

# Exercises

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# Construction Site BMP Training

## Sample Project for Exercises

# Storm Water Data Report

Dist-County-Route: 07-Ven-101

Kilometer Post (Post Mile) Limits:

39.2 (24.4)/40.2 (25.0)

Project Type: Interchange Modification/  
Widen 2 to 4 lanes

EA: 07-654321

Phase: PID PA/ED PS&E

Regional Water Quality Control Board(s): Los Angeles RWQCB Region 4

Total Disturbed Soil Area: 11.06 hectares (27.3 acres)

Estimated Construction Start Date: June 1, 2008 Construction Completion Date: June 1, 2011

## 1. PROJECT DESCRIPTION

The Central Expressway/US 101 freeway improvement project Phase II extends from Main Street to the US-101 freeway in the City of San Buenaventura. Central Expressway will be elevated and widened from 2 to 4 lanes beginning at Main Street to Victoria Avenue. Four construction stages are expected to complete the project.

The northbound ramps will be re-aligned and widened to the south to provide greater intersection spacing between the ramps and the intersection of Victoria Avenue with Ventura Boulevard. Greater traffic capacity will be provided by the project.

The existing project site generally consists of embankment fill material composed of very stiff clayey silt and silty clay. Groundwater elevation is approximately 27 meters below original ground. No ground water is anticipated at the Main Street and Central Expressway location.

## 2. SITE DATA AND STORM WATER QUALITY DESIGN ISSUES

The receiving waters within the project limits include Adobe Creek, which is tributary to the Santa Clara River. The Santa Clara River is tributary to the Pacific Ocean.

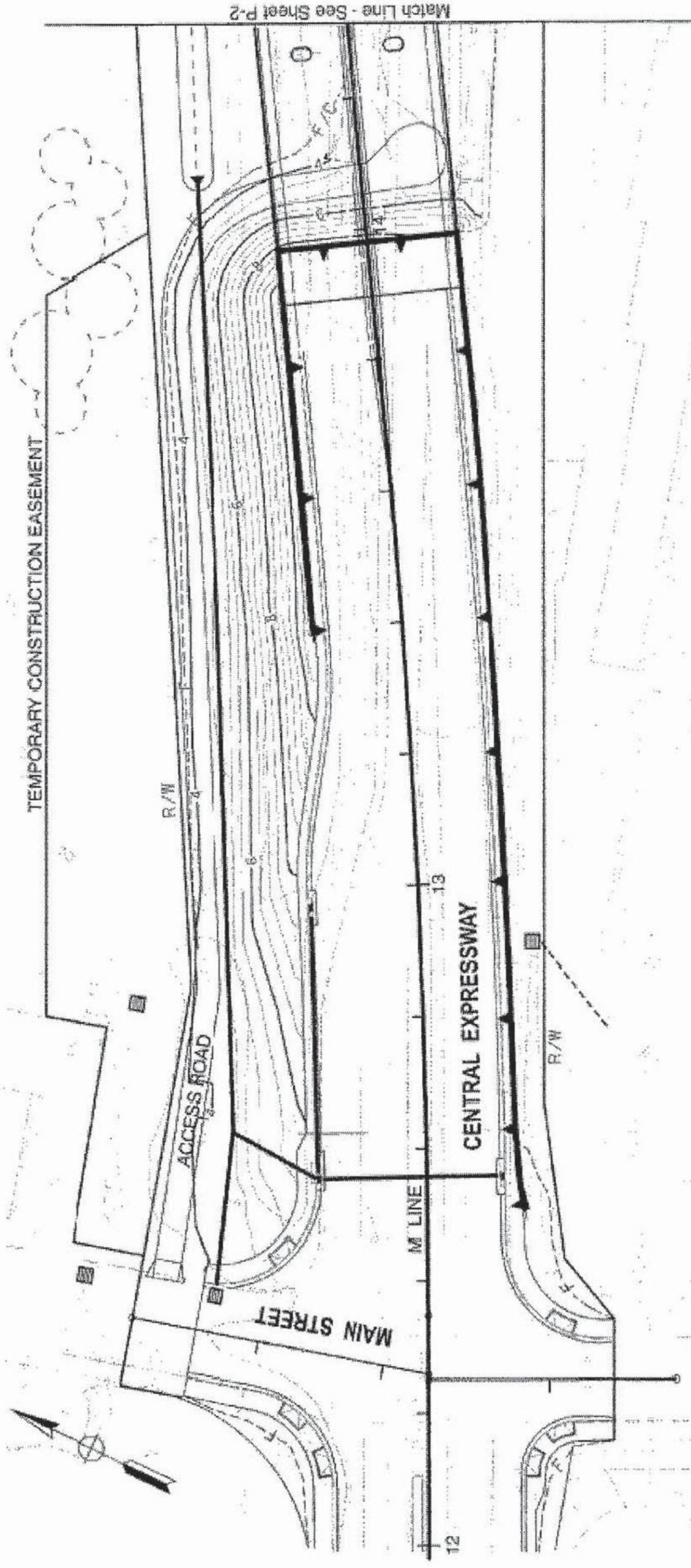
Average precipitation November through April is 14.00 inches, and May to October is 0.82 inches. The annual average high temperature is 70.2 degrees F, while the average low is 51 degrees F. Elevation is 30.5m (100 ft). The maximum allowable construction area is limited to 2.0 ha (5.0 acres) during the rainy season.

Embankment slopes throughout the project are at a gradient of approximately 2: 1 (horizontal: vertical), approximately 20m (60 ft) in length, and thickly vegetated. The most severe slope 1-½: 1 (horizontal: vertical) with a length of 30.5m (100 ft). Adjacent properties contain commercial and residential properties. Twenty-two exploratory borings were drilled in the project area in September 1995. The borings generally encountered alluvial soils to the depth of exploration; however, some borings encountered 1.5m (5.0 ft) of fill overlying the alluvium. The fill material consisted of clayey silt, and the alluvium consisted of silty sand, sandy silt and clayey silt. Groundwater was not encountered in the borings.

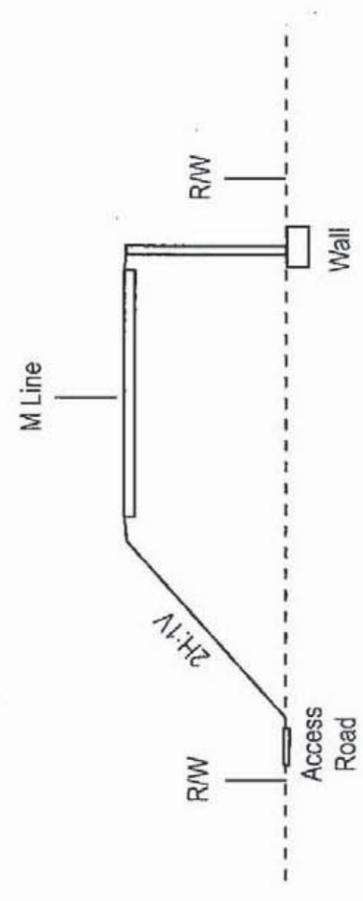
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# Construction Site BMP Training

Sample Project for Exercises



LAYOUT PLAN  
P-1



TYPICAL SECTION

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# Construction Site BMP Training

## Module II Exercise 1

### Soil Stabilization and Sediment Control BMPs

As Project Engineer for 07-654321, Ventura 101/Central Expressway Project, you are well into the PS&E design phase. You have enough information on site conditions and anticipated construction activities to begin selecting construction site BMPs.

Use the information in the Storm Water Data Report (SWDR) handout for this project and Figure 2-1, and Tables 2-1, 2-2, & 2-3 to determine the soil stabilization and sediment control BMPs required. The following slope data is given for the 11 ha (27.3 acres) of disturbed soil area (DSA):

DSA for slopes 1V:4H and flatter:	7 ha (17.3 acres)
DSA for slopes between 1V:4H and 1V:2H:	3 ha (7.4 acres)
DSA for slopes 1V:2H and steeper:	1 ha (2.5 acres)
DSA with slope length greater than 6 m (20 ft):	5 ha (12.4 acres)

1. What Rainy Season dates should be included in the project's Special Provisions (SSPs)?  
\_\_\_\_\_
2. What is the applicable Rainfall Area for this project?  
\_\_\_\_\_
3. For Non-Active DSA during the rainy season, which BMPs are required?  
\_\_\_\_\_
4. For Non-Active DSA during the rainy season, for which slope lengths are Soil Stabilization BMPs required? \_\_\_\_\_
5. For Non-Active DSA during the non-rainy season, which BMPs are required?  
\_\_\_\_\_
6. For Active DSA during the rainy season, which of the following BMPs are required?
  - A. Soil Stabilization \_\_\_\_\_
  - B. Sediment Barrier \_\_\_\_\_
  - C. Desilting Basin (see footnote 2) \_\_\_\_\_
7. For Active DSA during the non-rainy season, are the requirements more (or less) stringent?  
\_\_\_\_\_
8. For the most severe slope described for the project above....
  - A. What is the maximum slope length for Non-Active DSAs? \_\_\_\_\_
  - B. What BMP(s) can be used to break up the slope length? \_\_\_\_\_

# Construction Site BMP Training

## Module III Exercise 2

### Tracking, Wind Erosion, & Construction Site Management BMPs

#### 02-998871 Son 1

#### 39.2 /40.2 PM (24.4/25.0)(KP) Upgrade Sidewalk and Bridge Railing (PA/ED)

**Project Description:** The sidewalks, bridge railings and other facilities will be modified to meet American Disability Act (ADA) requirements. The existing handrail will be removed and replaced with a metal railing that is ADA compliant. Portions of the sidewalk will be sawcut, removed, and replaced. Several ramps will be installed. Scupper drains and grates will be modified to accommodate the sidewalk replacement.

An unpaved turnout near the south approach to the bridge has been designated as a staging area for the Contractor's use. Slightly more than 0.1 Ha (0.25 acres) of disturbed soil area is anticipated.

The project is estimated at \$6,000,000 and is expected to take 10 months to complete.

As Project Engineer for 02-998871, Rainbow Canyon Bridge, you are well into the PA/ED design phase. You have enough information on site conditions and anticipated construction activities to begin selecting construction site BMPs.

Use the Construction Site BMP Consideration Form and the Construction Site (CS) BMP Checklists to answer the following questions:

1. List the construction site BMPs most likely to be needed to build this project.

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2. This project has a minor amount of disturbed soil area. Considering the nature of the DSA, what BMPs are most appropriate for soil stabilization and sediment control (if any)?

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3. Although not mentioned on the forms and checklists or required by the amount of disturbed soil area, why does this project require a Storm Water Pollution Prevention Plan (SWPPP)?

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# Construction Site BMP Training

## Module III Exercise 3

### Tracking, Wind Erosion, & Construction Site Management BMPs

#### 03-445561 Eld 224 29.2 /30.2 PM Culvert Replacement (PS&E)

##### **Project Description:**

This project proposes to repair two 84 inch corrugated metal pipes located under an on and off ramp and an overcrossing. The culvert inverts have corroded so severely that they have become perforated allowing the water to erode the material underneath. This erosion has caused sinkholes in the roadbed that have been temporarily fixed with an asphalt concrete patch and shoulder backing.

The disturbed soil area will be limited to two five-foot paths cleared to facilitate personnel and hand carried equipment to each site from the road. This work is covered in the estimate by the item "Clearing and Grubbing" and will consist of brush clearing and removal of a fallen tree. No grading will be performed. The project will not have any water quality impacts as the existing slopes will not be disturbed and changes to vegetation will be minor.

Construction will occur during the late summer when stream flow is minor.

As Project Engineer for 03-445561, you are well into the PA/ED design phase. You have enough information on site conditions and anticipated construction activities to begin selecting construction site BMPs.

Use the Construction Site BMP Consideration Form and the Construction Site (CS) BMP Checklists to answer the following questions:

1. List the construction site BMPs most likely to be needed to build this project.

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2. This project has a minor amount of disturbed soil area. Considering the nature of the DSA, what BMPs are most appropriate for soil stabilization and sediment control (if any)?

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3. This project will likely have a Storm Water Data Report – Short Form and a Water Pollution Control Program (WPCP). As such, are construction site BMPs required to be included into the contract documents (PS&E)?

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# Construction Site BMP Training

## Module IV Exercise 4

### Construction Site BMP Strategy

#### 07-654321 Ven 101 39.2 /40.2 PM (24.4/25.0)(KP) Interchange Mod./ Widen 2 to 4 lanes (PS&E)

The Construction Site BMP Strategy for this project shall consist of the following for soil stabilization and sediment control. Perimeter controls shall consist of silt fence placed at the toe of all embankment slopes and gravel bag berms shall be placed along the construction pad above Smith Creek. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, fiber roll slope interruption devices shall be installed and bonded fiber matrix (BFM) shall be hydraulically applied. Whenever possible, early implementation of erosion control seeding and landscape planting shall be performed.

The riparian vegetation at Adobe Creek has been designated as an environmentally sensitive area (ESA). This ESA shall be protected with high visibility plastic fencing.

Offsite tracking of sediment shall be limited by placing stabilized construction entrances in combination with regular street sweeping and vacuuming.

Concrete wastes shall be managed through the use of concrete washout facilities.

Storm drain inlet protection shall be deployed throughout the project.

Applicable Construction Site BMPs were located based upon the above strategy on the proposed Construction Site BMPs Deployment Plan (D-Plan). Quantities include take-offs from the D-Plan and increasing the quantity by 25 percent to account for the two additional rainy seasons during construction.

At a separate meeting for Construction Site BMP implementation conducted on December 31, 2005, the designated construction representative, Mark S. Alott, Construction Storm Water Coordinator, concurred on the Construction Site BMP strategy for this project.

#### Module IV Exercise

For each of the following projects, indicate whether the Construction Site BMP Strategy is appropriate for the project and for the project phase (PID, PA/ED, and PS&E).

1. **Project A** 04-1S1701 SM-92 0.4/ 1.6 PM (0.9/2.53) (KP) Repair Storm Damage (PID)

Project repairs will be made on the embankment adjacent to eastbound Hwy 92, and repair of a damaged cross culvert drainage system, which crosses under the highway. The roadway is constructed on a hillside with steep slopes on the uphill (towards the west and downhill (towards the east) sides of the roadway. Pilarcitos Creek and a dirt road are located at the bottom of the slope embankment to the east and run parallel to the highway. Bank areas along the Pilarcitos Creek are environmentally sensitive and require permits that restrict construction activity.

#### **Construction Site BMP Strategy:**

Construction Site BMPs representing the six water pollution control categories are anticipated on this project. These include:

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

-Waste Management & Materials Pollution Controls

Appropriate? (yes/no) If no, why? \_\_\_\_\_

2. **Project B** 08- 443811 SBD-210 (R 27.2 / R 29.4) (KP) HOV & Interchange (PA/ED)

The San Bernardino Associated Governments (SANBAG) proposes to construct approximately 2.2 kilometers of State Route 210 (SR-210) in the City of Rialto, California. SR-210 Segment 9, as proposed, will construct a two High Occupancy Vehicle (HOV) lane, a six-lane restricted access highway (freeway) with an interchanges at Ayala Drive (2 entrance ramps, 2 exit ramps), Cactus Avenue Over-crossing, Lilac Avenue Pedestrian Overcrossing, bents, barriers, sound-walls, and retaining walls. Project limits along SR-210 begin at Post Mile (PM) **R16.9** easterly of the Linden Avenue, and ends at PM **R 18.27** easterly of the Lilac Avenue.

Excavation for Segment 9 is 122000m<sup>3</sup> and embankment is 6610m<sup>3</sup>. Cut slopes on the roadway will be 1:2 or flatter and 1:4 or flatter on fill sections. The total disturbed soil area will be approximately 27.5ha which includes areas that are disturbed because of adding new lanes, cut/fill slopes, sound walls and retaining walls.

**Construction Site BMP Strategy:** This project will require the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

The Construction Site BMP strategy for this project shall consist of the following for soil stabilization and sediment control. Linear sediment barriers such as silt fence will be placed at the toe of all excavation and embankment slopes. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, slope interruption devices such as fiber rolls shall be installed and soil stabilizer shall be hydraulically applied. Wherever possible, early implementation of permanent erosion control seeding or landscape planting shall be performed.

Offsite tracking of sediment shall be limited by placing stabilized construction entrances in combination with regular street sweeping and vacuuming. Stabilized construction roadways shall be used to provide access for construction activities.

Riparian areas adjacent to creeks shall be designated as ESAs and protected with temporary high visibility fencing. Where construction within the creek channels is anticipated, temporary stream crossings and clear water diversions shall be used to protect water quality.

Concrete wastes shall be managed through the use of concrete washout facilities.

Storm drain inlet protection shall be deployed throughout the project.

Various waste management, materials handling, and other housekeeping BMPs shall be used throughout the duration of the project. Stockpiles of various kinds are anticipated and shall be maintained with the appropriate BMPs.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan). An estimate based upon these quantities has been increased by 25 percent to account for the two additional rainy seasons during construction.

On October 31, 2006, an e-mail was received from Mina Changes concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

3. **Project C** 08-OC7301 SBD-15 140.3/142.4 PM (87.2/88.5) (KP) Signing Installation (PS&E)

This Minor B project proposed to remove and replace four existing warning signs with the new warning signs and install flashing beacon on the four signs facing Southbound I-15 prior to the Agricultural Inspection station near Yermo Rd. The project is located in the City of Yermo, California, northeast of Barstow. The project does not have the potential to create water quality impacts during and after construction because there are no excavations or cut slopes associated with this project.

The project area is very limited and replacement and installation will take place on dry days. The signs as well as the flashing beacons do not impact the water quality. All necessary construction precautions will take place.

**Construction Site BMP Strategy:** This project will require the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

The Construction Site BMP strategy for this project shall consist of the following for soil stabilization and sediment control. Linear sediment barriers such as silt fence will be placed at the toe of all excavation and embankment slopes. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, slope interruption devices such as fiber rolls shall be installed and soil stabilizer shall be hydraulically applied. Wherever possible, early implementation of permanent erosion control seeding or landscape planting shall be performed. Storm drain inlet protection shall be deployed throughout the project. Concrete wastes shall be managed through the use of concrete washout facilities.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan). An estimate based upon these quantities has been increased by 25 percent to account for the two additional rainy seasons during construction.

On October 31, 2006, an e-mail was received from Change A. Lott concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

4. **Project D** 08-OE0201 SBD-60 (R0.0/ R9.9) (KP) Replace Pavement Markers (PS&E)

This project will replace missing and faded pavement markers with reflective pavement markers between the travel way mainlines on San Bernardino Route 60 at PM R0.0/R95.9.

**Construction Site BMP Strategy:** The project requires a WPCP because the total disturbed soil area is less than 1 acre.

Construction activities at the project will not result in any areas of disturbed soil as defined by the Project Planning and Design Guide (PPDG). Non-storm water management and waste management and materials pollution control BMPs must be implemented throughout the construction project.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan).

On October 31, 2006, an e-mail was received from Mina Changes concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

# Construction Site BMP Training

## Estimating Exercise Module IV Exercise 5

### Concrete Washout

As Project Engineer for 07-654321, Ventura 101/Central Expressway Project, you have determined that concrete washouts will be incorporated into the PS&E as a separate contract item. In addition to the project information described in the SWDR, total construction costs are estimated at \$64,000,000 and construction duration at 750 working days.

#### Estimated Concrete Volume

Total concrete volume (structures, paving, barriers, etc.): (60,160 yd<sup>3</sup>) 46,000 m<sup>3</sup>  
 Concrete waste as a percentage of total concrete volume (approx.): 1.50%  
 Total concrete waste: (900 yd<sup>3</sup>) 690 m<sup>3</sup>

#### Concrete Washout Capacity

Above Grade (constructed per Caltrans detail): (2.6 yd<sup>3</sup>) 2 m<sup>3</sup>  
 Below Grade (constructed per Caltrans detail): (26.2 yd<sup>3</sup>) 20 m<sup>3</sup>  
 Above Grade (vendor supplied roll-on/roll-off): (2.6 yd<sup>3</sup>) 2 m<sup>3</sup>  
 Portable (constructed per Caltrans spec., approx. volume): (2.6 yd<sup>3</sup>) 2 m<sup>3</sup>

#### Concrete Washout Selection

PE decides that 90% of concrete waste will be contained in below grade washouts and 10% in above grade washouts [690 m<sup>3</sup> x 90% = 621 m<sup>3</sup>, 690 m<sup>3</sup> x 10% = 69 m<sup>3</sup>] (900 yd<sup>3</sup> x 90% = 810 yd<sup>3</sup>, 900 yd<sup>3</sup> x 10% = 90 yd<sup>3</sup>).

Below Grade: 690 m<sup>3</sup> / 20 m<sup>3</sup> (810 yd<sup>3</sup> / 26.2 yd<sup>3</sup>) 31 each  
 Above Grade: 69 m<sup>3</sup> / 2 m<sup>3</sup> (90 yd<sup>3</sup> / 2.6 yd<sup>3</sup>) 34 each

#### Concrete Washout Cost Estimation

Contractor's cost for below grade installation is \$500 and for above grade installation is \$400. Historically, washouts have been bid at \$2000 but for fewer installations. As such, washouts should be bid at \$1000.\*

65 washouts (31 Below Grade + 34 Above Grade) at \$1000/each \$65,000

\* Cost estimation based upon *Concrete Washout Selection and Estimating Guideline Summary Report*, December 2005, CTSW-RT-05-138-04.1.

# Construction Site BMP Training

## Estimating Exercise Module IV Exercise 6

### Street Sweeping

As Project Engineer for 07-654321, Ventura 101/Central Expressway Project, you have determined that street sweeping will be incorporated into the PS&E as a separate contract item. In addition to the project information described in the SWDR, total construction costs are estimated at \$64,000,000 and construction duration at 750 working days.

#### Estimated Sweeper Cost Per Year

Sweeper use: 1 full day/week	\$350/day
52 weeks/year at 5 working days/week (approx)	\$18,200 say \$20,000

#### Estimated Sweeper Cost for the Contract Period

Contract period 750 working days/250 working days/year	3 years
Estimated Cost for the Contract: 3 years at \$20,000/year	\$60,000

The following example illustrates another method for estimating this item:

#### Estimated Sweeper Events Per Year

Periodic Once Every Other Week	26 days
Rain Events	14 days
During Earth Moving Activities	<u>10 days</u>
Total Days	50 days

#### Estimated Sweeper Cost Per Year

Daily Cost: Sweeper & Driver 8 hours/day * \$50/hour	\$ 400/day
Yearly Cost: 50 days usage per year: 50 days/year * \$400/day	\$20,000/year

#### Estimated Sweeper Cost for the Contract Period

Contract period 750 Days/250 days/year	3 years
Estimated Cost for the Contract: 3 years at \$20,000/year	\$60,000

# EXERCISES

## Construction Site BMP Training

### Module III Exercise 3

## Tracking, Wind Erosion, & Construction Site Management BMPs

### 03-445561 Eld 224 29.2 /30.2 PM Culvert Replacemnt (PS&E)

#### Project Description:

This project proposes to repair two 84 inch corrugated metal pipes located under an on and off ramp and an overcrossing. The culvert inverts have corroded so severely that they have become perforated allowing the water to erode the material underneath. This erosion has caused sinkholes in the roadbed that have been temporarily fixed with an asphalt concrete patch and shoulder backing.

The disturbed soil area will be limited to two five-foot paths cleared to facilitate personnel and hand carried equipment to each site from the road. This work is covered in the estimate by the item "Clearing and Grubbing" and will consist of brush clearing and removal of a fallen tree. No grading will be performed. The project will not have any water quality impacts as the existing slopes will not be disturbed and changes to vegetation will be minor.

Construction will occur during the late summer when stream flow is minor.

As Project Engineer for 03-445561, you are well into the PA/ED design phase. You have enough information on site conditions and anticipated construction activities to begin selecting construction site BMPs.

Use the Construction Site BMP Consideration Form and the Construction Site (CS) BMP Checklists to answer the following questions:

1. List the construction site BMPs most likely to be needed to build this project.

Non-storm water, materials and waste management, good housekeeping type of BMPs.

2. This project has a minor amount of disturbed soil area. Considering the nature of the DSA, what BMPs are most appropriate for soil stabilization and sediment control (if any)?

None.

3. This project will likely have a Storm Water Data Report – Short Form and a Water Pollution Control Program (WPCP). As such, are construction site BMPs required to be included into the contract documents (PS&E)?

Yes. BMPs are required for all PS&E.

# EXERCISES

## Construction Site BMP Training

### Estimating Exercise

## Concrete Washout

As Project Engineer for 07-654321, Ventura 101/Central Expressway Project, you have determined that concrete washouts will be incorporated into the PS&E as a separate contract item. In addition to the project information described in the SWDR, total construction costs are estimated at \$64,000,000 and construction duration at 750 working days.

### Estimated Concrete Volume

Total concrete volume (structures, paving, barriers, etc.): (60,160 yd<sup>3</sup>) 46,000 m<sup>3</sup>  
Concrete waste as a percentage of total concrete volume (approx.): 1.50%  
Total concrete waste: (900 yd<sup>3</sup>) 690 m<sup>3</sup>

### Concrete Washout Capacity

Above Grade (constructed per Caltrans detail): (2.6 yd<sup>3</sup>) 2 m<sup>3</sup>  
Below Grade (constructed per Caltrans detail): (26.2 yd<sup>3</sup>) 20 m<sup>3</sup>  
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Portable (constructed per Caltrans spec., approx. volume): (2.6 yd<sup>3</sup>) 2 m<sup>3</sup>

### Concrete Washout Selection

PE decides that 90% of concrete waste will be contained in below grade washouts and 10% in above grade washouts [690 m<sup>3</sup> x 90% = 621 m<sup>3</sup>, 690 m<sup>3</sup> x 10% = 69 m<sup>3</sup>] (900 yd<sup>3</sup> x 90% = 810 yd<sup>3</sup>, 900 yd<sup>3</sup> x 10% = 90 yd<sup>3</sup>).

Below Grade: 690 m<sup>3</sup> / 20 m<sup>3</sup> (810 yd<sup>3</sup> / 26.2 yd<sup>3</sup>) 31 each  
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### Concrete Washout Cost Estimation

Contractor's cost for below grade installation is \$500 and for above grade installation is \$400. Historically, washouts have been bid at \$2000 but for fewer installations. As such, washouts should be bid at \$1000.\*

65 washouts (31 Below Grade + 34 Above Grade) at \$1000/each \$65,000

\* Cost estimation based upon *Concrete Washout Selection and Estimating Guideline Summary Report*, December 2005, CTSW-RT-05-138-04.1.

# EXERCISES

## Construction Site BMP Training

### Estimating Exercise

## Street Sweeping

As Project Engineer for 07-654321, Ventura 101/Central Expressway Project, you have determined that street sweeping will be incorporated into the PS&E as a separate contract item. In addition to the project information described in the SWDR, total construction costs are estimated at \$64,000,000 and construction duration at 750 working days.

### Estimated Sweeper Cost Per Year

Sweeper use: 1 full day/week	\$350/day
52 weeks/year at 5 working days/week (approx)	\$18,200 say \$20,000

### Estimated Sweeper Cost for the Contract Period

Contract period 750 working days/250 working days/year	3 years
Estimated Cost for the Contract: 3 years at \$20,000/year	\$60,000

The following example illustrates another method for estimating this item:

### Estimated Sweeper Events Per Year

Periodic Once Every Other Week	26 days
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Total Days	50 days

### Estimated Sweeper Cost Per Year

Daily Cost: Sweeper & Driver 8 hours/day * \$50/hour	\$ 400/day
Yearly Cost: 50 days usage per year: 50 days/year * \$400/day	\$20,000/year

### Estimated Sweeper Cost for the Contract Period

Contract period 600 Days/200 days/year	3 years
Estimated Cost for the Contract: 3 years at \$20,000/year	\$60,000

# EXERCISES

## Construction Site BMP Training

### Construction Site BMP Strategy

#### 07-654321 Ven 101 39.2 /40.2 PM (24.4/25.0)(KP) Interchange Mod./ Widen 2 to 4 lanes (PS&E)

The Construction Site BMP Strategy for this project shall consist of the following for soil stabilization and sediment control. Perimeter controls shall consist of silt fence placed at the toe of all embankment slopes and gravel bag berms shall be placed along the construction pad above Smith Creek. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, fiber roll slope interruption devices shall be installed and bonded fiber matrix (BFM) shall be hydraulically applied. Whenever possible, early implementation of erosion control seeding and landscape planting shall be performed.

The riparian vegetation at Adobe Creek has been designated as an environmentally sensitive area (ESA). This ESA shall be protected with high visibility plastic fencing.

Offsite tracking of sediment shall be limited by placing stabilized construction entrances in combination with regular street sweeping and vacuuming.

Concrete wastes shall be managed through the use of concrete washout facilities.

Storm drain inlet protection shall be deployed throughout the project.

Applicable Construction Site BMPs were located based upon the above strategy on the proposed Construction Site BMPs Deployment Plan (D-Plan). Quantities include take-offs from the D-Plan and increasing the quantity by 25 percent to account for the two additional rainy seasons during construction.

At a separate meeting for Construction Site BMP implementation conducted on December 31, 2005, the designated construction representative, Mark S. Alott, Construction Storm Water Coordinator, concurred on the Construction Site BMP strategy for this project.

#### Module IV Exercise

For each of the following projects, indicate whether the Construction Site BMP Strategy is appropriate for the project and for the project phase (PID, PA/ED, and PS&E).

1. **Project A** 04-1S1701 SM-92 0.4/ 1.6 PM (0.9/2.53) (KP) Repair Storm Damage (PID)

Project repairs will be made on the embankment adjacent to eastbound Hwy 92, and repair of a damaged cross culvert drainage system, which crosses under the highway. The roadway is constructed on a hillside with steep slopes on the uphill (towards the west and downhill (towards the east) sides of the roadway. Pilarcitos Creek and a dirt road are located at the bottom of the slope embankment to the east and run parallel to the highway. Bank areas along the Pilarcitos Creek are environmentally sensitive and require permits that restrict construction activity.

#### **Construction Site BMP Strategy:**

Construction Site BMPs representing the six water pollution control categories are anticipated on this project. These include:

- Soil Stabilization
- Sediment Control
- Tracking Controls
- Wind Erosion Control
- Non-Storm Water Management
- Waste Management & Materials Pollution Controls

Yes. This is the PID level of detail.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

# EXERCISES

## 2. **Project B** 08-443811 SBD-210 (R 27.2 / R 29.4) (KP) HOV & Interchange (PA/ED)

The San Bernardino Associated Governments (SANBAG) proposes to construct approximately 2.2 kilometers of State Route 210 (SR-210) in the City of Rialto, California. SR-210 Segment 9, as proposed, will construct a two High Occupancy Vehicle (HOV) lane, a six-lane restricted access highway (freeway) with an interchanges at Ayala Drive (2 entrance ramps, 2 exit ramps), Cactus Avenue Over-crossing, Lilac Avenue Pedestrian Overcrossing, bents, barriers, sound-walls, and retaining walls. Project limits along SR-210 begin at Post Mile (PM) **R16.9** easterly of the Linden Avenue, and ends at PM **R 18.27** easterly of the Lilac Avenue.

Excavation for Segment 9 is 122000m<sup>3</sup> and embankment is 6610m<sup>3</sup>. Cut slopes on the roadway will be 1:2 or flatter and 1:4 or flatter on fill sections. The total disturbed soil area will be approximately 27.5ha which includes areas that are disturbed because of adding new lanes, cut/fill slopes, sound walls and retaining walls.

**Construction Site BMP Strategy:** This project will require the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

The Construction Site BMP strategy for this project shall consist of the following for soil stabilization and sediment control. Linear sediment barriers such as silt fence will be placed at the toe of all excavation and embankment slopes. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, slope interruption devices such as fiber rolls shall be installed and soil stabilizer shall be hydraulically applied. Wherever possible, early implementation of permanent erosion control seeding or landscape planting shall be performed.

Offsite tracking of sediment shall be limited by placing stabilized construction entrances in combination with regular street sweeping and vacuuming. Stabilized construction roadways shall be used to provide access for construction activities.

Riparian areas adjacent to creeks shall be designated as ESAs and protected with temporary high visibility fencing. Where construction within the creek channels is anticipated, temporary stream crossings and clear water diversions shall be used to protect water quality.

Concrete wastes shall be managed through the use of concrete washout facilities.

Storm drain inlet protection shall be deployed throughout the project.

Various waste management, materials handling, and other housekeeping BMPs shall be used throughout the duration of the project. Stockpiles of various kinds are anticipated and shall be maintained with the appropriate BMPs.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan). An estimate based upon these quantities has been increased by **25 percent to account for the two additional rainy seasons** during construction.

On October 31, 2006, an e-mail was received from Mina Changes concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

No. Since there are two rainy seasons it should be 25% each.  
May be more than needed for a pA/ED , adequate for a PS&E.

## 3. **Project C** 08-OC7301 SBD-15 140.3/142.4 PM (87.2/88.5) (KP) Signing Installation (PS&E)

This Minor B project proposed to remove and replace four existing warning signs with the new warning signs and install flashing beacon on the four signs facing Southbound I-15 prior to the Agricultural Inspection station near Yermo Rd. The project is located in the City of Yermo, California, northeast of Barstow. The project does not have the potential to create water quality impacts during and after construction because there are no excavations or cut slopes associated with this project. The project area is very limited and replacement and installation will take place on dry days. The signs as well as the flashing beacons do not impact the water quality. All necessary construction precautions will take place.

# EXERCISES

**Construction Site BMP Strategy:** This project will require the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

The Construction Site BMP strategy for this project shall consist of the following for soil stabilization and sediment control. Linear sediment barriers such as silt fence will be placed at the toe of all excavation and embankment slopes. Contour grading of slopes shall include surface roughening by walking the slopes with tracked equipment. Immediately thereafter, slope interruption devices such as fiber rolls shall be installed and soil stabilizer shall be hydraulically applied. Wherever possible, early implementation of permanent erosion control seeding or landscape planting shall be performed. Storm drain inlet protection shall be deployed throughout the project. Concrete wastes shall be managed through the use of concrete washout facilities.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan). An estimate based upon these quantities has been increased by 25 percent to account for the two additional rainy seasons during construction.

On October 31, 2006, an e-mail was received from Change A. Lott concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

No. SWPPP should be WPCP the whole paragraph describing erosion and sediment controls and concrete waste is not for this project. The housekeeping, non-stormwater, waste and materials management BMPs for construction site management. More detail on concurrence needed.

#### 4. **Project D** 08-OE0201 SBD-60 (R0.0/ R9.9) (KP) Replace Pavement Markers (PS&E)

This project will replace missing and faded pavement markers with reflective pavement markers between the travel way mainlines on San Bernardino Route 60 at PM R0.0/R95.9.

**Construction Site BMP Strategy:** The project requires a WPCP because the total disturbed soil area is less than 1 acre.

Construction activities at the project will not result in any areas of disturbed soil as defined by the Project Planning and Design Guide (PPDG). Non-storm water management and waste management and materials pollution control BMPs must be implemented throughout the construction project.

Quantities for Construction Site BMPs were developed from take-offs from the proposed Construction Site BMPs Deployment Plan (D-Plan).

On October 31, 2006, an e-mail was received from Mina Changes concurring on the construction site BMP strategy for this project.

Appropriate? (yes/no) If no, why? \_\_\_\_\_

No. Don't need quantities on a deployment plan. More detail on concurrence needed.

# Construction Site BMP Training

## Module III Exercise 2

# Tracking, Wind Erosion, & Construction Site Management BMPs

### 02-998871 Son 1

### 39.2 /40.2 PM (24.4/25.0)(KP) Upgrade Sidewalk and Bridge Railing (PA/ED)

**Project Description:** The sidewalks, bridge railings and other facilities will be modified to meet American Disability Act (ADA) requirements. The existing handrail will be removed and replaced with a metal railing that is ADA compliant. Portions of the sidewalk will be sawcut, removed, and replaced. Several ramps will be installed. Scupper drains and grates will be modified to accommodate the sidewalk replacement.

An unpaved turnout near the south approach to the bridge has been designated as a staging area for the Contractor's use. Slightly more than 0.1 Ha (0.25 acres) of disturbed soil area is anticipated.

The project is estimated at \$6,000,000 and is expected to take 10 months to complete.

As Project Engineer for 02-998871, Rainbow Canyon Bridge, you are well into the PA/ED design phase. You have enough information on site conditions and anticipated construction activities to begin selecting construction site BMPs.

Use the Construction Site BMP Consideration Form and the Construction Site (CS) BMP Checklists to answer the following questions:

1. List the construction site BMPs most likely to be needed to build this project.

**Tracking BMPS, Sweeping BMPS, non-stormwater (concrete saw cut cooling water,)  
Hazardous material handling, demolition over water,**

2. This project has a minor amount of disturbed soil area. Considering the nature of the DSA, what BMPs are most appropriate for soil stabilization and sediment control (if any)?

**Drain inlet protection at scuppers, Cover stockpiles, Use gravel or compacted road base to reduce the size of the disturbed area in the turn around. (This may be cheaper than paving for a sweeper everyday.)**

3. Although not mentioned on the forms and checklists or required by the amount of disturbed soil area, why does this project require a Storm Water Pollution Prevention Plan (SWPPP)?

**Maybe Regional Board was invited and weighed in, requiring a SWPPP since it was over a water body. Perhaps it was the second project of a similar type and previous project has discharges. This is an instance where you would need to talk to the stormwater coordinator or the RE at the district.**