PRELIMINARY DRAFT PLAN

DRAINAGE, EROSION, AND SEDIMENT CONTROL PLAN

FOR

ORANGE GROVE PROJECT

COUNTY OF SAN DIEGO, CALIFORNIA
(08-AFC-04)

SUBMITTED TO THE:
CALIFORNIA ENERGY COMMISSION

SUBMITTED BY:
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Sega Project No. 07-0098

August 27, 2008

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SECTION 1

Introduction

This draft Drainage, Erosion, and Sediment Control Plan (DESCP) is preliminary because it is prepared in advance of the final phase of construction planning and engineering design, during which the details regarding construction schedule and certain aspects of erosion control design will be finalized. This will take place after licensing and will be included in a future draft of the DESCP. This document contains placeholders for some of these future items (detailed schedule, final BMP map).

1.1 Drainage, Erosion, and Sediment Control Plan Elements

The CEC Staff Data Request #57 requests a draft DESCP outlining site management activities and erosion/sediment control Best Management Practices (BMPs) to be implemented during site mobilization, grading construction, and operation of the proposed project. The Draft DESCP includes the following elements:

- **Vicinity Map** – Provide a map(s) at minimum scale 1"=100' indicating the location of all projects elements, including depictions of all significant geographic features including swales, storm drains, and sensitive areas.

- **Site Delineation** - The OGPP Site and project related areas, which are subject to soil disturbances, have been indicated on maps showing boundary lines of all construction areas and the location of existing and proposed structures, pipelines, roads, and drainage facilities.

- **Watercourses and Critical Areas** - The DESCP indicates the location and shows the proximity of all nearby watercourses, including swales, storm drains, and drainage ditches to the OGPP Site and project related areas.

- **Drainage Map**- The DESCP provides a topographic site map showing existing and proposed drainage systems, drainage area boundaries and watershed sizes.

- **Narrative Discussion of Project Site Drainage** - The DESCP includes a copy of the hydrology and hydraulic analysis to support the off-site drainage around and throughout the plant and project related areas. The narrative includes discussions on drainage management measures to be taken to protect the site and downstream facilities.

- **Clearing and Grading Plans** - The DESCP provides pre-development and post-development elevations, slope, location, and extent of proposed gradings.

- **Clearing and Grading Narrative** - The DESCP provides a table identifying all of the project elements where material will be excavated or filled, quantities of said material and whether the excavation or fill is temporary or permanent.

- **Construction Best Management Practices Plan** - The DESCP indicates on the topographic site map the location of site specific BMPs to be employed during each phase of construction. BMPs selected include measures designed to prevent wind and water erosion.

- **BMP Narrative** - The DESCP discusses the selection, location, timing, and maintenance schedule for all erosion and sediment control BMPs to be used prior to initial grading, during project element excavation and construction, at final grading/stabilization, and for post-construction.

1.2 Project Overview

The Project is designed to comply with all relevant laws, ordinances, regulations, and standards (LORS). The power plant will be constructed on an approximately 8.5-acre site (the "Site") that will be leased by Orange Grove Energy. The Site is part of an approximately 202-acre property (the "Property") owned by SDG&E, as shown in Figure 1.1-3 (see Appendix A). The power plant incorporates two General Electric (GE) LM6000 PC SPRINT combustion turbine generators (CTGs) that will be fueled with natural gas. A facility plot plan is shown in Drawing C100, Rev. 1 (see Appendix A). High-efficiency emission control technologies will be provided to meet Best Available Control Technology (BACT) requirements. Power will be transmitted to the grid at 69 kilovolt (kV) via an approximately 0.3-mile underground electric transmission line to the existing SDG&E Pala substation located on the Property. An approximately 2.4-mile underground gas pipeline lateral (See Figure 1.1-2, see Appendix A) will be constructed to convey natural gas to the Site from an existing SDG&E gas transmission line. The power plant will use tertiary-treated wastewater and fresh water obtained from Fallbrook Public Utility District (FPUD) and trucked to the Site (Figure 1.1-5, see Appendix A). Sanitary wastewater will be managed with an on-site septic system. Process wastewater from the plant will be recycled on site using a reverse osmosis (RO) water treatment system. Only a few hundred gallons per month of wastewater will not be recyclable on site and will need to be trucked off site for treatment at a licensed facility. With the RO system to recycle process wastewater on site, the plant will function with essentially zero liquids discharge technology that eliminates wastewater and reduces water use.

1.3 Watercourses and Critical Areas

The Site is located on a very old (CDMG, 2000a) alluvial fan surface north of State Route (SR) 76. The Site is located on a former citrus orchard with a small upstream watershed. Site facilities have been located and designed to avoid disturbance to drainages. No aspect of the Project will affect any wetlands. The transmission line interconnection and gas pipeline will be installed beneath several small and normally dry drainage crossings by boring method so the

Project will avoid disturbance to United States Army Corps of Engineers (ACOE) jurisdictional waters. A notification to the California Department of Fish and Game (CDFG) for streambed alteration will be submitted for boring at drainage crossings. Project disturbances will occur almost exclusively in areas where natural conditions have been disturbed by past activities, so there will be little new ground disturbance. Surface drainage from the power plant will flow to an on-site detention basin designed to detain flows from the 100-year storm and to manage storm water runoff in accordance with the County Watershed Protection, Stormwater Management and Discharge Control Ordinance (Stormwater Ordinance).

The Project region is within the jurisdiction of the San Diego (Region 9) Regional Water Quality Control Board (RWQCB) in the San Luis Rey Hydrologic Unit. The San Luis Rey Hydrologic Unit is an east-west trending drainage area of about 565 square miles that is tributary to the Pacific Ocean. Inflow to the hydrologic unit is primarily from surface water runoff (SLRMWD, 2006). Average annual rainfall within the hydrologic unit ranges from approximately 11 inches at low elevations near the coast, to more than 45 inches in the highest elevations of the headwaters. The region is typically dry in the spring, summer, and fall with most of the precipitation occurring from December through March.

1.4 Project Ownership

The Site and Property are owned by SDG&E. The power plant will be constructed, owned, and operated by the Applicant. Operations will occur in accordance with a 25-year tolling agreement with SDG&E in which SDG&E would have the right to deliver gas and receive power for 100 percent of the capacity from the Project.

Approximately 0.4 miles of the gas pipeline will be owned and operated by SDG&E between an existing gas main and a new metering station to be constructed in conjunction with the Project. The remaining approximately 2.0 miles of the pipeline will be owned and operated by the Applicant.

The transmission line interconnection will be entirely within the SDG&E property and will be constructed and owned by Orange Grove Energy between the Site and the substation boundary. Orange Grove Energy will obtain a 20-foot wide easement from SDG&E for the transmission line between the Site and the substation. SDG&E will conduct the necessary transmission system upgrade work downstream of the substation pursuant to the outcome of the interconnection agreement.

The fresh water and reclaim water pick-up stations where Project water will be obtained from FPUD will be constructed, owned, and operated by FPUD.

SECTION 2

Drainage

See Hydrology and Hydraulic calculations in Appendix B.

SECTION 3

Clearing and Grading

3.1 Areas to be Cleared and Graded

The OGPP will be cleared, graded and constructed on an approximately 8.5-acre site, previously developed as an orange grove. Approximately 5 acres of land, just south of the Site will be used as a temporary construction laydown area.

The 2.5-mile underground gas pipeline lateral will be excavated, installed and backfilled within an approximate 20' wide construction easement, consisting of both existing vegetative cover and existing dirt/concrete roads. The gas pipeline will have two temporary construction laydown areas located on existing disturbed areas. No clearing or grading will be required for either laydown area.

3.2 Locations of Disposal Areas, Fills, or Other Special Areas

It is anticipated that all excavated soil from the Site will be reused on site for grading and leveling purposes.

It is anticipated that the excavated soil from the gas pipeline will mostly be reused as back fill after the installation of the pipeline. Remaining excavated soil will be used to create diversion berms over the gas pipeline throughout the mountainous terrain. Any remaining excavated soil from the gas pipeline construction will be used to create landscaping berms on the Property. The gas pipeline construction will require the removal of concrete and asphalt, which will be disposed at a regional disposal facility.

3.3 Existing and Proposed Topography

The Site's existing topography is gradually sloped from the North to the South at approximately a 10% grade. The proposed OGPP will be constructed on a gently sloping 1% grade, with surrounding grades no greater than a 3:1 slope. Please reference Appendix C for drawings that show topography before and after the proposed construction.

3.4 Volumes of Cut and Fill

		Volume (cubic yards)	
GAS PIPELINE:	Excavation (permanent)	6,000	
	Fill (permanent)	4,050	
	Waste/Import (permanent)	1,500	of imported sand
		150	of removed concrete waste
		1,500	of soil for SDG&E Metering Station
		300	of displaced by 10” Dia. gas pipeline
		150	of waste soil
POWER PLANT:	Excavation (permanent)	56,000	(plus 13,000 cy over excavation)
	Fill (permanent)	56,000	(plus 13,000 cy recompaction)
	Waste/Import (permanent)	3,500	of imported crushed rock surface
		0	of anticipated waste soil material

SECTION 4

Project Schedule

Construction is expected to start in April 2009 and take approximately six months. The Project is scheduled to be operational by October 2009. The Project schedule is as follows:

PROJECT MILESTONE	PROJECTED SCHEDULE
Site preparation and mobilization	April 1 2009
Issuance of all discretionary permits (within 30 days after CEC approval)	May 2009
Grading and Foundation	May 2009
Turbines Delivered	May 2009
Transformers Delivered	August 2009
Plant Commissioning	September 2009
Commercial Operation	October 2009

SECTION 5

Best Management Practices

The OGPP will be constructed, so as to minimize as much as possible, the amount of sediment that is drained off site. Best Management Practices (BMPs) will be installed prior to initial grading commences. The BMPs will be maintained, adjusted and repaired through out the duration of construction and will remain in place until the landscaping and ground cover has sufficiently taken hold. The construction is expected to proceed as expediently and efficiently as possible, thereby minimizing soil exposure. The following sections present standard construction Best Management Practices (BMPs) most of which are described in the:

- *SDG&E Water Quality Construction Best Management Practices Manual* (2002)
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook* (2003)
- *Caltrans Storm Water Quality Handbooks* (2003)

These resourceful handbooks provide guidance on BMP implementation and will be required for contractor managers that may have an impact on implementation of the DESCP. Appendix D contains the Caltrans BMP cut sheets with detailed descriptions of the BMPs discussed, recommended maintenance practices and associated figures. In addition, drawings in Appendix D show the location of all BMPS to be used during construction (temporary) and post construction (permanent).

The following sections present the recommended construction BMPs for stormwater pollution prevention for the projects construction laydown areas, plant site, and linear facilities. Each section provides information on BMP implementation as it relates to the period of construction. BMPs that may have an impact on implementation of the DESCP will be reviewed by managers and construction contractors. While performing the work, the contractors may implement additional control measures, if necessary.

5.1 BMPs Prior to Initial Grading

The Project has been designed to impact as small an area as possible at any given time, thereby limiting the amount of exposed soil. BMPs will be used to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation.

Temporary erosion control measures would be implemented before construction begins. The drawings located in the appendix show recommend locations for erosion control.

5.2 BMPs During Project Element Excavation and Construction

The Site equipment will be constructed on relatively level ground; therefore, it is not considered necessary to place barriers directly around the Site perimeter fence, however, BMPs will be placed in locations where off-site drainage could occur in order to prevent sediment from

draining from the Site. In addition, all on-site area inlets will be will be protected with storm drain inlet protection. A detention basin will be installed as a permanent erosion control barrier to allow for on-site sediment to settle prior to discharging on-site drainage downstream.

The gas pipeline will be constructed on various slopes of terrain. During construction, temporary erosion control will be implemented to minimize sediment from draining downstream through the use of outlet protection, silt fences and fiber rolls. Permanent erosion control will include diversion berms on the steep slopes in the mountainous terrain.

If during construction, an erosion control measure causes interference with construction, becomes inadequate or additional BMPs are required to help minimize sediment discharge, the contractor and the resident engineer will evaluated and measures will be addressed accordingly. These measures typically include re-vegetation, mulching, physical stabilization, dust suppression, berms, ditches, sediment barriers and existing BMP replacement. These measures would be removed from the Site after the completion of construction, once sufficient stabilization has be accomplished by the new ground cover and landscaping.

A monitoring plan will also be developed in conjunction with CEC staff to set performance standards and monitor the effectiveness of BMPs. This plan will address the timing and methods of such measures as well as reporting and response requirements. Personnel will receive training to conduct their jobs properly and recognize and report abnormal and/or adverse situations so that they can be corrected in a timely manner.

5.3 BMPs During Final Grading/Stabilization

During final grading and stabilization construction, the new temporary BMPs will be employed to accommodate the newly developed drainage patterns and ditches. In addition, BMPs associated with the installation of concrete foundations will be required. Dumping of excess concrete and washing out of delivery vehicles will be prohibited at other locations on site. Signs will be posted to inform all drivers.

During power plant construction, primary access will be from a proposed coarse gravel road via Pala Road (SR-76). Post-construction, the coarse gravel road will act as a secondary access to the Site for emergency purposes. The construction entrance will be maintained to limit sediment tracking and creation of dust. The parking and laydown areas will be stabilized with coarse gravel. All site surfaces will be regularly watered to reduce dust generated by site traffic and wind, but will not be excessively watered, thus causing site runoff. Silt fencing will be used in project areas, as necessary, to minimize sediment discharging into swales or ditches.

All construction equipment will have regular inspections to help maintain and control leaks and spills. Equipment fueling will be conducted at designated, contained areas. In the event that soils become contaminated, resulting from spills, it will be excavated quickly, removed from the site and disposed of properly.

5.4 BMPs for Post Construction

As construction nears completion, areas used for parking, storage, and laydown will be cleared and stabilized. Areas that will continue to be used for parking or storage will have permanent storm water collection and conveyance structures provided. Temporary BMPs will remain in place until the landscaping and ground cover has sufficiently taken hold. Permanent BMPs will be part of the facility's regular maintenance schedule.

5.5 BMPs

BMP control measures may be used through out the various phases of the Project as indicated in the table below (see Appendix D for BMP cut sheet):

BEST MANAGEMENT PRACTICES TABLE				
BMP	Construction Phase*			
	5.1	5.2	5.3	5.4
Scheduling (SS-1)	X	X	X	X
Preservation of Existing Vegetation (EC-2)	X	X	X	X
Silt fence (SC-1)	X	X	X	X
Sediment/Desilting Basin (SC-2)		X	X	X
Fiber Rolls (SC-5)	X	X	X	X
Gravel Bag Berm (SC-6)	X	X	X	X
Sandbag Barrier (SC-8)	X	X	X	X
Storm Drain Inlet Protection (SC-10)	X	X	X	X
Stabilized Construction Entrance/Exit (TC-1)	X	X	X	
Extended Detention Basin (TC-22)		X	X	X
Water Conservation Practices (NS-1)		X	X	
Dewater Operations (NS-2)		X	X	
Vehicle and Equipment Maintenance (NS-10)		X	X	
Material Delivery and Storage (WM-1)		X	X	
Material Use (WM-2)		X	X	
Stockpile Management (WM-3)		X	X	
Spill Prevention and Control (WM-4)		X	X	
Solid Waste Management (WM-5)		X	X	
Hazardous Waste Management (WM-6)		X	X	
Contaminated Soil Management (WM-7)		X	X	
Concrete Waste Management (WM-8)			X	
Sanitary/Septic Waste Management (WM-9)		X	X	
Liquid Waste Management (WM-10)		X	X	

*Construction Phase:
5.1 = BMPs Prior to Initial Grading
5.2 = BMPs During Project Element Excavation and Construction
5.3 = BMPs During Final Grading/Stabilization
5.4 = BMPs for Post Construction

5.6 Other Controls

5.6.1 Material Handling and Storage

There will be a variety of chemicals stored and used during the construction and operation of OGPP. Chemicals will be stored in appropriate chemical storage facilities. Bulk chemicals will be stored in storage tanks and other chemicals will be stored in returnable delivery containers. Chemical storage and chemical feed areas will be designed to contain leaks and spills. Drain piping design will allow a full-tank capacity spill without overflowing. Drain piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors. The aqueous ammonia storage area will have spill containment and ammonia vapor detection equipment.

Safety showers and eyewashes will be provided in the vicinity of all chemical storage and use areas. Hose connections will be provided near the chemical storage and feed areas to flush spills and leaks to the plant wastewater collection system. Approved personal protective equipment will be used by plant personnel during chemical spill containment and clean-up activities. In case of a chemical spill or accidental release, personnel will be properly trained in the handling of these chemicals and instructed in the procedures to follow. Adequate supplies of absorbent material will be stored on site for spill cleanup.

The following BMPs will be considered for material handling and storage:

- Material delivery and storage (WM-1)
- Material use (WM-2)
- Solid waste management (WM-5)
- Concrete waste management (WM-8)
- Vehicle and equipment maintenance (NS-10)

5.6.2 Solid and Hazardous Waste Management

Solid non-hazardous waste, wastewater, and liquid and solid hazardous waste will be generated at the Site during facility construction and operation. During construction, the primary waste generated will be solid non-hazardous waste. However, some non-hazardous liquid waste and hazardous waste (solid and liquid) will also be generated. Most of the hazardous wastes will be generated at the Site, but a minimal quantity of hazardous waste will be generated during construction of the electric transmission lines. The types of waste and their estimated quantities are described below.

Solid Non-Hazardous Waste

The types of non-hazardous solid waste generated during construction will include vegetation debris, scrap wood and metal, excess concrete, other scrap materials, and empty non-hazardous containers. Paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty non-hazardous chemical containers during Project construction. Where practical, these wastes will be segregated from the trash dumpsters for recycling. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. On site, the waste will be placed in trash dumpsters.

Excess concrete will be generated during construction for both the OGPP and the gas pipeline. Waste concrete will be disposed of weekly in a Class III landfill or at clean fill sites, if available, or will be recycled and disposed of at a construction and demolition site. Management of these wastes will be the responsibility of the construction contractors.

During construction solid non-hazardous material will be generated including scrap metal/steel, packing materials, empty non-hazardous chemical containers, and aluminum waste from packing materials and electrical wiring. Waste will be recycled where practical and non-recyclable waste will be deposited in a local Class III landfill.

Non-hazardous solid waste generated during construction will be collected in dumpsters and picked up periodically by a certified waste disposal company. Typical management practices include recycling, temporary storage of waste and debris, and housekeeping of work areas. Pickup and disposal of recyclables and waste management at off-site licensed recycling and disposal facilities will occur frequently, so as to prevent unnecessary accumulation of waste on site.

Wastewater

Sanitary waste, stormwater runoff, dust control water, equipment washdown water, and water from excavation dewatering will generate wastewater during construction. Sanitary waste will be collected in portable, self-contained chemical toilets. The toilets will be pumped weekly or more, and the waste transported by licensed hauler to a sanitary sewer or to a licensed sanitary wastewater treatment facility. Stormwater runoff will be managed in accordance with a Storm Water Management Plan (SWMP). The SWMP will be required prior to the start of construction. Water used for dust control and soil compaction during construction will not result in off-site discharge. Equipment washdown water will be contained at designated wash areas and will be disposed of off site. Excavation dewatering water, if required, will be contained in portable tanks and sampled prior to disposal off site.

Hazardous Construction Waste

Hazardous waste generated during construction will consist of liquid waste, such as water from excavation dewatering, flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials and dried paint, may also be generated. Flushing and cleaning waste liquid will be generated as pipes are cleaned and flushed. The quantity of welding, solvent, and paint waste is expected to be minimal. Wastewater generated during construction could be considered hazardous.

The construction contractor will be considered the generator of hazardous construction waste and individually will be responsible for proper handling of hazardous waste in compliance with all applicable laws, ordinances, regulations, and standards (LORS). To conform with the LORS, the contractors requirements will include licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. Compliance with the LORS will ensure that hazardous wastes are not released to the environment. The hazardous waste will be collected in designated containers and moved daily to the contractor's 90-day hazardous waste storage area located at the Site. The waste will be removed from the Site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, before the 90-day storage limit expires.

The following BMPs will be considered at the designated storage locations:

- Material delivery and storage (WM-1)
- Material use (WM-2)
- Spill prevention and control (WM-4)
- Solid waste management (WM-5)
- Hazardous waste management (WM-6)

5.6.3 Potential Contaminated Soil

Potential contaminated soil, although unlikely to occur, may be encountered during excavation. Geotechnical staff will be on site during construction and will provide recommendations for soil quality. However, operators and construction personnel will also be asked to report unusual conditions to the geotechnical personnel and the area and/or material will be properly contained during excavation actions. If soils require temporary stockpiling, piles will be covered with plastic sheeting or tarps that are secured safely with sand bags and the stockpile perimeter will have silt fencing to prevent runoff from leaving the area. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contaminated soils are detected, the waste will be handled and properly disposed of in an authorized waste management facility.

5.6.4 Groundwater/Dewatering Controls

The Site construction phase of OGPP will require no groundwater removal. Stormwater is expected to result in only several days of dewatering during construction and this will be in accordance with BMPs. For the OGPP Project, this potential for Site dewatering will only occur over a single rain season.

Due to the seasonal changes in the groundwater table, the Orange Grove gas pipeline construction may require groundwater removal during installation. The dewatering will discharge to local drainage channels and erosion and sedimentation BMPs will be implemented at the discharge point, if necessary. The dewatering operation will be in compliance with all regulations.

If any contamination is detected via odors or visible sheens, the collected stormwater will be handled and properly disposed in a manner consistent with the laws, ordinances, regulations, and standards (LORS). The following control methods will be considered for groundwater/dewatering controls, as necessary:

- Dewatering operations (NS-2)
- Hazardous waste management (WM-6)

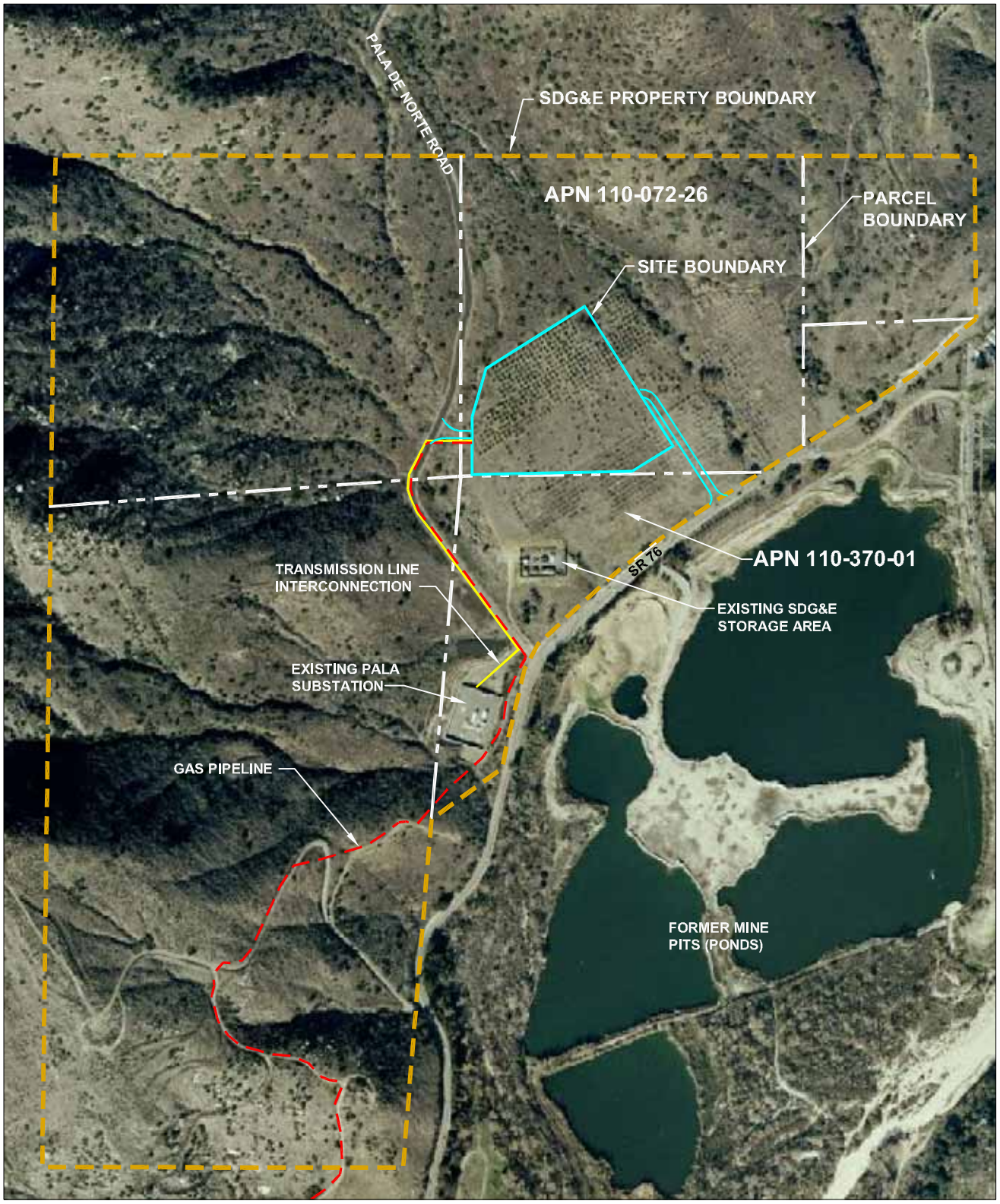
5.6.5 Off-Site Vehicle Tracking

Erosion and sediment controls will be in place to minimize or eliminate soils from being tracked off site from construction vehicles. At the Site, each entrance/exist will be paved and the remainder of the road will be constructed of coarse aggregate rock to limit the amount of material adhering to tires. After completion of the bridge, which will provide the primary access to the Site, both entrance/exists will be utilized. These areas will be inspected daily and cleaned as necessary during construction.

During the construction and installation of the gas pipeline construction laydown areas will be utilized and will require regular traffic. The construction laydown areas will utilize existing concrete and asphalt access drives. The following control methods will be considered for off-site vehicle tracking, as necessary:

- Stabilized construction entrance/exit (TC-1)

APPENDIX A



SOURCE:

Virtual Earth, 2006.

APPROXIMATE SCALE (FEET)

0 600 1200

PROJECT: 125158

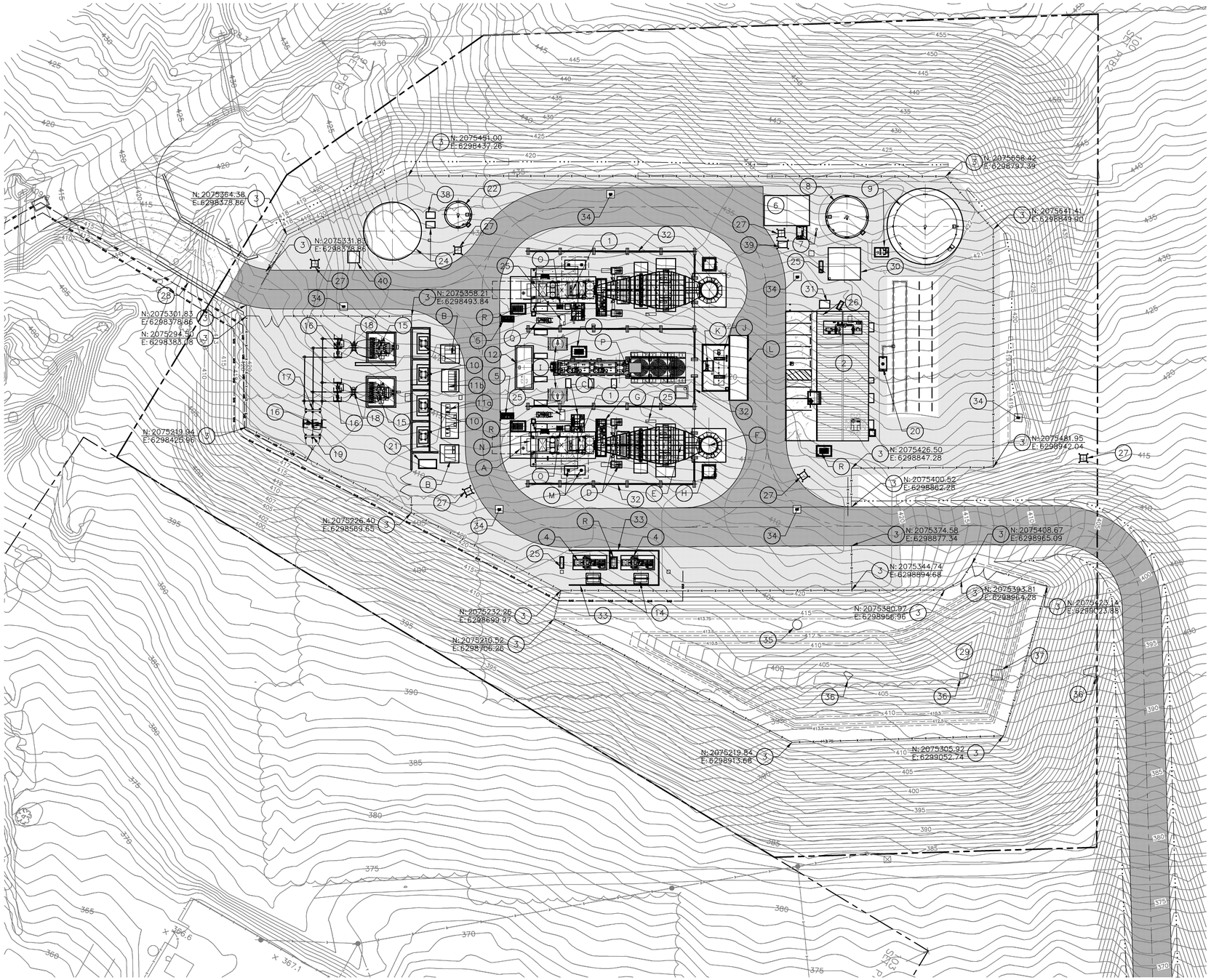
FACILITY:

ORANGE GROVE PROJECT
SAN DIEGO COUNTY, CALIFORNIA

SITE AND PROPERTY BOUNDARY

FIGURE 1.1-3

PS=1:1 L:\Graphics\ProjectsByNumber\29-xxxx\29-0319\AFC (125158)\AFC-SITE AERIAL.dwg Jun 16, 2008 - 9:30am aakers



SITE LAYOUT PLAN

PLAN NORTH IS 29°55'46" CCW OF TRUE NORTH

40 0 40 80

SCALE IN FEET

EMISSION COORDINATES SYMBOL		
DESCRIPTION	NORTHING	EASTING
COMBUSTION TURBINE #1 (NORTH)	2075491	6298683
COMBUSTION TURBINE #2 (SOUTH)	2075387	6298743
DIESEL FIRE PUMP (±2')	2075517	6298766
BLACK START GENERATOR (±2')	2075379	6298582

KEYNOTES:

1. COMBUSTION TURBINE (CT), GENERATOR, AND AUXILIARY EQUIPMENT. (FOR EACH UNIT): (HEIGHT = 43' AT THE TOP OF VBV DUCT).
   - A. MAIN TURBINE GENERATOR SKID ENCLOSURE.
   - B. 13.8KV ELECTRICAL SWITCHGEAR.
   - C. CT AUXILIARY EQUIPMENT SKID.
   - D. TEMPERING AIR FANS (2).
   - E. EMISSION CONTROL SYSTEM–SCR (HEIGHT = ±33').
   - F. STACK (HEIGHT = 80').
   - G. AMMONIA VAPORIZATION SKID.
   - H. CEMS ENCLOSURE WITH TRANSFORMER AND CALIBRATION GAS STORAGE.
   - I. CT LUBE OIL COOLER.
   - J. AMMONIA STORAGE TANK (COMMON TO BOTH CT UNITS).
   - K. AMMONIA FORWARDING PUMP SKID (COMMON TO BOTH CT UNITS).
   - L. AMMONIA UNLOADING PAD, SPILL CONTAINMENT (COMMON TO BOTH CT UNITS).
   - M. TURBINE REMOVAL SUPPORTS.
   - N. AIR INLET FILTER (HEIGHT = 34').
   - O. SPRINT SKID.
   - P. INLET AIR CHILLER AND COOLING TOWER (COMMON TO BOTH CT UNITS) (HEIGHT = 30').
   - Q. WATER INJECTION SKID.
   - R. OILY DRAIN TANK.
2. SERVICE BUILDING FOR CONTROL ROOM, ELECTRICAL EQUIPMENT, FIRE PUMPS, COMPRESSED AIR. (HEIGHT = 18').
3. SITE SECURITY CHAINLINK FENCE AND GATES.
4. FUEL GAS COMPRESSORS.
5. GAS COALESCING FILTER SKID.
6. CONCRETE PAD FOR TEMPORARY WATER TREATMENT TRAILER.
7. DEMIN. WATER PUMP SKID AND RELATED EQUIPMENT.
8. DEMIN. WATER STORAGE TANK (HEIGHT = 24').
9. RAW WATER/FIREWATER STORAGE TANK & PUMP SKID (HEIGHT = 44').
10. AUXILIARY TRANSFORMERS.
11a. 4160V ELECTRICAL SWITCHGEAR.
11b. 480V ELECTRICAL SWITCHGEAR.
12. BLACKSTART GENERATOR.
13. NOT USED.
14. FUEL GAS COMPRESSOR RECYCLE FIN–FAN COOLER.
15. 13.8KV–69KV GENERATOR STEP–UP TRANSFORMER (GSU).
16. 69KV DISCONNECT SWITCH AND SUPPORTS.
17. 69KV CT/VT METERING UNIT.
18. 69KV CIRCUIT BREAKER.
19. 69KV TRANSITION STRUCTURE & POTHEAD.
20. UNDERGROUND SANITARY SYSTEM.
21. TRANSFORMER DELUGE VALVE ENCLOSURE.
22. WASTEWATER STORAGE TANK (HEIGHT = 24').
23. NOT USED.
24. COOLING TOWER MAKEUP TANK AND PUMP SKID (HEIGHT = 36').
25. 480V MCC.
26. FIRE PUMP ROOM.
27. YARD FIRE HYDRANTS WITH HYDRANT MOUNT FIRE MONITORS.
28. BRIDGE.
29. STORMWATER DETENTION BASIN.
30. RO WATER TREATMENT AREA.
31. DIESEL STORAGE TANK – DIESEL FIRE PUMP.
32. GAS TURBINE SOUND WALL (HEIGHT = 48').
33. GAS COMPRESSOR SOUND WALL (HEIGHT = 24').
34. AREA INLET.
35. STORM MANHOLE.
36. STORM END SECTION.
37. STORMWATER OUTLET CONTROL STRUCTURE.

KEYNOTES CONT.:

38. TANK TRANSFER PUMP SKID.
39. FRESH WATER UNLOADING PUMP SKID.
40. RECLAIM WATER UNLOADING PUMP SKID.

REV.	DATE	DESCRIPTION	DWN	CHK
0	8-5-08	ISSUED FOR GRADING PERMIT	RAD	WHR
1	8-25-08	RE-ISSUED FOR GRADING PERMIT	BGG	WHR

PRIVATE CONTRACT

3 SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	45 SHEET

GRADING PLAN FOR:
THE CONSTRUCTION AND OPERATION OF THE ORANGE GROVE POWER PLANT, AN ELECTRIC GENERATOR FACILITY. ALSO, THE INSTALLATION OF A 10" NATURAL GAS PIPELINE TO PROVIDE THE PLANT WITH FUEL ENERGY.
CALIFORNIA COORDINATE INDEX 434-1736/434-1737

APPROVED FOR MOHAMAD FAKHRIDDIME
DIRECTOR OF PUBLIC WORKS
BY:

ENGINEER OF WORK
THOMAS F. HEAUSLER
C040363 R.C.E. 3-31-09

L-15454
GRADING PERMIT NO:

PERMITS

REZONE PERMIT NO. NOT APPLICABLE
SPECIAL USE PERMIT NO. NOT APPLICABLE
TENTATIVE MAP NO. NOT APPLICABLE
NOI/WDID NO. NOT YET ASSIGNED

BENCH MARK

DESCRIPTION: 3 1/2" brass disk "M.W.D. OF SOUTHERN CA S.D.6-69 1993"
LOCATION: S.E. CORNER OF MANHOLE
RECORD FROM: FIELD BOOK 4047-04-079
ELEVATION: 318.88' DATUM: NAVD88 AND NAD83

COUNTY APPROVED CHANGES

NO.	DESCRIPTION:	APPROVED BY:	DATE:

Sealed Only When Signed in Blue Ink

Sega ®
Engineers – Architects – Technicians
Design – Construction – Field Service
16041 Foster
P.O. Box 1000
Stilwell, Kansas 66085-1000

ORANGE GROVE ENERGY L.P.
Schaumburg, IL

ORANGE GROVE POWER PLANT

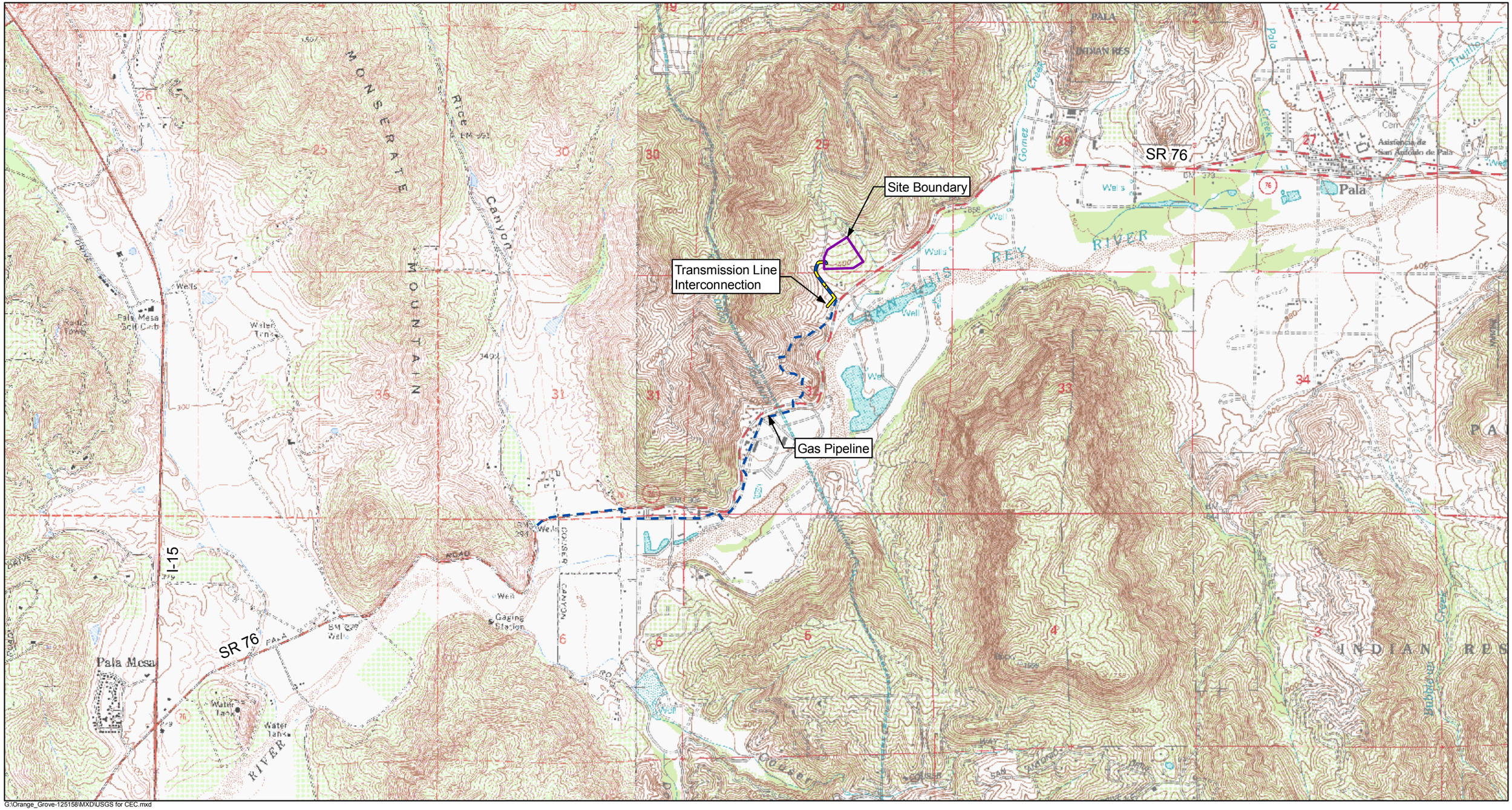
SITE LAYOUT PLAN

DESIGN BY: B. ROMINES	CHECKED BY: J. BONDANK
DRAWN BY: B. GASPERS	DATE: 9-12-07
CLIENT I.D.: ICC00101	SEGA PROJECT NO.: 07-201

CADD FILE NAME: 07201-C100.dwg

DRAWING NO. C100 REV. 1

SEGA INC.
PHONE NUMBER: (913) 681-2881



G:\Orange_Grove-125158\MXD\USGS for CEC.mxd

Figure 1.1-2
Vicinity Map
Orange Grove Project
San Diego County, CA

1" = 2,000'

2,000 1,000 0 2,000 4,000 6,000 Feet

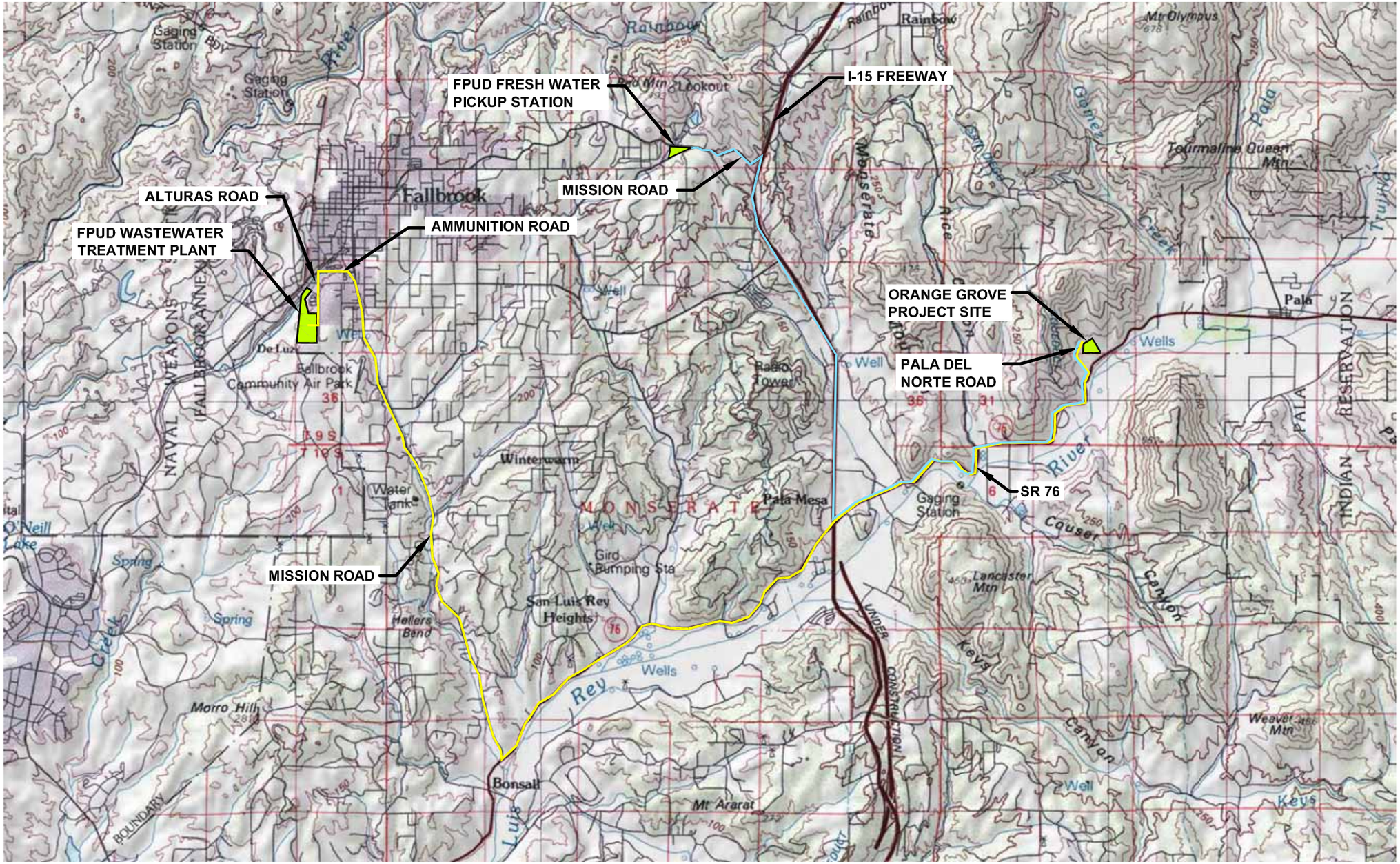
Source:
USGS Topographical Quardrangles:
Pala, Bonsall

TRC

LEGEND

RECLAIM WATER HAUL ROUTE

FRESH WATER HAUL ROUTE



N

SOURCE:

United States Geological Survey
7.5 Minute Topographic Map, 2000:
Morro Hill, Bonsall, Temecula,
and Fallbrook Quadrangles

0 1 1/2 3 MILES

TRC

PROJECT: 125158

FACILITY:

ORANGE GROVE PROJECT
SAN DIEGO COUNTY, CALIFORNIA

FPUD WATER PICKUP LOCATIONS AND WATER HAUL ROUTES

FIGURE 1.1-5

MS=1:1 L:\Graphics\ProjectsByNumber\29-xxxx\29-0319\AFC (125158)\AFC-HAUL ROUTE.dwg Jun 16, 2008 - 9:31am aakers

APPENDIX B

HYDROLOGY & HYDRAULIC CALCULATIONS

FOR

ORANGE GROVE ENERGY, L.P.

ORANGE GROVE POWER PLANT

MUP 07 - 009

AUGUST 5, 2008

PREPARED BY:

16041 Foster P.O. BOX 1000
Stilwell, Kansas 66085-1000
(913) 681-2881

Sega Project No. 07-0098

Table of Contents

Introduction and Pre-Development Condition

Orange Grove Energy, L.P.'s proposed Orange Grove Power Plant (OGPP) is located in Unincorporated San Diego County (SDC) west of Pala, California 92059 about 0.1 miles north of the intersection of State Road 76 (Pala Road or SR-76) and a private road called Pala Del Norte Road. The 8.5 acre proposed project site is located on approximately 202 acres of property owned by San Diego Gas & Electric (SDG&E) in San Diego County, California in Section 29, Township 9 South, Range 2 West (Please refer to the Site Location and Site and Property Boundary Maps in the Reference section for details). The site will utilize two leased areas during the construction of the project. The 8.5 acre northern leased area (APN 110-072-26) will be the location of the proposed site. The southern leased area (APN 110-370-01) is 8.0 acres, and will be the staging, pre-assembly, construction parking, and storage area during construction and after construction will be returned to its existing condition. An existing storage yard is included on the southern leased area and will be utilized for construction trailers.

The online USDA, NRCS, National Cooperative Soil Survey for this area of San Diego County, CA reports that this site has Las Posas stony fine sandy loam, 9 to 30 percent slopes (See Reference Soil Survey Map symbol LrE). The seasonal high groundwater table was not encountered during the geotechnical investigation. The maximum explored depth for the fourteen site borings was approximately 40.0 feet below grade (see the signed and sealed PSI Geotechnical Exploration Report for details). The parcel is designated as zone "X", which are areas determined to be outside the 500-year floodplain (and outside the 100-year floodplain), as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) dated June 19, 1997, for community panel number 501 of 2375 and map number 06073C0501 F (See the FEMA FIRM Map). There are no geological hazards such as landslides or rockslides identified according to the geotechnical exploration report (See signed and sealed PSI Geotechnical Exploration Report). The San Luis Rey River is located on the opposite side of SR-76, directly south of the proposed site. The river is the receiving watershed of the stormwater runoff from both the pre-development and post-development site.

Existing Development

This area of existing SDG&E property was previously developed into a citrus orchard that is no longer in use. A majority of the proposed site and staging areas are still covered with abandoned orchard trees. The rest of the site is covered with a mixture of grass and vegetation. The 8.5 acre leased area has few existing impervious areas located on-site.

The pre-development area drains from the north to the south at approximately a ten percent (10%) slope (See the USGS Topographic Quadrangle). The existing site drains to a portion of SR-76 that does not have a ditch or culvert to channlize or route the stormwater under the road. Two existing drainage channels located on the east and west sides of the site route neighboring stormwater runoff under SR-76. Except for negligible temporary disturbance for trenching and backfilling associated with the transmission and gas pipeline installation, both drainage channels will remain undisturbed throughout construction.

The first of the two channels; the West Channel is located between the proposed development and Pala Del Norte Road. The West Channel is fed by existing culvert pipes of various sizes (14"- 24") which route drainage from the northern mountains across Pala Del Norte Road. Once the drainage reaches SR-76 the runoff is routed underneath by an 18" corrugated metal culvert pipe. No existing stormwater calculations were available for review.

The second channel; the East Channel, is located on the east side of the proposed development approximately 250 linear feet east of the proposed east property line. The East Channel also routes stormwater runoff under SR-76 through a 24" corrugated plastic culvert pipe. The pipes outlet into an existing former sand and gravel quarry located on the Pala Band of Mission Indians property on the south side of SR-76.

The quarry is located within Flood Zones A and X which are "special flood hazard areas inundated by the 100-year flood" and "Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood" (See References for FEMA FIRM Map). Ultimately, the quarry outlets into the San Luis Rey River (See References for the Drainage Area Map). Two existing earth ridges, one located on the south side of the existing SDG&E maintenance/storage yard and the other located 300 feet west of the existing East Drainage Channel route the proposed existing site drainage between the earth ridges. These earth ridges collect pre-development stormwater runoff between them and route over SR-76. The stormwater then travels through the former quarry to the San Luis Rey River.

Proposed Development

The proposed Orange Grove Power Plant will be located on an 8.5 acre leased area. The plant area (the area located inside the fence) will include a switchyard area and the power plant turbine area including service building and various structures. Inside the proposed turbine plant area six (6) inches of crushed rock surface will be utilized instead of topsoil. The plant area loose rock is installed for reasons concerning electrical safety but it also improves the drainage characteristics of the property by slowing the runoff flow velocity. The surrounding site will be landscaped and constructed at 3:1 maximum slope. The proposed Stormwater Detention Basin is located on the south and down stream side of the proposed development. The basin will be utilized as an extended dry detention basin. The basin will be grass lined and discharge at less than the pre-development discharge rate. These hydrology and hydraulic calculations are to show that the proposed Stormwater Management System will be adequate for the proposed site.

The site has two proposed access drives, one from Pala Del Norte Road and the other from State Road 76 (Pala Road or SR-76). The Pala Del Norte Road access drive will be the main entrance and includes a bridge spanning the existing West Drainage Channel. Existing stormwater culvert pipes located under Pala Del Norte Road will remain undisturbed. These pipes route runoff from the northern mountains into the West Channel. The bridge will allow for the 100-year storm event to flow under the deck with a minimum of one foot of freeboard (see the FlowMaster 2005 Worksheets for the Proposed Concrete Bridge). A concrete approach apron will be constructed

between the bridge and the existing asphalted Pala Del Norte Road. Similarly, the SR-76 access drive will be located approximately 930 feet east of the existing intersection of Pala Del Norte Road and SR-76. This access drive entrance will be constructed of concrete pavement approximately 50 feet in length. All additional roads will be constructed of 18 inches of crushed rock surface including inside and out of the plant area. The two access drives will connect inside the plant area. All road widths, radii, and other requirements will be in accordance with California Fire Code, the San Diego - North County Fire Protection District, and the Orange Grove Power Plant Fire Protection Plan.

To adequately control water quality on-site, a combination of Site Design, Source Control, and Treatment Control Best Management Practices (BMPs) will be utilized for the Orange Grove Power Plant project based on the Caltran's BMP Handbook and SDG&E's BMP Handbook. The Orange Grove Power Plant project will implement stormwater treatment BMPs that will remove anticipated pollutants of concern from off-site discharge by routing the 50-year stormwater through the proposed storm drains and into the Stormwater Detention Basin located in the southeast side on the northern leased area (Please refer to the Grading and Drainage Plan Drawing).

The proposed drainage area for the detention basin is 5.2 acres, which includes the switchyard area, the power plant turbine block and supporting equipment, service building, and the detention basin area. When the planned construction is complete, the plant area will have approximately 43,500 SF of impervious foundation additions for various structures. In addition, there will be 7,500 SF of impervious area for access drive entrances which will not be located inside of the detention basin drainage area. Thus, the proposed drainage area of 5.2 acres will have a total impervious area of 43,500 SF (1.0 acres, 11.76 % of the parcel) (See the References for the Impervious Area Map and Calculations).

Stormwater Detention Basin Requirements

The proposed Stormwater Detention Basin will detain the stormwater runoff for a 5.2 acre drainage area. This area includes all areas inside the plant area fence yard, the detention basin area, and the north berm area (See the Drainage Area Map in the References). Stormwater runoff will be captured in the plant area by six stormwater grate area inlets. Both the grate inlets and storm drains are designed for 100-year storm event. The stormwater runoff will be routed into the detention basin for treatment. The inlets will be double San Diego Regional Standard No. D-15 grate inlets. The detention basin will detain the 100-year stormwater runoff and outlet at less than the pre-development discharge rate. The pre-development discharge rate will be controlled with a 12" diameter outlet pipe.

The San Diego Regional Water Quality Control Board (RWQCB) has jurisdiction within San Diego County. The Regional Boards issue the municipal Stormwater permits in California. These boards have water and stormwater jurisdiction on construction and development sites in California. The Orange Grove Power Plant is located in region 9, the San Diego RWQCB (See References for San Diego RWQCB Map). The site stormwater indirectly discharges into the San Luis Rey River located south of the proposed site (See the San Luis Rey River Watershed Map). The County of

San Diego – Stormwater Standards Manual requires that Priority Projects meet stormwater management system design criteria. The stormwater management system will meet both the quality and quantity requirements defined in the County of San Diego Stormwater Standards Manual, the 2003 San Diego County Hydrology Manual, and the 2005 San Diego County Drainage Design Manual. Accordingly, the proposed Detention Basin will detain both the quality and quantity volumes for the 100-year design storm event.

Required Quality Volume

The Design Treatment Control BMP standards for stormwater runoff is the primary control variable for designing Treatment Control BMPs. This design volume is for small, more frequent storm events. The runoff volume quality requirement ($V_{quality}$) is produced from the 24-hour 85th percentile storm event, as determined from the local historical rainfall (See County of San Diego Stormwater Standards Manual - *Appendix A to the Watershed Protection, Stormwater Management and Discharge Control Ordinance*, Amended August 2003). The Runoff Coefficient "C" was determined from the various proposed land modifications including impervious area, vegetation, and rock surface additions (See Table 3-1 Runoff Coefficients for Urban Areas from the County of San Diego Hydrology Manual Dated June 2003 page 3-6). The depth of rainfall "I" was determined to be 0.83 inches (San Diego County Hydrology Manual *Department of Public Works Flood Control Section* - Appendix E 85th Percentile Precipitation Isopluvial Map, Revised June, 2003). The Treatment Control BMP design volume is:

- $V_{quality} = C*I*A$
- Runoff Coefficient Impervious Areas = 0.85 acres, C = .95
  Crushed Rock Surface Areas = 2.55 acres, C = 0.35
  Grassy Areas = 1.8 acres, C = 0.51

$$C = \frac{(0.80 \text{ acres})(0.95) + (1.8 \text{ acres})(0.51) + (2.60 \text{ acres})(0.35)}{5.2 \text{ acres}} = 0.50$$

- $V_{quality} = (0.50)*(0.83 \text{ inches})*(5.2 \text{ acres})*(1 \text{ ft}/12 \text{ in})*(43{,}560 \text{ ft}^2/ 1 \text{ acre})$
  - **$V_{quality}$ = 7,833 cubic feet**

The required stormwater quality volume will be retained in the proposed detention basin. Below the inlet and outlet stormwater pipes will be a one foot sediment storage depth for anticipated erosion and sediment control. The depth will be maintained by riprap lining the bottom on the detention basin according to the San Diego County Drainage Design Manual and the Water Quality Management Plan (WQMP) Requirements.

Required Quantity Volume

The required quantity for the Orange Grove Power Plant Stormwater Detention Basin will be the stormwater runoff from the 24-hour, 100-year storm event with an outlet control structure

which will release stormwater at the pre-development discharge rate. The discharge values were calculated using the computer program Technical Release 55 (TR-55) and the Rational Method. TR-55 utilizes the U.S. Soil Conservation Service (SCS) runoff equation method to calculate the peak rate of discharge. The input requirements for calculating the peak discharge is the time of concentration, the drainage area, the rainfall distribution, the runoff curve number, and the 24-hour rainfall. The storm rainfall data was determined from the San Diego County Hydrology Manual. Runoff curve numbers characterize the properties for a particular soil and ground cover. A calculated runoff curve number of 76 was utilized for the pre-development areas and a curve number of 83 for post-development areas. All impervious area additions to the post-development site were given a 98 runoff curve number. The time of concentration was determined using TR-55 by defining the length and type of flow, the slope, and Manning's number for the pre- and post-development areas. The 24-hour, 100-year storm pre-development discharge is 12.68 cubic feet per second (cfs) and the post-development discharge to the detention basin is 14.66 cfs.

The volume required for detention was calculated by utilizing TR-55. In addition to the discharge output the program also calculates the stormwater runoff volume. The pre and post-development peak inflow for the 24-hour, 50 and 100-year design storm occurs at the 10^{th} hour. The post-development runoff quantity volumes for the 50-year and 100-year storms are 68,445 and 77,165 cubic feet, respectively (See WinTR-20 Pre-and Post Development Stormwater Runoff Amounts). The total required 100-year storage volume for the Stormwater Detention Basin is:

- **$V_{quality}$ + $V_{quantity}$ = 7,833 cubic feet + 77,165 cubic feet = 85,000 cubic feet**
    - **Thus, $V_{req'd}$ = 85,000 cubic feet**

Proposed Stormwater Detention Basin

The detention basin volume will be detained in the proposed Stormwater Detention Basin before discharging at the pre-development discharge. The Stormwater Detention Basin will be a 0.5 acre 11.0 foot deep basin. The bottom elevation of the detention basin is 402.0'. The side slopes of the basin will be 3:1 and the basin will be surrounded with a security fence and a 10' maintenance road. Access to the bottom of the detention basin for maintenance will be on the northwest corner of the basin (See the detailed Grading and Drainage Drawings). The 10' maintenance road will allow for access to the storm drain outlet structure or detention basin inlet structure, detention basin outlet structure, and the stormwater emergency outlet overflow structure. Because the proposed detention basin will be utilized for both water quality and flood control, it would be classified as a "conjunctive use basin" according to the Drainage Design Manual. The total storage volume available for the Stormwater Detention Basin is (not including one foot of freeboard):

- $V_{Available}$ = **85,650 cubic feet > $V_{req'd}$ so OK!**

The basin inlet structure or storm drain outlet pipe will be a 24" RCP with a flared end section. The pipe will discharge stormwater runoff from six grate area inlets located throughout the plant area. The proposed storm drains will have the capacity to drain the 50-year and 100-year storm event. The detention basin outlet control structure will release discharge at less than the pre-development rate of 11.28 cfs. Prior to inletting into the grate structures, stormwater will be treated over 6" of loose crushed rock (Class II Aggregate). The rock will act as the initial treatment BMP before being discharged into the detention basin. During the 100-year storm event, stormwater runoff will pond inside the development fenced area.

Proposed Outlet Control

The detention basin outlet pipe (12") is sized for less than the pre-development discharge rate at 11.28 cfs (See Outlet Circular Orifice Worksheet). The Stormwater Detention Basin 100-year storm water surface elevation is 412.4'. If water rises above the 412.4' elevation, the stormwater is directed outside of the detention basin through the emergency overflow structure. The structure will discharge at the post-development 100-year discharge rate (27.86 cfs) for the 5.2 acre drainage area. The emergency outlet control structure maximum discharge is 32.63 cfs. The outlet control pipe will channel the stormwater runoff through the emergency overflow structure. Downstream of the emergency overflow structure, the pipe size will increase to 36" to handle storm events larger than the 100-year storm event if needed. All runoff exiting the detention basin will be routed to the proposed west secondary entrance road drainage ditch. The outlet pipe will discharge at 11.28 cfs for a 100-year storm and 39.51 cfs for storm events greater the 100-year storm. The velocities for the outlet pipe are 7.09 ft/s and 9.83 ft/s, respectively. All inlet and outlet pipes on-site are equipped with riprap as energy dissipaters. Table 7-1 of the 2005 San Diego County Drainage Design Manual was utilized for the riprap design parameters.

The stormwater outlet pipe is located outside the top of bank of the Secondary Access Road drainage ditches. The outlet pipe will discharge into a proposed riprap energy dissipater on the west side of the access road.

Proposed On-site North Drainage Channel

The proposed Orange Grove Power Plant North Drainage Channel will be constructed to direct stormwater drainage, from the north side and upstream areas, around the developed area of the site and into the West Drainage Channel. The North Drainage Channel will add no additional stormwater runoff area to the West Drainage Channel. The West Drainage Channel drainage area will be modified in shape but will have no change to the channel. Post-development will have approximately 1.5 acres from the North Drainage Channel routed into the West Drainage Channel; having no net area increase to the existing ditch. The North Channel drainage from the existing 10% slope and the proposed 3:1 slope will be channeled into a two foot deep, five foot wide drainage channel. The channel will be grass lined with 3:1 side slopes and be located outside of the fence line of the development area. The channel will route stormwater runoff into the existing West Drainage Channel, underneath the proposed bridge, and ultimately beneath SR-76. Pre-

development stormwater runoff is routed into the West Drainage Channel or directly across SR-76. The North Drainage Channel is designed to handle the 100-year storm event, a stormwater discharge of 12.75 cfs allowing one foot of freeboard.

Existing West Drainage Channel

The existing West Drainage Channel collects stormwater runoff from areas upstream (north and northwest) of the proposed site location. Multiple existing stormwater culvert pipes are routed into the existing channel underneath Pala Del Norte Road and range from 14 to 24 inches in diameter. There are no proposed modifications to the existing culvert pipes. A proposed concrete bridge approximately 40 feet wide and 60 feet long will span the West Drainage Channel and will be utilized as the main entrance to the proposed site. The bridge will be constructed outside of the top of bank and intersect with Pala Del Norte Road between two sets of existing culvert pipes. The 100-storm event will pass below the bridge (see the FlowMaster 2005 Worksheets for the Proposed Concrete Bridge).

The proposed development will route the area north of the site into that drainage ditch; having no net area increase to the existing West Drainage Channel (See the USGS Topographic Quadrangle – Pre and Post-Development Maps). An outlet culvert pipe for the West Drainage Channel, located at the intersection of Pala Del Norte Road and SR-76, drains stormwater from north to south underneath SR-76. The outlet culvert pipe is an 18" Corrugated Metal Pipe. It drains into the existing former quarry and ultimately into the San Luis Rey River.

Secondary Access Road Drainage Ditches

The Orange Grove Power Plant access drive located off SR-76 will have drainage ditches located on either side. This secondary/emergency road will be utilized during construction as an alternate entrance until the bridge construction is complete for the Pala Del Norte Road access drive. This road will be 30 feet wide and will be constructed of 18 inches of crushed loose rock (Class II Aggregate). The entrance of the secondary road will be constructed of concrete. The secondary road will have ditch channels on both sides. The ditches are designed for the 100-year storm event with a 3 foot bottom and 3:1 side slopes. The west and east ditches discharge at 6.72 cfs and 12.56 cfs, respectively. During the 100-year storm event the water elevation in the channels are 0.31 feet and 0.45 feet in depth (See the FlowMaster Worksheets for the Secondary Access West/East Trapezoidal Channels). The west channel will be two foot deep and at a channel slope of ten percent. Likewise, the east ditch will have similar parameters as the west ditch but will only be one foot in depth. A larger depth was required for the west ditch to provide one foot of freeboard to channel the detention basin stormwater runoff. The detention basin outlet pipe will be 36 inches in diameter and outlet above the top of bank. Riprap will be lined from the outlet location to the secondary road and utilized as the energy dissipation. The two ditches will be connected by an 18" reinforced concrete culvert pipe under the road entrance near State Road 76. All other ditch segments will be grassed lined and maintained with silt fencing and cross barriers located every 50 feet during construction.

The Secondary Access Road Drainage Ditches will route no additional stormwater runoff south toward SR-76. The detention basin will control the stormwater runoff added from the proposed equipment and other impervious area additions. The detention basin will outlet into the west secondary access road ditch at approximately the pre-development discharge rate (11.28 cfs). The velocity for the 100-year storm event will be 14.36 ft/s and will be controlled with 3.0 foot, one ton stone riprap (See Table 7-1 of the County of San Diego Drainage Design Manual).

Maintenance Plan, Erosion, and Siltation BMPs

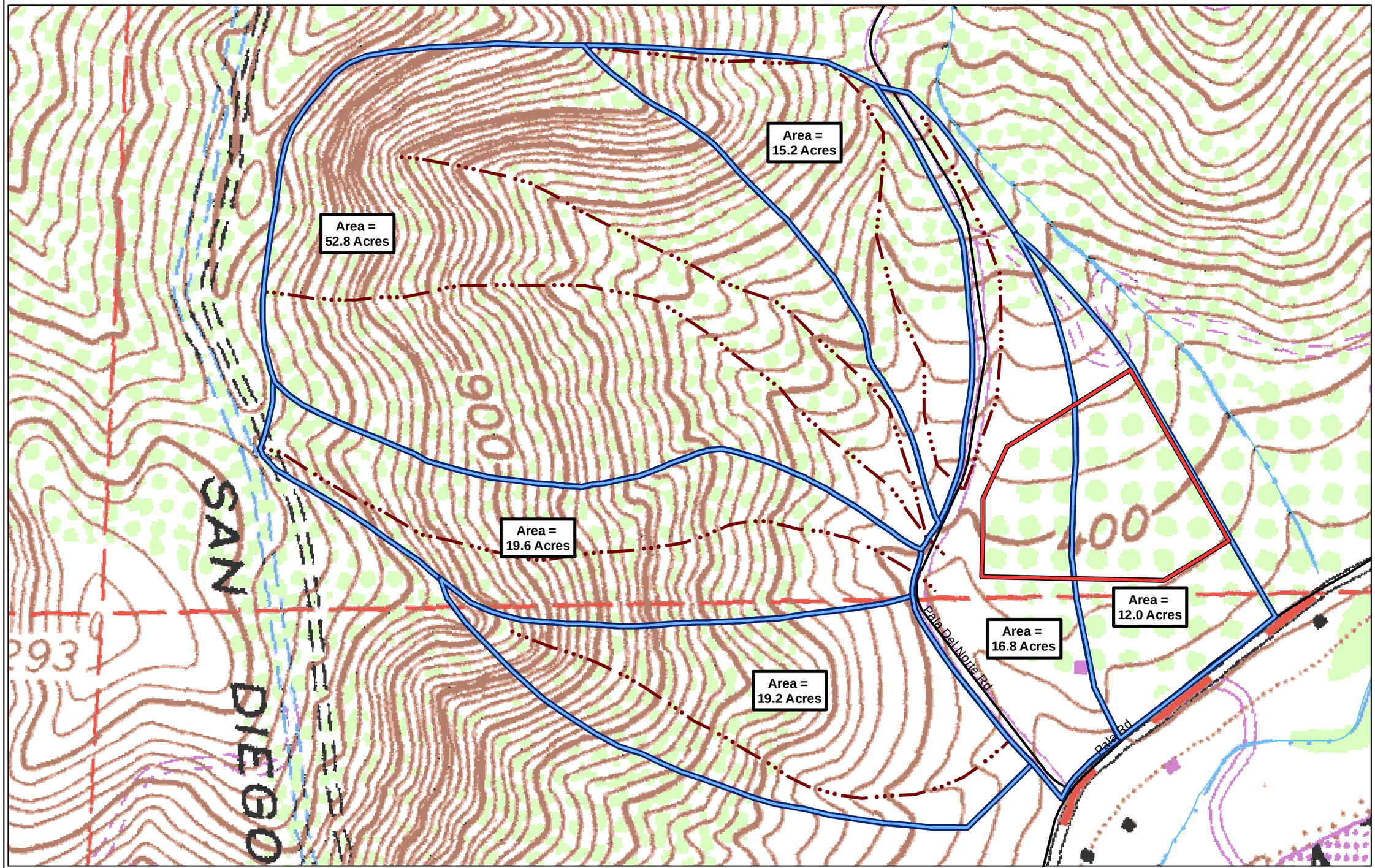
The Orange Grove Power Plant will meet the minimum requirements for construction and permanent BMPs. Construction BMPs will be utilized throughout the scheduled timeframe of the construction project to the maximum extent practicable. Erosion and sediment control will be implemented during construction by silt fences and fiber rolls accompanied with cross barriers (check dams) made from sand bags which will border all sides of the project site. Silt fences will also be implemented around any stockpiling of soil during grading and excavation. Permanent erosion and sediment controls will also be implemented by utilizing drainage channels, soil berms, landscaping, crushed rock surfaces, and ditches. Riprap will be utilized at all inlet and outlet structures for erosion control. These BMP measures were taken to route stormwater runoff around the proposed development and to minimize surrounding site impacts. The Stormwater Detention Basin's outlet control structure and overflow structure will act as the structural BMP's for stormwater drainage and release runoff to the proposed drainage channel on the east side of the site.

The Orange Grove Power Plant will have routine equipment maintenance required to maintain a sufficient operating facility. The Orange Grove Energy, L.P. Design Department will be notified if any problems arise, such as standing water in the power plant area. A Design Department representative will make a field check and then determine the best course of action to correct the problem. The site non-structural and structural BMPs will be routinely inspected, cleaned, and maintained on an annual basis according to San Diego County, the Stormwater Management Plan (SWMP), and the San Diego RWQCB.

Conclusion

The area inlets, pipes, and Stormwater Detention Basin will be adequate as the Orange Grove Power Plant surface water management system. Storm drains will route the 50-year and 100-year storm event to the detention basin. The stormwater will be discharged off-site at the 100-year pre-development discharge rate and will detain the 100-year storm event. Permanent BMPs will be utilized during the life of the project. Thus, the surface water management system meets all requirements for the San Diego RWQCB and the County of San Diego.

APPENDIX C



REV.	DATE	DESCRIPTION	DWN	CHK
A	6-11-07	ISSUED FOR REVIEW	JAC	WHR
B	6-12-07	ISSUED FOR REVIEW	JMQ	WHR

Legend

- Drainage Areas
- Drainage Path
- Site Boundary
- USGS Drainage (Blue Line)

N
W E
S

0 50 100 150 200 400
Feet

Sega
Engineers - Architects - Technicians
Design - Construction - Field Service

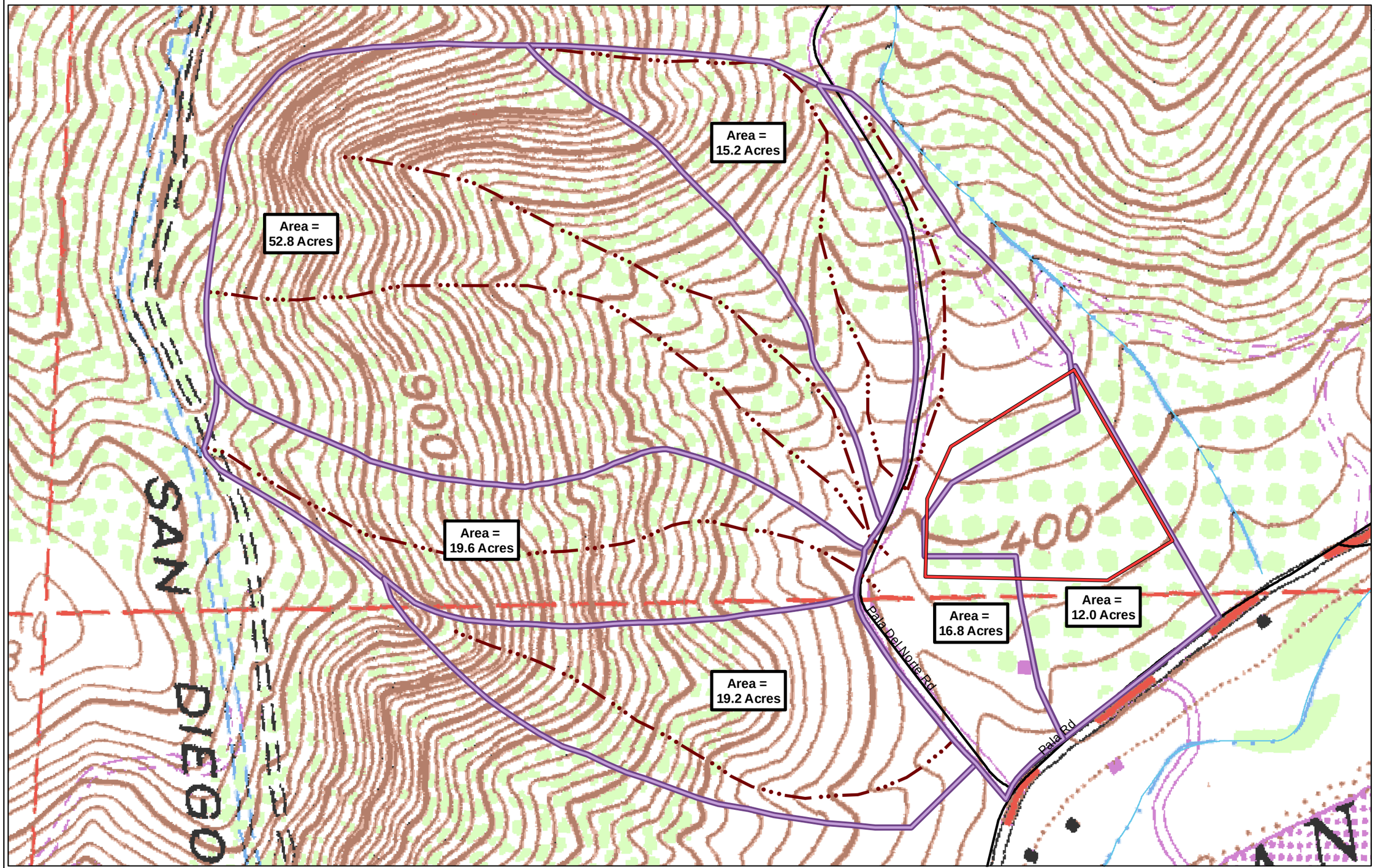
16041 Foster
P.O. Box 1000
Stilwell, KS 66085-1000

ORANGE GROVE ENERGY L.P.
Schaumburg, IL

MUP 07-009

FIGURE 4
ORANGE GROVE PROJECT
PRE-DEVELOPMENT DRAINAGE AREA MAP

DESIGN BY: J. LANGEL	CHECKED BY:
DRAWN BY: J. CLAUSSEN	DATE: 3-05-2008
CLIENT I.D.	SEGA PROJECT NO. 07-098
FILE NAME: pre_drainage.mxd	
DRAWING NO.	REV. D



REV.	DATE	DESCRIPTION	DWN	CHK
A	6-11-07	ISSUED FOR REVIEW	JAC	WHR
B	6-12-07	ISSUED FOR REVIEW	JMQ	WHR

Legend

- Site Boundary
- Drainage Areas
- Drainage Path
- USGS Drainage (Blue Line)

N
W E
S

0 50 100 150 200 400
Feet

Sega

Engineers - Architects - Technicians
Design - Construction - Field Service

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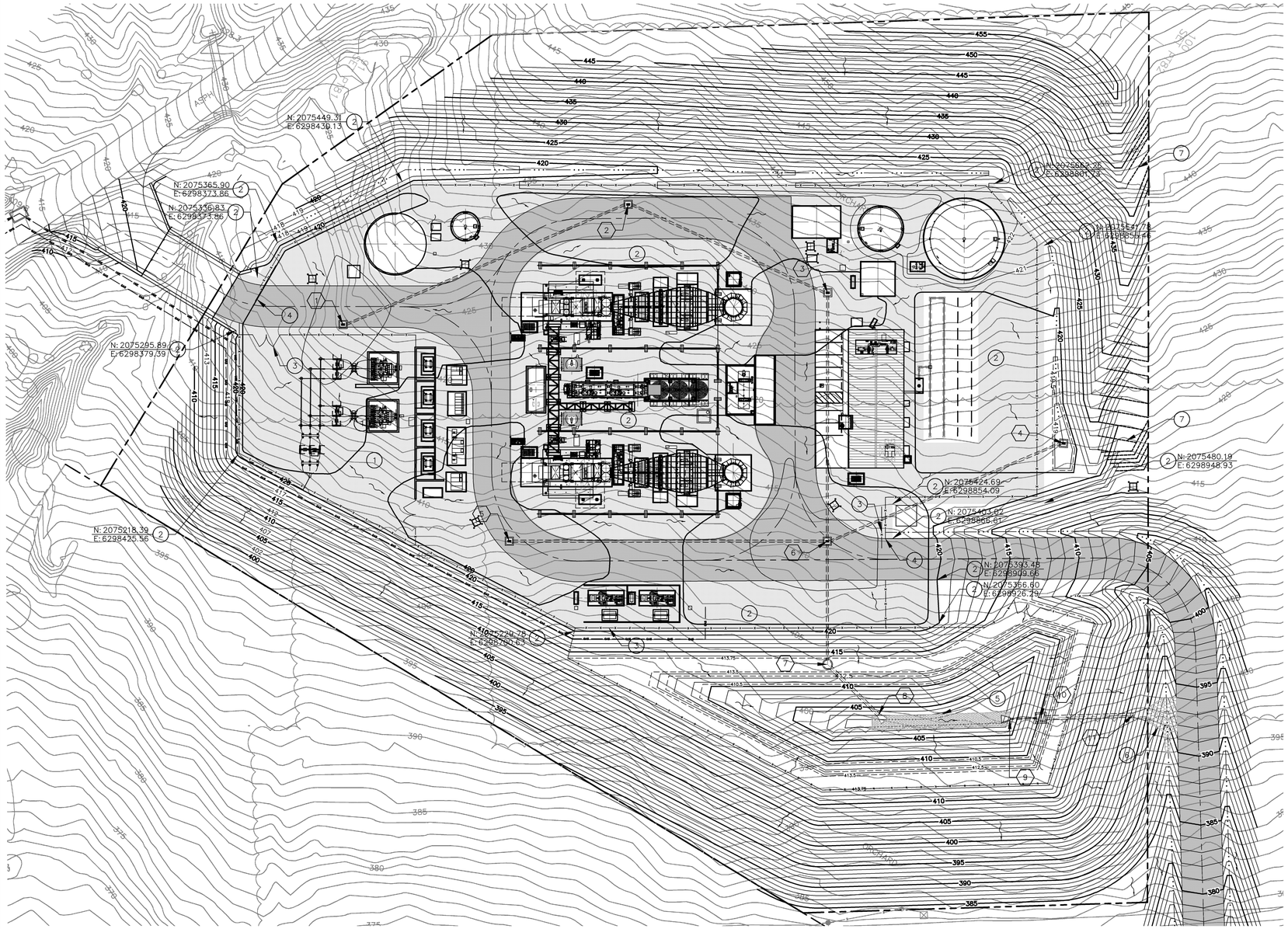
Stilwell, KS 66085-1000

ORANGE GROVE ENERGY L.P.
Schaumburg, IL

MUP 07-009

FIGURE 5
ORANGE GROVE PROJECT
POST-DEVELOPMENT DRAINAGE AREA MAP

DESIGN BY: J. LANGEL	CHECKED BY:
DRAWN BY: J. CLAUSSEN	DATE: 3-05-2008
CLIENT I.D.	SEGA PROJECT NO. 07-098
FILE NAME: post_drainage.mxd	
DRAWING NO.	REV. D



GRADING AND DRAINAGE PLAN

PLAN NORTH IS 29°55'46" CCW OF TRUE NORTH

40 0 40 80

SCALE IN FEET

CIVIL KEYNOTES:

1. INSTALL 6" CRUSHED ROCK SURFACE INSIDE SUBSTATION FENCE.
2. INSTALL 6" CRUSHED ROCK SURFACE INSIDE COMBUSTION TURBINE AREA FENCE.
3. INSTALL SITE SECURITY CHAINLINK FENCE WITH 30' MANUAL SLIDE GATES, SEE SITE DETAILS DWG. C801.
4. INSTALL 30' SLIDE GATE WITH GATE OPERATOR AND LOOP DETECTOR. COORDINATE WITH OWNER'S SECURITY CONSULTANT.
5. INSTALL MIN. 2.3' 1/2 TON STONE RIPRAP.
6. INSTALL MIN. 3.0' 1 TON STONE RIPRAP.
7. FILL AREA EAST OF LANDSCAPING BERM FOR EXCESS CUT, MIN. 3' FROM PROPERTY LINE.

GRADING NOTES:

1. ALL CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE COUNTY OF SAN DIEGO, CALIFORNIA, LATEST EDITION.
2. ALL STORM SEWER LINES SHALL BE CLASS III RCP.
3. PIPE LENGTHS EXCLUDE END SECTIONS AND ARE MEASURED ALONG CENTERLINE OF PIPE FROM CENTER OF INSIDE FACE TO CENTER OF INSIDE FACE OF STRUCTURES.
4. MATCH GRADES AT EXISTING IMPROVEMENTS.
5. SLOPES SHALL BE MADE AT 3:1 MAXIMUM GRADE (H:V).
6. EROSION CONTROL STRUCTURES (SEE EROSION CONTROL PLAN DWGS. C500 & C502) SHALL BE CONSTRUCTED PRIOR TO GRADING ACTIVITIES.
7. DRAINAGE CHANNELS SHALL BE MINIMUM 3' FLAT BOTTOM AND SHALL HAVE 3:1 SIDE SLOPES.
8. NORTHING AND EASTING COORDINATES FOR MANHOLES, AREA INLETS, FIELD INLETS, AND JUNCTION BOXES ARE MEASURED TO CENTER OF STRUCTURE.
9. NORTHING AND EASTING COORDINATES FOR END SECTIONS ARE MEASURED TO FARTHEST EDGE OF THE END SECTION AT PIPE CENTERLINE.

STORM DRAINAGE NOTES:

1. N:2075338.34 E:6298444.48 INSTALL 4X4 AREA INLET TOP EL. = 418.4' FLOWLINE OUT (N) = 412.4 INSTALL 220 L.F. 15" DIA. CLASS III RCP @ 0.5% SL. TO STRUCTURE 2
2. N:2075516.99 E:6298579.87 INSTALL 4X4 AREA INLET TOP EL. = 419.0' FLOWLINE IN (S) = 411.3 FLOWLINE OUT (E) = 410.8 INSTALL 154 L.F. 18" DIA. CLASS III RCP @ 0.5% SL. TO STRUCTURE 3
3. N:2075533.88 E:6298737.01 INSTALL 4X4 AREA INLET TOP EL. = 419.25' FLOWLINE IN (W) = 410.0 FLOWLINE OUT (SE) = 409.5 INSTALL 175 L.F. 18" DIA. CLASS III RCP @ 1.5% SL. TO STRUCTURE 6
4. N:2075524.83 E:6298939.55 INSTALL 4X4 AREA INLET TOP EL. = 418.75' FLOWLINE OUT (SW) = 412.25 INSTALL 181 L.F. 15" DIA. CLASS III RCP @ 0.5% SL. TO STRUCTURE 6
5. N:2075262.68 E:6298627.25 INSTALL 4X4 AREA INLET TOP EL. = 419.0' FLOWLINE OUT (NE) = 412.5' INSTALL 225 L.F. 15" DIA. CLASS III RCP @ 0.5% SL. TO STRUCTURE 6
6. N:2075377.85 E:6298826.72 INSTALL 4X4 AREA INLET TOP EL. = 418.25' FLOWLINE IN (W) = 411.35' FLOWLINE IN (NE) = 411.35' FLOWLINE IN (NW) = 406.85' FLOWLINE OUT (SE) = 406.35' INSTALL 84 L.F. 24" DIA. CLASS III RCP @ 2.0% SL. TO STRUCTURE 7
7. N:2075300.64 E:6298871.50 INSTALL STD. 6' DIA. MANHOLE TOP EL. 413.75' FLOWLINE IN (NW) = 404.6' FLOWLINE OUT (SE) = 404.0' INSTALL 49 L.F. 30" DIA CLASS III RCP @ 2.5% SL. TO STRUCTURE 8
8. N:2075287.29 E:6298921.76 INSTALL TO DETENTION BASIN CLASS III RCP FLARED END SECTION FLOWLINE OUT (SE) = 403.0'
9. N:2075332.50 E:6299005.70 INSTALL DETENTION BASIN OUTLET FLARED END SECTION FLOWLINE IN (E) = 403.0' INSTALL 20 L.F. 12" DIA CLASS III RCP @ 1.0% SL. TO STRUCTURE 10
10. N:2075344.26 E:6299024.69 INSTALL STORMWATER OUTLET CONTROL STRUCTURE TOP EL. 414.0' 100 YR INLET EL. 412.5' FLOWLINE IN (E) = 402.80' FLOWLINE OUT (W) = 400.00' INSTALL 64 L.F. 36" DIA CLASS III RCP @ 1.0% SL. TO STRUCTURE 11
11. N:2075379.51 E:6299081.66 INSTALL CLASS III RCP FLARED END SECTION FLOWLINE OUT (W) = 398.35'

LEGEND

- FOUND MONUMENT AS NOTED
- SET 1" IRON PIPE WITH "PSOMAS" PLUG UNLESS NOTED OTHERWISE
- PROPERTY LINE
- 400 EXISTING CONTOUR
- 380 PROPOSED MAJOR CONTOUR
- 383 PROPOSED MINOR CONTOUR
- PROPOSED GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- EXISTING ELECTRIC LINE
- EXISTING TELEPHONE (COMMUNICATIONS) LINE
- PROPOSED RCP STORMWATER PIPE
- EXISTING T&D LINE
- EXISTING FENCE
- EXISTING ROAD
- PROPOSED FENCE
- PARCEL LINE
- DRAINAGE PATH (FLOWLINE)
- EXISTING ORCHARD LINE
- PROPOSED RIPRAP
- PROPOSED CRUSHED ROCK SURFACE
- PROPOSED CRUSHED ROCK PAVEMENT
- PROPOSED CONCRETE
- PROPOSED NATIVE GROUND COVER
- PROPOSED LANDSCAPING
- DIRECTION OF FLOW
- EXISTING WINDMILL
- EXISTING OVERHEAD ELECTRICAL LINES

REV.	DATE	DESCRIPTION	DWN	CHK
0	8-5-08	ISSUED FOR GRADING PERMIT	RAD	WHR
1	8-25-08	RE-ISSUED FOR GRADING PERMIT	BGG	WHR

PRIVATE CONTRACT

7 SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	45 SHEET

GRADING PLAN FOR: THE CONSTRUCTION AND OPERATION OF THE ORANGE GROVE POWER PLANT, AN ELECTRIC GENERATOR FACILITY. ALSO, THE INSTALLATION OF A 10" NATURAL GAS PIPELINE TO PROVIDE THE PLANT WITH FUEL ENERGY.

CALIFORNIA COORDINATE INDEX 434-1736/434-1737

APPROVED FOR MOHAMAD FAKHRIDDIME DIRECTOR OF PUBLIC WORKS BY:

ENGINEER OF WORK THOMAS F. HEAUSLER C040363 R.C.E. 3-31-09

L-15454 GRADING PERMIT NO:

PERMITS

REZONE PERMIT NO. NOT APPLICABLE

SPECIAL USE PERMIT NO. NOT APPLICABLE

TENTATIVE MAP NO. NOT APPLICABLE

NOI/WDID NO. NOT YET ASSIGNED

BENCH MARK

DESCRIPTION: 3 1/2" brass disk "M.W.D. OF SOUTHERN CA S.D.6-69 1993"

LOCATION: S.E. CORNER OF MANHOLE

RECORD FROM: FIELD BOOK 4047-04-079

ELEVATION: 318.88' DATUM: NAVD88 AND NAD83

COUNTY APPROVED CHANGES

NO.	DESCRIPTION:	APPROVED BY:	DATE:

Sealed Only When Signed in Blue Ink

Sega ®

Engineers – Architects – Technicians
Design – Construction – Field Service

16041 Foster
P.O. Box 1000
Stilwell, Kansas 66085-1000

ORANGE GROVE ENERGY L.P.

Schaumburg, IL

ORANGE GROVE POWER PLANT

GRADING AND DRAINAGE PLAN

DESIGN BY:	CHECKED BY:
J. LANGEL	B. ROMINES
DRAWN BY:	DATE:
B. GASPERS	9-12-07
CLIENT I.D.	SEGA PROJECT NO.
ICC00101	07-201

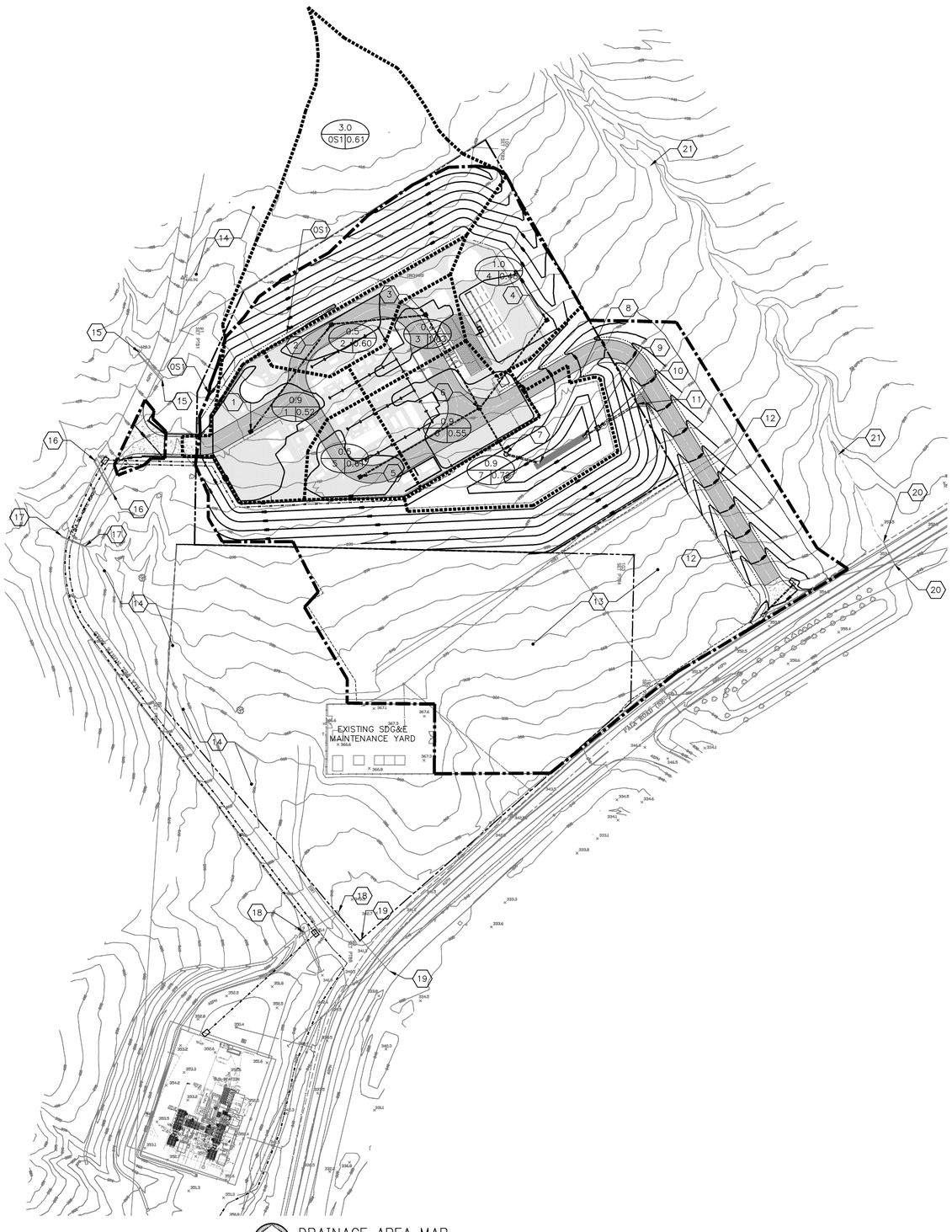
CADD FILE NAME: 07201-C300.dwg

DRAWING NO. C300

REV. 1

SEGA INC. PHONE NUMBER: (913) 681-2881

N:\2007\07201\dwgs\ce\07201-C300.dwg 8/25/08 3:13pm bgaspers



KEY:

(EX)	–	EXISTING STRUCTURES
CI	–	CURB INLET
SI	–	CURB INLET IN SUMP
DI	–	SINGLE DROP INLET
DI–2	–	DOUBLE DROP INLET
ES	–	PREFABRICATED END SECTION
JB	–	JUNCTION BOX
YI	–	YARD INLET
AI	–	AREA INLET
MH	–	MANHOLE
R	–	REDUCER
FI	–	FIELD INLET
BEND	–	PREFABRICATED VERTICAL BEND
T.D.	–	TRENCH DRAIN
G.I.	–	GRATE INLET
O.C.	–	DETENTION OUTLET CONTROL STRUCTURE
RCP	–	REINFORCED CONCRETE PIPE
CMP	–	CORREGATED METAL PIPE (STEEL)
CP	–	CULVERT PIPE

DESIGN NOTES:

(a) TIME OF CONCENTRATION
15 MINUTES MAX.
5 MINUTES MIN.

(b) PIPE LENGTHS EXCLUDE END SECTIONS AND ARE MEASURED ALONG CENTERLINE OF PIPE FROM CENTER OF INSIDE FACE TO CENTER OF INSIDE FACE OF STRUCTURES.

(c) MANNING'S ROUGHNESS COEFFICIENT = 0.013 (CONCRETE)

LEGEND

- FOUND MONUMENT AS NOTED
- SET 1" IRON PIPE WITH "PSOMAS" PLUG UNLESS NOTED OTHERWISE
- PROPERTY LINE
- 400 EXISTING CONTOUR
- 380 PROPOSED MAJOR CONTOUR
- 383 PROPOSED MINOR CONTOUR
- PROPOSED GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- EXISTING ELECTRIC LINE
- EXISTING TELEPHONE (COMMUNICATIONS) LINE
- PROPOSED RCP STORMWATER PIPE
- EXISTING T&D LINE
- EXISTING FENCE
- EXISTING ROAD
- PROPOSED FENCE
- PARCEL LINE
- DRAINAGE PATH (FLOWLINE)
- EXISTING ORCHARD LINE
- PROPOSED RIPRAP
- PROPOSED CRUSHED ROCK SURFACE
- PROPOSED CRUSHED ROCK PAVEMENT
- PROPOSED CONCRETE
- PROPOSED NATIVE GROUND COVER
- PROPOSED LANDSCAPING
- A = AREA IN ACRES
- B = BASIN DESIGNATION
- C = COMPOSITE RUNOFF COEFFICIENT
- D = DESIGN POINT DESIGNATION
- DRAINAGE AREA LIMITS
- PROPOSED DISTURBED AREA
- EXISTING USGS BLUELINE

DRAINAGE AREA NOTES:

(OS1) DRAINAGE WILL BE ROUTED AROUND SITE BY NORTH DITCH DRAINAGE CHANNEL.

OFF–SITE DRAINAGE–NORTH CHANNEL

50 YEAR DESIGN STORM					
DEVELOPMENT STAGE	STORM DRAINAGE AREA (ACRES)	PEAK RUNOFF RATE Q (CFS)	RUNOFF COEF. C.	AVERAGE CHANNEL VELOCITY V (FT/S)	AVERAGE DEPTH ELEVATION (FT.)
PRE–DEV.	3.0	6.75	0.3	2.75	420.77
PRE–DEV.	3.0	11.25	0.5	3.10	420.95±
100 YEAR DESIGN STORM					
PRE–DEV.	3.0	7.65	0.3	2.87	420.16±
POST–DEV.	3.0	12.75	0.5	3.20	421.00±

(1) INLET FOR DRAINAGE AREA.
(2) INLET FOR DRAINAGE AREA.
(3) INLET FOR DRAINAGE AREA.
(4) INLET FOR DRAINAGE AREA.
(5) INLET FOR DRAINAGE AREA.
(6) INLET FOR DRAINAGE AREA. DRAINAGE FROM AREAS 1, 2, 3, 4, AND 5 WILL BE ROUTED VIA STORM DRAIN.
(7) STORMWATER MANHOLE.
(8) STORM DRAIN OUTLET AND DETENTION BASIN INLET STRUCTURE.
(9) DETENTION BASIN OUTLET CONTROL STRUCTURE.
(10) DETENTION BASIN EMERGENCY OUTLET STRUCTURE.
(11) STORMWATER OUTLET.
(12) SECONDARY ACCESS ROAD DITCHES.
(13) AREAS SOUTH OF PARCEL LINE AND WITHIN "PROPOSED DISTURBED AREA" LINE ARE AREAS FOR "TEMPORARY CONSTRUCTION PARKING AND LAYDOWN."
(14) EXISTING NATURAL WEST DRAINAGE CHANNEL.
(15) EXISTING OFF–SITE CULVERT PIPES.
(16) EXISTING OFF–SITE CULVERT PIPES.
(17) EXISTING OFF–SITE CULVERT PIPES.
(18) EXISTING OFF–SITE CULVERT PIPE.
(19) EXISTING OFF–SITE CULVERT PIPE.
(20) EXISTING OFF–SITE CULVERT PIPE.
(21) EXISTING USGS BLUELINE OR NATURAL EAST DRAINAGE CHANNEL.

ON–SITE STORMWATER DETENTION BASIN

50 YEAR DESIGN STORM						
DEVELOPMENT STAGE	STORM DRAINAGE AREA (ACRES)	PEAK RUNOFF RATE Q (CFS)	RUNOFF CURVE. C.	DETENTION VOLUME V(FT³)	DESIGNED WATER SURFACE VOLUME (FT³)	WATER SURFACE ELEVATION (FT.)
PRE–DEV.	5.2	11.00	N/A	N/A	N/A	N/A
POST–DEV.	5.2	24.58	N/A	85,700	76,300	410.5(±)
100 YEAR DESIGN STORM						
PRE–DEV.	5.2	12.68	N/A	N/A	N/A	N/A
POST–DEV.	5.2	27.86	N/A	85,700	85,000	412.4(±)

NOTE: WATER SURFACE VOLUME DOES NOT INCLUDE ONE FOOT OF FREEBOARD.

SUMMARY OF AREAS (ACRES):

1. IMPERVIOUS AREA (INCLUDES CONCRETE ENTRANCE SECTION) – 1.00
2. CRUSHED ROCK SURFACE AREA (INCLUDES VEHICULAR AREA) – 3.22
3. DETENTION BASIN DRAINAGE AREA – 5.20
4. VEHICULAR AREA – 1.47
5. TEMPORARY CONSTRUCTION PARKING AREA AND LAYDOWN – 5.73
6. DISTURBED AREA – 14.83

50 YEAR DESIGN (PROPOSED CONSTRUCTION)

STRUCTURE		DIRECT RUNOFF						TOTAL RUNOFF	PIPE						
STRUCT NO. (Area No.)	TYPE	AREA (acres) A	RUNOFF COEF. C	C x A	K	i (in/hr)	Q (cfs)	TOTAL Q (CFS)	PIPE NO.	PIPE SIZE DIA. (inches)	PIPE SLOPE %	PIPE LENGTH (LF)	PIPE CAP. (CFS)	VELOCITY (ft/sec)	DEPTH OF FLOW (inches)
1	AI	0.90	0.52	0.47	1.1	7.5	3.86								
								3.86	1	15	0.5	220	4.91	4.17	10.58
2	AI	0.50	0.60	0.30	1.1	7.5	2.48								
								6.34	2	18	0.5	154	7.99	4.72	12.79
3	AI	0.46	0.59	0.27	1.1	7.5	2.24								
								8.58	3	18	1.5	175	13.84	7.79	10.75
4	AI	1.00	0.48	0.48	1.1	7.5	3.96								
								3.96	4	15	0.5	160	4.91	4.19	10.79
5	AI	0.52	0.61	0.32	1.1	7.5	2.62								
								2.62	5	15	0.5	225	4.91	3.85	8.14
6	AI	0.90	0.55	0.50	1.1	7.5	4.08								
								19.24	6	24	2	84	34.41	10.65	13.42
7	MH	NA	NA	NA	NA	NA	NA								
								19.24	7	30	2.5	49	69.76	11.52	11.20
8	OC	0.90	0.72	0.65	1.1	7.5	5.35								
								24.59							
9	OC	NA	NA	NA	NA	NA	NA								
								12.68 MAX	9	12	1.0	20	11.28	14.36	FULL
10	MH	NA	NA	NA	NA	NA	NA								
								SEE D.C.	10	36	1.0	64	71.74	7.02	10.02
11	MH	NA	NA	NA	NA	NA	NA								

REV.	DATE	DESCRIPTION	DWN	CHK
0	8–5–08	ISSUED FOR GRADING PERMIT	RAD	WHR
1	8–25–08	RE–ISSUED FOR GRADING PERMIT	BGG	WHR

PRIVATE CONTRACT

9 SHEET | COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS | 45 SHEET

GRADING PLAN FOR:
THE CONSTRUCTION AND OPERATION OF THE ORANGE GROVE POWER PLANT, AN ELECTRIC GENERATOR FACILITY. ALSO, THE INSTALLATION OF A 10" NATURAL GAS PIPELINE TO PROVIDE THE PLANT WITH FUEL ENERGY.
CALIFORNIA COORDINATE INDEX 434–1736/434–1737

APPROVED FOR MOHAMAD FAKHRIDDIME
DIRECTOR OF PUBLIC WORKS
BY:

ENGINEER OF WORK
THOMAS F. HEAUSLER
C040363 R.C.E. 3–31–09

L–15454
GRADING PERMIT NO:

PERMITS

REZONE PERMIT NO. NOT APPLICABLE
SPECIAL USE PERMIT NO. NOT APPLICABLE
TENTATIVE MAP NO. NOT APPLICABLE
NOI/WDID NO. NOT YET ASSIGNED

BENCH MARK

DESCRIPTION: 3 1/2" brass disk "M.W.D. OF SOUTHERN CA S.D.6–69 1993"
LOCATION: S.E. CORNER OF MANHOLE
RECORD FROM: FIELD BOOK 4047–04–079
ELEVATION: 318.88' DATUM: NAVD88 AND NAD83

COUNTY APPROVED CHANGES

NO.	DESCRIPTION:	APPROVED BY:	DATE:

Sealed Only When Signed in Blue Ink

Sega ®
Engineers – Architects – Technicians
Design – Construction – Field Service

16041 Foster
P.O. Box 1000
Stilwell, Kansas 66085–1000

ORANGE GROVE ENERGY L.P.
Schaumburg, IL

ORANGE GROVE POWER PLANT

DRAINAGE AREA MAP

DESIGN BY:	CHECKED BY:
J. LANGEL	B. ROMINES
DRAWN BY:	DATE:
B. GASPERS	9–12–07
CLIENT I.D.	SEGA PROJECT NO.
ICC00101	07–201

CADD FILE NAME: 07201–C400.dwg

DRAWING NO. C400 | REV. 1

SEGA, INC. PHONE NUMBER: (913) 681–2881

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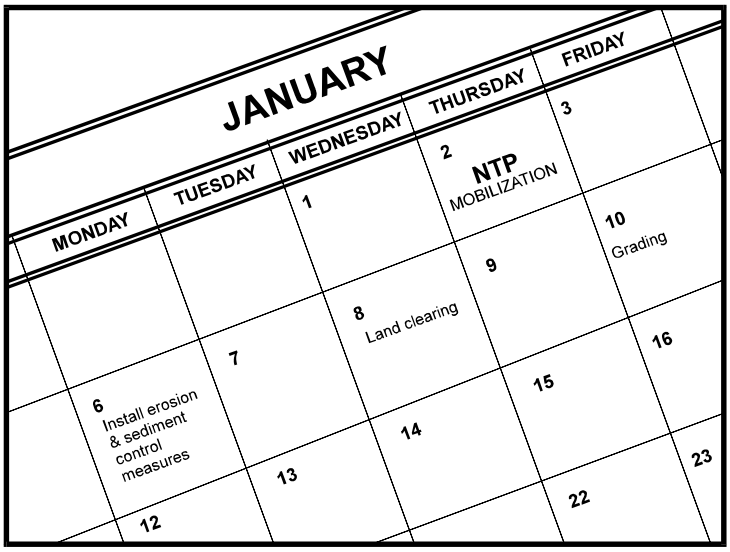
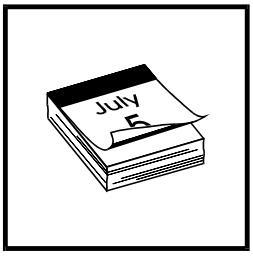
APPENDIX D

Scheduling

SS-1





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

Construction sequencing shall be scheduled to minimize land disturbance for all projects during the rainy and non-rainy season. Appropriate BMPs shall be implemented during both rainy and non-rainy seasons.

Limitations

None identified.

Standards and Specifications

- Developing a schedule and planning the project are the very first steps in an effective storm water program. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The construction schedule shall be incorporated into the SWPPP or WPCP.
- The schedule shall include detail on the rainy season implementation and deployment of:
  - Temporary soil stabilization BMPs.
  - Temporary sediment control BMPs.
  - Tracking control BMPs.
  - Wind erosion control BMPs.

  - Non-storm water BMPs.
  - Waste management and materials pollution control BMPs.

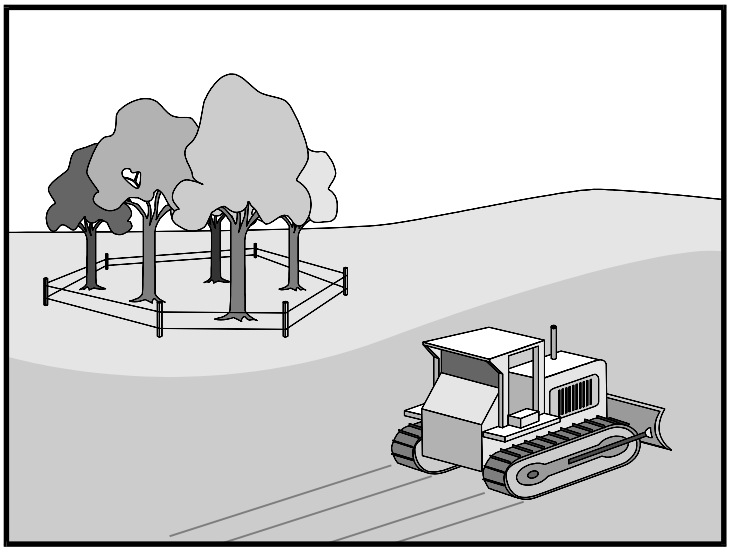
- Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule work to minimize soil disturbing activities during the rainy season.
- Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season.
- Schedule major grading operations for the non-rainy season when practical.
- Stabilize non-active areas within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy soil stabilization and sediment control practices as required by Section 2 of this Manual. Erosion may be caused during dry seasons by unseasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
- 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.
- Consider scheduling when establishing permanent vegetation (appropriate planting time for specified vegetation).
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

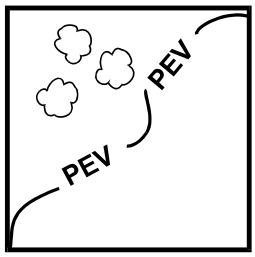
Maintenance and Inspection

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted or when directed by the Resident Engineer (RE).
- The Special Provisions require annual submittal of a rainy season implementation schedule. Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

Preservation of Existing Vegetation

SS-2





Standard Symbol

BMP Objectives

Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management
- ○

Definition and Purpose

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

Appropriate Applications

- Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date. Specifications for preservation of existing vegetation can be found in Standard Specifications, Section 7-1.11.
- On a year-round basis, temporary fencing shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas.
- Clearing and grubbing operations should be staged to preserve existing vegetation.

Limitations

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

Standards and Specifications

Timing

- Preservation of existing vegetation shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas identified on the plans to be preserved, especially on areas designated as Environmentally Sensitive Areas (ESAs).
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.

Design and Layout

- Mark areas to be preserved with temporary fencing made of orange polypropylene that is stabilized against ultraviolet light. The temporary fencing shall be at least 1 meter (3.2. ft) tall and shall have openings not larger than 50 mm by 50 mm (2 in by 2 in).

- Fence posts shall be either wood or metal, at the Contractor's discretion, as appropriate for the intended purpose. The post spacing and depth shall be adequate to completely support the fence in an upright position.

- Minimize the disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling.

- Consider the impact of grade changes to existing vegetation and the root zone.

Installation

- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.

- Keep equipment away from trees to prevent trunk and root damage.

- Maintain existing irrigation systems.

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

Trenching and Tunneling

- Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 450 mm (18 in) below the ground surface, and not below the tree center to minimize impact on the roots.

- Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.

- The ends of damaged or cut roots shall be cut off smoothly.

- Trenches and tunnels shall be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil which can damage roots.

- Remove any trees intended for retention if those trees are damaged seriously enough to affect their survival. If replacement is desired or required, the new tree shall be of similar species, and at least 50 mm (2 in) caliper, unless

otherwise required by the contract documents.

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

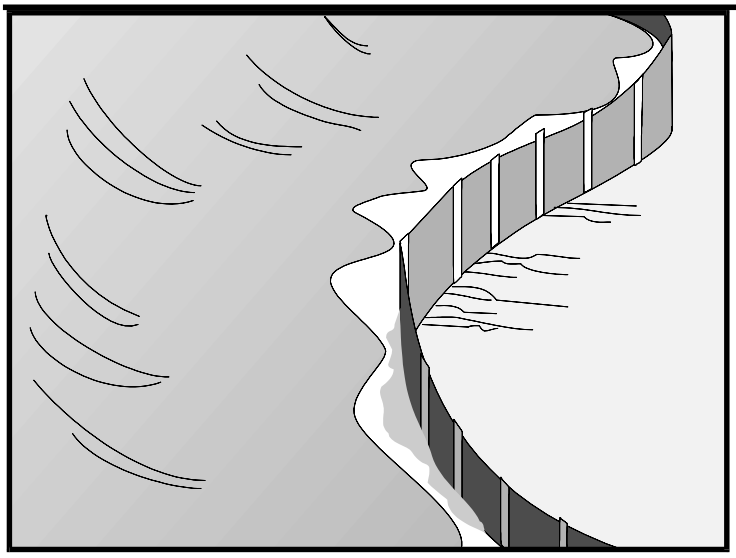
Maintenance and Inspection

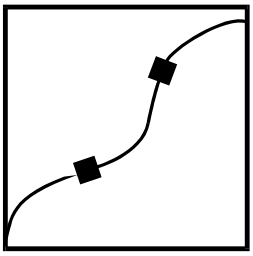
During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

- Serious tree injuries shall be attended to by an arborist.
- During construction, District Environmental shall be contacted to ensure that ESAs are protected.

Silt Fence

SC-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

Silt fences are placed:

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

Limitations

- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 1:4 (V:H).
- Must be maintained.
- Must be removed and disposed of.
- Don't use below slopes subject to creep, slumping, or landslides.
- Don't use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Don't use silt fences to divert flow.

Standards and Specifications

Design and Layout

- The maximum length of slope draining to any point along the silt fence shall be 61 m (200 ft) or less.
- Slope of area draining to silt fence shall be less than 1:1 (V:H).
- Limit to locations suitable for temporary ponding or deposition of sediment.
- Fabric life span generally limited to between five and eight months. Longer periods may require fabric replacement.
- Silt fences shall not be used in concentrated flow areas.
- Lay out in accordance with Pages 5 and 6 of this BMP.
- For slopes steeper than 1:2 (V:H) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), additional temporary soil stabilization BMPs shall be used.

Materials

- Silt fence fabric shall be woven polypropylene with a minimum width of 900 mm (36 inches) and a minimum tensile strength of 0.45-kN. The fabric shall conform to the requirements in ASTM designation D4632 and shall have an integral reinforcement layer. The reinforcement layer shall be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric shall be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491. Contractor must submit certificate of compliance in accordance with Standard Specifications Section 6-1.07.
- Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall 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.
- Bar reinforcement may be used, and its size shall be equal to a number four (4) or greater. End protection shall be provided for any exposed bar reinforcement.
- Staples used to fasten the fence fabric to the stakes shall be not less than 45 mm (1.75 inches) long and shall be fabricated from 1.57 mm (0.06 inch) or heavier wire. The wire used to fasten the tops of the stakes together when

joining two sections of fence shall be 3.05 mm (0.12 inch) or heavier wire. Galvanizing of the fastening wire is not required.

Installation

- Generally, silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective erosion and sediment control.
- Bottom of the silt fence shall be keyed-in a minimum of 150 mm (12 inches).
- Trenches shall not be excavated wider and deeper than necessary for proper installation of the temporary linear sediment barriers.
- Excavation of the trenches shall be performed immediately before installation of the temporary linear sediment barriers.
- Construct silt fences with a set-back of at least 1m (3 ft) from the toe of a slope. Where a silt fence is determined to be not practical due to specific site conditions, the silt fence may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case shall the reach exceed 150 meters (490 ft).
- Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
- Install in accordance with Pages 5 and 6 of this BMP.

Maintenance and Inspection

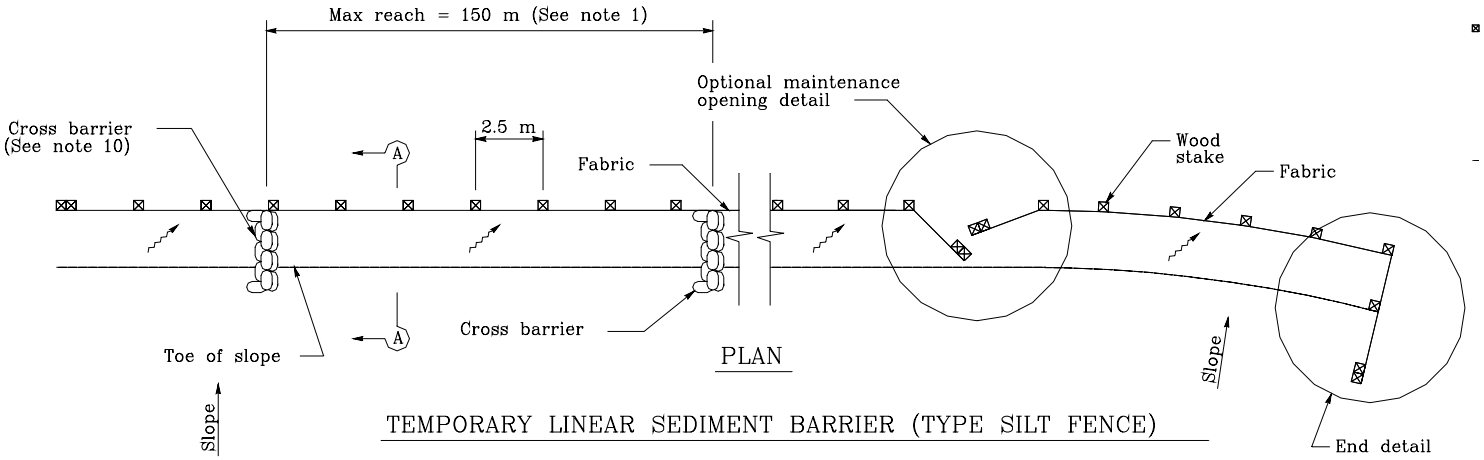
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric.
- Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance required by the Resident Engineer (RE).
- Inspect silt fence following rainfall events. Perform maintenance as necessary, or as required by the RE.
- Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the right-of-way in conformance with the Standard Specifications.
- Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the RE, shall be removed from the site of work, disposed of outside the highway right-of-way in conformance with the Standard Specifications, and replaced with new silt fence barriers.

- Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences shall be backfilled and repaired in conformance with the Standard Specifications.

- Remove silt fence when no longer needed or as required by the RE. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

Silt Fence

SC-1



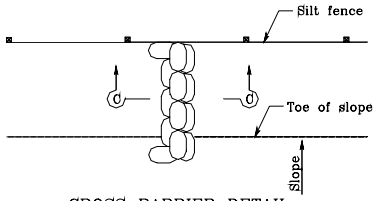
TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SILT FENCE)

NOTES

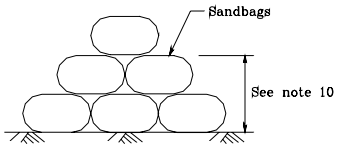
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 150m.
2. The last 2.5 m of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 2.5 m 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 1/3 and a maximum of 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.

LEGEND

- Tamped backfill
- Slope direction
- Direction of flow



CROSS BARRIER DETAIL



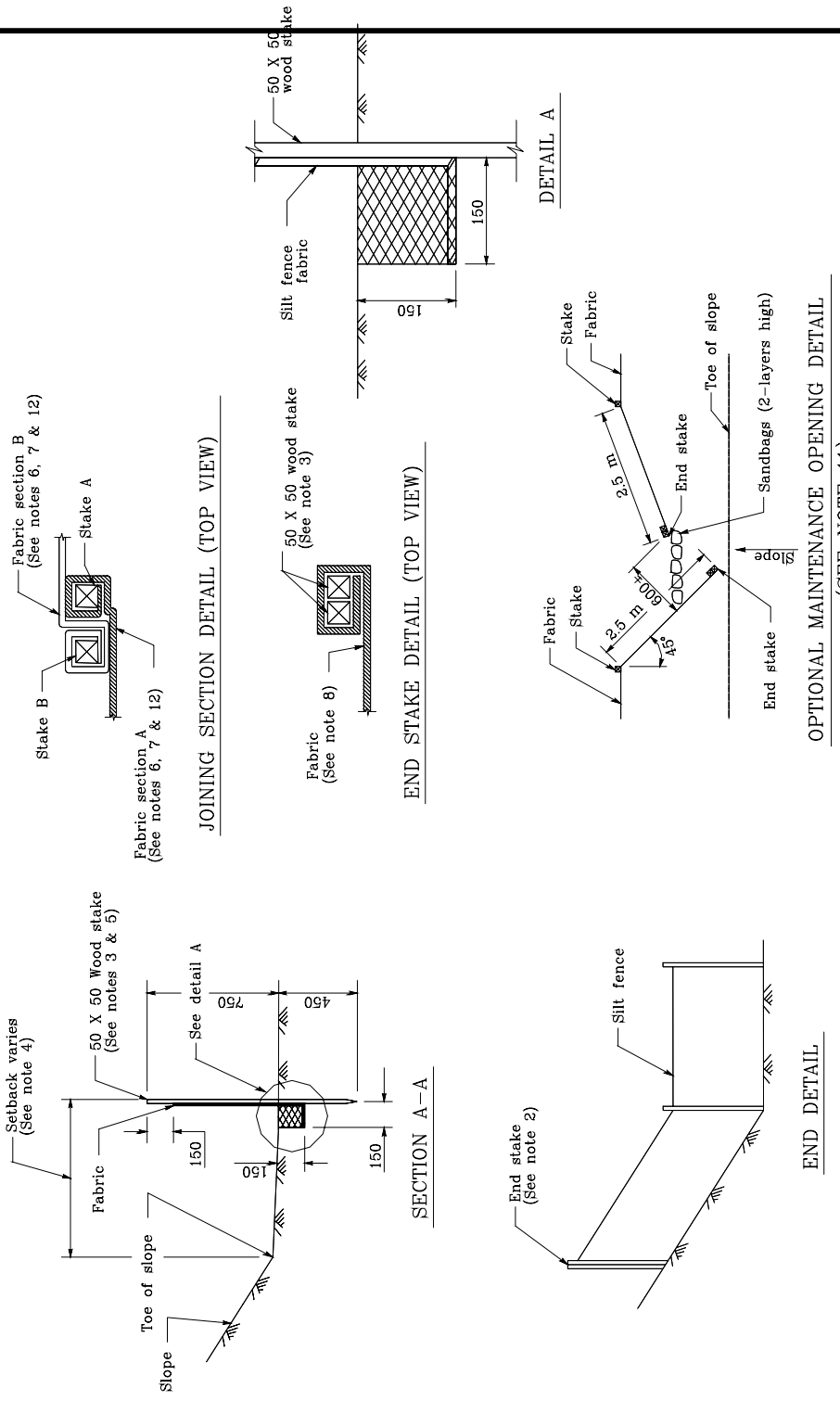
SECTION C-C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE SILT FENCE)

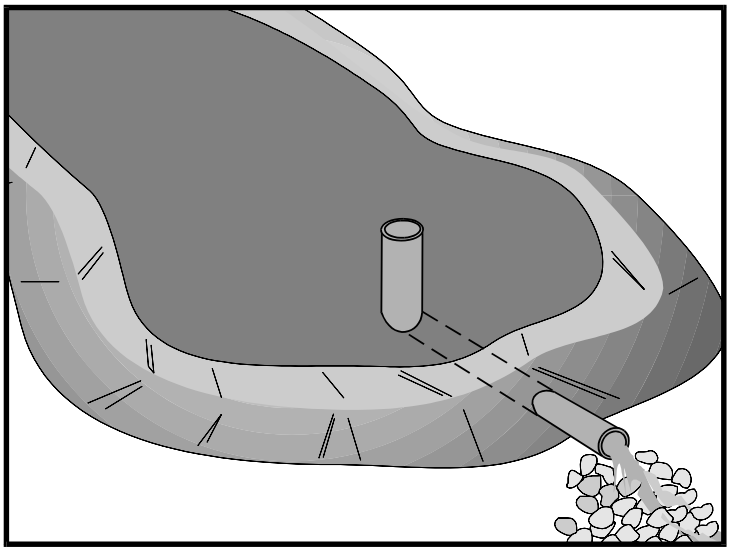
NO SCALE

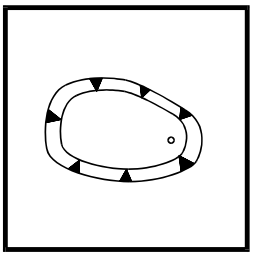
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN


50 X 50 wood stake
Silt fence fabric
150
150
DETAIL A
Fabric section B (See notes 6, 7 & 12)
Stake A
Stake B
Fabric section A (See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
50 X 50 wood stake (See note 3)
Fabric (See note 8)
END STAKE DETAIL (TOP VIEW)
Stake
Fabric
2.5 m
End stake
Toe of slope
Sandbags (2-layers high)
Slope
600
2.5 m
45°
Fabric
Stake
End stake
OPTIONAL MAINTENANCE OPENING DETAIL (SEE NOTE 11)
Setback varies (See note 4)
50 X 50 Wood stake (See notes 3 & 5)
See detail A
750
450
150
150
150
Fabric
Toe of slope
Slope
SECTION A-A
Silt fence
End stake (See note 2)
END DETAIL

Sediment/Desilting Basin

SC-2





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A sediment/desilting basin is a temporary basin formed by excavating and/or constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged (refer to Figures 1 and 2).

Appropriate Applications

Sediment basins shall be designed in accordance with Section A of the State of California NPDES General Permit for Storm Water Discharges Associated with Construction Activities (General Permit). If there is insufficient area to construct a sediment basin in accordance with the General Permit requirements, then the alternate desilting design standards specified herein may be used. This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.

Sediment/Desilting Basins shall be considered for use:

- On construction projects with disturbed areas during the rainy season.
- Where sediment-laden water may enter the drainage system or watercourses.
- At outlets of disturbed soil areas with areas between 2 ha and 4 ha (5 ac and 10 ac).

Limitations

- Alternative BMPs must be thoroughly investigated for erosion control before selecting temporary desilting basins.
- Requires large surface areas to permit settling of sediment.
- Not appropriate for drainage areas greater than 30 ha (75 ac).
- Not to be located in live streams

- For safety reasons, basins shall have protective fencing.
- Size may be limited by availability of right-of-way.

Standards and Specifications

- Limit the contributing area to the sediment/desilting basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment/desilting basin.

Sediment Basin

- Sediment basins shall, at a minimum, be designed as follows:
  - Option 1: Pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 3.

    OR

  - Option 2: Sediment basin(s), as measured from the bottom of the basin to the principal outlet, shall have at least a capacity equivalent to 102 cubic meters (3,600 cubic feet) of storage per 0.4 hectare (1 acre) draining into the sediment basin. The length of the basin shall be more than twice the width of the basin. The length is determined by measuring the distance between the inlet and the outlet; and the depth must not be less than 0.9 m (3 ft) nor greater than 1.5 m (5 ft) for safety reasons and for maximum efficiency.

    OR

  - Option 3: Sediment basin(s) shall be designed using the standard equation:

    $$As=1.2Q/Vs \qquad \text{(Eq. 1)}$$

    Where:

    As = Minimum surface area for trapping soil particles of a certain size

    Vs = Settling velocity of the design particle size chosen

    $Q = C\ I\ A$

    Where:

    Q = Discharge rate measured in cubic feet per second

    C = Runoff coefficient

    I = Precipitation intensity for the 10-year, 6-hour rain event

    A = Area draining into the sediment basin in acres

The design particle size shall be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01mm) particle, and the *Vs* used shall be 100 percent of the calculated settling velocity.

The length is determined by measuring the distance between the inlet and the outlet; the length shall be more than twice the dimension as the width; the depth shall not be less than 0.9 m (3 ft) nor greater than 1.5 m (5 ft) for safety reasons and for maximum efficiency [0.6 m (2 ft) of sediment storage, 0.6 m (2 ft) of capacity). The basin(s) shall be located on the site where it can be maintained on a year-round basis and shall be maintained on a schedule to retain the 0.6 m (2 ft) of capacity.

OR

– Option 4: The use of an equivalent surface area design or equation, provided that the design efficiency is as protective or more protective of water quality than Option 3.

Desilting Basin

- Desilting basins shall be designed to have a capacity equivalent to 100 cubic meters of storage (as measured from the top of the basin to the principal outlet) per hectare of contributory area. This design is less than the required to capture the 0.01 mm particle size but larger than that required to capture particles 0.02 mm or larger.

- The length of the basin shall be more than twice the width of the basin; the length shall be determined by measuring the distance between the inlet and the outlet.

- The depth must be no less than one (1) meter nor greater than 1.5 m.

- Basins with an impounding levee greater than 1.5 m (5 ft) tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 1000 cubic meters (35,300 cubic feet), shall be designed by a professional Civil Engineer registered with the state of California. The design must be submitted to the Resident Engineer (RE) for approval at least 7 days prior to the basin construction. The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.

General Requirements

- Design and locate sediment/desilting basins so that they can be maintained. Construct desilting basins prior to the rainy season and construction activities.

- Sediment/desilting basins, regardless of size and storage volume, shall include features to accommodate overflow or bypass flows that exceed the design storm event. The calculated basin volume and proposed location shall be submitted to

the RE for approval at least 3 days prior to the basin construction.

- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway shall consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.
- Spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, shall be a minimum of 6 m (20 ft) in length.
- A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.
- Basin inlets shall be located to maximize travel distance to the basin outlet.
- Rock or vegetation shall be used to protect the basin inlet and slopes against erosion.
- The outflow from the basins shall be provided with outlet protection to prevent erosion and scouring of the embankment and channel. See BMP SS-10, "Outlet Protection/Velocity Dissipation Devices."
- Basin shall be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, (3) where failure would not cause loss of life or property damage, (4) where the basins can be maintained on a year-round basins to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.
- Areas under embankments, structural works, and sediment/desilting basin must be cleared, stripped of vegetation in accordance with Standard Specifications Section 16 – "Clearing and Grubbing."
- Earthwork shall be in accordance with Standard Specifications Section 19 – "Earthwork". Contractor is specifically directed to Standard Specifications Sections 19-5, "Compaction," and 19-6, "Embankment Construction."
- Structure shall be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Discharge from the basin shall be accomplished through a water quality outlet. An example is shown in Figure 3. The Principal outlet shall consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure shall be designed

to accommodate the inflow design storm.

- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.

- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The water quality outlet should be designed to drain the basin within 24 to 72 hours (also referred to as "drawdown time"). (The 24-hour limit is specified to provide adequate settling time; the 72-hour limit is specified to mitigate vector control concerns.)

- The two most common outlet problems that occur are: (1) the capacity of the outlet is too great resulting in only partial filling of the basin and drawdown time less than designed for; and (2) the outlet clogs because it is not adequately protected against trash and debris. To avoid these problems, the following outlet types are recommended for use: (1) a single orifice outlet with or without the protection of a riser pipe, and (2) perforated riser. Design guidance for single orifice and perforated riser outlets are as follows:

  Flow Control Using a Single Orifice At The Bottom Of The Basin (Figure 1): The outlet control orifice should be sized using the following equation:

$$a = \frac{2A(H-Ho)^{0.5}}{3600CT(2g)^{0.5}} = \frac{(7x10^{-5})A(H-Ho)^{0.5}}{CT} \qquad \text{(Eq. 2)}$$

  where:

  a = area of orifice (ft^2) (1 ft^2 =0.0929m^2)
  A = surface area of the basin at mid elevation (ft^2)
  C = orifice coefficient
  T = drawdown time of full basin (hrs)
  G = gravity (32.2 ft/s^2)
  H = elevation when the basin is full (ft)
  Ho = final elevation when basin is empty (ft)

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

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

  Flow Control Using Multiple Orifices (see Figure2):

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

With terms as described above except:

a_t = total area of orifices

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

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

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

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

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

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

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

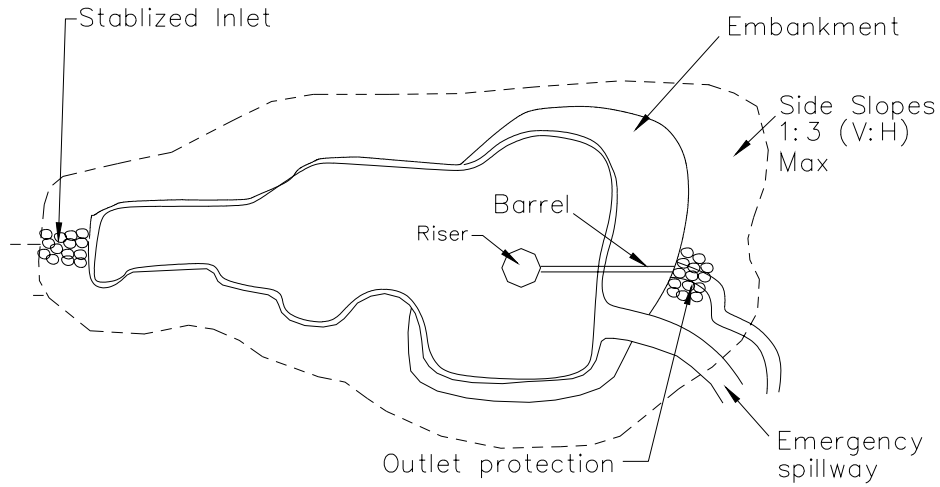
- The Contractor shall verify that the outlet is properly designed to handle the design and peak flows.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel), which extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level shall be clearly marked on the riser pipe
- Avoid dewatering of groundwater to the sediment/desilting basin during the rainy season. Insignificant quantities of accumulated precipitation may be dewatered to the sediment/desilting basin unless precipitation is forecasted within 24 hours. Refer to NS-2 “Dewatering Operations.”
- Chain link fencing shall be provided around each sediment/desilting basin to prevent unauthorized entry to the basin or if safety is a concern. Fencing shall be in accordance with Standard Specifications Section 80 – “Fencing.”

Maintenance and Inspection

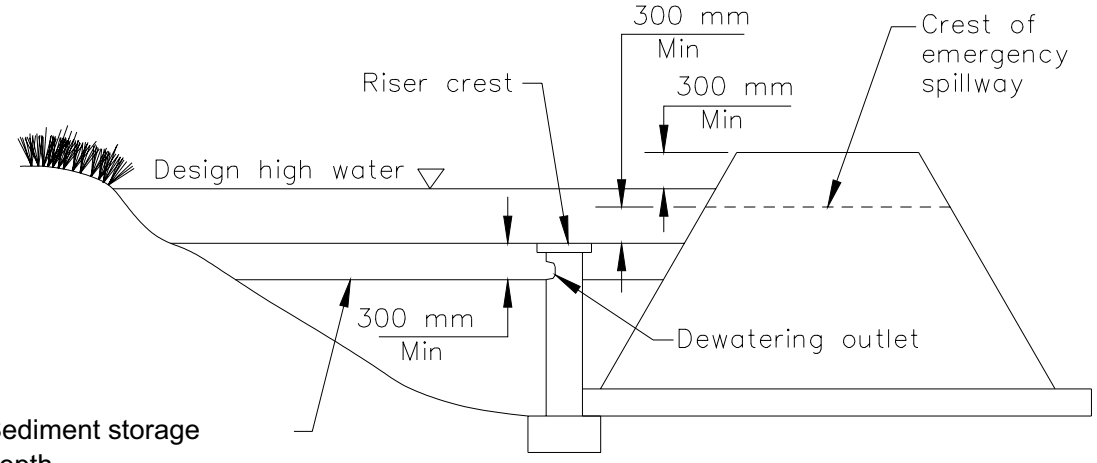
- Inspect sediment/desilting basins before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect at

least every 24 hours.

- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed, or as directed by the RE.
- Remove standing water from the basin within 72 hours after accumulation.
- Check inlet and outlet area for erosion and stabilize if required, or if directed by the RE.
- Remove accumulated sediment when its volume reaches one-third the volume of the sediment storage. Properly dispose of sediment and debris removed from the basin.
- Check fencing for damage and repair as needed or as directed by the RE.

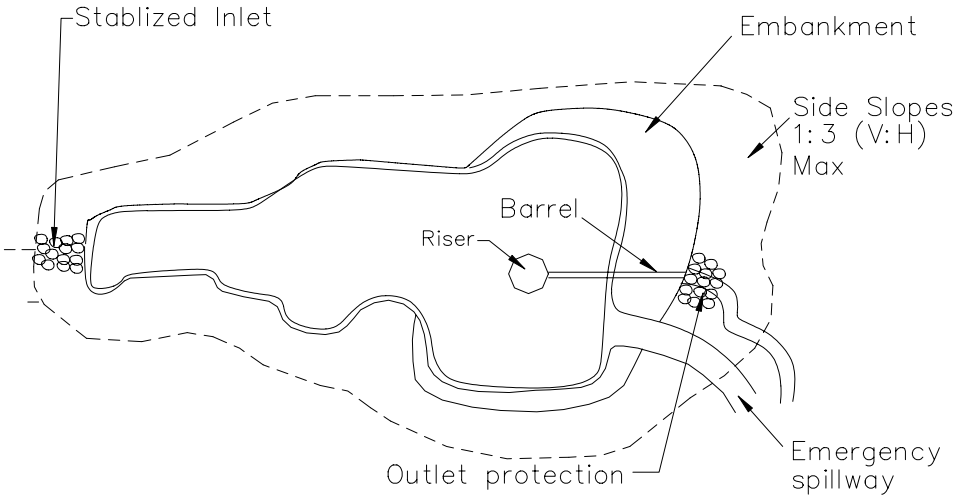


TOP VIEW



This outlet provides no drainage for permanent pool.

FIGURE 1: SINGLE ORIFICE DESIGN
NOT TO SCALE



TOP VIEW

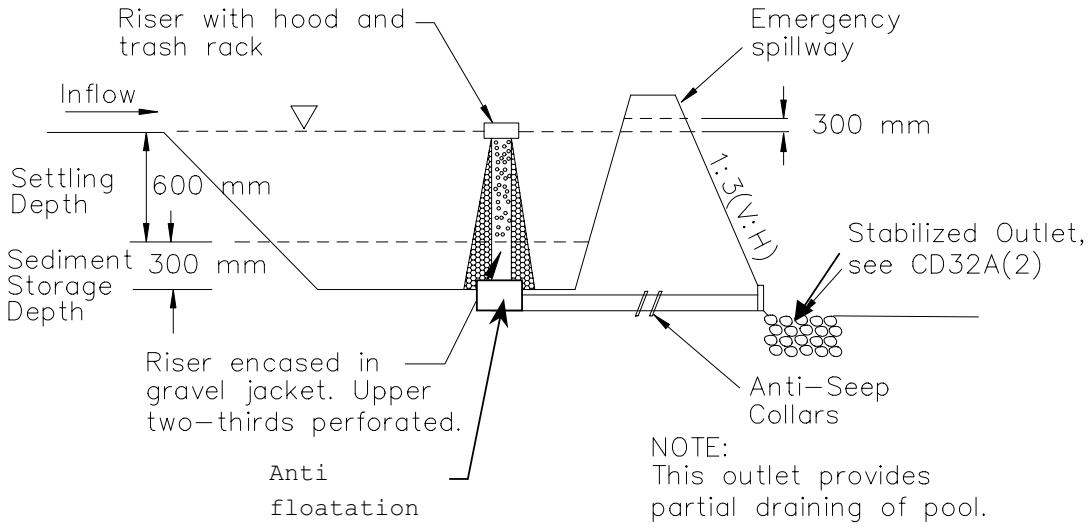
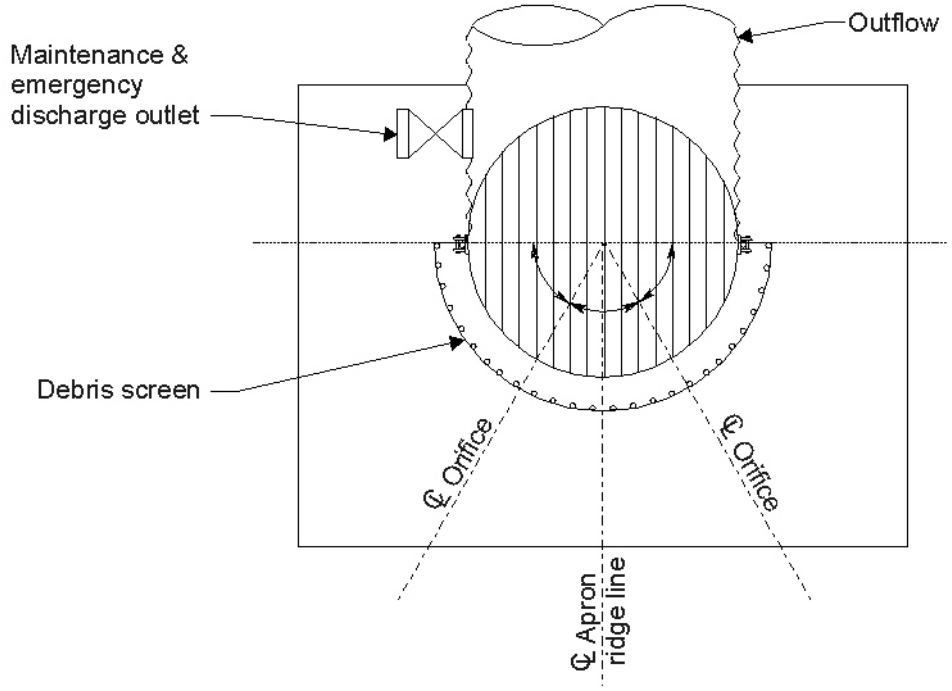


FIGURE 2: MULTIPLE ORIFICE DESIGN
NOT TO SCALE

Plan



Profile

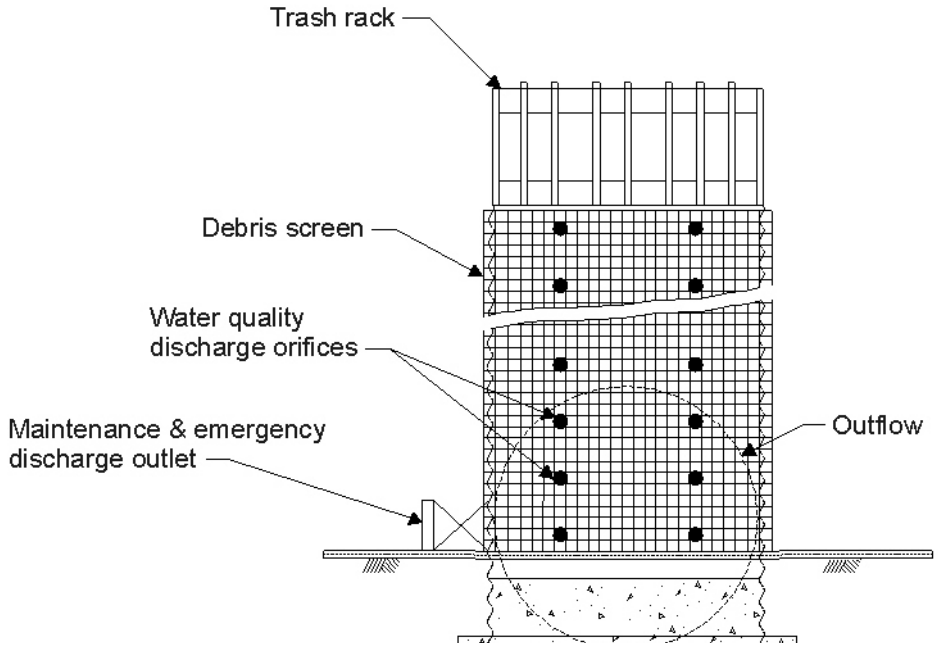
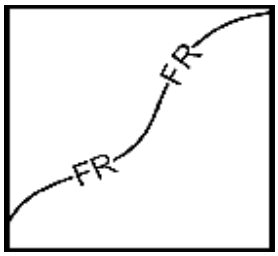


FIGURE 3: MULTIPLE ORIFICE OUTLET RISER
NOT TO SCALE

Fiber Rolls

SC-5



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.
- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Below the toe of exposed and erodible slopes.
- Fiber rolls may be used as check dams in unlined ditches if approved by the Resident Engineer (RE) or the District Construction Storm Water Coordinator (refer to SC-4 “Check Dams”).
- Fiber rolls may be used for drain inlet protection if approved by the RE or the District Construction Storm Water Coordinator (refer to SC-10 “Storm Drain Inlet Protection”).
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along the perimeter of a project.

Limitations

- Runoff and erosion may occur if fiber roll is not adequately trenched in.
- Fiber rolls at the toe of slopes greater than 1:5 may require the use of 500 mm (20" diameter) or installations achieving the same protection (i.e., stacked smaller diameter fiber rolls, etc.).
- Fiber rolls may be used for drainage inlet protection if they can be properly anchored.
- Difficult to move once saturated.
- Fiber rolls could be transported by high flows if not properly staked and trenched in.
- Fiber rolls have limited sediment capture zone.
- Do not use fiber rolls on slopes subject to creep, slumping, or landslide.

Standards and Specifications

Fiber Roll Materials

- Fiber rolls shall be either:

  (1) Prefabricated rolls.

  (2) Rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 200 mm (8 in) diameter.
- Bind roll at each end and every 1.2 m (4 ft) along length of roll with jute-type twine.

Installation

- Slope inclination of 1:4 or flatter: fiber rolls shall be placed on slopes 6.0 m apart.
- Slope inclination of 1:4 to 1:2: fiber rolls shall be placed on slopes 4.5 m apart.
- Slope inclination 1:2 or greater: fiber rolls shall be placed on slopes 3.0 m apart.
- Stake fiber rolls into a 50 to 100 mm (2 to 4 in) trench.

- Drive stakes at the end of each fiber roll and spaced 600 mm (2 ft) apart if Type 2 installation is used (refer to Page 4). Otherwise, space stakes 1.2 m (4 ft) maximum on center if installed as shown on Pages 5 and 6.
- Use wood stakes with a nominal classification of 19 by 19 mm (3/4 by 3/4 in), and minimum length of 600 mm (24 in).
- If more than one fiber roll is placed in a row, the rolls shall be overlapped; not abutted.

Removal

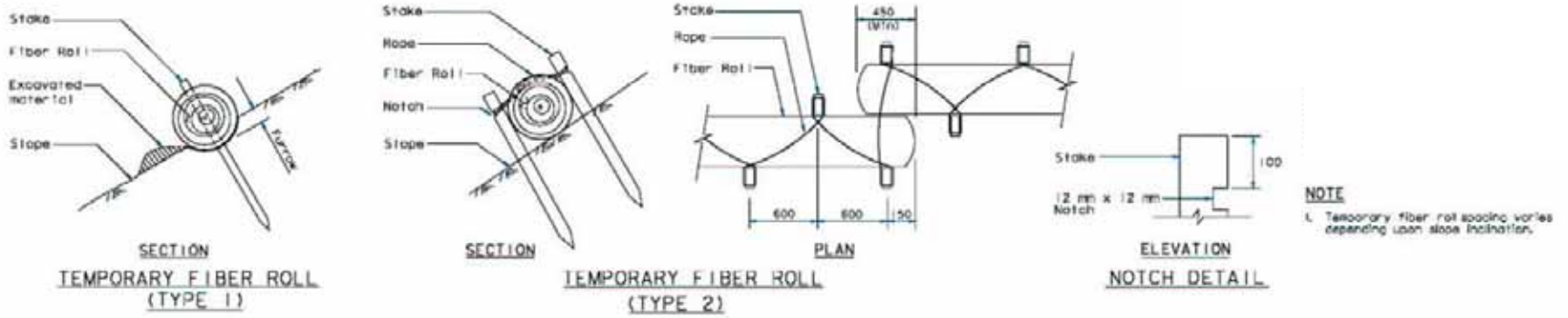
- Fiber rolls are typically left in place.
- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

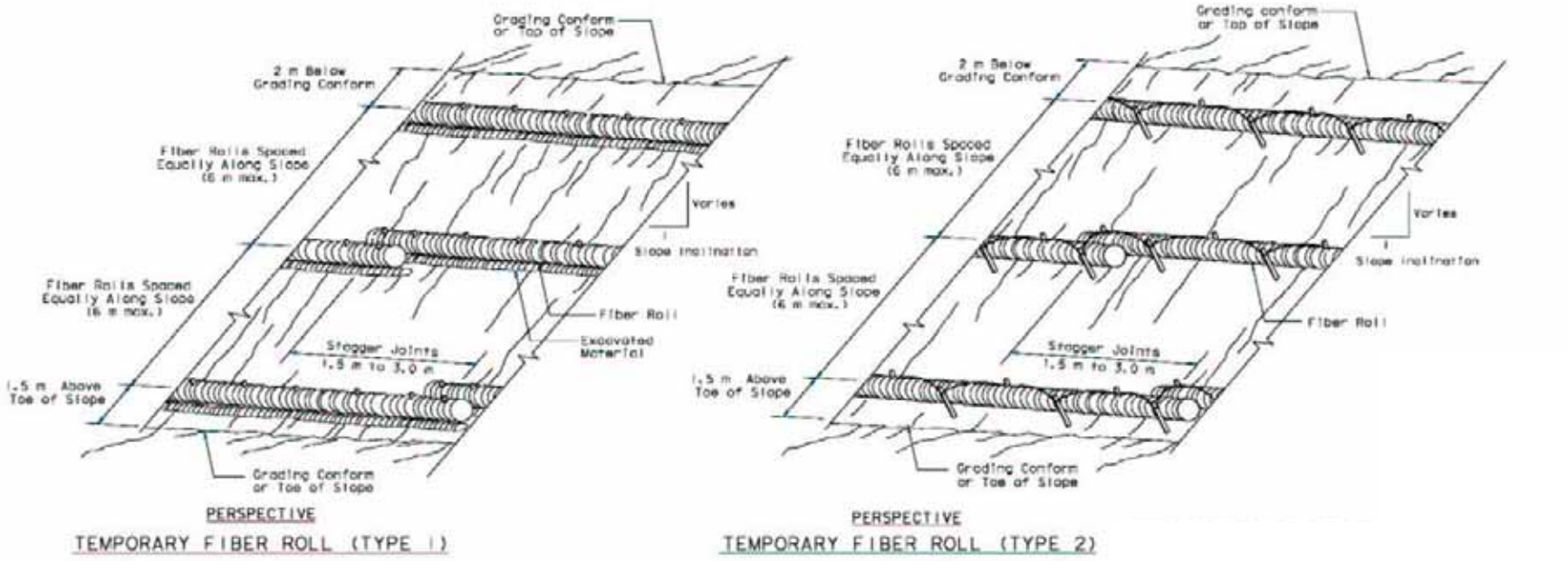
Maintenance and Inspection

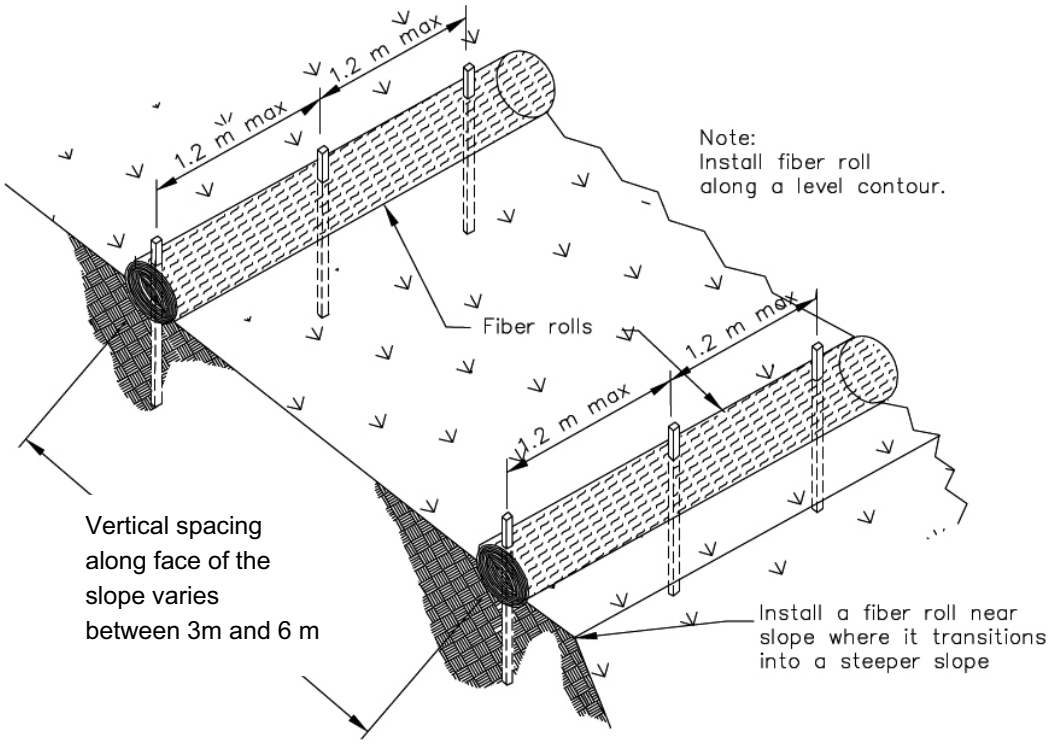
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- Inspect fiber rolls when rain is forecast. Perform maintenance as needed or as required by the RE.
- Inspect fiber rolls following rainfall events and a least daily during prolonged rainfall. Perform maintenance as needed or as required by the RE.
- Maintain fiber rolls to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Fiber Rolls

SC-5

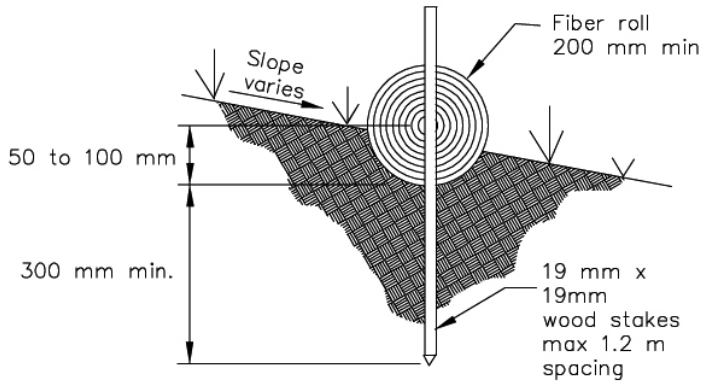






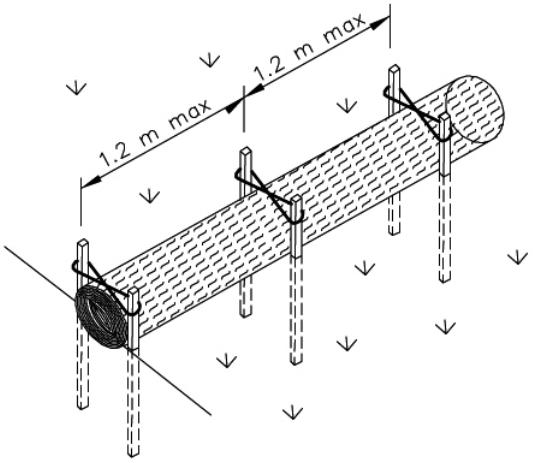
TYPICAL FIBER ROLL INSTALLATION

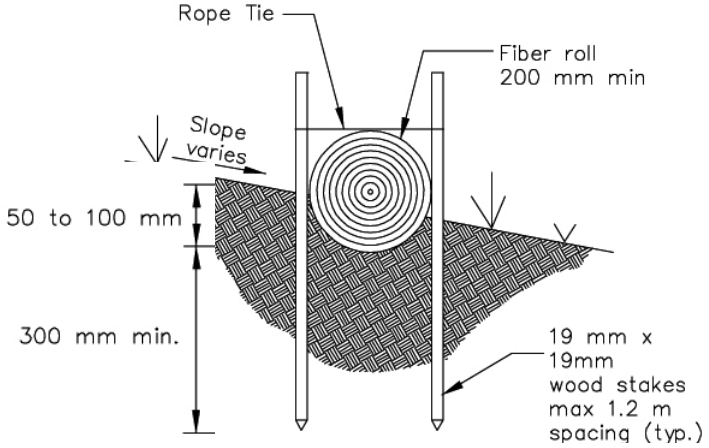
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



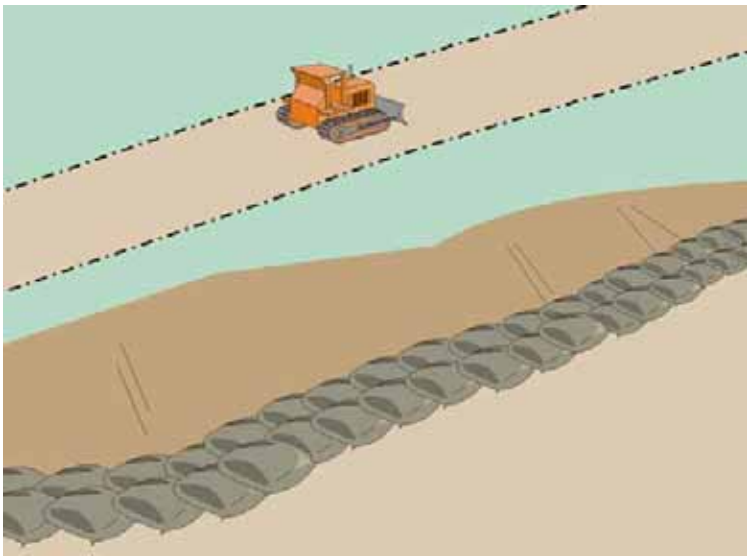


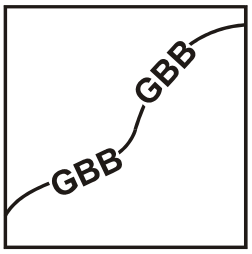
OPTIONAL ENTRENCHMENT DETAIL

N.T.S.

Gravel Bag Berm

SC-6





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

- BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the RE.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- Along the perimeter of a site.
- To divert or direct flow or create a temporary sediment basin.
- During construction activities in stream beds when the contributing drainage

area is less than 2 ha (5 ac).

- When extended construction period limits the use of either silt fences or straw bale barriers.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- At grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Limitations

- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Limited durability for long term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- Bag Material: Bags shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m2 (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- Bag Size: Each gravel-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.
- Fill Material: Gravel shall be between 10 mm and 20 mm (0.4 and 0.8 inch) in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be between 13 kg and 22 kg (28 and 48 lb) in mass. Fill material is subject to approval by the RE.

Installation

- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Turn ends of gravel bag row up slope to prevent flow around the ends.
  - Generally, gravel bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment

control.

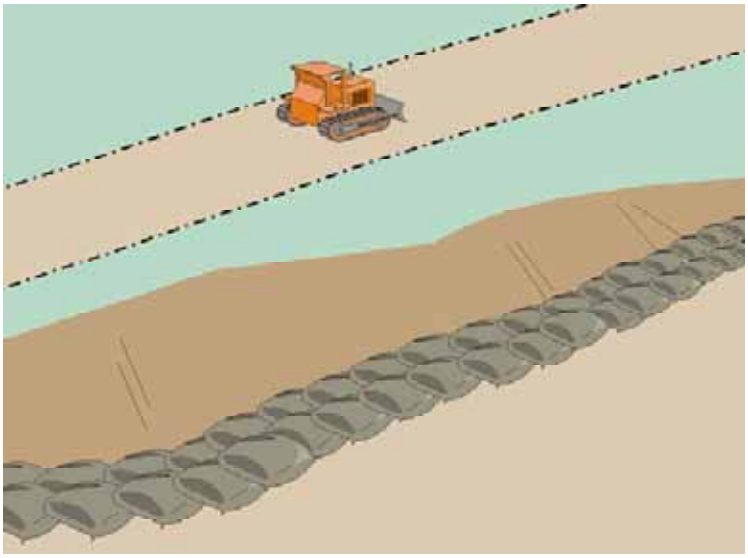
- When used for concentrated flows:
  - Stack gravel bags to required height using a pyramid approach.
  - Upper rows of gravel bags shall overlap joints in lower rows.
- Construct gravel bag barriers with a set-back of at least 1m from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the gravel bag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.
- Requires Certificate of Compliance per Standard Specifications 6-1.07.

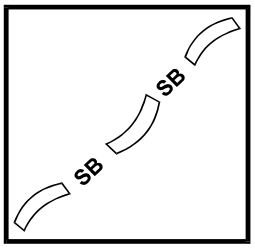
Maintenance and Inspection

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

Sandbag Barrier

SC-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment/desilting basin.
- During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).

Sandbag Barrier

SC-8

Appropriate Applications

- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).
- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment/desilting basin.
- During construction activities in stream beds when the contributing drainage area is less than 2 ha (5 ac).
- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.

Limitations

- Limit the drainage area upstream of the barrier to 2 ha (5 ac).
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Limited durability for long-term projects.

- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- Sandbag Material: Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m2 (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.

- Sandbag Size: Each sand-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and mass of approximately 15 kg (33 lb.). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the RE for approval prior to deployment.

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

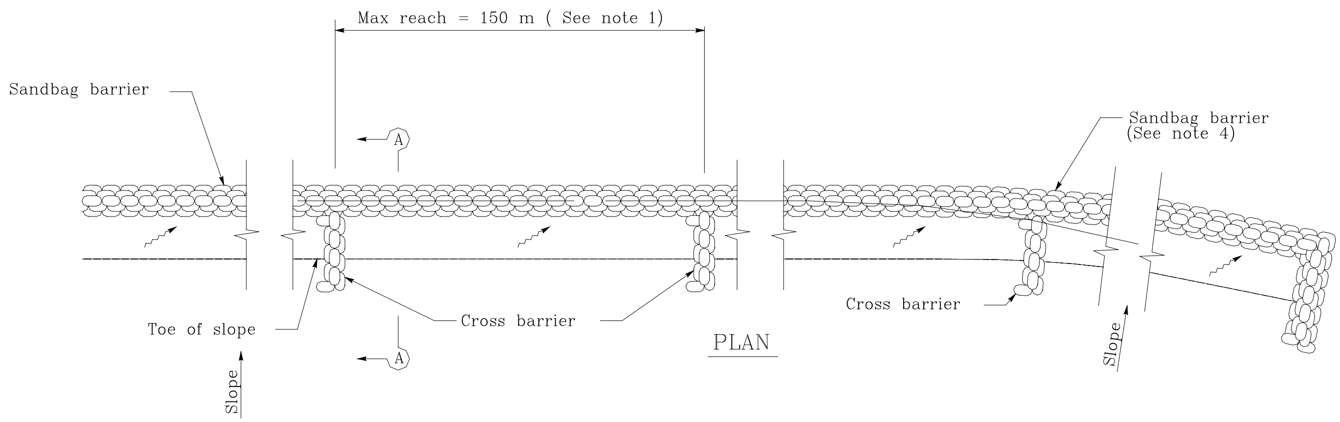
Installation

- When used as a linear sediment control:
  - Install along a level contour.
  - Turn ends of sandbag row up slope to prevent flow around the ends.
  - Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
  - Install as shown in Pages 4 and 5 of this BMP.
- Construct sandbag barriers with a set-back of at least 1m (3 ft) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly throughout the rainy season.

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



TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

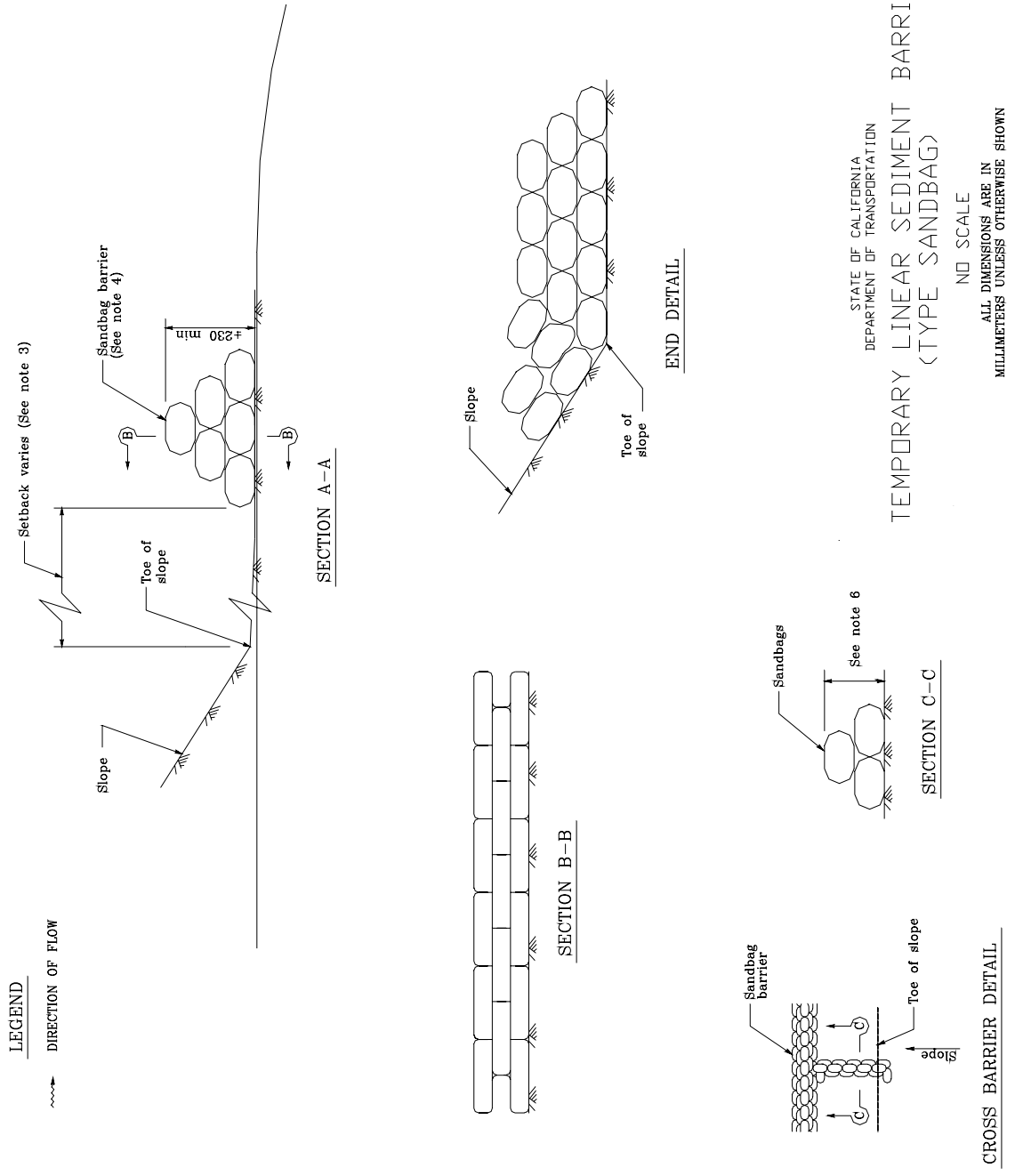
TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE SANDBAG)

NO SCALE

ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

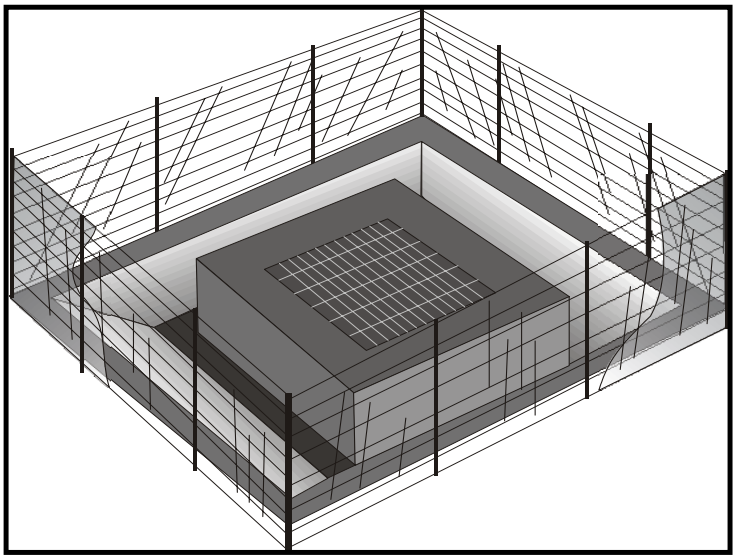
NOTES

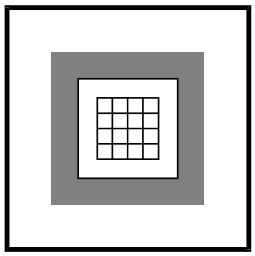
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 150 m.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum 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.


LEGEND
DIRECTION OF FLOW
Setback varies (See note 3)
Sandbag barrier (See note 4)
+230 min
Toe of slope
Slope
B
B
SECTION A-A
Slope
Toe of slope
END DETAIL
SECTION B-B
Sandbags
See note 6
SECTION C-C
Sandbag barrier
Toe of slope
Slope
C
C
CROSS BARRIER DETAIL
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE SANDBAG)
NO SCALE
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

Storm Drain Inlet Protection

SC-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into storm drainage systems or watercourses.

Appropriate Applications

- Where ponding will not encroach into highway traffic.
- Where sediment laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Where the drainage area is 0.4 ha (1 ac) or less.
- Appropriate during wet and snow-melt seasons.

Limitations

- Requires an adequate area for water to pond without encroaching upon traveled way and should not present itself to be an obstacle to oncoming traffic.
- May require other methods of temporary protection to prevent sediment-laden storm water and non-storm water discharges from entering the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques (e.g. check dams) in conjunction with inlet protection.
- Frequent maintenance is required.
- For drainage areas larger than 0.4 ha (1 ac), runoff shall be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, “Sediment/Desilting Basin,” and SC-3 “Sediment Trap.”

- Filter fabric fence inlet protection is appropriate in open areas that are subject to sheet flow and for flows not exceeding 0.014 m3/s (0.5 cfs).
- Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.014 m3/s (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

Methods and Installation

- ***DI Protection Type 1 - Filter Fabric Fence -*** The filter fabric fence (Type 1) protection is illustrated on Page 5. Similar to constructing a silt fence. See BMP SC-1, "Silt Fence." Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** The excavated drop inlet sediment trap (Type 2) is illustrated in Page 6. Similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence." Size excavated trap to provide a minimum storage capacity calculated at the rate of 130 m3/ha (67 yd3/ac) of drainage area.
- ***DI Protection Type 3 – Gravel bag -*** The gravel bag barrier (Type 3) is illustrated in Page 7. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-6, "Gravel Bag Berm." Gravel bags shall be used due to their high permeability.
- ***DI Protection Type 4 – Foam Barriers and Fiber Rolls –*** Foam barrier or fiber roll (Type 4) is placed around the inlet and keyed and anchored to the surface. Foam barriers and fiber rolls are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. RE or Construction Storm Water Coordinator approval is required.

Maintenance and Inspection

General

- Inspect all inlet protection devices before and after every rainfall event, and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.

- Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.
  - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
  - Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

Requirements by Method

- ***Type 1 - Filter Fabric Fence***
  - This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending.
  - Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
  - Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the RE.
  - At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications Section 7-1.13.
- ***Type 2 – Excavated Drop Inlet Sediment Trap***
  - This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.
  - Remove sediment from basin when the volume of the basin has been reduced by one-half.
- ***Type 3 - Gravel Bag Barrier***
  - This method may be used for drain inlets surrounded by AC or paved surfaces.
  - Inspect bags for holes, gashes, and snags.

- Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications Section 7-1.13.

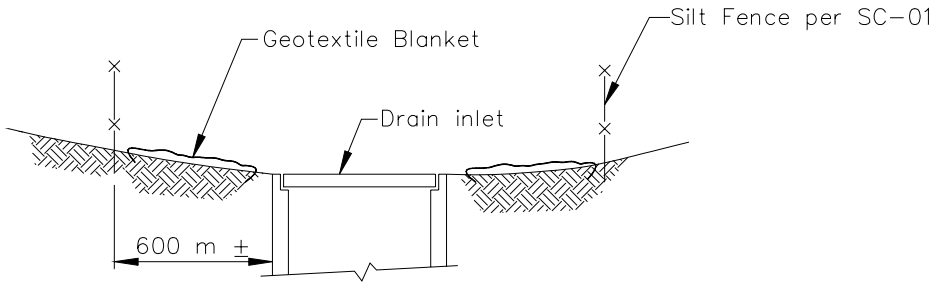
■ ***Type 4 Foam Barriers and Fiber Rolls***

- This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading. RE or Construction Storm Coordinator approval is required.

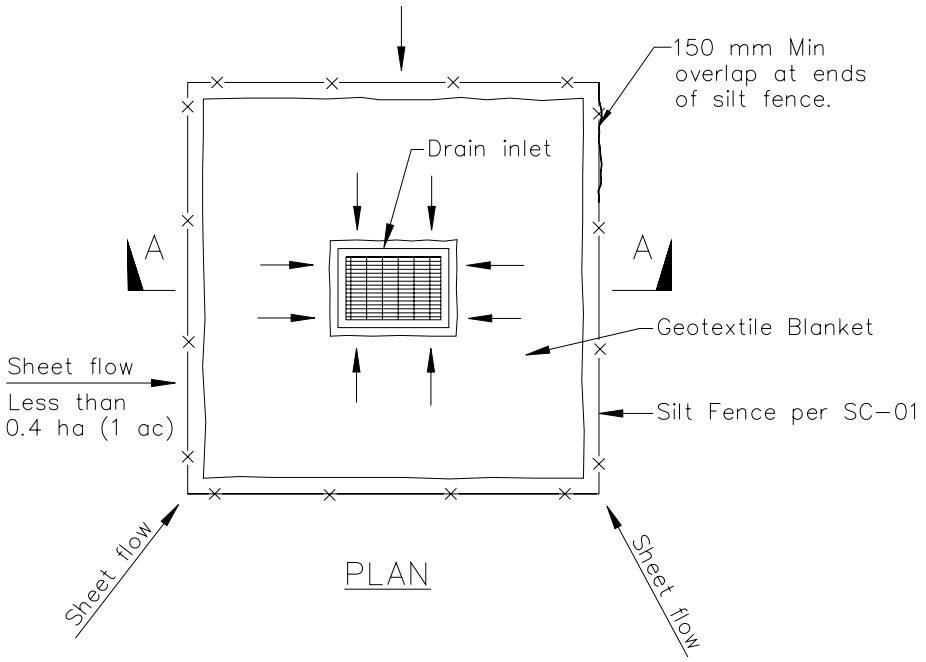
- Check foam barrier or fiber roll for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Storm Drain Inlet Protection

SC-10



SECTION A–A

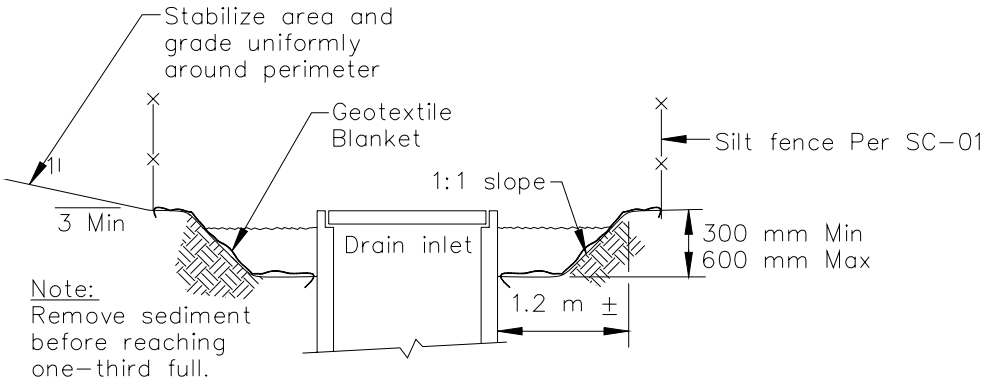


PLAN

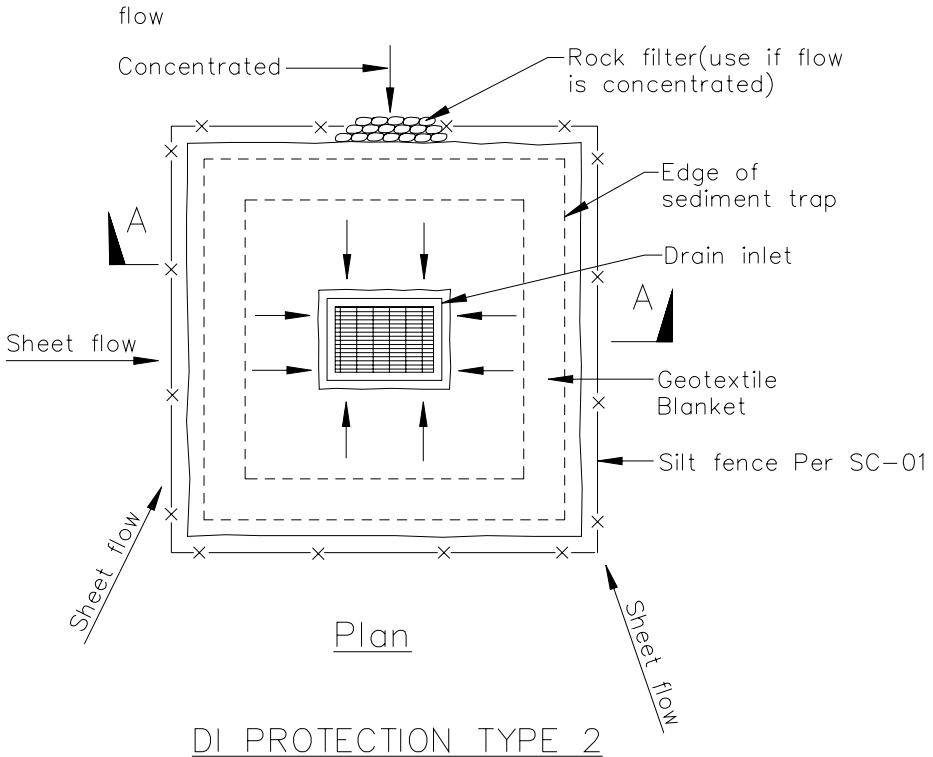
DI PROTECTION TYPE 1
NOT TO SCALE

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.



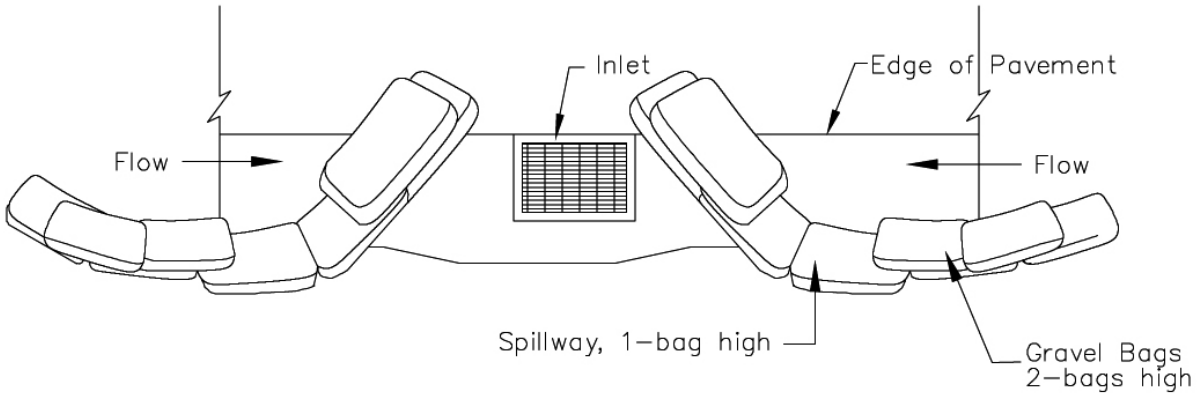
Section A–A



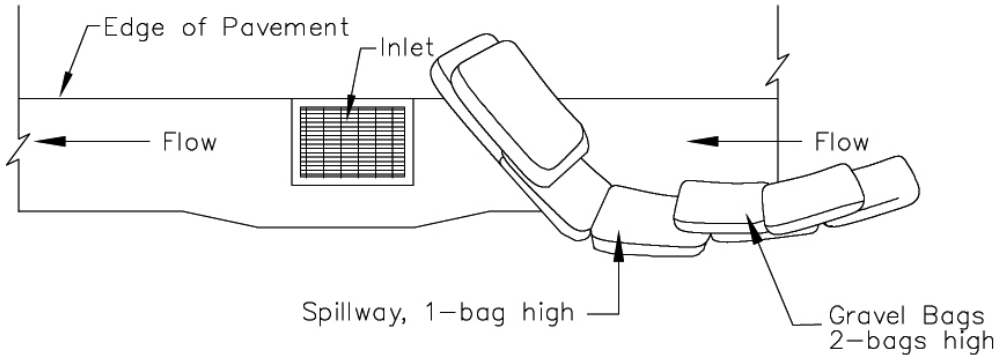
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

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 WITH OPPOSING FLOW DIRECTIONS

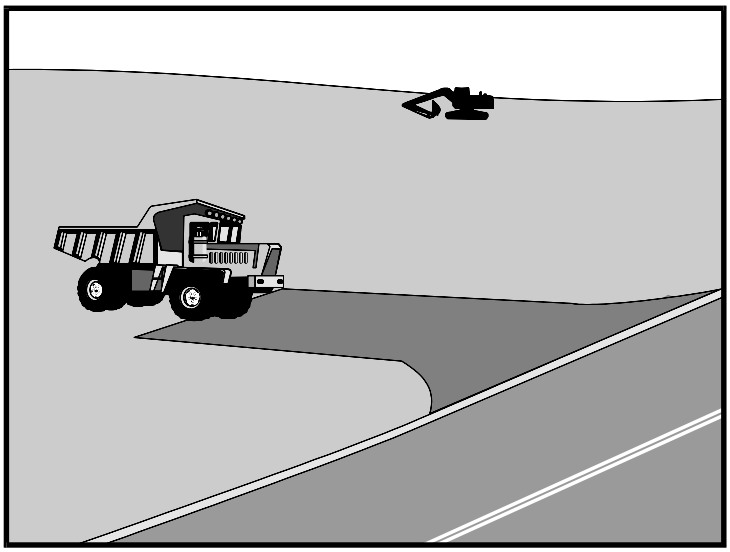


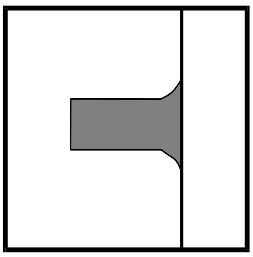
TYPICAL PROTECTION FOR INLET WITH SINGLE FLOW DIRECTION

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.

Stabilized Construction Entrance/Exit TC-1





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ● Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition 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.

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

Limitations

- Site conditions will dictate design and need.

Standards and Specifications

- 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 the heaviest vehicles and equipment that will use it.

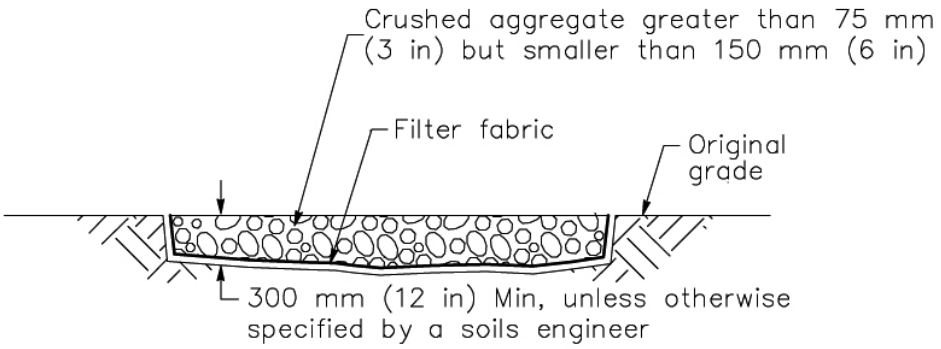
Stabilized Construction Entrance/Exit TC-1

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
- Use of constructed/manufactured steel plates with ribs for entrance/exit access is allowed with written approval from the RE.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed and as required.
- Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.
- All exit locations intended to be used continuously and for a period of time shall have stabilized construction entrance/exit BMPs (TC-1 "Stabilized Construction Entrance/Exit" or TC-3 "Entrance/Outlet Tire Wash").

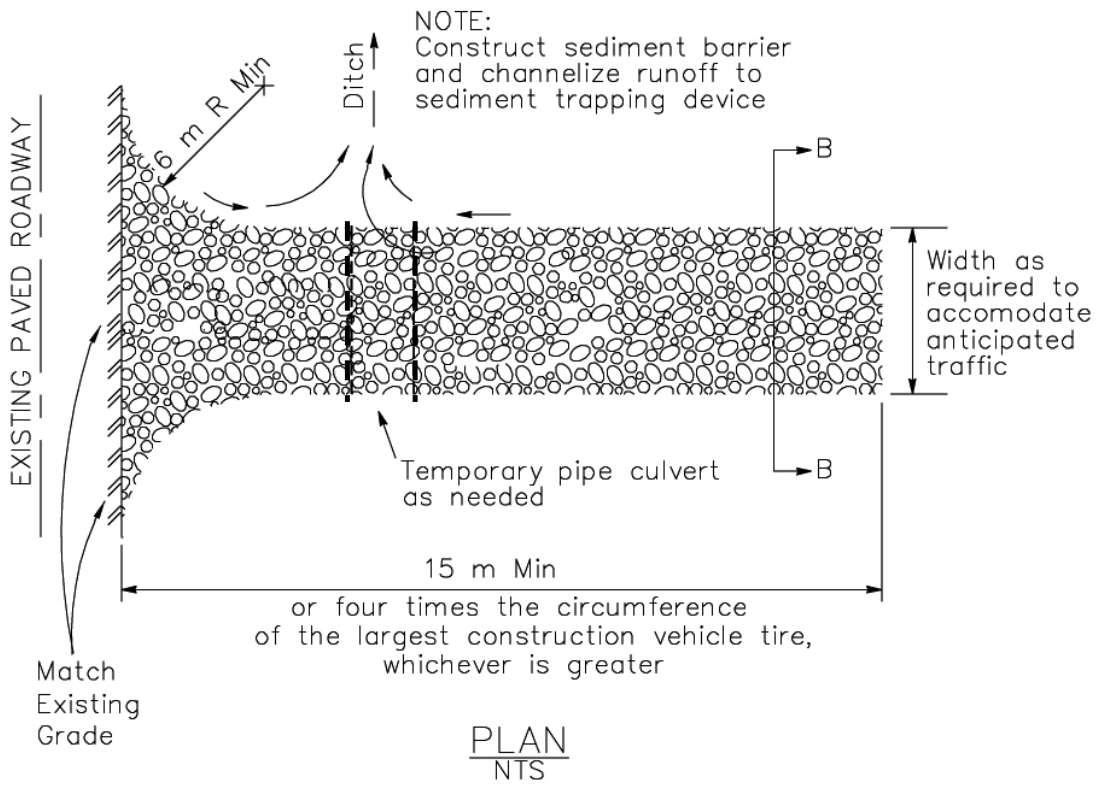
Maintenance and Inspection

- Inspect routinely for damage and assess effectiveness of the BMP. Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment or as directed by the RE.
- Keep all temporary roadway ditches clear.
- Inspect for damage and repair as needed.

Stabilized Construction Entrance/Exit TC-1



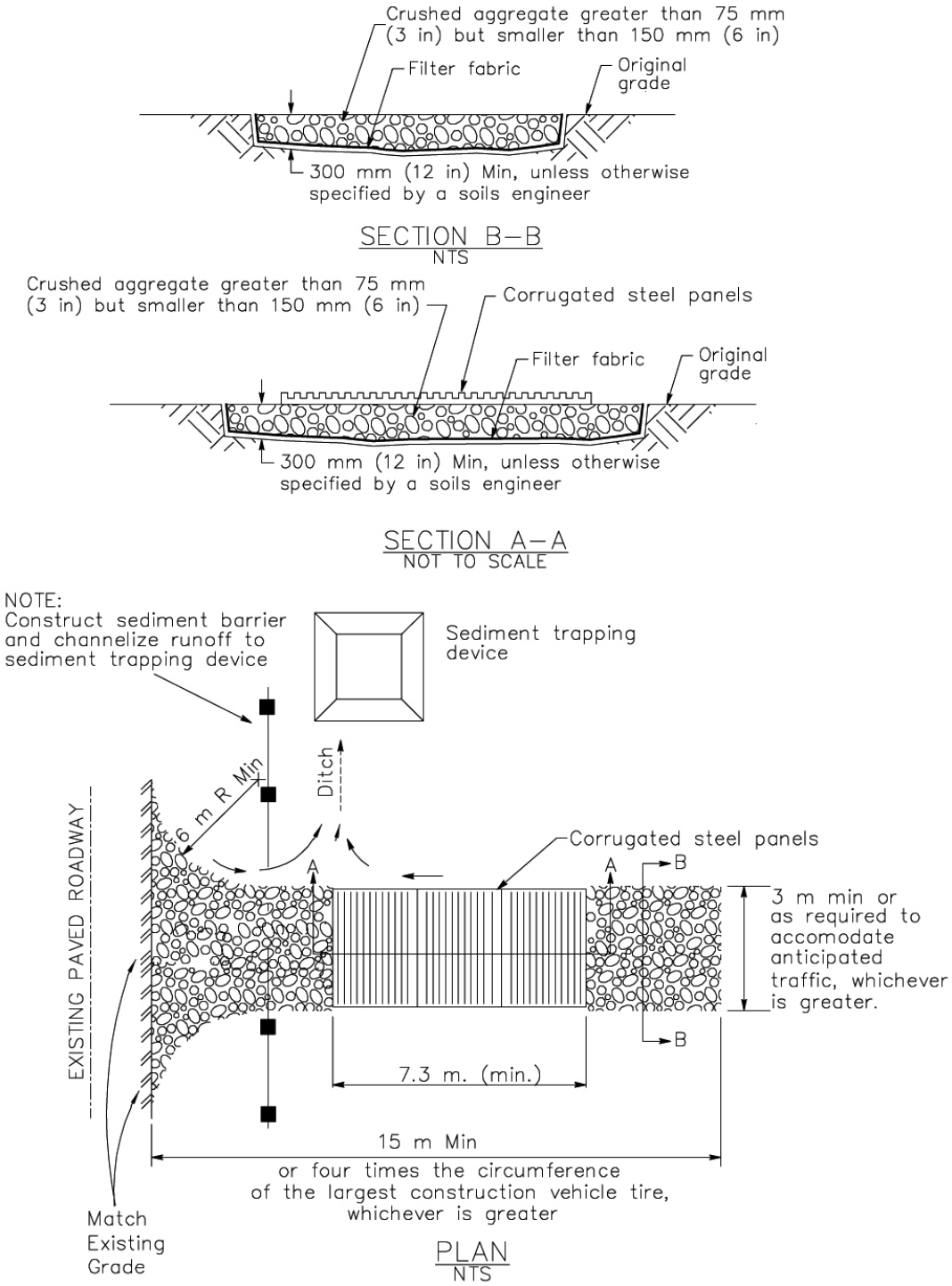
SECTION B–B
NTS



PLAN
NTS

Stabilized Contraction Entrance/Exit (Type 1)

Stabilized Construction Entrance/Exit TC-1



Stabilized Construction Entrance/Exit (Type 2)

Extended Detention Basin TC-22

Maintenance Concerns, Objectives, and Goals

- Vector/Pest Control
- Sediment and Trash Removal
- Vegetation/Landscape Maintenance
- Re-suspension of settled material
- Clogging of the Outlet

General Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 72 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

Inspection/Maintenance Considerations

Inspections should be conducted semi-annually and after significant storm events to identify potential problems early. Most maintenance efforts will need to be directed toward vegetation management and vector control, which may focus on basic housekeeping practices such as removal of debris accumulations and vegetation management to ensure that the basin dewaters completely (recommended 72 hour residence time or less) to prevent creating mosquito and other vector habitats.

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	■
☑	Metals	▲
☑	Bacteria	▲
☑	Oil and Grease	▲
☑	Organics	▲
☑	Oxygen Demanding	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

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CALIFORNIA STORMWATER QUALITY ASSOCIATION

Inspection Activities	Suggested Frequency
■ Inspect after several storm events for bank stability, vegetation growth, and to determine if the desired residence time has been achieved. ■ Inspect outlet structure for evidence of clogging or outflow release velocities that are greater than design flow.	Post construction
■ Inspect for the following issues: differential settlement, cracking; erosion of pond banks or bottom, leakage, or tree growth on the embankment; the condition of the riprap in the inlet, clogging of outlet and pilot channels; standing water, slope stability, presence of burrows; sediment accumulation in the basin, forebay, and outlet structures; trash and debris, and the vigor and density of the grass turf on the basin side slopes and floor.	Semi-annual, after significant storms, or more frequent
■ Inspect for the following issues: subsidence, damage to the emergency spillway; inadequacy of the inlet/outlet channel erosion control measures; changes in the condition of the pilot channel, accumulated sediment volume, and semi-annual inspection items.	Annual
■ During inspections, changes to the extended storage pond or the contributing watershed should be noted, as these may affect basin performance.	Annual inspection
Maintenance Activities	**Suggested Frequency**
■ If necessary, modify the outlet orifice to achieve design values if inspection indicates modifications are necessary. ■ Repair undercut or eroded areas. ■ Mow side slopes. ■ Manage pesticide and nutrients. ■ Remove litter and debris. ■ Control vectors as necessary.	As needed
■ Remove accumulated trash and debris from the basin, around the riser pipe, side slopes, embankment, emergency spillway, and outflow trash racks. The frequency of this activity may be altered to meet specific site conditions. ■ Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.	Semi-annual, or more frequent, as needed
■ Seed or sod to restore dead or damaged ground cover. ■ Repair erosion to banks and bottom as required.	Annual maintenance (as needed)
■ Supplement wetland plants if a significant portion have not been established (at least 50% of the surface area). ■ Remove nuisance plant species.	Annual maintenance (if needed)
■ Remove sediment from the forebay to reduce frequency of main basin cleaning.	3- to 5-year maintenance
■ Monitor sediment accumulation and remove accumulated sediment and regrade about every 10 years or when the accumulated sediment volume exceeds 10-20% of the basin volume, or when accumulation reaches 6 inches or if resuspension is observed. Clean in early spring so vegetation damaged during cleaning has time to re-establish.	Every 10-25 years

Additional Information

In most cases, sediment from extended detention basin does not contain toxins at levels posing a hazardous concern. Studies to date indicate that pond sediments are likely to meet toxicity limits and can be safely landfilled or disposed of onsite. Onsite sediment disposal is always preferable (if local authorities permit it) as long as the sediments are deposited away from the shoreline to prevent their re-entry into the pond.

Sediments should be tested for toxin in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed.

References

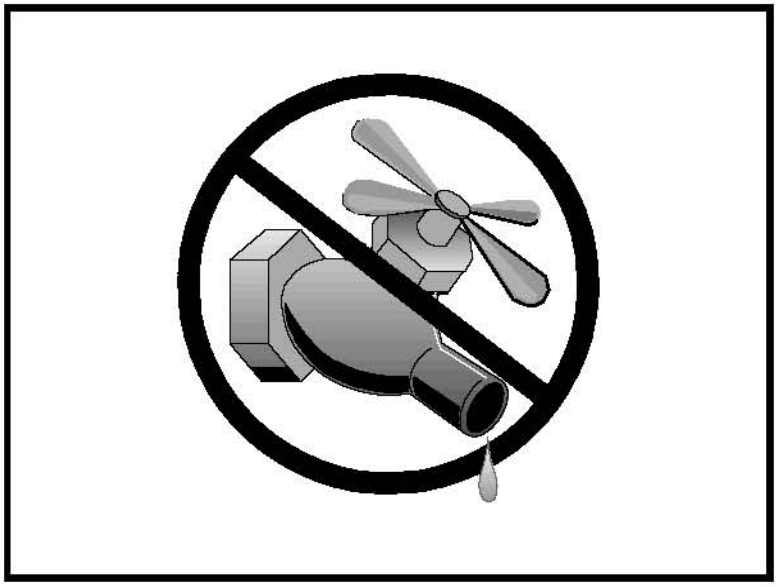
Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

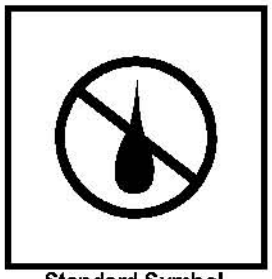
U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Water Conservation Practices

NS-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and/or the transport of pollutants off site.

Appropriate Applications

- Water conservation practices are implemented on all construction sites and wherever water is used.
- Applies to all construction projects.

Limitations

- None identified.

Standards and Specifications

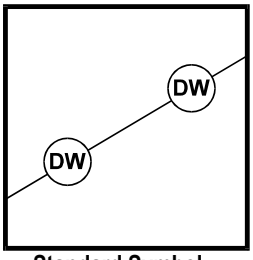
- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Vehicles and equipment washing on the construction site is discouraged.
- Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept and vacuumed.
- Direct construction water runoff to areas where it can infiltrate into the ground.
- Apply water for dust control in accordance with the Standard Specifications Section 10, and WE-1, "Wind Erosion Control."
- Report discharges to RE immediately.

Maintenance and Inspection

- Inspect water equipment at least weekly.
- Repair water equipment as needed.

Dewatering Operations

NS-2



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Dewatering Operations are practices that manage the discharge of pollutants when non-storm water and accumulated precipitation (storm water) must be removed from a work location so that construction work may be accomplished.

Appropriate Applications

- These practices are implemented for discharges of non-storm water and storm water (accumulated rain water) from construction sites. Non-storm water includes, but is not limited to, groundwater, dewatering of piles, water from cofferdams, water diversions, and water used during construction activities that must be removed from a work area.
- Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (storm water) from depressed areas at a construction site.
- Storm water mixed with non-storm water should be managed as non-storm water.

Limitations

- Dewatering operations for non-storm water will require, and must comply with, applicable local permits, project-specific permits, and regulations.
- Site conditions will dictate design and use of dewatering operations.
- A dewatering plan shall be submitted as part of the SWPPP/WPCP detailing the location of dewatering activities, equipment, and discharge point.
- The controls discussed in this best management practice (BMP) address sediment only. If the presence of polluted water with hazardous substances is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water to be removed by dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Resident Engineer (RE) and comply with Standard Specifications Section 5-1.116, "Differing Site Conditions."

- Avoid dewatering discharges where possible by using the water for dust control, by infiltration, etc.

Standards and Specifications

- Dewatering shall be conducted in accordance with the Field Guide to Construction Site Dewatering, October 2001, CTSW-RT-01-010.
- Dewatering for accumulated precipitation (storm water) shall follow this BMP and use treatment measures specified herein.
- The RWQCB may require a separate NPDES permit prior to the dewatering discharge of non-storm water. These permits will have specific testing, monitoring, and discharge requirements and can take significant time to obtain.
- Except in RWQCB Regions 1 and 2, the discharge of accumulated precipitation (storm water) to a water body or storm drain is subject to the requirements of Caltrans NPDES permit. Sediment control and other appropriate BMPs (e.g., outlet protection/energy dissipation) must be employed when this water is discharged.
- RWQCB Regions 1 and 2 require notification and approval prior to any discharge of water from construction sites.
- In RWQCB Regions 3, 5, 7, and 9 non-storm water dewatering for discharges meeting certain conditions are allowed under an RWQCB general dewatering NPDES Permit. Notification and approval from the RWQCB is required prior to conducting these operations. This includes storm water that is mixed with groundwater or other non-storm water sources. Once the discharge is allowed, appropriate BMPs must be implemented to ensure that the discharge complies with all permit requirements. Conditions for potential discharge under an RWQCB general dewatering NPDES Permit include:
  - Regions 3, 5, 7: Non-storm water discharges, free of pollutants other than sediment, <0.25 MGD, with a duration of 4 or fewer months.
  - Region 9: Groundwater, free of pollutants other than sediment, <0.10 MGD, to surface waters other than San Diego Bay.
- The flow chart shown on Page 4 shall be utilized to guide dewatering operations.
- The RE will coordinate monitoring and permit compliance.
- Discharges must comply with regional and watershed-specific discharge requirements.
- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges must not cause erosion at the discharge point.

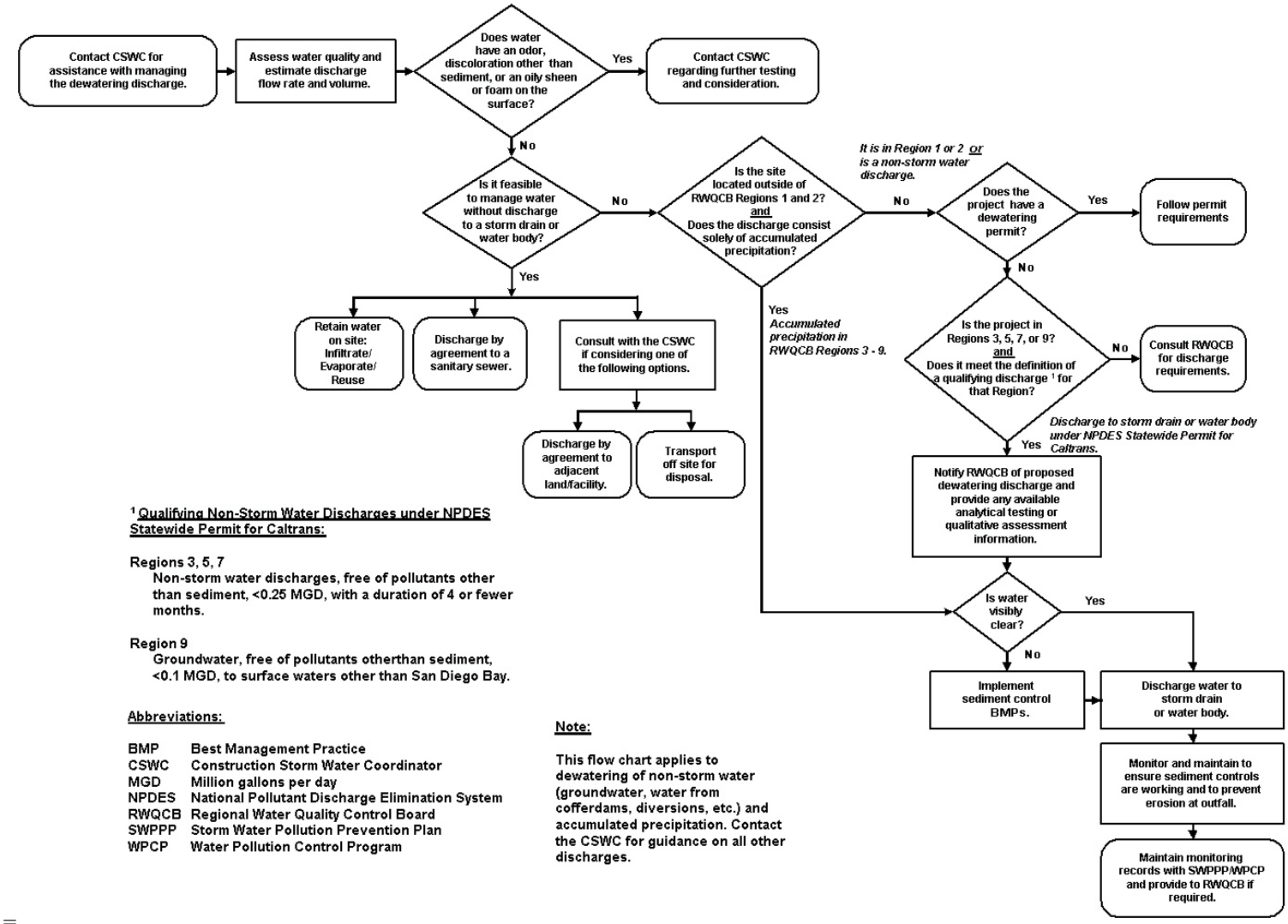
- Dewatering records shall be maintained for a period of 3 years.

Maintenance and Inspection

- Inspect all BMPs implemented to comply with permit requirements frequently and repair or replace to ensure the BMPs function as designed.
- Conduct water quality monitoring pursuant to the "Storm Water Dewatering Operations BMP Discharge Monitoring Forms".
- Accumulated sediment removed during the maintenance of a dewatering device may be incorporated in the project at locations designated by the RE or disposed of outside the right-of-way in conformance with the Standard Specifications.
- Accumulated sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations and as approved by the RE.

Dewatering Operations

NS-2



[1] Qualifying Non-Storm Water Discharges under NPDES Statewide Permit for Caltrans:

Regions 3, 5, 7
Non-storm water discharges, free of pollutants other than sediment, <0.25 MGD, with a duration of 4 or fewer months.

Region 9
Groundwater, free of pollutants otherthan sediment, <0.1 MGD, to surface waters other than San Diego Bay.

Abbreviations:

BMP	Best Management Practice
CSWC	Construction Storm Water Coordinator
MGD	Million gallons per day
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SWPPP	Storm Water Pollution Prevention Plan
WPCP	Water Pollution Control Program

Note:

This flow chart applies to dewatering of non-storm water (groundwater, water from cofferdams, diversions, etc.) and accumulated precipitation. Contact the CSWC for guidance on all other discharges.

=

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations from the construction site. Several devices are presented in this section that provide options to achieve sediment removal. The size of particles present in the sediment and Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate.

Category 1: Constructed Settling Technologies

The devices discussed in this category are to be used exclusively for dewatering operations only.

Sediment/Desilting Basin (SC-2)

Description:

A desilting basin is a temporary basin with a controlled release structure that is formed by excavation and/or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Temporary desilting basins must be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (SC-3)

Description:

A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging.

Appropriate Applications:

- Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets shall be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Category 2: Mobile Settling Technologies

The devices discussed in this category are typical of tanks that can be used for sediment treatment of dewatering operations. A variety of vendors are available who supply these tanks.

Weir Tank

Description:

A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

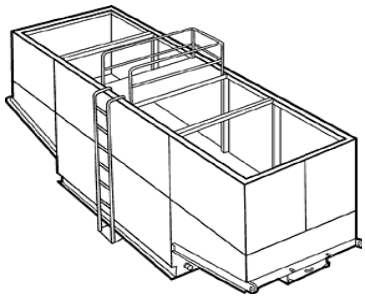
Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors shall be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company.

Schematic Diagrams:



Weir Tanks

Dewatering Tank

Description:

A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors shall be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company.

Schematic Diagrams:

Dewatering Tanks

Category 3: Basic Filtration Technologies

Gravity Bag Filter

Description:

A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.

Appropriate Applications:

- Effective for the removal of sediments (gravel, sand, and silt). Some metals are removed with the sediment.

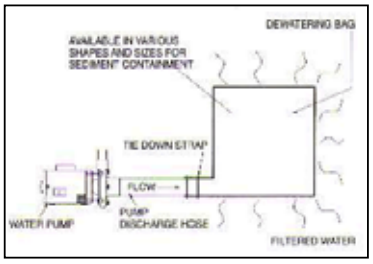
Implementation:

- Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.
- A secondary barrier, such as a rock filter bed or straw/hay bale barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- The bag is disposed off-site, or on-site as directed by the RE.

Schematic Diagrams:



Gravity Bag Filter

Category 4: Advanced Filtration Technologies

Sand Media Particulate Filter

Description:

Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for standalone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require monthly service to monitor and maintain the sand media.

Schematic Diagrams:

Sand Media Particulate Filters

Pressurized Bag Filter

Description:

A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header, allowing for the discharge of flow in series to an additional treatment unit. Vendors provide pressurized bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential exceeds the manufacturer's recommendation.

Schematic Diagrams:

Pressurized Bag Filter

Cartridge Filter

Description:

Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with pressurized bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential exceeds the manufacturer's recommendation.

Schematic Designs:

Cartridge Filter

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Central Coast Region (RWQCB 3)
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
Dissolved Oxygen	mg/L			
pH	unitless			
Turbidity	JTUs			

DISCHARGE LIMITATIONS [g, h, i]

Constituent	Units	EFFLUENT Daily Maximum	RECEIVING WATER Daily Maximum
Dissolved Oxygen	mg/L	--	5.0 [j]
pH	unitless	--	Between 7.0 - 8.5 [j]
Turbidity	JTUs	--	20% (Where Ambient is 0 - 50 JTUs)
			10 (Where Ambient is 50 - 100 JTUs)
			10% (Where Ambient is > 100 JTUs)

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
JTUs - Jackson turbidity units
mg/L - Milligrams per liter
RWQCB - Regional Water Quality Control Board
SAR - Sodium absorption ratio
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDE permit or Waste Discharge Requirements.

b All inland surface waters, enclosed bays, and estuaries. **Based on the 1994 RWQCB 3 Basin Plan.** [http://www.swrcb.ca.gov/rwqcb3/BasinPlan/Index.htm]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Dissolved oxygen, pH, and turbidity are required to be analyzed throughout the basin.

The following constituents shall be sampled if suspected to present in the discharge: ammonia for toxicity, MBAS, PCBs, phenols, and phthalate esters are required to be analyzed throughout the basin, however, bacteria, boron, chemical color, temperature, and total dissolved solids shall be analyzed if the project lies in an area designated for a specific beneficial use, as noted in the Basin Plan.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters.

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Biostimulatory substances, floating material, oil and grease, pesticides, sediment, settleable materials, suspended materials, and tastes and odors.

j In addition, dissolved oxygen and pH have specific beneficial uses discharge limitations. See basin plan for specific limitations.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Los Angeles Region (RWQCB 4)
Los Angeles and Ventura Counties
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]				
		Results		
		Effluent	Receiving Water [f]	
Constituents	Units		Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			
TDS [j]	mg/L			

DISCHARGE LIMITATIONS [g, h, k, i]			
		EFFLUENT	RECEIVING WATER
Constituent	Units	Daily Maximum	Daily Maximum
pH	unitless	--	Between 6.5 - 8.5 [j]
Turbidity	NTUs	--	20% (Where Ambient is 0 - 50 NTUs)
			10% (Where Ambient is > 50 NTUs)
TDS	mg/L	--	See Table 3-8 in Basin Plan

NOTES:

Ambient - Upstream sample result (ie. R-1)
BMP - Best Management Practice
mg/L - Milligrams per liter
NTUs - Nephelometric turbidity units
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

b All inland surface waters, enclosed bays, and estuaries, including wetlands. **Based on the 1995 RWQCB 4 Basin Plan.** [http://www.swrcb.ca.gov/rwqcb4/html/meetings/tmdl/Basin_plan/basin_plan_doc.html]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e pH, and turbidity are required to be analyzed throughout the basin, however, ammonia, bacteria/coliform, boron, chemical constituents, chloride, dissolved oxygen, methylene blue activated substances, nitrogen, pesticides, polychlorinated biphenyls, radioactive substances, sodium absorption ratio, sulfate, temperature, and total dissolved solids shall be analyzed if the project lies in an area designated for a specific beneficial use, as noted in the Basin Plan.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Bioaccumulation, biochemical oxygen demand, biostimulatory substances, color, exotic vegetation, floating material, oil and grease, solid/suspended/settleable materials, tastes and odors, and toxicity.

j In addition, ambient pH levels shall not be changed more than 0.2 units for inland surface waters, and 0.5 for bays or estuaries from natural conditions.

k See Table 3-8 in Basin Plan for applicable watershed

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Central Valley Region (RWQCB 5)
Sacramento River Basin and The San Joaquin River Basin
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No.	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			

DISCHARGE LIMITATIONS [g, h, i]

Constituent	Units	EFFLUENT Daily Maximum	RECEIVING WATER Daily Maximum
pH	unitless	--	Between 6.5 - 8.5
Turbidity	NTUs	--	1 NTU increase (Where Ambient is 0 - 5 NTUs)
			20% increase (Where Ambient is 5 - 50 NTUs)
			10 NTU increase (Where Ambient is 50 - 100 NTUs)
			10% increase (Where Ambient is > 100 NTUs)

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
NTUs - Nephelometric turbidity units
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

b All surface waters in the Sacramento and San Joaquin River Basins, including the Delta.**Based on the 1998 RWQCB 5a/5b Basin Plan.** [http://www.swrcb.ca.gov/rwqcb5/available_documents/index.html#anchor616381]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Turbidity and pH are required to be analyzed throughout the basin, however, bacteria, chemical constituents, dissolved oxygen, pesticides, radioactivity, salinity, and temperature shall be analyzed if the project lies in an area designated for a specific beneficial use or along a specific waterbody, as noted in the Basin Plan.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface water

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plar

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Biostimulatory substances, color, floating material, oil and grease, sediment, settleable material, suspended material, tastes and odors, and toxicity.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Central Valley Region (RWQCB 5)
Tulare Lake Basin
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]				
		Results		
		Effluent	Receiving Water [f]	
Constituents	Units		Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			
Dissolved Oxygen	mg/L			
Electrical Conductivity	umho/cm			

DISCHARGE LIMITATIONS [g, h, i]			
		EFFLUENT	RECEIVING WATER
		Daily	Daily
Constituent	Units	Maximum	Maximum
pH	unitless	--	Between 6.5 - 8.3 0.3 unit change for background
Turbidity	NTUs	--	1 (Where Ambient is 0 - 5 NTUs) 20% (Where Ambient is 5 - 50 NTUs) 10 (Where Ambient is 50 - 100 NTUs) 10% (Where Ambient is > 100 NTUs)
Dissolved Oxygen	mg/L		See Table III-1 in Basin Plan
Electrical Conductivity	umho/cm		See Table III-2 in Basin Plan

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
cm - Centimeter
mg/L - Milligrams per liter
NTUs - Nephelometric turbidity units
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

b **Based on the 1995 RWQCB 5c Basin Plan.** [http://www.swrcb.ca.gov/rwqcb5/available_documents/index.html#anchor616381]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Bacteria, chemical constituents, pesticides, radioactivity, salinity, and temperature shall be analyzed for a specific beneficial use as noted in the Basin Plan. Ammonia is suspected at elevated levels.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface water

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Biostimulatory substances, color, floating material, oil and grease, sediment, settleable material, suspended material, tastes and odors, and toxicity.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Lahontan Region (RWQCB 6)
For Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			

DISCHARGE LIMITATIONS [g, h, i]

Constituent	Units	EFFLUENT	RECEIVING WATER
		Daily Maximum	Daily Maximum
pH	unitless	--	Between 6.5 - 8.5 [j]
Turbidity	NTUs	--	10% of Ambient [j]

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
NTUs - Nephelometric turbidity units
mg/L - Milligrams per liter
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

[b] All surface waters including wetlands. **Based on the 1994 RWQCB 6 Basin Plan.** [http://www.swrcb.ca.gov/rwqcb6/BPlan/BPlan_Index.htm]

[c] Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

[d] Each constituent will be analyzed in the effluent and the two receiving water samples.

[e] pH and turbidity are required to be analyzed throughout the basin, however, adjusted sodium adsorption ration, algal growth potential, biological indicators, biostimulatory substances, boron, chemical constituents, chlorophyll-a, clarity, color, dissolved inorganic nitrogen, dissolved orthophosphate, dissolved oxygen, electrical conductivity, fluoride, iron, nitrogen as nitrate, pesticides, plankton counts, radioactivity, sodium adsorption ratio, soluble reactive iron, soluble reactive phosphorous, species composition, sulfate, suspended sediment, tastes & odors, temperatures, total dissolved solids, total alkalinity as carbonate, total kjeldahl nitrogen, total nitrogen, total phosphorous, total reactive iron, toxicity, transparency, un-ionized ammonia shall be analyzed if the project lies in an area designated for a specific beneficial use, as noted in the Basin Plan. Bacteria/Coliform if high levels are suspected. Residual chlorine if suspected to be present.

[f] R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

[g] If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters

[h] All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

[i] Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Floating material, nondegradation of aquatic communities and populations, oil and grease, sediment, settleable materials, and suspended materials.

[j] In addition, bacteria/coliform, pH, total residual chlorine, and turbidity have specific beneficial uses and/or location specific discharge limitations. See basin plan for specific limitations.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM[a]

Colorado River Basin Region (RWQCB 7)
For Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No.	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
pH	unitless			
TDS [f]	mg/L			

DISCHARGE LIMITATIONS [g, h, i]

Constituent	Units	EFFLUENT	RECEIVING WATER
		Daily Maximum	Daily Maximum
pH	unitless	--	Between 6.0 - 9.0
TDS [g]	mg/L	--	See Basin Plan

NOTES:

BMP - Best Management Practice

RWQCB - Regional Water Quality Control Board

-- - Not required

> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

b **Based on the 2002 RWQCB 7 Water Quality Plan.**
[http://www.swrcb.ca.gov/rwqcb7/documents/RB7Plan.pdf]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Bacteria, biochemical oxygen demand, chemical constituents, chemical oxygen demand, dissolved oxygen, radioactivity, and selenium shall be analyzed for specific beneficial uses as noted in the Basin Plan.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g Total Dissolved Solids (TDS) has specific location discharge limitations. See basin plan for specific limitations.

h If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters

i All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

j Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Biostimulatory substances, color, floating material, herbicides, oil and grease, pesticides, sediment, settleable and suspended solids, tainting substances, tastes and odors, temperature, toxicity, and turbidity.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

Santa Ana Region (RWQCB 8)
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			
TDS	mg/L			

DISCHARGE LIMITATIONS [g, h, i, j]

Constituent	Units	EFFLUENT	RECEIVING WATER
		Daily Maximum	Daily Maximum
pH	unitless	--	Between 7.0 - 8.6 (bays and estuaries)
		--	Between 6.5 - 8.5 (inland surface waters)
Turbidity	NTUs	--	20% (Where Ambient is 0 - 50 NTUs)
			10 NTUs (Where Ambient is 50 - 100 NTUs)
			10% (Where Ambient is > 100 NTUs)
TDS	mg/L	--	See Table 4-1 in Basin Plan

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
NTUs - Nephelometric turbidity units
mg/L - Milligrams per liter
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDE permit or Waste Discharge Requirements.

b All inland surface waters including streams, rivers, lakes, and wetlands. **Based on the 1995 RWQCB 8 Basin Plan.** [http://www.swrcb.ca.gov/rwqcb8/pdf/R8BPlan.pdf]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Bacteria/coliform, dissolved oxygen, fluoride, methylene blue-activated substances (MBAS), metals, nitrate, radioactivity, temperature, and un-ionized ammonia shall be analyzed for a specific beneficial use, as noted in the Basin Plan. Boron, Residual Chlorine, Hardness, sodium, chloride, total inorganic nitrogen, sulfate, and chemical oxygen demand if present at elevated levels.

f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters.

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses of the following: Algae, color, floatables, oil and grease, suspended & settleable solids, sulfides, sulfides, surfactants, tastes and odors, and toxic substances.

j Total dissolved solids (TDS), hardness, sodium (Na), chloride (Cl), total inorganic nitrogen (TIN), sulfate (SO_4) and chemical oxygen demand (COD) shall be analyzed for specific waterbodies as identified in the Basin Plan.

STORM WATER DEWATERING OPERATIONS BMP DISCHARGE MONITORING FORM [a]

San Diego Region (RWQCB 9)
For Inland Surface Waters [b]

GENERAL INFORMATION	
Project Name	
Contract No	
Contractor	
Sampler's Name	
Sampler's Signature	
Date Discharge Began	
Date of Sampling	

WATER SAMPLE LOG [c, d, e]

Constituents	Units	Results		
		Effluent	Receiving Water [f]	
			Upstream (R-1)	Downstream (R-2)
pH	unitless			
Turbidity	NTUs			
TDS	mg/L			
Dissolved Oxygen	mg/L			
Color				

DISCHARGE LIMITATIONS [g, h, i]

Constituent	Units	EFFLUENT Daily Maximum	RECEIVING WATER Daily Maximum
pH	unitless	--	Between 6.5 - 8.5
Turbidity	NTUs	--	20% (Where Ambient is 0 - 50 NTUs) 10 NTUs (Where Ambient is 50 - 100 NTUs) 10% (Where Ambient is > 100 NTUs) 0.2 NTUs (ocean waters)
TDS	mg/L		See Table 3-2 in Basin Plan
Dissolved Oxygen	mg/L		5.0 mg/l in inland surface waters 6.0 mg/l in waters with designated COLD beneficial uses
Color		--	See Table 3-2 in Basin Plan

NOTES:

Ambient - Upstream sample result (i.e.. R-1)
BMP - Best Management Practice
NTUs - Nephelometric turbidity units
mg/L - Milligrams per liter
RWQCB - Regional Water Quality Control Board
-- - Not required
> - Greater Than

a This form shall be used only for dewatering of storm water/accumulated precipitation. Dewatering non-storm water shall monitor constituents required in the applicable NPDES permit or Waste Discharge Requirements.

b All inland surface waters, enclosed bays, and estuaries and coastal lagoons. **Based on the 1994 RWQCB 9 Basin Plan.** [http://www.swrcb.ca.gov/rwqcb9/programs/basinplan.html]

c Collect monthly samples. The first sample shall be collected at the start of the discharge and the last sample shall be collected at the completion of the discharge. Use the same sample collection criteria for discharges less than one month in duration for a total of two samples per discharge event.

d Each constituent will be analyzed in the effluent and the two receiving water samples.

e Bacteria, E. Coli & enterococci, biostimulatory substances, dissolved oxygen, inorganic chemicals, organic chemicals, pesticides, phenolic compounds, radioactivity, tastes & odors, temperatures, and trihalomethanes shall be analyzed for specific beneficial use, as noted in the Basin Plan.
Un-ionized Ammonia, chloride, sulfate, sodium, iron, manganese, MBAS, boron, and fluoride if suspected at elevated levels.

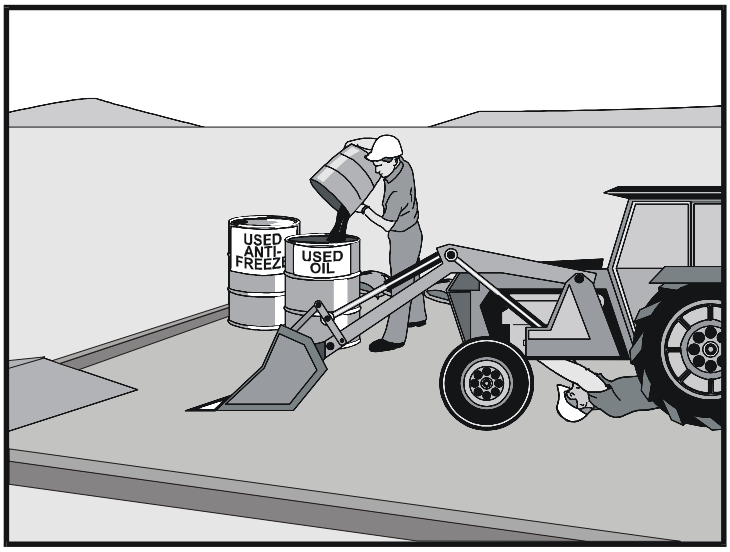
f R-1 shall be collected 100 feet upstream from the closest point of discharge. R-2 shall be collected 100 feet downstream from the closest point of discharge.

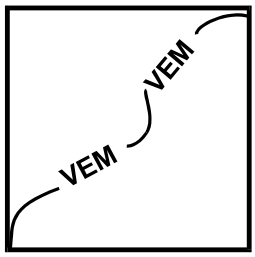
g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface waters.

h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan.

i Water shall not contain concentrations that cause nuisance or adversely affect beneficial uses as required in the Basin Plan.

Vehicle and Equipment Maintenance NS-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment maintenance procedures.

Appropriate Applications

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

Limitations

- None identified.

Standards and Specifications

- Drip pans or absorbent pads shall 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.
- All maintenance areas are required to have spill kits and/or use other spill protection devices.
- Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m (50 ft) from downstream drainage facilities and watercourses.
- Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt-spreading equipment shall be non-toxic.
- Use off-site maintenance facilities whenever practical.

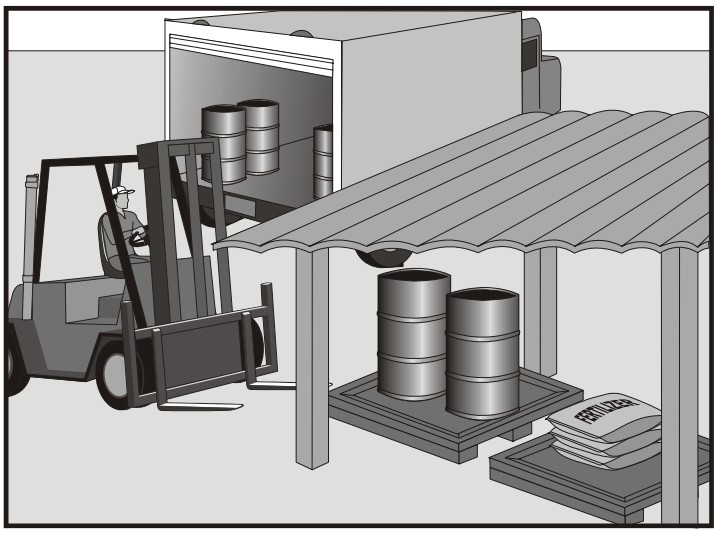
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose or recycle used batteries.
- Do not bury used tires.
- Repair of fluid and oil leaks immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums.

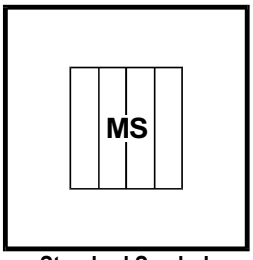
Maintenance and Inspection

- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas shall be inspected regularly.
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

Material Delivery and Storage

WM-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

- Hazardous chemicals such as:
  - Acids,
  - lime,
  - glues,
  - adhesives,
  - paints,
  - solvents, and
  - curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.

- Other materials that may be detrimental if released to the environment.

Limitations

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

Standards and Specifications

General

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

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for storage.
- Throughout the rainy season, each temporary containment facility shall have a permanent cover and side wind protection or be covered during non-working days and prior to and during rain events.
- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10% 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 shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.

-
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.
- Stockpiles shall be protected in accordance with BMP WM-3, "Stockpile Management."
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Also see BMP WM-6, "Hazardous Waste Management", for storing of hazardous materials.

Material Delivery Practices

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

Spill Clean-up

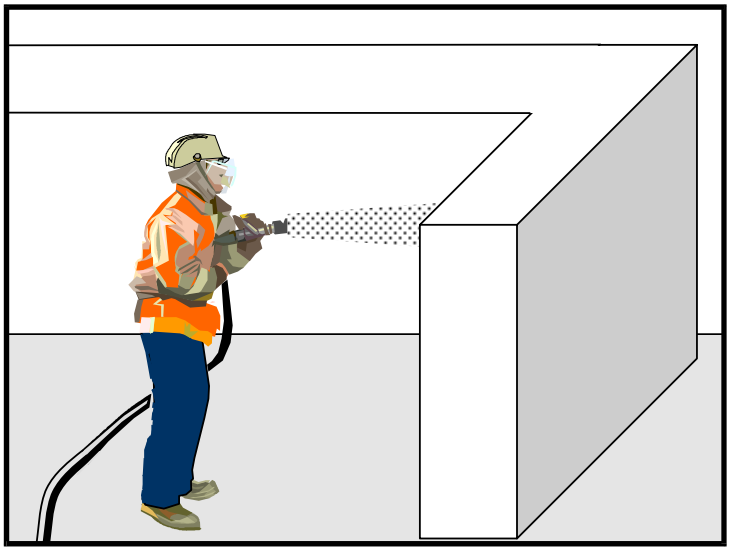
- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, "Spill Prevention and Control", for spills of chemicals and/or hazardous materials.

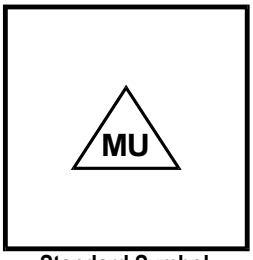
Maintenance and Inspection

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

Material Use

WM-2





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

- Hazardous chemicals such as:

  Acids,
  lime,
  glues,
  adhesives,
  paints,
  solvents, and
  curing compounds.

- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.
- Other materials that may be detrimental if released to the environment.

Material Use

WM-2

Limitations

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

Standards and Specifications

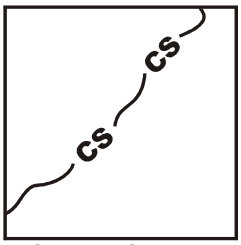
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not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

Maintenance and Inspections

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

Stockpile Management

WM-3



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

Implemented in all projects that stockpile soil and other materials.

Limitations

- None identified

Standards and Specifications

- Protection of stockpiles is a year-round requirement.
- Locate stockpiles a minimum of 15 m (50 ft)away from concentrated flows of storm water, drainage courses, and inlets.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information see BMP WE-1, "Wind Erosion Control."
- Stockpiles of contaminated soil shall be managed in accordance with BMP WM-7, "Contaminated Soil Management."
- Bagged materials should be placed on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials shall be protected further as follows:

- ***Soil stockpiles:***
  - During the rainy seasons, soil stockpiles shall be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
  - During the non-rainy season, soil stockpiles shall be covered and protected with a temporary perimeter sediment barrier prior to the onset of precipitation.
- ***Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase:***
  - During the rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier at all times.
  - During the non-rainy season, the stockpiles shall be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.
- ***Stockpiles of "cold mix":***
  - During the rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material at all times.
  - During the non-rainy season, cold mix stockpiles shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.
- ***Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate:***
  - During the rainy season, treated wood shall be covered with plastic or comparable material at all times.
  - During the non-rainy season, treated wood shall be covered with plastic or comparable material and shall be placed on pallets prior to the onset of precipitation.

Protection of Active Stockpiles

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

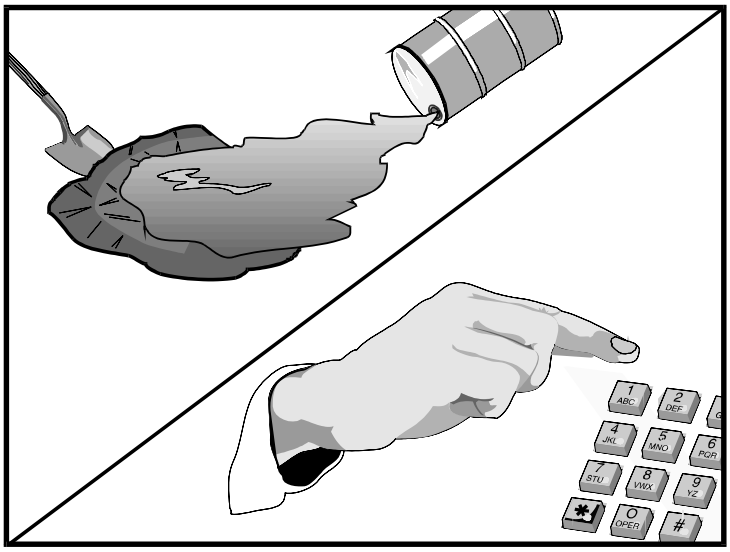
- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Maintenance and Inspections

- Repair and/or replace perimeter controls and covers as needed, or as directed by the RE, to keep them functioning properly. Sediment shall be removed when sediment accumulation reaches one-third (1/3) of the barrier height.

Spill Prevention and Control

WM-4



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Application

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders.
- Dust Palliatives.
- Herbicides.
- Growth inhibitors.
- Fertilizers.
- Deicing/anti-icing chemicals.
- Fuels.
- Lubricants.
- Other petroleum distillates.

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

Spill Prevention and Control

WM-4

Limitations

- This BMP only applies to spills caused by the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site.

Standards and Specifications

- To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.
- Spills shall not be buried or washed with water.
- Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with the special provisions.
- Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-10, "Liquid Waste Management."
- Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.
- Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.
- Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

- Educate employees and subcontractors on what a "significant spill" is for each material they use, and what 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.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.

Cleanup and Storage Procedures

- Minor Spills
  - Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
  - Use absorbent materials on small spills rather than hosing down or burying the spill.
  - Remove the absorbent materials promptly and dispose of properly.
  - The practice commonly followed for a minor spill is:
    - Contain the spread of the spill.
    - Recover spilled materials.
    - Clean the contaminated area and/or properly dispose of contaminated materials.
- Semi-Significant Spills
  - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
  - Clean up spills immediately:
    - Notify the project foreman immediately. The foreman shall notify the Resident Engineer (RE).
    - Contain spread of the spill.
    - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials 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 shall be taken:
    - Notify the RE immediately and follow up with a written report.
    - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
    - Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
    - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
    - Notification shall first be made by telephone and followed up with a written report.
    - The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff have arrived at the job site.
    - Other agencies 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, RWQCB, etc.

Maintenance and Inspection

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

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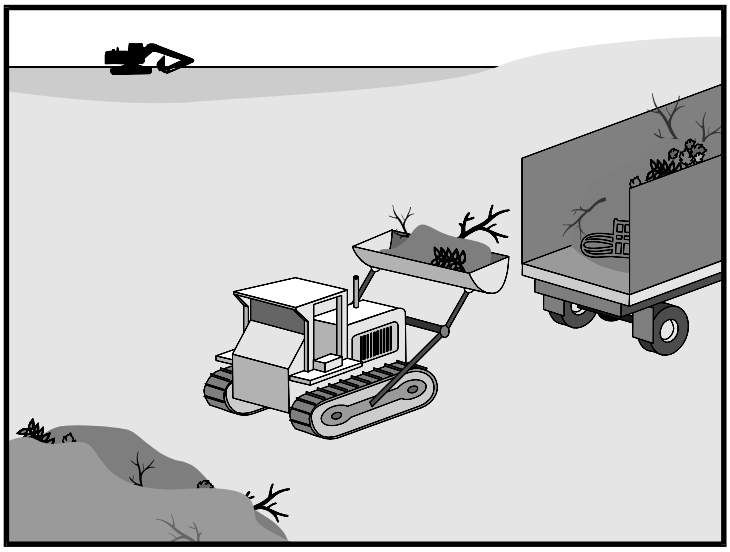
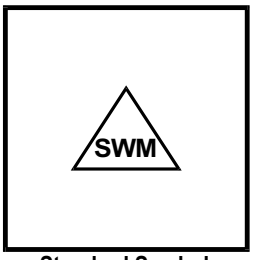
Solid Waste Management

WM-5





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

Solid wastes include but are not limited to:

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

Limitations

- 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.

Standards and Specifications

Education

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and properly serviced.
- Littering on the project site shall be prohibited.
- To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 7-1.13.
- Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
- Construction debris and waste shall be removed from the site every two weeks or as directed by the RE.

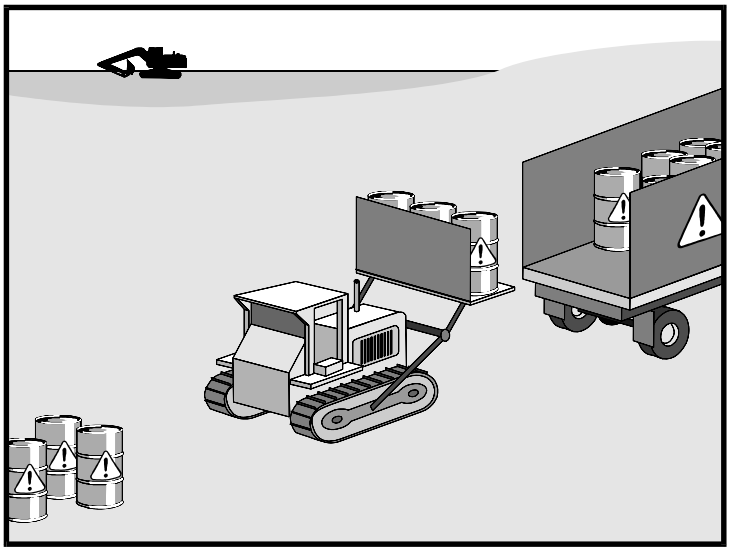
- Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the RE.
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas shall be located at least 15 m (50 ft) from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting or protected in conformance with the applicable Disturbed Soil Area protection section.
- Dumpster washout on the project site is not allowed.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Construction waste shall be stored in a designated area approved by the RE.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway Right of Way.
- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management." Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

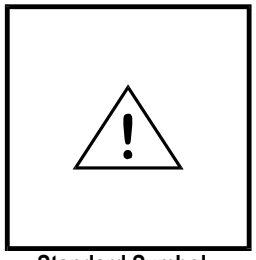
Maintenance and Inspection

- The WPCM shall monitor onsite solid waste storage and disposal procedures.
- Police site for litter and debris.

Hazardous Waste Management

WM-6





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

- This 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,
  - Asphalt Products,
  - Concrete Curing Compounds,
  - Pesticides,
  - Acids,
  - Paints,
  - Stains,
  - Solvents,
  - Wood Preservatives,
  - Roofing Tar, or
  - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

Limitations

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

Standards and Specifications

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The Contractor's Water Pollution Control Manager (WPCM) shall 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.

Storage Procedures

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

  - Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.

  - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.

  - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

  - Throughout the rainy season, temporary containment facilities shall be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.

- Drums shall not be overfilled and wastes shall not be mixed.

- Unless watertight, containers of dry waste shall be stored on pallets.

- Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

- Ensure that adequate hazardous waste storage volume is available.

- Ensure that hazardous waste collection containers are conveniently located.

- Designate hazardous waste storage areas on site away from storm drains or watercourses 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.

Disposal Procedures

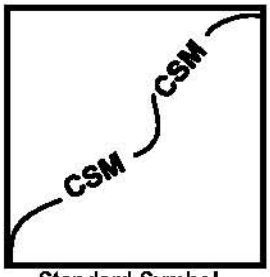
- Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE). In no case shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.
- Waste shall be disposed of by a licensed hazardous waste transporter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

Maintenance and Inspection

- A foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.
- Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Storage areas shall be inspected in conformance with the provisions in the contract documents.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- Copy of the hazardous waste manifests shall be provided to the RE.

Contaminated Soil Management

WM-7



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

Limitations

- The procedures and practices presented in this best management practice (BMP) are general. The contractor shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.

Standards and Specifications

Identifying Contaminated Areas

- Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate call-outs in the plans and specifications.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities.
  - Detected or undetected spills and leaks.
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.

- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris. Test suspected soils at a certified laboratory.

Education

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

Handling Procedures for Material with Aerially Deposited Lead (ADL)

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

Handling Procedures for Contaminated Soils

- To minimize on-site storage, contaminated soil shall be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 6626.250 to 66265.260.
- Test suspected soils at a DHS approved certified laboratory.
- If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- If temporary stockpiling is necessary:

  (1) Cover the stockpile with plastic sheeting or tarps.

  (2) Install a berm around the stockpile to prevent runoff from leaving the area.

  (3) Do not stockpile in or near storm drains or watercourses.

- Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT).
  - United States Environmental Protection Agency (USEPA).
  - California Environmental Protection Agency (CAL-EPA).
  - California Division of Occupation Safety and Health Administration (CAL-OSHA).
  - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies, which have jurisdiction over such work.
- Arrange to have tested, as directed by the Resident Engineer (RE), any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).

- The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities permitted to accept such waste.

Water Control

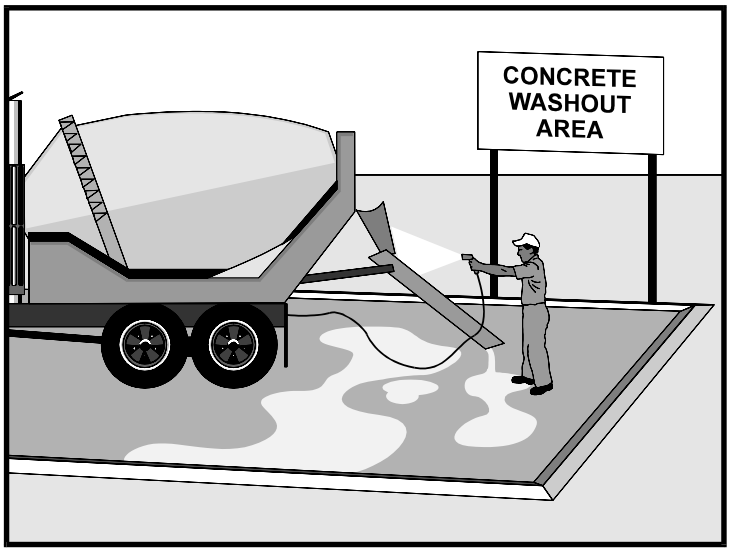
- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be dewatered consistent with BMP NS-2, "Dewatering Operations."

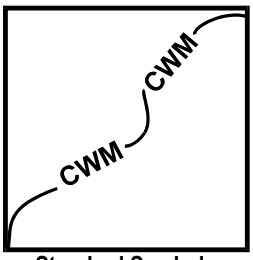
Maintenance and Inspection

- The Contractor's Water Pollution Control Manager, foreman, and/or construction supervisor shall monitor on-site contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.
- Inspect hazardous waste receptacles and areas regularly.

Concrete Waste Management

WM-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

- 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.
- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, “Vehicle and Equipment Cleaning."
- Where mortar-mixing stations exist.

Limitations

- None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The Contractor’s Water Pollution Control Manager (WPCM) shall oversee and enforce concrete waste management procedures.

Concrete Demolition Wastes

- Stockpile concrete demolition wastes in accordance with BMP WM-3, “Stockpile Management.”
- Disposal of hardened PCC and AC waste shall be in conformance with

Standard Specifications Section 7-1.13 or 15-3.02.

Concrete Slurry Waste Management and Disposal

- PCC and AC waste shall not be allowed to enter storm drainage systems or watercourses.
- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities as shown on Page 7.
- A foreman and/or construction supervisor shall monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Residue from saw cutting, coring and grinding operations shall be picked up by means of a vacuum device. Residue shall not be allowed to flow across the pavement and shall not be left on the surface of the pavement. See also BMP NS-3, "Paving and Grinding Operations."
- Vacuumed slurry residue shall be disposed in accordance with BMP WM-5, "Solid Waste Management" and Standard Specifications Section 7-1.13. Slurry residue shall be temporarily stored in a facility as described in "Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures" below), or within an impermeable containment vessel or bin approved by the Engineer.
- Collect and dispose of all residues from grooving and grinding operations in accordance with Standard Specifications Section 7-1.13, 42-1.02 and 42-2.02.

Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures

- Temporary concrete washout facilities shall be located a minimum of 15 m (50 ft) from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be installed as shown on the plans and in conformance with the provisions in Standard Specifications Section 56-2, Roadside Signs.
- Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete

materials generated during washout procedures.

- Perform washout of concrete mixers, delivery trucks, and other delivery systems in designated areas only.
- Wash concrete only from mixer chutes into approved concrete washout facility. Washout may be collected in an impermeable bag or other impermeable containment devices for disposal.
- Pump excess concrete in concrete pump bin back into concrete mixer truck.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of in conformance with the provisions in Standard Specifications Section 7-1.13 or 15-3.02.

Temporary Concrete Washout Facility Type "Above Grade"

- Temporary concrete washout facility Type "Above Grade" shall be constructed as shown on Page 6 or 7, with a recommended minimum length and minimum width of 3 m (10 ft), but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval from the RE.
- Straw bales, wood stakes, and sandbag materials shall conform to the provisions in BMP SC-9, "Straw Bale Barrier."
- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations.
- Portable delineators shall conform to the provisions in Standard Specifications Section 12-3.04, "Portable Delineators." The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement in Standard Specifications Section 85-1.06, "Placement." Portable delineators shall be applied only to a clean, dry surface.

Temporary Concrete Washout Facility (Type Below Grade)

- Temporary concrete washout facility Type "Below Grade" shall be constructed as shown on page 6, with a recommended minimum length and minimum width of 3m (10 ft). The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense,

upon approval of the RE. Lath and flagging shall be commercial type.

- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations.

- The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 7-1.13 or 15-3.02. Disposal of PCC dried residues, slurries or liquid waste shall be disposed of outside the highway right-of-way in conformance with provisions of Standard Specifications Section 7-1-13. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way in conformance with the provisions of the Standard Specifications, Section 7-1.13.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Standard Specifications Section 15-1.02, "Preservation of Property."

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site concrete waste storage and disposal procedures at least weekly or as directed by the RE.

- The WPCM shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving daily to ensure proper methods are employed or as directed by the RE.

- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 7-1.13 or 15-3.02.

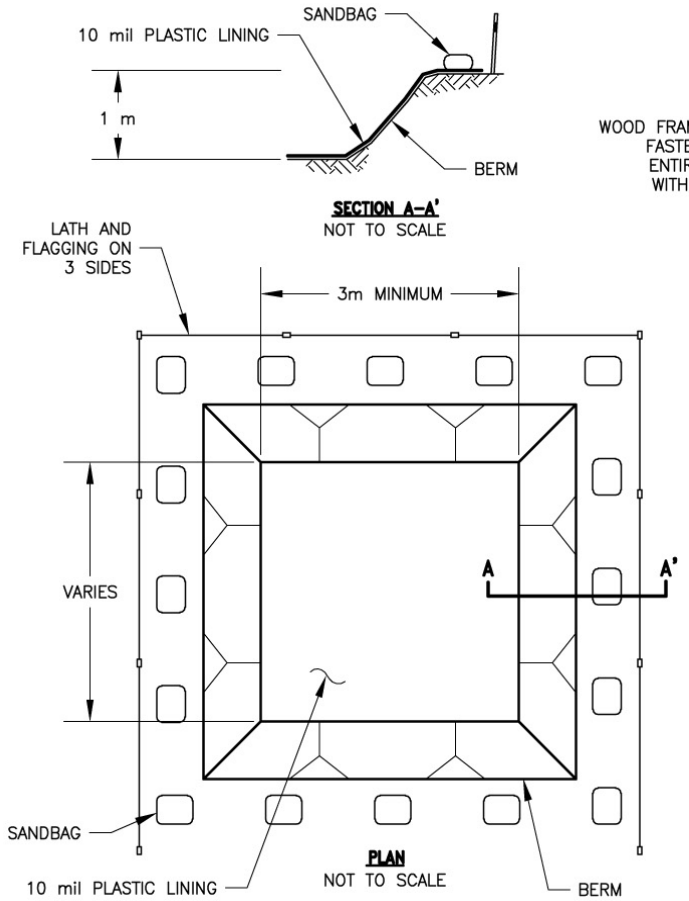
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

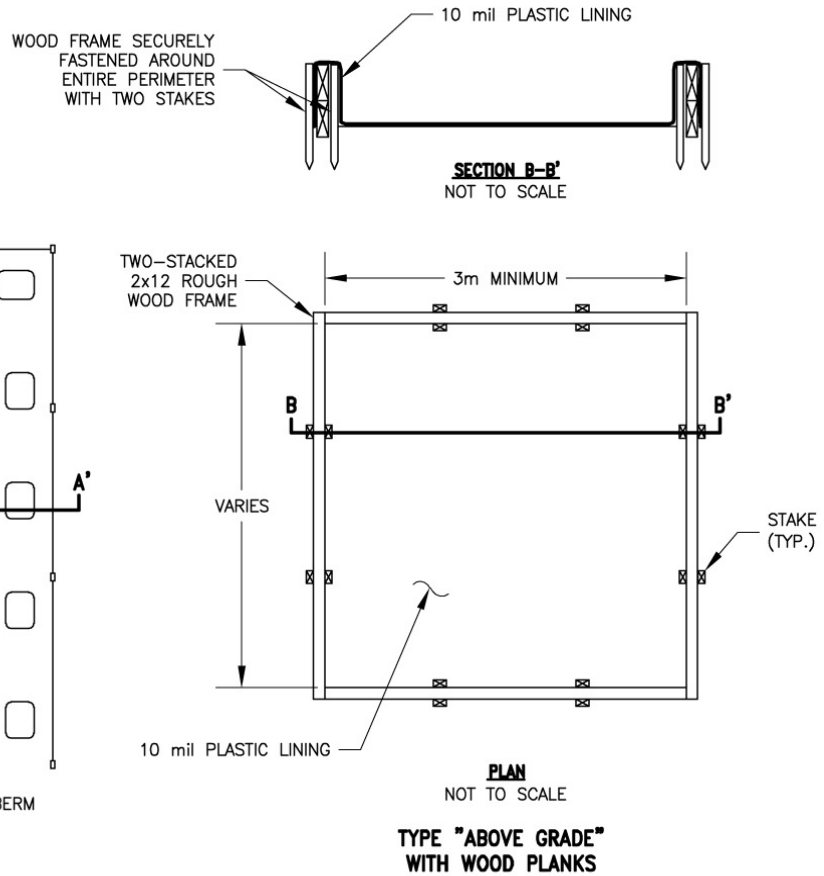
- Temporary concrete washout facilities shall be inspected for damage (i.e.

tears in polyethylene liner, missing sandbags, etc.). Damaged facilities shall be repaired.

Concrete Waste Management

WM-8

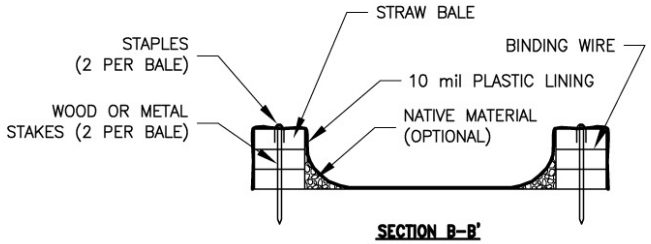




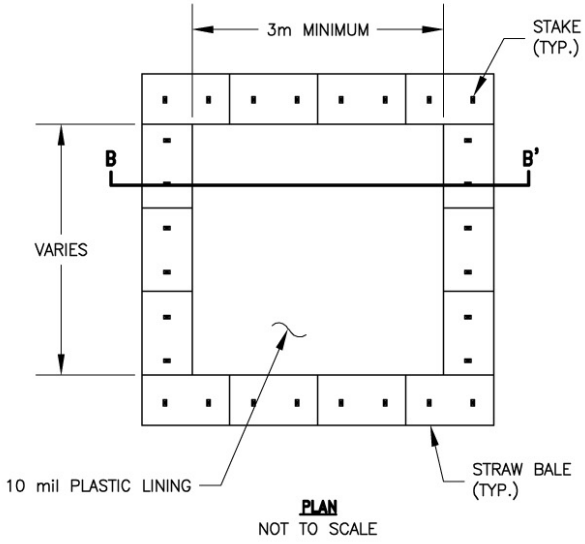
NOTES:

1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE PAGE 6) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Concrete Waste Management

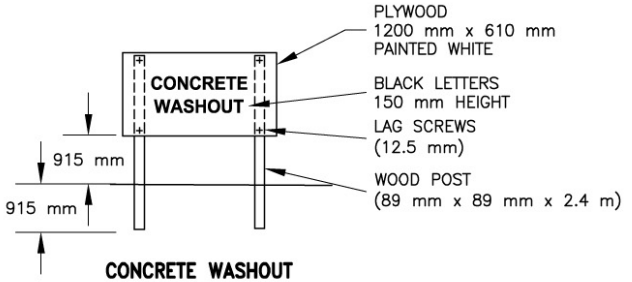


SECTION B–B'
NOT TO SCALE

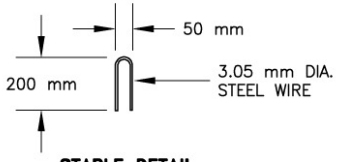


PLAN
NOT TO SCALE

TYPE "ABOVE GRADE"
WITH STRAW BALES



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)



STAPLE DETAIL

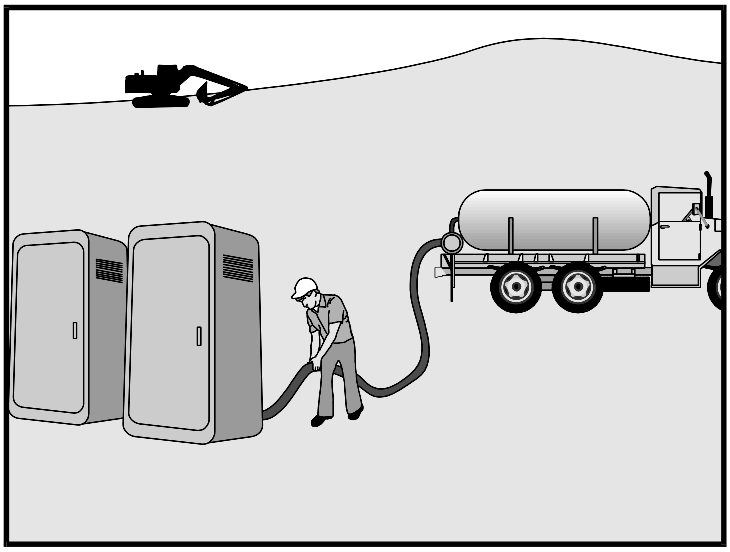
NOTES:

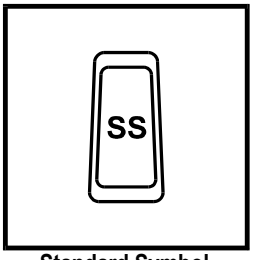
1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE FIG. 4–15) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITIY.

CALTRANS/FIG4–14.DWG SAC 8–14–02

Sanitary/Septic Waste Management

WM-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

Limitations

- None identified.

Standards and Specifications

Education

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

Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk.

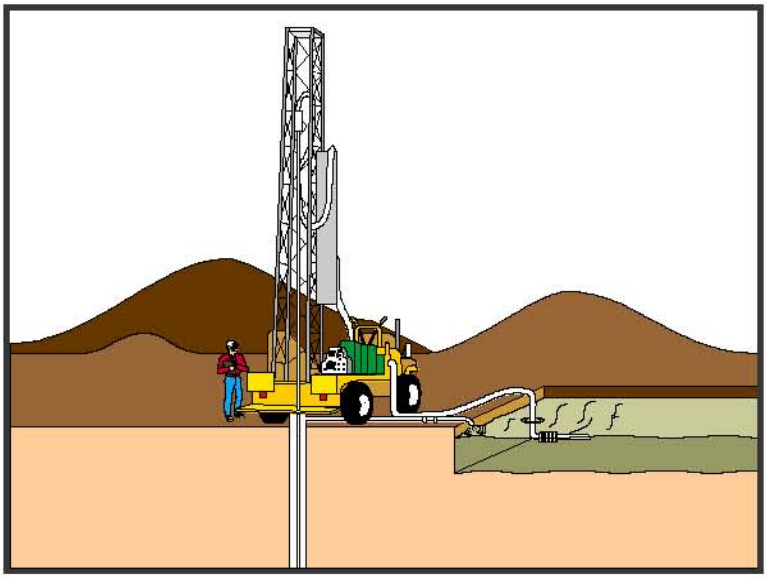
- Wastewater shall not be discharged or buried within the highway right-of-way.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.

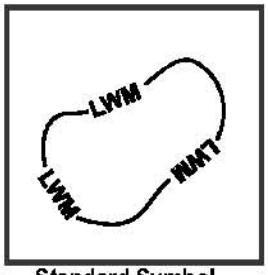
Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor onsite sanitary/septic waste storage and disposal procedures at least weekly.

Liquid Waste Management

WM-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

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

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations, or to requirements of other permits secured for the construction project (e.g., National Pollutant Discharge Elimination System [NPDES] permits, Army Corps permits, Coastal Commission permits, etc.).
- Does not apply to dewatering operations (see BMP NS-2, "Dewatering Operations"), solid waste management (see BMP WM-5, "Solid Waste Management"), hazardous wastes (see BMP WM-6, "Hazardous Waste Management"), or concrete slurry residue (see BMP WM-8, "Concrete Waste Management").
- Does not apply to non-stormwater discharges permitted by any NPDES permit held by the pertinent Caltrans District, unless the discharge is determined by Caltrans to be a source of pollutants. Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground

water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency fire fighting activities.

Standards and Specifications

General Practices

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper liquid waste management procedures and practices.
- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage structure, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities, and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the Caltrans Statewide NPDES permit; different regions might have different requirements not outlined in this permit. Some listed discharges may be prohibited if Caltrans determines the discharge to be a source of pollutants.
- Apply the NS-8, "Vehicle and Equipment Cleaning" BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and watercourses and shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 7-1.13.
- If an appropriate location is available, as determined by the Resident Engineer (RE), drilling residue and drilling fluids that are exempt under California Code of Regulations (CCR) Title 23 §2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in BMP WM-08, "Concrete Waste Management."
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.

- Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in BMP WM-4, "Spill Prevention and Control."
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

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

Disposing of Liquid Wastes

- Typical method is to dewater the contained liquid waste, using procedures such as described in BMP NS-2, "Dewatering Operations", and BMP SC-2, "Sediment/Desilting Basin"; and dispose of resulting solids per BMP WM-5, "Solid Waste Management", or per Standard Specifications Section 7-1.13, "Disposal of Material Outside the Highway Right of Way", for off-site disposal.
- Method of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 Water Quality Certifications or 404 permits, local agency discharge permits, etc., and may be defined elsewhere in the special provisions.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management."
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Maintenance and Inspection

- Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in BMP WM-5, "Solid Waste Management."
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.