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STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

PER

CALIFORNIA 2009-0009-DWQ

Amended by 2010-0014-DWQ and 2012-0006-DWQ

FOR

SANTA ANA AUTOMATION YARD

1325 S. Grand Avenue

Santa Ana, CA 92705

WDID# _____

SMARTS Application ID# 543537

Risk Level 2

Qualified SWPPP Developer (QSD)



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Preparation Date: November 2021

Estimated Construction Dates:

Start Date: 08/30/2021

Completion Date: 02/28/2022

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LIST OF ACRONYMS

AS - Approved Signatory
BAT - Best Available Technology Economically Achievable
BCT - Best Conventional Pollutant Control Technology
BMP - Best Management Practices
CFR - Code of Federal Regulations
CGP - NPDES General Permit for Storm Water Discharges Associated with Construction Activities
COC - Chain of Custody
CPESC - Certified Professional in Erosion and Sediment Control
CPSWQ - Certified Professional in Storm Water Quality
CWA - Clean Water Act
DWQ - Division of Water Quality
EPA - Environmental Protection Agency
FEA – Field Environmental Advisor
LRP - Legally Responsible Person
M&RP – Monitoring and Reporting Program
MRR - Monitoring and Reporting Requirements
MS4 - Municipal Separate Storm Sewer System
NAL - Numeric Action Level
NOAA - National Oceanic and Atmospheric Administration
NOI - Notice of Intent
NOT - Notice of Termination
NPDES - National Pollutant Discharge Elimination System
NRCS - Natural Resources Conservation Service
NTU - Nephelometric Turbidity Units
O&M - Operation and Maintenance
PRDs - Permit Registration Documents
QSD - Qualified SWPPP Developer
QSP - Qualified SWPPP Practitioner
REAP - Rain Event Action Plan
RUSLE - Revised Universal Soil Loss Equation
RW - Receiving Water
RWMT – Receiving Water Monitoring Trigger
RWQCB – Regional Water Quality Control Board – Los Angeles Region
SCE - Southern California Edison
SMARTS - Storm Water Multi Application Reporting and Tracking System
SSC – Suspended Sediment Concentration
SWPPP - Storm Water Pollution Prevention Plan
SWRCB – State Water Resources Control Board
TMDL - Total Maximum Daily Load
WDID - Waste Discharge Identification Number
WQO - Water Quality Objective

PROJECT INFORMATION

Project Name: Santa Ana Automation Yard
Project SWPPP Location: TBD Prior to Construction
Construction Duration: August 30, 2021 – February 28, 2022
Risk Level: 2
Standard Business Hours: 0600 – 1530, Monday through Friday Note: standard business hours may change due to environmental issues, construction crew changes, scheduling issues, etc.

Southern California Edison (SCE) shall ensure that the Project SWPPP is available at the location indicated above for the duration of construction. Should the Project SWPPP location change, this page shall be updated by the Qualified SWPPP Practitioner (QSP) to reflect the SWPPP's current location.

EMERGENCY CONTACT INFORMATION

For this Project, the SCE Crews have been identified, by SCE, as the primary spill clean-up responder, as well as for other waste discharge incidents. In the event of an emergency (e.g., environmental emergencies, hazardous waste release, etc.), the notifications shall be performed using the following information:

1. **Project QSP – Lucy Cortez-Johnson:** 714-794-7805
2. **Construction Site Representative:** TBD
3. **844-GOT-SPIL (Dispatch 24 hr. Contact):** (844) 468-7745

In the event of a hazardous spill at the Project Site:

Within the first hour of the incident, the person or entity causing or discovering the incident shall contact the Project QSP, Lucy Cortez-Johnson, the SCE Construction Site Representative and **844-GOT-SPIL** to notify the on-call Field Environmental Specialist.

Every reasonable effort to immediately contain and clean up hazardous materials releases shall be made. Once the spill has been cleaned up, within one (1) business day, an Incident and Evaluation Report shall be submitted to SCE's ESD at GOTSPILL@sce.com.

Refer to **Section 3.3.3.** for additional Spill Response procedures.

SECTION 1 SWPPP REQUIREMENTS

1.1 Introduction

The Santa Ana Automation Yard (Project) was eligible for the Construction Rainfall Erosivity Waiver and a WDID 8 30W004971 was issued by the Board. Due to delays in construction, the Project's start and end dates have been pushed back and the Project is no longer eligible per the requirements of the Waiver. Therefore, the Project has prepared a SWPPP and filed an NOI in SMARTS.

This SWPPP is written for a project with coverage under **STATE WATER RESOURCES CONTROL BOARD (SWRCB) ORDER NO. 2009-0009-DWQ as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ; GENERAL PERMIT NO. CAS000002** as a Risk Level 2 Project. (See risk assessment analysis in Appendix B).

SCE shall ensure that this SWPPP is developed and amended or revised by a Qualified SWPPP Developer (QSD). This SWPPP is designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled.
2. Where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit, all non-storm water discharges are identified and either eliminated, controlled, or treated.
3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the Best Available Technology Economically Available (BAT)/Best Conventional Pollutant Control Technology (BCT) standard.
4. Calculations and design details as well as BMP controls for site run-on are complete and correct.
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed.
6. Identify post-construction BMPs which are those measures to be installed during construction that are intended to reduce or eliminate pollutants after construction is completed (post-construction BMPs are required for all sites by Section XIII.B).

1.2 Certification by Qualified SWPPP Developer

This SWPPP was developed by a Qualified SWPPP Developer (QSD):

CASC Engineering and Consulting
Joyce Goode
18 Technology Drive, Suite 135
Irvine, CA 92618
(909) 557-0276
Qualifications*: CPESC #8448, QSD #25905



Date: November 8, 2021

QSD Signature:

Print QSD Name: Joyce Goode

QSD Title: QSD, CPESC

* Documentation of Qualification is located in Appendix A.

1.2.1 Permit Registration Documents (PRDs)

To obtain coverage under the General Permit, dischargers are required to electronically file PRDs which include a Notice of Intent (NOI), Risk Assessment, Site Map, Storm Water Pollution Prevention Plan, and Signed Certification Statement. In addition to electronically filed PRDs, the appropriate Annual permit fees shall be mailed to the SWRCB.

PRDs have been submitted to the SWRCB via the Storm water Multiple Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP) or Approved Signatory (AS). Refer to Appendix B for a copy of the Project PRDs and Waste Discharge Identification (WDID) confirmation.

1.3 SWPPP Availability and Implementation

The General Permit (Section XIV.C) requires the SWPPP be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawings will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone. The SWPPP shall be implemented concurrently with the start of ground disturbing activities.

1.4 SWPPP Amendments

The General Permit (Section VII.B.6) requires that this SWPPP be modified and amended to reflect any changes in construction or operations that may affect the discharge of pollutants from the construction site to surface waters, ground waters, or the municipal separate storm sewer system (MS4). The SWPPP will also be amended if it is in violation of any condition of the Permit. The QSP shall notify the SCE Storm Water Specialist and QSD if an amendment to this SWPPP is required. SWPPP Amendments will be dated, signed by the QSD, and directly attached to the SWPPP. Refer to Appendix C, for SWPPP Amendment Documents.

The SWPPP must be revised or modified:

- To reflect modifications to storm water control measures made in response to a change in design, construction, operation, or maintenance at the construction site that has or could have a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPPP.
- If during inspections or investigations by site staff, or by local, state, tribal or federal officials, it is determined that the existing storm water controls are ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.
- Based on the results of an inspection, as necessary to properly document additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP must be completed within 30 days.

Amendments shall be logged at the front of the SWPPP with amendment documentation and certifications kept in Appendix C. The SWPPP text shall be revised replaced, and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be made by a QSD. All changes indicated in Table 1-1 below have been designated by the QSD as "to be field determined" and constitute minor changes that the QSP may implement based on field conditions.

Table 1-1 List of Changes to be Field Determined by QSP:

Candidate Changes for field location or determination by QSP ⁽¹⁾	Indicates Changes that may be field located or field determined by QSP
Increase quantity of Erosion or Sediment Control Measures	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate/Add stockpiles or stored materials	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate/Add toilets – Shall include a containment tray	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate vehicle storage and/or fueling locations	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate concrete waste management facilities	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate areas for waste storage	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relocate water storage and/or water transfer location	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Changes to access points (entrance/exits)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Change type of Erosion or Sediment Control Measures – Changes may only include BMPs indicated within Section 3.1 of this SWPPP	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Changes to location of Erosion or Sediment Control Measures	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Minor changes to schedule or phases	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Changes in construction materials	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<i>⁽¹⁾ Any field changes not identified for field location or field determination by QSP, or designated representative, must be approved by QSD.</i>	

1.5 Retention of Records

The General Permit (Sections I.J.66 and IV.G) requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. SCE shall furnish the RWQCB, SWRCB, or US Environmental Protection Agency (EPA), within a reasonable time, any requested information to determine compliance with this General Permit. All SWPPP related records shall be digitally scanned and retained for a minimum of three years.

1.6 Required Reporting

The General Permit (Section I.J.) identifies several areas of reporting. It is the responsibility of SCE to properly document potential reportable discharges or other deficiencies related to the General Permit. Exceedances and violations will be reported using the SMARTS system and include the following:

- Self-reporting of any other discharge violations or to comply with RWQCB enforcement actions;
- Any basin plan exceedances; and

- Discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR parts 110, 117.3 and 302.4, and those defined by California regulation or statute, unless a separate NPDES Permit has been issued to regulate those discharges.

If an illegal discharge occurs or if the project receives a written notice or order from any regulatory agency, the QSP will immediately notify the Field Environmental Advisor and SCE Storm Water Specialist, and will submit a written report, with photos, to the SCE Storm Water Specialist within 24 hours of the discharge event, notice, or order, and the LRP will file compliance documentation as required per the General Permit, to the RWQCB via SMARTs. Corrective measures will be implemented immediately following the discharge, notice, or order. The report will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order;
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order;
- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence; and
- An implementation and maintenance schedule for any affected BMPs.

1.7 Annual Report

SCE is responsible for preparing, certifying, and electronically submitting an Annual Report no later than September 1st of each year and prior to submitting a Notice of Termination (NOT). An Annual Report is required of projects that are enrolled for more than one continuous three-month period during the year. The QSP is responsible for preparing the Annual Report and uploading it to SMARTs for SCE review, approval and certification. Reporting requirements are identified in Section XVI of the General Permit and include providing a summary of the following:

1. A summary and evaluation of all sampling and analysis results, including copies of laboratory reports.
2. The analytical method(s), method report unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit").
3. A summary of all corrective actions taken during the compliance year.
4. Identification of any compliance activities or corrective actions that were not implemented.
5. A summary of all violations of the General Permit.
6. The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements.
7. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including any required precipitation (rain gauge) recordings.
8. Documentation of all training for individuals responsible for all activities associated with compliance with this General Permit.

9. Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair.
10. Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

1.8 Changes to Permit Coverage

The General Permit (Section II.C) includes provisions allowing the revision of total acreage covered by the General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to the General Permit, is added to the site.

Within 30 days of a reduction or increase in total disturbed acreage, SCE will electronically file revisions of PRDs that include a certified Change of Information (COI), revised Site Map, SWPPP revisions, as appropriate, and certification that new landowners have been notified of applicable requirements to obtain permit coverage (including name, address, phone number, and e-mail address of new landowner) in accordance with requirements of the General Permit. Refer to Appendix C for SWPPP Amendment changes, as well as the revised NOI.

1.9 Notice of Termination

Prior to submitting a Notice of Termination (NOT) an annual report must be submitted (see Section 1.7). Within 90 days of when construction is complete or ownership has been transferred, SCE shall electronically file an NOT, a final Site Map, and photos via SMARTS, to terminate coverage under the General Permit. Construction is considered complete only when all portions of the site have been transferred to a new owner, or all of the following conditions are met:

- The site will not pose any additional sediment discharge risk than it did prior to construction activity;
- There is no potential for construction-related storm water pollutants to be discharged into site runoff;
- Final stabilization has been achieved;
- All construction-related equipment, materials, temporary BMPs that are no longer needed, and wastes have been removed from the site and disposed of properly; and
- Post-construction storm water management measures are installed and a long-term maintenance plan has been developed.

Final Stabilization for the purposes of submitting an NOT is satisfied when all soil disturbing activities are completed and one of the following criteria is met:

- 70% final cover method (photos required; no computational proof required); or
- RUSLE/RUSLE2 method (computational proof required); or
- Custom method (discharger demonstrates that site complies with final stabilization).

The final stabilization methods and measures selected for this project are found in Section 3.6.

SECTION 2 PROJECT/SITE INFORMATION

2.1 Project Information

The Santa Ana Automation Yard (Project) is located at 1325 S. Grand Avenue in Orange County within an urban area in the City of Santa Ana. The Project has previously been developed and utilized as a corporation yard facility. Existing surfaces consist of AC paved areas, gravel, and exposed soil. The proposed use for the Project is to act as the material storage yard for SCE. To achieve this use, the Project plans propose to improve fencing layout and ground surfacing in specific areas, while preserving other existing areas of the yard. Development of the material storage yard will result in an increase in overall pervious surfacing from the previous development condition, thereby, potentially reducing runoff from the pre-development condition.

Project Information Summary

Project/Site Name: Santa Ana Automation Yard		
Project Street/Location: 1325 S. Grand Avenue		
Project Acreage: 1.0 acres		
City: Santa Ana	State: California	ZIP Code: 92705
County: Los Angeles		
Latitude: 33.730781	Longitude: -117.845806	Regional Board: Santa Ana (8)
WDID:		
Are storm water discharges from the Site subject to post construction MS4 requirements? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If so, are post construction MS4 requirements addressed in this SWPPP <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Description: This project does not meet the criteria for a Priority Development Project and is not required to develop a WQMP. The Project proposes to reduce impervious area by 5%, thereby potentially improving water quality.		
Previous Land Use: Commercial land use		
Proposed Land Use: Commercial land use		
Existing Site Impervious Area: 25% Proposed Site Impervious Area: 20%		
Existing Site Pervious Area: 75% Proposed Site Pervious Area: 80%		
Are there any known contaminants on site from previous land uses or operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Description: N/A		

This site is within a municipal jurisdiction that has a Standard Urban Storm Water Mitigation Plan (SUSMP) Program or Water Quality Management Plan (WQMP) Program or local equivalent.

☒ Yes ☐ No

If answering "NO" then Post Construction Run Off requirements are located in: N/A

Receiving Water Information: Peters Canyon Channel to Newport Bay

Does this project discharge to a water body listed as impaired due to:

Sedimentation/Siltation or Turbidity pursuant to Clean Water Act, Section ☒ Yes ☐ No

Does the site drain into a water body with a sediment-related TMDL? ☒ Yes ☐ No

Does the disturbed area discharge to a water body with designated beneficial uses of SPAWN & COLD & MIGRATORY? ☐ Yes ☒ No

Project is located in the Newport Bay, Upper Watershed which is listed on the 303(d) list as impaired for Sedimentation/Siltation. All storm water ultimately drains to the Pacific Ocean.

2.1.1 Project Site Information and Construction Activities

Construction activities for the Project will be performed in 2 phases as described below:

SOIL DISTURBING ACTIVITIES

The Project will consist of the following construction activities:

- Existing tree and brush removal, as necessary.
- Fencing installation and removal activities.
- Existing curb/wall and footing removal activities.
- Existing utility vaults removal and backfill activities.
- Minor grading and soil fill activities.
- Temporary stockpiling of materials and/or wastes.
- Vehicle and equipment maintenance operations, if necessary.
- Vehicle and equipment fueling operations, if necessary.
- Gravel and/or wood mulch surfacing activities.

2.1.2 Project Disturbance Area

The total estimated area of soil disturbance for the Project is approximately 1.0 acres based on the following area breakdown. It should be noted that surfacing activities do not cause disturbance of the soil beyond the grading activities and are, therefore, not added into the overall disturbance areas.

- Fence installation/ removal = 2,764 sf (0.1 ac)
- Grading and vault removal = 40,621 sf (0.9 ac)

2.1.3 Geological Conditions and Project Flows

The Project experiences approximately 12 to 18-inches of rainfall annually. The site is relatively flat and drains to the southeast where flows enter a concrete swale and are discharged from an under-walk drain located in the right-of-way of Lyon Street. This drainage pattern is planned to be maintained for the SCE yard and BMPs will be used to manage sediment from discharging the site at this location. Runoff from the Project vicinity discharges through the City's MS4 to the Peters Canyon Channel. Peters Canyon Channel and its tributaries flow into the San Diego Creek Reach 1 which ultimately discharge into the Upper Newport Bay.

The Project is in an environmentally sensitive area and the receiving waters are 303(d) listed for impairments due to sedimentation/siltation.

According to the Natural Resources Conservation Service (NRCS) Soils Groups Exhibits identifies site soil types as B soils. Group B soils are typically silt loams or loams. They have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep and moderately well to well drained soils with moderately fine to moderately to moderately coarse texture. The existing depth to water table ranged from 24ft to 35.5ft below the ground surface for this area.

2.1.4 Vicinity Map

Refer to Appendix B for the Project Vicinity Map.

2.2 Storm Water Run-On from Offsite Areas

The Project is located on an already developed site, with the surrounding roadways consisting of improved streets with established curb and gutters, as well as containing existing off-site storm drains owned by the City of Santa Ana. Flows from the Project will flow southeast toward Mission Road. No construction shall occur during precipitation events, and no run-on flows are anticipated in the construction area. However, if any run-on flows are encountered, they will be routed around the construction work areas through use of appropriate BMPs, which are listed in Section 3, and then allowed to continue along their existing path of travel.

2.3 Project Risk Assessment

A project's risk assessment (Table 2-1) is dependent on the project's location in proximity to receiving waters, impairments of the receiving waters, the timeline for construction activities, and site characteristics. Project risk level is determined from the following:

- Sediment Risk – the relative amount of sediment that can be discharged, given the above mentioned factors; a project's sediment risk level is determined from the Revised Universal Soil Loss Equation (RUSLE).
- Receiving Waters Risk – the risk that sediment discharges pose to a project's receiving waters; a project's receiving waters risk level is based on whether a project drains to a sediment-sensitive water body or sensitive habitat. A project that meets at least one of the three criteria listed below has a high receiving water risk:
 - A water body listed on the most recent CWA 303(d) list for waterbodies impaired for sediment; or

- A water body that has a USEPA-approved Total Maximum Daily Load (TMDL) implementation plan for sediment; or
- A water body that has the beneficial uses of COLD and SPAWN and MIGRATORY.

**Table 2-1
Risk Assessment**

Summary of Sediment Risk			
RUSLE Factor	Value	Method for establishing value	
R	29.95	EPA Rainfall Erosivity Factor Calculator	
K	0.32	SWRCB GIS Map Method	
LS	0.65	SWRCB GIS Map Method	
Total Predicted Sediment Loss in tons/acre (R x K x LS)		6.2296	
Overall Sediment Risk: <div style="float: right; text-align: right;"> <input checked="" type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High </div>			
<div style="margin-left: 20px;"> – Low Sediment Risk < 15 tons/ acre – Medium Sediment Risk >= 15 and < 75 tons/acre – High Sediment Risk >= 75 tons/acre </div>			
Summary of Receiving Water Risk			
Receiving Water Name:	303(d) Listed for Sediment Related Pollutant ⁽¹⁾	TMDL for Sediment Related Pollutant ⁽¹⁾	Beneficial Uses of COLD, SPAWN, and MIGRATORY ⁽¹⁾
Peters Canyon Channel	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
San Diego Creek Reach 1	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Newport Bay, Upper	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Overall Receiving Water Risk			<input type="checkbox"/> Low <input checked="" type="checkbox"/> High

(1) If yes is selected for any option the Receiving Water Risk is High

2.3.1 Project Risk Level Determination

Based on the risk level assessment from Table 2-1 (above), the Project is a Risk Level 2 project as shown in Table 2-2. A copy of the Risk Level determination documentation is included in Appendix B.

Table 2-2
Risk Level Determination

Combined Risk Level Matrix		Sediment Risk		
		<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High
Receiving Water Risk	<input type="checkbox"/> Low	Level 1	Level 2	
	<input checked="" type="checkbox"/> High	Level 2		Level 3

2.4 Construction Schedule

A Project schedule has been developed and is provided in Appendix E. The Project schedule includes the following:

Estimated Project Start Date: August 30, 2021

Estimated Project Completion Date: February 28, 2022

If the project completion date will need to be extended beyond the original end date, the Project risk assessment will need to be recalculated at least 30 days prior to the original end date.

2.5 Potential Construction Site Pollutant Sources

SCE will utilize the control practices identified for each activity that are identified in Section 3 and on the Site Map to minimize or eliminate potential pollutants from discharging from the construction site. The following sections identify potential pollutant sources associated with the Project.

Appendix H includes a copy of the fact sheets of all the BMPs selected for this Project. Implementation and location of BMPs are shown on the Site Map in Appendix B. Narrative descriptions of BMPs which will be used during the overall Project are listed by category in Section 3 of this SWPPP.

2.5.1 Construction Activities

Table 2-3 provides a list of construction activities that may be performed which may have the potential to contribute pollutants in storm water discharges:

Table 2-3: Construction Activity and Associated Pollutants

Activity Type		Pollutant	Visually Observable
Soil Disturbance:			
<input checked="" type="checkbox"/>	Clear & Grub operations	Sediment and organics	Cloudy to opaque
<input checked="" type="checkbox"/>	Import/Export operations	Sediment	Cloudy to opaque
<input type="checkbox"/>	Grading operations - Rough	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Grading operations - Fine	Sediment	Cloudy to opaque
<input type="checkbox"/>	Grading operations - Slopes	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Landscape operations	Sediment	Cloudy to opaque
<input type="checkbox"/>	Pulling/Tensioning Operations	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Soil removal and recompaction	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Soil stockpiling	Sediment	Cloudy to opaque
<input type="checkbox"/>	Top soil removal and stockpiling	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Utility excavation	Sediment	Cloudy to opaque
<input checked="" type="checkbox"/>	Vehicle tracking	Sediment	Cloudy to opaque
<input type="checkbox"/>	Wall/Fence Installation	Sediment	Cloudy to opaque
Asphalt:			
<input type="checkbox"/>	Street/Surface Construction	Hydrocarbons	Oily sheen
<input checked="" type="checkbox"/>	Street/Surface Improvement	Hydrocarbons	Oily sheen
<input checked="" type="checkbox"/>	Street/Surface Demolition	Hydrocarbons	Oily sheen
Concrete Laden Liquid:			
<input checked="" type="checkbox"/>	Curb & Gutter	pH	Cloudy to milky
<input checked="" type="checkbox"/>	Sidewalks	pH	Cloudy to milky
<input checked="" type="checkbox"/>	Foundations/Walls	pH	Cloudy to milky
<input checked="" type="checkbox"/>	Driveways (A/C)	pH	Cloudy to milky
<input checked="" type="checkbox"/>	Medians	pH	Cloudy to milky
<input type="checkbox"/>	Stuccoing	pH	Cloudy to milky
<input type="checkbox"/>	Grouting	pH	Cloudy to milky
<input checked="" type="checkbox"/>	Washouts/Clean up	pH	Cloudy to milky
General:			
<input type="checkbox"/>	Framing	Sawdust	Yes
<input checked="" type="checkbox"/>	Painting	Paint (when wet)	Yes
<input type="checkbox"/>	Dry Walling	Gypsum/Joint Compound	Yes
<input type="checkbox"/>	Tiling	Ceramic dust	Yes
<input type="checkbox"/>	Cabinet Building/Installing	Sawdust	Yes
<input checked="" type="checkbox"/>	Plumbing	PVC Glue (when wet)/Plastic	Yes
<input checked="" type="checkbox"/>	Wiring/Electrical Utilities	Copper/Plastic/Metals	Yes
<input type="checkbox"/>	Heating/Air Conditioning	Sheet metal/fiberglass wool	Yes
<input checked="" type="checkbox"/>	Landscaping	Containers/mulch/soil	Yes

2.5.2 Construction Materials

The following is a list of construction materials that may be used which may have the potential to contribute to pollutants in storm water discharges:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with AC paving operations
- Base and subbase material for asphalt paving
- Cement materials associated with PCC paving operations
- Concrete curing compounds
- Metals and plated products
- Base and Subbase materials
- Treated wood products (redwood header at pavement edges)
- Construction BMP Materials
- Post-construction BMP materials – underground chambers system
- Concrete materials
- Electrical equipment
- Water and sewer line materials and related appurtenances
- Fencing materials
- Gravel base
- Paints, solvents and curing compounds

2.5.3 Construction Wastes

The following is a list of solid or construction wastes that may be created which may have the potential to contribute to pollutants in storm water discharges:

- Packaging materials including wood, paper and plastic
- Asphalt and sub-base material waste
- Concrete wastes
- Electrical cuttings
- General litter
- Treated wood products
- Non-hazardous equipment and fencing parts
- Hazardous wastes

2.5.4 Construction Equipment

Table 2-4 provides a list of construction equipment that may be used during construction of this Project:

Table 2-4: Equipment used During Construction*

Equipment Type			
<input checked="" type="checkbox"/>	Backhoe loader(s)	<input checked="" type="checkbox"/>	Fork & Rough-terrain lifts (Pettibone)
<input checked="" type="checkbox"/>	Water truck(s)	<input checked="" type="checkbox"/>	Generator(s)
<input type="checkbox"/>	Scraper(s)	<input type="checkbox"/>	Concrete boom pumps
<input checked="" type="checkbox"/>	Loader(s)	<input type="checkbox"/>	Concrete pumps
<input type="checkbox"/>	Bulldozer(s)	<input type="checkbox"/>	Asphalt planer / grinder
<input checked="" type="checkbox"/>	Motor-grader	<input checked="" type="checkbox"/>	Asphalt paving machine
<input checked="" type="checkbox"/>	Excavator(s) / Track hoe(s)	<input checked="" type="checkbox"/>	Street striping equipment
<input type="checkbox"/>	Dump trucks (10-wheel)	<input type="checkbox"/>	Building material delivery trucks (MEER)
<input type="checkbox"/>	Belly/Bottom dumps (tractor/trailer)	<input checked="" type="checkbox"/>	Personal cars and light trucks
<input type="checkbox"/>	Tractor: skip loader	<input type="checkbox"/>	Waste hauling trucks
<input checked="" type="checkbox"/>	Skid steer loaders (Bobcat)	<input checked="" type="checkbox"/>	Trencher(s)
<input checked="" type="checkbox"/>	Concrete delivery trucks	<input type="checkbox"/>	Stucco/Plaster spray pumps
<input type="checkbox"/>	Portable concrete mixers	<input checked="" type="checkbox"/>	Spray paint equipment (airless)
<input checked="" type="checkbox"/>	Compaction equipment	<input type="checkbox"/>	Other

* QSP, or designated personnel, to update during construction activity

2.5.5 Other Pollutant Sources

Table 2-5 provides a list of other pollutant sources that may be used during construction of this Project:

Table 2-5: Potential Construction Site Pollutants

Yes	Material Type	Pollutant	Visually Observable	Typical Location
<input checked="" type="checkbox"/>	Diesel Fuel	Petroleum distillates, naphthalene, xylene	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Gasoline	Benzene, toluene, xylene, MTBE	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Hydraulic Oil	Mineral oil, trace additives	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Engine Oil	Mineral oil, additives, combustion byproducts	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Transmission Oil	Mineral oil, trace additives	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Engine Coolant	Ethylene and propylene glycol, heavy metals	Green/red	Staging area
<input checked="" type="checkbox"/>	Grease	Petroleum hydrocarbons	Sheen/Stain	Staging area
<input type="checkbox"/>	Kerosene	Petroleum hydrocarbons	Sheen/Stain	Staging area
<input checked="" type="checkbox"/>	Fertilizer	Nitrogen, phosphorus	No	Material storage area
<input type="checkbox"/>	Pesticide	Water-insoluble chlorinated hydrocarbons, organophosphates, carbonates, and pyrethrins.	Varies	Material storage area
<input type="checkbox"/>	Herbicide	Chlorinated hydrocarbons, organophosphates	Varies	Material storage area
<input checked="" type="checkbox"/>	Soil Amendments		No	Material storage area
<input checked="" type="checkbox"/>	Concrete (wet)	Fly ash, heavy metals, Portland cement	White solid	Streets & building pads
<input type="checkbox"/>	Concrete coring slurry	Turbidity and pH	Gray liquid	Building construction & streets
<input checked="" type="checkbox"/>	Concrete sawing slurry	Turbidity and pH	Gray liquid	Building construction & streets
<input checked="" type="checkbox"/>	Cement	Aluminum calcium iron oxide, calcium sulfate	Gray powder	Building construction & streets
<input type="checkbox"/>	Drywall joint compound	Pigment, vinyl acetate	White putty	Building construction
<input type="checkbox"/>	Grout	Silica sand, Portland cement	White powder	Block wall & Building construction
<input checked="" type="checkbox"/>	Paint	Ethylene glycol, titanium oxide, VOC	Colored liquid	Building construction
<input checked="" type="checkbox"/>	Sealers	Diacetone alcohol,		Building construction & Streets
<input checked="" type="checkbox"/>	Adhesives	COD/ Phenols/ SVOC	White/yellow	Building construction

Yes	Material Type	Pollutant	Visually Observable	Typical Location
<input checked="" type="checkbox"/>	Sanitary waste	Bacteria, Ammonia, Nutrients	Yes	Staging areas & all construction areas
<input checked="" type="checkbox"/>	Animal waste	Bacteria, Ammonia, Nutrients	Yes	All areas
<input checked="" type="checkbox"/>	Asphalt	Asphalt fumes, cutback asphalt, emulsions	Black material	Streets/surfacing
<input checked="" type="checkbox"/>	Curing Compounds	Glass Oxide, urea-extended phenol	Creamy white	Building construction & Streets
<input checked="" type="checkbox"/>	Waste wash water	Residuals and modifications to pH	Suds, foam, froth	All areas
<input checked="" type="checkbox"/>	Wood Preservatives	Arsenic, Chromium (Total), Copper, and Zinc	Amber liquid	Building construction
<input checked="" type="checkbox"/>	Cleaning Solvents	Perchloroethylene, methylene chloride, TCE	Varies	Staging areas
<input checked="" type="checkbox"/>	Sediment	Soil, turbidity, dust	Muddy	All areas
<input type="checkbox"/>	Vegetation	Organic matter	Yes	All areas
<input checked="" type="checkbox"/>	Solid Waste	Floatable and blowable trash and debris	Yes	All areas
<input type="checkbox"/>	Tile		Yes	Building construction & material storage areas
<input type="checkbox"/>	Historic land use contaminants (if applicable)		NA	

2.6 Identification of Non-Storm Water Discharges

All efforts are to be made to minimize non-storm water discharges. Onsite inspections will include observations for non-storm water discharges. Activities that may result in discharges will be monitored and controlled as needed.

2.6.1 Authorized Non-Storm Water Discharges

Authorized non-storm water discharges include those from de-chlorinated potable water sources, such as:

- fire hydrant flushing, pipe flushing and testing,
- irrigation of vegetative erosion control measures
- water to control dust– water source to be determined prior to earth disturbing activities
- uncontaminated ground water from dewatering activities

The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of the CGP;
3. The discharge is not prohibited by the applicable Basin Plan;
4. SCE has included and implemented specific BMPs required by this CGP to prevent or reduce the contact of the non-storm water discharge with construction materials and equipment;
5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities or pollutants; and
6. The discharge is reported in the Annual Report.

2.6.2 Anticipated Non-Storm Water Discharges and Controls

Fire Hydrant Flushing

In the event there is a need to flush the fire hydrant the contractor personnel performing the operation will ascertain from the owner, contractor of the water line (if different), or fire department that there are no chemicals or other pollutants contained in the water. The flushed water will be diverted away from disturbed soils and into the storm drain system via a paved surface or lined channel so that erosion, scour and sediment laden discharges will be avoided. Contractor will place check dams in any existing or proposed drainage swales to slow the velocity of the discharge. Contractor will verify that velocity dissipaters are installed, maintained and functioning prior to the discharge. Contractor will monitor discharged water and cease operations in the event sediment or other pollutants are being discharged as a result of the fire hydrant flushing.

Waters to Control Dust

Dust control will be implemented when wind exceeds 15 MPH or when there is visible dust generated from the site via a small diameter (3/4" to 1") fire or garden hose or with a water truck depending on the area being serviced. Water to be used for dust suppression shall be non-chlorinated. All efforts will be made not to over-apply the water spray to avoid any surface run off. In the event there is surface run off it will be controlled with the use of appropriate perimeter BMPs. Any discharges from the property will be observed and operations ceased if levels of sediment in the discharge pose a negative impact [define how this is determined (i.e. visually)] on the drainage system or receiving waters.

Any changes in construction that will produce other allowable non storm water discharges will be identified to the QSD. The SWPPP will be amended and the appropriate erosion and sediment controls will be implemented.

Compliance with the CGP does not relieve the Project of other potentially applicable discharge requirements of various other plan requirements, such as but not limited to, the Basin Plan, or adopted TMDL allocations.

SECTION 3 BEST MANAGEMENT PRACTICES

3.1 BMP Implementation Schedule

Table 3-1 below provides a list of BMPs proposed for use on this Project. SCE will be responsible for installing and maintaining BMPs throughout the duration of this Project. The QSP will inspect BMPs and provide recommendations for BMP installation and maintenance. Copies of BMP fact sheets specific to this project are located in Appendix H of this SWPPP.

Table 3-1: Proposed BMPs and Implementation Schedule

BMP Description	<u>Estimated Timeline of Activity</u>	
	Estimated Project Start Date: August 2021 Estimated Project Completion Date: February 2022	
EC-1 Scheduling	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
EC-2 Preservation of Existing Vegetation	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
EC-5 Soil Binders	<input checked="" type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
EC-7 Geotextiles and Mats	<input checked="" type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
EC-8 Wood Mulching	<input type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
EC-16 Non-Vegetative Stabilization	<input type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-1 Material Delivery and Storage	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-2 Material Use	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-3 Stockpile Management	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-4 Spill Prevention and Control	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization

BMP Description	<u>Estimated Timeline of Activity</u>	
	Estimated Project Start Date: August 2021	
	Estimated Project Completion Date: February 2022	
WM-5 Solid Waste Management	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-6 Hazardous Waste Management	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-8 Concrete Waste Management	<input type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-9 Sanitary/Septic Waste Management	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WM-10 Liquid Waste Management	<input type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
NS-1 Water Conservation Practices	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
NS-3 Paving and Grinding Operations	<input type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
NS-6 Illicit Connection/Discharge	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
NS-9 Vehicle and Equipment Fueling	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
NS-10 Vehicle and Equipment Maintenance	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
NS-12 Concrete Curing	<input type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
NS-13 Concrete Finishing	<input type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
SE-1 Silt Fence	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization

BMP Description	<u>Estimated Timeline of Activity</u>	
	Estimated Project Start Date: August 2021	
	Estimated Project Completion Date: February 2022	
SE-4 Check Dams	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
SE-5 Fiber Rolls	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
SE-6 Gravel Bag Berm	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
SE-7 Street Sweeping and Vacuuming	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
SE-8 Sandbag Barrier	<input type="checkbox"/> Grading and Land Development <input type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input type="checkbox"/> Final Landscaping and Stabilization
SE-10 Storm Drain Inlet Protection	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
TC-1 Stabilized Construction Entrance/Exit	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization
WE-1 Wind Erosion Control	<input checked="" type="checkbox"/> Grading and Land Development <input checked="" type="checkbox"/> Vertical Construction Site	<input checked="" type="checkbox"/> Streets and Utilities <input checked="" type="checkbox"/> Final Landscaping and Stabilization

Copies of BMP fact sheets specific to this project are located in Appendix H. The following good housekeeping measures should be implemented on-site for the duration of the project:

1. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions.
2. Cover and berm loose stockpiled construction materials that are not actively being used (inactive). Inactive is defined as "construction areas of activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days."
3. Store chemicals in water tight containers with appropriate containment trays to prevent any spillage and leakage in a completely enclosed storage shed. Implement WM-2.
4. Minimize exposure of construction materials to precipitation.
5. Implement BMPs to prevent off-site tracking of loose construction materials.

6. Prevent the disposal of rinse or wash waters or materials on impervious site surfaces or into the storm drain.
7. Ensure the containment of sanitary facilities to prevent discharges of pollutants to the storm water drainage system or receiving water.
8. Regularly inspect sanitation facilities and clean or replace them as needed.
9. Cover waste disposal containers at the end of every business day and during rain events.
10. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.
11. Contain and securely protect stockpiled waste materials from wind and rain at all times unless actively being used.
12. Implement procedures to effectively address hazardous and non-hazardous spills.
13. Maintain equipment and materials for clean-up of spills on-site. Contain leaks and clean up spills immediately. Properly dispose of all spilled materials.
14. Prevent oil, grease, or fuel from leaking into the ground storm drains or surface waters.
15. Conduct on the spot cleanup of all leaked material and dispose of properly.
16. Contain stockpiled materials including wood mulches when they are inactive.
17. Implement measures to control all non-storm water discharges during construction.
18. Vehicle washing off-site only. Prevent non-storm water discharges from vehicle washing from reaching surface waters or the MS4 drainage system.
19. Prevent un-authorized non-storm water discharges from reaching surface waters or the MS4 drainage system when cleaning streets.
20. Implement effective wind erosion control BMPs.
21. Provide soil cover for areas of construction that have been disturbed and are not scheduled to be re-disturbed for at least 14 days and for all finished slopes, open space, utility backfill, and completed lots.
22. Concrete washouts are to be above ground concrete washouts and are to be maintained upon reaching 75% of capacity. In-ground, Visqueen-lined washouts are prohibited.
23. Limit the use of plastic materials when more sustainable environmentally friendly alternatives exist.
24. Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to control erosion and sediment discharges from the site.
25. Conduct storm water tailgate meetings with the workforce prior to commencement of any work. All new members of the workforce shall be trained prior to commencing with work.

3.2 Housekeeping

3.2.1 Construction Materials

An inventory of construction materials and activities is provided in Sections 2.5.1 and 2.5.2, respectively. Implementation and locations of some material handling control BMPs are shown on the Site Maps in Appendix B.

The BMPs that have been selected to handle material controls on the construction site areas are:

- **WM-1 – Material Delivery and Storage and WM-2 – Material Use**

The Project will utilize the laydown yard area, located near the southeast boundary of the site, for material storage and usage locations. All material for this Project will be delivered from off-site locations directly to the laydown yard area where it will be utilized to properly store construction materials and wastes with proper containment. Locations within the laydown yard area will be shown on the SWPPP site map and updated by the QSP as construction progresses. In general, this BMP will be implemented to help prevent discharges of construction materials during use. SCE will utilize stabilized areas, as necessary, to prevent potential spills and unnecessary tracking of sediment. Spill clean-up materials, material safety data sheets, material inventory, and emergency contact numbers will be maintained and stored at the substation by SCE.

- **WM-3 – Stockpile Management**

This Project will utilize the laydown yard area as the primary location for stockpiles. The QSP, or designated personnel, shall update the Site Maps in Appendix B to show stockpile locations, and ensure the following.

- Stockpiles shall be located a minimum of 50 feet away from any natural drainage courses and shall be for temporary use only.
- Stockpiles require proper wind erosion control. See WE-1-Wind Erosion Control for specifics of this BMP.
- Stockpiles shall be effectively covered prior to the onset of precipitation and when inactive¹, or planned to be inactive.

3.2.2 Waste Management Controls

An inventory of construction wastes is provided in Section 2.5.3. Implementation and field locations of waste management control BMPs shall be shown on the Site Maps in Appendix B. The BMPs that have been selected to handle materials and control construction wastes are:

- **WM-5 – Solid Waste Management**

SCE shall implement this BMP whenever wastes are generated, stockpiled, or removed from the Project. Implementation of this BMP will minimize or eliminate the discharge of pollutants to the storm drain systems or watercourses. In the event receptacle bins are relocated or

¹ Per Attachment A. J. 4, b. (page 24), inactive is defined as “construction areas of activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.”

additional bins are added, the Field QSP, or designated personnel, shall update the Site Maps to show respective locations.

This BMP will be implemented to minimize storm water contact with waste materials and prevent waste discharges. Waste containers shall be equipped with functional lids and covered at the end of every business day and during rain events. Solid waste, including rubble stockpiles, will be removed and disposed of at appropriate offsite facilities weekly.

- **WM-6 – Hazardous Waste Management**

SCE shall implement this BMP to prevent or reduce the discharge of hazardous materials to storm water or watercourses. SCE shall place hazardous materials in a non-permeable, waterproof spill containment bin and provide training of employees and subcontractors.

- **WM-8 – Concrete Waste Management**

SCE will utilize dedicated liquid-tight cement washout stations that will be monitored by the QSP, or delegated representative. All dedicated above ground cement washouts will be located in the laydown yard area and shall be replaced prior to or when their capacity reaches 75%. Washouts will be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations and placed a minimum of 50 feet from water courses. Concrete washouts will utilize a 10 mil plastic liner to prevent discharge to the underlying ground or surrounding areas, in accordance with the CASQA BMP Fact Sheet guidelines. A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facility.

- **WM-9 – Sanitary/Septic Waste Management**

SCE shall minimize or eliminate the discharge of construction sanitary/septic wastes. This BMP is applicable to temporary and portable sanitary/septic systems in the construction site area. Portable toilets will be located on the laydown yard area and shall have containment trays to prevent spillage of waste during use or servicing activities. However, should the location change, or if additional portable toilets are necessary, the QSP shall update the Site Maps.

Weekly maintenance, and maintenance within 24 hours after rain events, shall be provided and wastes will be properly disposed of at appropriate offsite facilities. The Field QSP will instruct the contractor on the placement of the toilets, which are required to be located a minimum of 50 feet away from traffic flow and any concentrated flow path that may be present onsite during construction operations.

- **WM-10 – Liquid Waste Management**

SCE may generate waste from construction activities such as pavement saw cutting and resurfacing operations. SCE shall contain wastes and slurry by utilizing the vacuum system during saw-cutting operations. In addition, SCE shall place sediment controls (i.e. Sand bags SE-8) around the down slope perimeter of the saw-cutting operations, and around nearby inlets/catch basins during these operations. Sand Bags shall be used onsite as a secondary means for containment of saw cutting slurry waste. After the liquid drains or evaporates, SCE shall vacuum the slurry residue from the pavement or gutter and properly dispose of in the Project's temporary concrete waste wash-out stations per WM-8.

3.2.3 Vehicle Storage and Maintenance Controls

An inventory of construction activities is provided in Section 2.5.1. Implementation and locations of vehicle storage and maintenance control BMPs will be field located and Site Maps updated by the QSP, or designated personnel, to show their respective locations. The BMPs that have been selected to handle vehicle storage and maintenance for the Project are:

- **NS-9 – Vehicle and Equipment Fueling**

All vehicle and equipment fueling shall be performed off-site, with this BMP being utilized to manage mobile fueling activities which may occur at the laydown yard, if needed. Fuel trucks, each equipped with absorbent spill clean-up materials, will be used for any mobile on the Project. All mobile fueling operations will be conducted at least 50 feet away from drainage courses and on a level graded area. Drip pans will be used for all mobile fueling.

- **NS-10 – Vehicle and Equipment Maintenance, and Storage**

Several types of vehicles and equipment will be used throughout the Project. This BMP will be utilized to prevent discharges of vehicle fluids during maintenance activities.

Construction vehicles and equipment will be serviced, if needed, and stored at the laydown yard. However, if locations change, the QSP shall update the Site Map to reflect current locations. All vehicle storage and maintenance will be conducted at least 50 ft. away from any inlets and drainage facilities and on a level graded area. SCE will place drip pans, plastic sheeting, or absorbent material under vehicles and equipment while parked overnight, in storage, and when requiring maintenance activities that involve grease, oil, solvents, or other vehicle fluids.

Note: SCE will also place drip pans, plastic sheeting, or absorbent material under stationary equipment (e.g. generators) to ensure no discharge of equipment fluids, when in use or in storage

3.2.4 Landscape Materials

No landscape materials are planned for use on this Project. If it is determined that landscape materials are needed, the QSD shall be notified and the SWPPP shall be amended to address the additional construction activities and materials.

3.3 Non-Storm Water Management

3.3.1 Non-Storm Water Controls

An inventory of construction activities and potential non-storm water discharges is provided in Sections 2.5 and 2.6. Implementation and locations of some non-storm water control BMPs are shown on the Site Maps in Appendix B. The BMPs that have been selected to control non-storm water pollution for the Project are:

- **NS-1 – Water Conservation Practices**

SCE shall use water in a manner, which will not cause erosion or transport pollutants off-site. Water application rates will be minimized as necessary to prevent runoff and ponding and water equipment leaks will be repaired immediately.

- **NS-3 – Paving and Grinding Operations**

SCE will implement controls during asphalt paving operations. This BMP will be implemented to prevent paving materials from being discharged off-site by scheduling activities, containing material and utilizing properly trained crews. Following paving operations, disposal of pavement material shall be per WM-8.

- **NS-6 – Illicit Connection/Discharge**

SCE shall use this BMP on all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered, or illegally dumped material is found on the construction site. The QSP shall be notified if an illicit connection and/or discharge is identified. Additionally, see Section 6.1.2 for a list of the QSP's responsibilities.

- **NS-12 – Concrete Curing**

Discharges of storm water and non-storm water exposed to concrete curing may have a high pH and may contain chemicals, metals, and fines. SCE will employ proper procedures, pursuant to BMPs NS-12, to reduce or eliminate the contamination of storm water runoff during concrete curing operations.

- **NS-13 – Concrete Finishing**

Discharges of storm water and non-storm water exposed to finishing operations may have a high pH and may contain chemicals, metals, and fines. SCE will employ proper procedures, pursuant to BMP NS-13, to reduce or eliminate the contamination of storm water runoff during concrete finishing operations.

3.3.2 Vehicle and Equipment Cleaning

Vehicle and equipment cleaning operations are not planned on this Project. Use of vehicle wash water will be prohibited onsite to prevent non-storm water discharges from entering natural watercourses.

3.3.3 Spill Response

The following BMP has been selected to be implemented to control and prevent spills and clean up any spills at the construction site:

- **WM-4 – Spill Prevention and Control**

SCE shall implement this BMP when chemical and/or hazardous substances are used or stored onsite, to control, clean up, and prevent spills and discharges to storm drain systems. SCE will ensure that spill response personnel are assigned and trained. Spills of oil, petroleum products, and substances listed under 40 CFR parts 110, 117.3, and 302.4, those defined by California regulation or statute, and sanitary and septic wastes shall be contained and cleaned up immediately.

SCE shall maintain equipment and spill clean-up materials onsite. Available equipment and spill clean-up materials include, but not limited to shovels, brooms, spill absorbent, rags, and proper waste containment (i.e. non-permeable, waterproof spill containment bin). Waste materials shall be labeled and disposed of properly in accordance with local, state, and federal requirements. SCE shall maintain Project-specific material safety data sheets, material inventory, and emergency contact numbers onsite.

Note: For this Project, the **SCE Crews** have been identified, by SCE, as the primary spill clean-up responder, as well as for other waste discharge incidents. In the event of an emergency (e.g.

environmental emergencies, hazardous waste release, etc.), the notifications shall be performed using the following information:

1. **Project QSP – Lucy Cortez-Johnson:** **714-794-7805**
2. **Construction Site Representative:** **TBD**
3. **844-GOT-SPIL (Dispatch 24 hr. Contact):** **(844) 468-7745**

In the event of a hazardous spill at the Project Site:

Within the first hour of the incident, the person or entity causing or discovering the incident shall contact the Project QSP Lucy Cortez-Johnson, the SCE Construction Site Representative and **(844) GOT-SPIL** to notify the on-call Field Environmental Specialist.

Every reasonable effort to immediately contain and clean up hazardous materials releases shall be made. Once the spill has been cleaned up, within one (1) business day, an Incident and Evaluation Report shall be submitted to SCE's ESD at GOTSPILL@sce.com.

3.4 Erosion Controls

Erosion control consists of source control measures that are designed to prevent soil particles from detaching and becoming suspended in storm water runoff. This Project will incorporate, at a minimum, temporary erosion control measures required by the CGP, and other measures selected by SCE. See Section 3.6 for permanent stabilization measures.

- **EC-1 – Scheduling**

Scheduling is an erosion control BMP that consists of the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. 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.

- **EC-2 – Preservation of Existing Vegetation**

The construction work area was previously graded for development. Existing surfaces consist of AC pavement, gravel, and exposed soils. SCE shall limit work areas to only those specified in the contract and/or agreements to protect and preserve any existing vegetation that may exist adjacent to the access roadways or construction work areas.

Implementation and locations of temporary erosion control BMPs are shown on the Site Maps in Appendix B and described in this section. The BMPs that will be implemented to control erosion for this Project are:

3.4.1 Wind Erosion Controls

Wind erosion control consists of applying water to prevent or minimize dust nuisance. This project will implement the following practices for effective wind erosion control:

- **WE-1: Wind Erosion Control**

SCE shall prevent dust nuisance generated from construction activities on the site by applying stabilizer/water on exposed soil surfaces. Whenever biological conditions prohibit use of a chemical stabilizer, water shall be used to on exposed soil surfaces.

The purpose of applying a stabilizer/water on exposed soil surfaces is to provide temporary stabilization from wind erosion and prevent dust. Wind erosion control should be applied to all disturbed areas where soil is exposed to wind, especially on access roads. Wind erosion control will be implemented in accordance to water conservation practices (see NS-1 found in Appendix H) as directed by the QSP.

Refer to Appendix H for the steps necessary to properly implement this BMP. Water trucks and/or a portable tank shall be made available to the field crews with an adequate supply of non-chlorinated water to be used as necessary to mitigate the generation of airborne dust particulates from the construction sites. Stabilizer/Water used for dust control will be applied in such a manner to minimize runoff from the site.

- **EC-5 – Soil Binder**

SCE may use a soil binder to temporarily prevent water or wind erosion of exposed soils or stockpiles. Binders may be used in the following locations:

- On disturbed soils prior to wind or rain events, if not stabilized the same day.

Note: The proposed binder to be used is Gorilla Snot, but must be formally approved by SCE prior to its implementation on the Project. Any binder or water used for dust control will be applied in such a manner to minimize runoff from the Project site.

3.5 Sediment Controls

Sediment controls are structural measures that are intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. This project will implement the following practices for effective sediment control:

- SCE shall 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 in accordance with the table below. **Based on the slopes proposed in the landscape areas, the face of slopes shall have linear barriers implemented at 15-foot spacing.** See Section 3.5.1.

Slope Percentage	Sheet flow length not to exceed
0 – 25%	20 feet
25 – 50%	15 feet
Over 50%	10 feet

- SCE shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment.
- SCE shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits are maintained and protected from activities that reduce their effectiveness.

- SCE shall inspect all immediate access roads. Upon observation of any tracking onto paved surfaces and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

Implementation and locations of temporary sediment control BMPs are shown on the Site Maps in Appendix B. The BMPs that will be implemented to control sediment for the Project are:

3.5.1 Linear Barriers/Perimeter Controls

Linear barriers for perimeter protection of construction areas will be applied throughout the Project. The installation of linear barriers will serve as sediment control for exposed soil areas. Linear barriers shall be maintained to provide adequate sediment holding capacity. Linear barriers will be placed across construction area's downstream perimeters, and when needed for run-on, across the upstream perimeter of the construction area. These upstream linear barriers will be placed to prevent sheet flow from running uninterrupted into areas of the Project under active construction. As construction progresses and these Linear Barrier/Perimeter Control BMPs are implemented, altered, removed, and/or no longer required, the Site Maps in Appendix B shall be updated by the QSP, or designated personnel.

As shown on the phased Site Maps in Appendix B, the following BMPs, or a combination thereof, have been selected to control sediment from discharging from the perimeter of active construction areas, ingress and egress locations, and into natural drainage systems outside of the construction areas:

- **SE-1 – Silt Fence**

The QSP, or designated personnel, may implement this BMP in lieu of, or in addition to SE-6 and SE-6, as a linear barrier BMP at the Project perimeter or laydown yard perimeter. Linear barriers are placed to prevent sheet flow from running uninterrupted into the laydown yard and active construction areas. If utilized, silt fence shall be placed with a setback of at least three feet from the toe of slope, and trenched in. Sediment shall be removed when it reaches approximately 1/3 of the barrier height. Barriers shall be removed from the site when no longer required, per the "Final Stabilization Phase" Site Map. The QSP, or designated personnel, shall update Site Maps to show usage locations.

- **SE-5 – Fiber Rolls**

The QSP, or designated personnel, may implement this BMP in lieu of, or in addition to SE-6 and SE-6, as a linear barrier BMP at the Project perimeter. Fiber rolls may be placed around disturbed soil area perimeters, down-slope of exposed soil areas, and on proposed landscaped area slope faces exceeding 15' in length. SCE shall place fiber rolls in locations to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from runoff, as shown on the Site Maps in Appendix B. The Field QSP, or designated personnel, shall update the Site Maps to show locations.

Pro-Wattle™ may be used in lieu of standard fiber roll material for all perimeter BMPs but must not be left in place after final stabilization activities. ***All fiber roll materials must made of biodegradable material, with burlap wrapping, and be properly installed per CASQA Type 1 or Caltrans Type 2.***

- **SE-6 – Gravel Bag Berm and SE-4 – Check Dams**

Gravel bags may be used to reduce runoff flow velocity and provide removal of sediment from runoff. The Field QSP, or designated personnel, shall update the Site Maps to show locations.

Note: For this Project, gravel bags shall be approximately 3-inches in thickness when filled, and shall be placed in a minimum of 2 rows with butt joints overlapping. When determined by the Field QSP to be needed for upcoming forecasted storm events of at least 0.5-inches of precipitation, an additional layer of bags may be overlapped to a maximum height of 12-inches.

The following BMPs have been selected to reduce sediment tracking from the construction site onto private or public roads:

- **SE-7 – Sediment Sweeping and Vacuuming**

- The Project mostly occurs adjacent to developed, public asphalt roadways. SCE will implement sweeping and vacuuming of S. Lyon St, at the ingress/egress access points, and any other areas, as needed to control sediment tracked onto public roads. This will limit the amount of sediment that may be transported to storm drains or watercourses.

3.5.2 Run-on – Run-off Controls

The following BMP has been selected to control run-on and runoff from discharging sediment onto and off of the construction site (Also see Section 3.5.1 for perimeter controls):

- **SE-8 – Sandbag Barrier**

SCE shall use this BMP to prevent slurry from saw cutting activities from discharging or entering the storm drain system. The QSP, or designated personnel, shall update the Site Maps to show implementation locations.

Note: For this Project, sandbag shall be placed in a minimum of 2 rows with butt joints overlapping to a maximum height of 12-inches.

- **SE-10 – Storm Drain Inlet Protection**

Existing inlets shown on S Raymond Ave and W Mission Dr will be protected, as necessary, from sediment using SE-5 or SE-6. Protection is only anticipated to be required during demolition, grading and land development activities. If the QSP determines that the inlet shall be protected during other activities of construction, the Site Maps shall be updated to reflect this BMP installation.

Storm drain inlet protection measures temporarily pond run-off before it enters the storm drain. SCE will remove this sediment periodically, and especially after heavy rains. Gravel bags, which become clogged with sediment, will be replaced as necessary to ensure the water will eventually pass through the gravel bag. Leave room upstream from barrier for water to pond and sediment to settle.

Existing inlets shall be covered and protected from grinding, sandblasting, and demolition operations. Any air-borne debris from these operations can settle into surrounding inlets. Therefore, these inlets shall be protected with gravel bags or with a plastic medium.

3.6 Final Stabilization Measures

The Project is located in urban areas with both hardscape surfaces and natural landscape areas. In hardscape areas, construction activities will include completion and/or redevelopment of the proposed warehouse and PCC/AC pavement areas to achieve final stabilization.

For construction areas involving proposed landscape areas, final stabilization will consist of the following:

70% Cover Method

In order to achieve the requirements of the 70% cover method, all natural ground areas in the project disturbance must be stabilized using the following methods.

- **EC-8 – Wood Mulch**
Wood mulch will be utilized in the Project area as a final stabilization method. SCE will implement a minimum 3-inch-thick layer of 1"-2" size wood bark over areas of exposed soil.
- **EC-16 – Non-Vegetative Stabilization**
Gravel base – Gravel base will be utilized in the Project area as a final stabilization method. SCE will implement a minimum 3-inch-thick layer of ¾ inch gravel rock surfacing over areas of exposed soil.

3.7 Post-Construction Storm Water Management Measures

The Project is located in the City of Santa Ana within Orange County. Orange County is a Phase 1 MS4 facility; therefore, this Project is not subject to run-off reduction requirements of the CGP. This Project is a non-priority project and is not required to develop a Water Quality Management Plan. Development of the material storage yard will result in an increase in overall pervious surfacing from the previous development condition, thereby, potentially reducing runoff from the pre-development condition.

SECTION 4 TRAINING

4.1 Training

Personnel at the site shall receive training appropriate for individual roles and responsibilities on the Project. Appropriate personnel shall receive training on SWPPP implementation, BMP inspection and maintenance, and record keeping.

The training log showing formal and informal training of various personnel is provided in Appendix F. This form shall be used by the QSP to document informal training of onsite personnel, including subcontractor's supervisors, project foremen, laborers, or other staff members.

SECTION 5 RESPONSIBLE PARTIES AND OPERATORS

5.1 Responsible Parties

The following sections provide a description of authorized representatives that have been approved by the LRP to be responsible for SWPPP activities and have been granted authority to sign permit related documents. Refer to Appendix A – Responsible Parties, for information on written authorizations.

5.1.1 Qualified SWPPP Developer (QSD)

The SWPPP shall be written, amended, and certified by a Qualified SWPPP Developer. The QSD shall meet the qualifications as specified by section VII.B.1 of the General Permit. Refer to Appendix I for the General Permit.

The Qualified SWPPP Developer that prepared this SWPPP was:

Joyce Goode
CPESC #8448, QSD #25905
Environmental Analyst II
(909) 557-0276

5.1.2 SCE Storm Water Specialist

The General Permit requires that the personnel assigned to conduct inspections and monitoring is knowledgeable in the principles and practice of erosion and sediment controls. Assigned personnel shall possess the skills to assess the effectiveness of measures selected to control the quality of storm water discharges from the construction activity.

The SCE Storm Water Specialist assigned to the Project is:

Lucy Cortez-Johnson
CPESC No. 7481, QSD/P No. 24500
Southern California Edison
(714) 794-7805

The SCE Storm Water Specialist is SCE the staff member that is responsible for ensuring full compliance with the SWPPP and the Permit, cost control and compliance concerns, and the elimination of all unauthorized discharges. The SCE Storm Water Specialist will be available at all times throughout the duration of the Project.

5.1.3 Qualified SWPPP Practitioner (QSP)

The General Permit requires that the personnel assigned to conduct inspections and monitoring is knowledgeable in the principles and practice of erosion and sediment controls. Assigned personnel shall possess the skills to assess the effectiveness of measures selected to control the quality of storm water discharges from the construction activity.

The Qualified SWPPP Practitioner (QSP) assigned to the Project is:

Kate Norgard
CESSWI, QSP No. 24367

Environmental Analyst
(949) 275-8405

The QSP is responsible for non-storm water and storm water 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. The QSP will be available at all times throughout the duration of the Project. Duties of QSP include but are not limited to:

- Implementing all elements of the SWPPP, including but not limited to:
 - Implementation of prompt and effective erosion and sediment control measures
 - Implementing all non-storm water management, and materials and waste management activities such as monitoring discharges (dewatering, diversion devices)
 - General site clean-up
 - Vehicle and equipment cleaning, fueling and maintenance
 - Spill control
 - Ensuring that no materials other than storm water are discharged in quantities that will have an adverse effect on receiving waters or storm drain systems, etc.
- Weekly inspections
- Pre-storm inspections
- Post-storm inspections
- Storm event inspections
- Quarterly for non-storm water discharges
- Retaining documentation necessary for the preparation of the annual report
- Ensuring elimination of all unauthorized discharges
- Coordinate with the SCE Project Manager to assure all of the necessary corrections/repairs are made upon identification of deficiencies, and that the Project complies with the SWPPP, the Permit and approved plans at all times
- Submitting Notices of Discharge and reports of Illicit Connections or Illegal Discharges

5.1.4 Contractors List

All Contractors and Subcontractors will be notified of the requirement for storm water management measures during the Project's tailboard training prior to the commencement of work. A list of contractors, subcontractors, and other individuals directed by the SCE Storm Water Specialist will be maintained and included in Appendix G of this SWPPP. If Subcontractors change during the Project, the list will be updated accordingly.

SECTION 6 CONSTRUCTION SITE MONITORING PROGRAM (CSMP)

This CSMP is a guide for the QSP, or other designated personnel supervised by the QSP, for monitoring and sampling procedures and instructions. The QSP is to determine whether BMPs included in the SWPPP are effective, if immediate actions are needed and/or SWPPP revisions are necessary to reduce pollutants in storm water and authorized non-storm water discharges. Any revisions to SWPPP will be made by the QSD.

6.1 Objectives and Implementation Schedule

SCE has prepared this CSMP prior to the start of the construction project, so that it shall be implemented immediately upon the start of construction. The CSMP shall be implemented to protect water quality at all times throughout the life of the project.

The CSMP shall be revised when:

- Site conditions or construction activities change such that a change in monitoring is required to comply with the requirements and intent of this General Permit; or
- The RWQCB requires SCE to revise its CSMP based on its review of the document. Revisions may include, but not limited to, conducting additional site inspections, submitting reports, and certifications. Revisions shall be submitted via postal mail or electronic e-mail.

6.2 Monitoring and Reporting Requirements

Table 6-1: Summary of Monitoring Requirements for Risk Level 2

Risk Level	Visual Inspections						Sample Collection		
	Weekly BMP	Quarterly Non-Storm Water Discharge	Pre-Storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	Non- Visible (when applicable)
			Baseline	REAP					
2	X	X	X	X	X	X	X	NA	X
Sampling & Analysis	Type of Monitoring				When				
	Effluent Sampling: pH, Turbidity				Collect a minimum of three (3) samples per day. Each discharge location must be sampled. Collect runoff samples which are representative of site discharges for each day of a qualifying event.				
	Non-visible pollutants: spill/BMP failure based on pollutant source assessment				Within first two hours of discharge from site. Collect samples of runoff affected by the spilled or released material(s) and runoff that is unaffected by the spilled or released material(s).				
	Contained storm water				At time of discharge				
	Non-storm water				At locations where discharged from site.				
	Other				RWQCB or TMDLs may require other monitoring.				
Visual Inspections	Qualifying rain event: Pre-rain inspection				All drainage areas, BMPs, and storm water containments within two business days prior to each qualifying rain event.				
	Qualifying rain event: Post-rain inspection				All discharge locations within two business days after each qualifying rain event. Visually observe discharge of contained storm water when discharged.				
	During rain inspection				See BMP inspection below				
	BMP				Weekly and every 24 hours during extended storm events.				
	Non-storm water discharge inspection				Once per quarter (Jan-Mar, Apr-Jun, July-Sept, Oct-Dec)				

NA = Not Applicable

6.2.1 BMP Inspection Requirements and Maintenance

All inspection, maintenance, repair, and sampling activities shall be performed or supervised by a Qualified SWPPP Practitioner (QSP). Refer to Section 5.1.3 for QSP contact information. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment. Site personnel (such as BMP Inspectors and SCE Site Reps) who have received training on SWPPP implementation, BMP inspection and maintenance, and record keeping will be documented on a training log maintained in Appendix F.

SCE is subject to the following inspection requirements:

- SCE shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel are listed in this SWPPP.
- SCE shall ensure that all visual inspections are conducted weekly during working hours and in conjunction with other activities in areas where active construction is occurring.
- SCE shall ensure that during storm inspections are conducted at least once each 24-hour period, during extended storm events and are documented SCE's Mobile Field Inspection Application (SWPPP App).
- SCE shall ensure that pre-storm and post-storm inspections are conducted for each qualifying event and documented using SCE's SWPPP App.
- SCE shall ensure that onsite inspections by the QSD are conducted on a quarterly basis.
- SCE shall conduct quarterly non-storm water discharge inspections to document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source, and document the response taken to control or eliminate unauthorized non-storm water discharges.
- Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).
- Inspection programs are required where temporary and permanent stabilization BMPs are installed and are to be monitored after active construction is completed. Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until minimum vegetative coverage is established per final stabilization criteria.

6.2.2 Inspection Exceptions

SCE is not required to conduct inspections under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled construction hours and business days.

SCE will document why any inspections were not conducted and include these exceptions into the SWPPP and the Annual Report.

6.2.3 Visual Inspections

Inspections for this Project shall be performed utilizing SCE's SWPPP App and shall be conducted as follows:

- Weekly (Baseline) - documented utilizing SCE's Cloudcompli Mobile Inspection Application.
- Quarterly for non-storm water discharges - documented utilizing SCE's Cloudcompli Mobile Inspection Application.
- Rain Inspections - documented utilizing SCE's Mobile Field Inspection application:
 - Prior to a forecasted rain event
 - During (24-Hour intervals) Rain Event
 - Post-rain event
- Stored or Contained Storm Water Discharge - documented utilizing SCE's Cloudcompli Mobile Inspection Application.

The purpose of these inspections is to determine if implemented BMPs need maintenance, have failed, or could fail to operate as intended (also see Section 6.2.1). If deficiencies are identified during BMP inspections, commencement of field repairs or design changes shall be initiated within 72 hours of identification of the deficiency. Exceptions to site inspections include safety factors and outside of scheduled construction hours; see Section 6.2.2 regarding exceptions.

All Inspections shall be documented in SCE's SWPPP App; hardcopies shall be printed out and retained onsite with the SWPPP at all times.

6.2.4 Qualifying Rain Event Inspections

The QSP shall visually inspect the construction site within two days (48 hours) prior to a qualifying rain event, and within two days (48 hours) after a qualifying rain event. In order to satisfy the Permit requirements to inspect the site prior to a qualifying rain event, the QSP will conduct a visual pre-storm inspection if a probability of rain is forecast. This will ensure that a qualifying rain event is properly documented. These inspections are only required within normal business hours of the construction site.

According to the General Permit, a qualifying rain event produces ½ inch or more of precipitation within a 48 hour or greater period between events. **Per the State Water Resources Control Board (SWRCB) website's General Construction "Frequently Asked Questions," an adequate trigger for a pre-storm event visual inspection is a 50% or greater probability of producing precipitation based on NOAA's forecast. This guideline shall be utilized for this Project.** Weather forecast information shall be obtained only from the National Oceanographic Atmospheric Administration (NOAA) at the following website: <http://www.srh.noaa.gov/>. A rain gauge shall be installed on the Project site so that the QSP will have an accurate indication of a qualifying rain event (0.5 inches or greater).

The QSP will record the storm information for all qualifying rain events including the date, place, time of facility inspections, sampling, visual observation (inspections) notes, and/or measurements, including precipitation. Inspections shall be documented on the Visual Inspection Field Log, provided in Appendix D and shall remain on-site with the SWPPP at all times.

6.2.5 Stored or Contained Storm Water Monitoring Locations

The QSP shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours. Inspections will be documented using the Visual Inspection Field Log, provided in Appendix D, and maintained onsite with the SWPPP.

6.2.6 Quarterly Non-Storm Water Discharge Inspections

Non-storm water discharge inspections will be conducted at each drainage area per quarter at the construction site during normal daylight business hours within the following periods:

- January – March,
- April – June,
- July – September, and
- October – December.

Quarterly inspections shall be documented in SCE's Mobile Field Inspection application and may be conducted in conjunction with weekly inspections. Inspection forms shall be printed out and retained onsite with the SWPPP at all times. Refer to Section 6.2.2 for typical business hours.

6.2.7 Maintenance and Repair

The QSP and/or delegated personnel shall begin conducting field repairs or design changes to BMPs within 72 hours of identification of BMPs that:

- Need maintenance to operate effectively;
- Have failed; or
- Could fail to operate as intended.

If the problem warrants an amendment (e.g. a new procedure or BMP that needs to be implemented) the QSD shall be notified.

6.3 Rain Event Action Plan (REAP)

6.3.1 Active Construction

This Project is a Risk Level 2 project and requires REAP implementation. The REAP is designed to protect all exposed portions of the project sites and to ensure that SCE has adequate materials, staff, and time to implement erosion and sediment control measures to reduce the amount of sediment and other pollutants that could be generated during a likely precipitation event. Upon completion of visual observations for the REAP, the QSP, or designated personnel, shall communicate findings via phone or in-person, with an email follow-up, to the SCE Site rep to coordinate any BMPs changes or implementation needed for the upcoming precipitation event. Appendix I includes a template for the site specific REAP, including forms.

- The QSP shall obtain a printed copy of the current NOAA forecast information (<http://www.srh.noaa.gov/forecast>) for the Project site.
- The QSP must develop the REAP 48-hours in advance of a likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area.
- The REAP must be onsite and be implemented 24 hours in advance of the likely precipitation event.

The QSP shall maintain a paper copy of each REAP onsite; in compliance with the record retention requirements (see Sections 1.5 and 7.9). The REAP must address the current construction phase occurring at the time of the likely precipitation event and at a minimum must include the following site and phase-specific information:

1. Site Address;
2. Calculated Risk Level (i.e., 2, 3);
3. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number;
4. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number;
5. Storm water Sampling Agent information including the name, company, and 24-hour emergency telephone number;
6. Activities associated with each construction phase;
7. Trades active on the construction site during each construction phase;
8. Trade contractor information; and
9. Suggested actions for each project phase.

6.3.2 Inactive Construction

If construction activities are indefinitely halted or postponed (Inactive Construction) the QSP shall develop additional REAPs that, at a minimum, must include the following information:

1. Site Address;
2. Calculated Risk Level (i.e., 2, 3);
3. Site Storm water Manager Information including the name, company, and 24-hour emergency telephone number;
4. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number;
5. Storm water Sampling Agent information including the name, company, and 24-hour emergency telephone number;
6. Trades active on site during Inactive Construction;
7. Trade contractor information; and

Suggested actions for inactive construction sites

6.4 Sample and Analysis Plan for pH and Turbidity

Sampling and analysis of runoff for pH and turbidity is required for this project. This Sampling and Analysis Plan describes the strategy for monitoring turbidity and pH levels of storm water runoff discharges from the project site and run-on that may contribute to an exceedance of a Numeric Action Level (NAL).

6.4.1 Effluent Sampling Schedule

Storm water runoff samples shall be collected for pH and turbidity from each day of a qualifying rain event that results in discharge from the project site. At minimum, these effluent samples will be collected from each site discharge location draining a disturbed area. A minimum of three samples will be collected per day of discharge during a qualifying event. Samples should be representative of the total discharge from the project each day of discharge during the qualifying event. Typically, representative samples will be spaced in time throughout the daily discharge event.

Stored or collected water from a qualifying storm event when discharged shall be tested for turbidity and pH, when applicable. Stored or collected water from a qualifying event may be sampled at the point it is released from the storage or containment area or at the site discharge location.

For this project, it is not anticipated that run-on samples will be required. However, if the QSP identifies that run-on has the potential to contribute to an exceedance of a NAL, run-on samples shall be obtained.

SCE is not required to conduct effluent sampling under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled construction hours: 0630 – 1530, Monday through Friday.

SCE will document why sampling was not conducted and include these exceptions into the SWPPP and the Annual Report.

6.4.2 Effluent Sampling Locations

Sampling locations are based on the site runoff discharge locations and locations where run-on enters the site; accessibility for sampling; and personnel safety. Planned pH and turbidity sampling locations are shown on the Site Maps in Appendix B and are also identified in Table 6-4. If additional sampling locations are required during construction, the QSP shall update the site maps in Appendix B and Table 6-4 below.

Table 6-2: pH and Turbidity Sample Locations

Sample Location Number	Sample Location	Estimate of Site (%)
D/S 1	Southeast discharge location at existing channel	100
U/S 1	To be field located	-

6.4.3 Effluent Sampling Procedures

Samples of discharge shall be collected at the designated runoff and, if needed, run-on sampling locations shown on the Site Maps in Appendix B. Any run-on samples taken shall be collected within close proximity of the point of run-on to the project.

Grab samples will be collected by following the steps outlined below:

1. Place the meter or secondary sample container directly into the stream of flow;
2. Sampling personnel will collect the water up-gradient of where they are standing.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Pre-rinse the meter probe or secondary sample container with deionized water or within the flow of runoff;
- Not sample near a running vehicle where exhaust fumes may impact the sample;
- Not touch the exposed end of the meter's probe;
- Not touching inside secondary sampling containers, if utilized;
- Avoid allowing rainwater to drip from rain gear or other surfaces into secondary sampling containers, if utilized; and
- Not eat, smoke, or drink during sample collection nor sneeze or cough in the direction of the meter probe or secondary sampling container.

For pH and turbidity samples collected for field analysis, the collection shall be in accordance with SWAMP QAPrP² protocols and analysis, and equipment calibration shall be in accordance with field instrument manufacturer's specifications. Table 6-5 below lists the type of instruments used in the field for these parameters.

Table 6-3: Field Analysis Instrumentation

Field Instrument	EPA Analytical Method	Parameter	MDL
pH Meter	150.1	pH	0.2
Turbidity Meter	180.1	Turbidity	1

- The instruments will be maintained in accordance with manufacturer's instructions.
- The instrument(s) will be calibrated before each sampling event.
- Maintenance and calibration records will be maintained with the SWPPP.

Immediately following collection, samples for field analysis shall be tested in accordance with the field instrument manufacturer's instructions and results recorded on the Effluent Sampling Field Log Sheet located in Appendix D.

² Sampling personnel shall be trained to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring program (SWAMP) 2017 Quality Assurance Program Plan (QAPrP)

6.4.4 Effluent Sampling Field Analyses

The narrative effluent limitations require this project to minimize or prevent pollutants in storm water and authorized non-storm water through the implementation of best management practices. Discharges from the site are subject to Numeric Action Level (NALs) for pH and turbidity as shown in Table 6-6 below.

Table 6-4: Numeric Action Levels

Parameter	Unit	Numeric Action Level Daily Average
pH	pH units	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	NTU	250 NTU

Compliance with the NAL for pH and turbidity is based on a daily average. Upon receiving or reviewing the field log sheets, the QSP shall immediately calculate the arithmetic average of the turbidity samples, and the logarithmic average of the pH samples to determine if the listed NALs have been exceeded.

The QSP shall, within 2 days from the end of the storm event, submit copies of the completed Effluent Sampling Field Log Sheets to the QSD for review. Within 3 days from the end of the storm event, the QSD shall submit copies of the completed Effluent Sampling Field Log Sheets to the SCE Storm Water Specialist.

In the event that the pH or turbidity NAL is exceeded, the QSP, or designated personnel, shall immediately (within the same business day) notify the SCE Storm Water Specialist and the QSD, and investigate the cause of the exceedance and identify corrective actions.

Exceedances of NALs shall be electronically reported to the State Water Board by SCE Representatives through the SMARTs system within 10 days of the conclusion of the storm event. If requested by the RWQCB, a NAL Exceedance report will be submitted. The NAL Exceedance Report must contain the following information:

- Analytical method(s), method reporting unit(s), and MDL(s) of each parameter;
- Date, place, time of sampling, visual observation, and/or measurements, including precipitation; and
- Description of the current BMPs associated with the sample that exceeded the NAL and the proposed corrective actions taken

6.5 Sample Analysis Plan for Non-Visible Pollutants

All construction projects, regardless of risk level, are required to monitor runoff for non-visible pollutants in the event of a BMP failure, breach, or spill. An area unaffected by the failure, breach, or spill must also be sampled to serve as the basis of comparison.

SCE is subject to the following non-visible pollutant monitoring requirements:

- SCE shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would be visually detectable in storm water;
- SCE is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event;
- SCE shall ensure that water samples are large enough to characterize the site conditions;
- SCE shall collect samples at all discharge locations that can be safely accessed;
- SCE shall collect samples during the first two hours of discharge from rain events that occur during business hours which generate runoff;
- SCE shall analyze samples for the non-visible pollutant parameters, if applicable (see the list of parameters identified in Table 2-5 – Potential Construction Site Pollutants);
- SCE shall collect a sample of storm water that has not come in contact with the disturbed soil or materials stored or used onsite (uncontaminated sample) for comparison with the discharge sample;
- SCE shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis;
- For laboratory analyses, all sampling sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. SCE shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specifications; and
- SCE shall keep all field/or analytical data with the SWPPP document.

6.5.1 Non-Visible Pollutant Sampling Schedule

Samples for the applicable non-visible pollutant(s) will be collected from the discharge along with a 1-gallon (4-Liter) volume of uncontaminated background sample. Samples shall be collected within the first two hours of discharge, or at the time of discovery, from rain events, during business hours, and which generate runoff.

6.5.2 Non-Visible Pollutant Sampling Locations

Locations for the collection of non-visible pollutant sampling are described below.

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use; accessibility for sampling, personnel safety; and other factors in accordance with the applicable requirements in the General Permit. Planned sampling locations are shown on the Site Maps in Appendix B and include the following:

- Based on the QSP's routine monitoring inspections, sampling will be conducted when it is evident that a breach, malfunction, or spill has occurred. The sampling location(s) will be field located down-gradient from the area(s) and from runoff that has come into contact with the pollutant material.

- The down-gradient sample location(s), will be designated as D1, D2, etc. as appropriate, and will be field located depending on construction phasing and location of materials and equipment, and will be shown on the Site Maps at the time the location is identified.
- Up-gradient sampling locations will be identified for the collection of an uncontaminated runoff sample (background sample) for comparison with the down-gradient samples. The up-gradient samples will be analyzed for the same non-visible pollutants as the down-gradient samples. The location(s) will be selected so that the runoff sample will not have come in contact with the pollutant material.
 - The up-gradient sample location(s), will be designated as U1, U2, etc. as appropriate, and will be field located depending on construction phasing and location of materials and equipment, and will be shown on the Site Maps at the time the location is identified.
- Since there are no known areas of historical contamination at this site, there are no designated sampling locations. If areas of contamination are subsequently discovered during construction activities, the SWPPP will be amended by the QSD.

6.5.3 Non-Visible Sample Collection Procedures

Samples of discharge will be collected at the designated sampling locations described in Section 6.3.2 and as shown on the Site Maps in Appendix B for locations of observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in Table 6-3. Samples will be collected by following the steps outlined below:

1. Place a laboratory provided sampling container directly into a stream of water down-gradient and within close proximity to the potential non-visible pollutant discharge location;
2. Transfer the collected sample into the sample bottles (supplied by the lab for the appropriate parameters being monitored) filling the bottles completely (or as instructed by the laboratory);
3. The up-gradient (uncontaminated) background samples will be collected first, prior to collecting the down-gradient sample, in order to minimize cross-contamination; and
4. Sampling personnel will collect the water up-gradient of where they are standing.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of powder-free nitrile gloves prior to the collection and handling of each sample at each location;
- Not contaminate the inside of the sample bottle by allowing it to come into contact with any material other than the water sample;
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection;
- Not leave the cooler lid open for an extended period of time once samples are placed inside;
- Not sample near a running vehicle where exhaust fumes may impact the sample;

- Not touch the exposed end of a sampling tube, if applicable;
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles;
- Not eat, smoke, or drink during sample collection nor sneeze or cough in the direction of an open sample bottle;
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample;
- Decontaminate sampling equipment prior to sample collection using a tri-sodium phosphate (TSP) solution water wash and triple rinse with distilled or de-ionized water; and
- Dispose of decontamination water/soaps appropriately (i.e., do not discharge to the storm drain system or receiving water).

6.5.4 Non-Visible Pollutant Laboratory Analyses

The Table below lists the sources of and types of potential non-visible pollutants on the Project and the applicable water quality indicator parameter(s) for that pollutant. Refer to Appendix D for The Construction Material and Pollutant Testing Guidance Table - Non-Visible Pollutants, which contains a partial list of additional common sources of non-visible pollutants.

Table 6-5: Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Vehicle batteries	Sulfate or pH	Sulfuric Acid or pH
Cleaning products	Acids / Bleaches / Solvents	pH/ Chlorine/ VOC, SVOC
Masonry products	pH, Alkalinity	pH, Alkalinity
Landscaping materials	Fertilizer	Nitrate
Line Flushing	Chlorinated Water	Total Chlorine
Adhesives	Adhesives	COD/ Phenols/ SVOC
Vehicle	Batteries	Sulfuric Acid, Lead, pH
Treated wood products	ACZA, CCA, ACA, Copper Naphthenate	Arsenic, Chromium (Total), Copper, and Zinc

Samples will be analyzed for the applicable constituents using the analytical methods identified in Table 6-3 (Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants).

Laboratory Analysis: For samples that will be analyzed by a laboratory, sampling, preservation and analysis shall be performed by a state-certified laboratory in accordance with 40 CFR Part 136.

Immediately following collection of non-visible samples, sample bottles for laboratory analytical testing will be capped, labeled, documented on a Chain-of-Custody form provided by the analytical laboratory, sealed in a re-sealable storage bag, placed in an ice-chilled cooler, at as near to 4 degrees Celsius as practicable, and delivered within 24 hours to the following California state-certified laboratory:

Laboratory Name: Eurofins Calscience

Southern California Edison Company (SCE)
CASC Engineering and Consulting, Inc.

Address:	7440 Lincoln Way
	Garden Grove, CA
Telephone Number:	714-895-5494
URL Email:	Calscience@EurofinsUS.com

Table 6-6: Sample Collection, Preservation and Analysis for Non-Visible Pollutants

Parameter	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs-Solvents	EPA 8260B	3 x 40 mL	VOA-glass	Store at 4° C, HCl to pH<2	1 ug/L	14 days
SVOCs	EPA 8270C	1 x 1 L	Glass-amber	Store at 4° C	10 ug/L	7 days
Pesticides/PCBs	EPA 8081A/8082	1 x 1 L	Glass-amber	Store at 4° C	0.1 ug/L	7 days
Herbicides	EPA 8151A	1 x 1 L	Glass-amber	Store at 4° C	Check Lab	7 days
BOD	EPA 405.1	1 x 500 mL	Polypropylene	Store at 4° C	1 mg/L	48 hours
COD	EPA 410.4	1 x 250 mL	Glass-Amber	Store at 4° C, H2SO4 to pH<2	5 mg/L	28 days
DO	SM 4500-O G	1 x 250 mL	Glass-Amber	Store at 4° C	Check Lab	8 hours
pH	EPA 150.1	1 x 100 mL	Polypropylene	None	unitless	Immediate
Alkalinity	SM 2320B	1 x 250 mL	Polypropylene	Store at 4° C	1 mg/L	14 days
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 6010B/7470A	1 x 250 mL	Polypropylene	Store at 4° C, HNO3 to pH<2	0.1 mg/L	6 months
Metals (Chromium VI)	EPA 7199	1 x 500 mL	Polypropylene	Store at 4° C	1 ug/L	24 hours

Notes:

°C	–	Degrees Celsius	ug/L	–	Micrograms per Liter
BOD	–	Biological Oxygen Demand	ml	–	Milliliter
COD	–	Chemical Oxygen Demand	PCB	–	Polychlorinated Biphenyl
DO	–	Dissolved Oxygen	SVOC	–	Semi-Volatile Organic Compound
EPA	–	Environmental Protection Agency	SM	–	Standard Method
HCl	–	Hydrogen Chloride	TPH	–	Total Petroleum Hydrocarbons
H2SO4	–	Hydrogen Sulfide	TRPH	–	Total Recoverable Petroleum Hydrocarbons
HNO3	–	Nitric Acid	VOA	–	Volatile Organic Analysis
L	–	Liter	VOC	–	Volatile Organic Compound
mg/L	–	Milligrams per Liter			

6.6 Sample Documentation

Sample documentation consists of appropriate information onto non-visible sample bottle identification labels, Chain-of-Custody forms, Sampling Activity Logs, and Inspection Checklists. It is important that waterproof labels, paper, and ink are used. These will be considered recordable documents. If an error is made on a document, the individual shall make corrections by lining through the error, initial and date, and entering the correct information. Copies of the Sampling Activity Log will be maintained in Appendix D.

Sampling and field analysis activity will be documented using the following forms:

- Sample Bottle Identification Labels: Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:
 - Project name
 - Project number
 - Unique sample identification number and location. (Example: Santa Ana AY-D1-123121 which would denote Project Name [Santa Ana AY], Sample Site [D1], Sample Date [mmddyy])
 - Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or designation (Example: Santa Ana AY-D1-123121 -DUP1).
 - Collection date/time
 - Analysis constituent
- Sampling Activity Logs: A log of sampling events will identify:
 - Sampling date
 - Separate times for collected samples and QA/QC samples recorded to the nearest minute (am/pm)
 - Unique sample identification number and location
 - Analysis constituent
 - Names of sampling personnel
 - Weather conditions (including precipitation amount)
 - Field analysis results
 - Other pertinent data
- Chain-of-Custody (COC) forms: All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Proper transferring of responsibility must be recorded on the COC signature fields, the final signature will be of the receiving lab personnel. COC procedures will be strictly adhered to for QA/QC purposes.
- Storm Water Quality Construction Inspection Checklists: When applicable, the contractor's storm water inspector will document on the checklist that samples for non-visible pollutants were taken during a rain event.

6.7 Sampling Personnel

Only personnel trained in the State of California's SWAMP QAPrP³ water quality sampling will collect samples. Samples from the Project area will be collected by one of the following sampling personnel:

Name/Telephone Number: Kate Norgard (949) 275-8405

Alternate(s)/Telephone Number: Josh Luevanos (626) 513-6626

All sampling personnel and alternates will review the CSMP, described herein for the qualifications of designated personnel describing environmental sampling training and experience as provided in Appendix A.

An adequate stock of monitoring supplies and equipment for obtaining samples will be available at the Project site prior to a sampling event, or in the possession of the sampling personnel. Monitoring supplies and equipment will be stored in a cool-temperature environment that will not come in contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule described in this SWPPP.

Supplies maintained at the Project site will include, but are not limited to, powder-free nitrile gloves, sample collection equipment (bailers, etc.), coolers, appropriate number and volume of sample bottles, identification labels, resealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody (COC) forms.

Consultant will obtain and maintain the field-testing instruments, as described under Sample Analysis, for analyzing samples in the field by contractor sampling personnel.

Safety practices for sample collection will be in accordance with CASC Engineering and Consulting's *Injury and Illness Prevention Plan*, January 2017.

6.8 Safety

Care must be exercised in selecting representative sampling locations and in sample collection to ensure the safety of the sampling crew(s). Avoid entering a water body for sampling if possible. Potential hazards may include but are not limited to the list in the Table below.

³ Sampling personnel shall be trained to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring program (SWAMP) 2017 Quality Assurance Program Plan (QAPrP)

Table 6-7: Potential Safety Hazards

Hazard	Safety Precautions
Animals and Plants	Be alert for the presence of snakes, rodents, insects, and poisonous plants and avoid contact. Long pants are recommended for all field crews.
Construction Operations	Follow construction site safety protocols. Be aware of trip and slip hazards and confirm activities before entering constructions zones. Obey all caution and danger signage.
Lifting heavy objects	Use proper lifting techniques.
Rough terrain	Wear boots with non-slip soles. Use appropriate caution when walking in rough terrain. Two person-sampling crews are recommended when working from or descending steep banks where the water is greater than knee deep.
Weather	Observe weather conditions, avoid lightning strike prone features, wear appropriate clothing, and be aware of flash flood dangers.
Reagents, preservatives	Wear appropriate personal protective equipment (PPE) when using reagents or preservatives.

6.9 Quality Assurance and Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 5 percent (minimum of 1 duplicate) per sampling event⁴. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence any evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

6.10 Retention of Records

All records, storm water monitoring information, lab data, and reports, including the Annual Report and supportive documentation, shall be retained for a period of at least three years. These records shall include:

- A. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.
- B. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.
- C. The date and approximate time of analyses.
- D. The individual(s) who performed the analyses.
- E. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

⁴ Per the Surface Water Ambient Monitoring program (SWAMP) 2017 Quality Assurance Program Plan (QAPrP)

- F. Rain gauge readings from site inspections.
- G. Quality assurance/quality control records and results.
- H. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records.
- I. Visual observation and sample collection exception records.
- J. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

APPENDIX A

RESPONSIBLE PARTIES AND CERTIFICATIONS

Responsible Parties

Title and Contact Information	Area of Responsibility
Legally Responsible Person: Name: Kenneth Borngrebe Address: 2244 Walnut Grove, Quad 2C City, State, Zip: Rosemead, CA 91770 Telephone Number: (626) 633-7183	Property Owner and Permittee under the General Permit.
Approved Signatory for the LRP: Name: Julie Granbery Address: 2244 Walnut Grove, Quad 2C City, State, Zip: Rosemead, CA 91770 Telephone Number: (714) 745-0569 <i>Written authorizations available upon request to representatives of the SWRCB and RWQCB.</i>	Authorized to sign (and certify) on behalf of the LRP: the Notice of Intent, Notice of Termination, Changes to the Permit Registration Documents, SWPPP Certification, Annual Reports, Non-Compliance reports, and any other information requested by the RWQCB, SWRCB, or EPA under the General Permit.
Project QSD: Company Name: CASC Engineering & Consulting QSD Name: Joyce Goode Address: 18 Technology Drive, Suite 135 City, State, Zip: Irvine, CA 92618 Cell Number (909) 557-0276 Email:	Draft the SWPPP and any SWPPP amendments and certify compliance of the SWPPP with the General Permit.
Alternate QSD: Company Name: CASC Engineering & Consulting QSD Name: Melanie Sotelo Address: 18 Technology Drive, Suite 135 City, State, Zip: Irvine, CA 92618 Telephone Number (909) 835-0313 Email: msotelo@cascinc.com	Draft the SWPPP and any SWPPP amendments and certify compliance of the SWPPP with the General Permit.
SCE Project QSP: Company Name: Southern California Edison Project QSP Name: Lucy Cortez-Johnson, CPESC Address: 2244 Walnut Grove, Quad 2C City, State, Zip: Rosemead, CA 91770 Cell: (714) 794-7805 Email: mike.gallagher@sce.com	Implement the SWPPP on a daily basis at the Project, oversee the training of contractors and other personnel undertaking SWPPP-related duties, monitor and direct contractors with SWPPP responsibilities (including those installing or maintaining BMPs), oversee the inspection and monitoring programs, perform inspections or delegate others to do so (see other delegated inspectors below), prepare reports required by the SWPPP for review and certification by the LRP's representative.

Title and Contact Information	Area of Responsibility
Field QSP: Company Name: CASC Engineering & Consulting Field QSP Name: Kate Norgard Address: 18 Technology Drive, Suite 135 City, State, Zip: Irvine, CA 92618 Cell: (949) 275-8405 Email: knorgard@cascinc.com	Conduct inspections and SWPPP implementation under the overall supervision of the Project QSP.
Alternate Field QSP: Company Name: CASC Engineering & Consulting Field QSP Name: Josh Luevanos Address: 18 Technology Drive, Suite 135 City, State, Zip: Irvine, CA 92618 Cell: (626) 513-6626 Email: jluevanos@cascinc.com	Conduct inspections and SWPPP implementation under the overall supervision of the Project QSP.
Alternate Field Inspector: Company Name: CASC Engineering & Consulting Field QSP Name: Shanna Delgado/ Tony Sidor Address: 18 Technology Drive, Suite 135 City, State, Zip: Irvine, CA 92618 Cell: (909) 583-7085 / (909) 520-5368 Email: sdelgado@cascinc.com / tsidor@cascinc.com	Conduct inspections and SWPPP implementation under the overall supervision of the Project QSP.
Contractor/Subcontractor Company Name: QSD Name: Address: City, State, Zip: Telephone Number (including emergency contact number[s]): Fax: Email:	Install, maintain, and replace erosion and sediment controls, and implementation of good housekeeping, waste management, etc.

QSP: Company Name QSP Name: Address: City, State, Zip: Telephone Number Cell: Fax: Email:	Conduct inspections and SWPPP implementation under the overall supervision of the SCE Storm Water Specialist.
Alternate QSP: Company Name Alternate QSP Name: Address: City, State, Zip: Telephone Number Cell: Fax: Email:	Conduct inspections and SWPPP implementation under the overall supervision of the SCE Storm Water Specialist.
Contractor/Subcontractor Company Name: QSD Name: Address: City, State, Zip: Telephone Number (including emergency contact number[s]): Fax: Email:	Install, maintain, and replace erosion and sediment controls, and implementation of good housekeeping, waste management, etc.

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP DEVELOPER (QSD) AND QUALIFIED SWPPP PRACTITIONER (QSP)

Lucy Cortez-Johnson

Aug 12, 2021 - Aug 30, 2023

Certificate # 25220



**California Stormwater Quality Association and
California Construction General Permit Training Team**

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP DEVELOPER (QSD) AND QUALIFIED SWPPP PRACTITIONER (QSP)

Joyce Goode

Apr 12, 2020 - Apr 15, 2022

Certificate # 25905



**California Stormwater Quality Association and
California Construction General Permit Training Team**

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP DEVELOPER (QSD) AND QUALIFIED SWPPP PRACTITIONER (QSP)

Melanie Sotelo

Jan 07, 2021 - Jan 17, 2023

Certificate # 00225



**California Stormwater Quality Association and
California Construction General Permit Training Team**

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP PRACTITIONER (QSP)

Kathleen Norgard

Apr 09, 2021 - Jun 12, 2023

Certificate # 24367



**California Stormwater Quality Association and
California Construction General Permit Training Team**

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP PRACTITIONER (QSP)

Shanna Delgado

Jul 26, 2020 - Jul 26, 2022

Certificate # 27561



California Stormwater Quality Association and
California Construction General Permit Training Team

APPENDIX B

SUBMITTED PERMIT REGISTRATION DOCUMENTS

- Notice of Intent (NOI) and WDID Confirmation Letter – To be included in field SWPPP
- Risk Assessment Worksheets
- Site Maps with Vicinity Map

	A	B	C
1	Sediment Risk Factor Worksheet		Entry
2	A) R Factor		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	R Factor Value		29.95
6	B) K Factor (weighted average, by area, for all site soils)		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	K Factor Value		0.32
10	C) LS Factor (weighted average, by area, for all slopes)		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	LS Factor Value		0.65
14			
15	Watershed Erosion Estimate (=R_xK_xLS) in tons/acre		6.2296
16	Site Sediment Risk Factor		Low
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet		Entry	Score
A. Watershed Characteristics		yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ? http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		Yes	High
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml			
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan			

Combined Risk Level Matrix				
		<u>Sediment Risk</u>		
		Low	Medium	High
<u>Receiving Water Risk</u>	Low	Level 1	Level 2	
	High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: High

Project Combined Risk: Level 2

Rainfall Erosivity Factor Calculator for Small Construction Sites

EPA's stormwater regulations allow NPDES permitting authorities to waive NPDES permitting requirements for stormwater discharges from small construction sites if:

- the construction site disturbs less than five acres, and
- the rainfall erosivity factor ("R" in the revised universal soil loss equation, or RUSLE) value is less than five during the period of construction activity.

If your small construction project is located in an area where EPA is the permitting authority and your R factor is less than five, you qualify for a low erosivity waiver (LEW) from NPDES stormwater permitting. If your small construction project does not qualify for a waiver, then NPDES stormwater permit coverage is required. Follow the steps below to calculate your R-Factor.

LEW certifications are submitted through the NPDES eReporting Tool or "CGP-Net". Several states that are authorized to implement the NPDES permitting program also accept LEWs. Check with your state NPDES permitting authority for more information.

- [Submit your LEW through EPA's eReporting Tool](#)
- [List of states, Indian country, and territories where EPA is the permitting authority](#)
- [Construction Rainfall Erosivity Waiver Fact Sheet](#)
- [Appendix C of the 2017 CGP – Small Construction Waivers and Instructions](#)

The R-factor calculation can also be integrated directly into custom applications using the [R-Factor web service](#).

For questions or comments, email EPA's CGP staff at cgp@epa.gov.

Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date: 08/30/2021 End Date: 02/28/2022

Locate your small construction project using the search box below or by clicking on the map.

Location: 33.730781,-117.845806 Search



Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

Calculate R Factor

Facility Information

Start Date: 08/30/2021	Latitude: 33.7308
End Date: 02/28/2022	Longitude: -117.8458

Calculation Results

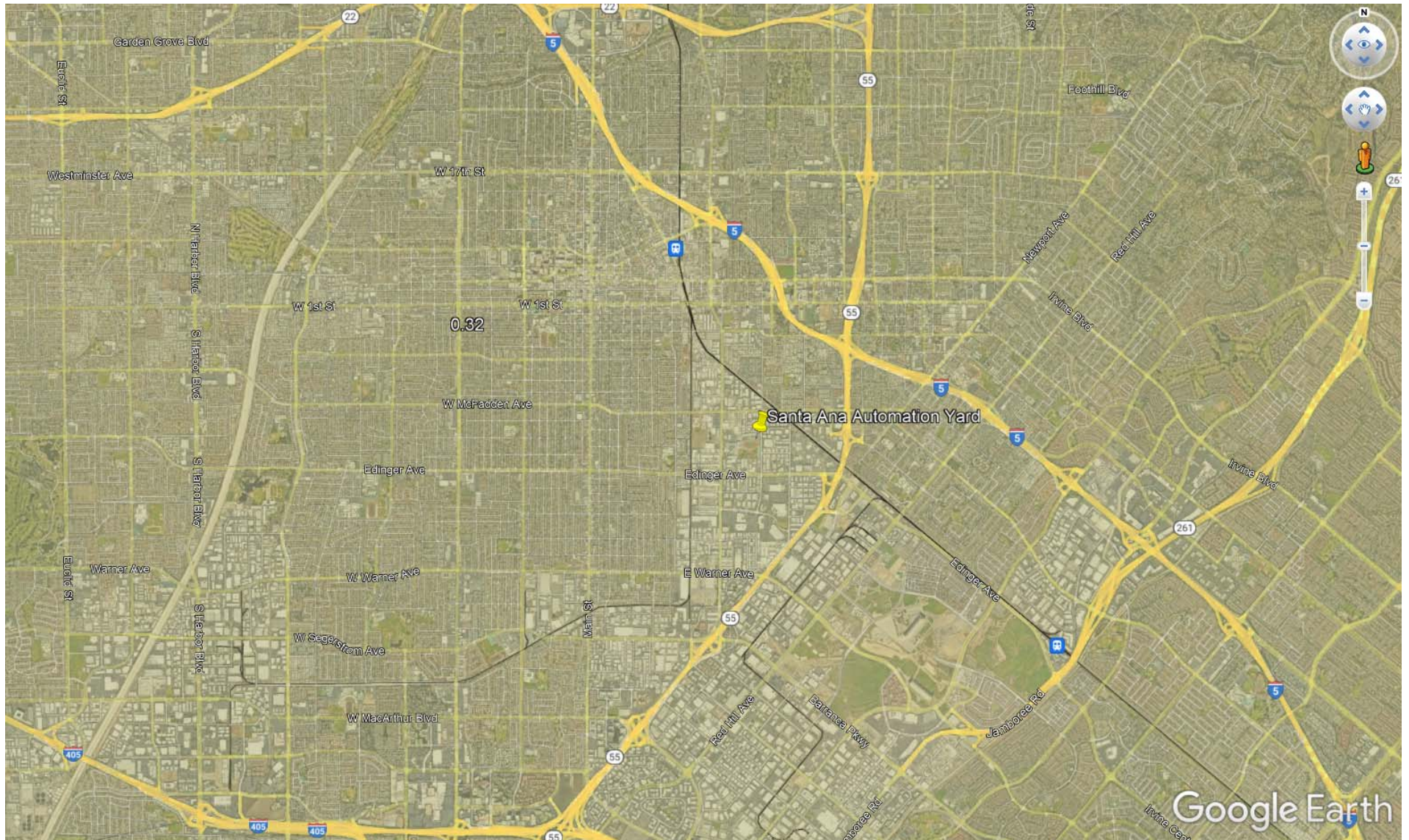
Rainfall erosivity factor (R Factor) = **29.95**

A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage. If you are located in an area where EPA is the permitting authority, you must submit a Notice of Intent (NOI) through the [NPDES eReporting Tool \(Net\)](#). Otherwise, you must seek coverage under your state's CGP.

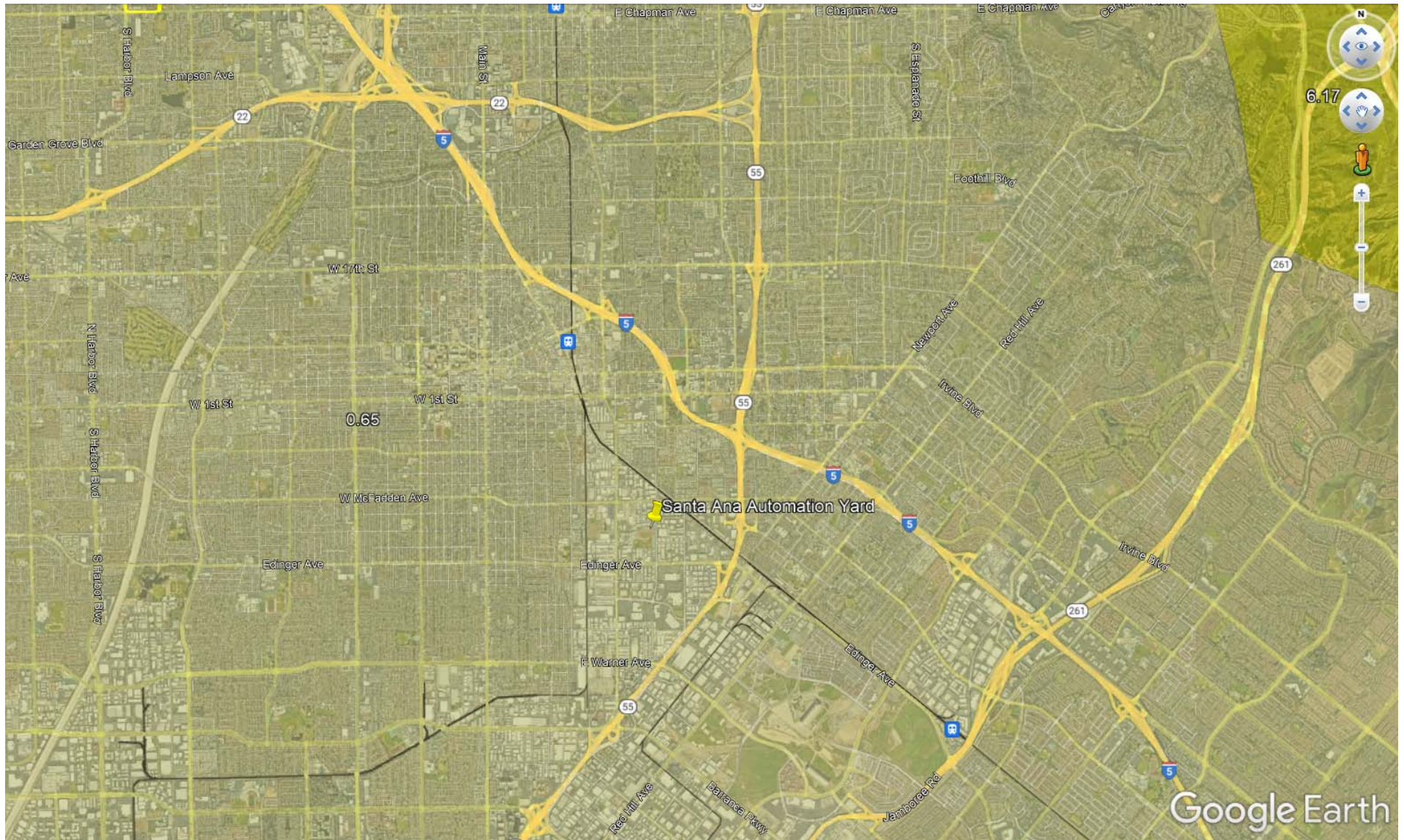
Santa Ana Automation Yard

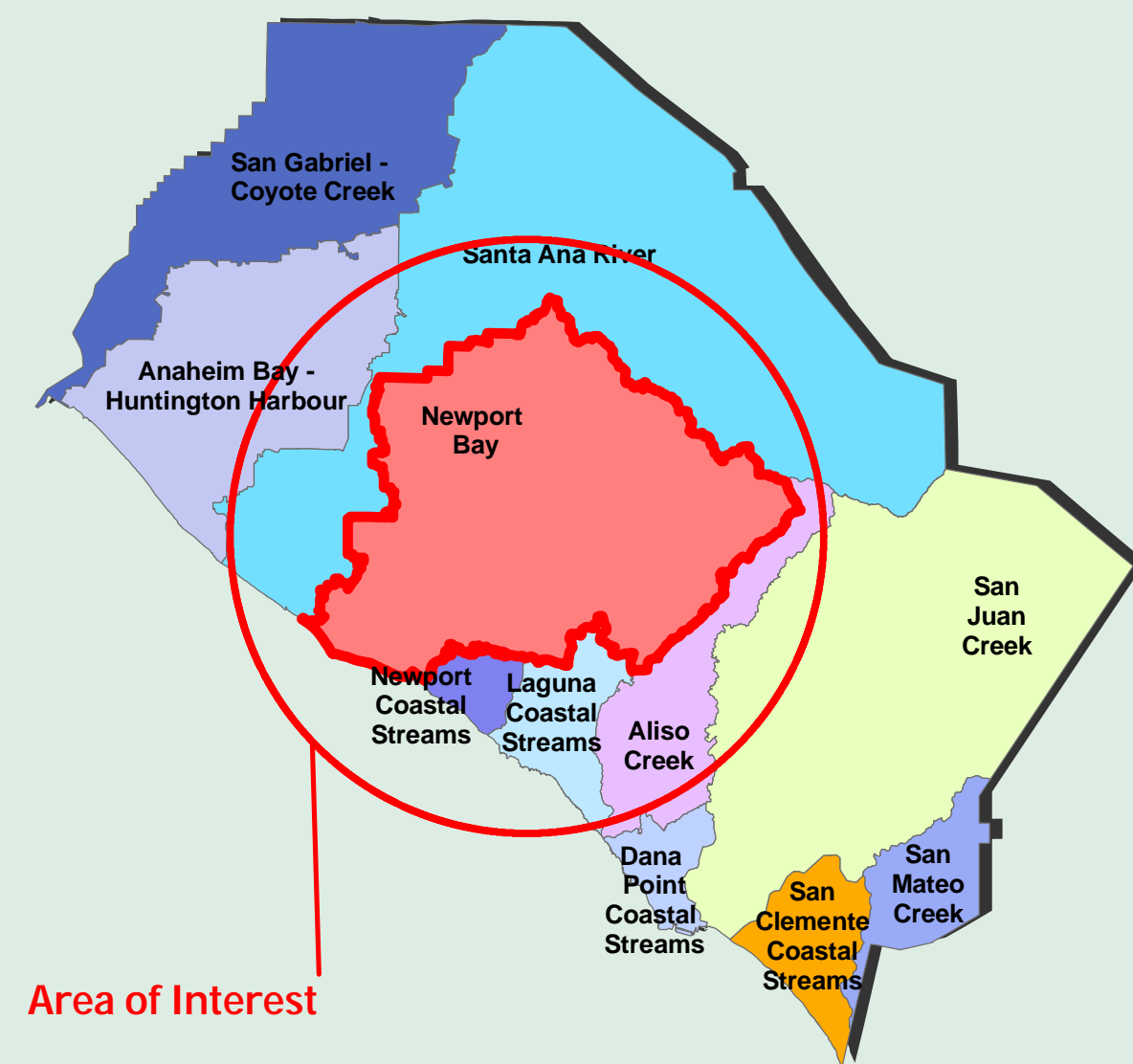
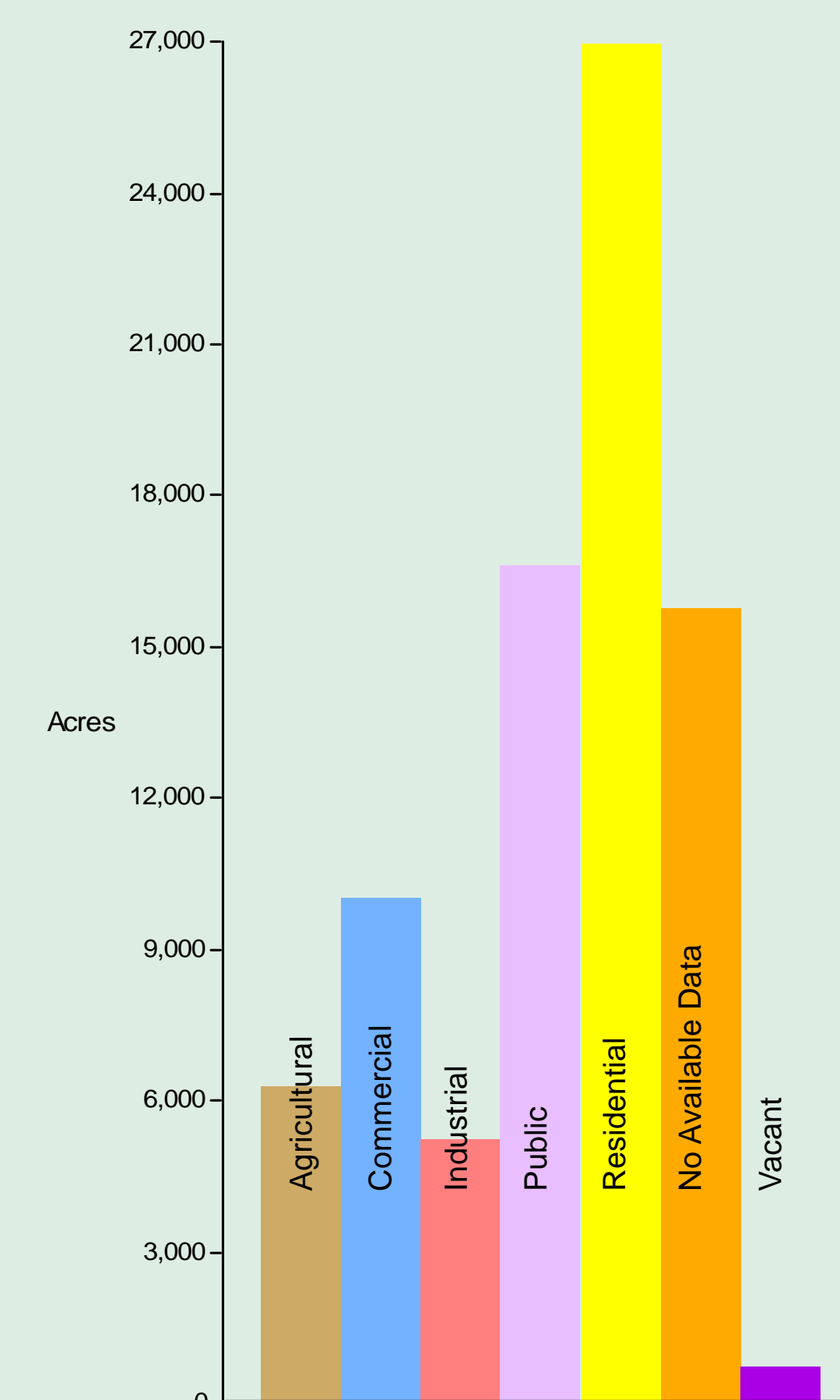
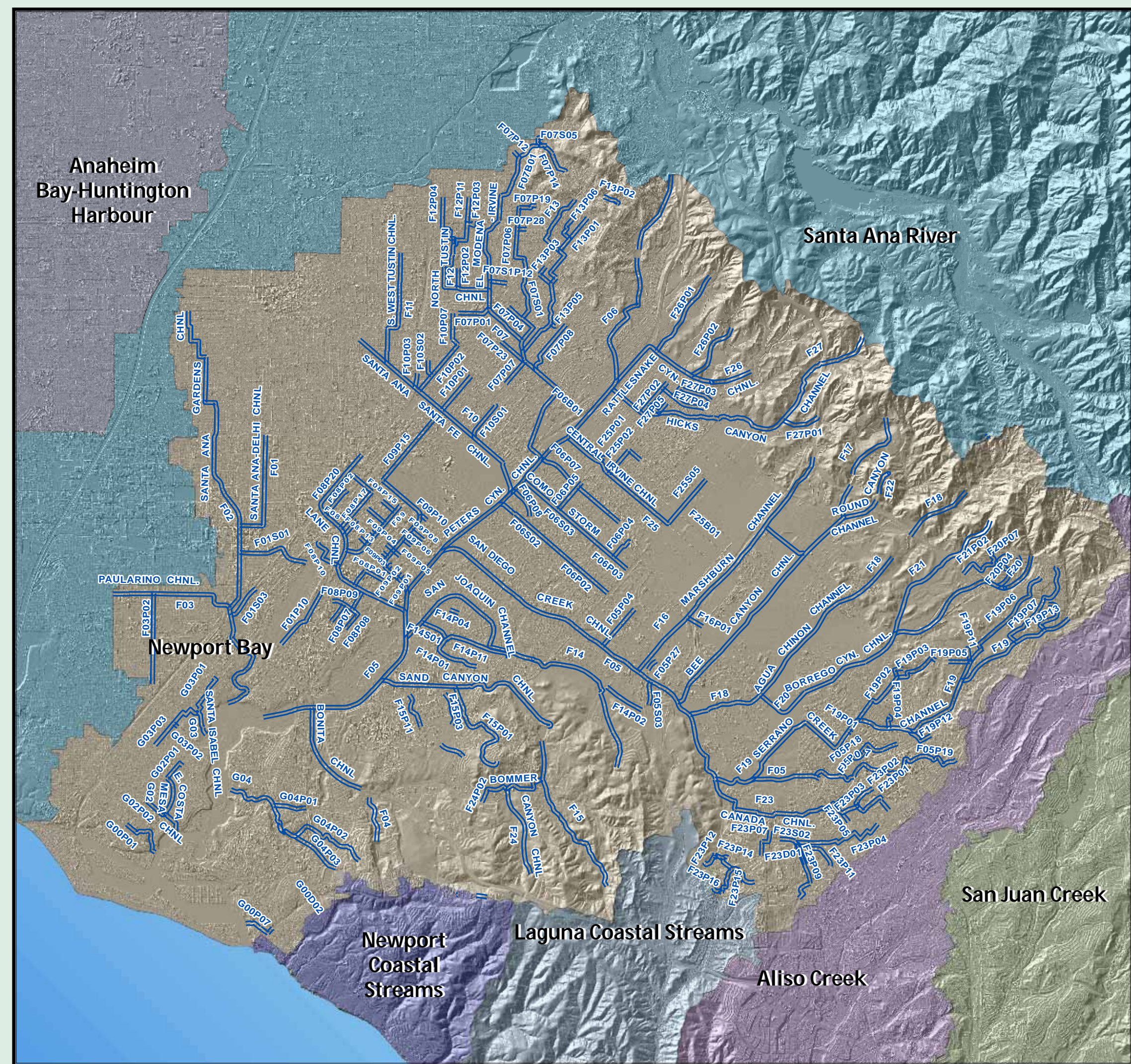
GIS K-Value = 0.32



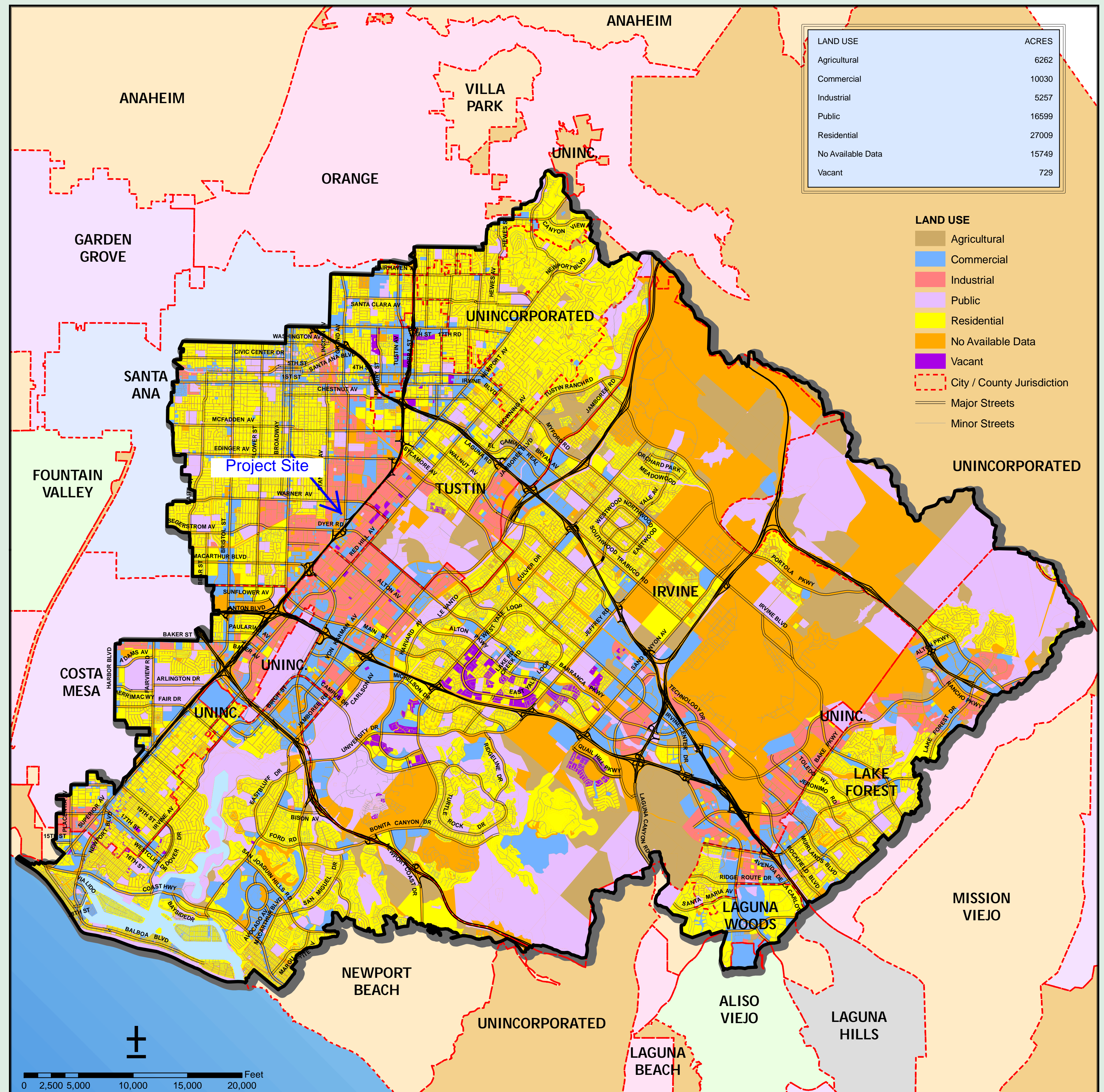
Santa Ana Automation Yard

GIS LS-Value = 0.65





97294 Acres



WATERSHED: NEWPORT BAY **COUNTY OF ORANGE, CALIFORNIA**

DESIGNED AND PRODUCED BY:
 CJC Public Works
 GIS Mapping Unit
 Philip Pappas

DATA SOURCE:
 Geomatics Land Information Systems Division

The County of Orange and Geomatics/LISGIS make no representations or warranties regarding the accuracy of the data from which this map was derived. Neither the County nor Geomatics/LISGIS shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

DATE: November 18, 2009

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	B	Anaheim Bay	80111000	Dieldrin (tissue) <i>This listing was made by USEPA.</i> Source Unknown		402 Acres	2019
				Nickel <i>This listing was made by USEPA.</i> Source Unknown		402 Acres	2019
				PCBs (Polychlorinated biphenyls) (tissue) <i>This listing was made by USEPA.</i> Source Unknown		402 Acres	2019
				Sediment Toxicity Source Unknown		402 Acres	2019
8	C	Balboa Beach	80114000	DDT Source Unknown		1.8 Miles	2019
				Dieldrin Source Unknown		1.8 Miles	2019
				PCBs (Polychlorinated biphenyls) Source Unknown		1.8 Miles	2019
8	L	Big Bear Lake	80171000	Copper Resource Extraction		2865 Acres	2007
				Mercury Resource Extraction		2865 Acres	2007
				Metals Resource Extraction		2865 Acres	2007
				Noxious aquatic plants Construction/Land Development Unknown point source		2865 Acres	2006

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nutrients		2865 Acres	2006
					Construction/Land Development Snow skiing activities		
				PCBs (Polychlorinated biphenyls)		2865 Acres	2019
					Source Unknown		
				Sedimentation/Siltation		2865 Acres	2006
					Construction/Land Development Snow skiing activities Unknown Nonpoint Source		
8	C	Bolsa Chica State Beach	80111000	Copper		2.6 Miles	2019
				<i>This listing was made by USEPA.</i>			
					Source Unknown		
				Nickel		2.6 Miles	2019
				<i>This listing was made by USEPA.</i>			
					Source Unknown		
8	R	Buck Gully Creek	80111000	Fecal Coliform		0.3 Miles	2019
				<i>Listing is downstream of Pacific Coast Highway.</i>			
					Source Unknown		
				Total Coliform		0.3 Miles	2019
				<i>Listing is downstream of Pacific Coast Highway.</i>			
					Source Unknown		
8	L	Canyon Lake (Railroad Canyon Reservoir)	80211000	Pathogens		453 Acres	2006
					Nonpoint Source		
8	R	Chino Creek Reach 1	80121000	Nutrients		7.8 Miles	2019
					Agriculture Dairies		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	L	Elsinore, Lake	80231000	PCBs (Polychlorinated biphenyls)		2431 Acres	2019
					Source Unknown		
				Unknown Toxicity		2431 Acres	2007
					Unknown Nonpoint Source		
8	L	Fulmor, Lake	80221000	Pathogens		4.2 Acres	2019
					Unknown Nonpoint Source		
8	R	Grout Creek	80171000	Metals		3.5 Miles	2007
					Unknown Nonpoint Source		
				Nutrients		3.5 Miles	2008
					Unknown Nonpoint Source		
8	C	Huntington Beach State Park	80111000	Enterococcus		5.8 Miles	2019
				<i>Impaired 50 yards around drain at Magnolia St.</i>			
					Source Unknown		
				Indicator bacteria		5.8 Miles	2019
				<i>This listing was made by USEPA for 2006. This listing for indicator bacteria applies to the area of the beach at Brookhurst St.</i>			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		5.8 Miles	2019
					Source Unknown		
8	B	Huntington Harbour	80111000	Chlordane		221 Acres	2019
					Source Unknown		
				Copper		221 Acres	2019
				<i>This listing was made by USEPA.</i>			
					Source Unknown		
				Lead		221 Acres	2019
					Source Unknown		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nickel		221 Acres	2019
				<i>This listing was made by USEPA.</i>			
					Source Unknown		
				Pathogens		221 Acres	2019
					Urban Runoff/Storm Sewers		
				PCBs (Polychlorinated biphenyls) (tissue)		221 Acres	2019
				<i>This listing was made by USEPA.</i>			
					Source Unknown		
				Sediment Toxicity		221 Acres	2019
					Source Unknown		
8	R	Knickerbocker Creek	80171000				
				Metals		2 Miles	2007
					Unknown Nonpoint Source		
				Pathogens		2 Miles	2005
				<i>For 2006, pathogens was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.</i>			
					Unknown Nonpoint Source		
8	R	Los Trancos Creek (Crystal Cove Creek)	80111000				
				Fecal Coliform		0.19 Miles	2019
				<i>Listing is downstream of Pacific Coast Highway.</i>			
					Source Unknown		
				Total Coliform		0.19 Miles	2019
				<i>Listing is downstream of Pacific Coast Highway.</i>			
					Source Unknown		
8	R	Lytle Creek	80141000				
				Pathogens		41 Miles	2019
					Unknown Nonpoint Source		
8	R	Mill Creek (Prado Area)	80121000				
				Nutrients		1.6 Miles	2019
					Agriculture		
					Dairies		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Suspended Solids (TSS)		1.6 Miles	2019
					Dairies		
8	R	Mill Creek Reach 1	80156000	Pathogens		12 Miles	2019
					Unknown Nonpoint Source		
8	R	Mill Creek Reach 2	80158000	Pathogens		12 Miles	2019
					Unknown Nonpoint Source		
8	R	Mountain Home Creek	80158000	Pathogens		3.7 Miles	2019
					Unknown Nonpoint Source		
8	R	Mountain Home Creek, East Fork	80158000	Pathogens		5.1 Miles	2019
					Unknown Nonpoint Source		
8	B	Newport Bay, Lower	80114000	Chlordane		767 Acres	2019
					Source Unknown		
				Copper		767 Acres	2007
					Source Unknown		
				DDT		767 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		767 Acres	2019
					Source Unknown		
				Sediment Toxicity		767 Acres	2019
					Source Unknown		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	E	Newport Bay, Upper (Ecological Reserve)	80111000	Chlordane		653 Acres	2019
					Source Unknown		
				Copper		653 Acres	2007
					Source Unknown		
				DDT		653 Acres	2019
					Source Unknown		
				Metals		653 Acres	2019
					Urban Runoff/Storm Sewers		
				PCBs (Polychlorinated biphenyls)		653 Acres	2019
					Source Unknown		
				Sediment Toxicity		653 Acres	2019
					Source Unknown		
8	R	Peters Canyon Channel	80111000	DDT		3 Miles	2019
					Source Unknown		
				Toxaphene		3 Miles	2019
					Source Unknown		
8	L	Prado Park Lake	80121000	Nutrients		90 Acres	2019
					Nonpoint Source		
8	R	Rathbone (Rathbun) Creek	80171000	Nutrients		4.7 Miles	2008
					Snow skiing activities		
					Unknown Nonpoint Source		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		4.7 Miles	2006
					Snow skiing activities		
					Unknown Nonpoint Source		
8	B	Rhine Channel	80114000	Copper		20 Acres	2019
					Source Unknown		
				Lead		20 Acres	2019
					Source Unknown		
				Mercury		20 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		20 Acres	2019
					Source Unknown		
				Sediment Toxicity		20 Acres	2019
					Source Unknown		
				Zinc		20 Acres	2019
					Source Unknown		
8	R	San Diego Creek Reach 1	80111000	Fecal Coliform		7.8 Miles	2019
					Urban Runoff/Storm Sewers		
					Other Urban Runoff		
				Selenium		7.8 Miles	2007
					Source Unknown		
				Toxaphene		7.8 Miles	2019
					Source Unknown		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	R	San Diego Creek Reach 2	80111000	Metals		6.3 Miles	2007
					Urban Runoff/Storm Sewers		
8	R	Santa Ana River, Reach 4	80127000	Pathogens		14 Miles	2019
					Nonpoint Source		
8	R	Santiago Creek, Reach 4	80112000	Salinity/TDS/Chlorides		9.8 Miles	2019
					Source Unknown		
8	C	Seal Beach	80111000	Enterococcus		0.53 Miles	2019
				<i>Impaired 50 yards around drain at 1st Street.</i>			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		0.53 Miles	2019
					Source Unknown		
8	R	Silverado Creek	80112000	Pathogens		11 Miles	2019
					Unknown Nonpoint Source		
				Salinity/TDS/Chlorides		11 Miles	2019
					Unknown Nonpoint Source		
8	R	Summit Creek	80171000	Nutrients		1.5 Miles	2008
					Construction/Land Development		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
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ABBREVIATIONS

REGIONAL WATER QUALITY CONTROL BOARDS

- 1 North Coast
- 2 San Francisco Bay
- 3 Central Coast
- 4 Los Angeles
- 5 Central Valley
- 6 Lahontan
- 7 Colorado River Basin
- 8 Santa Ana
- 9 San Diego

WATER BODY TYPE

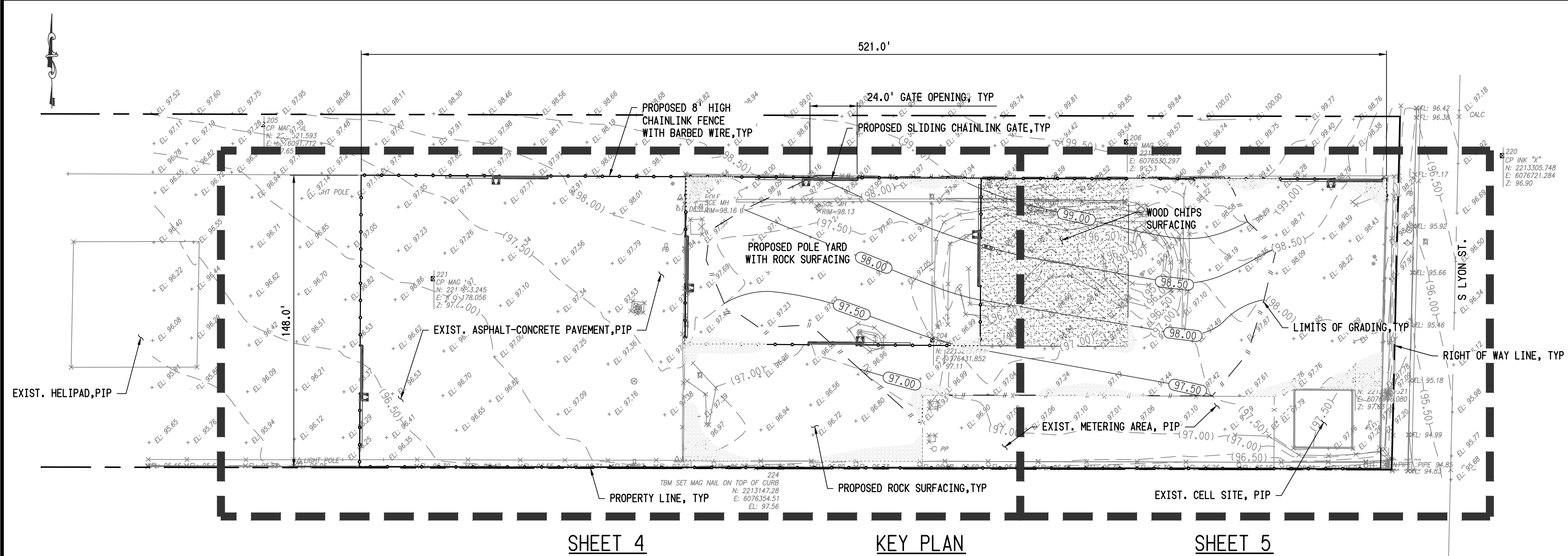
- B =** Bays and Harbors
C = Coastal Shorelines/Beaches
E = Estuaries
L = Lakes/Reservoirs
R = Rivers and Streams
S = Saline Lakes
T = Wetlands, Tidal
W = Wetlands, Freshwater

CALWATER WATERSHED

"Calwater Watershed" is the State Water Resources Control Board hydrological subunit area or an even smaller area delineation.

GROUP A PESTICIDES OR CHEM A

aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide,
 hexachlorocyclohexane (including lindane), endosulfan, and toxaphene



CONSTRUCTION NOTES:	EST. QTY.
1. INSTALL 8' HIGH (MINIMUM) CHAIN LINK FENCE WITH BARBED WIRE PER SCE STANDARD ECS 71-00-03, S2 & S4. SEE SHEET '7' AND '8'. CHAINLINK FABRIC SHALL BE 2"x2" OPENING, 9GA.	841 LF
2. INSTALL WOOD CHIPS SURFACING AT POLE AREA. WOOD CHIPS SHALL BE AS SPECIFIED BY SCE (1" TO 2" WOOD BARK) (3" THICK MINIMUM). SEE SECTIONS 'A' AND 'B' ON SHEET '6'.	6,375 SF
3. INSTALL 24' WIDE X 8' HIGH CHAIN LINK SLIDING GATE WITH BARBED WIRE (NON-MOTORIZED) AS SHOWN ON THIS DRAWING & PER GATE DETAILS ON SHEET '9' TO '11'.	7 EA
4. GRADE AREA AS SHOWN ON THIS DRAWING AND PER SECTIONS 'A', 'A1' & B ON SHEET '6'.	1 LOT
5. INSTALL CRUSHED ROCK SURFACING, 3" MINIMUM THICKNESS, AS SHOWN ON THIS DRAWING & PER SECTIONS 'A', 'A1' & 'B' ON SHEET '6'. ROCK SPECIFICATIONS SHALL COMPLY WITH GREENBOOK SPECIFICATIONS FOR 3/4" ROCKS PER TABLE ON SHEET 1.	41,220 SF
6. REMOVE SEDIMENT BUILD UP AT EXISTING DRAINAGE SWALE/GUTTER & CLEAN EXISTING PARKWAY DRAIN.	1 LS
7. INSTALL 10' HIGH CHAIN LINK FENCE WITHOUT BARBED WIRE PER SECTION 'B' AND DETAIL '1' ON SHEET '6'. SEE SCE STANDARD ECS 71-00-03, S2 & S4, SHEETS '7' AND '8' FOR GATE POST, RAIL ENDS, STIFFENER WIRE, TIE WIRE, CLIP, STEEL STRAND, TRUSS ROD TIGHTENER, TENSION BAR, TENSION BAND, BRACE BAND, POST CAP AND CORNER BRACE DETAILS. CHAINLINK FABRIC SHALL BE 1"x1" OPENING, 9GA.	465 LF
8. REMOVE AND REPLACE EXISTING CHAINLINK FABRIC BY 1"x1" 9GA CHAINLINK FABRIC. CONTRACTOR TO KEEP EXISTING FENCE POST. CHAINLINK FENCE HEIGHT TO MATCH EXISTING.	76 LF

DEMOLITION NOTES:	EST. QTY.
1. REMOVE AND DISPOSE EXISTING 6' HIGH CHAIN LINK FENCE INCLUDING ITS POST & FOOTING.	802 LF
2. REMOVE AND DISPOSE EXISTING CURB/WALL INCLUDING ITS FOOTING.	198 LF
3. REMOVE EXISTING MANHOLE/VAULT. BACKFILL EXCAVATION PER GEOTECH RECOMMENDATIONS.	3 EA
4. REMOVE AND DISPOSE EXISTING CHAIN LINK SLIDING GATE.	2 EA
5. REMOVE AND DISPOSE EXISTING TREE.	1 EA
6. REMOVE AND DISPOSE EXISTING CHAINLINK FABRIC.	65 LF

SANTA ANA AUTOMATION YARD (RL2) SWPPP SITE MAP INDEX		
SWPPP Site Map Number	Construction Set Sheet Number	Description
1	2	Key Plan and Construction Notes
2	3	Demolition Plan
3	12	Erosion Control Plan
4	13	Erosion Control Details

- GENERAL NOTES**
- THIS PLAN IS ACCURATE FOR STORMWATER POLLUTION PREVENTION PURPOSE ONLY.
 - THE INFORMATION ON THIS PLAN IS INTENDED TO BE USED AS A GUIDELINE FOR THE FIELD INSPECTOR AND/OR CONTRACTOR TO COMPLY WITH THE REQUIREMENTS OF THE STATE WATER RESOURCES CONTROL BOARD. FIELD CONDITIONS MAY NECESSITATE MODIFICATIONS TO THIS PLAN BY THE FIELD INSPECTOR.



TWO WORKING DAYS BEFORE YOU DIG

REFERENCE DRAWINGS	REFERENCE DRAWINGS	NO.	REVISIONS	DATE	SAP WO	SUPV	APPROVED	ENGR	CK'D	MADE	P.E.	NO.
5640020 SHT 13 EROSION CONTROL DETAILS	5640020 SHT 7 FENCE SECTIONS AND DETAILS											
5640020 SHT 12 EROSION CONTROL PLAN	5640020 SHT 6 GRADING SECTIONS AND PLAN DETAILS											
5640020 SHT 11 GATE SECTIONS AND DETAILS	5640020 SHT 5 GRADING, DRAINAGE, SURFACING & FENCING PLAN SHT. 2 OF 2											
5640020 SHT 10 GATE SECTIONS AND DETAILS	5640020 SHT 4 GRADING, DRAINAGE, SURFACING & FENCING PLAN SHT. 1 OF 2											
5640020 SHT 9 GATE TYP. PLAN AND SECTION	5640020 SHT 3 DEMOLITION PLAN											
5640020 SHT 8 FENCE SCE ECS STANDARDS AND DETAILS	5640020 SHT 1 TITLE SHEET AND GENERAL NOTES											

BEST MANAGEMENT PRACTICES (BMPs)

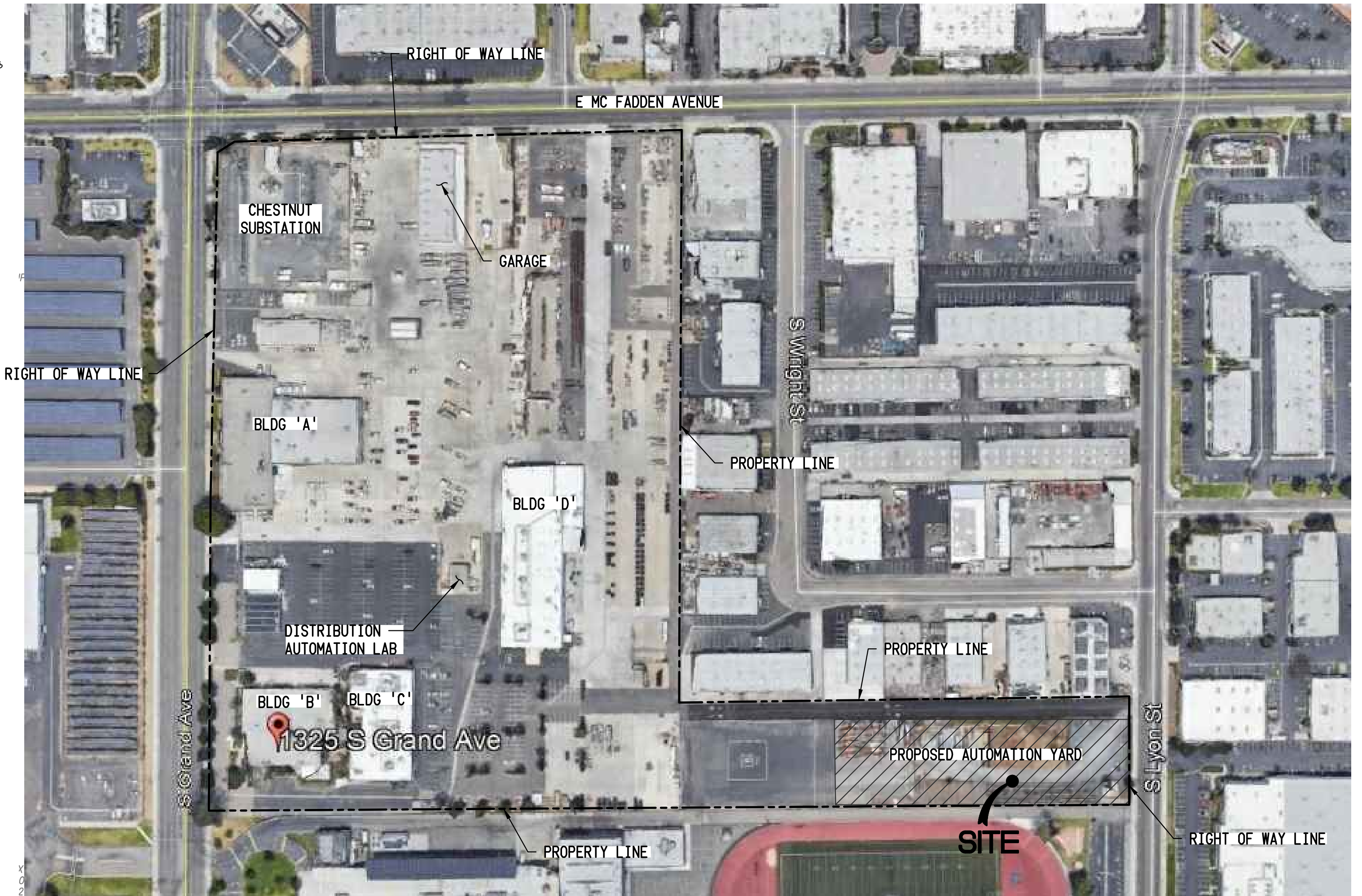
- EC-1 SCHEDULING
- EC-2 PRESERVATION OF EXISTING VEGETATION
- EC-5 SOIL BINDERS
- EC-7 GEOTEXTILES AND MATS
- EC-8 WOOD MULCHING
- EC-16 NON-VEGETATIVE STABILIZATION
- NS-1 WATER CONSERVATION
- NS-3 PAVING AND GRINDING OPERATIONS
- NS-6 ILLICIT CONNECTIONS/DISCHARGE
- NS-9 VEHICLE AND EQUIPMENT FUELING
- NS-10 VEHICLE AND EQUIPMENT MAINTENANCE
- NS-12 CONCRETE CURING
- NS-13 CONCRETE FINISHING
- SE-1 SILT FENCE
- SE-4 CHECK DAMS
- SE-5 FIBER ROLLS
- SE-6 GRAVEL BAG BERM
- SE-7 STREET SWEEPING AND VACUUMING
- SE-8 SANDBAG BARRIER
- SE-10 STORM DRAIN INLET PROTECTION
- TC-1 STABILIZED CONSTRUCTION ENTRANCE
- WM-1 MATERIAL DELIVERY AND STORAGE
- WM-2 MATERIAL USE
- WM-3 STOCKPILE MANAGEMENT
- WM-4 SPILL PREVENTION & CONTROL
- WM-5 SOLID WASTE MANAGEMENT
- WM-6 HAZARDOUS WASTE MANAGEMENT
- WM-8 CONCRETE WASTE MANAGEMENT
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT
- WM-10 LIQUID WASTE MANAGEMENT
- WE-1 WIND EROSION CONTROL

BMPs TO BE FIELD LOCATED BY QSP.

FIELD QSP
CASC ENGINEERING AND CONSULTING
KATE NORGARD, CESSM, QSP
18 TECHNOLOGY DRIVE, SUITE 135
IRVINE, CA 92618
CELL: (949) 275-8405
KNORGARD@CASCINC.COM

QUALIFIED SWPPP DEVELOPER
CASC ENGINEERING AND CONSULTING
JOYCE GOODE, CPESC, QSD/P
18 TECHNOLOGY DRIVE, SUITE 135
IRVINE, CA 92618
CELL: (909) 557-0276
JGOODE@CASCINC.COM

QUALIFIED SWPPP PRACTITIONER
SOUTHERN CALIFORNIA EDISON (SCE)
LUCY CORTEZ-JOHNSON, CPESC, QSD/P, ToR
2244 WALNUT GROVE AVENUE
GO-1, QUAD 2C
ROSEMEAD, CA 91770
OFFICE: (714) 794-7805

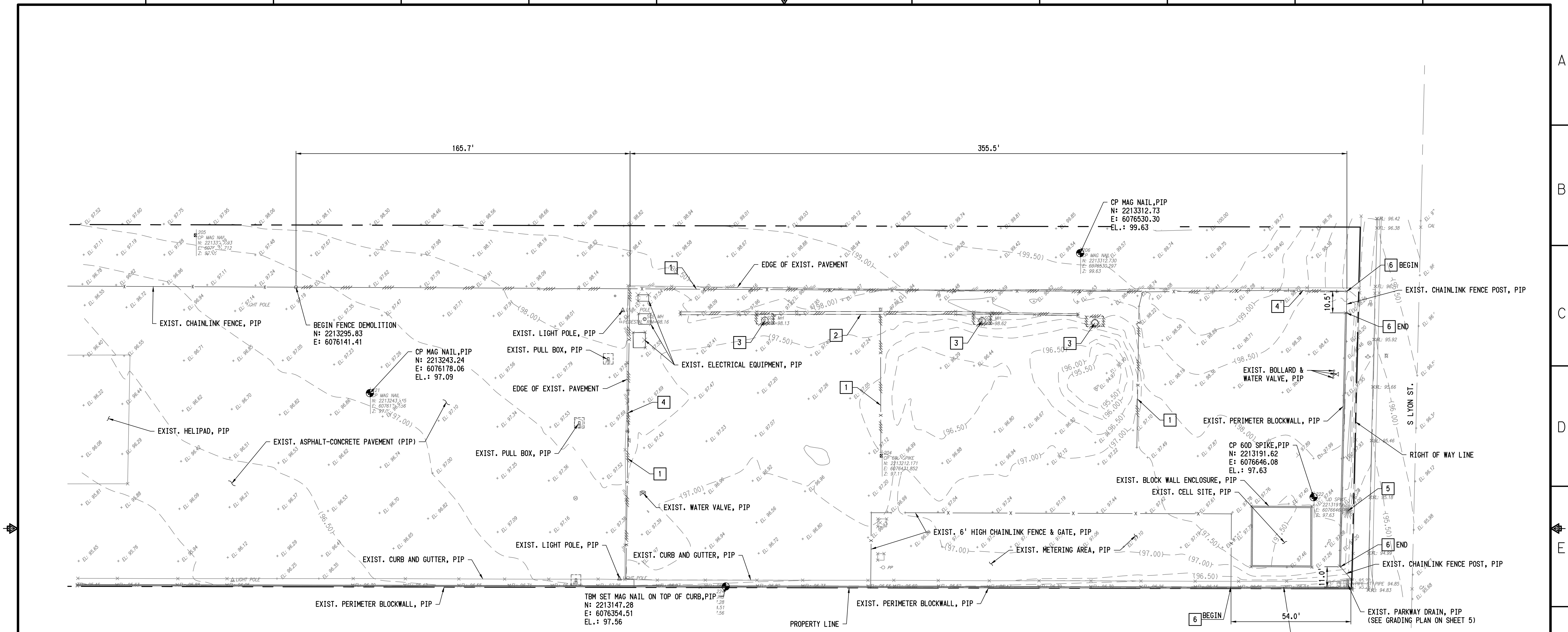


LOCATION MAP
APPROX. SCALE: 1"=150'

SWPPP Sheet 1 of 4

LOCATION: SANTA ANA AUTOMATION YARD	SHEET NO. 2
KEY PLAN AND CONSTRUCTION NOTES	SCALE: AS SHOWN
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company	2 OF 13 SHTS.

5640020-A

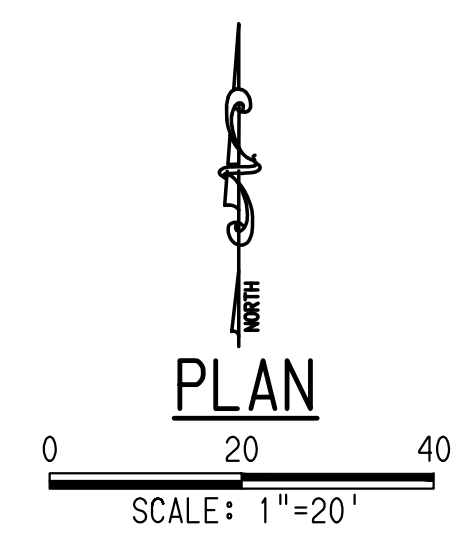


LEGEND:

- EXISTING CONCRETE CURB/WALL (TO BE REMOVED)
- EXISTING CHAINLINK FENCE, (TO BE REMOVED)
- EXISTING CHAINLINK FENCE, PIP
- EXISTING CHAINLINK SLIDING GATE (TO BE REMOVED)
- EXISTING MANHOLE/VAULT (TO BE REMOVED)
- EXISTING BLOCKWALL, PIP

DEMOLITION NOTES: EST. QUANTITIES

- 1 REMOVE AND DISPOSE EXISTING 6' HIGH CHAIN LINK FENCE INCLUDING ITS POST & FOOTING. 790 LF
- 2 REMOVE AND DISPOSE EXISTING CURB/WALL INCLUDING ITS FOOTING. 198 LF
- 3 REMOVE EXISTING MANHOLE/VAULT. BACKFILL EXCAVATION PER GEOTECH RECOMMENDATIONS. 3 EA
- 4 REMOVE AND DISPOSE EXISTING CHAIN LINK SLIDING GATE. 2 EA
- 5 REMOVE AND DISPOSE EXISTING TREE. 1 EA
- 6 REMOVE AND DISPOSE EXISTING CHAINLINK FABRIC. 76 LF



TWO WORKING DAYS BEFORE YOU DIG

5640020	SHT 13	EROSION CONTROL DETAILS	5640020	SHT 7	FENCE SECTIONS AND DETAILS
5640020	SHT 12	EROSION CONTROL PLAN	5640020	SHT 6	GRADING SECTIONS AND PLAN DETAILS
5640020	SHT 11	GATE SECTIONS AND DETAILS	5640020	SHT 5	GRADING, DRAINAGE, SURFACING & FENCING PLAN SHT. 2 OF 2
5640020	SHT 10	GATE SECTIONS AND DETAILS	5640020	SHT 4	GRADING, DRAINAGE, SURFACING & FENCING PLAN SHT. 1 OF 2
5640020	SHT 9	GATE TYP. PLAN AND SECTION	5640020	SHT 2	KEY PLAN & CONSTRUCTION NOTES
5640020	SHT 8	FENCE SCE ECS STANDARDS AND DETAILS	5640020	SHT 1	TITLE SHEET AND GENERAL NOTES
REFERENCE DRAWINGS			REFERENCE DRAWINGS		

NO.	REVISIONS	DATE	SAP	WO	SUPV	APPROVED	ENGR	CK'D	MADE	P.E.	NO.
-----	-----------	------	-----	----	------	----------	------	------	------	------	-----

LOCATION: SANTA ANA AUTOMATION YARD	SHEET NO. 3
DEMOLITION PLAN	SCALE: 1"=20'
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company	3 OF 13 SHTS.

5640020-A

S:\CGR-DB PROJECTS\SANTA ANA AUTOMATION YARD\WORKING\DWG\SHT3-DEMO-SANTA ANA AUTOMATION YARD.dwg

* REVISE ON AUTOCAD SYSTEM ONLY *

1 2 3 4 5 6 7 8 9 10 11 12

A

B

C

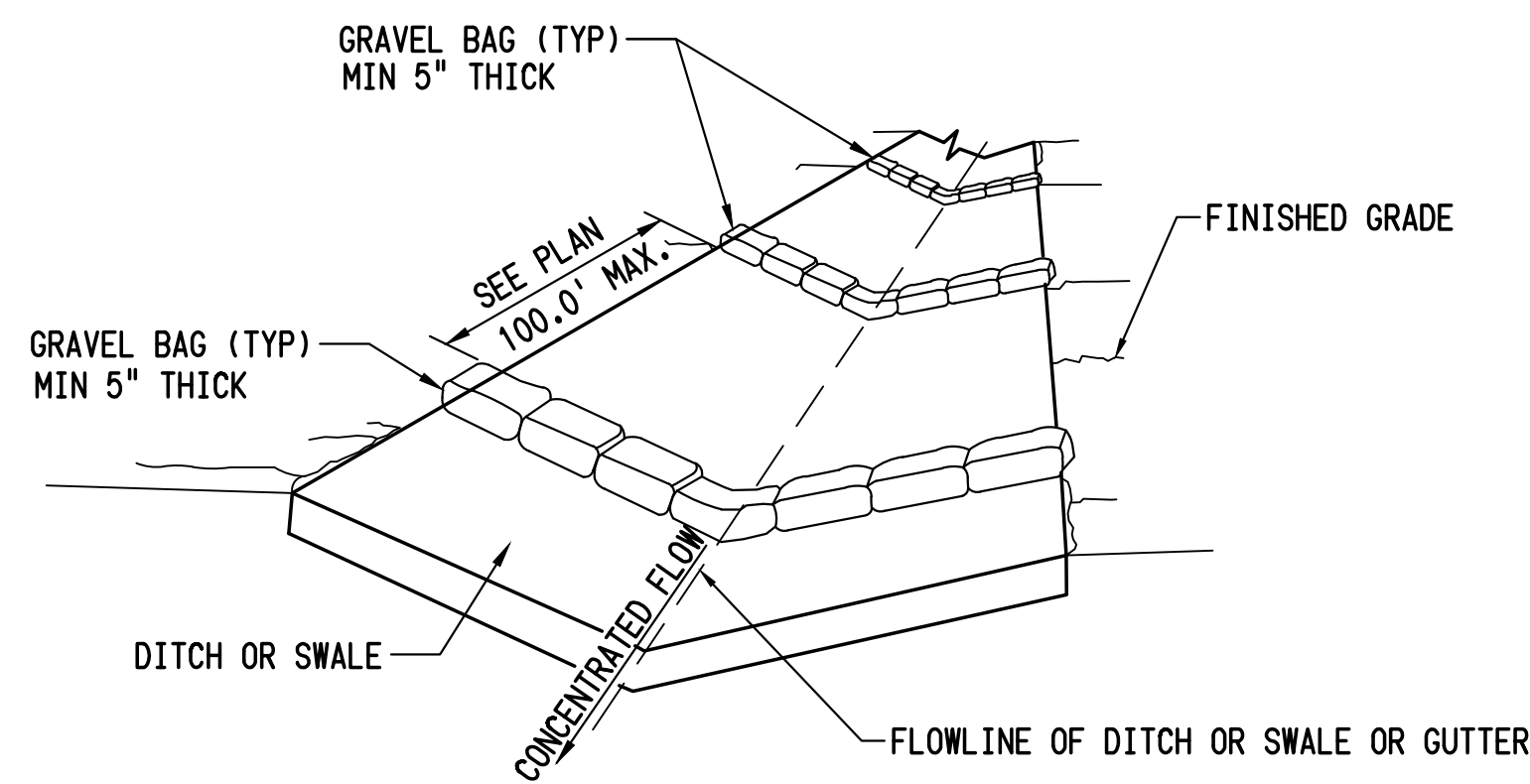
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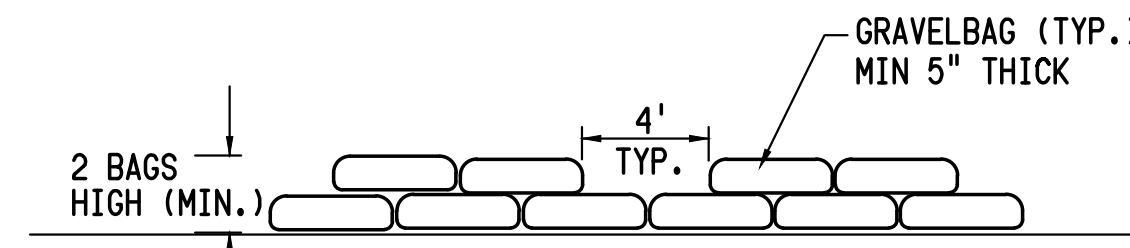
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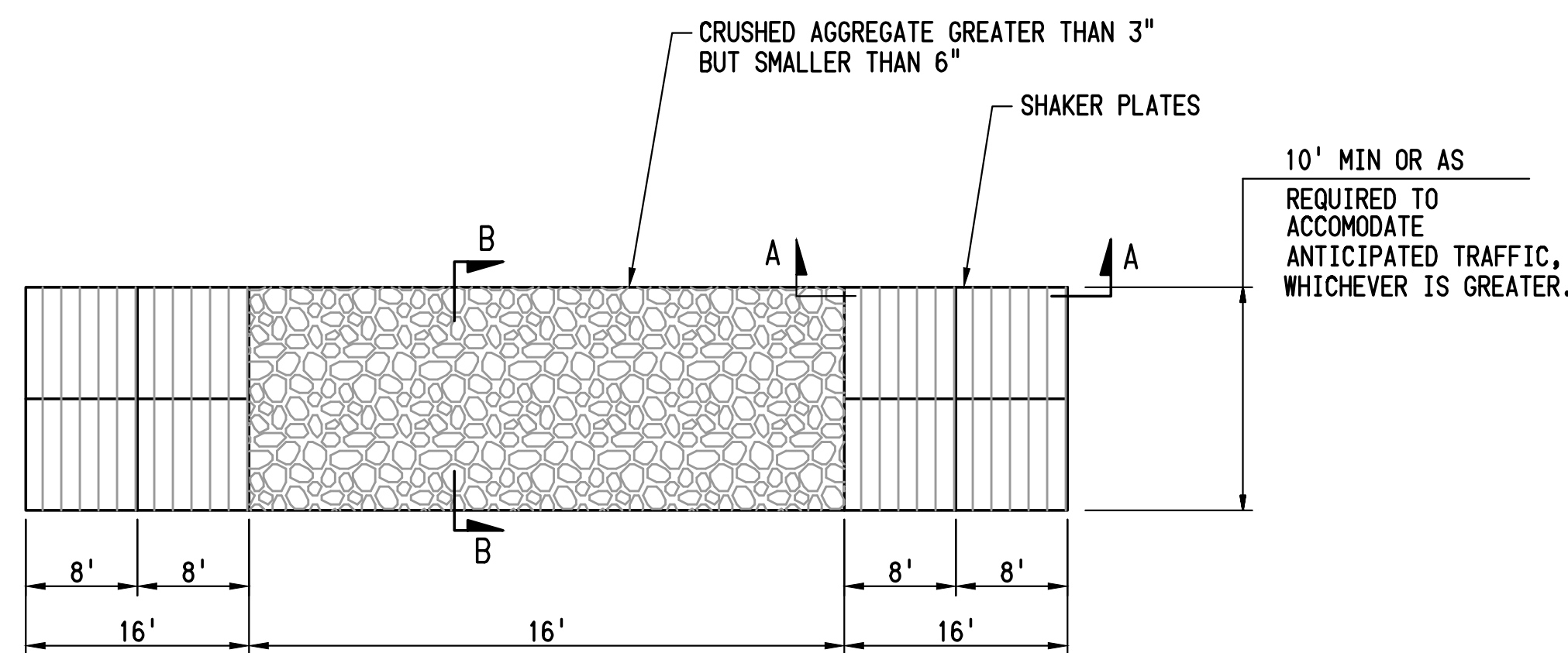
TYPICAL DETAIL - VELOCITY REDUCER

DETAIL 1
NOT TO SCALE SHT. 12

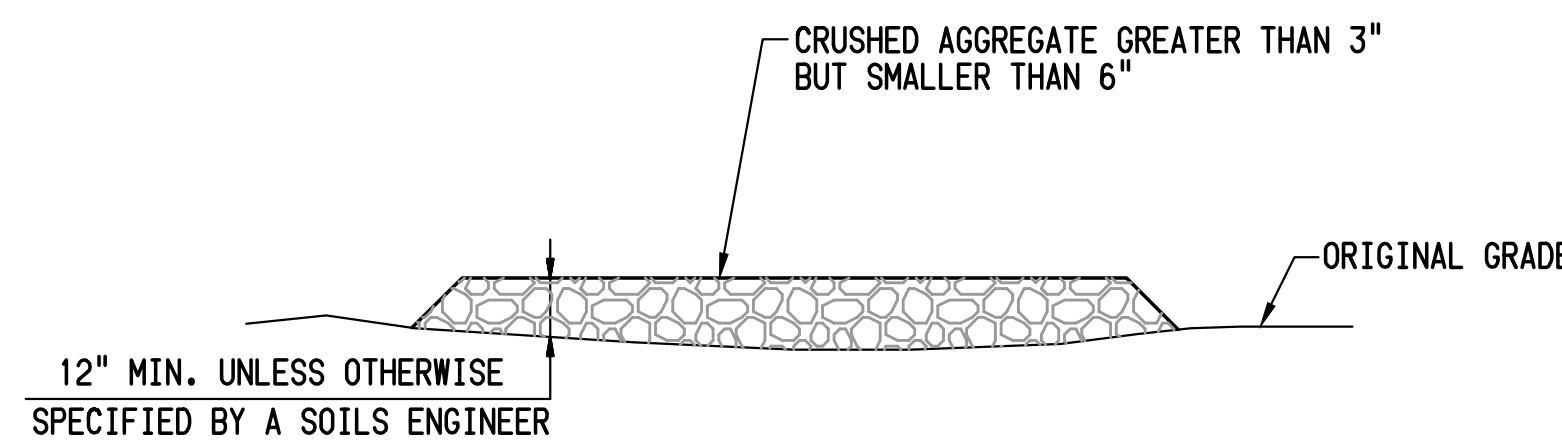


TYP. DETAIL - GRAVELBAG BERM

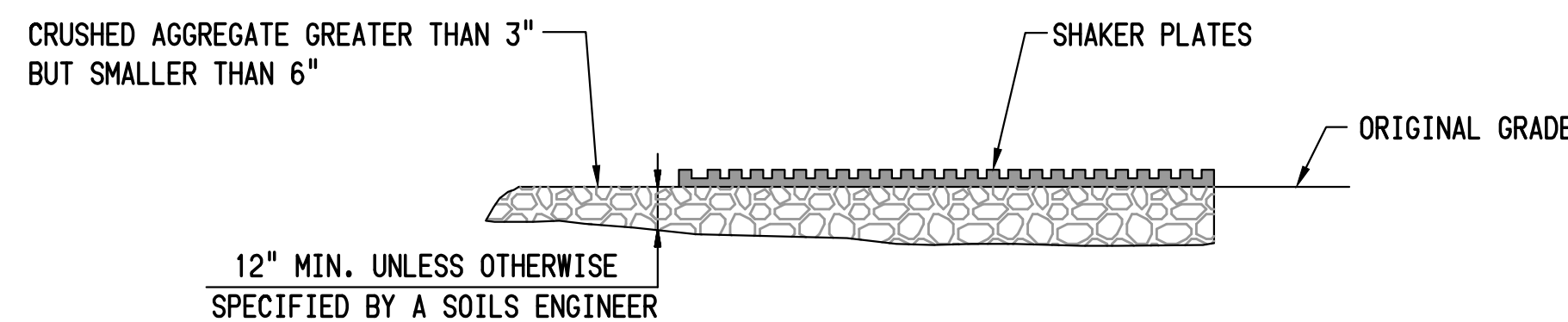
DETAIL 2
NOT TO SCALE SHT. 12



PLAN
NOT TO SCALE



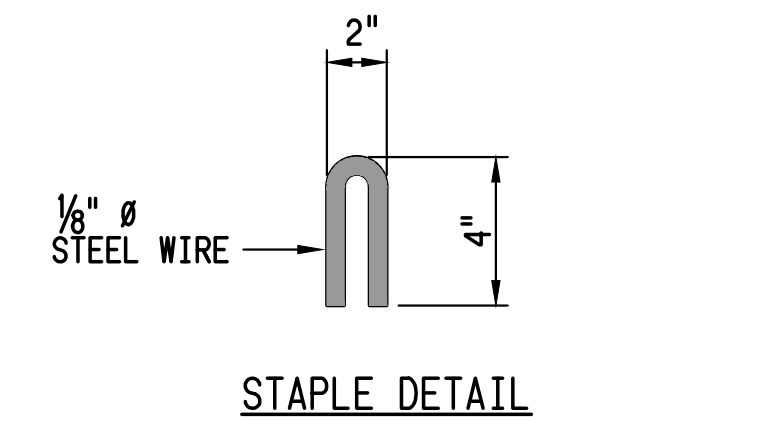
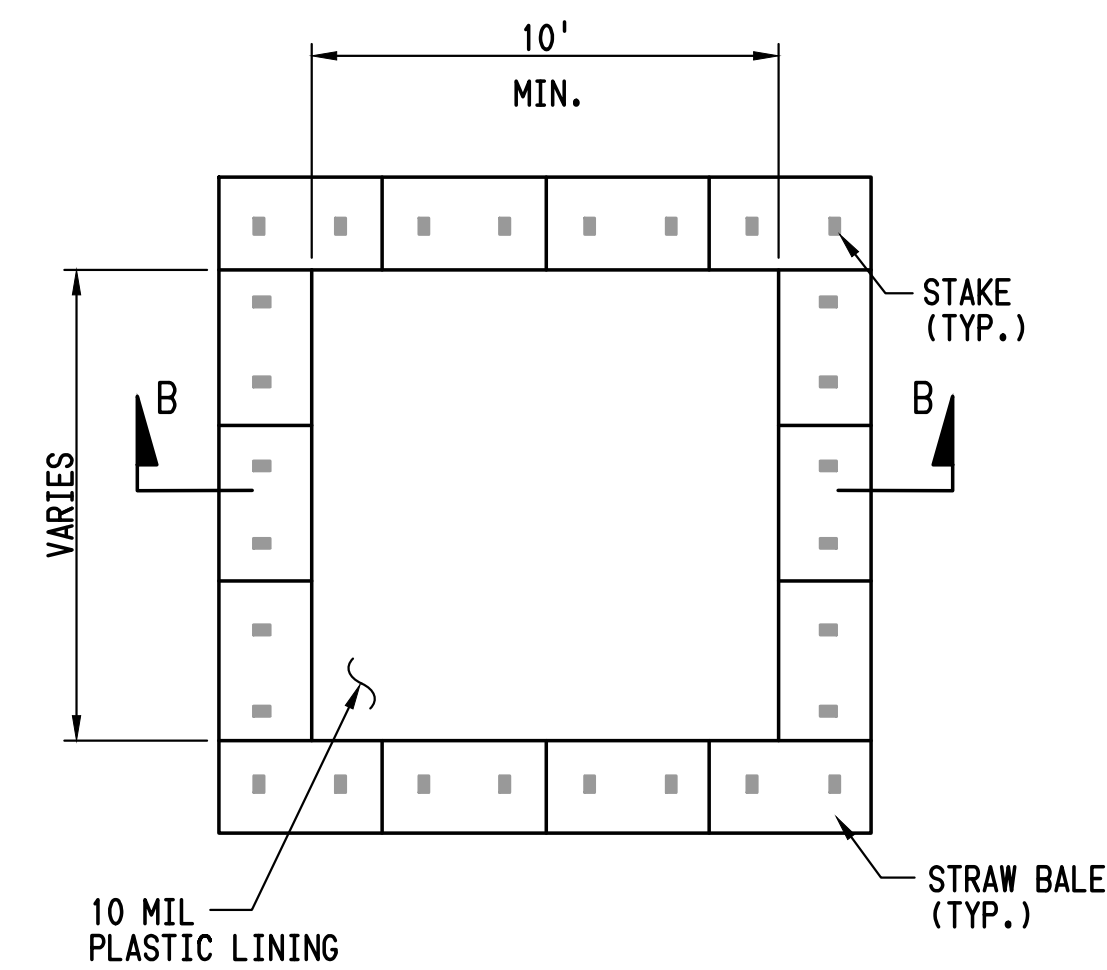
SECTION B-B
NTS



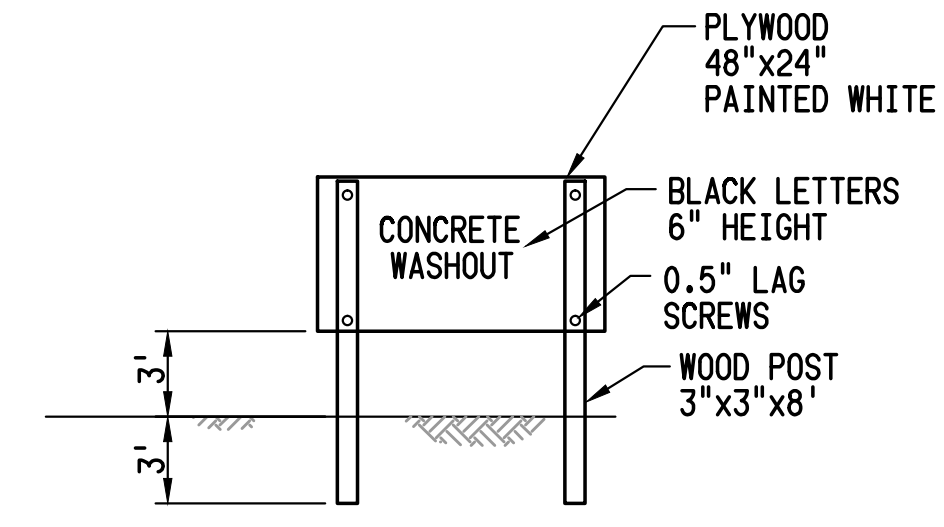
SECTION A-A
NTS

DETAIL - STABILIZED CONSTRUCTION ENTRANCE/EXIT

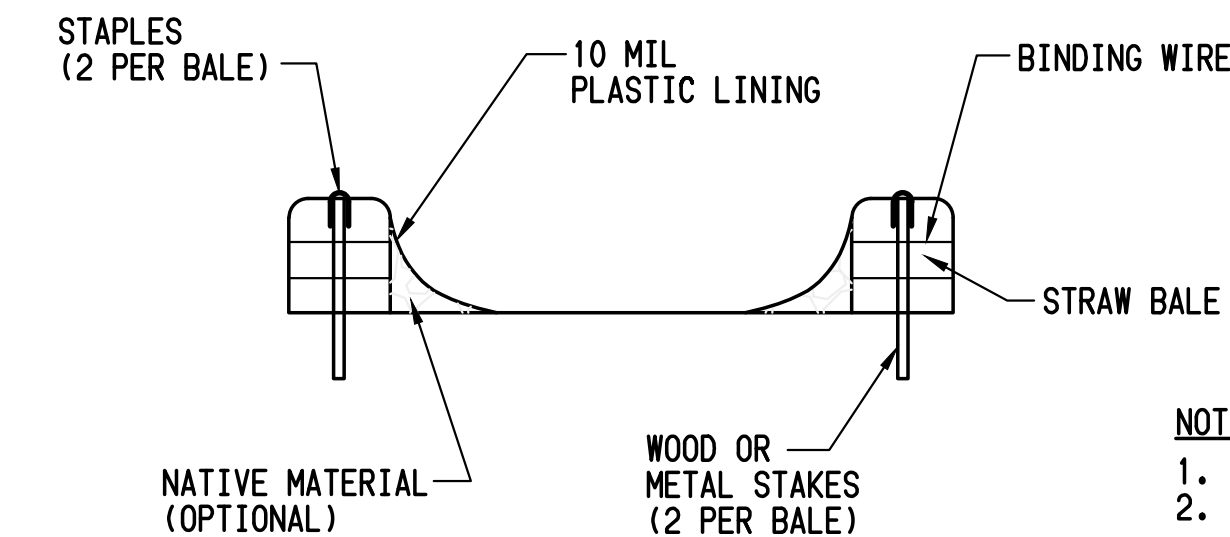
DETAIL 3
NOT TO SCALE SHT. 12



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)



SECTION B-B
NOT TO SCALE

- NOTES
1. ACTUAL LAYOUT DETERMINED IN FIELD.
 2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

CONCRETE WASTE MANAGEMENT WM-8

CONCRETE WASHOUT DETAIL 4
FIELD LOCATE NOT TO SCALE SHT. 12

Underground Service Alert



TWO WORKING DAYS BEFORE YOU DIG

SWPPP Sheet 4 of 4

LOCATION: SANTA ANA AUTOMATION YARD

EROSION CONTROL DETAILS

SHEET NO.

13

SCALE: AS SHOWN

13 OF 13 SHTS.



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5640020-A

APPENDIX C

Amendments and Changes to PRDs

SWPPP AMENDMENT LOG

Project Name: Santa Ana Automation Yard Project

Amendment No.	Prepared by QSD	Brief Description of Amendment	Date

APPENDIX D

CONSTRUCTION SITE MONITORING PROGRAM RECORDS:

- Chain of Custody (COC) Form
- Pollutant Testing Guidance Table

Note: The following forms are available inside of SCE's CloudCompli Mobile Inspection Application and not included within the body of this SWPPP:

7. Storm Water Inspection Forms
 8. Chain of Custody (COC) Form
 9. Pollutant Testing Guidance Table
 10. Sampling Field Log for Non-Visible Pollutants
 11. Effluent Sampling Field Log **[RL 2&3]**
- NAL Exceedance Evaluation Summary Report



Calscience

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For courier service / sample drop off information, contact us26_sales@eurofinsus.com or call us.

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY

DATE: _____

PAGE: _____ OF _____

LABORATORY CLIENT:						CLIENT PROJECT NAME / NUMBER:										P.O. NO.:											
ADDRESS:						PROJECT CONTACT:										SAMPLER(S): (PRINT)											
CITY: _____ STATE: _____ ZIP: _____																											
TEL: _____		E-MAIL: _____				REQUESTED ANALYSES																					
TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):						Please check box or fill in blank as needed.																					
<input type="checkbox"/> SAME DAY <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input type="checkbox"/> 5 DAYS <input type="checkbox"/> STANDARD																											
<input type="checkbox"/> COELT EDF		GLOBAL ID: _____				LOG CODE: _____																					
SPECIAL INSTRUCTIONS:						Unpreserved	Preserved	Field Filtered																			
LAB USE ONLY	SAMPLE ID	SAMPLING		MATRIX	NO. OF CONT.				<input type="checkbox"/> TPH(g) <input type="checkbox"/> GRO	<input type="checkbox"/> TPH(d) <input type="checkbox"/> DRO	TPH <input type="checkbox"/> C6-C36 <input type="checkbox"/> C6-C44	TPH _____	BTEX / MTBE <input type="checkbox"/> 8260 <input type="checkbox"/> _____	VOCs (8260)	Oxygenates (8260)	Prep (5035) <input type="checkbox"/> En Core <input type="checkbox"/> Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs <input type="checkbox"/> 8270 <input type="checkbox"/> 8270 SIM	T22 Metals <input type="checkbox"/> 6010/747X <input type="checkbox"/> 6020/747X	Cr(VI) <input type="checkbox"/> 7196 <input type="checkbox"/> 7199 <input type="checkbox"/> 218.6					
		DATE	TIME																								
Relinquished by: (Signature)						Received by: (Signature/Affiliation)										Date:		Time:									
Relinquished by: (Signature)						Received by: (Signature/Affiliation)										Date:		Time:									
Relinquished by: (Signature)						Received by: (Signature/Affiliation)										Date:		Time:									

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Asphalt Products	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	pH Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)
					SM 2310B (Acidity)
					EPA 300.0 (Anion)
	Bleaches	No	Residual Chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No	Phosphate	Phosphate	EPA 365.3 (Phosphate)
	Solvents	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)

Portland Concrete Cement	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	Methyl Methacrylate	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	Aluminum Calcium Vanadium Zinc	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
			VOC/SVOC		EPA 601/602 or EPA 624 (VOC)/ EPA 625 (SVOC)

Landscaping and Other Products	Aluminum Sulfate	No	Aluminum	TDS Meter Sulfate	EPA 200.8 (Metal)
			TDS		EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	Sulfate	Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic ⁴	No	Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	Herbicide	None	Check lab for specific herbicide or pesticide
	Pesticide		Pesticide		
Lime	Alkalinity		pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)	
	pH			EPA 150.1 (pH)	
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		

Line Flushing Products	Chlorinated Water	No	Total chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)
			Phenols	Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		

Soil Amendment/ Stabilization Products	Polymer/Copolymer ⁵	No	Organic Nitrogen	None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
			TDS	TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		

Treated Wood Products	Ammoniacal-Copper-Zinc-Arsenate (ACZA)	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
	Copper-Chromium-Arsenic (CCA)		Total Chromium		
	Ammoniacal-Copper-Arsenate (ACA)		Copper		
	Copper Naphthenate		Zinc		
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. If specific pollutant is known, analyze only for that specific pollutant. See SDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.

APPENDIX E

CONSTRUCTION SCHEDULE

Construction Schedule

Event or Construction Phase	Estimated Dates
Overall Start of Construction Estimated Date:	August 30, 2021
Estimated Start Date BMP Installation:	August 30, 2021
Estimated Completion of Final Stabilization Activities:	February 28, 2022
Estimated Overall Completion Date:	February 28, 2022

APPENDIX F

TRAINING MATERIALS AND LOGS

Trained Contractor Personnel Log

Storm Water Management Training Log

Project Name: Santa Ana Automation Yard Project

Storm Water Management Topic: (check as appropriate)

- | | |
|---|---|
| <input type="checkbox"/> Erosion Control | <input type="checkbox"/> Sediment Control |
| <input type="checkbox"/> Wind Erosion Control | <input type="checkbox"/> Tracking Control |
| <input type="checkbox"/> Non-storm water management | <input type="checkbox"/> Waste Management and Materials Pollution Control |
| <input type="checkbox"/> Storm Water Sampling | |

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster
(Attach additional forms if necessary)

Name	Company	Phone

COMMENTS:

Trained Contractor Personnel Log

(Insert any documentation of training here.)

Date	Training Type (ex. formal class, tailgate session, video)	Training Duration	Attendees

Note: Attach copies of sign-in sheets or other documentation of training (certificates, materials presented, agenda, etc.)

APPENDIX G

CONTRACTORS AND SUBCONTRACTORS

CONTRACTORS AND SUBCONTRACTORS

Contractor/Subcontractor Name and Address	Contact Person/ Phone Number	Activity

APPENDIX H

CASQA CONSTRUCTION BMP HANDBOOK FACT SHEETS

JANUARY				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
		1	2 NTP MOBILIZATION	3
			9	10 Grading
6 Install erosion & sediment control measures	7	8 Land clearing		16
		13	14	15
12				22
				23

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. 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.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

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

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

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to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.
- Avoid soil disturbance during periods with high wind velocities.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques

should be compared with the other less effective erosion and sedimentation controls to achieve a cost-effective balance.

Inspection and Maintenance

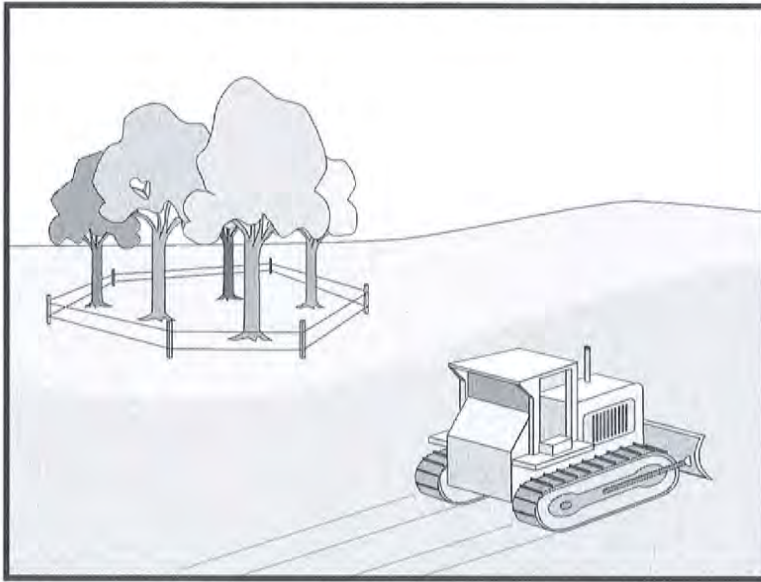
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, 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. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.
- Protecting existing vegetation buffers and swales.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Preservation of Existing Vegetation EC-2

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. 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.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
 - Orange colored plastic mesh fencing works well.
 - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Preservation of Existing Vegetation EC-2

- Consider pruning or mowing vegetation instead of removing it to allow for regrowth.
- If possible, retain vegetation buffer around the site and adjacent waterways.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of \$10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far 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 or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a tree's root zone by punching holes 12 in. deep with an iron bar and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization:

Preservation of Existing Vegetation EC-2

- Fertilize trees in the late fall or early spring. Although to note, many native species do not require fertilization.
- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

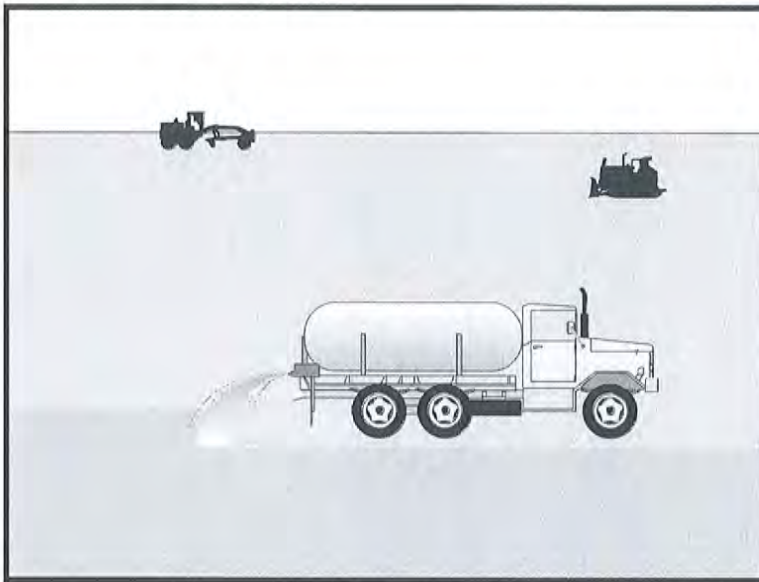
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Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time.
- Soil stockpiles.
- Temporary haul roads prior to placement of crushed rock.
- Compacted soil road base.
- Construction staging, materials storage, and layout areas.
- Slopes and areas requiring stabilization prior to rain.
- Disturbed areas subject to high winds.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching

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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. Curing time may be 24 hours or longer. 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.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- 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.
- The water quality impacts of some chemical soil binders are relatively unknown, and some may have water quality impacts due to their chemical makeup. Additionally, these chemicals may require non-visible pollutant monitoring. Products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to the product Material Safety Data Sheet for chemical properties.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site 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, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Safety Data Sheet (SDS) from the manufacturer to ensure non-toxicity (note however, the SDS may not include ecological information).
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
 - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.

- Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Some soil binders are designed for application to roads.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

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

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- 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 is related to the functional longevity of the binder, which 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 clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	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 together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should 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 should 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 and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1-part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

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% acrylic emulsion blend of 40% 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 the manufacturer's recommendations and applied with a hydraulic seeder at the rate of 20 gallons/acre. 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 (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Poly-Acrylamide (PAM) and Copolymer of Acrylamide: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:
 - Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
 - The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
 - PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
 - PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. 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%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

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

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 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 time.
- For liquid agents:
 - Crown or slope ground to avoid ponding.
 - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
 - Apply solution under pressure. Overlap solution 6 to 12 in.
 - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
 - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
 - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre
Plant-Material-Based (Short Lived) Binders	\$900-\$1,200
Plant-Material-Based (Long Lived) Binders	\$1,500-\$1,900
Polymeric Emulsion Blend Binders	\$900-\$1,900
Cementitious-Based Binders	\$1,000-\$1,500

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
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
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies ⁽¹⁾	Varies ⁽¹⁾	Varies ⁽¹⁾	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

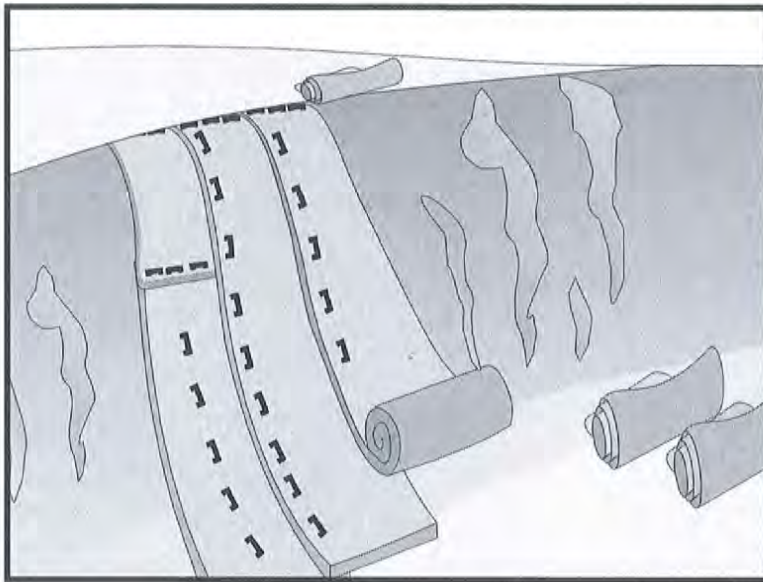
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Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high, and vegetation will be slow to establish. Matting is also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations:

- Steep slopes, generally steeper than 3:1 (H:V).
- Long slopes.
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding

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- Disturbed areas where temporary cover is needed, or plants are slow to establish or will not establish.
- Channels with flows exceeding 3.3 ft/s.
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies.

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g., channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature and/or sunlight.
- RECPs 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). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic sheeting should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until other measures, such as seeding and mulching, may be installed.
 - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
 - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- According to the State Water Board's *CGP Review, Issue #2*, only RECPs that either do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials, such as jute, sisal, or coir fiber should be used due to plastic pollution and wildlife concerns. If a plastic-netted product is used for temporary stabilization, it must be promptly removed when no longer needed and removed or replaced with non-plastic netted RECPs for final stabilization.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting. As per State Water Board guidance, RECPs that

contain plastic netting are discouraged for temporary controls and are not acceptable alternatives for permanent controls. RECPs that do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber should be used.

- RECPs may have limitations in extremely windy climates; they are susceptible to wind damage and displacement. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.
- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.
- Plastic sheeting should have a minimum thickness of 6 mils and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).
- All sheeting must be inspected periodically after installation and after significant rainstorms 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.

Erosion Control Blankets/Mats

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.
- **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd², ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5

lb/yd². Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- 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. Only biodegradable RECPs can remain on a site applying for a Notice of Termination due to plastic pollution and wild life concerns (State Waterboard, 2016). RECPs containing plastic that are used on a site must be disposed of for final stabilization.
- **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 1/4 in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Bonded synthetic fibers** consist of a three-dimensional geometric nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates

root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding/Planting

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

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd². Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 1/2 staples/yd². Check manufacturer's specifications to determine if a higher density staple pattern is required.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.

- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake 1/2-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- 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 just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre
Biodegradable	Jute Mesh	\$7,700-\$9,000
	Curled Wood Fiber	\$10,200-\$13,400
	Straw	\$10,200-\$13,400
	Wood Fiber	\$10,200-\$13,400
	Coconut Fiber	\$16,600-\$18,000
	Coconut Fiber Mesh	\$38,400-\$42,200
	Straw Coconut Fiber	\$12,800-\$15,400
Non-Biodegradable	Plastic Netting	\$2,600-\$2,800
	Plastic Mesh	\$3,800-\$4,500
	Synthetic Fiber with Netting	\$43,500-\$51,200
	Bonded Synthetic Fibers	\$57,600-\$70,400
	Combination with Biodegradable	\$38,400-\$46,100

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

References

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Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

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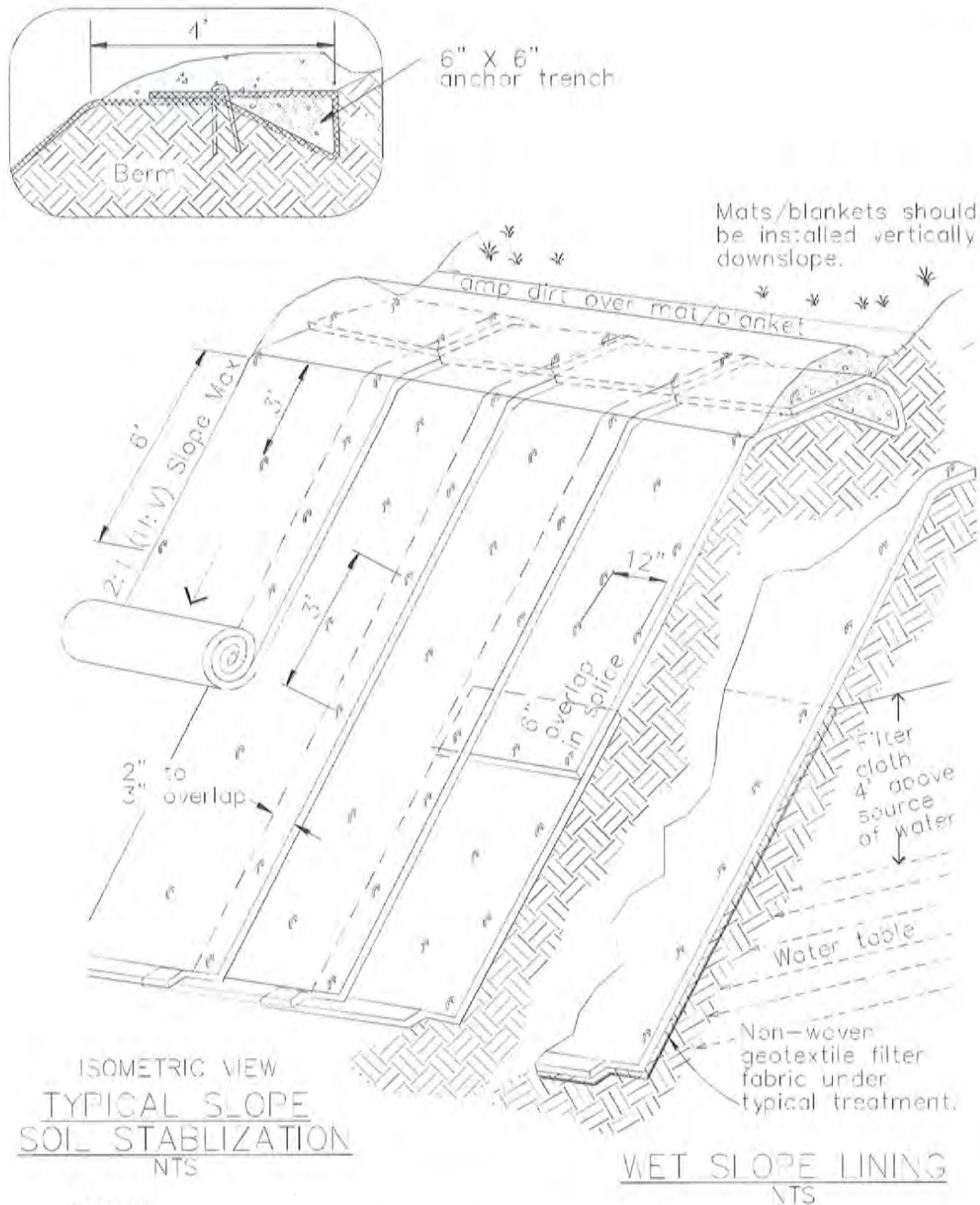
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Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

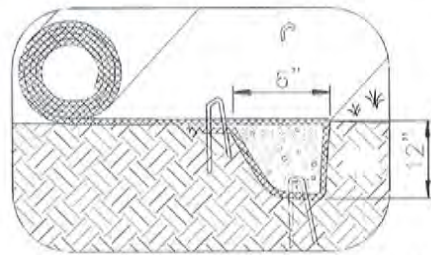
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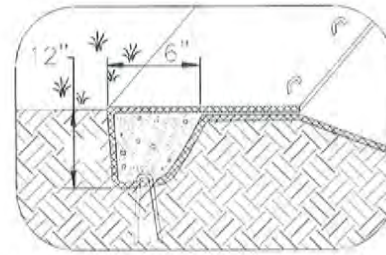
NOTES:

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

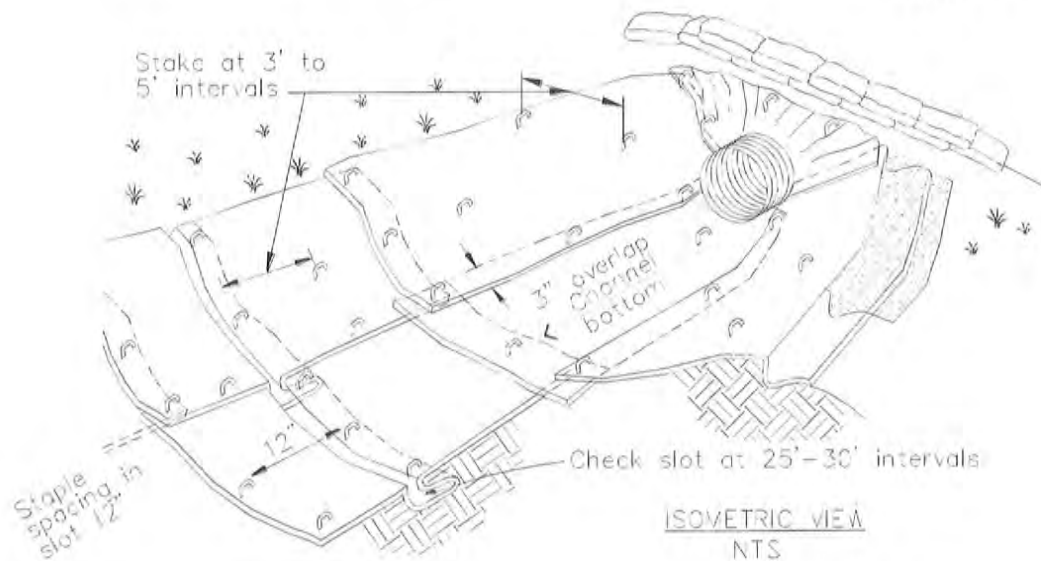
TYPICAL INSTALLATION DETAIL



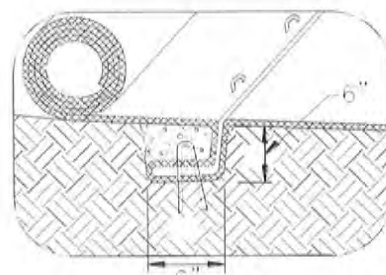
INITIAL CHANNEL ANCHOR TRENCH
NTS



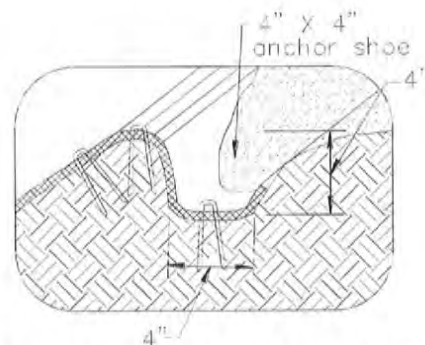
TERMINAL SLOPE AND CHANNEL
ANCHOR TRENCH
NTS



ISOMETRIC VIEW
NTS



INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:

1. Check slots to be constructed per manufacturers specifications
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



Description and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch or bark to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established. Wood mulch may also be used for final stabilization; generally, used in a landscape setting or areas that will have pedestrian traffic.

Limitations

- Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter. Not suitable for use on slopes steeper than 3:1 (H:V). For slopes steeper than 3:1, consider the use of Compost Blankets (EC-14).
- Wood mulch may introduce unwanted species if it contains seed, although it may also be used to prevent weed growth if it is seed-free.
- Not suitable for areas exposed to concentrated flows.
- If used for temporary stabilization, wood mulch may need to be removed prior to further earthwork.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats

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Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a device such as a punching type roller or by track walking. The construction application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

- **Green Material:** This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Chipped brush from on-site vegetation clearing activities may be used (this may require stockpiling and reapplying after earthwork is complete). Methods of application are generally by hand although pneumatic methods are available.
 - Green material can be used as a temporary ground cover with or without seeding.
 - The green material should be evenly distributed on site to a depth of not more than 2 in.
- **Shredded Wood:** Suitable for ground cover in ornamental or revegetated plantings.
 - Shredded wood/bark is conditionally suitable. See note under limitations.
 - Distribute by hand or use pneumatic methods.
 - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in.
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Assuming a 2-in. layer of wholesale landscaping-grade wood mulch, the average one-time cost for installation may range from \$15,000 – \$23,000 per acre¹. Costs can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

¹ Costs based on estimates provided by the California Department of Transportation's *Soil Stabilization BMP Research for Erosion and Sediment Controls Cost Survey Technical Memorandum*, CTSW-TM-07-172.35.1, July 2007 (available at: http://www.dot.ca.gov/hq/LandArch/16_1a_design/guidance/estimating/Soil_Stabilization_Pricing.pdf) and adjusted for inflation from 1997 to 2016.

- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the 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.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.
- Reapply mulch when bare earth becomes visible.

References

Controlling Erosion of Construction Sites Agriculture Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

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Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible; examples include:

- Areas of vehicular or pedestrian traffic such as roads or paths;
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
- Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
- Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions.

Decomposed Granite (DG) is a permanent erosion protection method that consists of a layer of stabilized decomposed granite placed over an erodible surface.

Degradable Mulches of various types (see EC-3, EC-6, EC-8) can be used for temporary non-vegetative stabilization; examples include straw mulch, compost, wood chips or hydraulic mulch.

Geotextiles and Mats can be used for temporary non-vegetative stabilization (see EC-7). These BMPs are typically manufactured from degradable or synthetic materials and are

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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designed and specified based on their functional longevity, i.e., how long they will persist and provide erosion protection. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization methods are instituted.

Gravel Mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate.

Rock Slope Protection consists of utilizing large rock or rip-rap (4" - 24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Soil Binders can be used for temporary non-vegetative stabilization (see EC-5). The key to their use is functional longevity. In most cases, the soil binder will need to be routinely monitored and re-applied to maintain an erosion-resistant coverage.

Suitable Applications

Non-vegetated stabilization methods are suitable for use on disturbed soil areas and on material stockpiles that need to be temporarily or permanently protected from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Decomposed Granite (DG) and Gravel Mulch are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

Degradable Mulches can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets for more information.

Geotextiles and Mats can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 mos – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats.

Rock Slope Protection can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Soil Binders can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information.

Limitations

General

- Refer to EC-3, EC-6, EC-8, and EC-14 for limitations on use of mulches. Refer to EC-7 for limitations on use of geotextiles and mats. Refer to EC-5 for limitations on use of Soil Binders.

Decomposed Granite

- Not available in some geographic regions.
- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V]).
- Installed costs may be more expensive than vegetative stabilization methods.

Gravel Mulch

- Availability is limited in some geographic regions.
- If not properly screened and washed, can contain fine material that can erode and/or create dust problems.
- If inadequately sized, material may be susceptible to erosion on sloped areas.
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds.

Rock Slope Protection

- Installation is labor intensive.
- Installed costs can be significantly higher than vegetative stabilization methods.
- Rounded stones may not be used on slopes greater than 2:1 [H:V].

Implementation

General

Non-vegetated stabilization should be used in accordance with the following general guidance:

- Should be used in conjunction with other BMPs, including drainage, erosion controls and sediment controls.
- Refer to EC-3, EC-6, EC-8, and EC-14 for implementation details for mulches. Refer to EC-7 for implementation details for geotextiles and mats. Refer to EC-5 for implementation details for soil binders.
- Non-vegetated stabilization measures should be implemented as soon as the disturbance in the areas they are intended to protect has ceased.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Decomposed Granite Stabilization

- If used for a road or path should be installed on a prepared base.
- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Though porous it is recommended to prevent standing water on or next to a decomposed granite road or pathway.

Gravel Mulch

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Rock Slope Protection

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

- Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. In addition, availability of certain materials will vary by region/location, which will also affect the cost. Costs of mulches, geotextiles and mats, and soil binders are presented in their respective fact sheets. Costs for decomposed granite, gravel mulch stabilization and rock slope protection may be higher depending on location and availability of materials. Caltrans has provided an estimate for gravel mulch of \$13 - \$20/yd² in flat areas and \$14 - \$30/yd² on side slopes (adjusted for inflation, 2016 dollars).

Inspection and Maintenance

General

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Refer to EC-3, EC-6, EC-8, and EC-14 for inspection and maintenance requirements for mulches. Refer to EC-7 for inspection and maintenance requirements for geotextiles and mats. Refer to EC-5 for inspection and maintenance requirements for soil binders.

Decomposed Granite and Gravel Mulch Stabilization

- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.

- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

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Arid Zone Forestry: A Guide for Field Technicians. Food and Agriculture Organization of the United Nations, 1989.

Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular Number 15, Third Edition, Federal Highway Administration, 2007.

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Erosion and Sediment Control Handbook: A Guide for Protection of State Waters through the use of Best Management Practices during Land Disturbing Activities, Tennessee Department of Environment and Conservation, 2002.

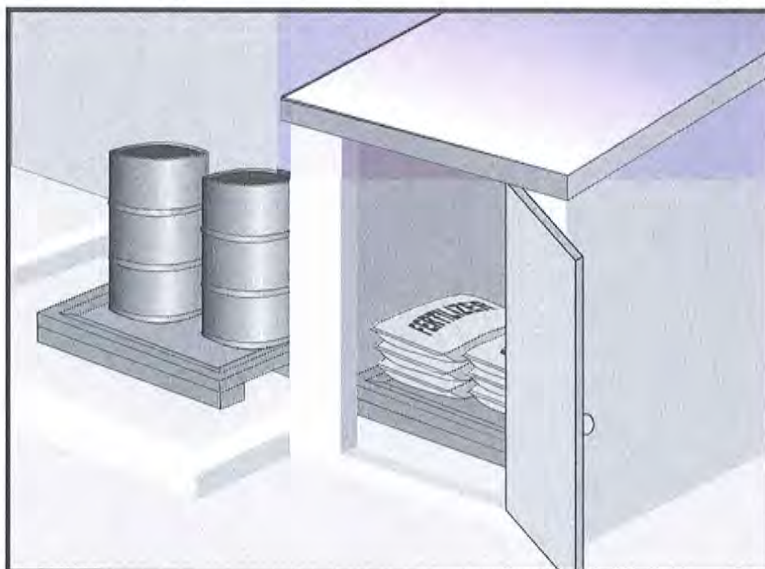
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Maine Erosion and Sediment Control BMPs, DEPLWo588, Maine Department of Environmental Protection: Bureau of Land and Water Quality, 2003.

National Menu of Best Management Practices, US Environmental Protection Agency, 2006.

Standard Specification 72-2: Rock Slope Protection. California Department of Transportation, 2006.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

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

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

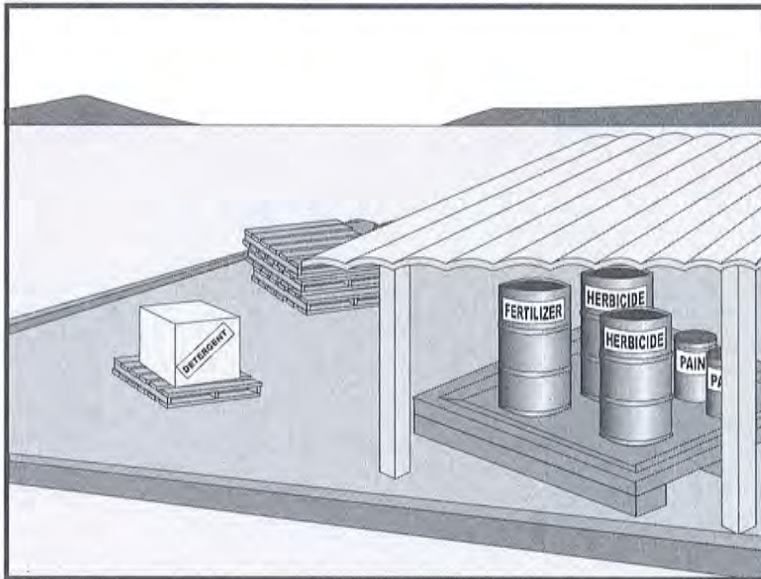
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Limitations

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

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
 - Do not treat soil that is water-saturated or frozen.
 - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
 - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
 - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
 - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
 - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
 - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
 - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- 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.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

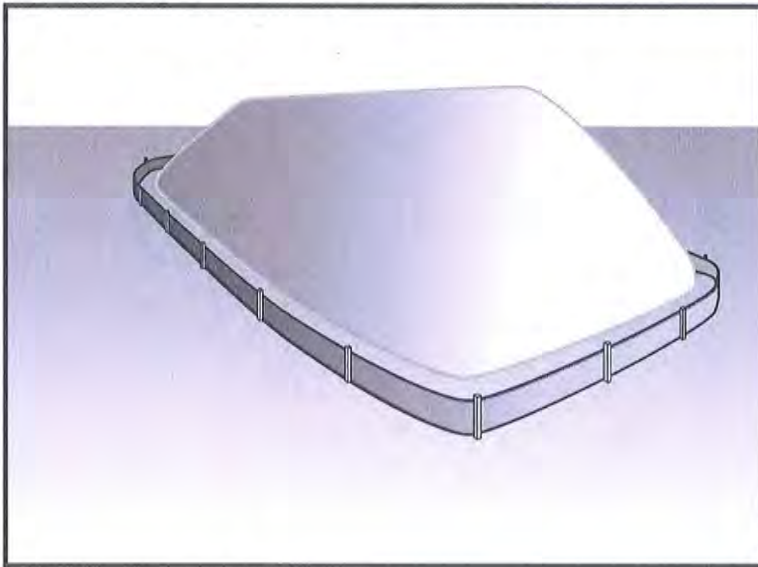
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP-2005-0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006. Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

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

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Treat Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater run-on using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of treated wood

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

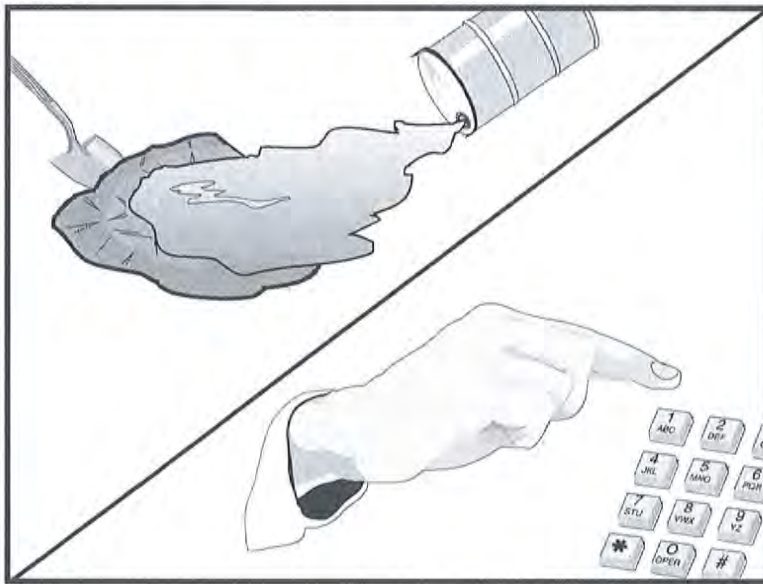
For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases, it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- 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 should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn’t compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

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.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
 - 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, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spill's contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

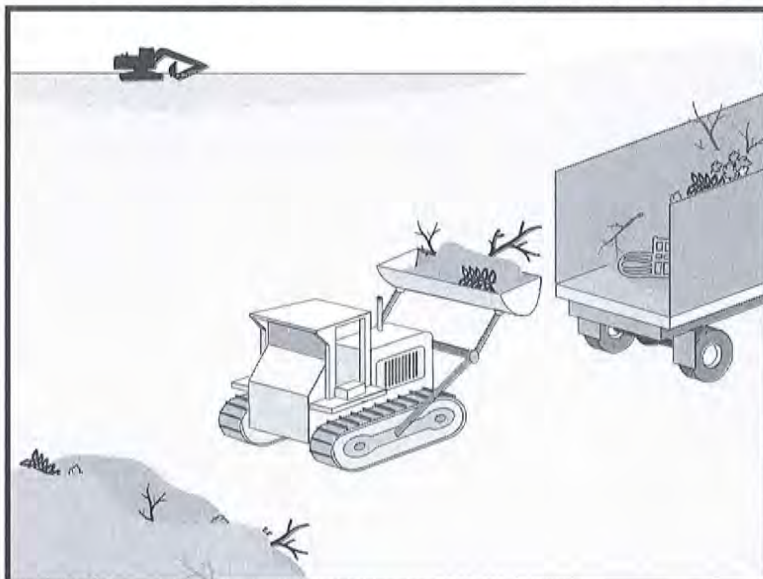
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

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

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should 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 should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runoff should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see 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 surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

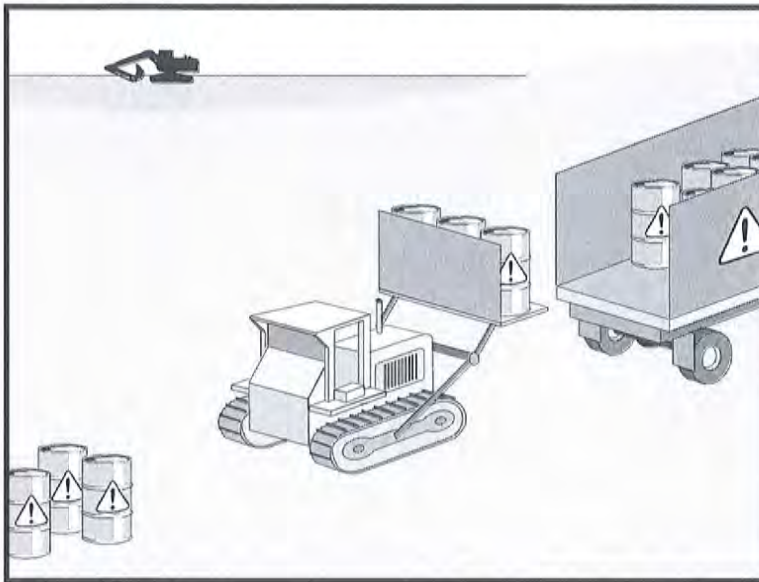
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
☒ Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- 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

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- 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.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
 - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
 - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
 - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, temporary containment facilities should 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.
- Drums should not be overfilled, and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil-based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
 - Ensure that adequate hazardous waste storage volume is available.
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - 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.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

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).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

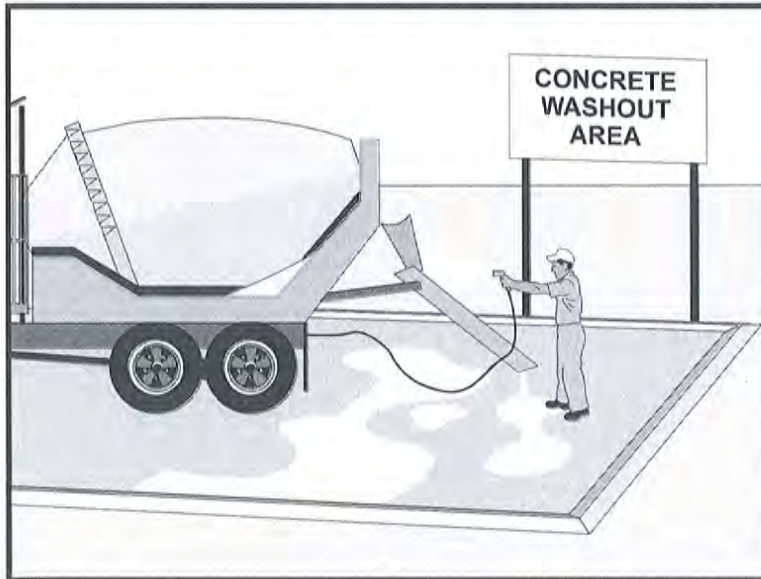
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing Portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
 - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
 - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
 - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

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

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
 - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
 - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
 - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
 - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off"; this concrete washout facility should be properly sealed to prevent leakage and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
 - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
 - Lath and flagging should be commercial type.
 - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

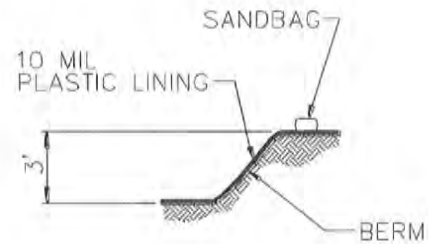
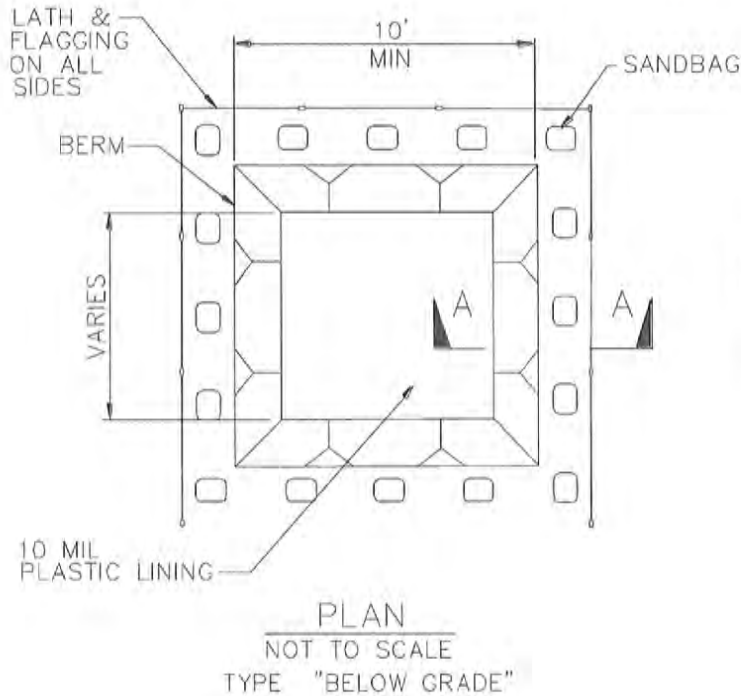
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

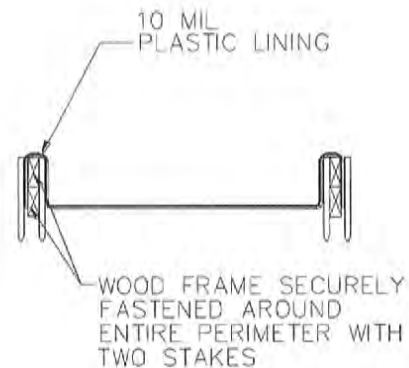
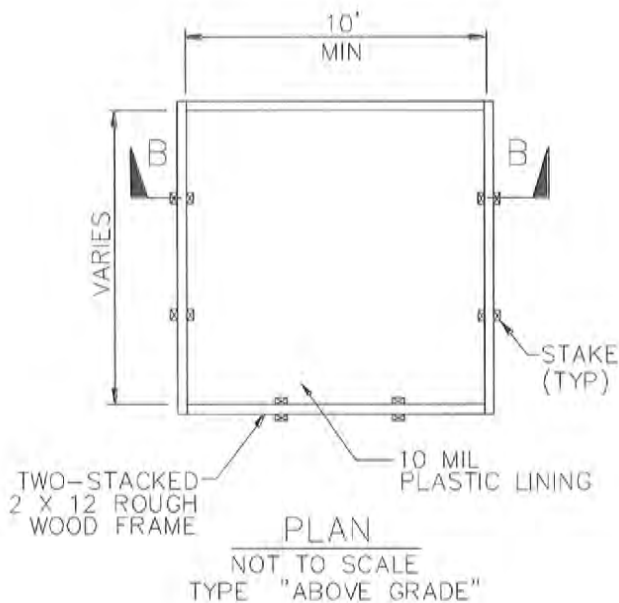
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



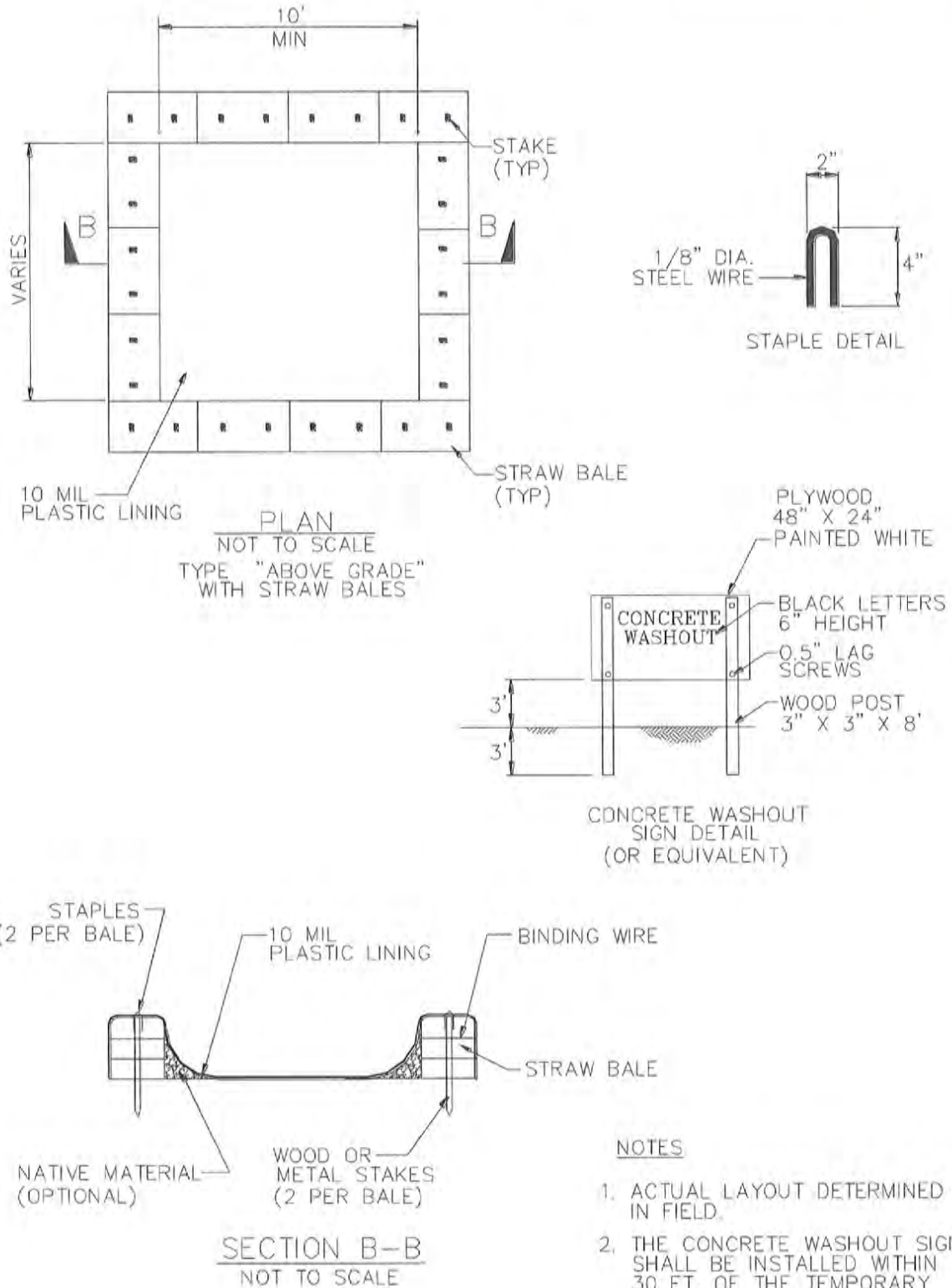
SECTION A-A
NOT TO SCALE



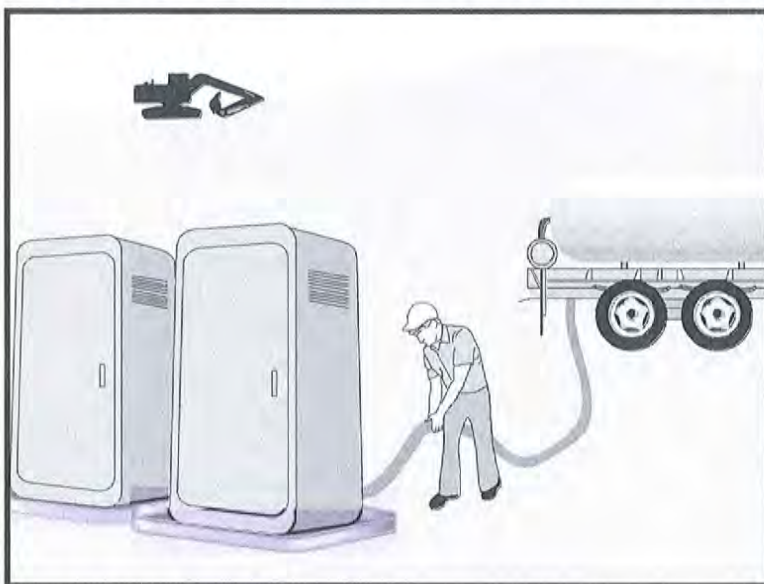
SECTION B-B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



Sanitary/Septic Waste Management WM-9



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Sanitary/Septic Waste Management WM-9

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

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 and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Sanitary/Septic Waste Management WM-9

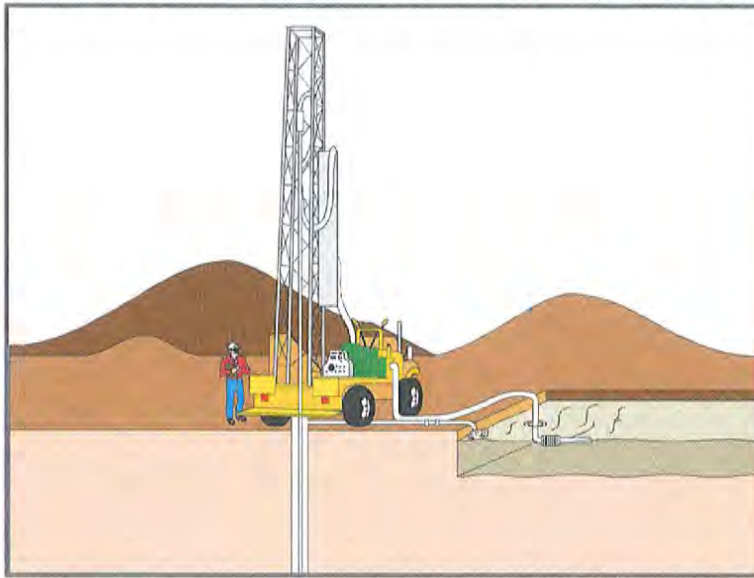
Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Description and Purpose

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

Suitable 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-stormwater liquid discharges not permitted by separate permits

Limitations

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

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 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-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained 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.

- Precautions should be taken 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.
- Containment areas or devices should not be located 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 that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.
- 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.
- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.
- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.
- 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.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Direct construction water runoff to areas where it can soak into the ground or be collected and used.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

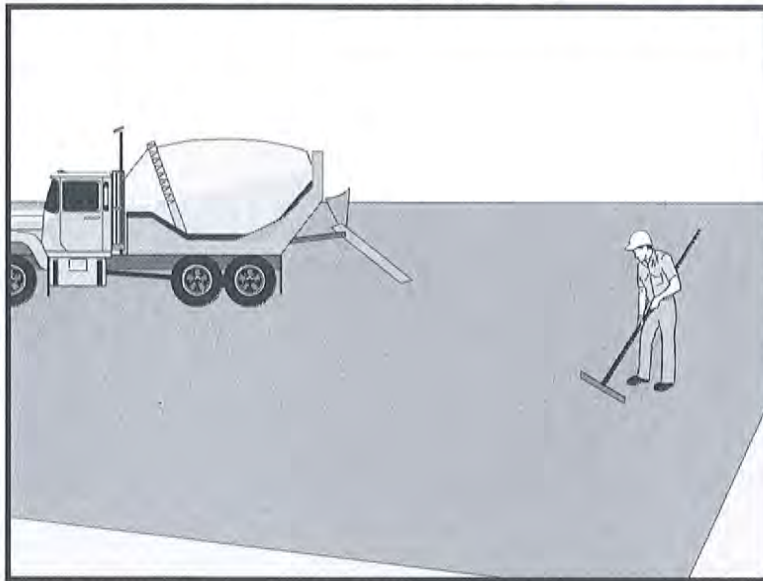
The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occurring.
- Repair water equipment as needed to prevent unintended discharges.
 - Water trucks
 - Water reservoirs (water buffalos)
 - Irrigation systems
 - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runoff (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of) or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered, or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping 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 illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
 - Abnormal water flow during the dry weather season
 - Unusual flows in sub drain 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 offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
 - Abnormal water flow during the non-irrigation season
 - Non-standard junction structures
 - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

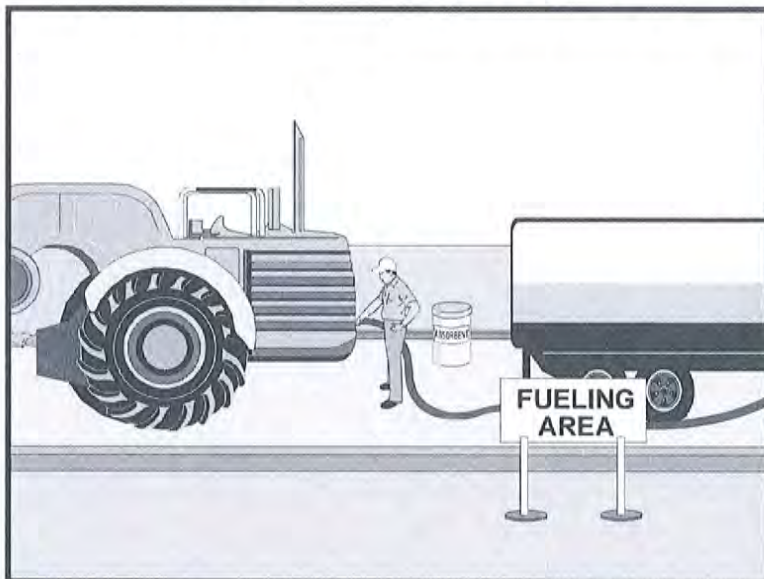
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job-related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

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

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runoff and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately, or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

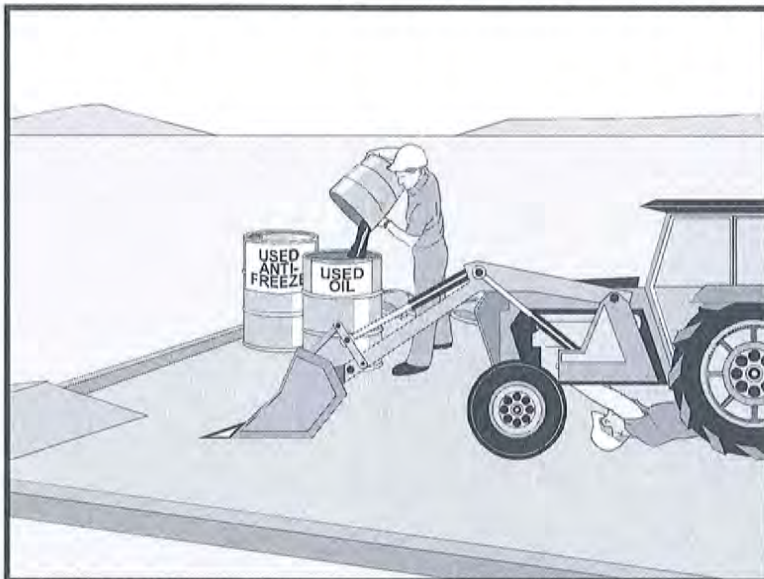
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

Categories

EC	Erosion Control	
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Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Vehicle & Equipment Maintenance NS-10

Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runoff and runoff and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should 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.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

Vehicle & Equipment Maintenance NS-10

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an “environmentally friendly” label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The “chlor” term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like, -trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Vehicle & Equipment Maintenance NS-10

Inspection and Maintenance

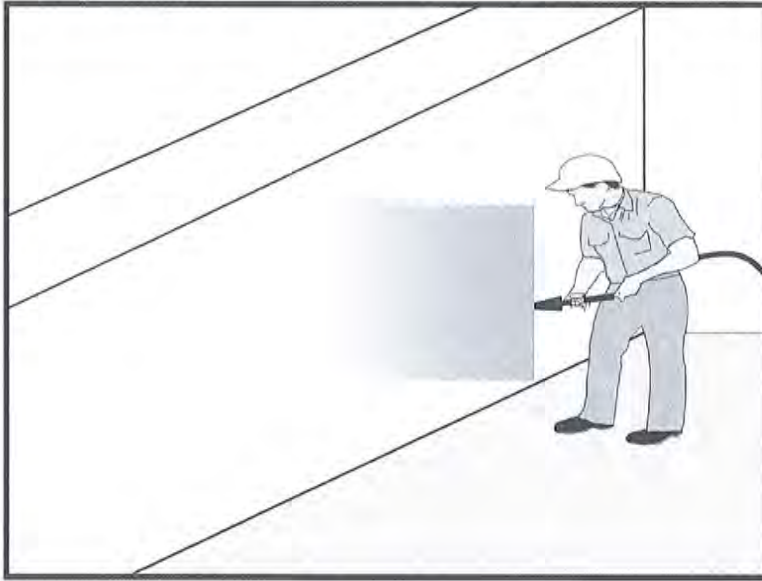
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately, or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

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

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

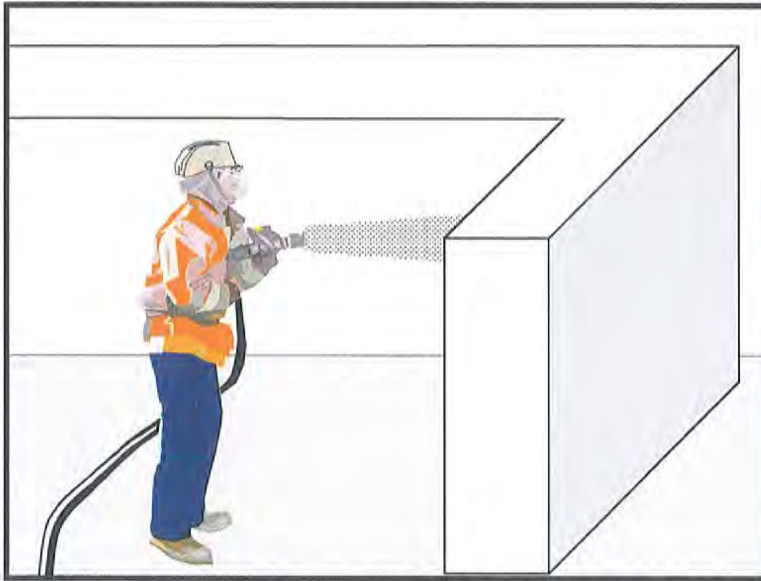
References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non-Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Description 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. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

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

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
W	Waste Management and	
M	Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (Storm Drain Inlet Protection, SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project (although they should not be installed up and down slopes).
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.

Targeted Constituents

Sediment (coarse sediment)	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-13 Compost Socks and Berms
- SE-14 Biofilter Bags

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- Around inlets.
- Below other small cleared areas.

Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- According to the State Water Board's *CGP Review, Issue #2* (2014), silt fences reinforced with metal or plastic mesh should be avoided due to plastic pollution and wildlife concerns.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.



Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft. at any point along the silt fence.

- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft.² of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)
- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb- 100-feet of silt fence per 10,000 ft.² of disturbed area.) (EPA, 2012)
- The maximum length of slope draining to any point along the silt fence should be 100 ft. per ft of silt fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.
- J-hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.
- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
 - Fabric is reinforced with wire backing or additional support.
 - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.
- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15-gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft. apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy-duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.
- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with native material and compacted.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed $\frac{1}{3}$ the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of $\frac{1}{3}$ and a maximum of $\frac{1}{2}$ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 in. into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
 - Ease of installation (most often done with a 2-person crew).
 - Minimal soil disturbance.
 - Better level of compaction along fence, less susceptible to undercutting
 - Uniform installation.
- Limitations:
 - Does not work in shallow or rocky soils.
 - Complete removal of geotextile material after use is difficult.
 - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is \$7 per linear foot based on vendor research. Range of cost is \$3.50 - \$9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.
- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.

- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

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Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Monitoring Data on Effectiveness of Sediment Control Techniques, Proceedings of World Water and Environmental Resources Congress, Barrett M. and Malina J. 2004.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), USEPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991.

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Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

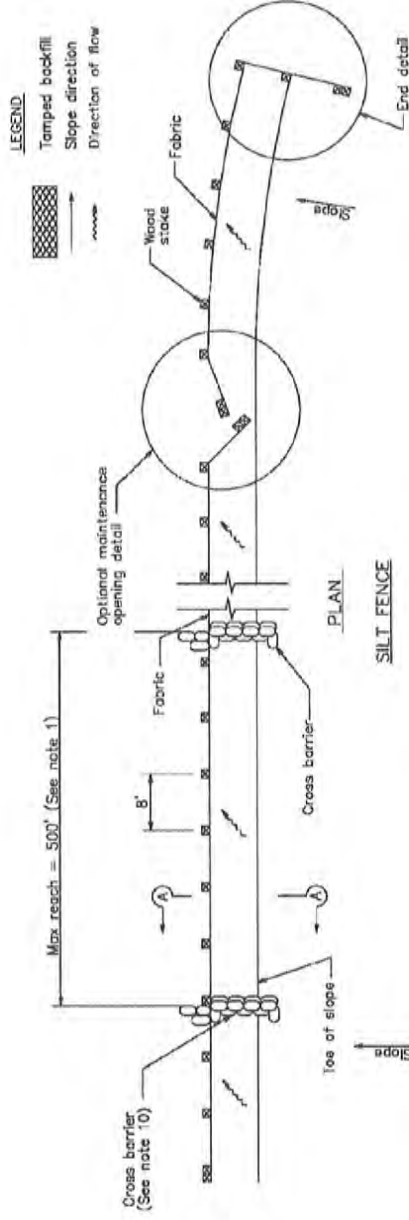
U.S. Environmental Protection Agency (USEPA). Stormwater Best Management Practices: Silt Fences. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 2012.

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Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

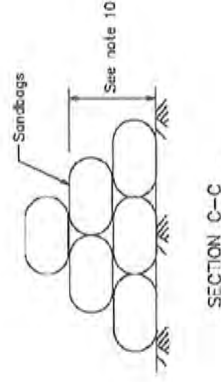
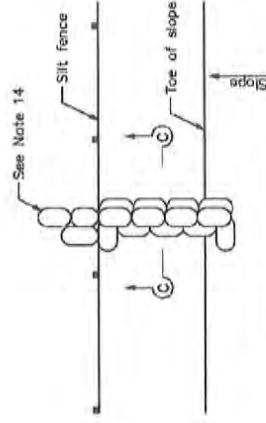
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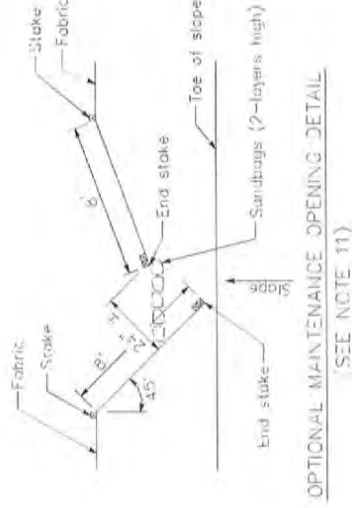
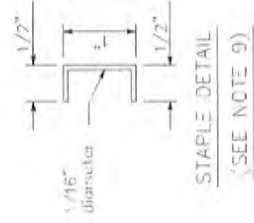
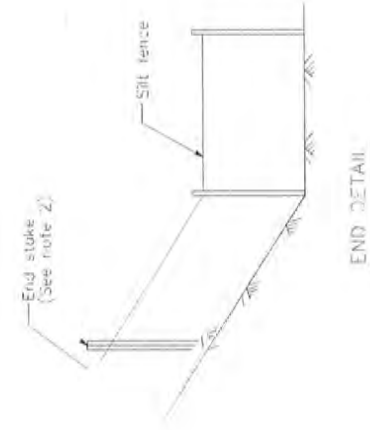
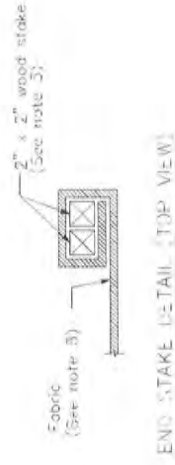
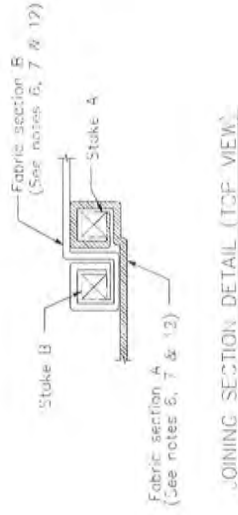
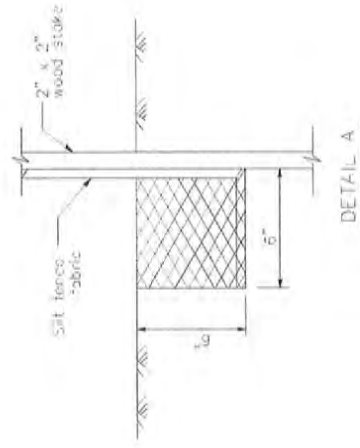
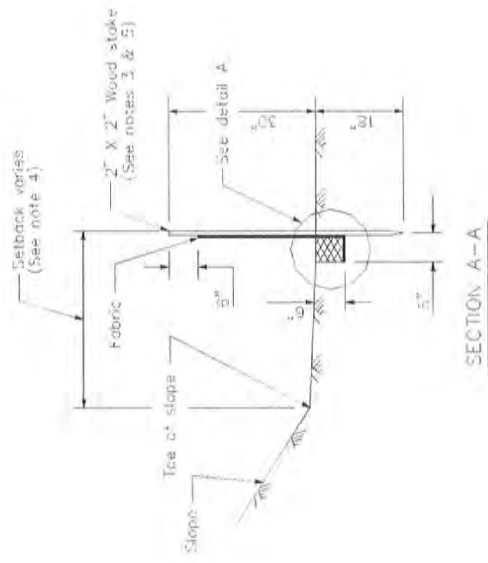
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

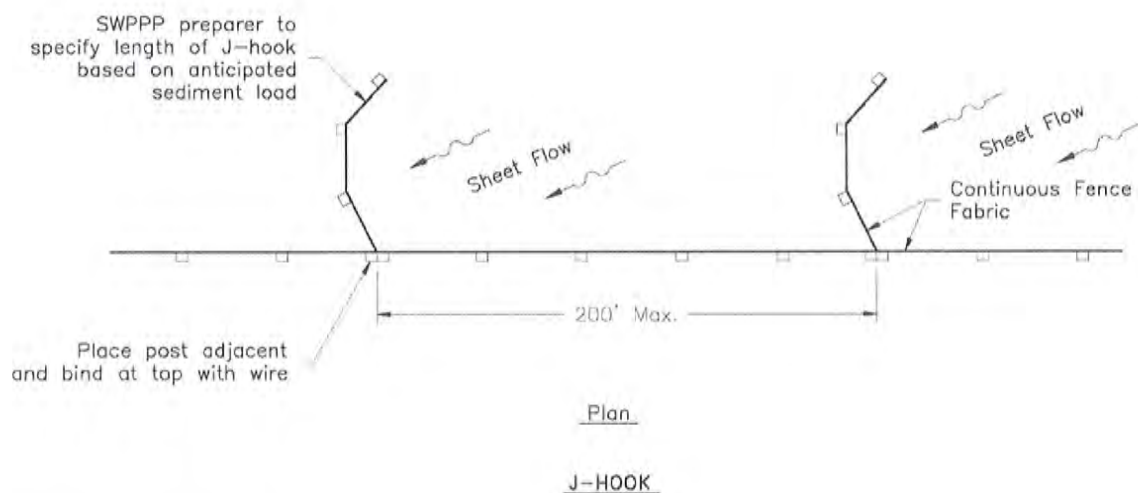


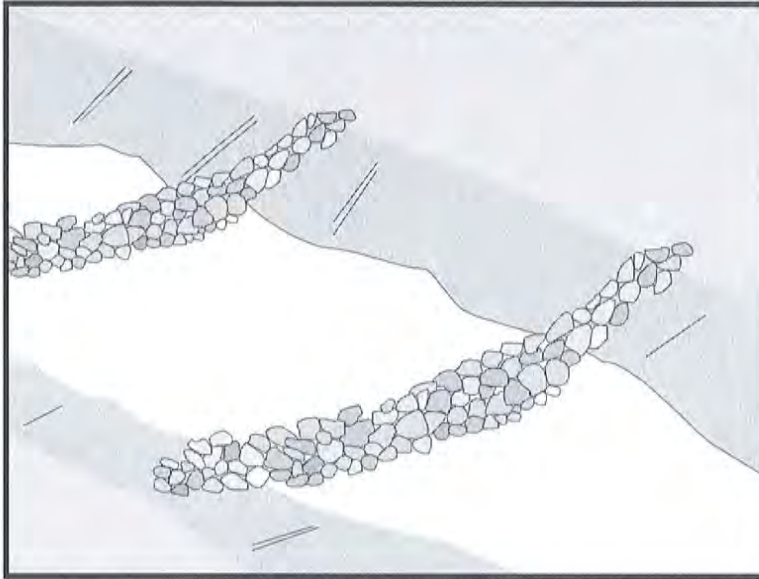
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed $\frac{1}{3}$ the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'-0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'-0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of $\frac{1}{3}$ and a maximum of $\frac{1}{2}$ the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3-4 bags to cross barrier on downstream side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.









Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- 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.
- To act as a grade control structure.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a “permanent” ditch or swale being constructed early and used as a “temporary” conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don’t use check dams. Consider alternative BMPs, or,
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see “Spacing Between Check Dams” detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of

the ditch or swale (see “Typical Rock Check Dam” detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see “Gravel Bag Check Dam” detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer’s instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- 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.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.
- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.
- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.
- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.
- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.
- Upper rows of gravel and sand bags shall overlap joints in lower rows.
- Fiber rolls should be trenched in, backfilled, and firmly staked in place.
- Install along a level contour.
- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

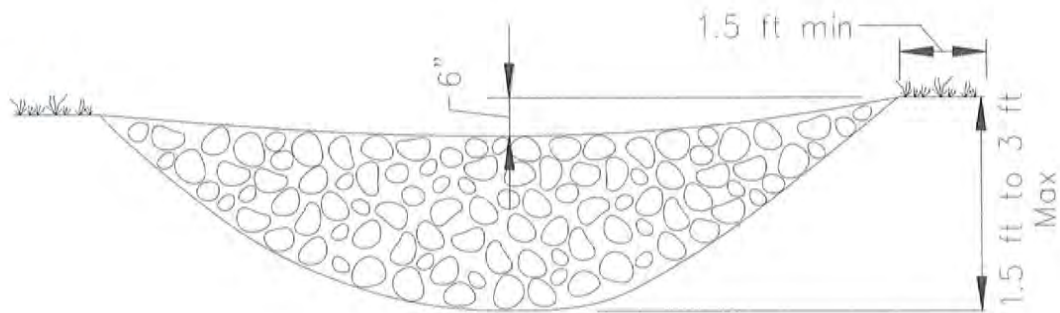
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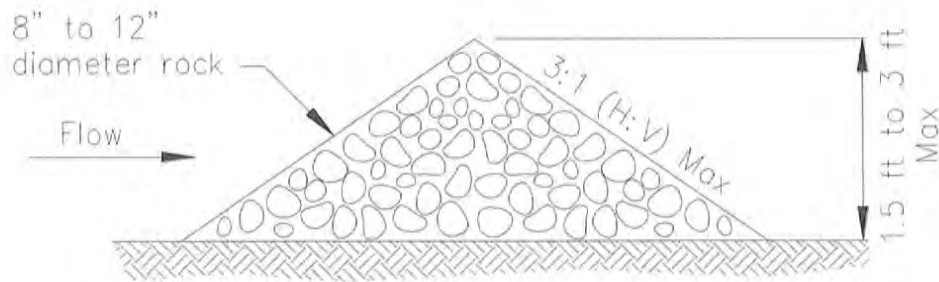
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Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: <http://anrcatalog.ucdavis.edu/pdf/8125.pdf>

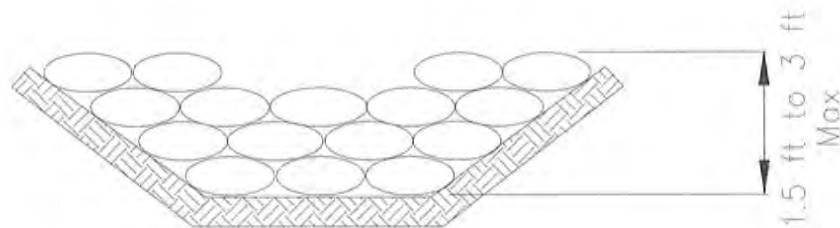


ELEVATION

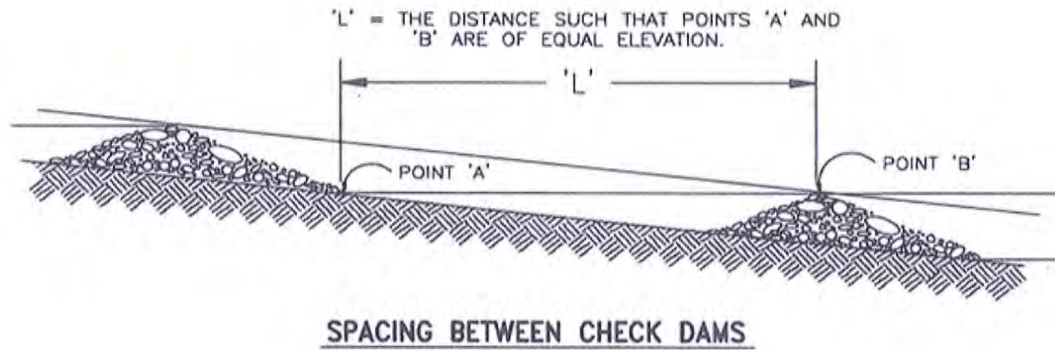


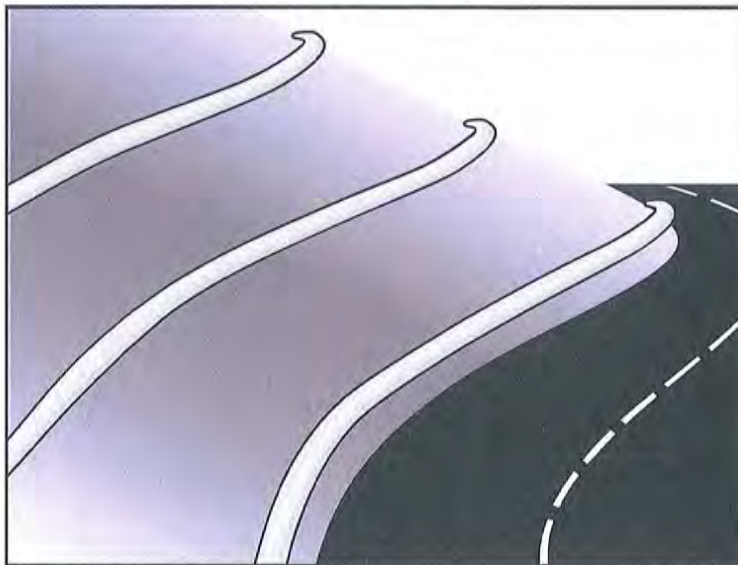
TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE





Description and Purpose

A fiber roll (also known as wattles or logs) consists of straw, coir, curled wood fiber, or other biodegradable materials bound into a tight tubular roll wrapped by plastic netting, which can be photodegradable, or natural fiber, such as jute, cotton, or sisal. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months, depending upon local conditions and roll material.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed-free rice straw, flax, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

- Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
- Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be $\frac{1}{4}$ to $\frac{1}{3}$ of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.
- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for straw fiber rolls range from \$26 - \$38 per 25-ft. roll¹ and curled wood fiber rolls range from \$30 - \$40 per roll².

Material costs for PAM impregnated fiber rolls range between \$9.00-\$12.00 per linear foot, based upon vendor research¹.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

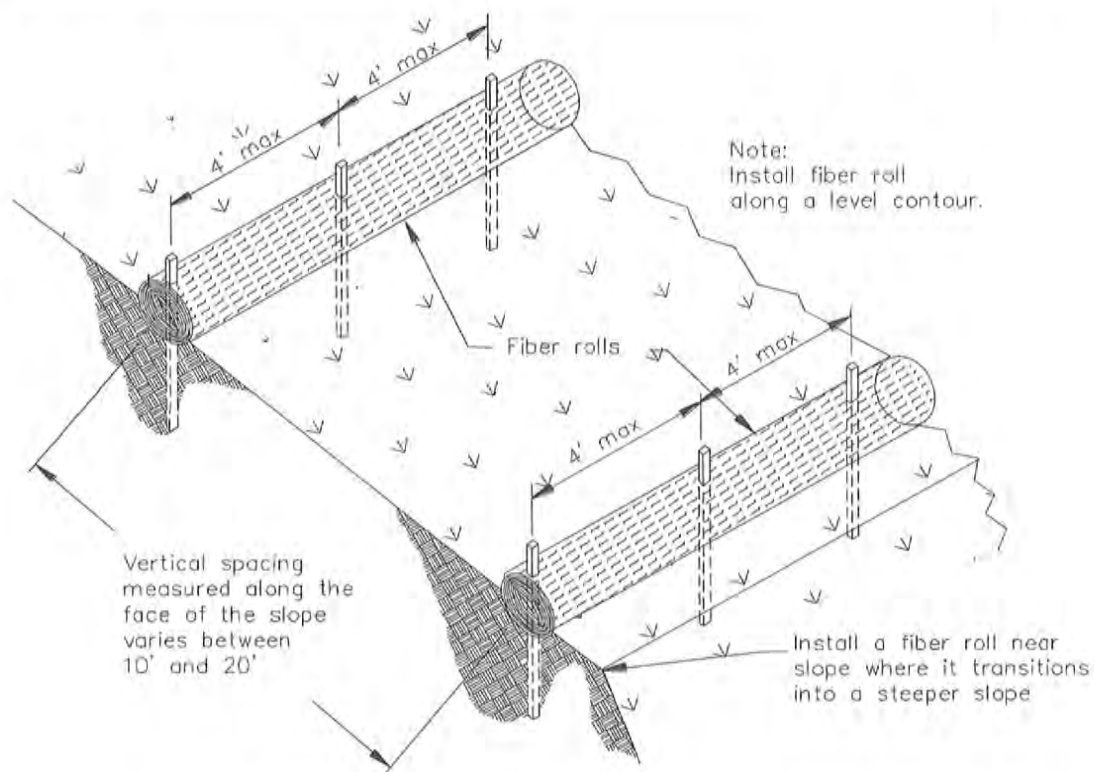
General Construction – Frequently Asked Questions, Storm Water Program website, State Water Resources Control Board, 2009 updated in 2016. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const_faq.shtml.

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Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

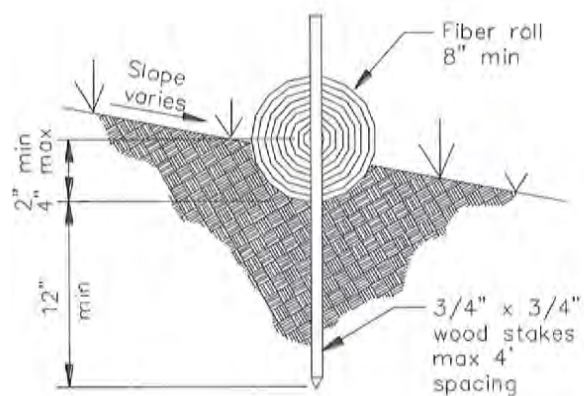
¹ Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

² Costs estimated based on vendor query by Tetra Tech, Inc. 2016.



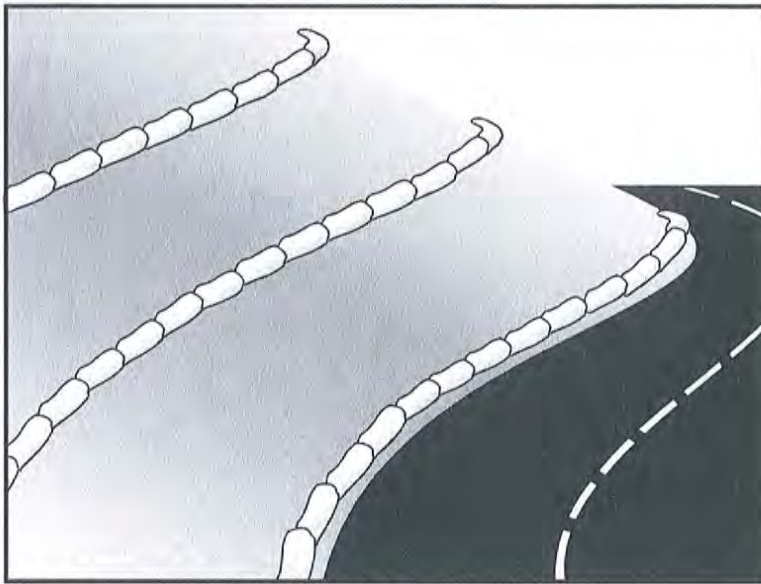
TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-8 Sandbag Barrier
- SE-12 Temporary Silt Dike
- SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited, and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction
 - Top width = 12 in. minimum for one- or two-layer construction
 - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction.
 - Top width = 12 in. minimum for one- or two-layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- **Bag Material:** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- **Bag Size:** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.
- **Fill Material:** Fill material should be 0.5 to 1 in. Crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. \$3.20-\$3.80 per filled gravel bag is standard based upon vendor research (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

- Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- Sweeping may be less effective for fine particle soils (i.e., clay).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused and perhaps save money.
- Inspect potential sediment tracking locations daily.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$ 650/day to \$2,500/day¹, plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

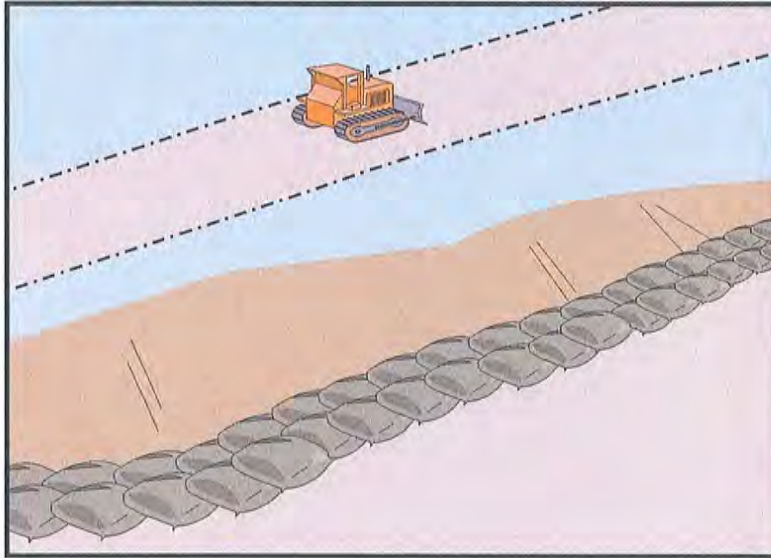
Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

¹ Based on contractor query conducted by Tetra Tech, Inc. November 2016.



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes.
 - As sediment traps at culvert/pipe outlets.
 - Below other small cleared areas.
 - Along the perimeter of a site.
 - Down slope of exposed soil areas.
 - Around temporary stockpiles and spoil areas.
 - Parallel to a roadway to keep sediment off paved areas.
 - Along streams and channels.

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
 - At the top of slopes to divert runoff away from disturbed slopes.
 - As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited, and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.
- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction
 - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- **Sandbag Material:** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- **Sandbag Size:** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- **Fill Material:** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

Costs

Empty sandbags cost \$0.25 - \$0.75. Average cost of fill material is \$8 per yd³. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at \$1.50 - \$2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

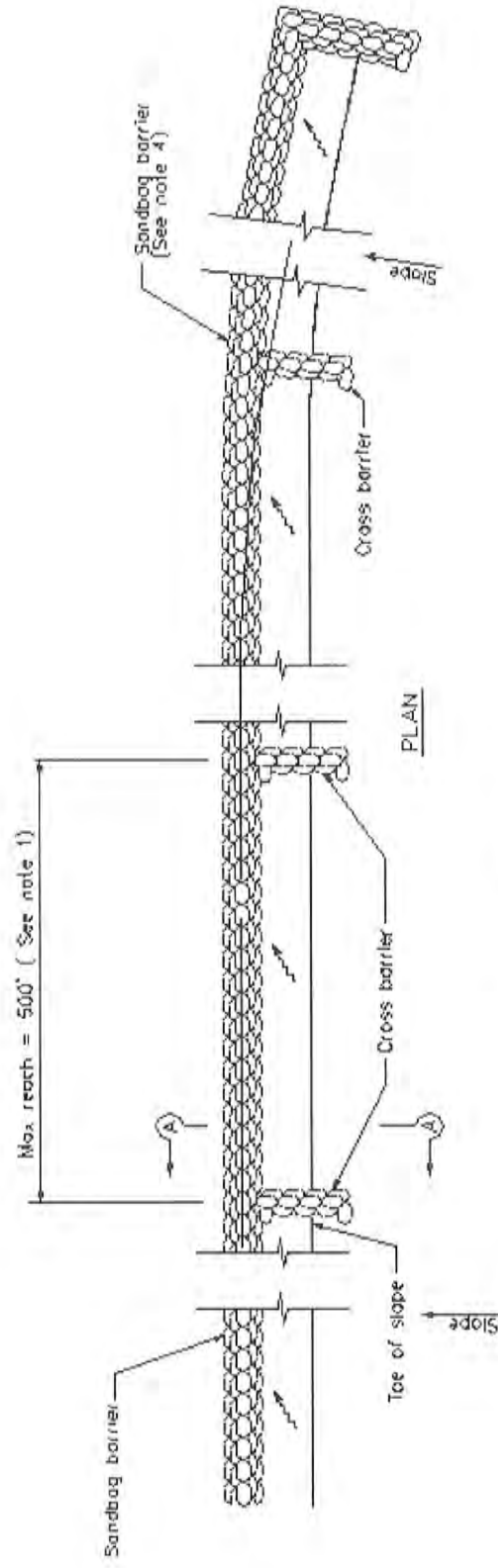
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

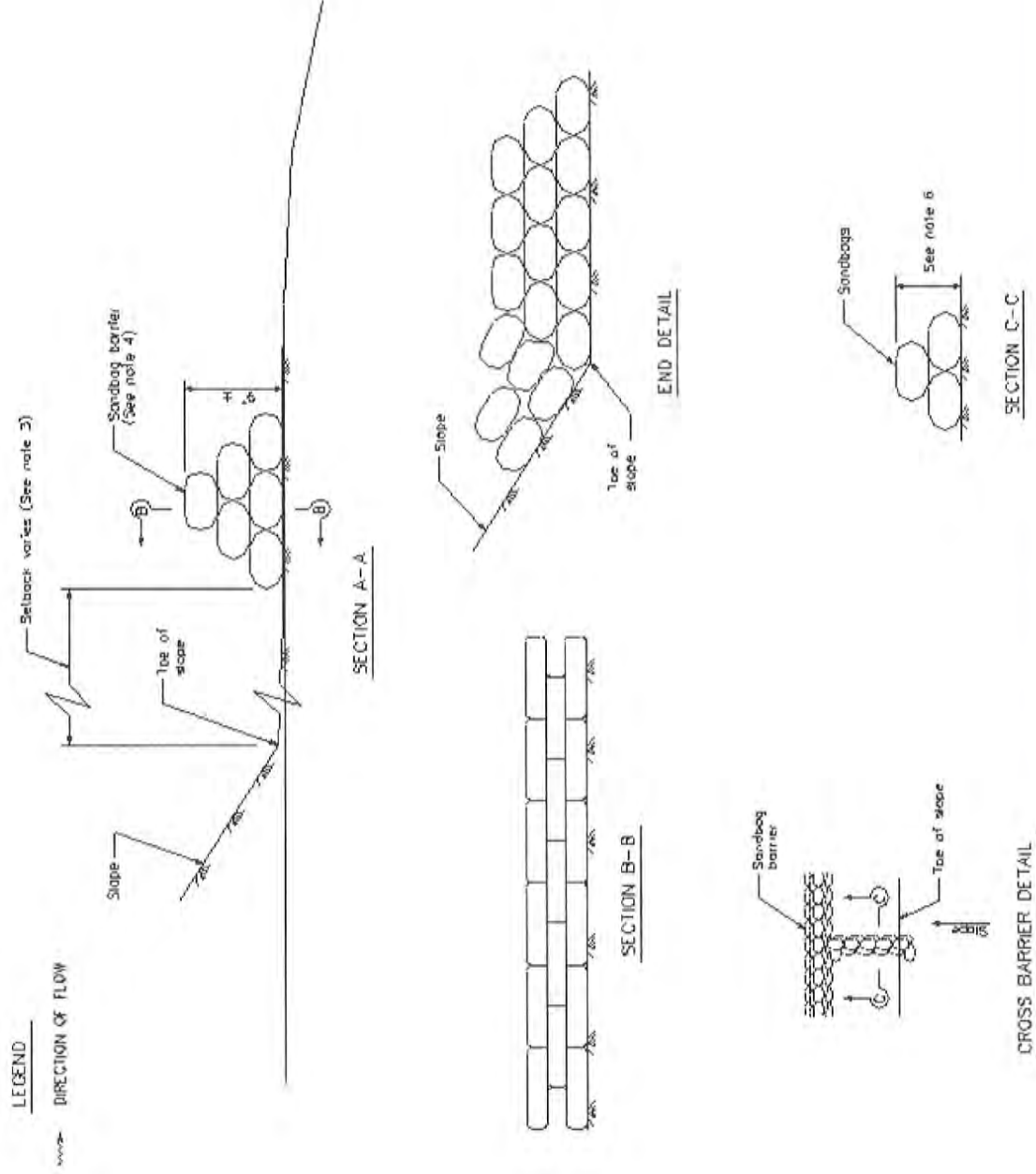
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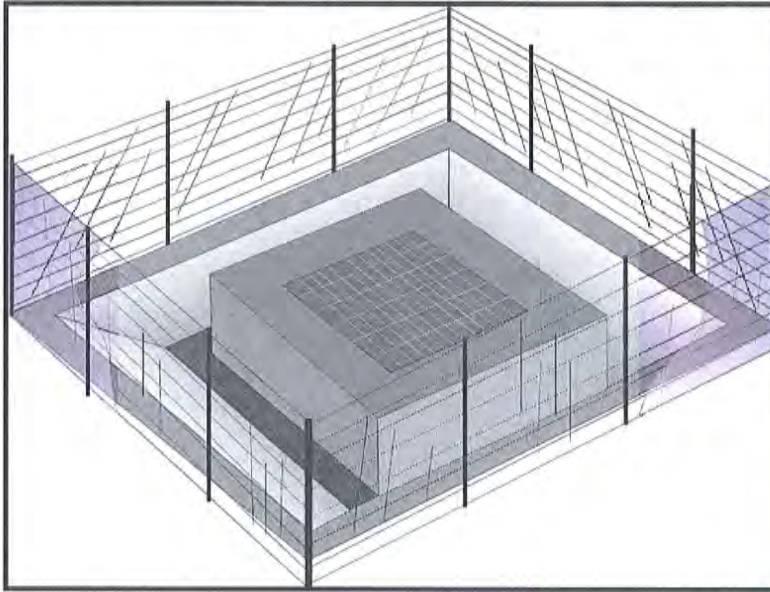


SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed $1/2$ the height of the linear barrier, in no case shall the reach length exceed 500'.
2. Place sandbags tightly
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of $1/2$ and a max of $2/3$ the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.





Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-14 Biofilter Bags
- SE-13 Compost Socks and Berms

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other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
 - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
 - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
 - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
 - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
 - Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
 - Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
 - Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
 - Provide area around the inlet for water to pond without flooding structures and property.
 - Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
 - Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- **DI Protection Type 1 - Silt Fence** - Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.
 1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
 2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
 3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
 4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.
- **DI Protection Type 2 - Excavated Drop Inlet Sediment Trap** - Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd³/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.
 - **DI Protection Type 3 - Gravel bag** - Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.
 1. Construct on gently sloping street.
 2. Leave room upstream of barrier for water to pond and sediment to settle.
 3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.
 4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10-year storm) should not overtop the curb.
 - **DI Protection Type 4 – Block and Gravel Filter** - Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.
 1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.
 2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
 3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
 4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.
 - **DI Protection Type 5 – Temporary Geotextile Insert (proprietary)** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable, and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- **DI Protection Type 6 - Biofilter bags** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.
 1. Construct in a gently sloping area.
 2. Biofilter bags should be placed around inlets to intercept runoff flows.
 3. All bag joints should overlap by 6 in.
 4. Leave room upstream for water to pond and for sediment to settle out.
 5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.
- **DI Protection Type 7 – Compost Socks** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one-year useful life) is \$200 per inlet.
- Temporary geotextile inserts are proprietary, and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from \$50-75 plus installation, but costs can exceed \$100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

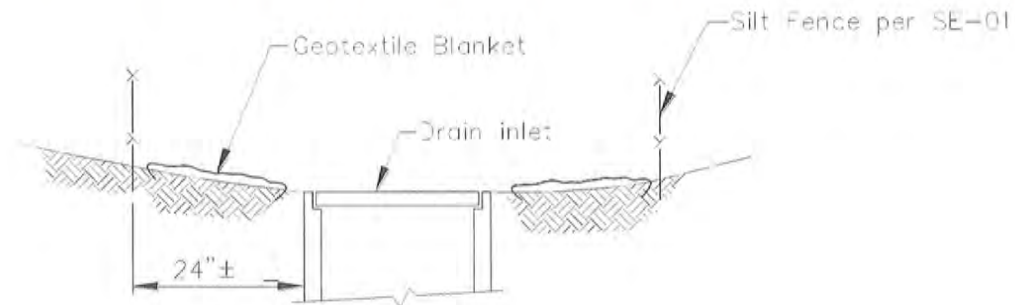
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
 - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

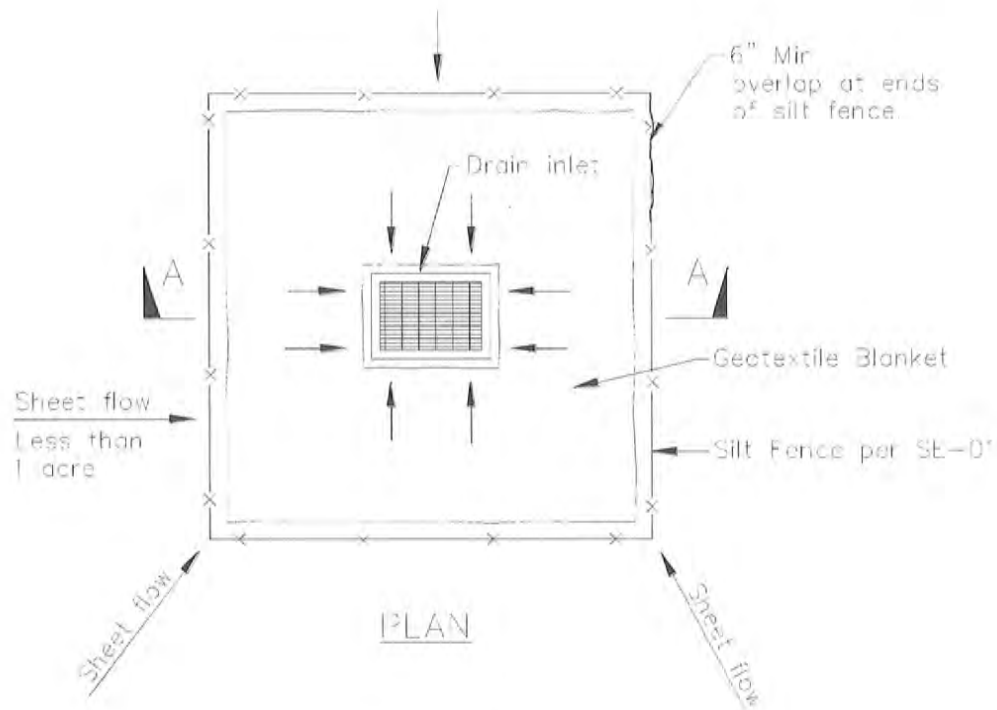
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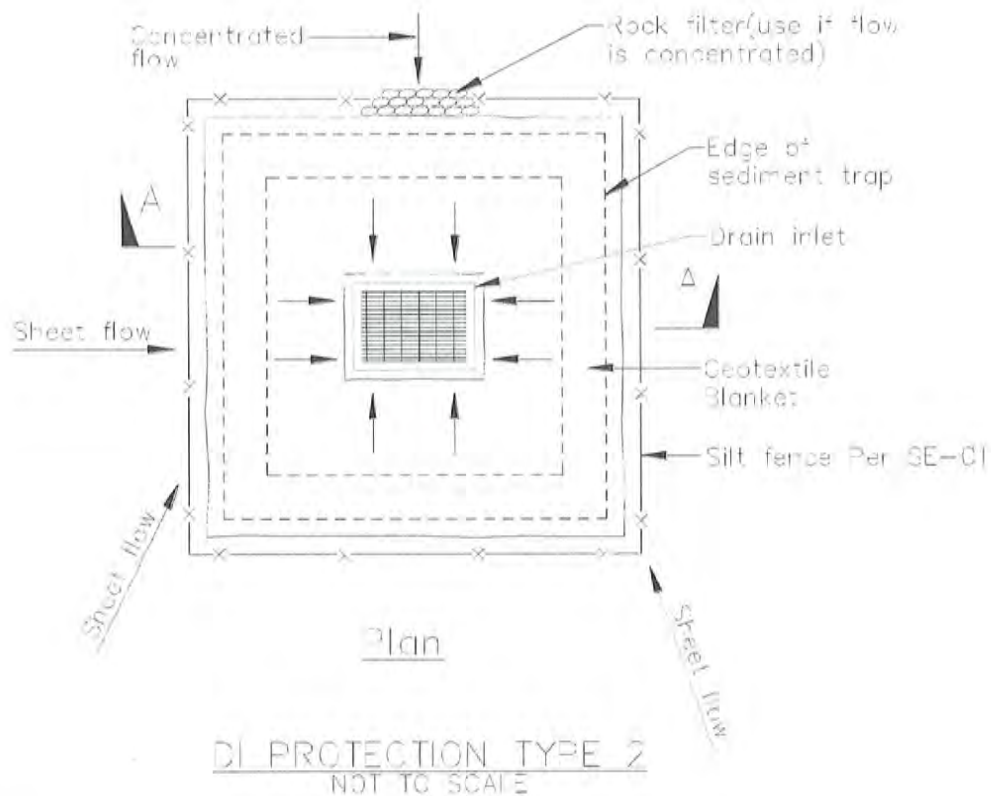
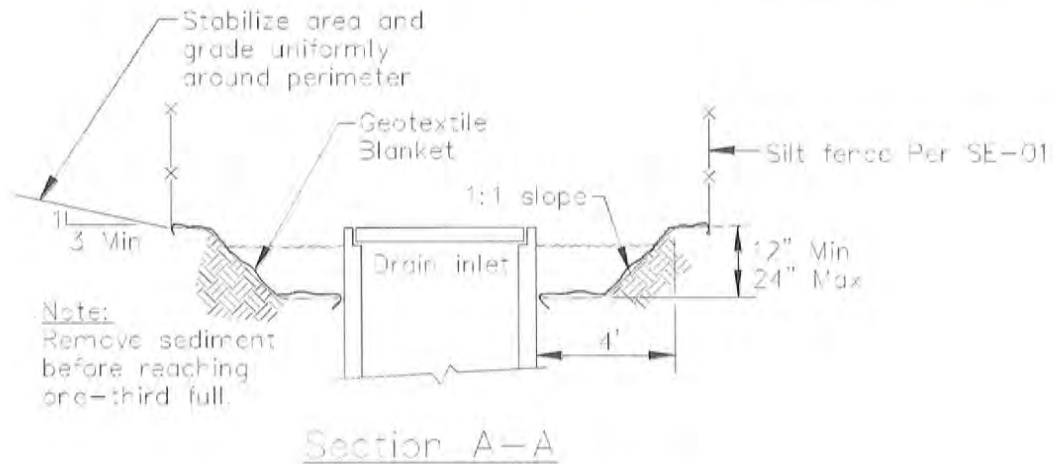
SECTION A-A



DI PROTECTION TYPE 1
NOT TO SCALE

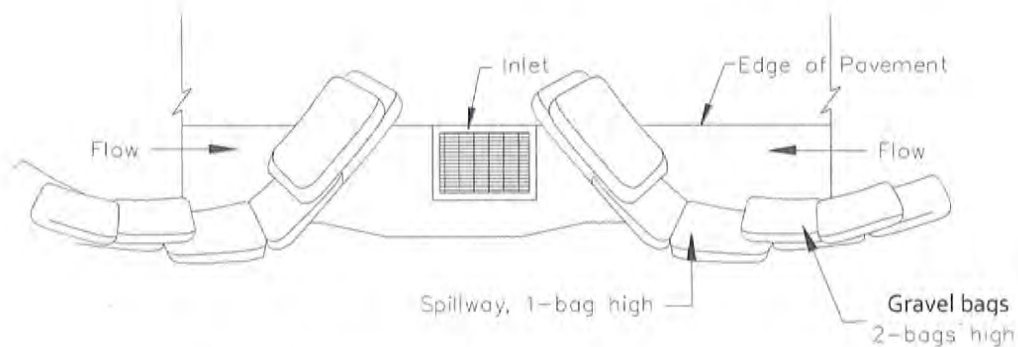
NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

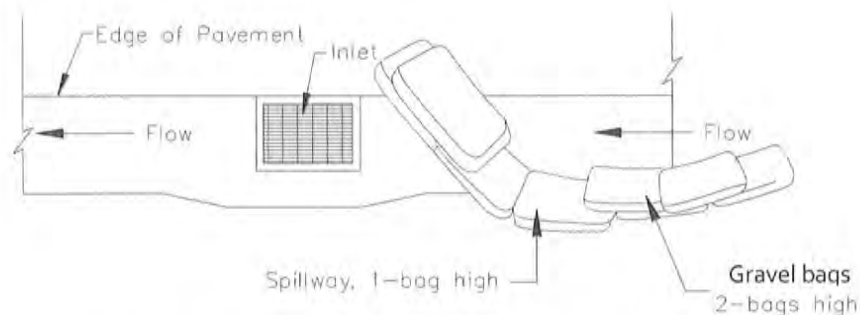


Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

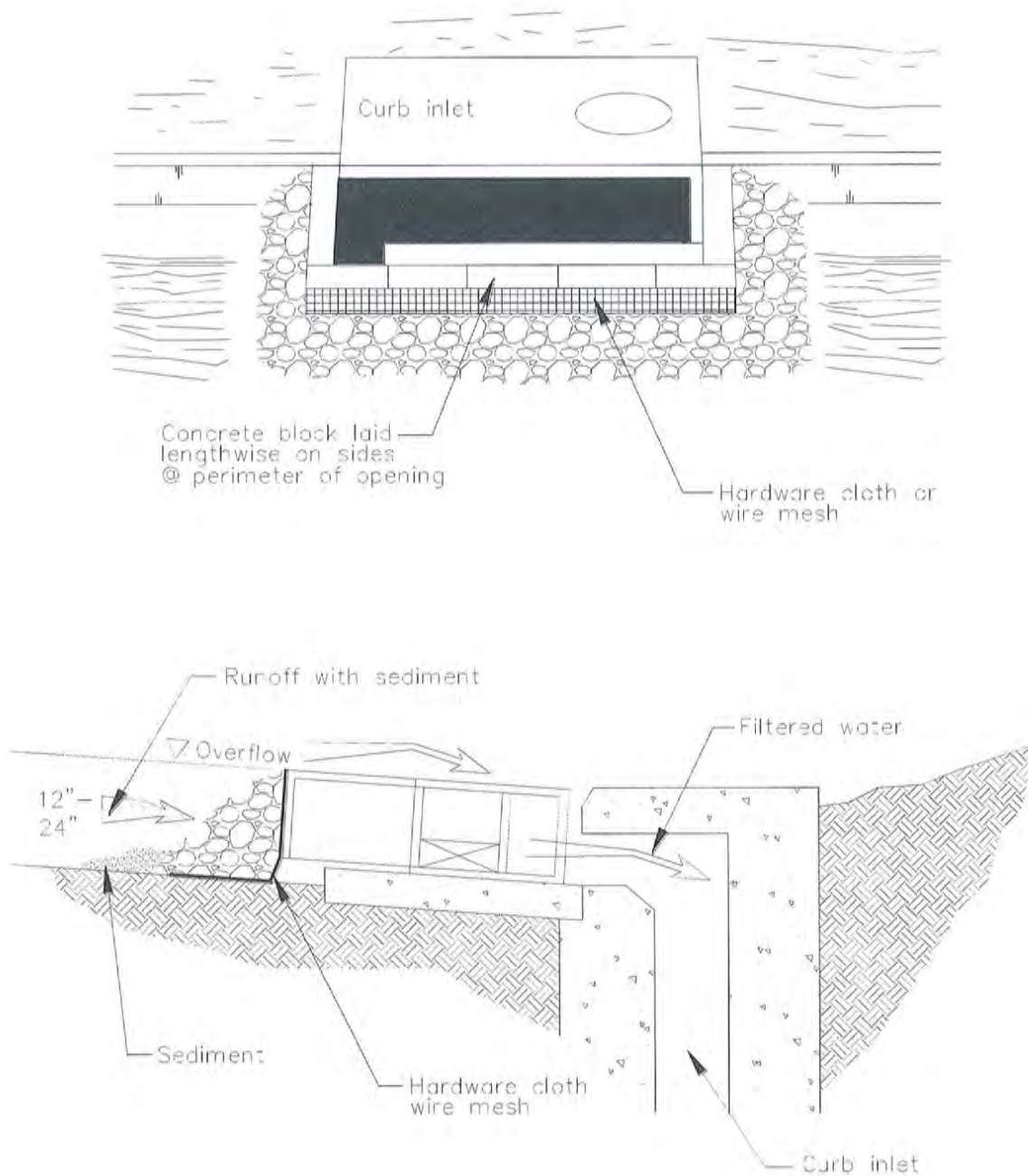


TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

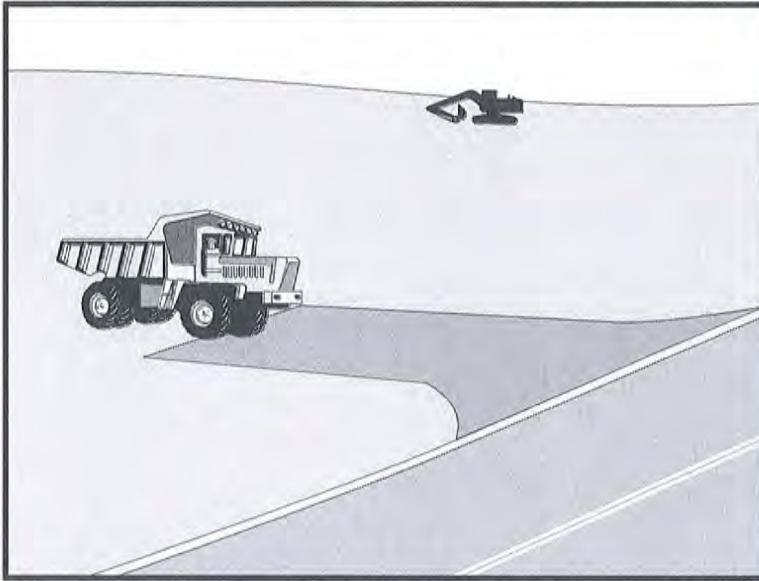
1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed.
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.

DI PROTECTION TYPE 3
NOT TO SCALE



DI PROTECTION – TYPE 4
NOT TO SCALE

Stabilized Construction Entrance/Exit TC-1



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- 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

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

Stabilized Construction Entrance/Exit TC-1

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from \$1,500 to \$6,100 each, averaging \$3,100 per entrance. Costs will increase with addition of washing rack and sediment trap. With wash rack, costs range from \$1,500 - \$7,700 each, averaging \$4,600 per entrance (All costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stabilized Construction Entrance/Exit TC-1

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

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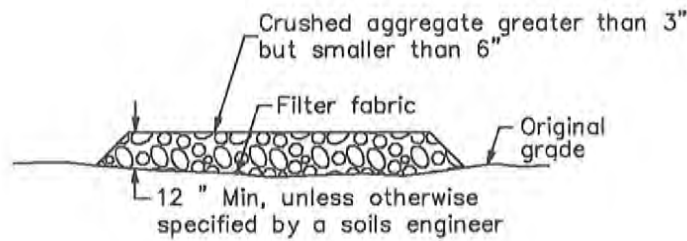
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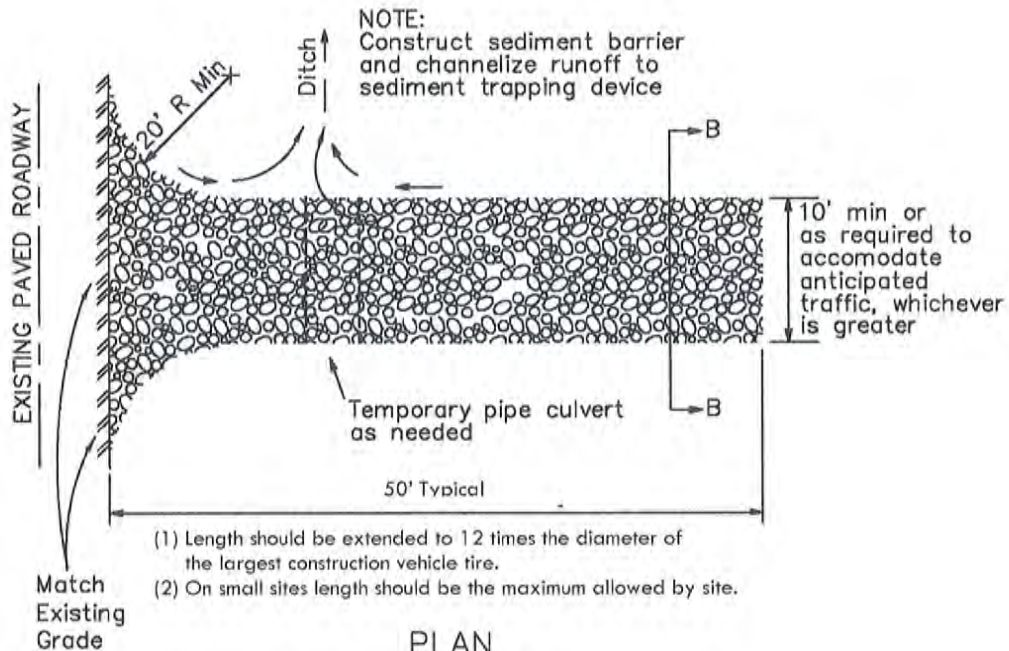
Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

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Stabilized Construction Entrance/Exit TC-1

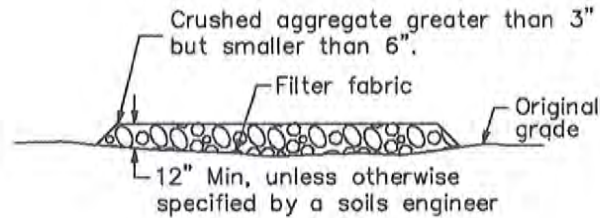


SECTION B-B
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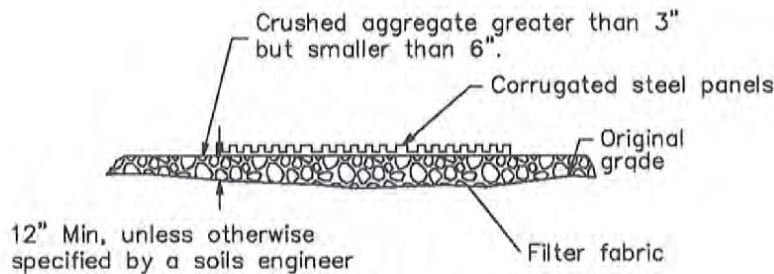


PLAN
NTS

Stabilized Construction Entrance/Exit TC-1



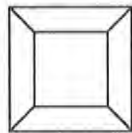
SECTION B-B
NTS



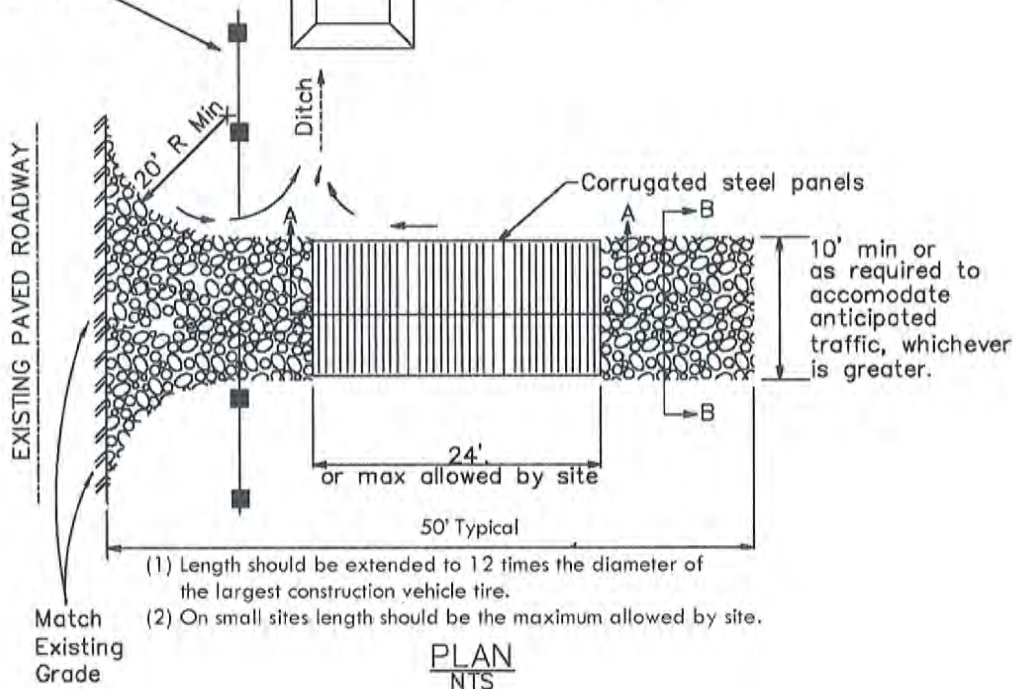
SECTION A-A
NOT TO SCALE

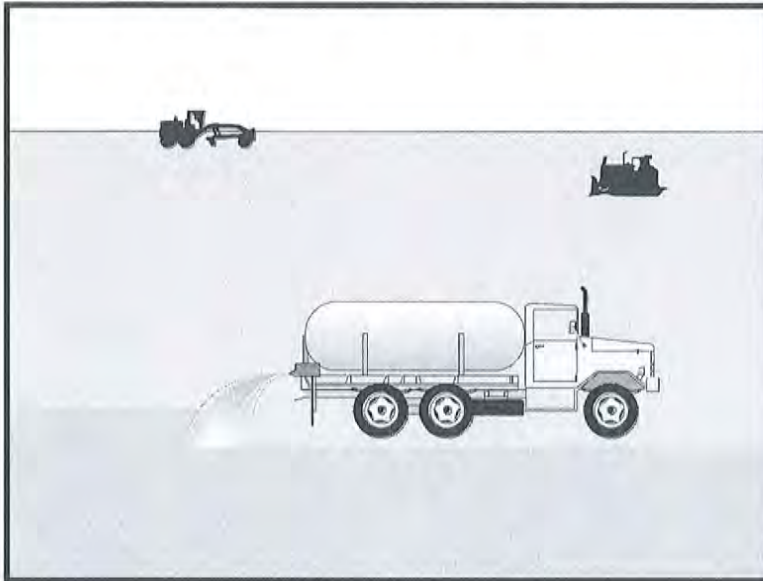
NOTE:

Construct sediment barrier and channelize runoff to sediment trapping device



Sediment trapping device





Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking, and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water-based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:



- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyl, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- 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 waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM₁₀), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

APPENDIX I

RAIN EVENT ACTION PLAN

Note: REAP forms are available inside of SCE's CloudCompli Mobile Inspection Application and not included within the body of this SWPPP.

APPENDIX J

CONSTRUCTION GENERAL PERMIT

ORDER NO. 2009-0009-DWQ AS AMENDED BY ORDER NOS. 2010-0014-DWQ AND 2012-0006-DWQ

The complete document can be found at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf

Will be placed in field SWPPP