APPENDIX 8.14B

Construction SWPPP

Appendix 8.14B
Administrative Draft

Vernon Power Plant Construction Drainage, Erosion, and Sediment Control/ Stormwater Pollution Prevention Plan

Prepared for

City of Vernon

June 2006

CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA95833

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Administrative Draft

Vernon Power Plant Construction Drainage, Erosion, and Sediment Control/ Stormwater Pollution Prevention Plan

Submitted to

City of Vernon

CH2MHILL

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SECTION 1

Introduction

1.1 Objectives

This Stormwater Pollution Prevention Plan[1] (SWPPP) was developed to address the new construction activity associated with the City of Vernon's Power Plant (VPP). As required by the State Water Resources Control Board (SWRCB), this SWPPP was developed and will be amended or revised, when necessary, to meet the following objectives:

- Identify all pollutant sources, including sources of sediment, associated with construction activity that may affect the quality of stormwater discharges from the construction site;
- Identify non-stormwater discharges;
- Identify and provide the information necessary to install Best Management Practices (BMPs) to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction; and
- Develop a maintenance schedule for BMPs installed during construction.

1.2 Project Overview

The City of Vernon proposes to develop a natural-gas-fired generating facility in the south-central portion of the City (see Figure 1-1; other figures are located at the end of the section) in Los Angeles County (County), California. The proposed VPP will be a high-efficiency, combined-cycle facility that will be integrated into the City's plans to meet its growing native load, and provide other ancillary services and benefits to Vernon, Los Angeles County, and southern California.

Figure 1-2 shows the proposed routes for the sewer line, gas line, transmission lines, and an alternative transmission line route that could connect the project to the Laguna Bell substation owned by SCE, and the project location. The plant site would occupy 13.7 acres at the corner of Boyle and Fruitland avenues. An additional 13.3 acres would be available for equipment laydown and construction parking immediately south of the plant site. After

[1] In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollution Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which established a framework for regulating municipal and industrial stormwater discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that establish stormwater permit application requirements for specified categories of industries. The regulations provide that discharges of stormwater to waters of the United States from construction projects that encompass five (5) or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES Permit. While federal regulations allow two permitting options for stormwater discharges (individual permits and General Permits), the California State Water Resources Control Board elected to adopt only one statewide General Permit that (with few exceptions) apply to all stormwater discharges associated with construction activity, upon submittal of a Notice of Intent to comply, certain fees and a Stormwater Pollution Prevention Plan. The SWPPP must be kept onsite during construction and made available upon request by a representative of the Regional Water Quality Control Board or local agency.

construction, the 13.3 acres would be available for future use or development as determined by the City of Vernon. A site plan is presented in Figure 1-3. Primary access to the site will be from Fruitland Avenue with a secondary access from Boyle Avenue.

Presently, the site is occupied by a large building and parking lot. Under a purchase agreement between the City of Vernon and the property owner, the property owner will be responsible for removing all existing buildings and structures (with the exception of the existing perimeter concrete wall).

The generating facility will consist of three CTGs equipped with ultra-low NO_x combustors; three heat recovery steam generators (HRSGs) with duct burners; one condensing STG; a deaerating surface condenser; a 14-cell mechanical-draft cooling tower; and associated support equipment providing a total nominal generating capacity of 914 MW net (at average annual ambient conditions of 65°F and 60 percent relative humidity, [RH]). The combustion turbines will be Siemens SGT6-5000F (formally Siemens Westinghouse 501F) units. The project will include an electric auxiliary boiler, but will not include a standby generator or black start capability.

Two options are being considered for connecting the plant to the Southern California Edison's (SCE) Laguna Bell Substation: River Route and Randolph Route. The River Route exits the site to the east, crosses Alcoa Avenue, and approaches the LADWP right-of-way. It continues by crossing the LADWP right-of-way and turning north on an easement on the east side of the LADWP right-of-way. It then proceeds east between the south side of the Leonis Substation and the north side of the Fire Station to the west side of Downey Road. On the west side of Downey Road, it heads north to District Boulevard and proceeds east where it follows the Los Angeles River south to Randolph Street. On Randolph Street the line turns east to Laguna Bell Substation. The Randolph Route also exits the site on the east and crosses to the east side of Alcoa Avenue. It heads south on Alcoa Avenue to Randolph Street, then heads east along Randolph Street to the Laguna Bell Substation.

Natural gas for the facility will be delivered to the site by the City via approximately 2,300 feet of new 24-inch pipeline that will connect to Southern California Gas' (SoCalGas') existing pipeline (Line 765) at the intersection of East 50th Street and South Downey Road (Figure 1-2).

Recycled water for the VPP's process and cooling water, and equipment wash water, will be supplied by the Central Basin Municipal Water District (CBMWD). The recycled water supply will be pumped to a 2 million-gallon recycled water storage tank. The project proposes to use potable water from the City of Vernon for all potable, plant service, and fire protection needs. The project will also use potable water as an emergency water supply should the recycled water supply be disrupted for longer than 8 hours.

Because the site is currently in use with an existing stormwater collection system, the volume and rate of runoff from the project site would not be substantially altered as a result of project development. Post-construction stormwater treatment will be designed to capture stormwater runoff in a series of drainage inlets that would convey runoff to a stormwater detention basin, if required, prior to discharge into the LACDPW storm drain system. Figure 1-4 shows the post-construction runoff and drainage patterns.

1.3 Implementation Schedule

Construction would take place over approximately 24 months, from the third quarter 2007 to third quarter 2009. Plant testing is planned to occur during the second quarter of 2009, and commercial operation is expected to commence in the third quarter 2009. Major milestones are listed in Table 1.3-1.

TABLE 1.3-1
Project Schedule Major Milestones

Activity	Date
Begin Construction	Third Quarter 2007
Startup and Test	Second Quarter 2009
Commercial Operation	Third Quarter 2009

Total construction personnel requirements for both the plant and linear facilities will be an average of 266 workers per month for 24 months, with a peak total work force of 499 during month 16. The peak construction workforce for the plant is estimated to be 470 workers in months 15 and 16, and the peak construction work force for the linear facilities will reach 29 during month 16.

Construction will be scheduled to occur between 7:00 a.m. and 5:30 p.m. on weekdays and Saturdays. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities will continue 24 hours per day, 7 days per week.

The peak construction site workforce level is expected to last from Month 11 through Month 17 of the construction period, with the peak being Month 16.

During construction, approximately 13.7 acres of land associated with the plant site and other facilities will be disturbed. In addition, an additional 13.3 acres would be disturbed for the construction laydown and worker parking areas. Surface water impacts are anticipated to be related primarily to short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts. Best management practices (BMPs) for erosion control will be implemented. Additionally, erosion and sediment controls, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the NPDES Construction Permit issued statewide by the State Water Quality Control Board and local agency requirements.

The construction phases of the VPP Project as they pertain to stormwater management are expected to be as follows:

- **Site Disturbance**—Demolition of the structures on the project site is not a part of this project; therefore this SWPPP does not address the demolition aspect. A separate SWPPP will be prepared by the demolition contractor before the demolition takes place. After demolition occurs the project areas available for parking and construction laydown will comprise approximately 13.3 acres.
- **Preparation**—Parking areas for construction workers and laydown areas for construction materials will be prepared on 13.3 acres, immediately south of the site. Detailed information regarding the location of the laydown and parking areas will be developed after a contractor is hired, and incorporated into the SWPPP as appropriate.
- **Access Road**—Primary access to the site will be from Fruitland Avenue. Secondary access is from Boyle Avenue. A stabilized entrance/exit will be provided to clean vehicle wheels at both the plant site and construction laydown areas.
- **Site Grading**—Site grading for parking and the construction laydown area will have already occurred subsequent to the demolition of the existing structures. After demolition, portions of the exposed site will be filled (as necessary) and graveled to provide all weather use and further minimize soil erosion potential. Heavy equipment will be stored on dunnage to protect it from ground moisture. Once construction is complete, the gravel will be removed. No re-grading will be necessary.
- **Foundation**—All underground piping and wiring will be installed, followed by installation of the foundation for the new generating facility and associated structures. Post-construction treatment of stormwater will be accomplished by directing stormwater to a detention pond via drainage inlets.
- **Plant Construction**—After final site design and prior to construction, the Applicant will be required to finalize the Drainage, Erosion and Sediment Control Plan (DESCP)/Construction SWPPP (this document). During construction, the Applicant will be required to follow the DESCP/SWPPP to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the DESCP/SWPPP; the DESCP/SWPPP will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.
- **Site Stabilization**—Permanent stormwater management fixtures will replace any temporary items at the end of project construction.
- **Demobilization**—All temporary construction facilities will be removed. Permanent stormwater controls will then be in effect.

A Notice of Intent (NOI) to comply with the terms of the General Permit to Discharge Stormwater associated with Construction Activity will be prepared and submitted prior to the commencement of construction (Appendix A). Any necessary revisions to the SWPPP will be prepared in a timely manner. The SWPPP will be amended whenever there is a change in construction or operations that may affect the discharge status of pollutants. Once

construction activities have been concluded, a Notice of Termination will be submitted to the Regional Board and this Construction SWPPP will no longer be in effect.

1.4 Plan Availability

The SWPPP will remain on the construction site while the project is under construction during working hours, commencing with the initial construction activity and ending with termination of coverage under the General Permit (Appendix I). A copy of the California General Permit also will be maintained on the construction site. The SWPPP will be provided to the Regional Board upon request, and be made available to the public only through the Regional Board.

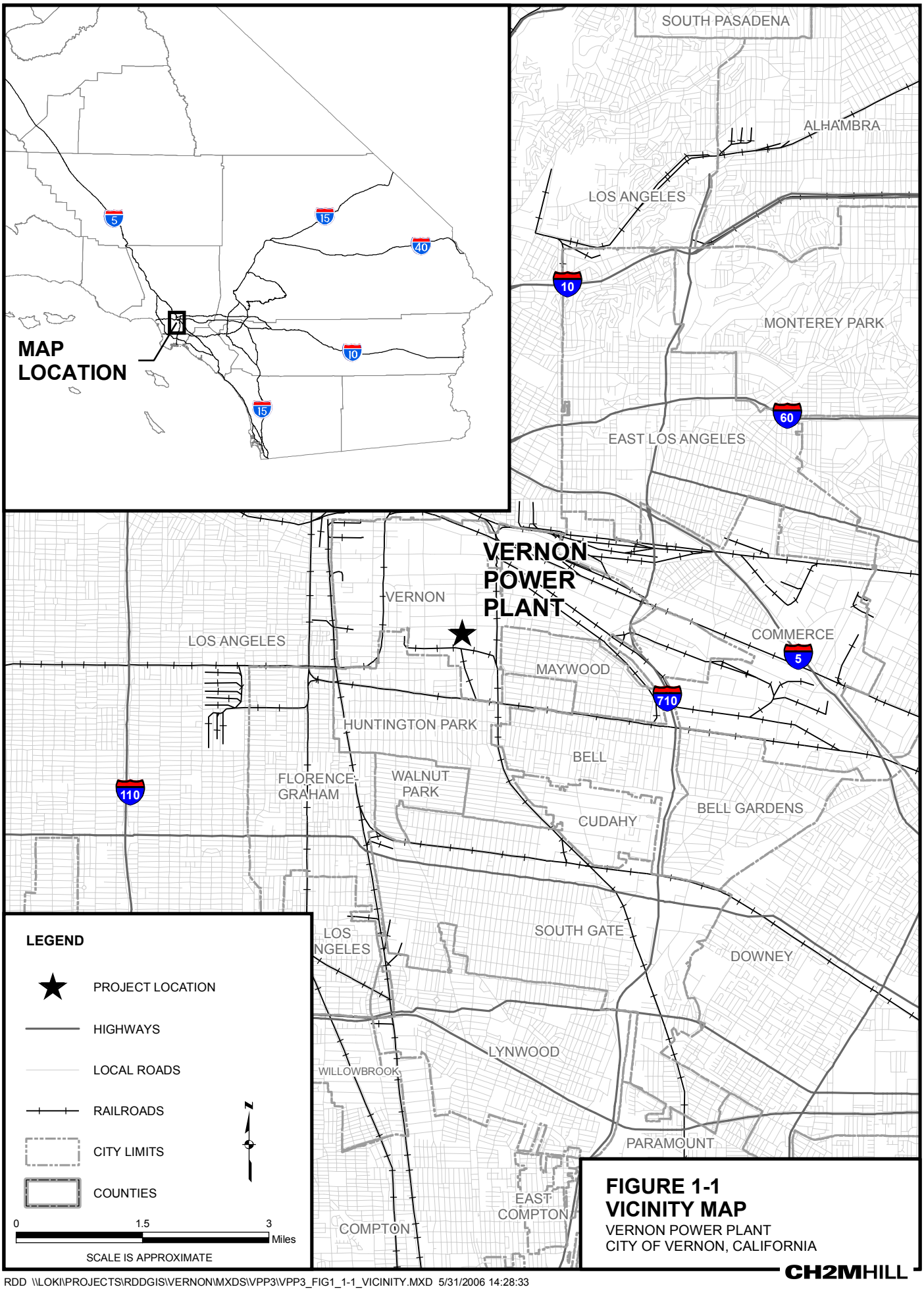

FIGURE 1-1
VICINITY MAP
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

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RDD \\LOKI\PROJECTS\RDDGIS\VERNON\MXDS\VPP3\VPP3_FIG1_1-1_VICINITY.MXD 5/31/2006 14:28:33

PROJECT LOCATION

LEGEND

- VERNON POWER PLANT
- LAGUNA BELL SUBSTATION
- PROPOSED NATURAL GAS LINE
- PROPOSED SEWER LINE
- TRANSMISSION LINE - RANDOLPH ROUTE
- TRANSMISSION LINE - RIVER ROUTE

0 1,500 3,000 Feet

SCALE IS APPROXIMATE

FIGURE 1-2
VPP SITE AND LINEAR FACILITIES LOCATION MAP

VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

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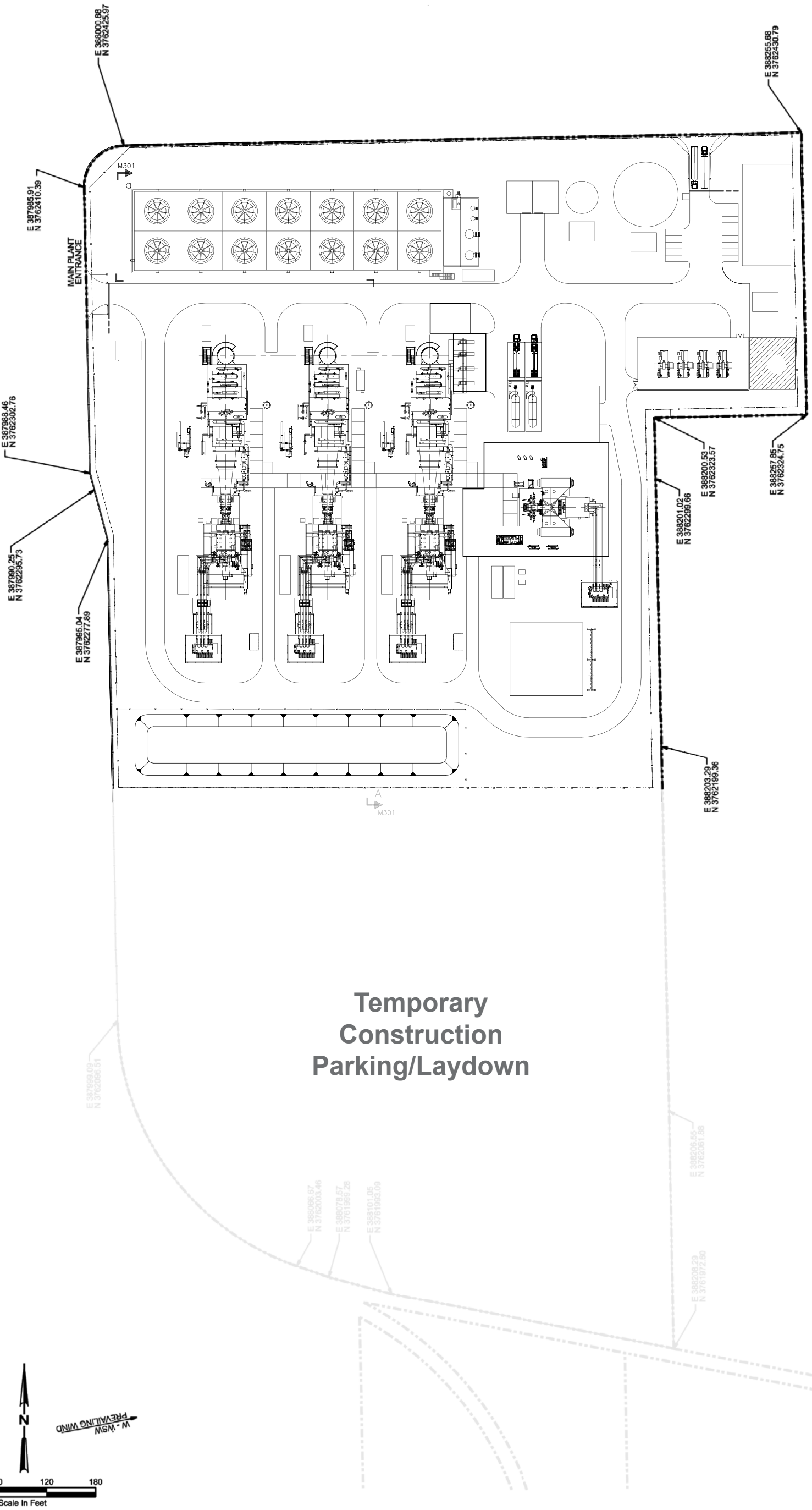

FIGURE 1-3
SITE PLAN
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

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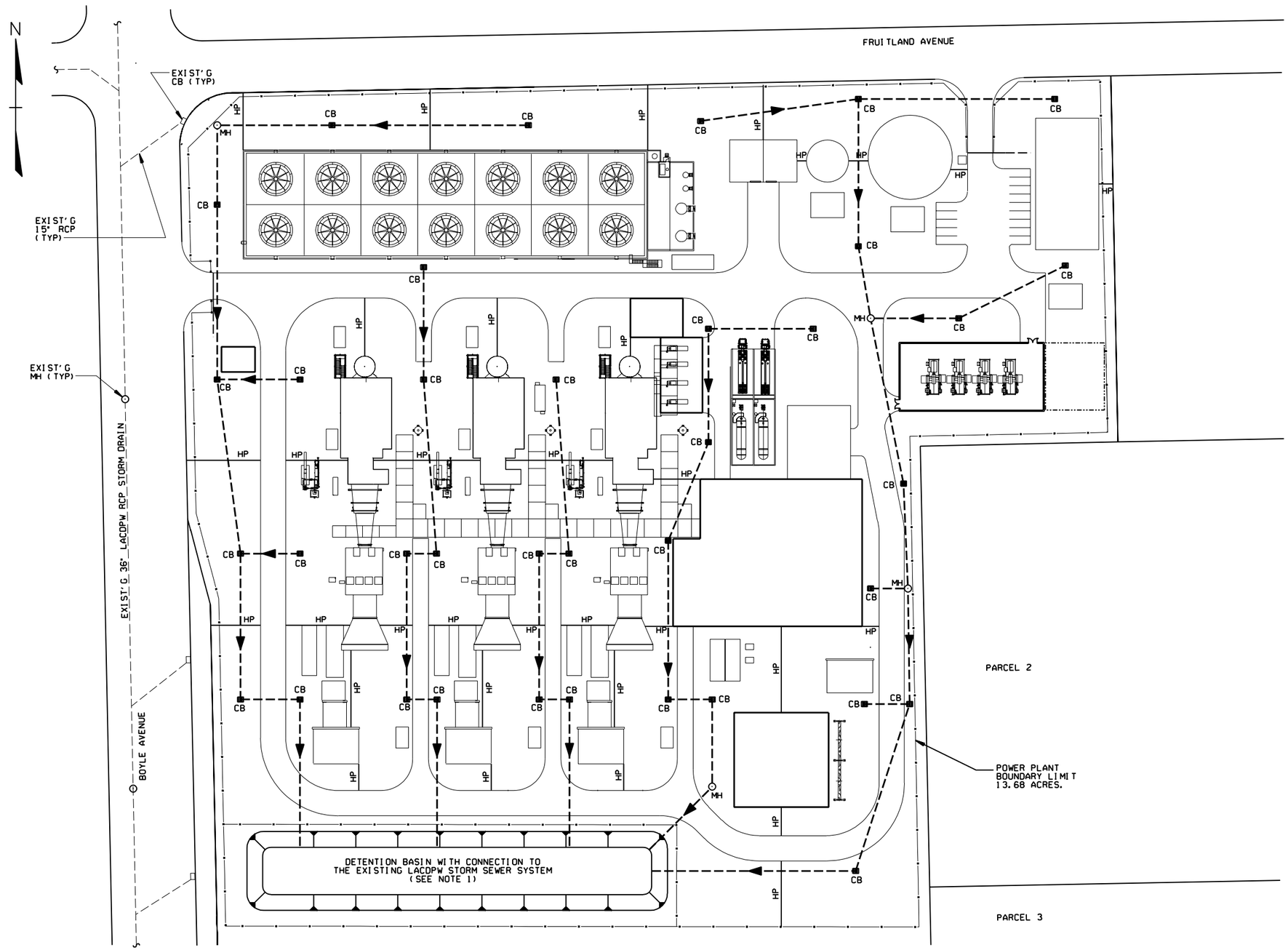


NOTES

1. PLANT STORM WATER DRAINAGE SYSTEM REQUIREMENTS

A. THE PLANT STORM DRAINAGE SYSTEM SHALL BE DESIGNED IN ACCORDANCE WITH LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS (LACDPW) FLOOD CONTROL DISTRICT REQUIREMENTS, INCLUDING THE LACDPW HYDROLOGY MANUAL AND ALL ADDENDUMS. AN LACDPW FLOOD PERMIT APPLICATION SHALL BE OBTAINED FOR CONNECTION TO THE EXISTING LACDPW STORM SEWER SYSTEM, AND SHALL INCLUDE ALL REQUIRED HYDROLOGY CALCULATIONS, HYDRAULIC CALCULATIONS AND CONSTRUCTION DRAWINGS.

B. STORM WATER FLOW INTO THE EXISTING LACDPW STORM SEWER SYSTEM SHALL BE LIMITED TO THE FLOW RATES SPECIFIED BY LACDPW. EXISTING LACDPW STORM SEWER SYSTEMS ARE LOCATED ALONG BOYLE AVENUE, ADJACENT TO THE PROJECT, AND ALONG ALCOA AVENUE (LOCATED APPROXIMATELY 1200 FEET EAST OF BOYLE AVENUE).

C. A STORM WATER DETENTION BASIN SHALL BE PROVIDED, AS REQUIRED, TO LIMIT STORM WATER FLOW INTO THE LACDPW STORM SEWER SYSTEM TO THE LACDPW SPECIFIED FLOW RATES. CONNECTION TO THE EXISTING LACDPW STORM SEWER SYSTEM SHALL BE IN ACCORDANCE WITH APPLICABLE LACDPW REQUIREMENTS.

D. THE PLANT STORM DRAINAGE SYSTEM SHALL ALSO BE DESIGNED IN ACCORDANCE WITH THE LOS ANGELES COUNTY STANDARD URBAN STORM WATER MITIGATION PLAN (SUSMP) TO CONTROL STORM WATER POLLUTION. STRUCTURAL OR TREATMENT CONTROL BEST MANAGEMENT PRACTICES (BMP'S) SHALL BE INSTALLED TO TREAT STORM WATER IN ACCORDANCE WITH SUSMP REQUIREMENTS.

2. FOR PLANT EQUIPMENT DESIGNATION AND LOCATIONS SEE FIGURE 2.2-1.

LEGEND

- STORM DRAIN LINE
- CATCH BASIN INLET
- MANHOLE
- HP HIGH POINT

GRAPHIC SCALE
0 25' 50' 100' 150'

FIGURE 1-4
CONCEPTUAL DRAINAGE PLAN
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

Source: Burns and Rowe, Dwg. No. C200, Rev. B.

SECTION 2

Site Description

2.1 Site Description and Project Activity

This section describes the facility's conceptual design and proposed operation.

2.1.1 Site Arrangement and Layout

The site plan on Figure 1-4 and typical elevation views on Figure 2-1 illustrate the location and size of the proposed generating facility. The proposed transmission line, alternate transmission line, gas pipeline, and sewer line are shown in Figure 1-2.

The site is located in an industrial area in the City of Vernon, in Los Angeles County. Site features include the generating facility, electric transmission lines, natural gas supply pipeline, recycled water supply pipeline, and potable water supply line.

The new power plant will be a 914-megawatt (MW) net (at 65 degrees Fahrenheit [°F] with duct burners and evaporative cooling)/943-MW (gross) combined-cycle generating facility configured using three natural-gas-fired combustion turbines and one steam turbine. The VPP will connect to the electrical transmission system via new double-circuit 230-kilovolt (kV) line that will connect to Southern California Edison's (SCE) Laguna Bell Substation. Natural gas for the facility will be delivered via approximately 2,300 feet of new 24-inch pipeline that will connect to Southern California Gas Company's (SoCalGas) existing gas transmission line (Line 765). The project will include an onsite fuel gas compressor station.

The VPP will be located on land at the southeast corner of Fruitland and Boyle avenues. The City has executed a purchase agreement for the property. The existing facility will be demolished in 2007. The project site will consist of approximately 13.7 acres. Construction parking and equipment laydown will be located on 13.3 acres immediately south of the plant site. Access to the site will be from Fruitland Avenue. Part of the power block will be paved to provide internal access to all project facilities and onsite buildings. The areas around equipment, where not paved, will have gravel surfacing. The 230-kV transmission lines will run from the project site to the existing SCE Laguna Bell substation via one of two optional routes. Both of these routes will be of less than 5 miles in length. The route options for the 230-kV transmission line are shown in Figure 1-2.

2.1.2 Major Electrical Equipment and Systems

The bulk of the electric power produced by the facility will be transmitted to the grid. A small amount of electric power will be used onsite to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. Some power will also be converted from alternating current (AC) to direct current (DC), which will be used as backup power for control systems and other uses.

2.1.3 Fuel System

The CTGs will be designed to burn natural gas only. The natural gas requirement during base load operation at annual average ambient temperature is approximately 5,295 million British thermal units per hour (MMBtu/hr) (LHV basis, total for three CTG units). The maximum natural gas requirement, experienced during low ambient temperature operation, is approximately 5,571 MMBtu/hr (LHV basis).

2.1.4 Offsite Linear Descriptions and Project Activity

2.1.4.1 Transmission System

The proposed interconnection between VPP and the LADWP transmission system would consist of the following major facilities:

- New 230-kV double-circuit overhead lines extending approximately 1,000 feet from the VPP switchyard looping the existing two Century-Velasco 230-kV transmission lines from the existing LADWP right-of-way into the VPP switchyard (Figure 5.1-2, Link 1)
- A new 230-kV onsite switchyard at VPP using a breaker-and-a-half bus configuration
- Modifications in the Velasco and Century substations to add protective control devices

The two double circuits of the transmission interconnection would exit the VPP switchyard area at a structure near the northeast corner of the switchyard. The line would proceed in an easterly direction approximately 550 feet to the west side of Alcoa Avenue. From that point the interconnection will angle to the southeast across Alcoa Avenue approximately 150 feet. From there the interconnection will proceed 350 feet east to the centerline of the existing double-circuit Century-Velasco 230-kV transmission lines.

It is anticipated that the new segment of the transmission interconnection from the VPP switchyard to the existing LADWP Century-Velasco right-of-way will occupy a new right-of-way or easement appropriately specified to accommodate the interconnection. The preferred location of this easement or right-of-way is between 5233 and 5383 Alcoa and across the parking lot of 5400 Alcoa.

2.1.4.2 Natural Gas Pipeline

Natural gas will be provided to the City of Vernon from a Southern California Gas Company (SoCalGas) transmission pipeline (Line 765), located east of the Project site at South Downey Road. A new connection to Line 765 will be constructed to a new city gate meter adjacent to Fruitland Regulator Station. From the city gate meter, a new 24-inch-diameter pipeline will be constructed along E. 50th Street, Alcoa Avenue and Fruitland Avenue to the VPP site. At the plant site, the natural gas will flow through a flow-metering station, gas scrubber/filtering equipment, a gas pressure control station, electric driven booster compressors (when required), and a fuel gas heater prior to entering the combustion turbines. “Will serve” letters from the City of Vernon and SoCalGas are provided in Appendix 6A.

Construction primarily will be open trench. The natural gas pipeline will be constructed with a minimum of one crew working continuously along the road right-of-way (franchise) or pipeline ROW, with construction of the entire pipeline requiring a peak workforce of

approximately 14 workers. Workers will park their vehicles in the construction parking area at the VPP site or along the ROW. The ROW will be accessed over existing roads. Most major pieces of construction equipment will remain along the ROW during construction. Besides providing worker parking, the VPP site will serve as the location for storing pipe and other pipeline construction materials. Additional storage locations will be in existing paved areas along the pipeline route. Pipeline construction will take approximately 4 months and is expected to begin toward the end of the first year following the start of project construction.

During construction along the roadway, one lane would be blocked and traffic control would be required. Excavated earth material would be stored on the side of the road. When work is not in progress, a trench plate would cover the exposed trench so that traffic can proceed in both lanes. If necessary, additional material-storage locations may be located along the ROW. The line pipe will be of alloyed carbon steel in accordance with the American Petroleum Institute (API) specification for line pipe. The pipe will have factory-applied corrosion protection coating. Joints would be welded and inspected using x-ray.

The construction of the natural gas pipeline will consist of the following:

1. **Trenching-**width depends on the type of soils encountered and requirements of the governing agencies. The optimal trench will be approximately 36 inches wide and 5 to 10 feet deep depending on the location of existing utilities in the road, especially at the intersection of Fruitland and Alcoa avenues. With loose soil, a trench up to 8 feet wide at the top and 3 feet wide at the bottom may be required. The pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil will be piled on one side of the trench and used for backfilling after the pipe is installed. The pipeline will be installed through trenching at all locations.

2. **Stringing** consists of trucking lengths of pipe to the ROW and laying them on wooden skids beside the open trench.

3. **Installation** consists of bending, welding, and coating the weld-joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench. Bends will be made using a cold bending machine or shop-fabricated as required for various changes in bearing and elevation. Welding will meet the applicable API standards and will be performed by qualified welders. Welds will be inspected in accordance with API Standard 1104. Welds will undergo 100 percent radiographical inspection by an independent, qualified radiography contractor. All coating will be checked for holidays (i.e., defects) and will be repaired before lowering the pipe into the trench.

4. **Backfilling** consists of returning spoil back into the trench around and on top of the pipe, ensuring that the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.

5. **Plating** consists of covering any open trench in areas of foot or vehicle traffic at the end of a workday. Plywood plates will be used in areas of foot traffic and steel plates will be used in areas of vehicle traffic to ensure public safety. Plates will be removed at the start of each workday. Efforts will be made to minimize the length of open trench along the ROW.

6. **Boring/Horizontal Directional Drilling (HDD)** method may be used for moderately short crossings under roads, canals, sensitive habitats, or where it would be environmentally unsound to use the open-cut method. Boring pits will be dug on each side of the crossing. The HDD method may be used when a longer crossing is required.
7. **Hydrostatic testing** consists of filling the pipeline with fresh water, venting all air, increasing the pressure to the specified code requirements, and holding the pressure for a period of time. Stainless steel piping will tested with demineralized water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in until the water treatment plant is operational. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the sanitary sewer system under permit from the Sanitation Districts of Los Angeles County (LACSD), unless the analysis shows that the water is contaminated. In which case the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction contractor, as required.
8. **Cleanup** consists of restoring the surface of the roadway or ROW by removing any construction debris, grading to the original grade and contour, and revegetating or repairing where required.
9. **Commissioning** consists of cleaning and drying the inside of the pipeline, purging air from the pipeline, and filling the pipeline with natural gas.
10. **Safety** consists of using SoCalGas' standard safety plan for the project, or if constructed by others, the contractor will prepare a safety plan. These plans would addresses specific safety issues, traffic control, working along traveled county streets, and other areas, as required by permits.

A gas-metering station will be required at the VPP site to measure and record gas volumes. In addition, facilities will be installed to regulate the gas pressure and to remove any liquids or solid particles. The metering station will require a minimum area of approximately 50 feet by 150 feet.

Construction activities related to the metering station will include grading a pad and installing above- and belowground gas piping, metering equipment, gas conditioning, pressure regulation, and possibly pigging facilities. A distribution power line for metering-station-operation lighting, communication equipment, and perimeter chain-link fencing for security will also be installed.

2.1.4.3 Recycled Water Supply Pipeline and Potable Water Supply Pipeline

Recycled Water. Recycled water, supplied by the Central Basin Municipal Water District (CBMWD), will be used for cooling and industrial processes. Potable water for drinking, safety showers, service water, fire suppression and sanitary uses will be provided from the City of Vernon's potable water system. The water requirements for VPP are approximately 6,266 acre-feet of water per year (afy) (see Table 2-1.1). Instantaneous peak water use is based on full plant output at ambient conditions of 105°F and 35 percent relative humidity. Most of the water used would be for cooling.

TABLE 2-1.1
Daily and Annual Water Use for VPP Operations

Water Use	Water Source	Daily Use (gpm[a])		Annual Use (afy[b])
		Average	Peak	
Recycled Water	Central Basin Municipal Water District	3,885	5,000	6,266
Potable Water	City of Vernon	0.21	30	0.34

[a] gpm = gallons per minute

[b] afy = acre-feet per year (based on an annual operation of 8,760 hours/year at full plant output)

All water demands for cooling and other industrial processes would be met by recycled water, supplied by Central Basin Municipal Water District (CBMWD), which is highly treated and disinfected to meet the requirements specified in Title 22 of the California Code of Regulations. The Title 22 recycled water will be primarily used for the cooling tower (roughly 96 percent of water consumption). Treated recycled water also will be used for evaporative cooling of air entering the gas turbines and makeup water for the Heat Recovery Steam Generators (HRGSs).

Currently, the primary use of CBMWD recycled water supply is landscape irrigation, accounting for approximately 66 percent of total use. The CBMWD Urban Water Management Plan anticipates the percentage of industrial users to increase, primarily as a result of the Malburg Generating Station (MGS) and VPP projects. CBMWD and the City of Vernon have entered into an agreement for the purchase and use of up to 13,500 afy of recycled water (Agreement No. 05-130). This agreement addresses planned improvements to the CBMWD recycled water conveyance system.

Potable Water. The source of water for construction-related activities such as dust control, soil compaction, and concrete curing will be potable water supplied by the City of Vernon. The other possible water supply considered for construction was recycled water from CBMWD. The use of potable water is preferred over CBMWD's recycled water because sufficient recycled water will not available until the Southeast Water Reliability Project is completed.

The amount of water used for dust and erosion control is anticipated to be 87 acre-feet during the construction period, and the amount of water for equipment washing is expected to be 0.07 acre-feet during the construction period. Prior to plant start-up, additional water (estimated to be 0.34 acre-feet) will be used for hydrostatic testing.

Potable water for drinking, safety showers, fire protection water, service water, and sanitary uses will be provided from the City of Vernon's potable water system using existing water lines in Boyle and Fruitland avenues. Potable water use is included in Table 2-1.1, above. In addition, potable water will be used as an emergency supply for cooling and other industrial uses should the recycled water supply be interrupted for longer than 8 hours. The onsite storage capacity for recycled water will accommodate 8 hours of uninterrupted plant operations once recycled water from CBMWD is unavailable. Therefore, use of potable water for industrial purposes would only occur if recycled water is unavailable for periods longer than 8 hours.

Based on review of aerial photographs and field surveys, there are no active commercial agricultural uses within the proposed VPP site; however, there are limited agricultural uses

in the project vicinity. One of these agricultural sites is within the LADWP transmission line corridor between Fruitland Avenue and East 50th Street. Another agricultural site is within the SCE transmission line corridor about 1,300 feet north of the Laguna Bell Substation, between the Union Pacific Railroad tracks and East Slauson Avenue (see Figure 2-5).

Once a final design has been established, the selected contractor will prepare site maps showing the construction project in detail. Site conditions, including paved areas, buildings, lots and roadways, general topography and drainage patterns for stormwater collection will be shown for the following phases of construction:

- **Existing Site Topography**—A plan showing existing site topography and drainage will be prepared.
- **Conceptual Rough Grading**—A plan with figures for interim grading and erosion control will be prepared. It will show the temporary onsite drainage patterns to be established by the grading of the project site, as well as any necessary erosion control features.
- **Stabilized Site**—A detailed finish grading and drainage plan with figures will be prepared showing the final conditions of the site as constructed.
- **Finished Project**—A conceptual image of the VPP facility (Figure 2-2), shows the completed generating facility.

2.2 Vegetation and Soils

Agricultural production land is very limited in this area. The proposed VPP site is located in an urban area of the Los Angeles Basin that is dominated by industrial/commercial land uses and these uses are found on the properties immediately surrounding the proposed VPP site. Densely developed residential areas are located approximately 2,000 to 2,500 feet east and southwest from the proposed VPP site in the cities of Huntington Park and Maywood.

Based on review of aerial photographs and field visits, there are no active commercial agricultural uses within the proposed VPP site; however, there are limited agricultural uses in the project vicinity. One of these agricultural sites is within the LADWP transmission line corridor between Fruitland Avenue and East 50th Street. Another agricultural site is within the Southern California Edison (SCE) transmission line corridor about 1,300 feet north of the Laguna Bell Substation, between the Union Pacific Railroad tracks and East Slauson Avenue (Figure 2-5).

One of the proposed transmission line routes (i.e., River Route) would run along the east side of the parcel just north of Fruitland Avenue. It is expected that construction of the overhead transmission facilities in this area can be done in a manner (timing and methods) that would avoid direct impacts to agricultural activities at this location. There will be no impacts to the agricultural parcel located to the north of the Laguna Bell substation.

Soil survey mapping units characterizing the types and distribution of soils within the project area, as shown on Figure 2-4, are taken from: *Report and General Soil Map, Los Angeles County, California* (NRCS 2002). These mapping units were scanned from the general soil

map. Detailed soil descriptions were developed from the soil survey publication (NRCS 2002) and from Official Series Descriptions on the NRCS website.

It should be noted that, because of the densely developed, urban nature of the VPP site and vicinity, there is a high probability that actual soil conditions could vary significantly from those described. This could occur because of historic grading (mixing) of locally occurring soils or from imported fill brought in where native soil bearing properties were not sufficient to support building foundations or other facilities.

2.2.1 Agricultural Use on the Proposed VPP Site and Along the Linear Corridors

A review of project-specific aerial photographs and field surveys, confirmed that the VPP site and immediately surrounding land uses are not used to support livestock. However, some agricultural production is supported within the LADWP transmission line right-of-way between Fruitland Avenue and East 50th Street (see Figure 2-5).

The land parcel within the LADWP transmission corridor just north of Fruitland Avenue is used to produce edible cactus plants, unspecified row crops, and unspecified crops within plastic hot houses. The proposed electrical transmission line (River Route) will run along the east side of this area for approximately 300 feet. It is expected that construction of the overhead transmission facilities in this area can be completed in either the asphalted area to the east of the crops or without otherwise significantly impacting the agricultural activities at this location.

The soils mapped at the VPP and surrounding areas are indicated to be of the soil capability subclass IVec-1 (without irrigation) indicating that these soils have severe limitations for choice of plants or management (or both) due to potential for soil erosion and dry climate.

Of the mapped soils, only the Hanford soils are associated with prime agricultural land or other important farmland classifications. However, none of the important farmland terms apply to the VPP site or vicinity because those lands have been developed for urban (industrial, commercial, or residential) uses.

The Farmland Mapping and Monitoring Program (FMMP) of the California Department of Conservation (CDC) provide statistics on conversion of farmland to non-agricultural uses for Los Angeles County where the VPP site is located (CDC, 2005). In the year 2004, Los Angeles County had approximately 44,051 acres of Important Farmlands (including Prime Farmland, Farmland of Statewide and Local Importance and Unique Farmlands) and an additional 233,399 acres of grazing land. In the period from 2002 to 2004, Important Farmlands had shown a net increase of almost 1,599 acres (3.8 percent) within the county. In the prior review period (2000-2002), there was only a net change (loss) of 79 acres within the county. A review of the "Important Farmlands" mapping by the FMMP shows that the project site and surrounding areas to be designated as "Urban and Built-Up Land."

2.2.2 Soil Types within the Study Area and Prime Farmlands

Table 2-2.1 summarizes the characteristics of each of the individual soil mapping units identified on Figure 2-4 in the project vicinity including the site boundaries and the project's linear facilities. The table summarizes depth, texture, drainage, permeability, erosion hazard rating, land capability classification, and fertility as an indicator of its revegetation potential.

TABLE 2-2.1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
13	**Tujunga-Soboba association; 0 to 5 percent slopes:** This soil comprises a portion of the proposed electrical transmission line linear as follows: approximately 1.55 miles of the River Route or 1.14 miles of the Randolph Route. On the River Route, this soil is found on the west side of the channelized Los Angeles River. On the Randolph Route, it is found on both side of (and beneath) the Los Angeles River. The soils of this association are formed in parent materials on nearly level and gently sloping alluvial fans. They occur between Sea level and 3,700 feet of elevation. The Land Capability Classification for non-irrigated soils is VIIe-4 (indicating soils unsuited to commercial crop production and severe limitations due to erosion hazard caused by sandy soil textures). **Tujunga** soils make up about 60 percent of this soil mapping unit. They are deep soils (>60 inches) and have sand or loamy fine sand surface layers under lain by similar soil textures in the substratum. **Tujunga** soils are somewhat excessively or excessively drained. Flooding may never occur or it may occur frequently depending on the location. **Tujunga** soils have a rapid permeability and negligible or very low runoff. **Tujunga** soils have a low inherent fertility. Taxonomic Class: Mixed, thermic Typic Xeropsamments **Soboba** soils make up about 30 percent of this soil mapping unit with the remaining 10 percent composed of unnamed sandy and cobbly material in the beds if intermittent streams. **Soboba** soils are deep (> 60 inches) and have very fine sandy loam surface soils underlain by very cobbly loamy coarse sand in the substratum. **Soboba** soils are excessively drained. Occasional flooding of these soils may occur. **Soboba** soils have a very rapid permeability and very slow runoff. **Soboba** soils have a very low inherent fertility. Taxonomic Class: Sandy-skeletal, mixed, thermic Typic Xerofluvents
14	**Hanford association; 2 to 5 percent slopes:** This soil unit comprises the entire site and area containing the proposed sewer and gas supply linears in proximity to the site. It is also the major soil mapping unit along the electrical transmission line, as follows: about 2.61 miles of the River Route including portions near the site and along the Los Angeles River; and about 2.65 miles of the Randolph Route mostly south of and east of the VPP site and a small portion on the east side of the Los Angeles River along Randolph Avenue. The soils of this association are formed in parent materials on gently sloping alluvial fans. They occur between Sea level and 3,500 feet in elevation. The Land Capability Classification for non-irrigated soils is IVec-1 (indicating soils with severe limitations for choice of plants because of problems with erosion and dry climate). **Hanford** soils make up about 85 percent of this soil mapping unit with the remaining soils comprised of Yolo (10 percent) and Hesperia (5 percent) soils. **Hanford** soils are deep (> 60 inches) and have sandy loam surface and gravelly loamy coarse sand substratum. **Hanford** soils are well-drained; they have moderately rapid permeability and negligible to low runoff. **Hanford** soils have a moderate fertility. Taxonomic Class: Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

TABLE 2-2.1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
15	**Yolo association:** This soil mapping unit would not be affected by the VPP project but the information is included because this could be a considerable component (up to 10 percent) of the Hanford association. Soils are formed in alluvial fans between the elevation of 1,175 and 1,200 ft. Typical profile: Silt loam surface over a silt loam subsoil. Deep soils (> 60 inches) and well-drained. Permeability is moderate; Runoff is slow to medium. Inherent fertility is high. Taxonomic class: Fine-silty, mixed, superactive, non-acid, thermic Mollic Xerofluvent
21	**Ramona-Placentia association, 2 to 5 percent slopes:** This soil comprises approximately 0.61 mile of the proposed electrical transmission line linear along Randolph Avenue (for both the River and Randolph Routes) on the east side of the Los Angeles River near the Laguna Bell Station. The soils of this association are formed in parent materials on gently sloping terraces. They occur between Sea level and 1,300 feet of elevation. The Land Capability Classification is not given for non-irrigated soils. For the Ramona soils, the irrigated Land Capability Classification is IIIe-1 (indicating soils with severe limitations for choice of plants because of problems with erosion). For the Placentia soils, the irrigated Land Capability Classification is IVe-3 (indicating soils with severe limitations for choice of plants or management because of problems with erosion due to clayey soil or slow permeability). **Ramona** soils make up about 80 percent of this soil mapping unit. They are deep (> 60 inches) and have heavy loam, loam, or sandy loam surface layers with dense clay loam or clay subsoil. **Ramona** soils are well drained; they have moderately slow to slow (subsoil) permeability; and slow to rapid runoff. **Ramona** soils have a moderate inherent fertility. **Ramona** soils have a high shrink/swell capacity. Taxonomic Class: Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs **Placentia** soils make up about 15 percent of this soil mapping unit with Hanford soils making up the remaining 5 percent. **Placentia** soils moderately deep (> 18 inches) over a clay subsoil. They have a loam or sandy loam surface texture over a dense clay loam subsoil. **Placentia** soils are moderately well drained; they have very slow permeability; and very rapid runoff. **Placentia** soils have a low inherent fertility. **Placentia** soils have a high shrink/swell capacity. Taxonomic Class: Fine, smectitic, thermic Typic Natrixeralfs

Notes:
Soil characteristics are based on soil mapping descriptions provided in the published soil survey (NRCS, 2002) and in the NRCS Official Series Descriptions provided on the NRCS website.

Soil descriptions are limited to those soil units that could be affected by the VPP project. Other soil mapping units that are outside of the project area, but shown on Figure 8.9-1 include the Yolo association and the Chino association. While the Yolo association map unit is outside of the project area, a brief description is provided because these soils could comprise up to 10 percent of the Hanford association soil mapping unit in which the majority of the VPP project occurs.

2.3 Hydrology

Table 2-3.1 provides average and maximum historical rainfall in downtown Los Angeles.

TABLE 2-3.1
Average Monthly Rainfall near the Proposed Project Site

Precipitation	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average	15.06	0.48	1.34	2.43	3.15	3.21	2.67	1.04	0.31	0.07	0.01	0.05	0.24
Maximum	38.18	6.96	9.68	15.80	14.94	13.68	12.36	7.53	3.57	1.39	0.24	2.26	5.67

Source: NOAA, 1999.

Stormwater runoff under current conditions drains to the existing storm drain system, maintained by the Los Angeles County Department of Public Works (acting as the Los Angeles County Flood Control District). Existing runoff volume is estimated to be approximately 18.23 cubic feet per second (cfs), or 2.89 acre feet during a 10-year storm event (120 minutes at 0.75 inches per hour).

2.4 Estimated Total Disturbed Area

The estimated area disturbed during project construction is:

Vernon Power Plant & Laydown	Total 27 acres
Plant Site	13.7 acres
Laydown and Construction Area	13.3 acres
Linear Construction	
Natural Gas Line	2,300 feet
Sanitary Sewer Line	2,400 feet
Electrical Transmission Line	4.4 to 4.8 miles

2.5 Existing Drainage

Because the project site is currently in use with an existing stormwater collection system, the volume and rate of runoff from the project site would not be substantially altered as a result of project development. The project site will be designed to capture stormwater runoff in a series of drainage inlets that would convey runoff to a stormwater detention basin, if required, prior to discharge into the Los Angeles County Department of Public Works (LACDPW) storm drain system (Figure 1-4).

Presently, the total developed site area is approximately 13.7 acres. Impervious surfaces (i.e., buildings and pavement) cover the entire area. After project development, approximately 9 percent of the site would be dedicated to areas that would retain runoff (i.e., the cooling tower, ammonia unloading area, and the step-up/auxiliary transformer areas). Discharge from these areas would not occur during a rainfall event, and would therefore not contribute to the peak flow associated with the drainage system design storm. For the remaining developed project areas, approximately 51 percent would be impervious

surfaces (i.e., buildings, equipment, foundations and pavement), and 40 percent would be pervious surfaces (i.e., crushed stone surfacing and grass).

The plant storm drainage system will be designed in accordance with LACDPW requirements, including the LACDPW Hydrology Manual and all addendums. An LACDPW Flood Permit Application is required for connection to the existing LACDPW storm sewer system. Stormwater flow into the existing LACDPW storm sewer system may be limited by the LACDPW, and a stormwater detention basin may be required to reduce the stormwater flow below the LACDPW maximum specified flow rates. Connections to the existing LACDPW storm sewer system will be in accordance with applicable LACDPW requirements.

Additionally, because this site is considered "redevelopment" as defined by the City of Vernon, a drainage concept and stormwater quality plan will be submitted to the City that includes details of facilities and measures that mitigate impacts to water quality. Redevelopment is described as land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces.

2.5.1 VPP Site Area

2.5.1.1 Stormwater Quality (Construction Phase)

During construction, approximately 13.7 acres of land associated with the plant site and other facilities will be disturbed. An additional 13.3 acres would be disturbed for the construction laydown and worker parking areas. Surface water impacts are anticipated to be related primarily to short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially destroy habitat and increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts. Best management practices for erosion control will be implemented. Additionally, erosion and sediment controls, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the NPDES Construction Permit issued statewide by the State Water Quality Control Board and local agency requirements.

2.5.1.2 Stormwater Quality (Operations Phase)

As described above, stormwater from the site will be discharged to the LACDPW storm drain system. Because this site is considered "redevelopment," a Standard Urban Stormwater Management Plan (SUSMP) will be submitted to the City of Vernon and LACDPW that includes details of facilities and measures that mitigate impacts to water quality. Compliance with the SUSMP will reduce any impact from stormwater runoff to a level of less than significant.

In addition to review and approval of the SUSMP, LORS compliance also requires preparation of a SWPPP for industrial operations. The industrial SWPPP will require a suite of good housekeeping requirements including steps to identify and mitigate pollutants and conditions of concern. Compliance with the SUSMP would compliment the requirement to prepare and implement a SWPPP for industrial activities. A copy of the Notice of Intent to the State Water Quality Control Board and a draft SWPPP for industrial operations will be submitted for the operation of the VPP.

2.5.1.3 Flooding Potential

The general region is flat and there are no significant dams or levees in the project vicinity. Additionally, the project site is also flat and would remain generally flat after development. The site grading and drainage will be designed to comply with all applicable federal, state, and local regulations. The general site grading will establish a working surface for construction and plant operating areas, and will provide positive drainage from buildings and structures to reduce the potential of onsite flooding hazards. The project is not located in a flood hazard zone, as defined by FEMA, indicating it is likely in a moderate, minimal hazard area.

2.6 Proposed Drainage

2.6.1 VPP Project Areas

After final site design and prior to construction, the Applicant will be required to finalize this Drainage, Erosion and Sediment Control Plan (DESCP)/Construction SWPPP. During construction, the Applicant will be required to follow this DESCP/SWPPP to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the final DESCP/SWPPP; the DESCP/SWPPP will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.

Implementation of the project will alter existing drainage patterns. After construction, the rate of stormwater runoff would increase because of increased impervious surfaces. General site grading will provide positive drainage from buildings and structures. Stormwater will be directed to a detention pond via sheet flow. Figure 1-4 shows a conceptual post-construction runoff and drainage plan. Appendix J contains drainage calculations for the detention pond.

2.6.2 VPP Linear Construction Areas

Implementation of the project will not alter existing drainage patterns along the roadways or other rights-of-way.

2.7 Construction and Maintenance Access Road

Site access for construction and maintenance will be provided via existing access roads. Primary access to the site will be provided via an existing entrance from Fruitland Avenue, A secondary entrance will be provided via Boyle Avenue.

2.8 Earthwork

2.8.1 VPP Plant Site Earthwork

Excavation work will consist of removal, storage, and/or disposal of earth, sand, gravel, vegetation, loose rock, and debris to the lines and grades necessary for construction. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion protection methods. Excess materials will be incorporated into the unused portion of the site or removed from the site and disposed of at an acceptable location.

Graded areas will be smooth, compacted, free from irregular surface changes, and sloped to drain. Structures will be designed to meet appropriate seismic requirements (the site is located in Seismic Risk Zone 4) and California Building Code requirements. Areas to be backfilled will be prepared by removing unsuitable materials and rocks. The bottom of an excavation will be examined for loose or soft areas. Such areas will be excavated fully and backfilled with compacted fill.

Backfilling will be done in layers of uniform, specified thickness. Soil in each layer will be properly moistened to facilitate compaction to achieve the specified density. To verify compaction, representative field density and moisture-content tests will be performed during compaction in accordance with ASTM standards.

2.8.2 VPP Linear Construction

Construction of the natural gas line will be by open trench. Trench excavation will consist of concrete/asphalt cutting and making subgrade to the depth, width, and grade necessary for construction of the pipeline. Disturbed soils such as those from trench excavation will be hauled away, backfilled into the trench, and/or covered (e.g. metal plates, pavement, plastic covers over spoil piles) at the end of the construction day. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion and sediment control methods. Excess materials (i.e., asphalt debris, earth, sand, gravel, loose rock) will be incorporated into the unused portion of the site or removed from the site and disposed of at an acceptable location.

Areas to be backfilled will be prepared by removing unsuitable materials and rocks. The bottom of an excavation will be examined for loose or soft areas. Such areas will be excavated fully and backfilled with compacted fill.

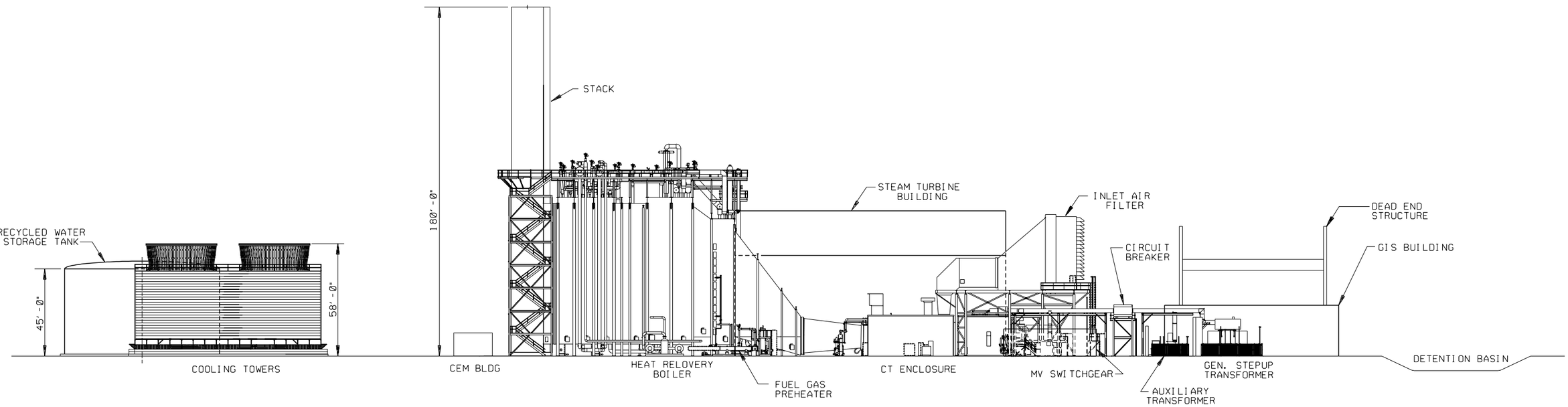
Backfilling will be done in layers of uniform, specified thickness. Soil in each layer will be properly moistened to facilitate compaction to achieve the specified density. To verify compaction, representative field density and moisture-content tests will be performed during compaction in accordance with ASTM standards.

2.9 Potential Pollutant Sources

Construction of the project will involve handling a large variety of building materials. The primary potential pollutant source for stormwater during the construction of the VPP Project results from soil materials being exposed to wind and water movement. The greatest amount of soil will be exposed during trench excavation for the linear facilities and the site

grading and preparation phases of the project. Upon completion of the foundation phase, the amount of soil exposed will be significantly reduced. Due to the controls and BMPs described in subsequent sections of this SWPPP, soils and sediments in stormwater runoff from the VPP Project site will be minimized.

Other chemicals that could be potentially stored and used during construction of the facility include: gasoline, diesel fuel, oil, lubricants (i.e., motor oil, transmission fluid, and hydraulic fluid), solvents, adhesives, asphalt products, and paint materials. There are no feasible alternatives to these materials for construction or operation of construction vehicles and equipment, repaving areas, pouring concrete, or for painting and caulking buildings and equipment. Material Safety Data Sheets for each chemical used will be kept onsite, and construction employees will be made aware of their location and content. The contractor will be responsible for assuring that the use, storage and handling of these materials will comply with applicable federal, state, and local laws, ordinances, regulations, and standards (LORS), including licensing, personnel training, accumulation limits, reporting requirements, and record keeping.



SECTION A-A
(M300)

FIGURE 2-1
TYPICAL ELEVATION
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

Source: Burns and Roe, Dwg. No. M301, Rev. D.

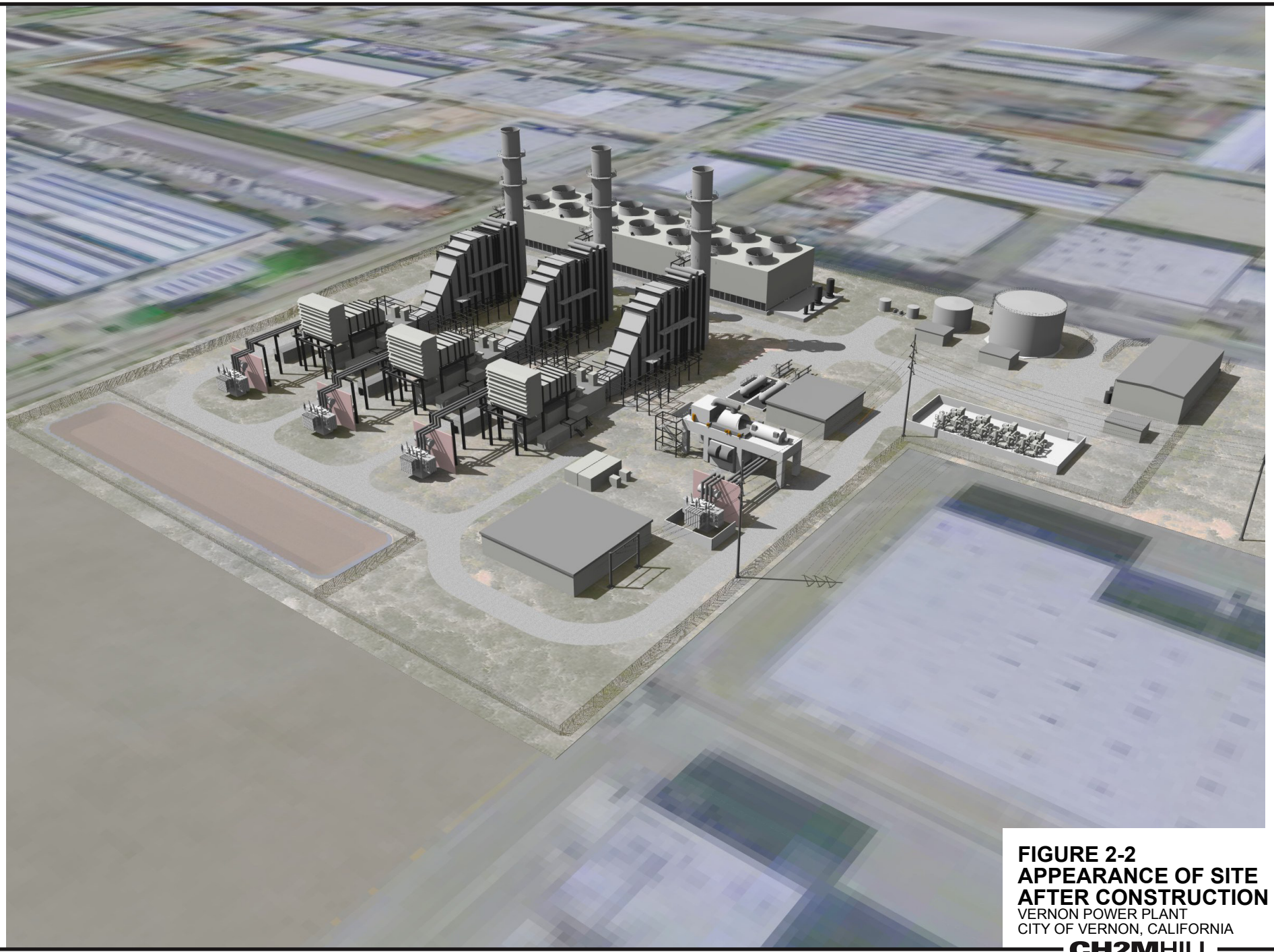


FIGURE 2-2
APPEARANCE OF SITE AFTER CONSTRUCTION
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

CH2MHILL

EY052006001SAC figure_1.2-7.ai 06/19/06 tdaus

FIGURE 2-3
BIOLOGICAL RESOURCES WITHIN 1-MILE OF PROJECT SITE AND WITHIN 1,000 FEET OF LINEAR CORRIDOR
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

EY052006001SAC figure_2_3.ai 06/01/06 tdaus

PROJECT LOCATION

LEGEND

- 13 — Tujunga - Soboba association, 0 to 5 percent slopes
- 21 — Ramona-Placentia association, 2 to 5 percent slopes
- 14 — Hanford association 2 to 5 percent slopes
- 15 — Yolo association
- 20 — Chino association
- PROPOSED NATURAL GAS LINE
- PROPOSED SEWER LINE
- TRANSMISSION LINE - RANDOLPH ROUTE
- TRANSMISSION LINE - RIVER ROUTE
- VERNON POWER PLANT
- LAGUNA BELL SUBSTATION
- 1-MILE BUFFER

SOURCE: NRCS, 2002

0 2,000 4,000 Feet

SCALE IS APPROXIMATE

N

FIGURE 2-4
SOILS MAP OF THE VPP PROJECT AREA

VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

CH2MHILL

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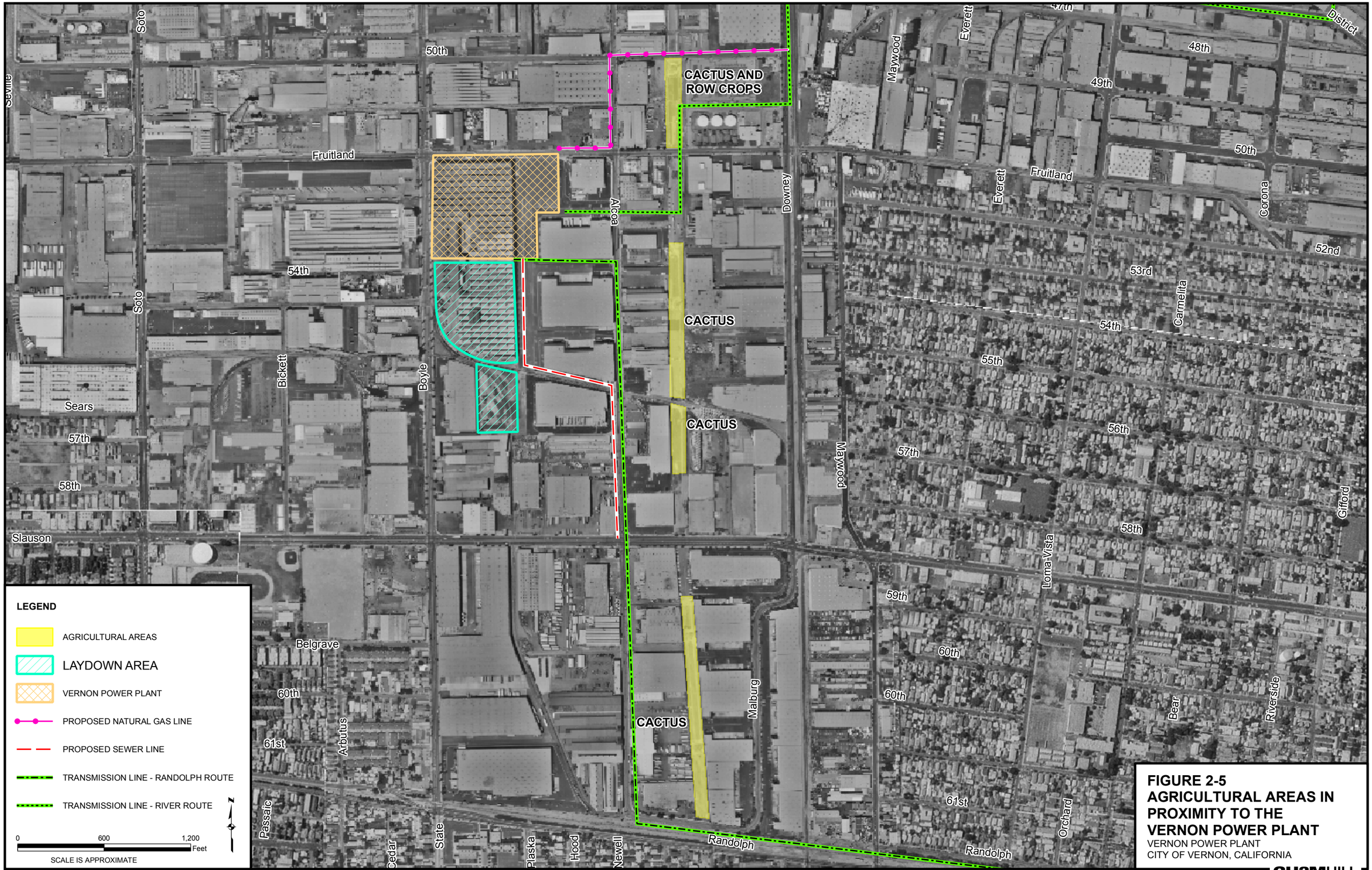

FIGURE 2-5
AGRICULTURAL AREAS IN PROXIMITY TO THE VERNON POWER PLANT
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

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SECTION 3

Erosion Control Plan

3.1 Best Management Practices

The following sections present standard construction Best Management Practices (BMPs) most of which are described in the *California Storm Water Best Management Practice Handbook* (1993) and the *Caltrans Storm Water Quality Handbook* (2003). These resource handbooks provide comprehensive details on BMP implementation and will be obtained and reviewed by managers for all construction contractors that may have an impact on implementation of the SWPPP. Additional BMPs are described where appropriate. The BMPs outlined in this SWPPP are considered the minimum requirements for erosion and sediment control. Specific BMPs are described in this section, but at this time, no BMP site map has been designed. Figure 3-1 illustrates installation methods for various BMPs. When the site is graded and topographical maps for the site have been developed, site-specific BMPs will be designed on the project site maps. [Figures 3-2, 3-3, and 3-4 are to be provided by the contractor] Appendix C contains the Caltrans BMP factsheets with detailed descriptions of BMPs discussed in the following sections.

3.2 General Erosion and Sediment Control Measures

The project has been designed to impact as small an area as possible at any given time, thereby limiting the amount of exposed soil. Construction is expected to proceed as expediently and efficiently as possible, while maintaining all levels of safety, thereby ensuring that as little soil is exposed for as short a time as possible. Work areas may be surrounded by dikes, drainage swales, sand bags, or combinations of these to prevent run-on and uncontrolled run-off from the work area. General erosion and sediment controls may include installation of filter fabric fencing, fiber rolls, or sand bags wherever appropriate. It may be appropriate to surround the site and neighboring laydown area with filter fabric fencing (silt fencing) and/or fiber rolls. All drains on surface streets surrounding the site will be protected with gravel bags and/or silt sacks.

A mitigation monitoring plan will also be developed in conjunction with California Energy Commission (CEC) staff to set performance standards and monitor the effectiveness of mitigation measures. 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/adverse situations so that they can be quickly corrected.

Following are general control measures that may be used during various phases of the project and in conjunction with phase-specific BMPs (see Appendix C):

- Proper scheduling and sequencing of activities (BMP SS-1)
- Silt Fences and Fiber Rolls (BMP SC-1 and SC-5)
- Straw mulch (BMP SS-6)

- Placement of geotextiles, plastic covers, & erosion control blankets/mats (BMP SS-7)
- Gravel bag berm (BMP SC-6)
- Street sweeping (BMP SC-7)
- Sandbag barrier (BMP SC-8)
- Storm drain inlet protection (BMP SC-10)
- Stockpile management (BMP WM-3)
- Dust control (BMP WE-1)
- Employee and contractor training

3.2.1 Access Road, Entrance and Parking, Staging and Laydown Areas

3.2.1.1 Plant Site and Laydown Area

Approximately 13.7 acres will be used to accommodate the generation facilities. Parking areas for construction workers and laydown areas for construction materials will be prepared in the 13.3 acres immediately south of the VPP plant site. The laydown area is a previously disturbed, flat parcel of land. It is currently completely developed with buildings, asphalt surfaces, and some landscape vegetation. This area will be demolished prior to the project and graded to a pre-construction standard as stipulated in local and regional ordinances. The laydown area will be devoted to equipment and materials laydown, storage, construction equipment and employee parking, and office trailers. The plant entrance/exit off Fruitland Avenue and/or Boyle Avenue will be stabilized using coarse aggregate. The aggregate cover will be maintained so as to limit sediment tracking and creation of dust. Filter fabric fencing (silt fencing) may be used at edges of these areas, as necessary, to minimize sediment discharges. The following BMPs may be used for construction access areas:

- Proper scheduling and sequencing of activities (BMP SS-1)
- Silt fencing (BMP SC-1)
- Fiber Rolls (BMP SC-5)
- Storm drain inlet protection (BMP SC-10 or silt sacks)
- Stockpile Management (WM-3)
- Stabilizing surfaces with coarse aggregate
- Compacting access/entrance road surfaces (BMPs TC-1 and TC-2)
- Placement of geotextile (BMP SS-7)
- Dust control (BMP WE-1)
- Temporary drains and swales (BMP SS-9)
- Vehicle and equipment cleaning (BMP NS-8)

3.2.1.2 Linear Construction Access

[SPECIFICS TO BE PROVIDED BY CONTRACTOR]

Site access for construction and maintenance will be provided via existing city roads. Access roads are currently paved and prior to disturbance do not need to be provided with erosion and sediment controls. Prior to ground-disturbance associated with the linear construction phases, all or a combination of these BMPs may be used:

- Proper scheduling and sequencing of activities (BMP SS-1)
- Straw mulch (BMP SS-6)
- Placement of geotextiles, plastic covers, & erosion control blankets/mats (BMP SS-7)
- Silt fencing (BMP SC-1)
- Fiber rolls (BMP SC-5)
- Gravel bag berm (BMP SC-6)
- Street sweeping and vacuuming (BMP SC-7)
- Sandbag barrier (BMP SC-8)
- Storm drain inlet protection (BMP SC-10 or silt sacks)
- Stockpile management (BMP WM-3)
- Dust control (BMP WE-1)

3.2.2 Site Grading

Prior to use as the construction laydown area, no grading will be necessary since the site is flat and completely developed with buildings, asphalt surfaces, and some landscape vegetation. The site may be graveled to provide all weather use and further minimize soil erosion potential. Heavy equipment stored onsite will be placed on dunnage to protect it from ground moisture. Once construction is completed, the gravel will be removed from the site.

Grading will be required for the plant site. The overall plant site grading scheme is designed to route surface water around and away from all equipment and buildings. Barriers will be placed around the property boundary to prevent sediment from leaving the site. If used, fiber rolls would be properly installed (staked), then removed after construction. Runoff detention basins, drainage diversions, and other large-scale sediment traps are not considered necessary due to the level topography and surrounding paved roads. Any stockpiles would be stabilized and covered if left onsite for long periods of time, including placement of sediment barriers around the base of the stockpile. These methods can be employed during trenching operations for the natural gas line and transmission line.

3.2.3 Foundations

As the foundation for the project structures are developed, temporary BMPs will be replaced with permanent BMPs. Sediments and hydrocarbons will be minimized or prevented from entering the surface collectors with storm drain inlet protection devices and rings of hydrocarbon-absorbing fabric.

A concrete washout site will be designated or will occur offsite at the concrete contractor's facility. Dumping of excess concrete and washing out of delivery vehicles will be prohibited onsite. Notices will be posted to inform all drivers.

The following BMPs will be used around foundations:

- Storm drain inlet protection (BMP SC-10 or silt sacks)
- Concrete waste management (BMP WM-8)

3.2.4 Site Stabilization and Demobilization

As construction nears completion, areas used for parking, storage and laydown will be stabilized. Areas that will continue to be used (for parking or storage) will have permanent

stormwater collection and conveyance structures provided. All disturbed areas associated with the linear facilities will be stabilized.

3.3 Other Controls

3.3.1 Hazardous Materials

There will be a variety of chemicals stored and used during the construction and operation of the VPP project. The storage, handling, and use of all chemicals will be conducted in accordance with applicable LORS. 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. Berm and drain piping design will allow a full-tank capacity spill without overflowing the berms. For multiple tanks located within the same bermed area, the capacity of the largest single tank will determine the volume of the bermed area and drain piping. Drain piping for volatile chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors. After neutralization, if required, water collected from the chemical storage areas will be directed to the cooling tower basin. The aqueous ammonia storage area will have spill containment.

3.3.2 Solid and Hazardous Wastes

The construction of the facility will generate various types of non-hazardous solid wastes, including debris and other materials requiring removal during site grading and excavation, excess concrete, lumber, scrap metal, and empty non-hazardous chemical containers. Management of these wastes will be the responsibility of the construction contractor(s). The generation of waste materials will be minimized through efficient and careful use of materials, and recycling when possible. Non-hazardous materials will be used where acceptable to meet construction requirements. Drummed and bagged wastes will not be stored directly on the ground, and will be covered or stored indoors where feasible. Incompatible materials will be separated, and secondary containment will be provided for liquids. Sufficient spill cleanup materials will be kept in proximity to areas where materials are stored and used.

Small quantities of hazardous wastes will be generated over the course of construction. These may include flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. All hazardous wastes generated during facility construction will be handled and disposed of in accordance with applicable laws, ordinances, regulations, and standards, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. It will be moved daily to the contractor's 90-day hazardous waste storage area, located at the site construction laydown area. The waste will be removed from the site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

Nonhazardous solid waste generated during construction will be collected in onsite dumpsters. The dumpsters will meet local and state solid waste management regulations, and be provided with solid lids or removable flexible covers. Wastes will be recycled where practical. Waste that cannot be recycled will be disposed of in a Class III landfill.

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

- Cover or store hazardous materials indoors, if possible (BMP WM-1)
- Material delivery and storage (BMP WM-1)
- Material use (BMP WM-2)
- Spill Prevention and Control (BMP WM-4)
- Solid Waste Management (BMP WM-5)
- Hazardous Waste Management (BMP WM-6)
- Use of covered dumpsters and containers for waste (BMP WM-5)
- Sanitary and septic waste management (BMP WM-9)
- Stockpile management (BMP WM-3)

3.3.3 Potential Contaminated Soil

Although there is no known contaminated soil at the plant site, it may be possible that contaminated soil is encountered during construction. Operators and construction personnel will be trained on the identification of contaminated soils and will be asked to report unusual conditions to an approved registered professional geologist. If soils require temporary stockpiling, piles will be covered with plastic sheeting or tarp secured safely with sand bags and bermed with hay bales or 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 contamination is detected, the waste will be handled and properly disposed of at an authorized waste management facility.

3.3.4 Groundwater Controls

Groundwater at the project site is currently not used for potable water, and project construction will have no effect on groundwater. The linear facilities, minor excavation and foundation structures required for VPP would not result in any substantial change from the existing groundwater flow and conditions at the site. During construction, the project would be subject to LORS requiring standards for isolating and controlling offsite runoff and contaminants that could enter groundwater. During construction, the project would isolate all work areas using fiber, rolls, mats or similar devices to keep contaminated runoff from leaving the site.

3.3.5 Offsite Vehicle Tracking

Because sediment reaching public roads generally has a clear path to water bodies, controls will be in place to minimize or eliminate soils from being tracked off the project site from vehicles. The site will have an access road and entrance/exit made of coarse aggregate to limit the amount of material adhering to tires. Paved roads used during the linear facilities construction phase and those located at the entrance of the construction site will be inspected daily and cleaned as necessary using manual or mechanical street sweepers (BMP SC-7).

3.3.6 Dust Suppression and Control

Wind erosion controls shall be evaluated and implemented as needed throughout the duration of the project on all disturbed soils on the project site and linear facility sites that are subject to wind erosion, and when significant wind and dry conditions are anticipated

during project construction. Wind controls will be used to prevent the transport of soil from soil-disturbed areas of the project site. The following control methods will be used for dust suppression, as necessary:

- Water aggregate roadways, parking areas and construction areas as needed (BMP WE-1).
- Cover all trucks hauling soil, sand and other loose materials offsite or require all trucks to maintain at least 18 inches of freeboard.
- Sweep adjacent streets and onsite paved roadways (BMP SC-7).
- Apply non-toxic soil stabilizers to inactive or completed construction areas as soon as is practical (BMP SS-4 or SS-5).
- Enclose, cover, water or apply non-toxic soil stabilizers to exposed stockpiles of sand, dirt, etc. (BMP WM-3).
- Limit traffic speed onsite to 15 mph or less.
- Suspend excavation and grading during periods of high winds.

FIGURE 3-1
VPP Erosion and Sediment Control Plan – Example Installation Methods

TO BE PROVIDED

FIGURE 3-2
BMP Map – Main Site

Will be provided by contractor for Final document

FIGURE 3-3
BMP Map – Transmission Line

Will be provided by contractor for Final Document

FIGURE 3-4
BMP Map – Natural Gas Line

Will be provided by contractor for Final Document

FIGURE 3-5
BMP Map – Recycled Water Supply Pipeline and Potable Water Supply Pipeline

Will be provided by contractor for Final Document

SECTION 4

Training

Prior to project startup, all designated onsite representatives will participate in a pre-project stormwater training workshop. The workshop will cover basic stormwater information, the requirements of the general permit, and the SWPPP. Specifically, the workshop will focus on implementation, inspection, and maintenance of stormwater controls. All new employees will be trained by staff familiar with these topics.

As required by the SWRCB, individuals responsible for SWPPP preparation, implementation, and permit compliance will be appropriately trained, and the training will be documented. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also document their training.

All contractors are responsible for familiarizing their personnel with the information contained in the SWPPP. Contractors will be informed of this obligation and will be expected to have one or more employee training or briefing sessions conducted. The purpose of the meetings will be to review the proper installation methods and maintenance of all erosion control BMPs to be used on the project. Monitoring and inspection activities will only be conducted by individuals who have had additional training specific for this purpose. Training records will be maintained. All contractors are responsible for familiarizing subcontractors with information contained in the SWPPP.

Each contractor will be required to certify that they understand the requirements of the SWPPP, and will perform their duties in accordance with its requirements. An example Certification Form is included as Appendix D. These signed Certifications will be collected by the Project Manager (or designee) to identify authorized contractors in the SWPPP (see Appendix E).

SECTION 5

Maintenance, Inspection, and Repair

5.1 Maintenance

Erosion and sediment control structures must be maintained to remain effective. Features that are washed out or damaged will be repaired as soon as possible, contingent at all times on worker safety. Structures designed to accumulate sediment will have sediment removed in advance of the rainy season, and before major storm events. The following criteria will be used to determine whether erosion and sediment control features should be cleaned, repaired, or replaced:

- Sediment or other debris has accumulated to greater than one-third the height of sediment fabric fences.
- Sediment or debris has reduced the storage capacity of sediment traps by 50 percent or more
- More than one-third of the cross-section of conveyance structures, such as drainage swales or ditches are plugged or blocked

In addition, the following maintenance activities will be performed:

- Paved roads immediately surrounding the construction sites will be cleaned as necessary using manual or mechanical street sweepers.
- Coarse aggregate on plant access road and entrance/exit will be maintained so as to limit sediment tracking and creation of dust.
- Surfaces that are not paved or provided with gravel surfacing will be watered to limit the generation of dust (but will not be excessively watered so as to generate runoff).
- All equipment will be maintained according to manufacturers' specifications so as to prevent leaks and spills.
- Any contaminated soils resulting from spills will be dug up as quickly as possible, and then removed from the site for proper disposal.

5.2 Inspections and Record Keeping

Inspections of the construction site will be conducted prior to anticipated storm events and after actual storm events that cause runoff from the site. This will be accomplished by conducting weekly inspections. In addition, inspections will be made during each 24-hour period during extended storm events. SWPPP inspections may be conducted in conjunction with other facility inspections. For instance, if a regulated amount of petroleum materials is onsite and there is a Spill Prevention, Control and Countermeasures Plan (SPCC), the SWPPP inspections may be conducted in conjunction with SPCC inspections.

The goals of these inspections are: (1) to identify areas contributing to a stormwater discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed and functioning in accordance with the terms of the General Permit; and (3) whether additional control practices or corrective maintenance activities are needed.

Personnel responsible for inspections before, during and after storm events will receive additional training specific for this purpose. This can take the form of formal classroom training and/or "walk-around" with an experienced individual, who discusses the appropriate conditions and those conditions requiring action. The Project Manager (or designee) will maintain a list of authorized inspection individuals for the SWPPP (Appendix F).

All required inspections will be recorded on an inspection form (Appendix G). Records of SWPPP inspections will be maintained onsite for at least 3 years. An example checklist will contain, at a minimum, the following information required by the Regional Water Quality Control Board:

- Inspection date
- Weather information: best estimate of beginning of storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall (inches)
- Description of any inadequate BMPs
- If possible to safely access during inclement weather, observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls; otherwise, result of visual inspection at relevant outfall, discharge point, or downstream location and projected required maintenance activities.
- Corrective actions required, including any changes to SWPPP necessary and implementation dates
- Inspectors name, title, and signature

Records of all monitoring information, copies of all reports required by the general stormwater permit, and records of all data used to complete the Notice of Intent for the construction activity shall be held, retained, and kept in possession by the facility operator and/or contractor for at least 3 years.

The facility operator and/or contractor will annually certify that its construction activity is in compliance with the requirements of this general permit and SWPPP. Noncompliance notifications will be submitted within 30 days of identification of noncompliance to the Regional Water Quality Control Board.

Equipment, materials, and workers will be available for rapid response to failures and emergencies. All corrective maintenance to BMPs will be performed as soon as possible, depending upon worker safety.

Prior to plan commencement, names of responsible personnel will be added to this plan.

SECTION 6

Sampling and Analysis Program

The General Permit requires permittees to implement specific sampling and analytical procedures to determine whether BMPs implemented on the construction site are:

- Preventing sediment impaired waters from further impairment by direct discharge of sediments in stormwaters to listed waters
- Preventing other pollutants (not visually detectable) from causing or contributing to exceedances of water quality objectives

6.1 Sampling and Analysis Plan for Sediment

This project does not have the potential to discharge directly to a water body listed as impaired due to Sedimentation/Siltation and/or Turbidity pursuant to Clean Water Act, Section 303(d); therefore a Sampling and Analysis Plan for Sediment is not required.

6.2 Sampling and Analysis Plan for Non-Visible Pollutants

The Sampling and Analysis Plan (SAP) for non-visible pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater discharges from the project site and offsite activities directly related to the project in accordance with the requirements of Section B of the General Permit, including SWRCB Resolution 2001-046.

6.2.1 Scope of Monitoring Activities

The following are common construction materials, wastes, or activities that are potential sources of non-visible pollutants to stormwater discharges from a project. Identification, storage, use, and operational locations of the potential sources at this project will be determined, identified on site maps, and incorporated into this SWPPP at a later date.

- Vehicle batteries
- Painting products
- Contaminated soil
- Line flushing products
- Dust palliative products
- Masonry products
- Landscaping products
- Concrete curing
- Sealants
- Adhesives
- Cleaning products

Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil may be used on the project site.

The project may have the potential to receive stormwater run-on with the potential to contribute non-visible pollutants to stormwater discharges from the project. There currently are no data available regarding stormwater run-on. This data will be added to the SWPPP when it is available.

Sampling for non-visible pollutants will be conducted when: (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

6.2.2 Monitoring Strategy

6.2.2.1 Sampling Schedule

Samples for the applicable non-visible pollutant(s) and a sufficiently large uncontaminated background sample shall be collected during the first two hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples shall be collected during daylight hours (sunrise to sunset) and shall be collected regardless of the time of year, status of the construction site, or day of the week.

In conformance with the U.S. Environmental Protection Agency definition, a minimum of 72 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during the required inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as: (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by temporary cover and containment that prevents stormwater contact and runoff from storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but: (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- An operational activity with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) applicable BMPs were observed to be breached, malfunctioning, or improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters or storm sewer system.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

6.2.2.2 Sampling Locations

Considerations for determining sampling locations will be proximity to the non-visible pollutant of concern, accessibility for sampling, personnel safety, and other factors in accordance with the applicable requirements in the Permit.

Sampling locations for the collection of samples of run-on to the project site with the potential to combine with discharges being sampled for non-visible pollutants will be identified at a later date. These samples will be intended to identify sources of potential non-visible pollutants that originate off the project site.

A background sample location for comparison with the samples being analyzed for non-visible pollutants will be selected such that the sample will not have come in contacted with: (1) operational or storage areas associated with project materials, wastes, and activities; (2) areas in which soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied; or (3) disturbed soil areas.

If an operational activity or stormwater inspection conducted 24 hours prior to or during a rain event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters or a storm sewer system that was an unplanned location, sampling locations will be selected using the same rationale as that used to identify planned locations.

6.2.3 Monitoring Preparation

The person collecting samples on the project site will be selected at a later date.

Prior to the rainy season, all sampling personnel and alternates will review the SAP. Qualifications of designated personnel describing environmental sampling training and experience will be provided as an Attachment in this SWPPP.

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool-temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule.

Supplies maintained at the project site will include, but are not limited to, surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody (COC) forms. Field equipment will be obtained and maintained for analyzing samples in the field.

6.2.4 Analytical Constituents

6.2.4.1 Identification of Non-Visible Pollutants

Table 6.2-1 lists common potential sources and types of non-visible pollutants on a project site and the applicable water quality indicator constituent(s) for that pollutant. The table will be updated with the onsite materials at a later date.

TABLE 6.2-1
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Sealant	Methyl methacrylate, cobalt, zinc	Methyl methacrylate, cobalt, zinc
Solvents/thinners	VOC	COD, VOC
Adhesives	Phenols, SVOC	COD, phenols, SVOC
Batteries	Sulfuric acid, lead	Sulfuric acid, lead, pH
Herbicides	Herbicide	Herbicide

6.2.5 Sample Collection and Handling

6.2.5.1 Procedures

Samples of discharge will be collected at the designated sampling locations for observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in the Table included in the Sample Analysis Section. Only personnel trained in proper water quality sampling will collect samples.

Samples will be collected by placing a separate lab-provided sample container directly into a stream of water downgradient and within close proximity to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples shall be collected first prior to collecting the downgradient to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing. Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored.

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

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

- Not touch the exposed end of a sampling tube, if applicable.
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles.
- Not eat, smoke, or drink during sample collection.
- Not sneeze or cough in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the samples to take place.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately; i.e., not discharge to the storm drain system or receiving water.

6.2.5.2 Sample Handling Procedures

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

Any samples for field analysis will be tested immediately following collected in accordance with the field instrument manufacturer's instructions and results recorded on a Sampling Activity Log.

6.2.5.3 Sample Documentation Procedures

All original data documented on sample bottle identification labels, COC forms, Sampling Activity Logs, and Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated.

Sampling and field analysis activities will be documented using the following:

Sample Bottle Identification Labels. Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:

- Project name
- Project number
- Unique sample identification number and location
- [Project Number]-[Six digit sample collection date]-[Location]
- Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or designation

- Collection date/time (No time applied to QA/QC samples)
- Analysis constituent

Sampling Activity Logs. A log of sampling events will identify:

- Sampling date
- Separate times for collected samples and QA/QC samples recorded to the nearest minute
- Unique sample identification number and location
- Analysis constituent
- Names of sampling personnel
- Weather conditions (including precipitation amount)
- Field analysis results
- Other pertinent data

Chain of Custody (COC) forms. All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

Stormwater Quality Construction Inspection Checklists. When applicable, the Contractor's stormwater inspector will document on the checklist that samples for non-visible pollutants were taken during a rain event.

6.2.6 Sample Analysis

Samples will be analyzed for applicable constituents using the analytical methods identified in Table 6.2-2. The table will be updated once the onsite materials have been identified. For samples collected for field analysis, collection, analysis, and equipment calibration and maintenance will be in accordance with the field instrument manufacturer's specifications.

TABLE 6.2-2
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs – Solvents	EPA 8260B	3 x 40 mL	VOA – glass	Store at 4º C, HCl to pH < 2	1 µg/L	14 days
SVOCs	EPA 8270C	1 x 1 L	Glass – amber	Store at 4º C	10 µg/L	7 days
COD	EPA 410.4	1 x 250 mL	Glass – amber	Store at 4º C, H_2SO_4 to pH < 2	5 mg/L	28 days
pH	EPA 150.1	1 x 100 mL	Polypropylene	None	Unitless	Immediate
metals	EPA 6010B/7470A	1 x 250 mL	Polypropylene	Store at 4º C, HNO_3 to pH < 2	0.1 mg/L	6 months
Herbicides	EPA 8151A	1 x 1 L	Glass – amber	Store at 4º C	Check lab	7 days

µg/L = micrograms per liter

The instrument(s) will be calibrated before each sampling and analysis event. Maintenance and calibration records will be maintained with the SWPPP.

6.2.7 Quality Assurance/Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 10 percent or 1 duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence any evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

6.2.8 Data Management and Reporting

A copy of all water quality analytical results and QA/QC data will be submitted to the Owner/Developer within 5 days of sampling (for field analyses) and within 30 days (for laboratory analyses).

Lab reports and COCs will be reviewed for consistency between lab methods, sample identifications, dates, and times for both primary samples and QA/QC samples. All data, including COC forms and Sampling Activity Logs, shall be kept with the SWPPP.

6.2.9 Data Evaluation

An evaluation of the water quality sample analytical results, including figures with sample locations, will be submitted to the Owner/Developer with the water quality analytical results and the QA/QC data.

Should the runoff/downgradient sample show an increased level of the tested analyte relative to the background sample, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase. As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visual pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the SWPPP.

6.2.10 Change of Conditions

Whenever SWPPP monitoring, pursuant to Section B of the General Permit, indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. All such revisions will be recorded as amendments to the SWPPP.

SECTION 7

Non-Stormwater Management

7.1 General

Non-stormwater management at the construction sites mainly involves prevention of contamination in runoff. Non-stormwater discharges from the project site are not anticipated due to effective implementation of control practices.

7.2 Inventory for Pollution Prevention Plan

The following substances are expected to be present onsite during construction:

- Portland Concrete Cement and masonry products
- Paints
- Detergents
- Fuels
- Lubricants
- Lumber
- Solvents
- Asphalt products
- Adhesives

Contractors are required by state and federal law to have inventories of hazardous materials. If the use of other types of hazardous materials at the site becomes necessary, the SWPPP will be amended as needed.

7.3 Hazardous Materials Management Plan

A variety of chemicals will be stored and used during construction of the facility. Hazardous materials to be used during construction include unleaded gasoline, diesel fuel, oil, lubricants (i.e., motor oil, transmission fluid, and hydraulic fluid), solvents, adhesives, paint materials, and building materials such as asphalt, sealants, and concrete. There are no feasible alternatives to these materials for construction or operation of construction vehicles and equipment, or for painting and caulking buildings and equipment.

In general, construction contractors will use lubricating oils, solvents, and other hazardous materials during construction of VPP. The contractor will be responsible for assuring that the use, storage and handling of these materials will comply with applicable federal, state, and local LORS, including licensing, personnel training, accumulation limits, reporting requirements, and recordkeeping.

All equipment will be maintained to prevent leaks and spills, and fueling will only be conducted within contained areas. Spill containment equipment will be available if it is needed. Any contaminated soils resulting from spills will be dug up as quickly as possible, and then removed from the site for proper disposal.

7.4 Prevention of Non-Stormwater Discharges

There will be specific designated temporary waste storage areas onsite. These areas will be contained within earthen berms or an equivalent barrier measure. Non-hazardous construction wastes (trash and construction debris) will be collected and placed into commercial disposal containers as soon as possible.

BMPs that will be implemented to prevent non-stormwater discharges include:

- Monitor all vehicle and equipment fueling and maintenance activities; fuel offsite wherever possible (BMPs NS-9 and NS-10)
- Use secondary containment for hazardous material delivery and storage areas to prevent spills or leakage of liquid material from contaminating soil or soaking into the ground (BMP WM-1)
- Train employees on the proper use of materials such as fuel, oil, asphalt and concrete compounds, paints, solvents, etc. (BMP WM-2)
- Store all liquid wastes in covered containers (BMP WM-4)
- Regularly remove construction wastes (BMP WM-5)
- Educate employees, subcontractors, and suppliers on concrete waste management techniques (BMP WM-8)
- Use portable toilet facilities managed and regularly serviced by a licensed contractor (BMP WM-9)
- Keep water equipment in good working condition; do not use water to clean pavement (BMP NS-1)
- Use practices for conducting paving operations to minimize the transport of pollutants to the stormdrain system (BMP NS-3)
- Recognize and report illicit connections or discharges (BMP NS-6)
- Restrict vehicle and equipment washing to designated areas (BMP NS-8)
- Use proper procedures to minimize pollution of runoff during concrete curing and finishing (BMPs NS-12 and NS-14)

7.4.1 Good Housekeeping

The following good housekeeping practices will be followed on all construction sites during the construction project:

- An effort will be made to store only enough product required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers, and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.

- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used before disposing of the container.
- Manufacturer and/or State and local recommendations for proper use and disposal will be followed.
- Storage areas including equipment storage will be inspected for visible signs of oil or other spillages.

7.4.2 Product Specific Practices

The following product-specific practices will be followed onsite:

- **Petroleum Products:** All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the potential for leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Asphalt substances used onsite will be applied according to the manufacturers' recommendations.
- **Paints:** Containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be disposed of properly according to manufacturers' instructions and State and local regulations.
- **Concrete:** Equipment used for concrete mixing and transport will not be allowed to wash out or discharge surplus concrete or drum wash water on the site except in areas specifically designated for rinse out as indicated in Section 3.2.3. Wash water will be contained in a temporary pit where waste concrete can harden for later removal. Fresh concrete washing will be avoided unless runoff can be drained to a bermed or level area, away from waterways and storm drain inlets.

7.4.3 Spill Prevention Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite, and will include, but not limited to brooms, dustpans, mops, rags, gloves, goggles, absorbents (e.g., kitty litter, sand, sawdust), and plastic and metal trash containers specifically for this purpose.
- Spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from and contact with a hazardous substance.

- The Project Manager (or designee) will be the spill prevention and cleanup coordinator. The names of additional responsible spill personnel and authorized contractors will be posted in various areas.
- Spills of toxic or hazardous materials will be reported to the Project Supervisor (or designee) regardless of the size.
- Spills of hazardous materials that exceed their reportable quantities will be reported to all appropriate local, state and federal government agencies.

Contaminated soil or debris that cannot be recycled, reused, or salvaged will be collected and stored in securely lidded dumpsters rented from a licensed solid waste management company. The dumpsters will meet all local and State solid waste management regulations. Potentially hazardous wastes will be separated from known non-hazardous wastes. This includes the segregation of storage areas and proper labeling of containers. All waste will be removed from the site by licensed contractors in accordance with applicable regulatory requirements and disposed of at either local or regional approved facilities. No waste materials will be buried onsite. All personnel will be instructed regarding the correct procedures for waste disposal. Notices stating these procedures will be posted in various areas.

The Project Manager (or designee) will be responsible for investigating spills and determining whether the reportable quantity has been exceeded. Regulations defining the reportable quantity levels for oil and hazardous substances are found in 40 CFR Part 110, Part 117 or Part 302. Should a release occur during construction activities that exceeds the reportable quantity, the following steps should be taken:

- Notify Local Emergency Response Agency at 9-1-1
- Notify the National Response Center immediately at (800) 424-8802
- Notify Governor's office of Emergency Services Warning Center at (805) 852-7550

A written description of the release should be submitted to the USEPA Regional Office providing the date, circumstances of the release, and the preventative measures taken to prevent further releases.

7.4.4 Isolation of Potentially Hazardous Materials

A supply of drums will be available in the event of spills of known materials or if potentially hazardous materials are found during project construction. The contaminated material will be placed in the drums, sealed and placed in a storage area to await proper characterization and disposal. The sealed drums should be further placed in a lined roll-off container with a tarpaulin cover. In this case, the potentially hazardous materials are stored in a marked covered area that has secondary containment. In the event that a larger amount of material needs to be isolated, it will be placed directly into a lined roll-off container from a licensed hazardous waste transporter. The roll-off container will be placed out of the flow of construction traffic and equipment, in a bermed area to contain and isolate possible leaks and rainwater. In the unlikely event that even larger volumes of potentially hazardous material must be temporarily held awaiting disposition, a containment area will be constructed. Plastic sheeting will be laid on the ground prior to placement of the contaminated material and the material itself will be covered. A berm will surround the covered material to keep any rainwater from leaving the site.

SECTION 8

Waste Management and Disposal

All wastes (including waste oil and other equipment maintenance waste) from VPP construction shall be disposed of in compliance with federal, state, and local laws, regulations, and ordinances. Specific waste management and disposal procedures have been addressed in previous sections of this plan (see Section 3.3.2).

SECTION 9

Annual Review and Certification

Annually, the Project Manager (or designee) will review performance under the SWPPP and certify that construction activities are in compliance with the requirements of the Stormwater General Permit and the SWPPP. This Certification shall be based upon knowledge of construction activities and the site inspections conducted in accordance with the General Permit. The certification must be completed by July 1 of each year, and maintained for at least 3 years. If necessary, amendments to the SWPPP will be prepared and submitted at this time.

SECTION 10

SWPPP Administration

The Project Manager (or designee) will be identified in this SWPPP as the qualified person(s) assigned responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

The following lists required as part of the SWPPP will be maintained by the Project Manager:

- List of authorized contractors who have signed certifications that they understand and will comply with the SWPPP will be maintained in Appendix E. Additional information including current and emergency telephone numbers, address, contractor's responsibilities, and the specific names of individuals responsible for implementation of the SWPPP will also be maintained.
- List the name and telephone number of the qualified person(s) who have been assigned responsibility for pre-storm, post-storm, and storm event inspections (Appendix F).
- List of amendments will be maintained from the date of the first amendment prepared to the date of the most recent amendment (Appendix H). The SWPPP and each amendment will be certified by the Project Manager (or designee).

SECTION 11

Contractors/Subcontractors

The prime construction contractor will be included in this SWPPP upon award of the construction contract. Portions of the work are likely to be subcontracted to various specialty contractors. All subcontractors will be required to comply with the requirements of this permit. A list of authorized contractors/subcontractors will be maintained in Appendix E.

SECTION 12

SWPPP Certification by Contractor

The contractor who is authorized to implement and amend this SWPPP will be required to sign and certify that the SWPPP is in conformance with the General Permit. The Contractor is designated as the responsible party for the overall stormwater management at the site. By signing the Certification (found in Appendix D), the Contractor agrees to the following:

> *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel prepared the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for preparing the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

SECTION 13

SWPPP Certification by Preparer

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel prepared the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for preparing the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Signed **Position**

_____

Date

SECTION 14

Notice of Intent

The Notice of Intent (NOI) Form to obtain coverage under the State General Construction Activity Stormwater Permit is included in Appendix A. The Notice of Intent will be filed by the contractor prior to initiation of project construction as required.

SECTION 15

References

California Department of Conservation (CDC). 2005. Farmland Mapping and Monitoring Program, Soil Candidate Listing for Prime Farmland and Farmland of Statewide Importance for San Bernardino County. Updated August 23.

CDC. 2005a. Farmland Mapping and Monitoring Program, Soil Candidate Listing for Prime Farmland and Farmland of Statewide Importance for Riverside County. Updated August 23.

CDC. 2002. Farmland Mapping and Monitoring Program Maps for San Bernardino County and for Riverside County. Division of Land Resource Protection, Sacramento.

CDC. 1995. Farmland Mapping and Monitoring Program Soil Candidate Listing for Prime Farmland and Farmland of Statewide Importance for Riverside County. August 1.

City of Grand Terrace. 2001. Zoning Code (Title 18 of the Grand Terrace Municipal Code). August.

City of Grand Terrace. 1988. General Plan. December.

Federal Emergency Management Agency (FEMA). 1997. Flood Insurance Rate Map: County of San Bernardino (panel number 060270)/City of Grand Terrace (panel number 060737).

National Resource Conservation Service (NRCS) (formerly the Soil Conservation Service [SCS] of the U.S. Department of Agriculture). 2005. Official Soil Series Descriptions [Online WWW]. Available URL: "http://soils.usda.gov/technical/classification/osd/index.html" [Accessed January 16, 2055].

NRCS. 1980. Soil Survey of San Bernardino County, Southwestern Part, California. January.

NRCS. 1971. Soil Survey Western Riverside Area, California. November.

State of California Department of Transportation (Caltrans). 2003. *Caltrans Storm Water Quality Handbooks*.

Storm Water Quality Task Force. 1993. *California Stormwater Best Management Practices Handbooks.* Volume 2: Commercial/Industrial Handbook.

APPENDIX A

Notice of Intent

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WQ ORDER No. 99-08-DWQ)

I. NOI STATUS (SEE INSTRUCTIONS)

MARK ONLY ONE ITEM 1. ■ New Construction 2. ☐ Change of Information for WDID#

II. PROPERTY OWNER

Name **City of Vernon**		Contact Person **Samuel Kevin Wilson**	
Mailing Address **4305 Santa Fe Avenue**		Title **Director of Community Services and Water**	
City **Vernon**	State **CA**	Zip **90058**	Phone **(323) 583-8811**

III. DEVELOPER/CONTRACTOR INFORMATION

Developer/Contractor **TBD**		Contact Person	
Mailing Address		Title	
City	State	**Zip**	Phone

IV. CONSTRUCTION PROJECT INFORMATION

Site/Project Name **Vernon Power Plant**		Site Contact Person **TBD**		
Physical Address/Location **3200 Fruitland Avenue**	Latitude **33.99**	Longitude **-118.20**	County **Los Angeles**	
City (or nearest City) **Vernon**	Zip **90058**	Site Phone Number **TBD**	Emergency Phone Number **TBD**	

A. Total size of construction site area: **27** Acres

B. Total area to be disturbed: **27** Acres (% of total 100)

C. Percent of site imperviousness (including rooftops):
Before Construction: **100** %
After Construction: **100** %

D. Tract Number(s): N/A

E. Mile Post Marker: N/A

F. Is the construction site part of a larger common plan of development or sale?
☐ YES ■ NO

G. Name of plan or development:
N/A

H. Construction commencement date: **09/01/2006**

I. % of site to be mass graded: **100**

J. Projected construction dates:
Complete grading: **08/15/2006** Complete project: **04/01/2008**

K. Type of Construction (Check all that apply):

1. Residential 2. Commercial 3. ☐ Industrial 4. ☐ Reconstruction 5. ☐ Transportation
6. ■ Utility Description: **Power Plant** 7. Other (Please List): _____

V. BILLING INFORMATION

SEND BILL TO: ■ OWNER (as in II. above)	Name **City of Vernon**	Contact Person **Samuel Kevin Wilson**	
☐ DEVELOPER (as in III. above)	Mailing Address **4305 Santa Fe Avenue**	Phone/Fax **(323) 583-8811 / (323) 826-1435**	
☐ OTHER (enter information at right)	City **Vernon**	State **CA**	Zip **90058**

VI. REGULATORY STATUS

A. Has a local agency approved a required erosion/sediment control plan? ■ YES ☐ NO

Does the erosion/sediment control plan address construction activities such as infrastructure and structures? ■ YES ☐ NO

Name of local agency: **California Energy Commission** Phone: **TBD**

(The SWPPP will serve as the erosion/sediment control plan.)

B. Is this project or any part thereof, subject to conditions imposed under a CWA Section 404 permit of 401 Water Quality Certification? ☐ YES ■ NO

If yes, provide details:

VII. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (Check all that apply):

1. ☐ Indirectly to waters of the U.S.
2. ■ Storm drain system - Enter owner's name: **City of Vernon**
3. ☐ Directly to waters of U.S. (e.g. , river, lake, creek, stream, bay, ocean, etc.)

B. Name of receiving water: (river, lake, creek, stream, bay, ocean): N/A

VIII. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (check one)

☐ A SWPPP has been prepared for this facility and is available for review: Date Prepared: ____/____/____ Date Amended: ____/____/____

■ A SWPPP will be prepared and ready for review by (enter date) **08/31/08**

☐ A tentative schedule has been included in the SWPPP for activities such as grading, street construction, home construction, etc.

B. MONITORING PROGRAM

■ A monitoring and maintenance schedule has been developed that includes inspection of the construction BMPs before anticipated storm events and after actual storm events and is available for review.

If checked above: A qualified person has been assigned responsibility for pre-storm and post-storm BMP inspections to identify effectiveness and necessary repairs or design changes. ■ YES ☐ NO

Name: **TBD** Phone:

C. PERMIT COMPLIANCE RESPONSIBILITY

A qualified person has been assigned responsibility to ensure full compliance with the Permit, and to implement all elements of the Storm Water Pollution Prevention Plan including:

1. Preparing an annual compliance evaluation. ■ YES ☐ NO

Name: **TBD** Phone:

2. Eliminating all unauthorized discharges. ■ YES ☐ NO

IX. VICINITY MAP AND FEE (must show site location in relation to nearest named streets, intersections, etc.)

Have you included a vicinity map with this submittal? ■ YES ☐ NO

Have you included payment of the annual fee with this submittal? ■ YES ☐ NO

X. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan will be complied with."

Printed Name: **Samuel Kevin Wilson**

Signature: **Date:**

Title: **Director of Community Services and Water**

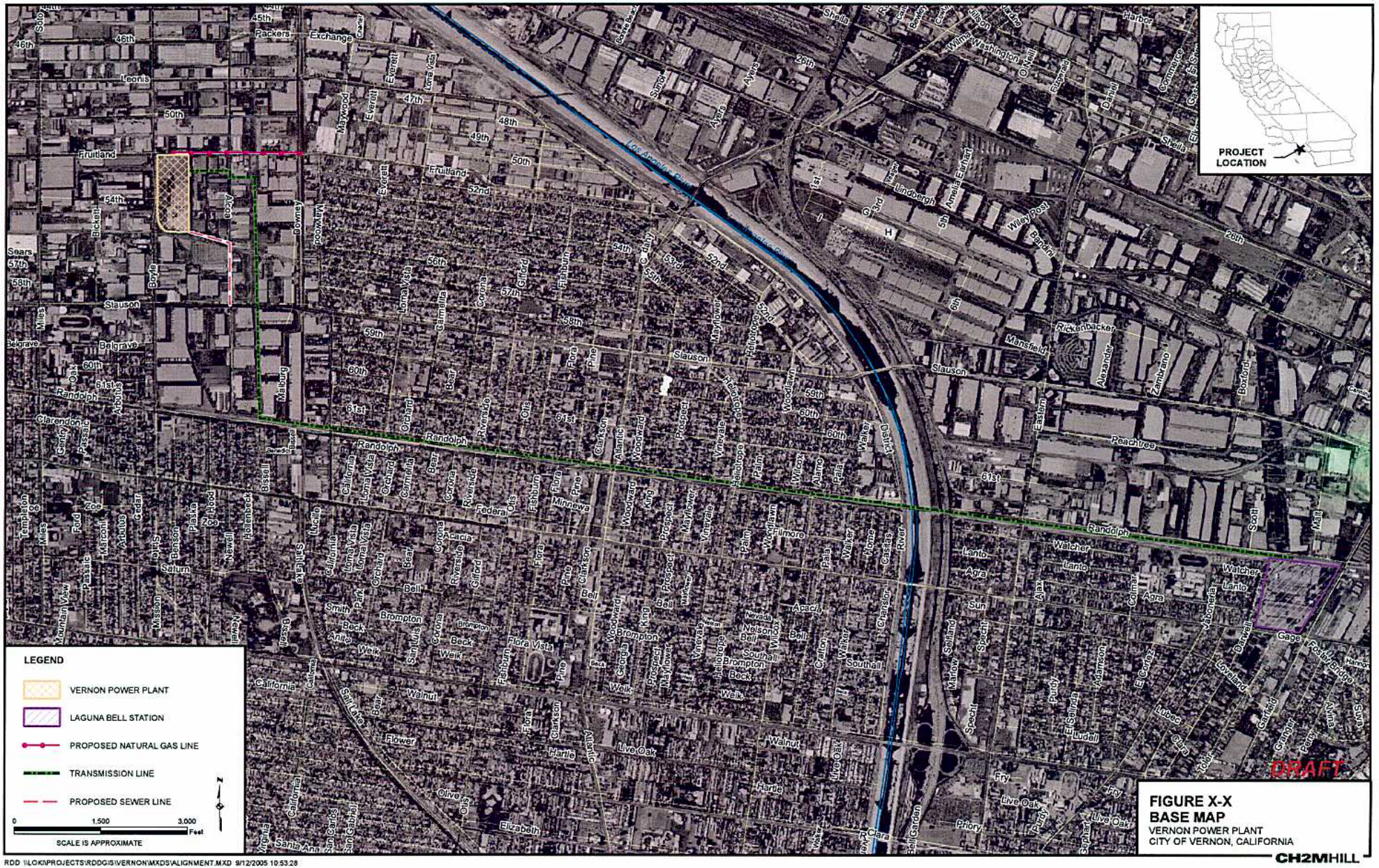


FIGURE X-X
BASE MAP
VERNON POWER PLANT
CITY OF VERNON, CALIFORNIA

CH2MHILL

RDD \\LOKAPROJECTS\RDDGIS\VERNON\MXDS\ALIGNMENT.MXD 9/12/2005 10:53:28

APPENDIX B

Stormwater Calculations

BURNS AND ROE ENTERPRISES, INC.

W.O. No: 2731 Calc. _____ Sheet No: 1 Cont'd on 2
Prepared By: DM Date: 5-23-06 Checked By: _____ Date: _____
Title: VERNON POWER PLANT - DETENTION BASIN STORAGE CAPACITY

DETERMINE REQUIRED DETENTION BASIN STORAGE CAPACITY

50-YR 24-HR RAINFALL DEPTH = 5.0IN

REF: E-MAIL DATED 2/15/06

CONVERT 50-YR STORM TO 10YR DESIGN STORM

10-YR STORM = 5.0IN(.714) = 4IN

REF: LACDPW HYD MANUAL P64

TOTAL PLANT AREA = 13.68AC = 595,901SF

CONTAINMENT AREAS = 54925SF (DOES NOT DRAIN TO BASIN)
PAVED AREAS = 280,000 SF
CRUSHED STONE AREAS = 260,976SF > 540976SF

CALCULATE AVERAGE RUNOFF COEFFICIENT - "C"

$$\text{Avg "C"} = \frac{280{,}000}{540976}(.95) + \frac{260{,}976}{540976}(.70) = 0.83$$

"C" FOR PAVED AREA

"C" FOR PERVIOUS STONE

$$\text{REQ'D BASIN STORAGE CAPACITY} = 540976\text{SF}\left(\frac{4\text{IN}}{12\text{IN}}\right)(.83)$$

$$= 149670\text{CF}$$

ASSUMING A BASIN STORAGE DEPTH OF 6½ FT WITH 1V:2H SIDE SLOPES, TRY BASIN SIZE OF 400'x75' (INCLUDE 1 FOOT FREEBOARD ABOVE STORAGE)

$$\text{STORAGE CAPACITY} = (400-2(6.5))(75-(2\times6.5))\,6.5$$

(AVG BASIN AREA)

$$= 155961\text{SF} > 149{,}670\text{CF} \quad \text{OK}$$

SHEET 2 OF 3

From: "Maximous, Ehab" <EMaximous@ci.vernon.ca.us>
To: "Dennis Morrissey" <dmorrissey@roe.com>
Date: 2/15/2006 5:53:18 PM
Subject: RE: LA County DPW Info

approx. 5.6in.
Asbuilts are in the mail and should be on the way. We found two storm drain sheets for the RCP along Seville and Soto.

-----Original Message-----
From: Dennis Morrissey [mailto:dmorrissey@roe.com]
Sent: Wednesday, February 15, 2006 12:51 PM
To: Maximous, Ehab
Subject: Re: LA County DPW Info

Max,

I have downloaded the Hydrology Manual and Addendum, but have been unable to view or download the associated 50-year 24-hour Rainfall Isohyetal Maps. Do you know what the 50-year 24-hour rainfall depth is in the vicinity of the Vernon Power Plant?

Also, were you able to send the storm drain asbuilts?

Thanks for your help,

Dennis

Dennis Morrissey, PE
Principal Engineer
Burns and Roe Enterprises, Inc
Phone 201 986 4090
Fax 201 986 4425
Email dmorrissey@roe.com

>>> "Maximous, Ehab" <EMaximous@ci.vernon.ca.us> 02/02/06 1:04 PM >>>
As we discussed, please see the attached. Also, here is the website for the County of Los Angeles Department of Public Works:
http://www.ladpw.com/wrd/publication/index.cfm The Hydrology Manual can be downloaded here.

I'll be mailing you out some storm drain asbuilts today.
Let me know if you need any additional help.

Max

E. MAXIMOUS (MAX), PE | CIVIL ENGINEER<?xml:namespace prefix = o ns = "urn:schemas-microsoft-com:office:office" />

CITY OF VERNON | COMMUNITY SERVICES AND WATER DEPARTMENT

4305 SANTA FE AVE. | VERNON, CA 90058

Isohyetal maps for the 50-year 24-hour rainfall depth in inches have been generated using a geographic information system (GIS). The isohyetal maps are at intervals of two tenths of an inch and are included in Appendix C of this addendum. Frequency reduction factors have been developed to calculate 10-year and 25-year 24-hour rainfall depths from the 50-year 24-hour rainfall depths. The frequency reduction factors are as follow:

Rainfall Depth	Frequency Factor
10-year 24-hour	0.714
25-year 24-hour	0.878
50-year 24 hour	1.000

Using the isohyetal maps and the appropriate frequency reduction factor, a mean basin rainfall depth in inches can be determined for each subarea in the watershed. By using the dimensionless mass curve found in Appendix B and the mean subarea rainfall depth, the temporal distribution of the rainfall is determined.

4. Isohyetal Method:

Isohyetal maps indicating the spatial variability of rainfall over Los Angeles County have been created. These maps are shown in Appendix C. This more precisely defined rainfall distribution reasonably represents the average rainfall over the watershed and its subareas.

The following procedures can be used to compute the average rainfall within a watershed subarea:

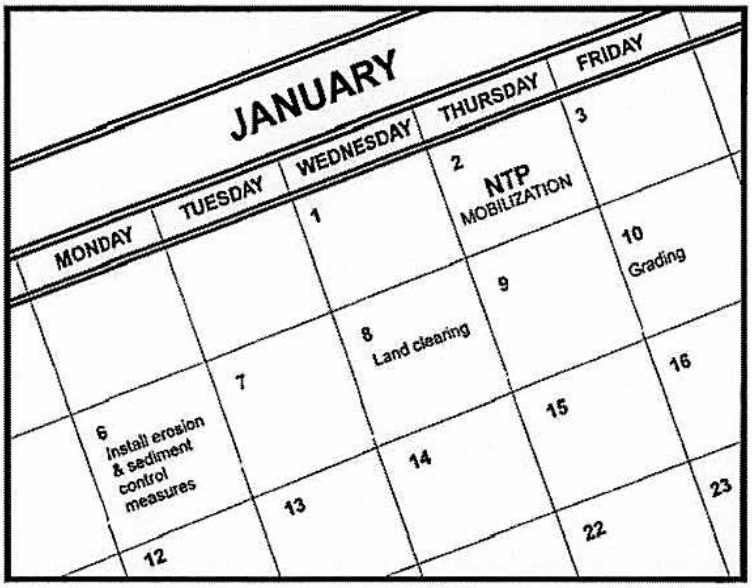
The area between successive isohyetal lines is computed and multiplied by the numerical average of the two contour (isohyet) values. The sum of the computed values described above divided by the drainage area or subarea area provides the weighted average rainfall depth. The average rainfall should be calculated to the nearest printed isohyet for every subarea.

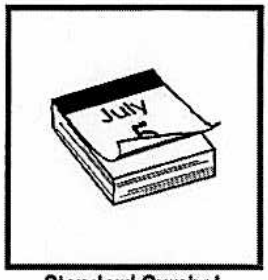
APPENDIX C

Detailed Description of CALTRANS BMPs

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.

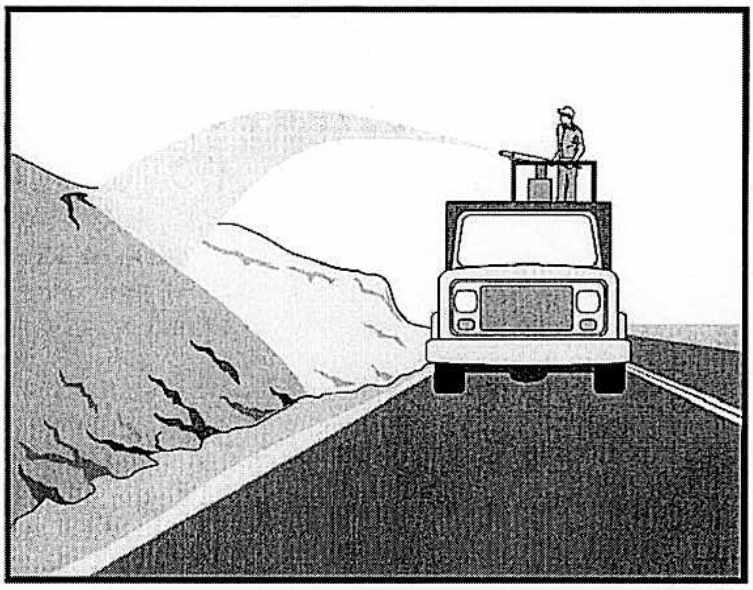
- Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule work to minimize 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.

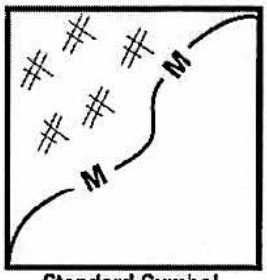
Maintenance and Inspection

- 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.

Hydraulic Mulch

SS-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

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix and a stabilizing emulsion or tackifier with hydroseeding equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Hydraulic mulch is applied to disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must re-disturbed following an extended period of inactivity.

Limitations

- Wood fiber hydraulic mulches are generally short-lived (only last a part of a growing season) and need 24 hours to dry before rainfall occurs to be effective.
- Paper mulches are not permitted.
- Avoid use in areas where the mulch would be incompatible with immediate future earthwork activities and would have to be removed.

Standards and Specifications

- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.
- Hydraulic matrices require 24 hours to dry before rainfall occurs to be effective unless approved by the Resident Engineer.
- Avoid mulch over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.
- Selection of hydraulic mulches by the Contractor must be approved by the Resident Engineer (RE) or Construction Storm Water Coordinator.

- Materials for wood fiber based hydraulic mulches and hydraulic matrices shall conform to Standard Specifications Section 20-2.07.

- Hydraulic Mulch

- Wood fiber mulch is a component of hydraulic applications. It is typically applied at the rate of 2,250 to 4,500 kilograms per hectare (kg/ha) (2,000 to 4,000 lb/ac) with 0-5% by weight of a stabilizing emulsion or tackifier (e.g., guar, psyllium, acrylic copolymer) and applied as a slurry. This type of mulch is manufactured from wood or wood waste from lumber mills or from urban sources. Specifications for wood fiber mulch can be found in Standard Specifications Sections 20-2.07 and 20-2.08.

- Hydraulic matrix is a combination of wood fiber mulch and a tackifier applied as a slurry. It is typically applied at the rate of 2,250 to 4,500 kilograms per hectare (kg/Ha) with 5-10% by weight of a stabilizing emulsion or tackifier (e.g., guar, psyllium, acrylic copolymer).

- Hydraulic Matrix

- Hydraulic matrix is a combination of wood fiber mulch and tackifier applied as a slurry. It is typically applied at the rate of 2,250 to 4,500 kg/ha with 5-10% by weight of a stabilizing emulsion or tackifier (e.g., guar, psyllium, acrylic copolymer).

- Bonded Fiber Matrix

- Bonded fiber matrix (BFM) is a hydraulically-applied system of fibers and adhesives that upon drying forms an erosion-resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,400 kg/ha to 4,500 kg/ha based on the manufacturer's recommendation. The biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall if the soil is saturated. Depending on the product, BFMs require 12 to 24 hours to dry to become effective.

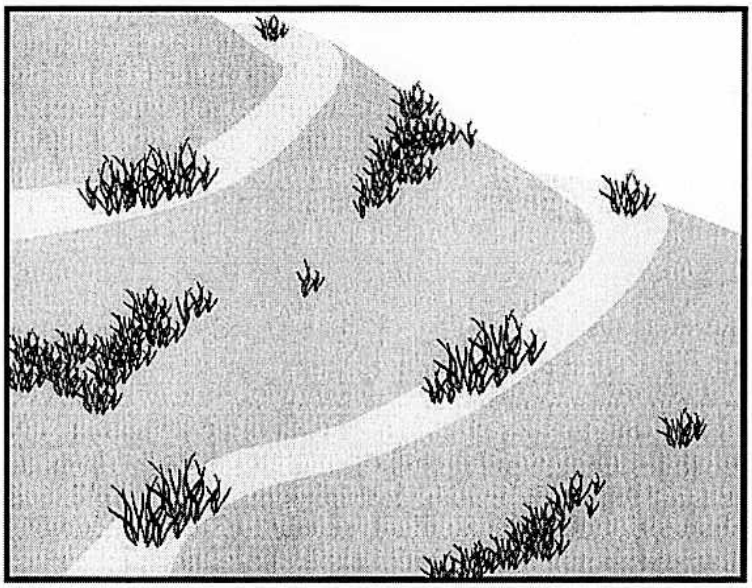
Maintenance and Inspections

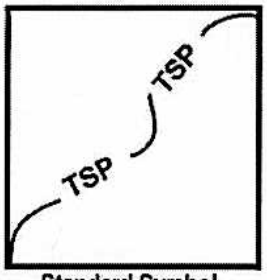
- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked. Inspect before expected rain storms and repair any damaged ground cover and re-mulch exposed areas of bare soil.

- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Hydroseeding

SS-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

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

Appropriate Applications

- Hydroseeding is applied on disturbed soil areas requiring temporary protection until permanent vegetation is established or disturbed soil areas that must be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and erosion control. Otherwise, hydroseeding must be used in conjunction with a soil binder or mulching (i.e., straw mulch), refer to BMP SS-5, Table 1 for options.
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short-term inactivity.

Standards and Specifications

To select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

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

- Selection of hydroseeding mixtures shall be approved by the District Landscape Architect and the Construction Storm Water Coordinator.

The following steps shall be followed for implementation:

- Seed mix shall comply with the Standard Specifications Section 20-2.10, and the project's special provisions.

- Hydroseeding can be accomplished using a multiple-step or one-step process; refer to the special provisions for specified process. The multiple-step process ensures maximum direct contact of the seeds to soil. When the one-step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.

- Prior to application, roughen the slope, fill area, or area to be seeded with the furrows trending along the contours. Rolling with a crimping or punching type roller or track walking is required on all slopes prior to hydroseeding. Track walking shall only be used where other methods are impractical.

- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow, refer to Standard Specifications Sections 20-2.06 and 20-3.03.

- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test; provide the Resident Engineer (RE) with such documentation. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet-inoculated. Inoculant sources shall be species-specific and shall be applied at a rate of 2 kg of inoculant per 100 kg of seed (2-lb inoculant per 100-lb seed), refer to Standard Specifications Section 20-2.10.

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

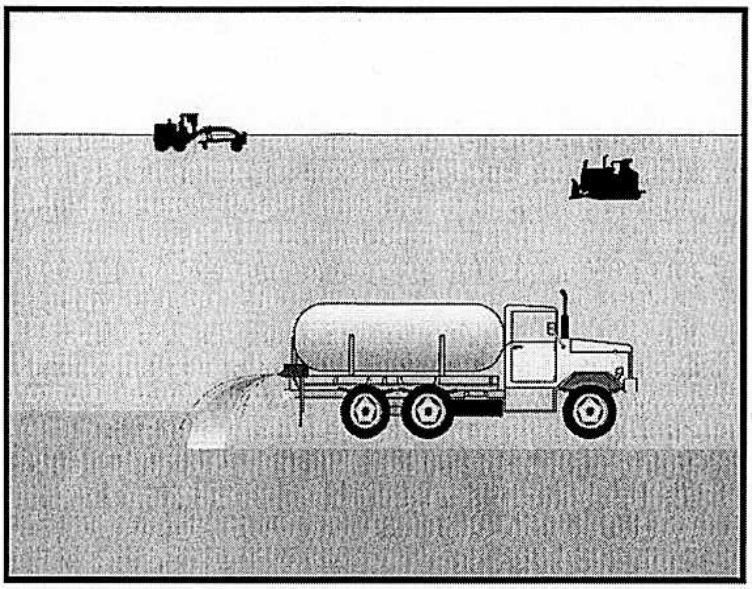
- Follow-up applications shall be made as needed to cover weak spots, and to maintain adequate soil protection.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

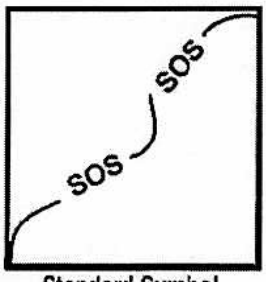
Maintenance and Inspection

- All seeded areas shall be inspected for failures and re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be reapplied at a scheduled recommended by the Caltrans Landscape Architect or RE.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Soil Binders

SS-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

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

Appropriate Applications

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

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer, which may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.
- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Storm water quality runoff sampling is required for many soil binders. Soil binders that do not require sampling are identified in the Caltrans SWPPP/WPCP Preparation Manual, Pollutant Table, Attachment S.

- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- May not cure if low temperatures occur within 24 hours of application.

Standards and Specifications

General Considerations

- Site-specific soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces, refer to Standard Specifications Section 20-2.11.
- Some soil binders are compatible with existing vegetation.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Soil Binders Applications

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

- Follow manufacturer's recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where rolling is impractical.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Soil binders shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 4oC (40oF) during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.14 to 1.4 L/m^2 (0.03 to 0.3 gal/yd^2) or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 150 to 300 mm (6 to 12 in).
  - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
  - In low humidities, reactivate chemicals by re-wetting with water at 0.5 to 0.9 L/m^2 (0.1 to 0.2 gal/yd^2).

Selecting a Soil Binder

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

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

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

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

Plant-Material Based (Short Lived)

-Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersent agents for easy field mixing. It shall be diluted at the rate of 1.2 to 1.8 kg per 1,000 liters (1 to 5 lb per 100 gallons) of water, depending on application machine capacity. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (V:H):	Flat	1:4	1:3	1:2	1:1
Kg/Ha:	45	50	56	67	78
lb/ac	40	45	50	60	70

-Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Psyllium shall be applied at a rate of 90 to 225 kg/ha (80 to 200 lb/ac), with enough water in solution to allow for a uniform slurry flow.

-Starch: Starch is non-ionic, cold-water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 170 kg/ha (150 lb/ac). Approximate drying time is 9 to 12 hours.

Plant-Material Based (Long Lived)

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

For clayey soil: 5 parts water to 1 part emulsion

For sandy soil: 10 parts water to 1 part emulsion

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

Polymeric Emulsion Blends

-Acrylic Copolymers and Polymers: Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date; manufacturers shall provide the expiration date. Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air cure within a maximum of 36 to 48 hours. Liquid copolymer shall be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 11,000 liters/hectare (1,175 gal/ac).

-Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 190 L/ha (20 gal/ac). Drying time is 12 to 18 hours after application.

-Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (V:H)	kg/ha (lb/ac)
Flat to 1:5	3.4 – 5.6 (3-5)
1:5 to 1:3	5.6 – 11.2 (5-10)
1:2 to 1:1	11.2 – 22.4 (10-20)

-Poly-Acrylamide and Copolymer of Acrylamide: Linear copolymer polyacrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 1.5 kg/1,000 liters (1 lb/100 gal) of water and applied at the rate of 5.6 kg/ha (5 lb/ac).

-Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 60 to 70 kg/ha (53 to 62 lb/ac). Drying times are 0 to 4 hours.

Cementitious-Based Binders

-*Gypsum:* This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,500 to 13,500 kg/ha (4,000 to 12,000 lb/ac). Drying time is 4 to 8 hours.

Maintenance and Inspection

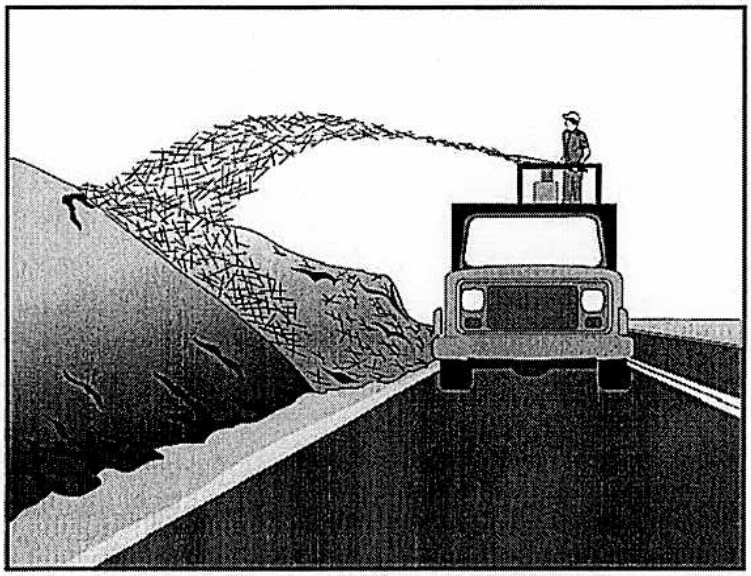
- Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected daily, and lower traffic areas shall be inspected weekly.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.
- Maintain an unbroken, temporary stabilized area while DSAs are nonactive. Repair any damaged stabilized area and re-apply soil binder to exposed areas.

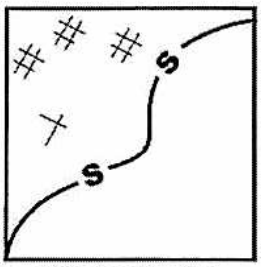
Table 1 Properties of Soil Binders for Erosion Control				
Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion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

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

Straw Mulch

SS-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

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a stabilizing emulsion. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
- There is a potential for introduction of weed-seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 45 m (150 ft) of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- "Punching" of straw does not work in sandy soils.

Standards and Specifications

- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Sections 20-2.06, 20-2.07 and 20-2.11.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Apply loose straw at a minimum rate of 3,570 kg/ha (4,000 lb/ac), or as indicated in the project's special provisions, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 140 kg/ha (125 lb/ac). In windy conditions, the rates are typically 200 kg/ha (178 lb/ac).
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
  - Applying and incorporating straw shall follow the requirements in Standard Specifications Section 20-3.03.
  - On small areas, a spade or shovel can be used.

- On slopes with soils, which are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper."

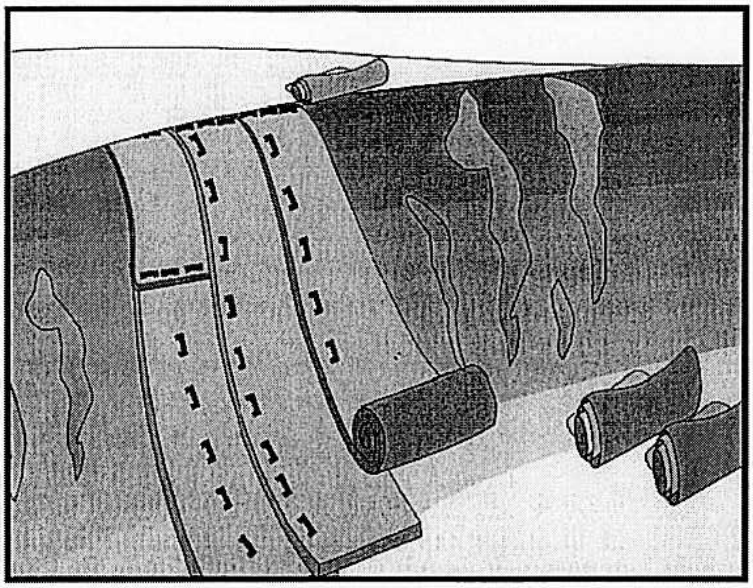
- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes. Refer to BMP SS-7, "Geotextiles, Plastic Covers and Erosion Control Blankets/Mats."

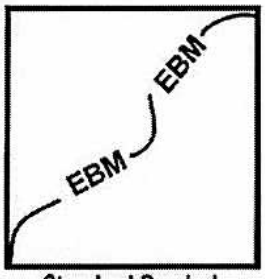
Maintenance and Inspections

- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required by the Resident Engineer (RE) to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7





Standard Symbol

BMP Objectives

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

Definition and Purpose

This Best Management Practice (BMP) involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 1:3 (V:H).
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 1.0 m/s (3.3 ft/s).
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.
- Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic shall be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

Standards and Specifications

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer (RE); certification of compliance shall be in accordance with Standard Specifications Section 6-1.07.

Geotextiles

- Material shall be a woven polypropylene fabric with minimum thickness of 1.5 mm (0.06 inch), minimum width of 3.7 m (12 ft) and shall have minimum tensile strength of 0.67 kN (warp) 0.36 kN (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec –1 in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Plastic Covers

- Plastic sheeting shall have a minimum thickness of 6 mil, and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 3 m (10 ft) apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 300 mm to 600 mm (12 to 24 inches) overlap of all seams. Edges shall be embedded a minimum of 150 mm (6 inches) in soil.

- All sheeting shall be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If washout or breakages occurs, the material shall be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.

  - **Jute** is a natural fiber that is made into a yarn, which is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Excelsior (curled wood fiber)** blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 150 mm (6 inches) or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips, a minimum of 1220 mm (48 inches) wide, and shall have an average weight of 0.5 kg/m^2 (12 lb/ft^2), ±10 percent, at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

- **Straw blanket** shall be machine-produced mats of straw with a lightweight biodegradable netting top layer. The straw shall be attached to the netting with biodegradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m2 (6.4 lb/ft2). Straw blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Coconut fiber blanket** shall be machine-produced mats of 100% coconut fiber with biodegradable netting on the top and bottom. The coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27-kg/m2 (6.4 lb/ft2). Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** shall be machine-produced mats of 70% straw and 30% coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket shall be of consistent thickness. The straw and coconut fiber shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m2 (6.4 lb/ft2). Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

  - **Plastic netting** is a lightweight biaxially-oriented netting designed for securing loose mulches like straw to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Plastic mesh** is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 0.5 cm (0.2 inch). It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Bonded synthetic fibers** consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90% open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

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

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.

Seeding

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

Anchoring

- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 3.05 mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- Metal stake pins shall be 5 mm (0.188 in) diameter steel with a 40 mm (1.5 in) steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be 150 mm (6 in) to 450 mm (18 in) long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes

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

- Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket downslope in the direction of water flow.

- Overlap the edges of adjacent parallel rolls 50 mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).
- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped area, approximately 300 mm (12 in) apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/m2 (2 staples/yd2). Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1½ staples/m2 (1 ½ staples/yd2), placing 1 staple/m (1 staple/yd) on centers. Gentle slopes require a minimum of 1 staple/m2 (1 staple/yd2).

Installation in Channels

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

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

- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 300 mm (12 in) intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 150 mm (6 in) centers at 8 m (25 ft) to 10 m (30 ft) intervals in lieu of excavated check slots.
- Shingle-lap spliced ends by a minimum of 300 mm (12 in) apart on 300 mm (12 in) intervals.
- Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
- Anchor, fill and compact upstream end of mat in a 300 mm (12 in) by 150 mm (6 in) terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

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

Temporary Soil Stabilization Removal

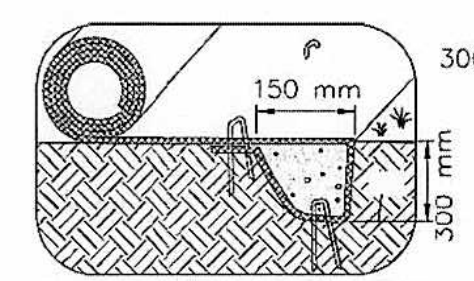
- When no longer required for the work, temporary soil stabilization shall become the property of the Contractor. Temporary soil stabilization removed from the site of the work shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 7-1.13. If approved by the RE, the contractor may leave the temporary soil stabilizer in place.

Maintenance and Inspection

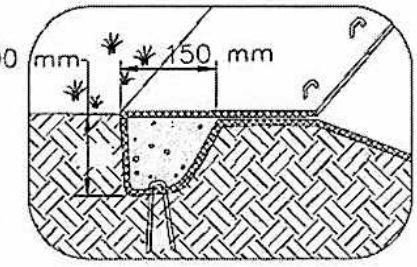
Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary soil stabilization shall be maintained to provide adequate erosion control. Temporary soil stabilization shall be reapplied or replaced on exposed soils when area becomes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

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

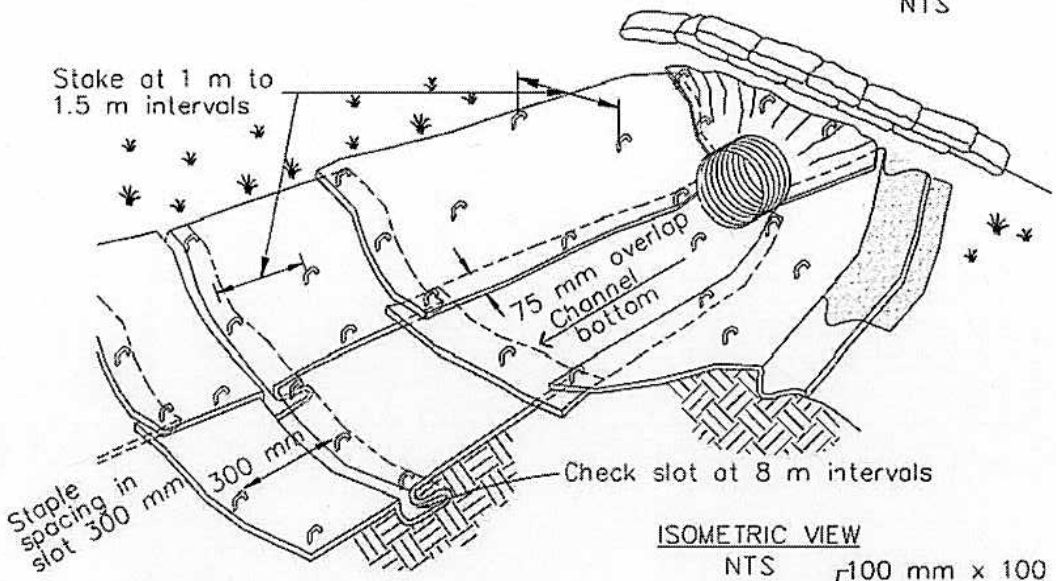
Typical Installation Detail



IN TIAL CHANNEL ANCHOR TRENCH
NTS



TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH
NTS



ISOMETRIC VIEW
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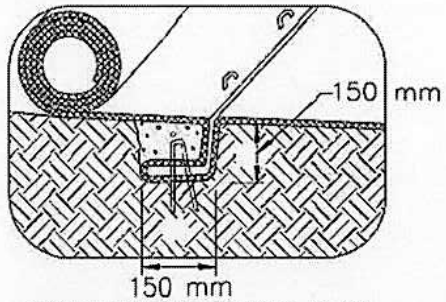
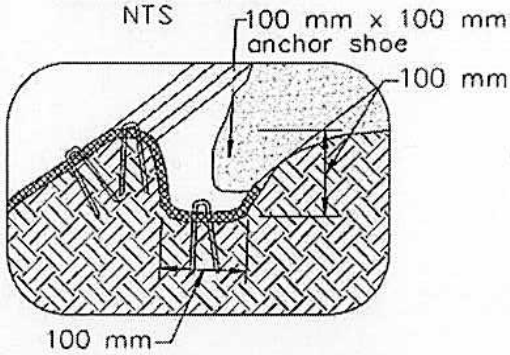


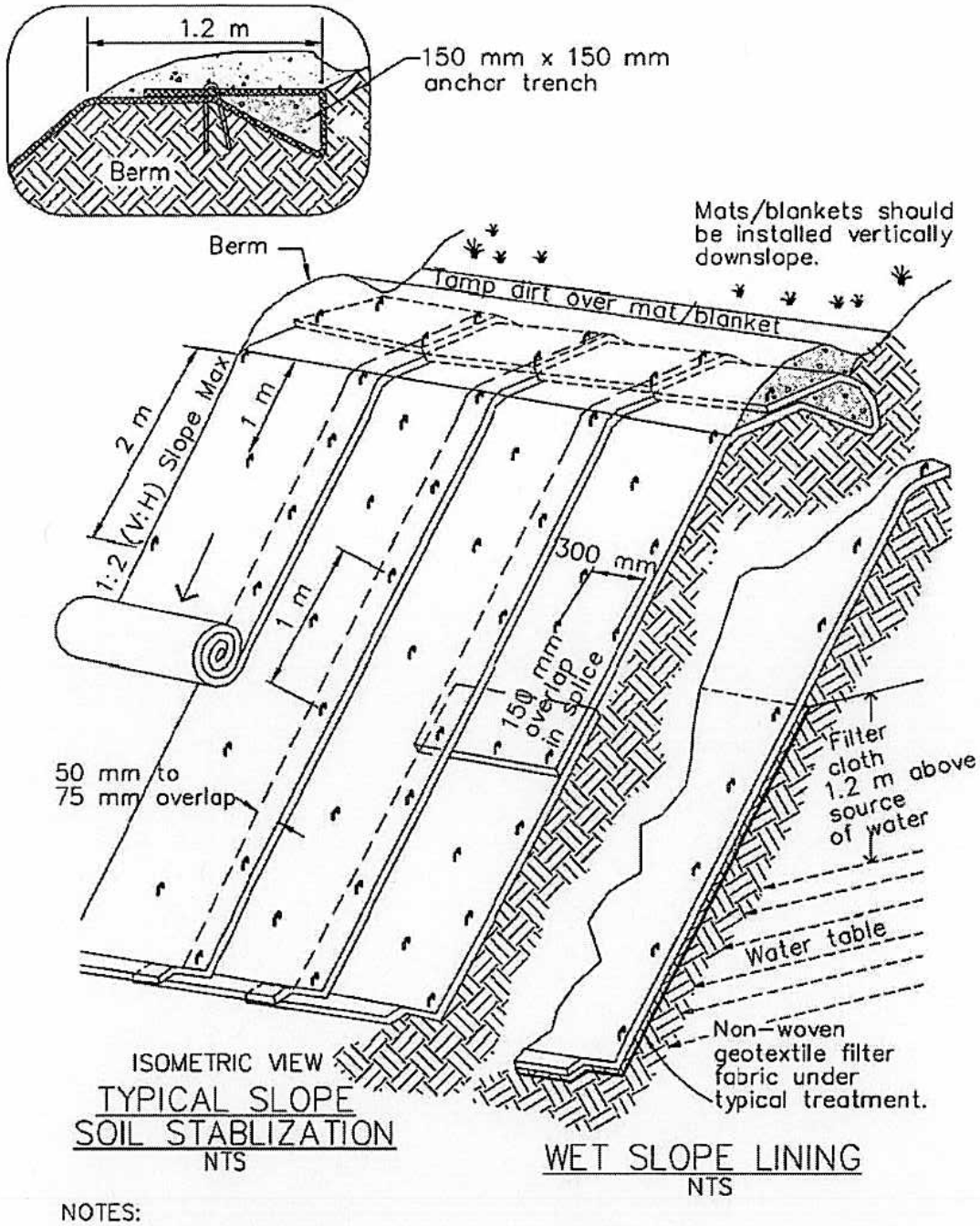
INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

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

Typical Installation Detail

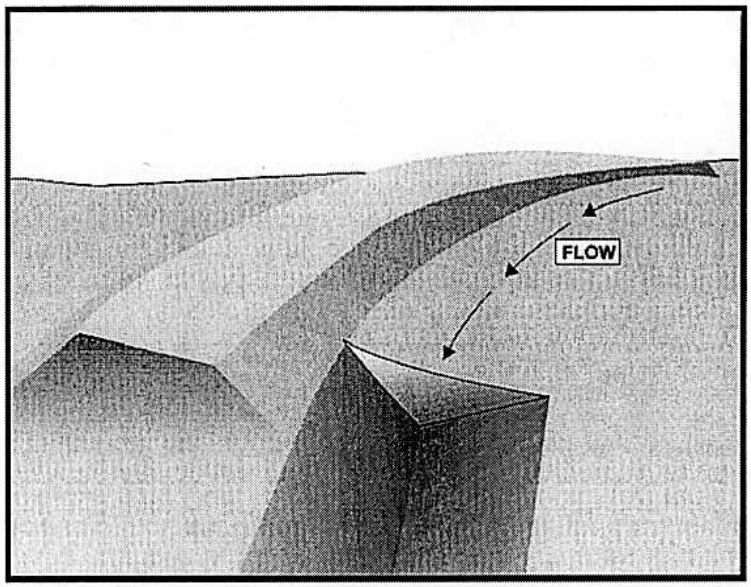


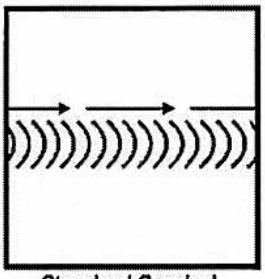
NOTES:

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

Earth Dikes/Drainage Swales and Lined Ditches

SS-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

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

Appropriate Applications

- Earth dikes/drainage swales and lined ditches may be used to:
  - Convey surface runoff down sloping land.
  - Intercept and divert runoff to avoid sheet flow over sloped surfaces.
  - Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
  - Intercept runoff from paved surfaces.
- Earth dikes/drainage swales and lined ditches also may be used:
  - Below steep grades where runoff begins to concentrate.
  - Along roadways and facility improvements subject to flood drainage.
  - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
  - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Earth Dikes/Drainage Swales and Lined Ditches

SS-9

Limitations

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

Standards and Specifications

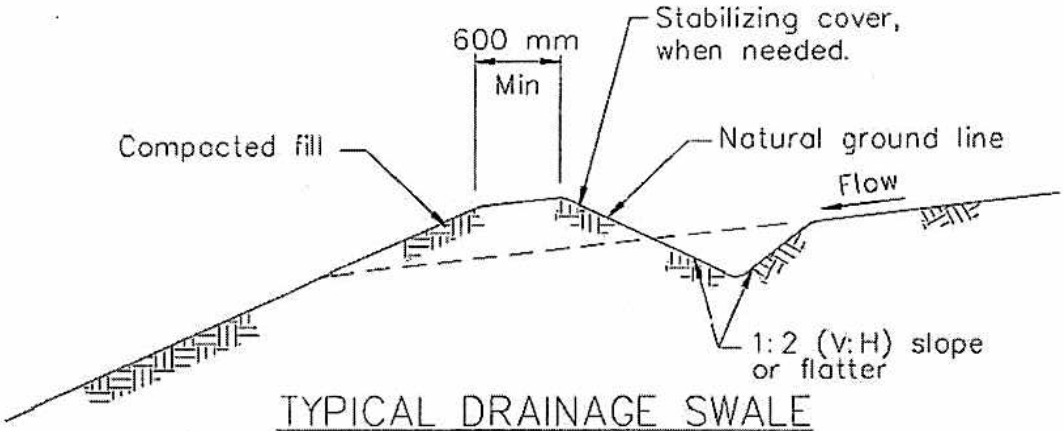
- Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Conveyances shall be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, over topping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff from the highway right-of-way onto other property.
- When possible, install and utilize permanent dikes, swales and ditches early in the construction process.
- Provide stabilized outlets. Refer to SS-10, "Outlet Protection/Velocity/ Dissipation Devices."

Maintenance and Inspections

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed or as directed by the RE.
- Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Earth Dikes/Drainage Swales and Lined Ditches

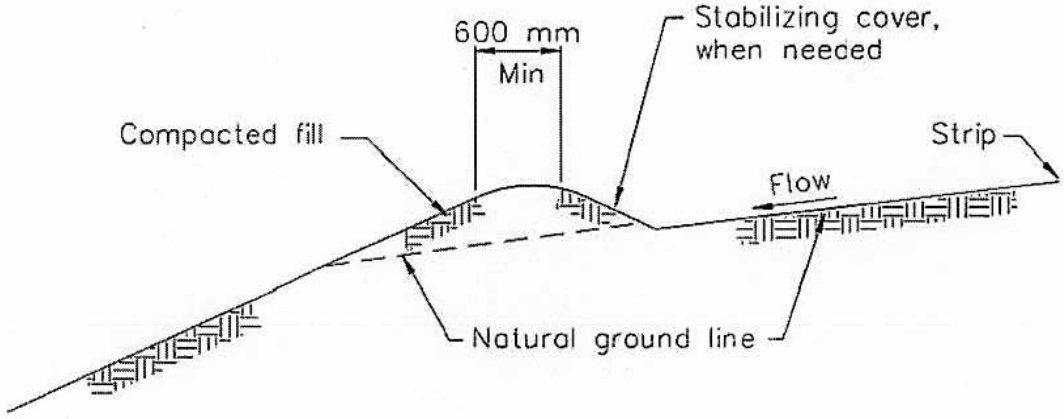
SS-9



TYPICAL DRAINAGE SWALE
NOT TO SCALE

NOTES:

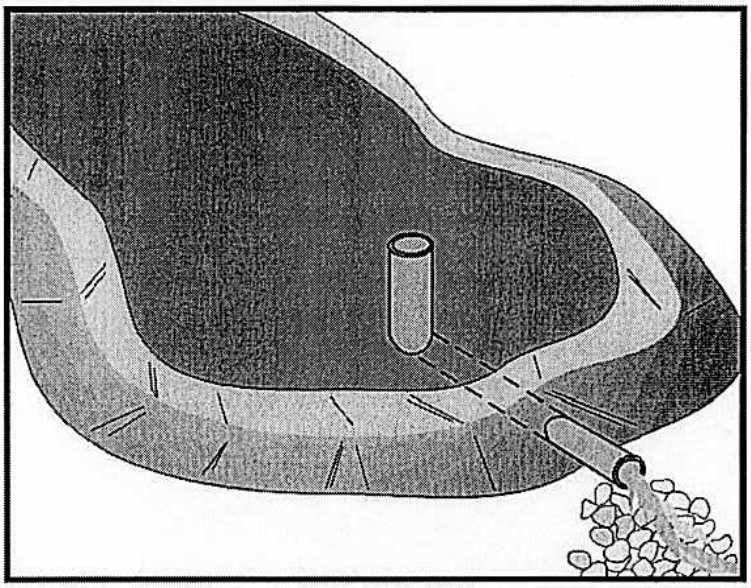
1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade, in conformance with Section 19-5 of the Caltrans Standard Specifications.

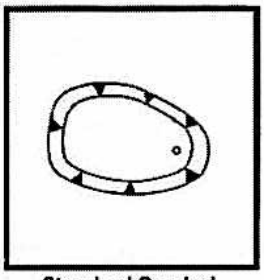


TYPICAL EARTH DIKE
NOT TO SCALE

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:

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

    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

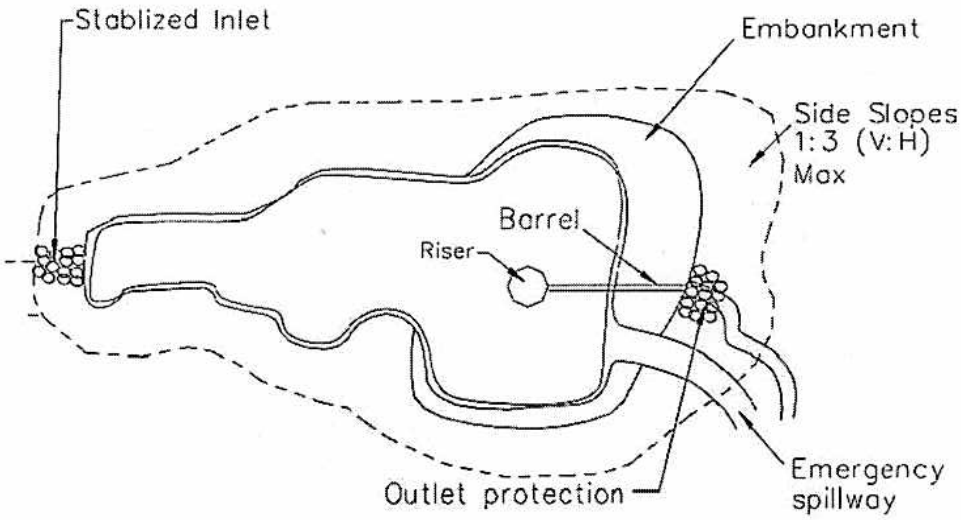
- The Contractor shall verify that the outlet is properly designed to handle the design and peak flows.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel), which extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level shall be clearly 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

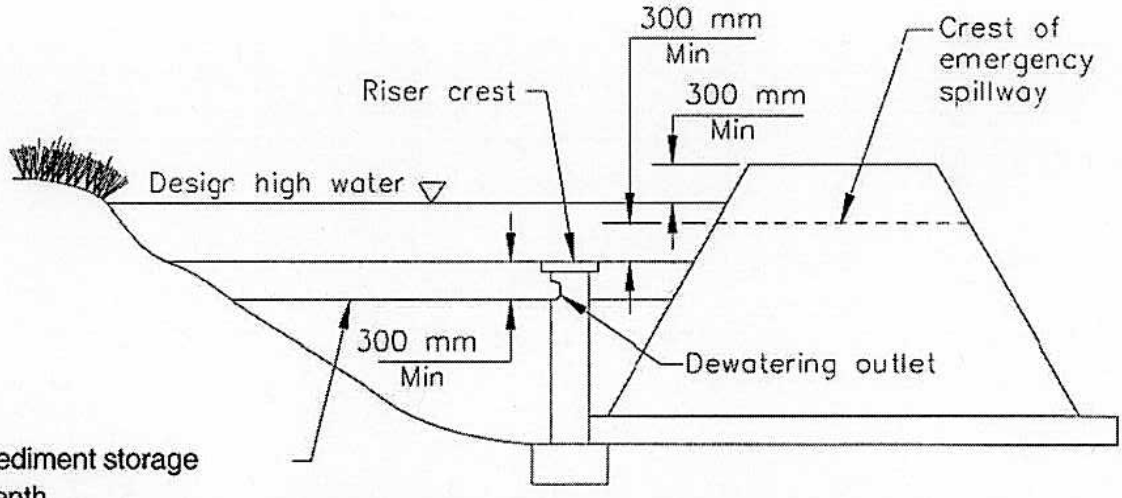
- Inspect sediment/desilting basins before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect at

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.

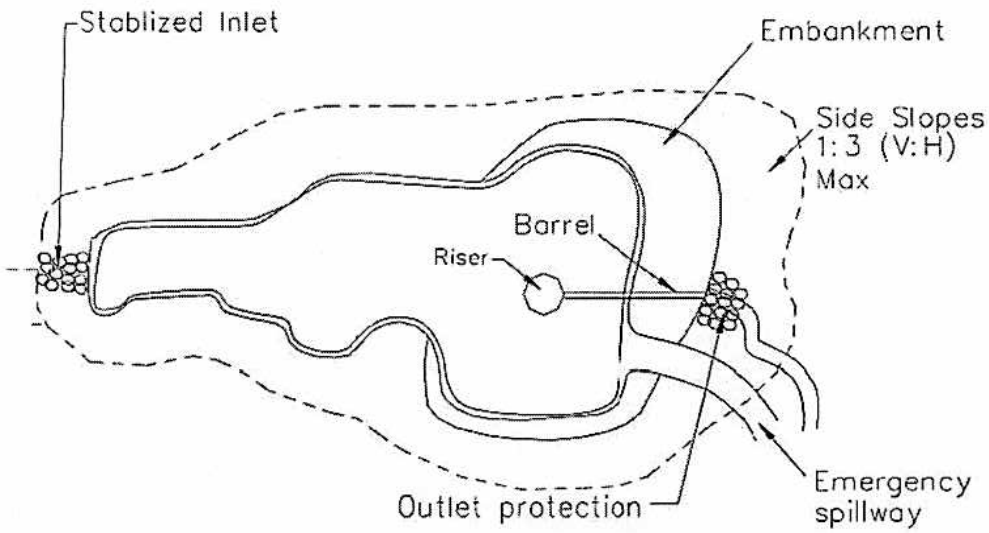


TOP VIEW



This outlet provides no drainage for permanent pool.

FIGURE 1: SINGLE ORIFICE DESIGN
NOT TO SCALE



TOP VIEW

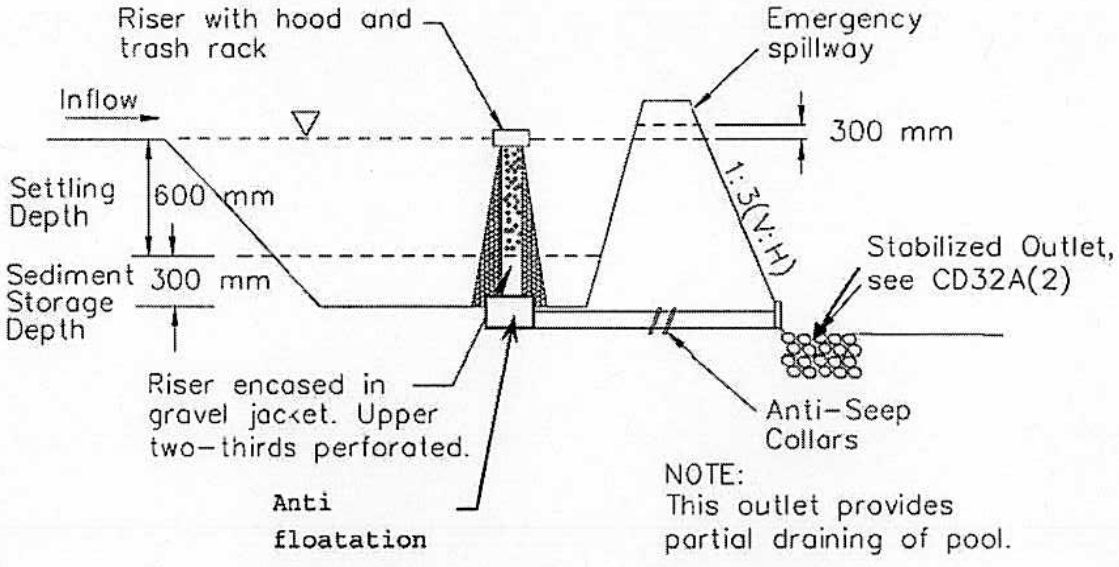
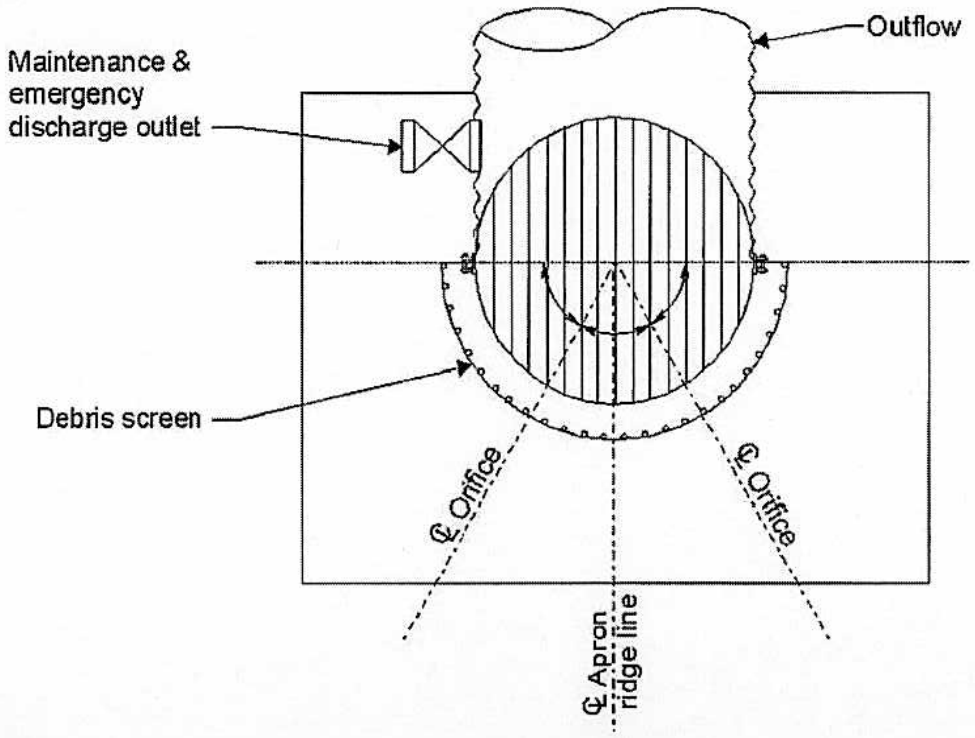


FIGURE 2: MULTIPLE ORIFICE DESIGN
NOT TO SCALE

Plan



Profile

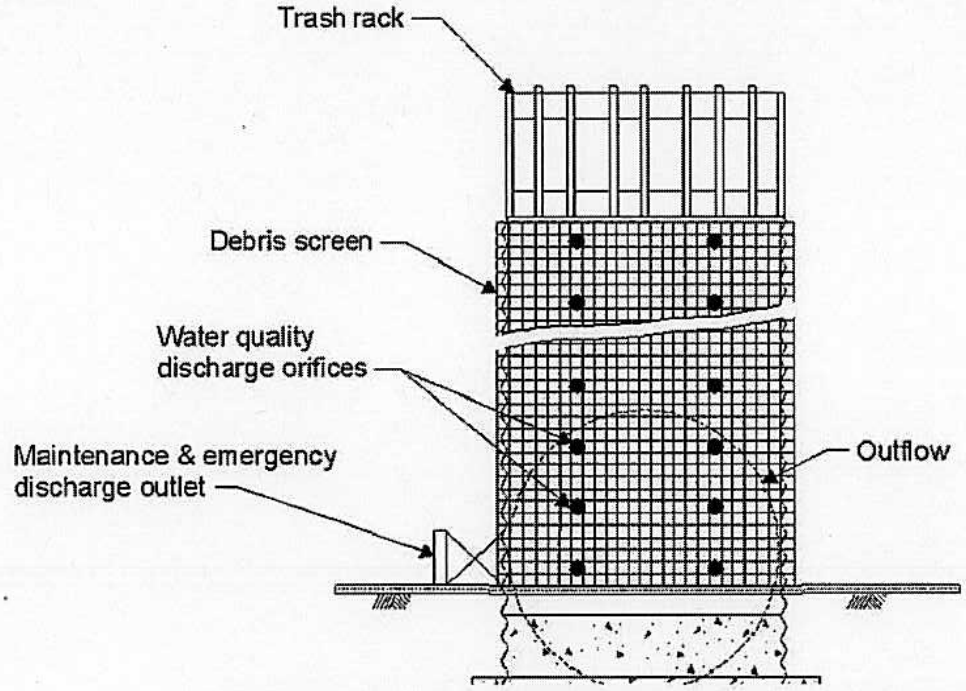
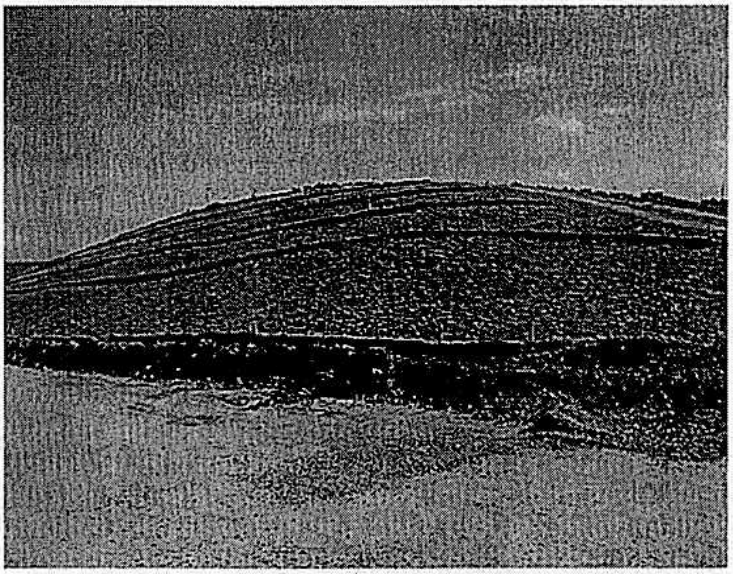
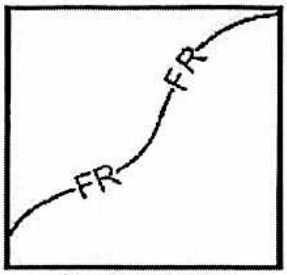


FIGURE 3: MULTIPLE ORIFICE OUTLET RISER
NOT TO SCALE

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.

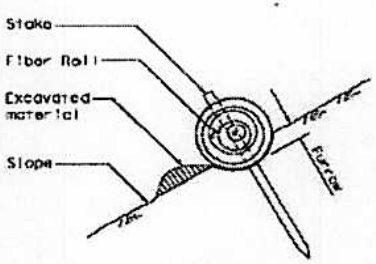
- Drive stakes at the end of each fiber roll and spaced 600 mm (2 ft) apart if Type 2 installation is used (refer to Page 4). Otherwise, space stakes 1.2 m (4 ft) maximum on center if installed as shown on Pages 5 and 6.
- Use wood stakes with a nominal classification of 19 by 19 mm (3/4 by 3/4 in), 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.

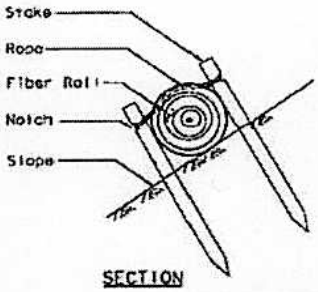
Maintenance and Inspection

- 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.

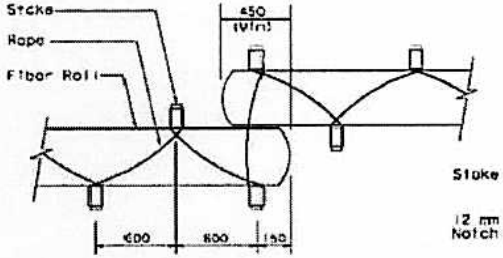


SECTION

TEMPORARY FIBER ROLL (TYPE 1)

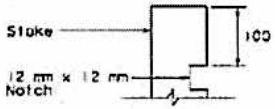


SECTION



PLAN

TEMPORARY FIBER ROLL (TYPE 2)

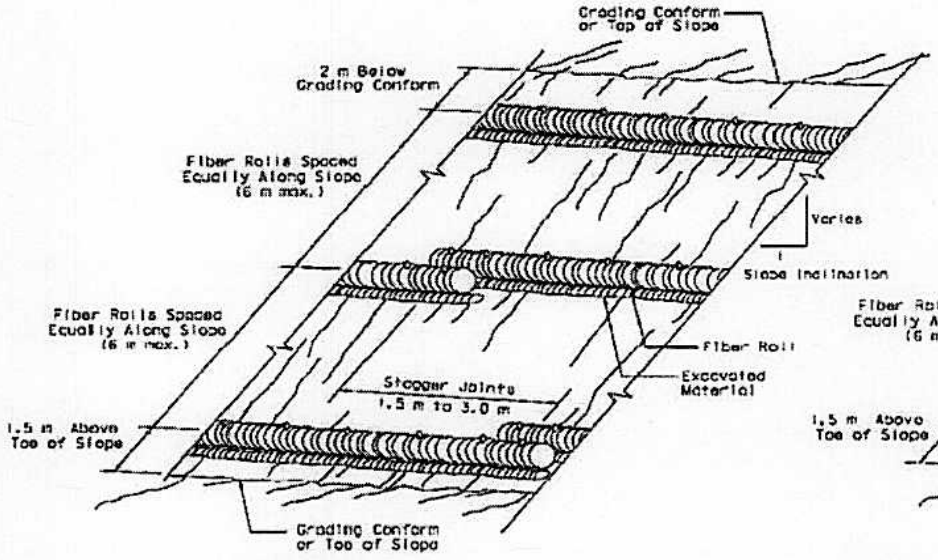


ELEVATION

NOTCH DETAIL

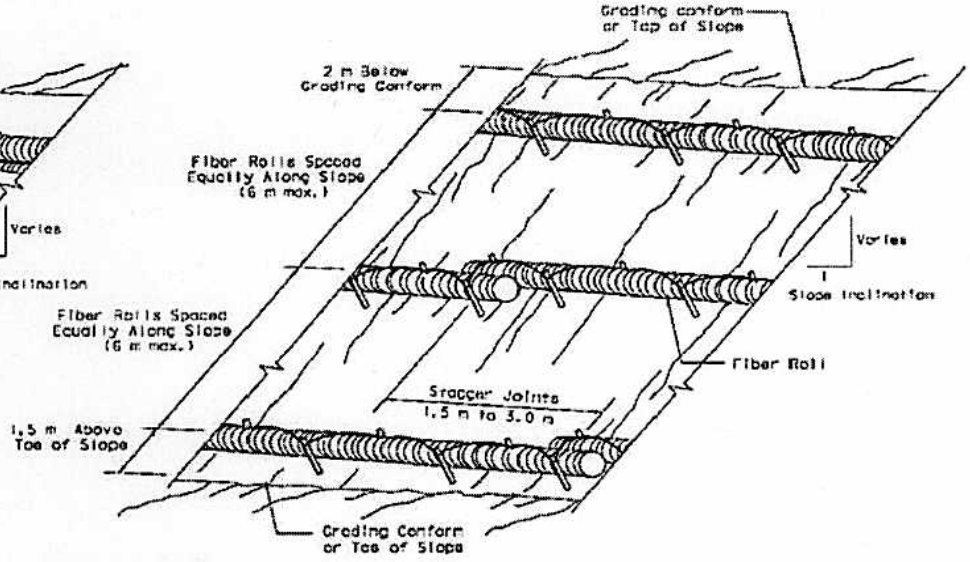
NOTE

1. Temporary fiber roll spacing varies depending upon slope inclination.



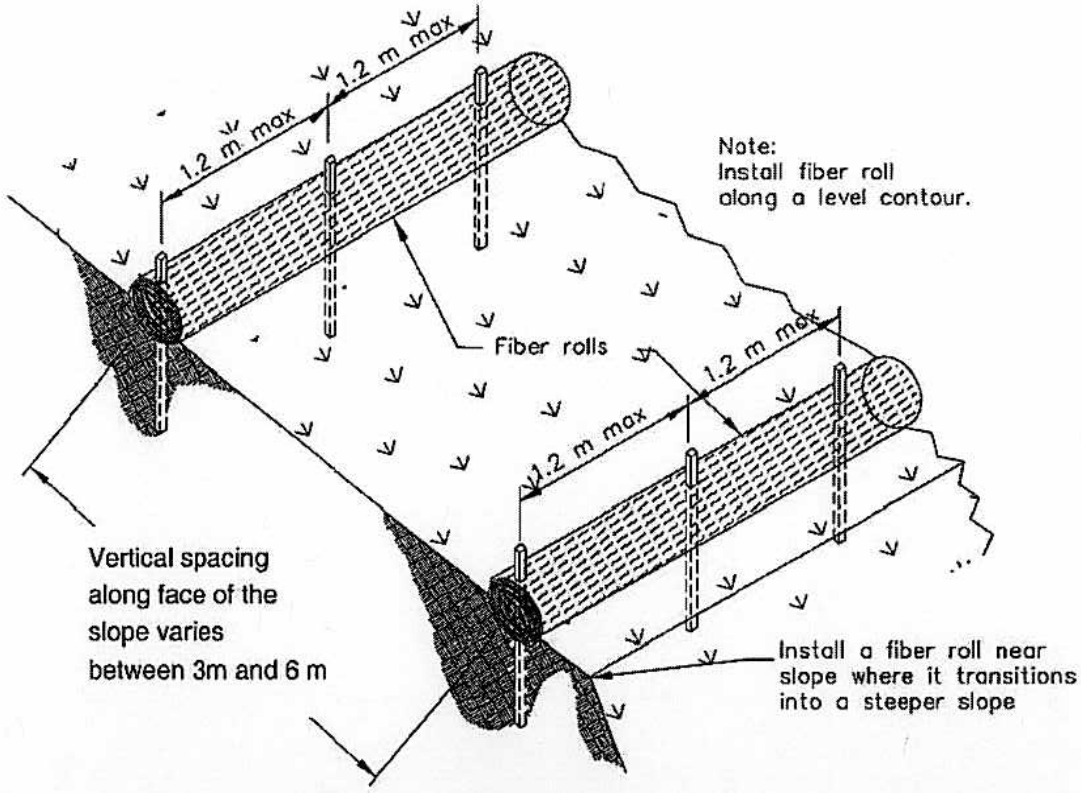
PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 1)



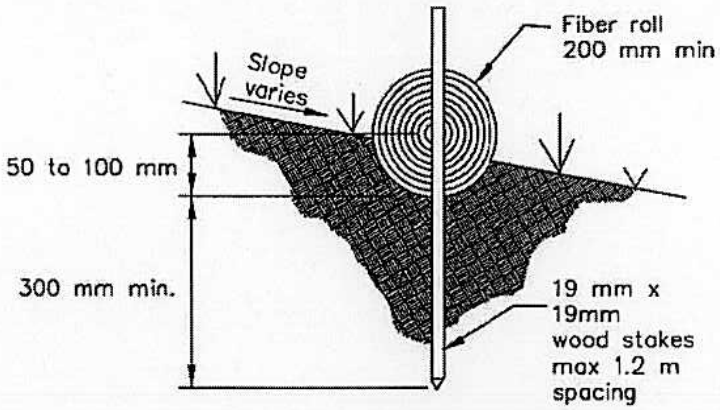
PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 2)



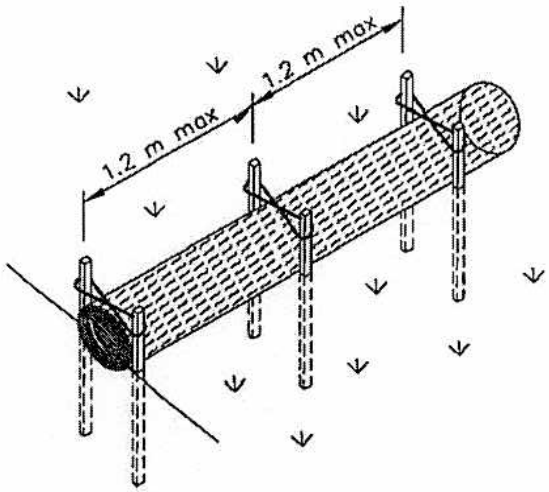
TYPICAL FIBER ROLL INSTALLATION

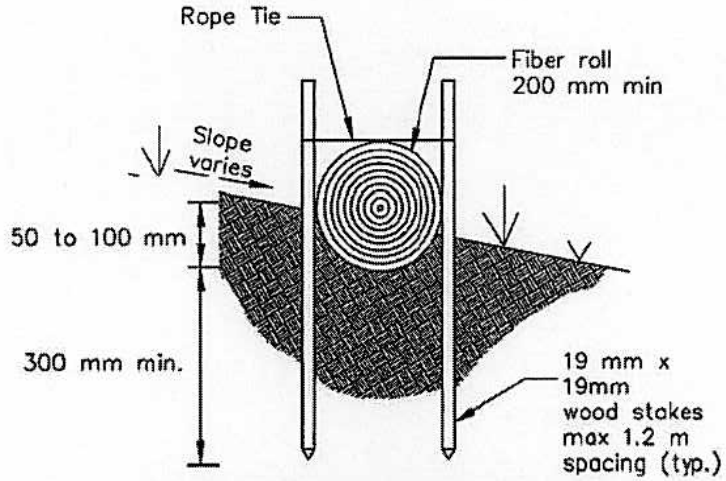
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



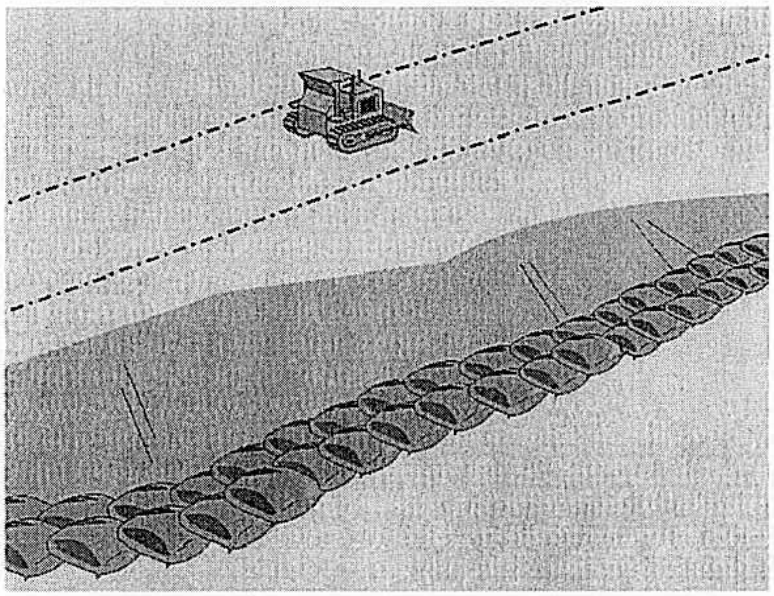


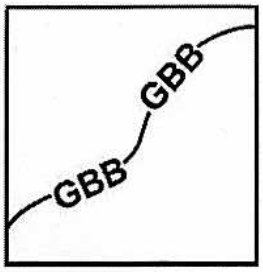
OPTIONAL ENTRENCHMENT DETAIL

N.T.S.

Gravel Bag Berm

SC-6





Standard Symbol

BMP Objectives

- o Soil Stabilization
- • Sediment Control
- o Tracking Control
- o Wind Erosion Control
- o Non-Storm Water Management
- o 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.

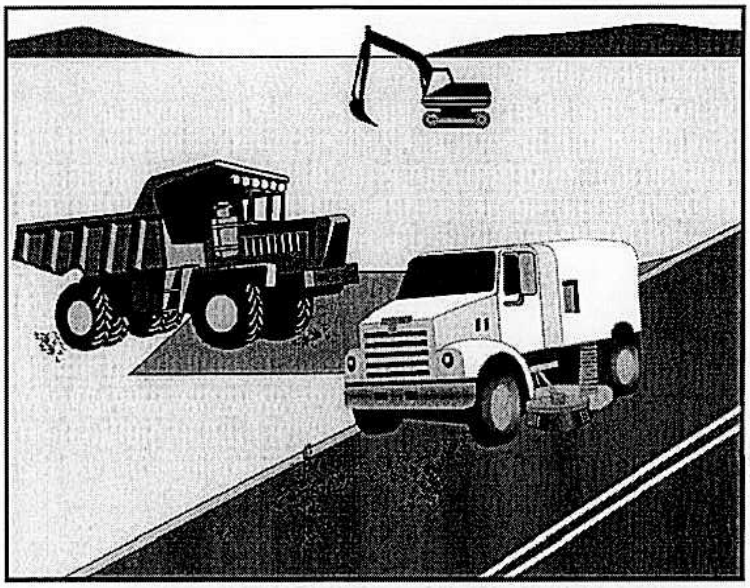
- When used for concentrated flows:
  - Stack gravel bags to required height using a pyramid approach.
  - Upper rows of gravel bags shall overlap joints in lower rows.
- Construct gravel bag barriers with a set-back of at least 1m from the toe of a slope. Where it is determined to be not practicable 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.

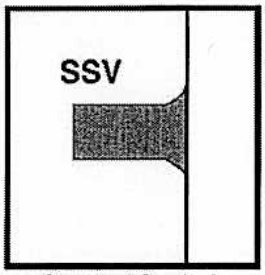
Maintenance and Inspection

- 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.

Street Sweeping and Vacuuming

SC-7





Standard Symbol

BMP Objectives

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

Definition and Purpose

Practices to remove tracked sediment to prevent the sediment from entering a storm drain or watercourse.

Appropriate Applications

These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of ingress/egress.

Limitations

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

Standards and Specifications

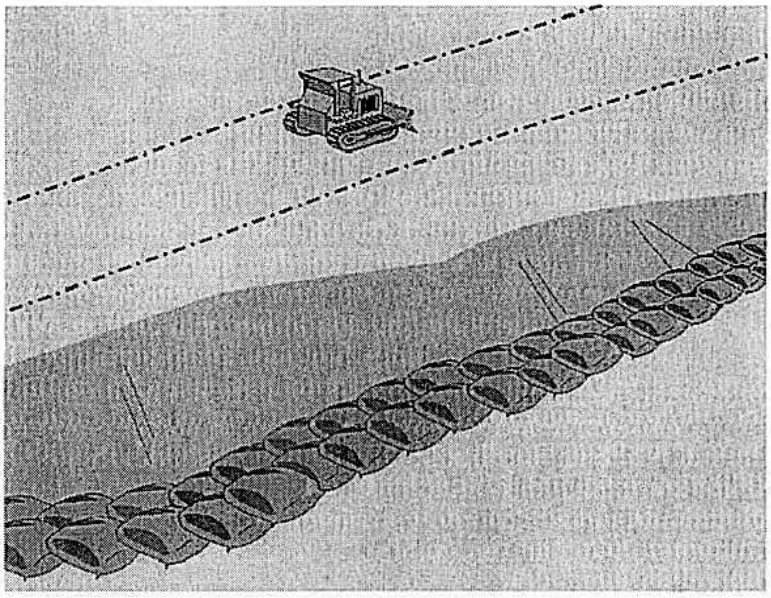
- Kick brooms or sweeper attachments shall not be used.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking shall be swept and/or vacuumed daily.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project.

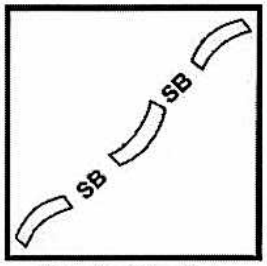
Maintenance and Inspection

- Inspect ingress/egress access points daily and sweep tracked sediment as needed, or as required by the Resident Engineer (RE).
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite in conformance with the provisions in Standard Specifications Section 7-1.13 .

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).

- 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.

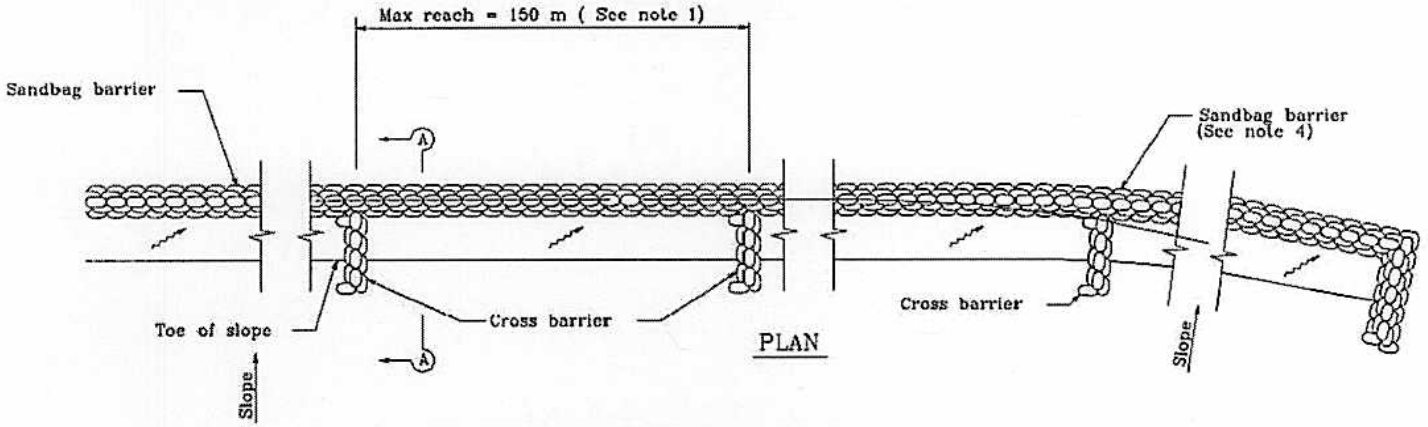
Installation

- 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.

Sandbag Barrier



TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

Caltrans Metric

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.

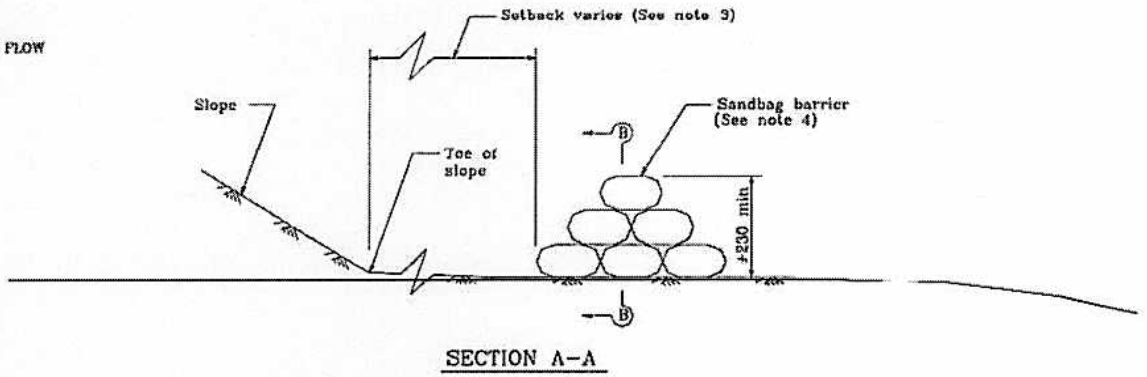
SC-8

Sandbag Barrier

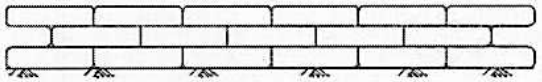
SC-8

LEGEND

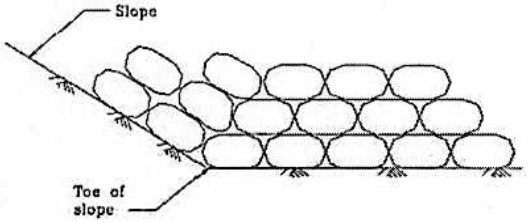
DIRECTION OF FLOW



SECTION A-A



SECTION B-B



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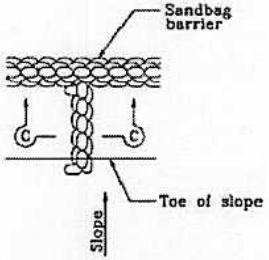
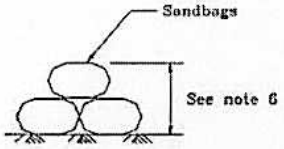


CROSS BARRIER DETAIL



SECTION C-C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

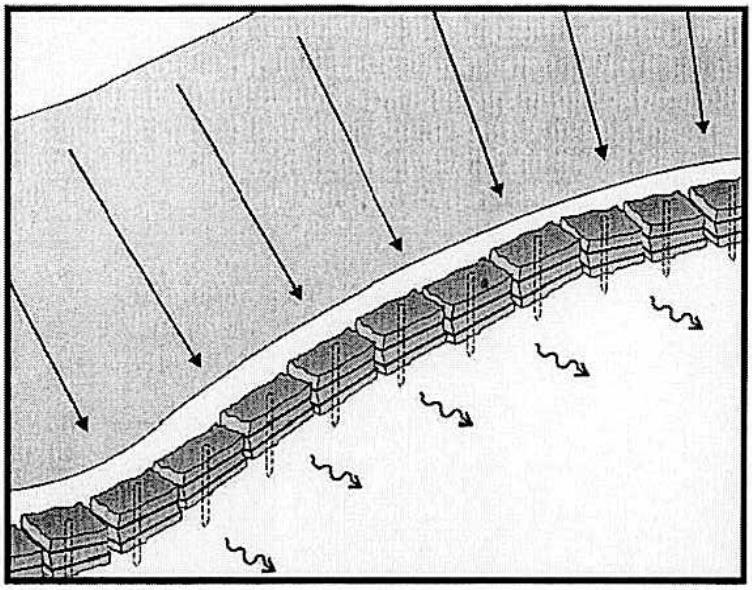
TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

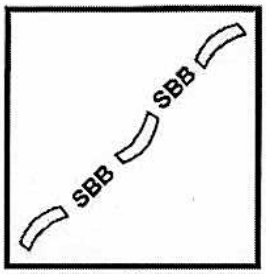
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

Straw Bale Barrier

SC-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

A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale 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 minor swales or ditches with small catchments.
- Around above grade type temporary concrete washouts (See BMP WM-8, "Concrete Waste Management").
- Parallel to a roadway to keep sediment off paved areas.

Limitations

- Installation can be labor intensive.
- Straw bale barriers are maintenance intensive.
- Degraded straw bales may fall apart when removed or left in place for extended periods.
- Can't be used on paved surfaces.
- Not to be used for drain inlet protection.
- Shall not be used in areas of concentrated flow.
- Can be an attractive food source for some animals.
- May introduce undesirable non-native plants to the area.

Standards and Specifications

Materials

- ***Straw Bale Material:*** Straw bale materials shall conform to the provisions in Standard Specifications Section 20-2.06, "Straw."
- Straw Bale Size: Each straw bale shall be a minimum of 360 mm (14 in) wide, 450 mm (18 in) in height, 900 mm (36 in) in length and shall have a minimum mass of 23 kg (51 lb.) The straw bale shall be composed entirely of vegetative matter, except for the binding material.
- Bale Bindings: Bales shall be bound by either steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding shall not be used. Baling wire shall be a minimum diameter of 1.57 mm (0.06 inch). Nylon or polypropylene string shall be approximately 2 mm (0.08 inch) in diameter with a breaking strength of 360 N.
- Stakes: 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. Steel bar reinforcement shall be equal to a number four designation or greater. End protection shall be provided for any exposed bar reinforcement.

Installation

- Limit the drainage area upstream of the barrier to 0.3 ha/100 m (0.25 ac/100ft) or barrier.
- Limit the slope length draining to the straw bale barrier to 30 m (100 ft.)

- Slopes of 2:100 (V:H) (2%) or flatter are preferred. If the slope exceeds 1:10 (V:H) (10%), the length of slope upstream of the barrier must be less than 15 m (50 ft).
- Install straw bale barriers along a level contour, with the last straw bale turned up slope.
- Straw bales must be installed in a trench and tightly abut adjacent bales.
- Construct straw bale barriers with a set-back of at least 1 m (3 ft) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the straw bale barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical.
- See pages 4 and 5 of this BMP for installation detail.

Maintenance and Inspection

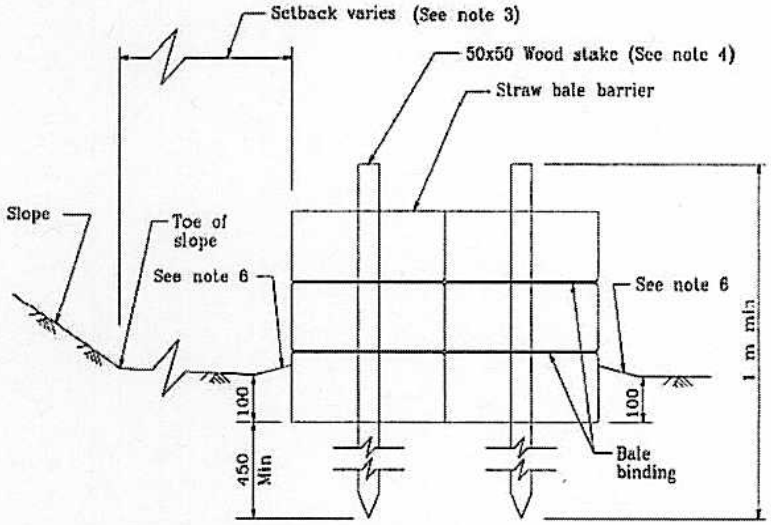
- Inspect straw bale barriers before and after each rainfall event, and weekly throughout the rainy season.
- Inspect straw bale barriers for sediment accumulations and remove sediment when depth reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Replace or repair damage bales as needed or as directed by the RE.
- Repair washouts or other damages as needed or as directed by the RE.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

Straw Bale Barrier

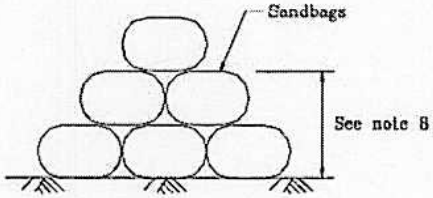
SC-9

LEGEND

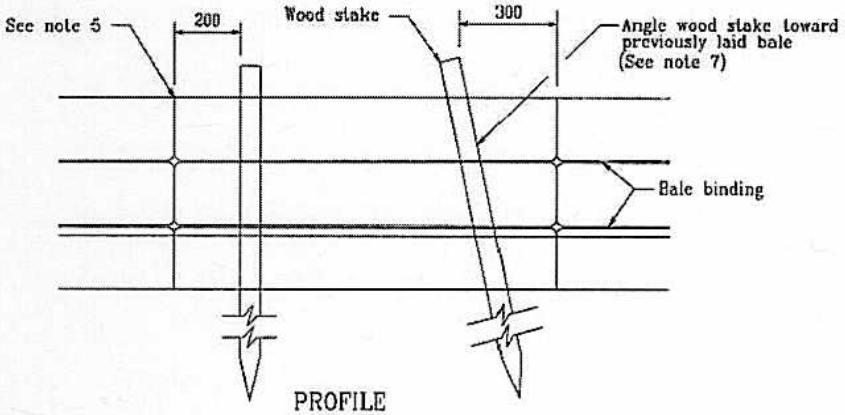
DIRECTION OF FLOW



SECTION B-B



SANDBAG CROSS BARRIER



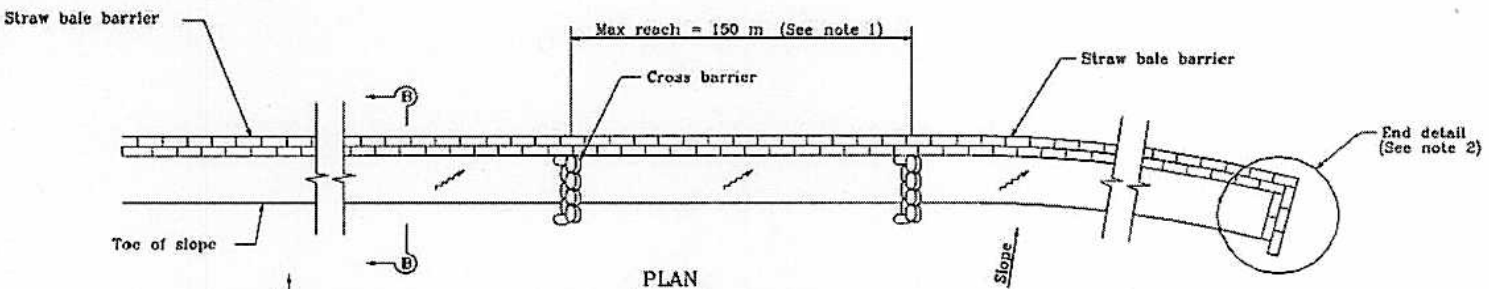
PROFILE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY LINEAR SEDIMENT BARRIER
(TYPE STRAW BALE)

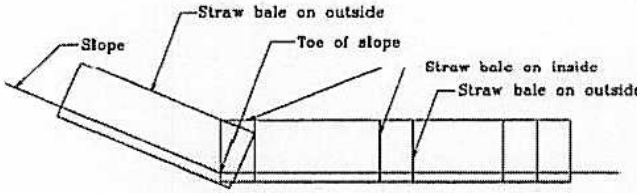
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



PLAN

TEMPORARY LINEAR SEDIMENT BARRIER (TYPE STRAW BALE)



END DETAIL

Caltrans Metric

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. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers shall be offset to eliminate gaps.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

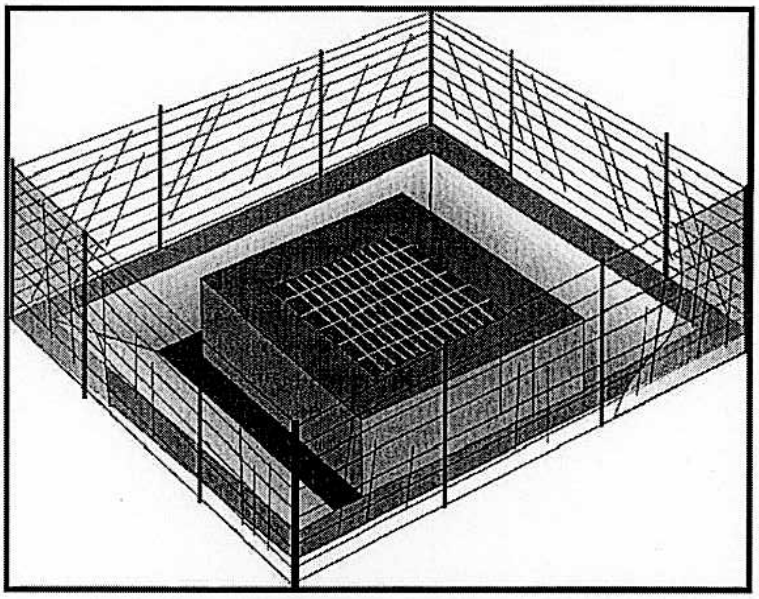
TEMPORARY LINEAR SEDIMENT BARRIER (TYPE STRAW BALE)

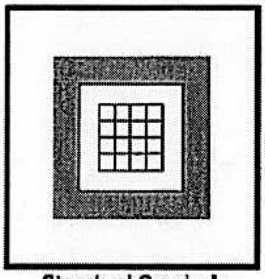
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

Storm Drain Inlet Protection

SC-10





Standard Symbol

BMP Objectives

- o Soil Stabilization
- • Sediment Control
- o Tracking Control
- o Wind Erosion Control
- o Non-Storm Water Management
- o 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

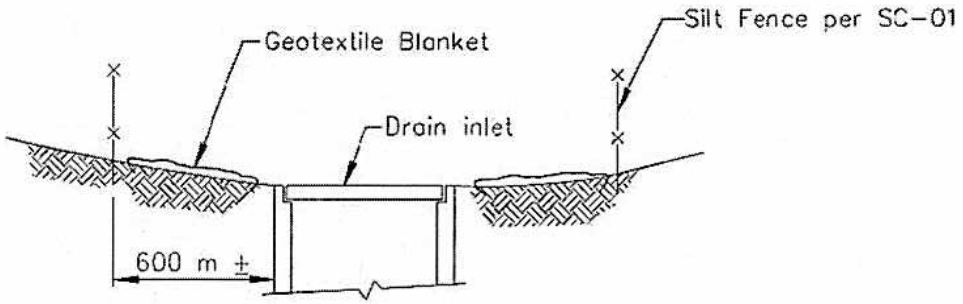
- *Type 1 - Filter Fabric Fence*
  - This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending.
  - Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not 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.

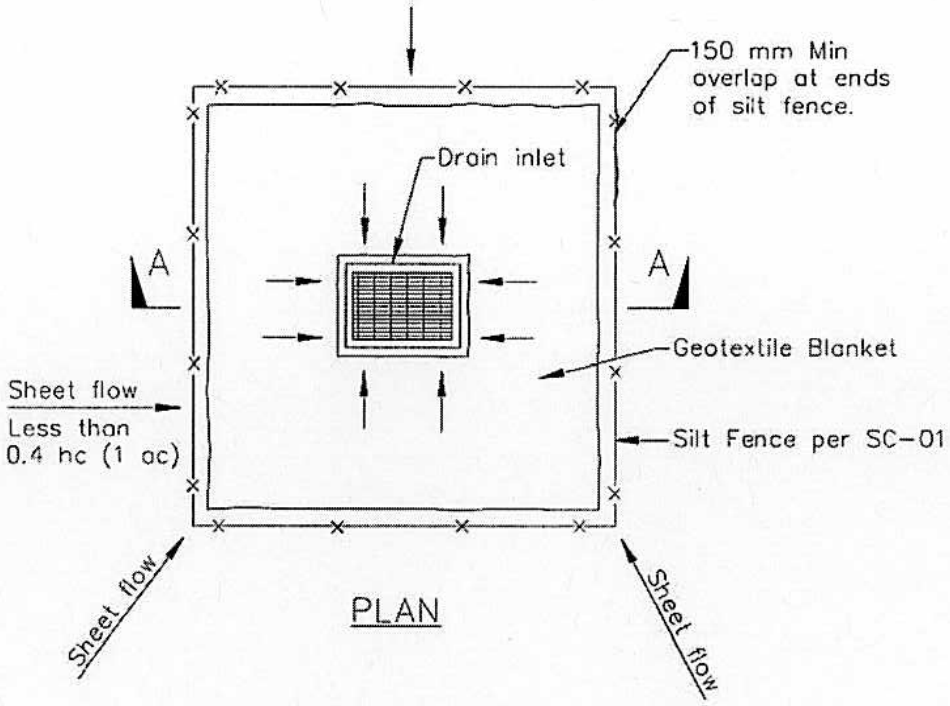
■ *Type 4 Foam Barriers and Fiber Rolls*

- 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.



SECTION A–A

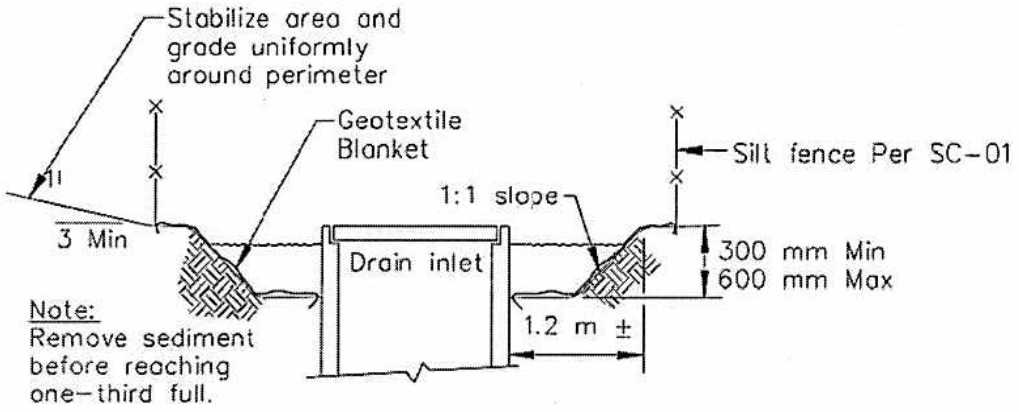


PLAN

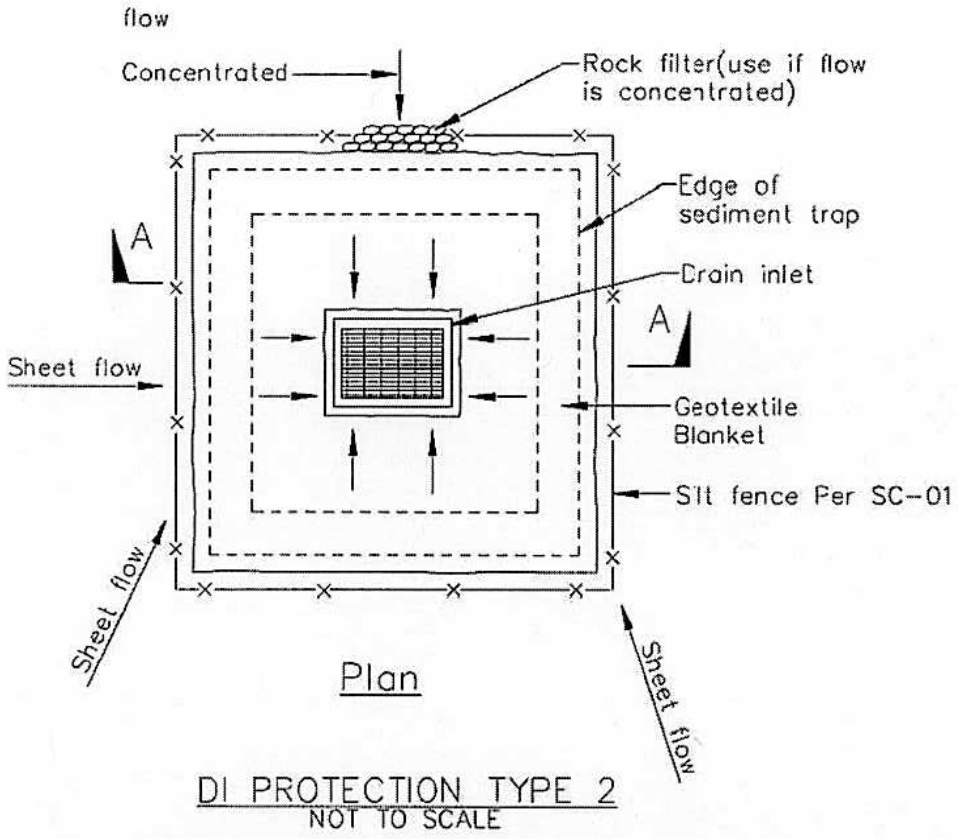
DI PROTECTION TYPE 1
NOT TO SCALE

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.



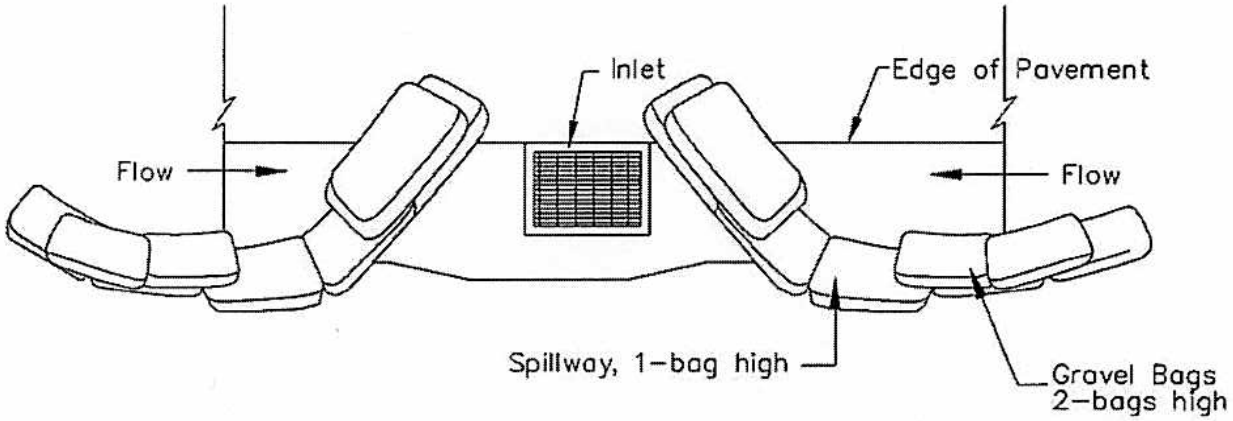
Section A–A



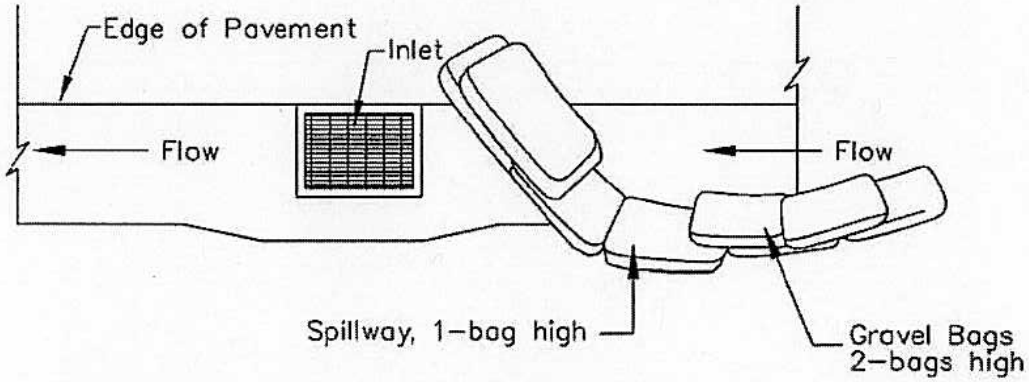
Plan

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



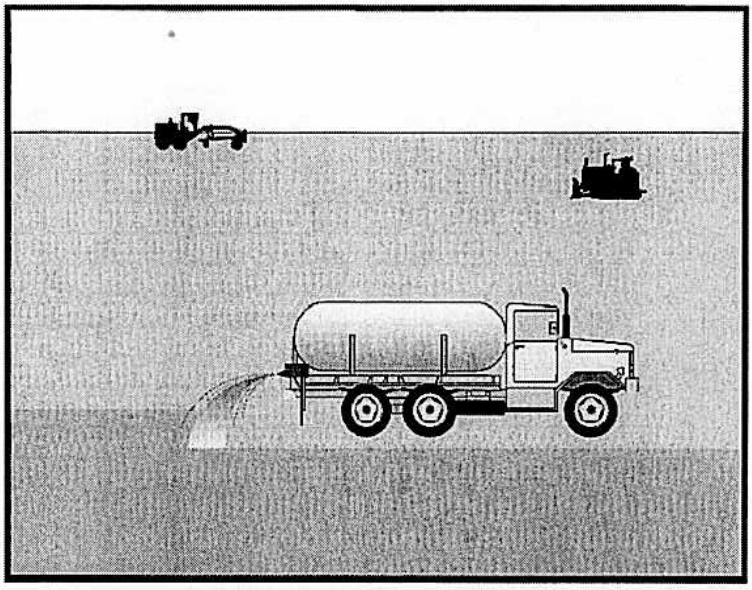
TYPICAL PROTECTION FOR INLET WITH SINGLE FLOW DIRECTION

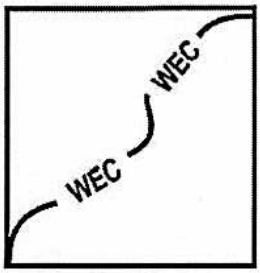
NOTES:

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.

Wind Erosion Control

WE-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

Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control shall be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives.

Appropriate Applications

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

Limitations

- Effectiveness depends on soil, temperature, humidity and wind velocity.

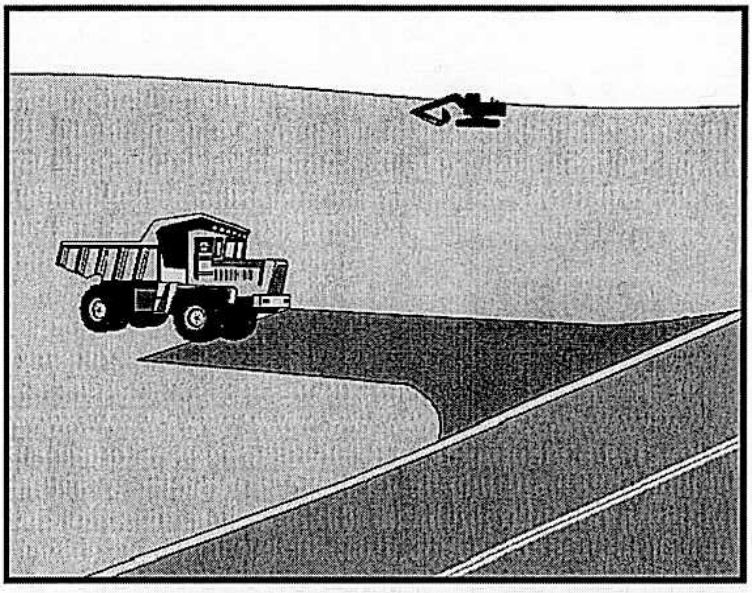
Standards and Specifications

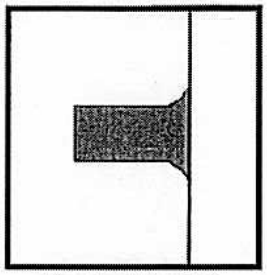
- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment shall be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
- If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked "NON-POTABLE WATER - DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders will also provide wind erosion control benefits.

Maintenance and Inspection

- Check areas that have been protected to ensure coverage.

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.

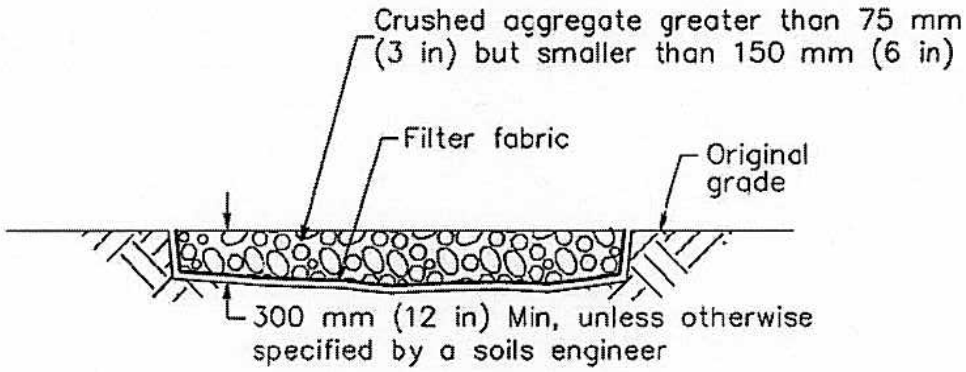
Standards and Specifications

- 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.

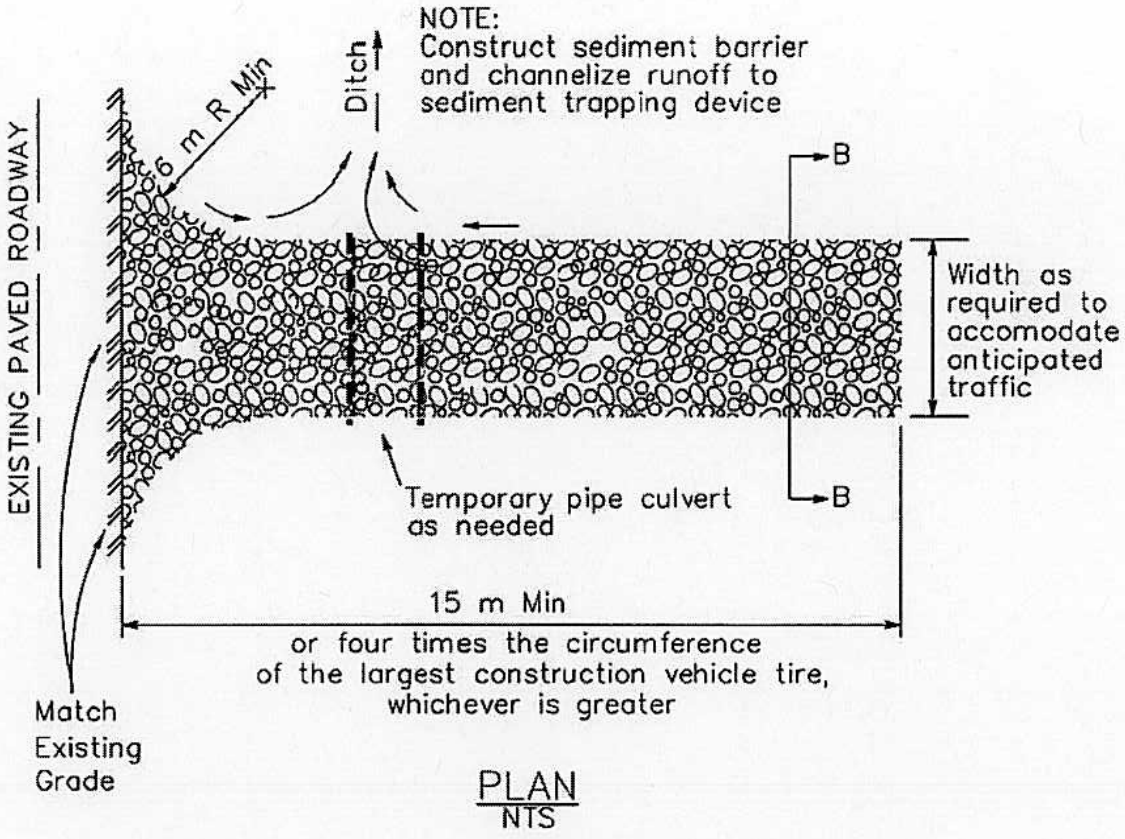
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
- Use of constructed/manufactured steel plates with 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.

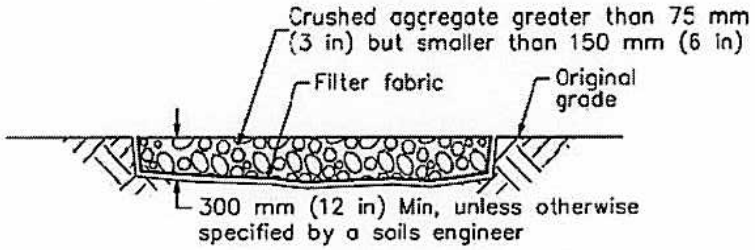


SECTION B–B
NTS

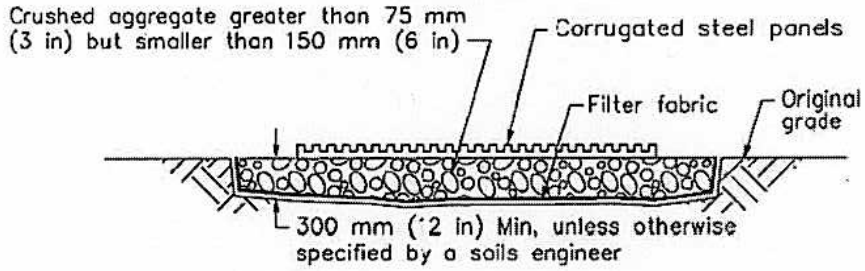


PLAN
NTS

Stabilized Contraction Entrance/Exit (Type 1)



SECTION B–B
NTS



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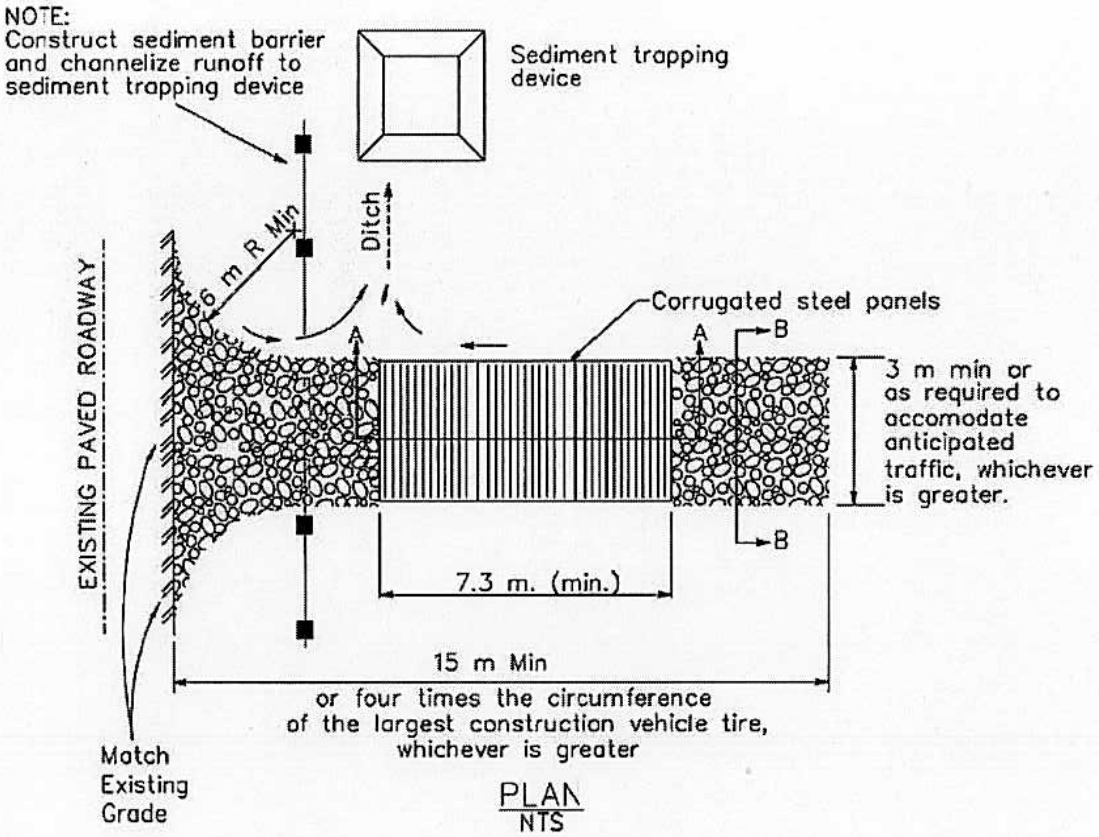
NOT TO SCALE

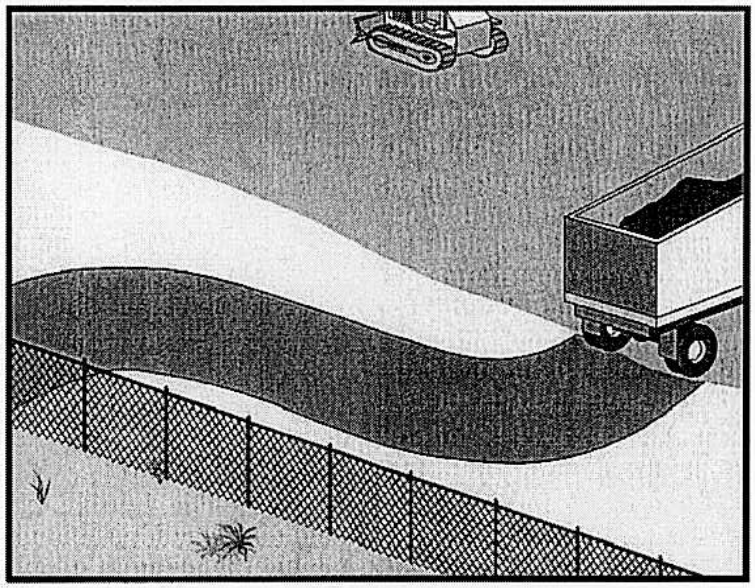


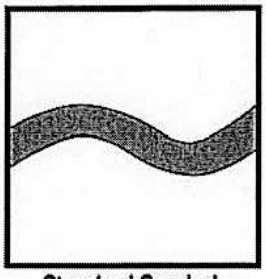
PLAN
NTS

Stabilized Construction Entrance/Exit (Type 2)

Stabilized Construction Roadway

TC-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 stabilized construction roadway is a temporary access road. It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

- Construction roadways and short-term detour roads:
  - Where mud tracking is a problem during wet weather.
  - Where dust is a problem during dry weather.
  - Adjacent to water bodies.
  - Where poor soils are encountered.
  - Where there are steep grades and additional traction is needed.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

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

Stabilized Construction Roadway

TC-2

Standards and Specifications

- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support the heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by the RE or Construction Storm Water Coordinator. Crushed aggregate greater than 75 mm (3 inches) and smaller than 150 mm (6 inches) shall be used.

Maintenance and Inspection

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

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

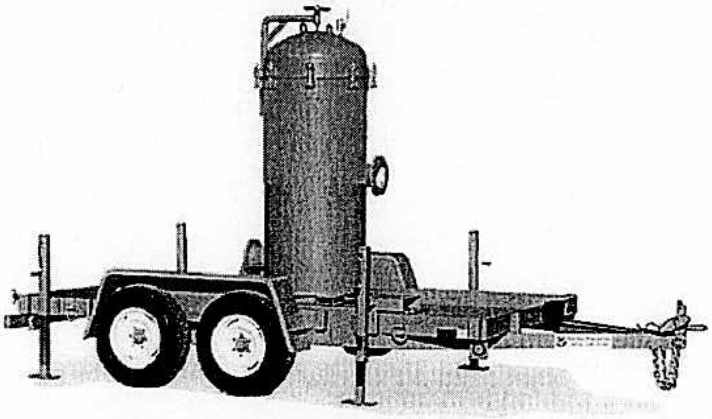
- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Vehicles and equipment washing on the construction site is discouraged.
- Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept 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.

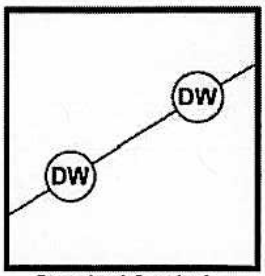
Maintenance and Inspection

- 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.

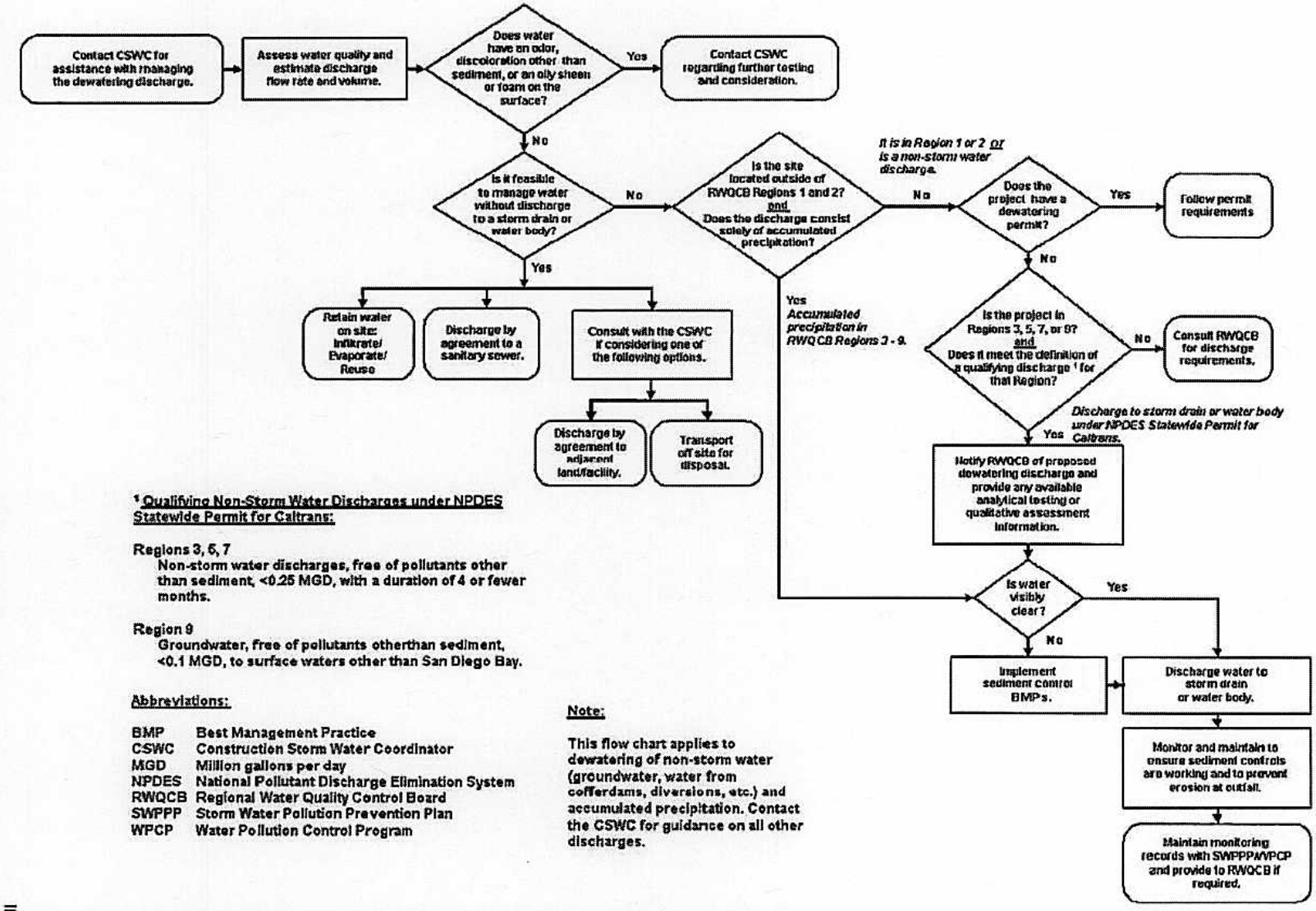
- Dewatering records shall be maintained for a period of 3 years.

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.

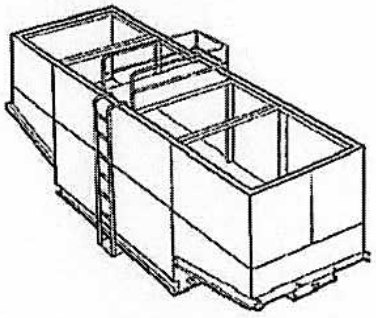
Implementation:

- 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.

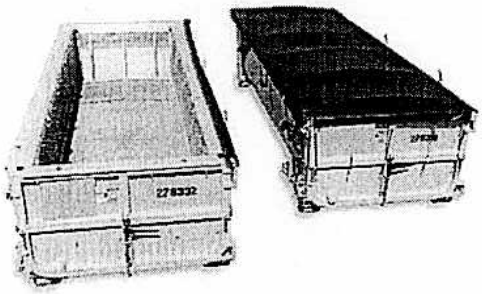
Implementation:

- 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.

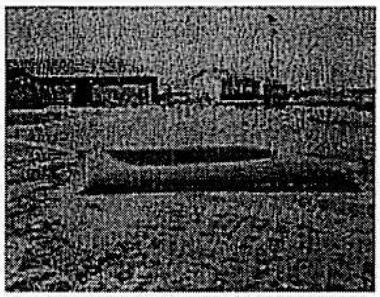
Implementation:

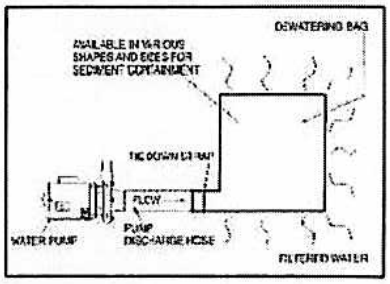
- Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.
- A secondary barrier, such as a rock filter bed or straw/hay bale barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag.

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.

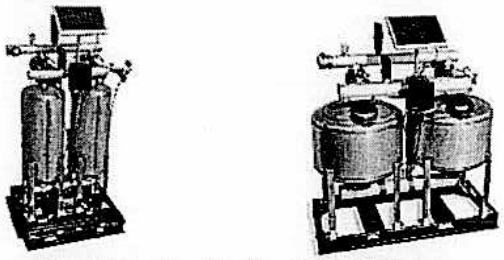
Implementation:

- 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.

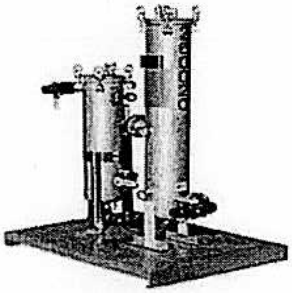
Implementation:

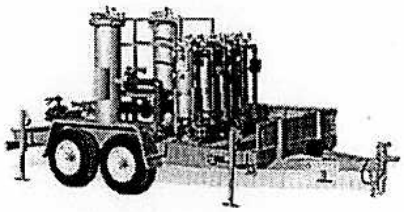
- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

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.

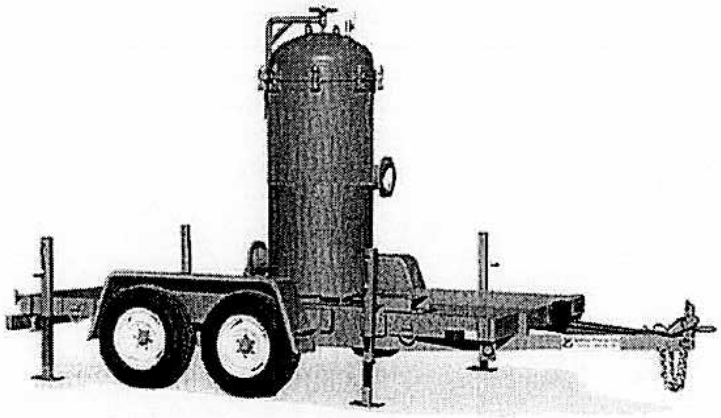
Implementation:

- 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 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	RECEIVING WATER
		Daily Maximum	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.

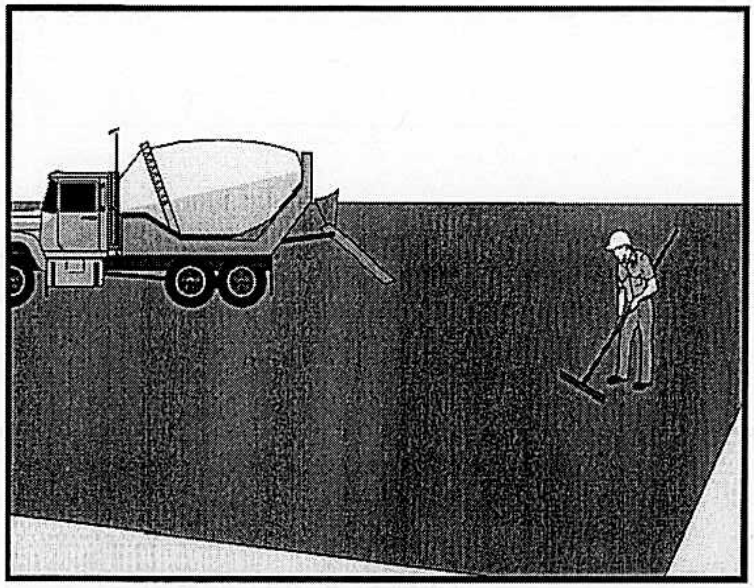
g If the results from receiving water sample exceed any of the discharge limits then discontinue dewatering activities to surface water

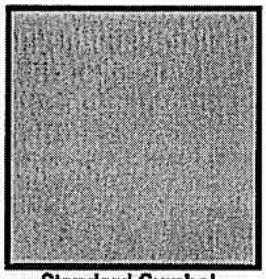
h All discharge limitations are listed in the Water Quality Objectives Section of the Basin Plan

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.

Paving and Grinding Operations

NS-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

Procedures and practices for conducting paving, saw cutting, and grinding operations to minimize the transport of pollutants to the storm drain system or receiving water body.

Appropriate Applications

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

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Standards and Specifications

- Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap and shall be non-foaming and non-toxic.
- Place plastic materials under asphaltic concrete (AC) paving equipment while not in use, to catch and/or contain drips and leaks. See also BMP WM-4, "Spill Prevention and Control."
- When paving involves AC, the following steps shall be implemented to prevent the discharge of uncompacted or loose AC, tack coats, equipment cleaners, or other paving materials:
  - Minimize sand and gravel from new asphalt from getting into storm drains, streets, and creeks by sweeping.
  - Old or spilled asphalt must be recycled or disposed as approved by the Resident Engineer (RE).

- AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drain or watercourses. Install silt fence until structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with Standard Specification 7-1.13.
- Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 0.3 m (1 ft) of material.
- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Use silt fence until installation is complete.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.
- Paving equipment parked onsite shall be parked over plastic to prevent soil contamination.
- Clean asphalt-coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP WM-5, "Solid Waste Management." Any cleaning onsite shall follow BMP NS-8, "Vehicle and Equipment Cleaning."
- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile, or dispose of properly.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in BMP WM-8, "Concrete Waste Management," or dispose in accordance with Standard Specifications Section 7-1.13.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses.

Pavement Grinding or Removal

- Residue from PCC grinding operations shall be picked up by means of a vacuum attachment to the grinding machine, shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP WM-8, "Concrete Waste Management;" and BMP WM-10, "Liquid Waste Management," and Standard Specifications Section 42-2

"Grindings."

- Collect pavement digout material by mechanical or manual methods. This material may be recycled if approved by the RE for use as shoulder backing or base material at locations approved by the RE.
- If digout material cannot be recycled, transport the material back to a maintenance facility or approved storage site.
- Digout activities shall not be conducted in the rain.
- When approved by the RE, stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses and stored consistent with BMP WM-3, "Stockpile Management."
- Disposal or use of AC grindings shall be approved by the RE. See also BMP WM-8, "Concrete Waste Management."

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the storm water drainage system, or watercourses.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Contractor shall not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with Standard Specification 7-1.13.

Raised/Recessed Pavement Marker Application and Removal

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

bituminous material from the roadway after removal of markers.

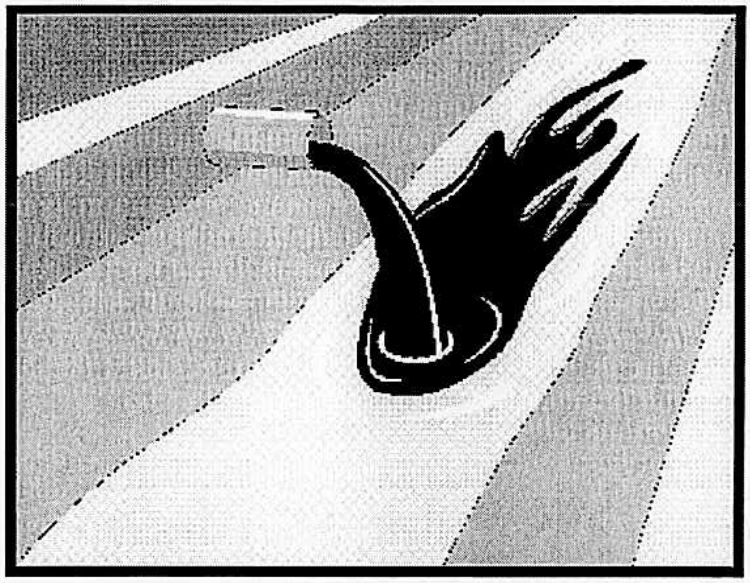
- Waste shall be disposed of in accordance with Standard Specification 7-1.13.

Maintenance and Inspection

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

Illicit Connection/Illegal Discharge Detection and Reporting

NS-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

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

Appropriate Applications

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

Limitations

- Unlabeled or non-identifiable material shall be assumed to be hazardous.
- Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the RE when illicit connections or illegal dumping or discharges are discovered, and take no further action unless directed by the RE.
- If pre-existing hazardous materials or wastes are known to exist onsite, the contractor's responsibility will be detailed in separate special provisions.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6

Standards and Specifications

Planning

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

Identification of illicit connections and illegal dumping or discharges.

- Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- Liquids – signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Abnormal water flow during the dry weather season.
- Urban Areas - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season.
  - Unusual flows in subdrain systems used for dewatering.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.

- Rural Areas - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the dry weather season.
  - Non-standard junction structures.
  - Broken concrete or other disturbances at or near junction structures.

Reporting

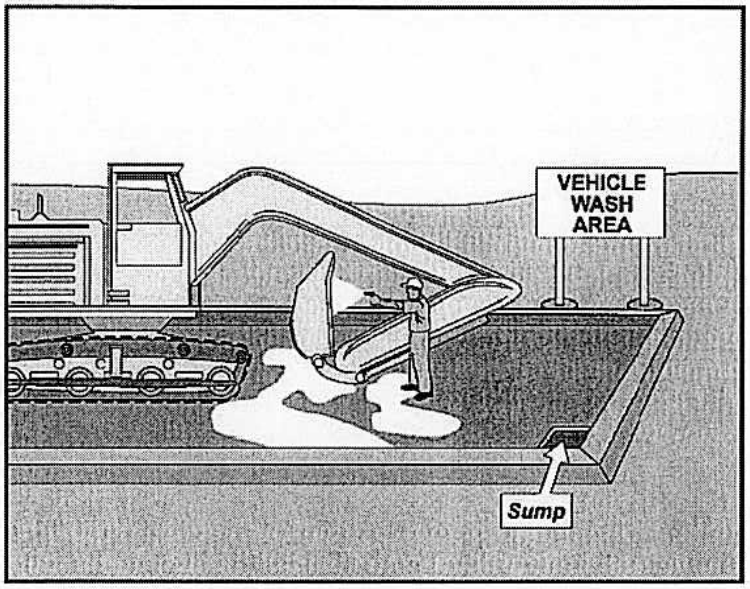
- Notify the RE of any illicit connections and illegal dumping or discharge incidents at the time of discovery. The RE will notify the District Construction Storm Water Coordinator and the Construction Hazmat Coordinator for reporting.

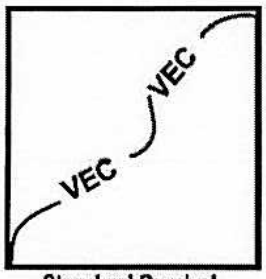
Cleanup and Removal

The contractor is not responsible for investigation and clean up of illicit or illegal dumping or discharges not generated by the contractor. Caltrans may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.

Vehicle and Equipment Cleaning

NS-8





Standard Symbol

BMP Objectives

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- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

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

Appropriate Applications

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

Limitations

- None.

Standards and Specifications

- On-site vehicle and equipment washing is discouraged.
- Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project site unless the Resident Engineer (RE) has been notified in advance and the resulting wastes are fully contained and disposed of outside the highway right-of-way in conformance with the provisions in the Standard Specifications Section 7-1.13. Resulting wastes and by-products shall not be discharged or buried within the highway right-of-way, and must be captured and recycled or disposed according to the requirements of WM-10, "Liquid Waste Management" or WM-6, "Hazardous Waste Management," depending on the waste characteristics. Minimize use of solvents. The use of diesel for vehicle and equipment cleaning is prohibited.
- Vehicle and equipment wash water shall be contained for percolation or evaporative drying away from storm drain inlets or watercourses and shall not be discharged within the highway right-of-way. Apply sediment control BMPs if applicable.
- All vehicles/equipment that regularly enter and leave the construction site must be cleaned off-site.
- When vehicle/equipment washing/cleaning must occur onsite, and the

operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the following characteristics, and shall be arranged with the construction storm water coordinator:

- Located away from storm drain inlets, drainage facilities, or watercourses.
- Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff.
- Configured with a sump to allow collection and disposal of wash water.
- Wash waters shall not be discharged to storm drains or watercourses.
- Used only when necessary.

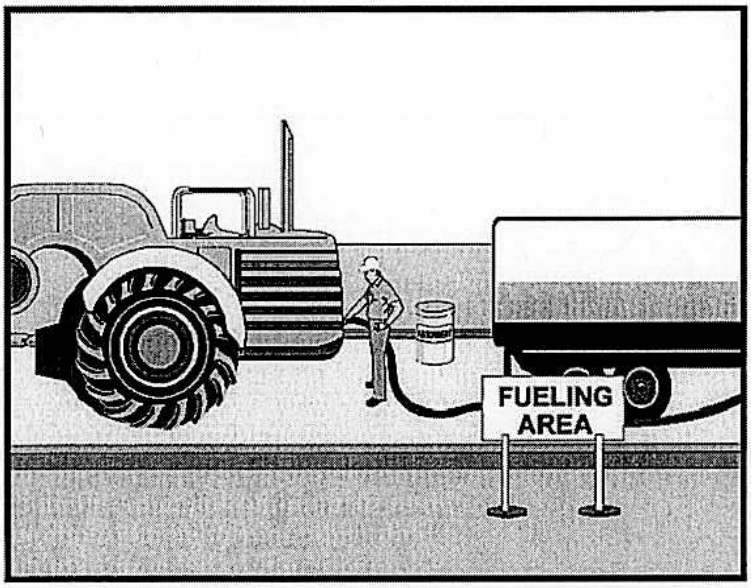
- When cleaning vehicles/equipment with water:
  - Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
  - Use positive shutoff valve to minimize water usage.
  - Facility wash racks shall discharge to a sanitary sewer, recycle system or other approved discharge system and shall not discharge to the storm drainage system or watercourses.

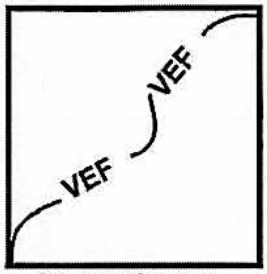
Maintenance and Inspection

- The control measure shall be inspected at a minimum of once a week.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed or as directed by the RE.

Vehicle and Equipment Fueling

NS-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

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

Appropriate Applications

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

Limitations

- Onsite vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

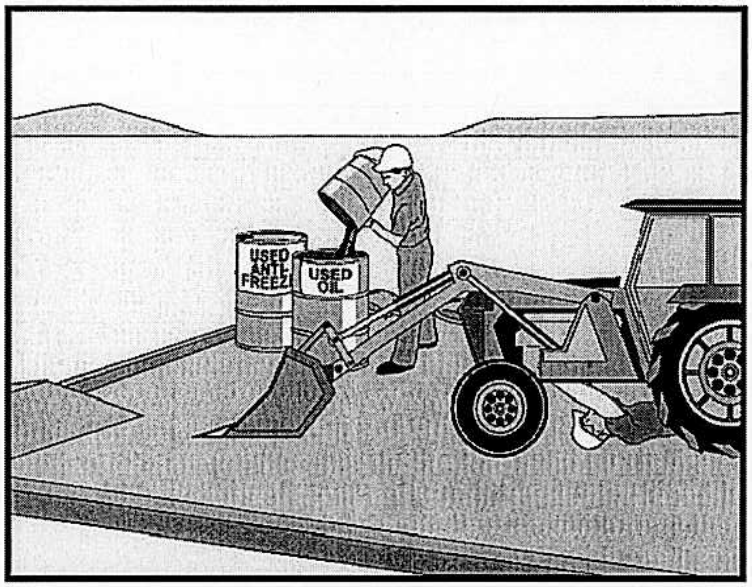
- When fueling must occur onsite, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer (RE).
- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Dedicated fueling 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. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.
- Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.

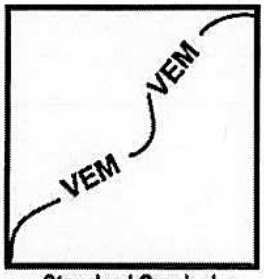
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD). Ensure the nozzle is secured upright when not in use.
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available in fueling and maintenance areas and used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks. Refer to WM-1, "Material Delivery and Storage."
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected regularly.
- Keep an ample supply of spill cleanup material on the site.
- Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.

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.

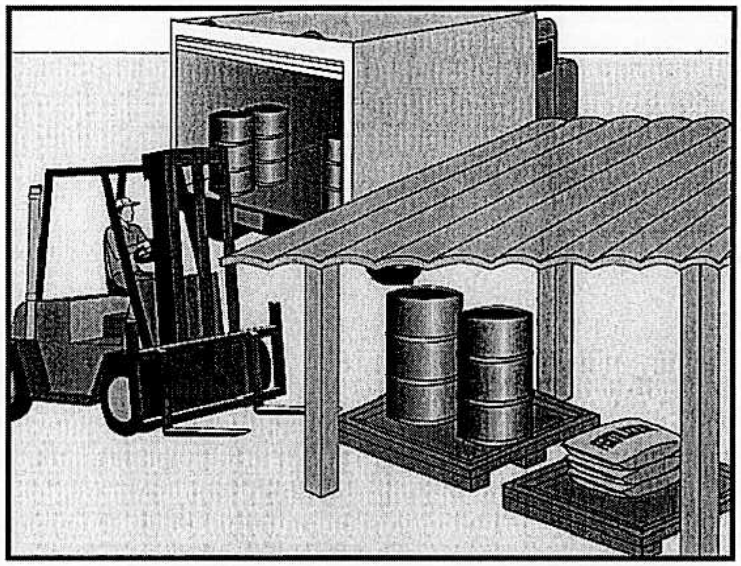
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain 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.

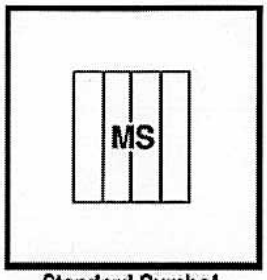
Maintenance and Inspection

- 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

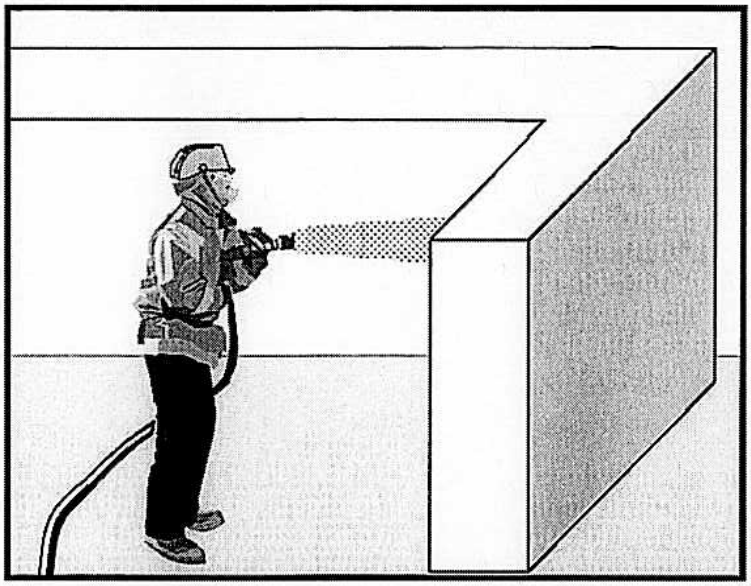
- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, "Spill Prevention and Control", for spills of chemicals and/or hazardous materials.

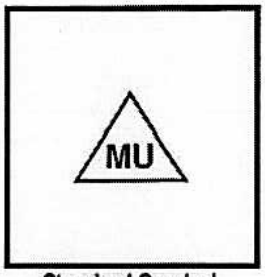
Maintenance and Inspection

- 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.

Limitations

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

Standards and Specifications

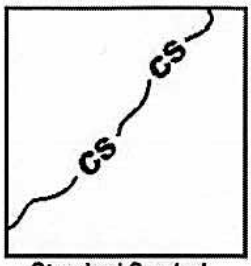
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not 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

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- ● 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:

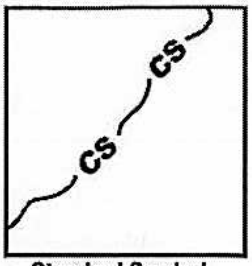
- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

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.

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:

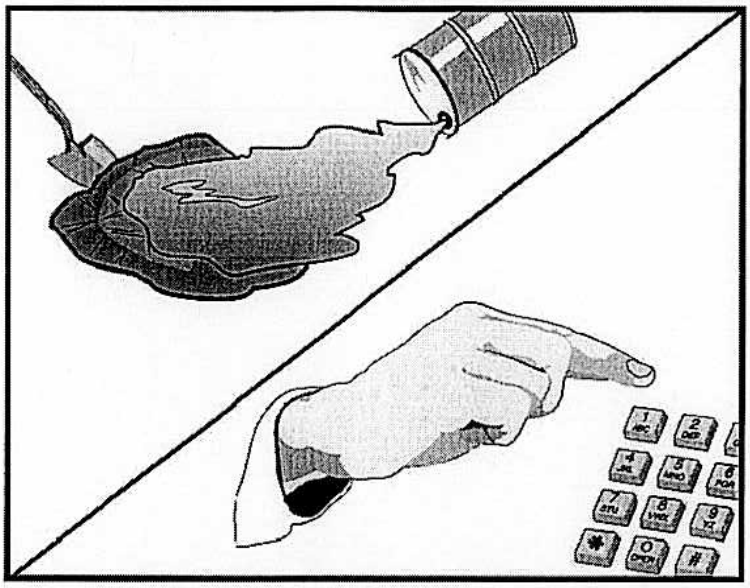
- All stockpiles shall be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" shall be placed on and covered with plastic or comparable material prior to the onset of precipitation.

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.

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.

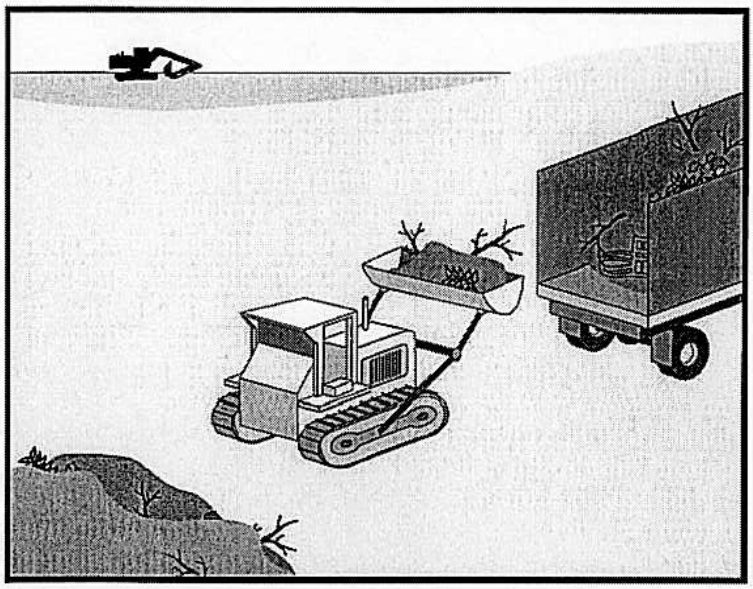
- Significant/Hazardous Spills
  - For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
    - Notify the RE immediately and follow up with a written report.
    - Notify the local emergency response by dialing 911. In 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.

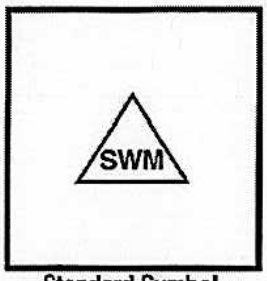
Maintenance and Inspection

- 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.

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.

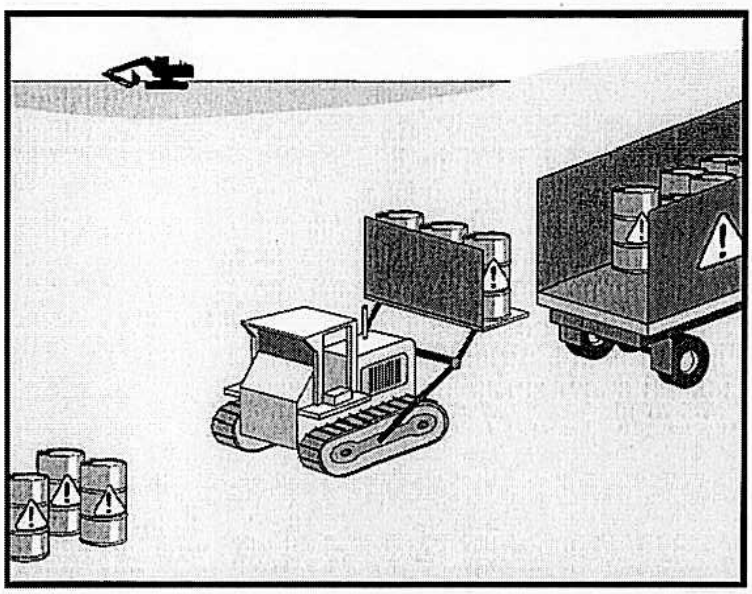
- Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the RE.
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures 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.

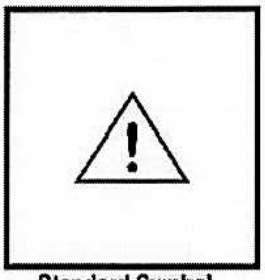
Maintenance and Inspection

- 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

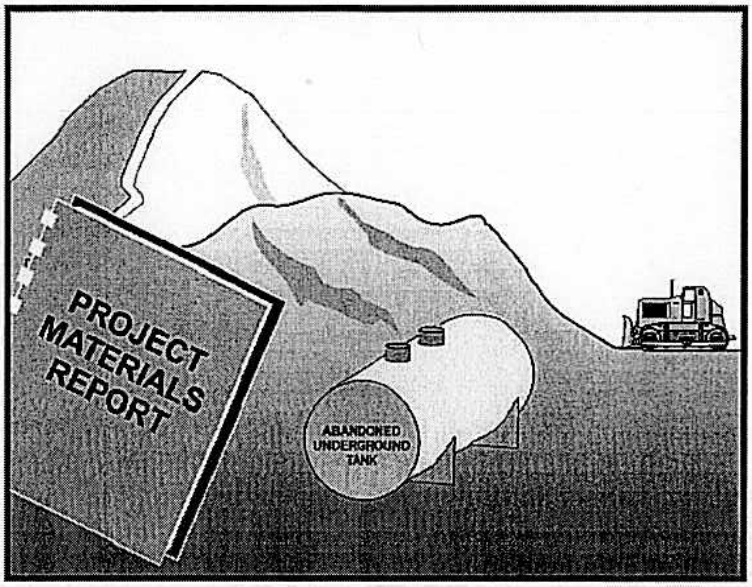
- Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE). In no case shall hazardous waste storage exceed requirements in Title 22 CCR, Section 66262.34.
- Waste shall be disposed of by a licensed hazardous waste transporter 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.

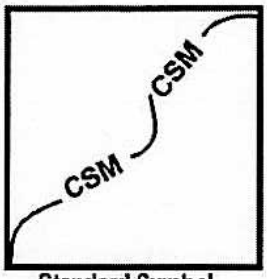
Maintenance and Inspection

- 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

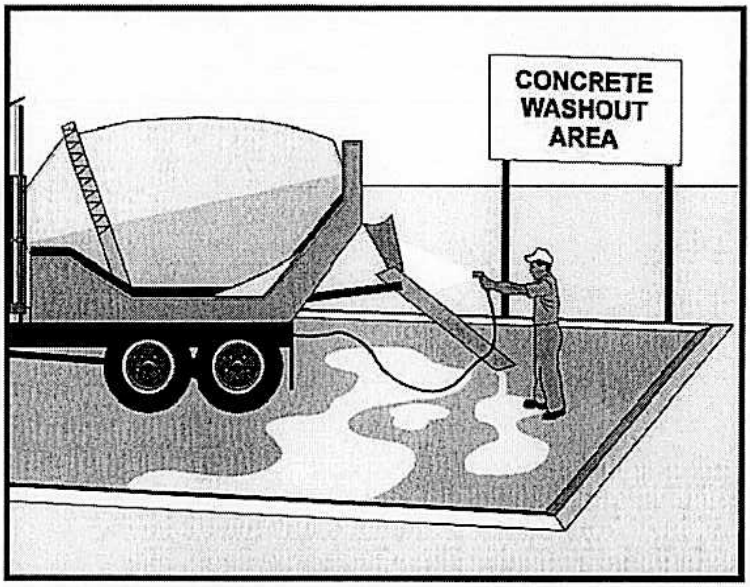
- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, 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."

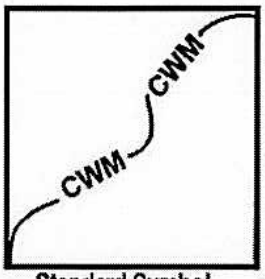
Maintenance and Inspection

- 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.

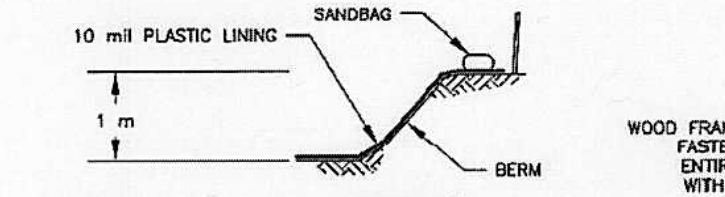
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

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

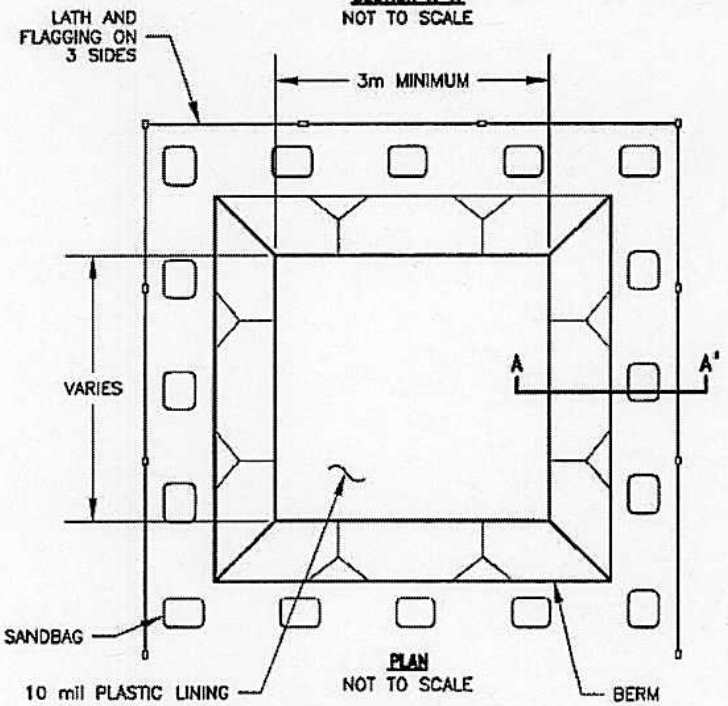
tears in polyethylene liner, missing sandbags, etc.). Damaged facilities shall be repaired.

Concrete Waste Management

WM-8

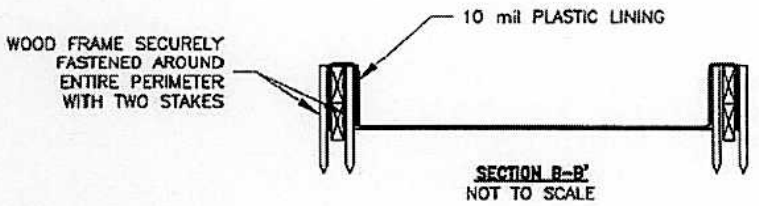


SECTION A-A'
NOT TO SCALE

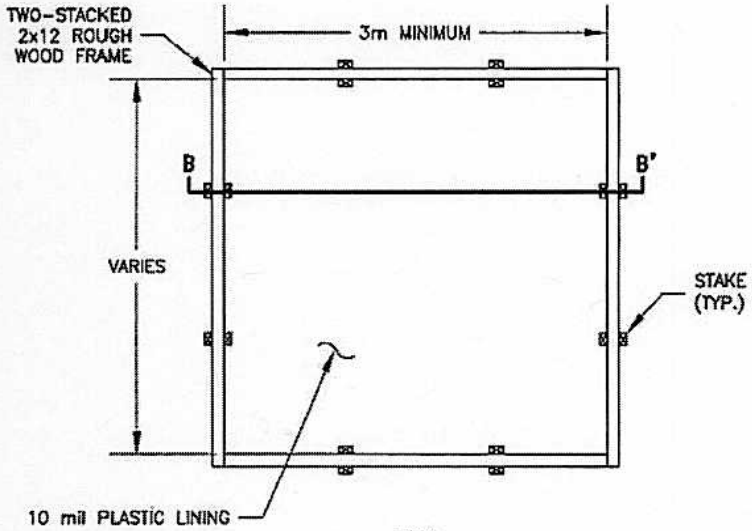


PLAN
NOT TO SCALE

TYPE "BELOW GRADE"



SECTION B-B'
NOT TO SCALE



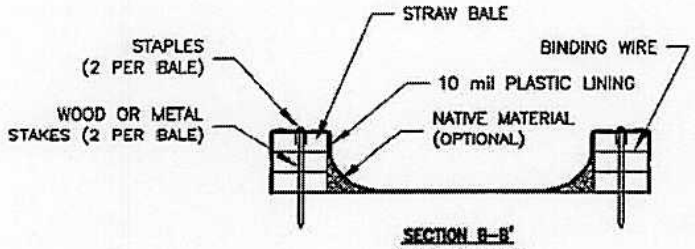
PLAN
NOT TO SCALE

TYPE "ABOVE GRADE" WITH WOOD PLANKS

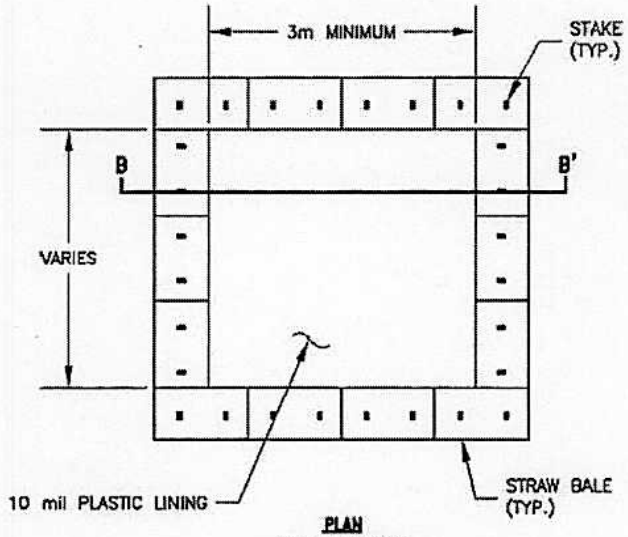
NOTES:

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

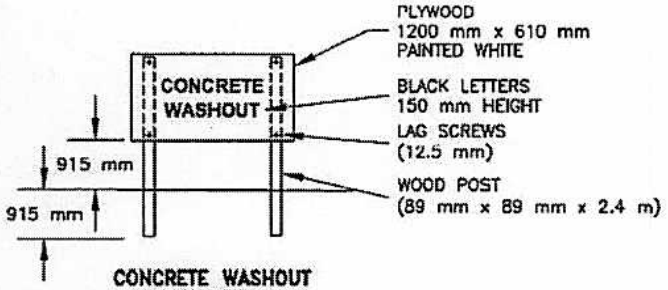


SECTION B–B'
NOT TO SCALE

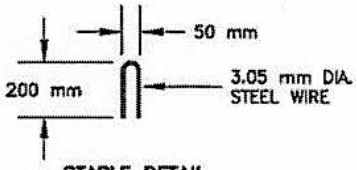


PLAN
NOT TO SCALE

TYPE "ABOVE GRADE"
WITH STRAW BALES



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)



STAPLE DETAIL

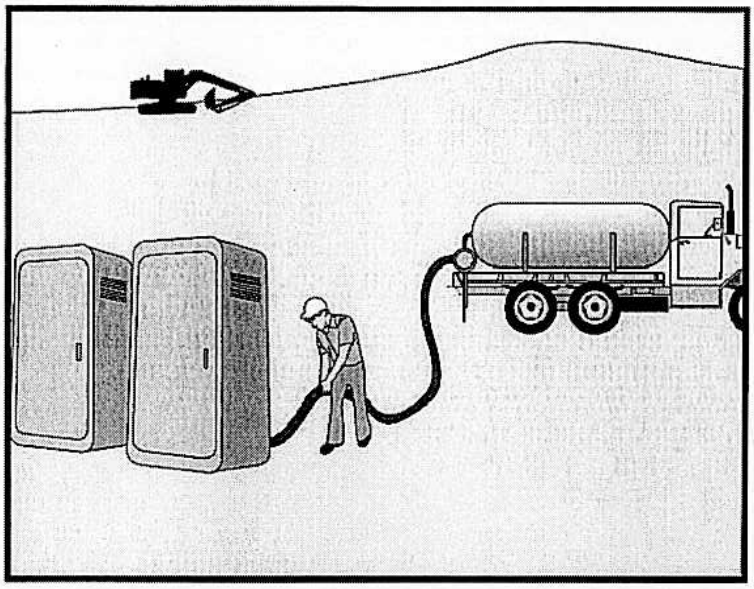
NOTES:

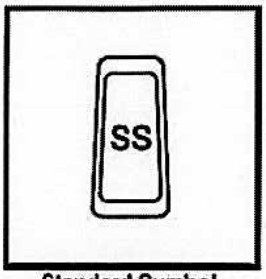
1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE FIG. 4–15) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITIY.

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.

APPENDIX D

Contractor Certification

Contractor Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel prepared the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for preparing the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Signed *Position*

_____

Date

APPENDIX E

Authorized Contractors

List of Authorized Contractors

Contractor	Designated Responsible Person	Address	Telephone Number (current and emergency)	Responsibilities

APPENDIX F

Authorized Inspectors

List of Authorized Inspectors

Contractor	Designated Responsible Person	Telephone Number	Responsibilities

APPENDIX G

SWPPP Inspection Form

Storm Water Quality Construction Site Inspection Checklist

Caltrans Stormwater Quality Handbooks, March 2003

GENERAL INFORMATION				
Project Name				
Caltrans Contract Nº				
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	❒ Prior to forecast rain		❒ After a rain event	
	❒ 24-hr intervals during extended rain		❒ Other _____	
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE LIMITS FROM SPECIAL PROVISIONS				
Total Project Area	_____	Hectares	_____	Acres
Rainy Season DSA Limit	_____	Hectares	_____	Acres
Field Estimate of Non-Active DSAs	_____	Hectares	_____	Acres
Field Estimate of Active DSAs	_____	Hectares	_____	Acres

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Temporary Soil Stabilization				
Does the applied temporary soil stabilization provide 100% coverage for the required areas?				
Are any non-vegetated areas that may require temporary soil stabilization?				
Is the area where temporary soil stabilization required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers				
Are temporary linear sediment barriers properly installed in accordance with the details, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Are fiber rolls installed and maintained on required slopes in accordance with the details, functional and maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected with either Type 1, 2 or 3 inlet protection?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Location:				
Desilting Basins				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 15 m from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Are points of ingress/egress to public/private roads inspected, swept, and vacuumed daily?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				
Wind Erosion Control				
Is dust control implemented in conformance with Section 10 of the Standard Specifications?				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Is dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses, and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of outside the highway right of way?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are the temporary concrete washout facilities' PVC liners free from punctures and holes?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas within the construction limits of the project site collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed as shown on the plans or as approved by the engineer?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Location:				
Illicit Connection/Illegal Discharge Detection and Reporting				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Engineer been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from noticeable pollutants?				
Are discharge points free of any significant erosion or sediment transport?				
Location:				
Location:				
Location:				
Location:				
WPCP/SWPPP Update				
Do the WPCP/SWPPP, Project Schedule/Water Pollution Control Schedule and WPCDs adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the WPCDs installed in the proper location(s) and according to the details for the plan?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential water pollution control concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to an water body listed as impaired for sediment/sedimentation or turbidity in the General Construction Activity Permit?				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan, if required, during rain events?				
Were there any BMPs not properly implemented, or breaches, malfunctions, leakages or spills observed, which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Were soil amendments (e.g., gypsum) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Did storm water contact stored materials or waste and resulted in a discharge from the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				

APPENDIX H

SWPPP Amendments

SWPPP Amendments

Project Name: AES Highgrove Energy Facility

Amendment Number	Date	Brief Description of Amendment	Prepared By

APPENDIX I

Relevant Permits

Insert General Permit

APPENDIX J

Drainage Calculations for Detention Pond