**THIS REPORT IS PROVIDED AS AN EXAMPLE ONLY. ALL PROJECT INFORMATION, NAMES, AND DATES ARE FICTITIOUS. THIS IS NOT INTENDED TO BE A FINAL REPRESENTATION OF THE WORK DONE OR RECOMMENDATIONS MADE BY CALTRANS FOR AN ACTUAL PROJECT.**

# *Long Form - Storm Water Data Report*

Dist-County-Route: 03-ED-50
Post Mile Limits: 0.0/2.9
Project Type: Lane Addition (HOV)
Project ID (or EA): 03-xxxxxx
Program Identification: HB4
Phase: ☐ PID ☐ PA/ED ☒ PS&E

Regional Water Quality Control Board(s): Region 5, Central Valley Region

Is the Project required to consider Treatment BMPs? Yes ☒ No ☐
If yes, can Treatment BMPs be incorporated into the project? Yes ☒ No ☐
If No, a Technical Data Report must be submitted to the RWQCB at least 30 days prior to the projects RTL date. List RTL Date:

Total Disturbed Soil Area: 18.35 acres Risk Level: 2
Estimated: Construction Start Date: December 2011 Construction Completion Date: June 2013
Notification of Construction (NOC) Date to be submitted: November 2011

| | | | | |
|---|---|---|---|---|
| Erosivity Waiver | Yes ☐ | Date: | | No ☒ |
| Notification of ADL reuse (if Yes, provide date) | Yes ☒ | Date: | August 2011 | No ☐ |
| Separate Dewatering Permit (if yes, permit number) | Yes ☐ | Permit # | | No ☒ |

*This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the date upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E.*

Betsy Ross — 10/08/10
Betsy Ross, Registered Project Engineer/Landscape Architect — Date

*I have reviewed the stormwater quality design issues and find this report to be complete, current and accurate:*

George Washington — 10/08/10
*George Washington, Project Manager* — *Date*

Paul Revere — 10/08/10
*Paul Revere, Designated Maintenance Representative* — *Date*

Horatio Gates — 10/08/10
*Horatio Gates, Designated Landscape Architect Representative* — *Date*

Friedrich Wilhelm von Steuben — 10/08/10
*[Stamp Required for PS&E only)* — Friedrich Wilhelm von Steuben, *District/Regional Design SW Coordinator or Designee* — *Date*

# STORM WATER DATA INFORMATION

## 1. Project Description

El Dorado County (County) and Caltrans propose to construct High Occupancy Vehicle (HOV) lanes along US Route 50 within El Dorado County (ED-50) from the County Line (PM 0.0) to west of Bass Lake Road (PM 2.9). This project is partially funded by the State of California's Corridor Mobility Improvement Account (CMIA), with the remaining funds provided by the County. The widening to accommodate the HOV lane will consist of constructing an additional lane in the median in each direction and widening median shoulders to meet current standards.

The project includes:

- Replacement of the existing Latrobe Road Undercrossing (UC) (Bridge No. 25-0071L/R)
- Median widening of the Clarksville UC (Bridge No. 25-0072L/R)
- Placement of a concrete median barrier from the County Line (PM 0.0) to just east of the Clarksville UC (PM 1.8)

Construction of the HOV lanes would end at PM 2.9.

The County is required to file a Notification of Construction (NOC), as the County will advertise, award, and administer the project, with Caltrans providing oversight.

The total disturbed soil area (DSA) for the project is 18.35 acres. The DSA was calculated based on the project side slopes to be disturbed, construction staging work and areas that are anticipated to be used by the contractor for equipment. The existing impervious area is 40.18 acres. The proposed added impervious area is 13.09 acres. The total impervious area after construction will be 53.27 acres.

Directly north of ED-50 is the Community of El Dorado Hills; however, there are no major incorporated cities or towns within the area. The project is located within the El Dorado County Municipal Separate Storm Sewer System (MS4) area.

## 2. Site Data and Storm Water Quality Design Issues (refer to Checklists SW-1, SW-2, and SW-3)

The project is located within the Region 5, Central Valley Regional Water Quality Control Board (RWQCB) jurisdiction.

### Hydrologic Unit

The project is within the Middle Sierra Hydrologic Unit, Cosumnes Hydrologic Area, and Upper Deer Creek Hydrologic Sub-Area (HSA) 532.22. The HSA was determined using the California State University, Sacramento Office of Water Programs *Water Quality Planning Tool*.

### Receiving Water Bodies

Carson Creek is the only major waterbody that crosses ED-50 within the project limits, and it is a direct receiving water body for the project (see attached Vicinity Map). Carson Creek merges with Deer Creek approximately 10 miles downstream of the project. Deer Creek is tributary to Cosumnes River which is tributary to the Mokelumne River, which joins the San Joaquin River.

### 2006 CWA Section 303(d) List of Water Quality Limited Segments [303(d) List]

Carson Creek is listed on the 2006 Clean Water Act 303(d) List of Water Quality Limited Segments downstream of the project site. The 303(d) list identifies Carson Creek as being impaired for aluminum and manganese from the Waste Water Treatment Plant (WWTP) at Carson Creek to the creek's confluence with Deer Creek. The WWTP is located on Latrobe Road approximately 1.2 miles south of the Latrobe Road UC and 1.3 miles southwest of the ED-50 crossing of Carson Creek and ED-50.

### Special Construction Considerations

The Federal Highway Administration has designated an area along ED-50 as an "Area of Potential Effects". The Railroad Cemetery is located on the eastbound side of ED-50, where Carson Creek crosses ED-50. This area is identified as a historical resource and will be off-limits to the contractor as shown on Contract Plans.

Other areas within the project limits are designated as Environmentally Sensitive Areas (ESA) due to the presence of an existing waterway and the need to preserve vegetation within the area. All areas determined as an ESA are properly fenced off and protected through the use of best management practices (BMPs) and are off limits to construction work, as shown on the Contract Plans and per the specification S5-760 "Environmentally Sensitive Area" and 07-446 "Temporary Fence (Type ESA)".

## Climate

The average temperatures in the western end of the county range from 100ºF (high temperature) in July to 44ºF (low temperature) in January. Winter storms, which can extend from November through May, generally come from the southwest and travel in a northeasterly direction. The average rainfall for the western portion of the County is 30 inches per year (Federal Emergency Management Agency [FEMA], 1995).

## Topography

El Dorado County is mountainous, and its terrain consists of steep slopes. Relatively little of the land comes under the category of level land. Elevations vary from approximately 200 ft at the Sacramento County boundary to 10,881 ft at the top of Freel Peak along the eastern border of the county in the Lake Tahoe Basin. The 1000 ft elevation lines run diagonally across the county from northwest to southwest (FEMA, 1995).

## Soil Characteristics

The soil data for this project was obtained from the Caltrans Geotechnical Report, which was completed on September 30, 2010. The general soil type was identified as Hydrologic Soil Group (HSG) D (very dense soils and rocky silty loam). Below is a summary of the soil findings based on the location along the project length:

> According to the Geotechnical Report, Mesozoic-age metavolcanic and metasedimentary rocks are in the project vicinity. In addition, the metamorphic rock structure is dominated by a series of northwest-trending faults and fault zones that mark the boundaries of various rock types. The Log of Test Borings (LOTB) indicated subsurface materials consisting of clay and fill over variably weathered and fractured metavolcanic rock and schist.

## Groundwater

According to the Geotechnical Report, shallow ground water and seepage exists along the soil/rock interface during the winter months or extended periods of rainfall. Locally, seepage can occur along zones of fractured or less weathered rock and daylight at the ground surface, within excavations, or onto cut-slopes. Actual Log of Test Borings indicated that groundwater was encountered at approximately 6 ft below the ground surface.

## Hazardous Waste

The Hazardous Soil Report concludes that Aerially Deposited Lead (ADL) is present within the project limits. The report finds that the soils can be reused as roadway fill beneath the paved roadway section; the ADL soils must also be 5 feet above the groundwater level. The "Notification of ADL Reuse" was approved on October 2, 2010.

## Erosion Potential

The National Resources Conservation Service (NRCS) provides soil erodibility information in its soil surveys by providing a set of numerical indices for each soil type. The soil erodibility factor, K, within the project area is primarily 0.37.

## Risk Assessment

The R factor was determined from the EPA's "Rainfall Erosivity Factor Calculator" to be 67.44. The K is 0.37. The LS factor was determined by first cutting cross-sections every 1,000 ft. The LS factor was determined from electronic cross-sections of the existing grade. The LS factor was calculated using the LS Table. The LS factor is 1.46.

The product of these values is 36 tons/acre. Because this value is between 15 tons/acre and 75 tons/acre, the project is classified as having a medium sediment risk. See the attachments for the sediment risk factor input values.

The receiving water risk is classified as low because Carson Creek is not on the 303(d) List for sediment, and the creek does not have the beneficial uses of SPWN, COLD and MIGR.

The combined medium sediment risk and low receiving water risk results in the project being classified as Risk Level 2. The requirements for Risk Level 2 projects are summarized in Section 6 of this report.

## Measures for avoiding or reducing potential water impacts

The project team contacted Joshua Ross, the Caltrans Maintenance Area Manager, on September 27, 2010 and Mr. Ross informed the Project team that there are no historical slope failures within the project corridor. It was concluded that mitigation measures for existing slopes that will not be disturbed by the project were unnecessary.

The project will propose to grade slopes to be 2:1 (H:V) or flatter, and the slopes will be stabilized by using permanent erosion control measures. A retaining wall will be constructed at the Latrobe Road UC to reduce DSA and stabilize slopes.

The project cannot be relocated or realigned as the proposed work will conform to the existing roadway. The project design allows for ease of maintaining all BMPs, and the Contract Specifications have been edited so that construction activities are scheduled or phased to minimize soil-disturbing work during an anticipated rain event.

## Land Use

The land use within the Project area is primarily residential and light commercial. The 2004 *El Dorado County General Plan* states that growth in El Dorado County has resulted in compact development patterns with populated areas being small, mixed-use communities where residents lived, worked and shopped. The characteristics of the area have slowly

transformed from rural to dispersed residential uses due to the development of large-lot, low-density residential units.

Right-of-Way Requirements

The project is entirely within Caltrans' R/W; there are no R/W acquisitions or variances for this project. All proposed temporary and permanent BMPs are within Caltrans R/W.

## 3. Regional Water Quality Control Board Agreements

The project received a letter from Elysia Perry of the RWQCB on September 24, 2010 that stated that the RWQCB has evaluated the Project and concluded that the project had no impacts to wetlands and Other Waters of the U.S. Therefore, no permits, negotiated understandings or agreements are required for this project.

## 4. Proposed Design Pollution Prevention BMPs to be used on the Project.

Downstream Effects Related to Potentially Increased Flow, Checklist DPP-1, Parts 1 and 2

The proposed improvements result in an increase of impervious area which will increase velocity and volume of flow within the project limits. This increase has been accounted for in the project design and mitigated through the use of BMPs. Based on flows and design information in the project Drainage Report, increased flows within the project limits should have a negligible impact on downstream flow.

This Project utilizes low impact development (LID) efforts to maintain or restore pre-project hydrology, as well as provide overall water quality improvement of discharges. These LID efforts are incorporated in the development and placement of permanent best management practices (BMPs) to the maximum extent practicable. LID measures incorporated into this Project that improve water quality include:

- Vegetated drainage ditches (see Drainage Plans for specific locations) to decrease the velocity of discharge plus decrease the volume of discharge by promoting infiltration and allowing for pollutant removal, and
- Graded slopes to blend with the natural terrain at 4:1 (H:V) slopes and decreasing quantities of dikes for sheet flow to vegetated areas which provide water quality benefits and promote infiltration,
- Check dams within drainage ditches and swales (see Drainage Details) to increase time of concentrations and designing disconnected drainage facilities to mimic the existing drainage pattern of the area,
- Maintaining existing vegetated areas with ESA fencing

Table 1 shows the flow control calculations related to the project LID efforts; detailed discussion and calculations are included in the project Drainage Report. Per the Drainage Report, the post-construction runoff coefficients increase from 0.92 (pre-construction) to 1.00, which is a conservative estimate for concrete. The proposed LID measures increase the roughness coefficient to 0.24 from 0.05 in the existing condition. Thus, the time of concentration increases, and the rainfall intensity decreases. The drainage studies used the 25-year storm to compare the pre-project and post-project flows.

*Table 1. Summary of Flow Control Calculations*

| Bioswale | Pre-Construction | | | | Post-Construction | | | |
|---|---|---|---|---|---|---|---|---|
| No. | C | i | A | Q | C | i | A | Q |
| | | (in/hr) | (ac) | (cfs) | | (in/hr) | (ac) | (cfs) |
| 1 | 0.92 | 4.443 | 0.42 | 1.72 | 1 | 4.129 | 0.42 | 1.73 |
| 2 | 0.92 | 4.443 | 0.70 | 2.86 | 1 | 4.129 | 0.70 | 2.89 |
| 3 | 0.92 | 4.443 | 0.88 | 3.60 | 1 | 4.129 | 0.88 | 3.63 |
| 4 | 0.92 | 4.443 | 0.50 | 2.04 | 1 | 4.129 | 0.50 | 2.06 |
| 5 | 0.92 | 4.443 | 0.18 | 0.74 | 1 | 4.129 | 0.18 | 0.74 |
| 6 | 0.92 | 4.443 | 0.31 | 1.27 | 1 | 4.129 | 0.31 | 1.28 |
| 7 | 0.92 | 4.443 | 1.36 | 5.56 | 1 | 4.129 | 1.36 | 5.62 |
| 8 | 0.92 | 4.443 | 1.69 | 6.91 | 1 | 4.129 | 1.69 | 6.98 |
| 9 | 0.92 | 4.443 | 0.64 | 2.62 | 1 | 4.129 | 0.64 | 2.64 |
| 10 | 0.92 | 4.443 | 2.23 | 9.12 | 1 | 4.129 | 2.23 | 9.21 |
| 11 | 0.92 | 4.443 | 0.91 | 3.72 | 1 | 4.129 | 0.91 | 3.76 |
| 12 | 0.92 | 4.443 | 0.80 | 3.27 | 1 | 4.129 | 0.80 | 3.30 |
| 13 | 0.92 | 4.443 | 1.31 | 5.35 | 1 | 4.129 | 1.31 | 5.41 |
| 14 | 0.92 | 4.443 | 1.09 | 4.46 | 1 | 4.129 | 1.09 | 4.50 |

Although the post-construction flows are slightly higher than the pre-construction flows, the post-construction impacts have been decreased to extent practicable.

The project does not encroach, cross, realign or cause other hydraulic changes to Carson Creek or any other streams or water bodies that affect downstream channel stability.

Slope/Surface Protection Systems, Checklist DPP-1, Parts 1 and 3

The work along ED-50 and the UCs result in the creation of new slopes and the modification of existing slopes. The Geotechnical Report identifies the existing cut and fill slopes as stable, with some minor erosion of the cut slopes. The report also suggested that necessary erosion control measures be taken for work along the existing slopes.

The existing slopes are 2:1 (H:V) or flatter. Proposed slopes within the project are 4:1 (H:V) where possible, with maximum 2:1 (H:V) slopes in areas where R/W or existing slopes do not allow for flatter slopes. The project, when possible, does maintain or match existing slopes to reduce any slope stabilization and erosion concerns. Measures to prevent these concerns during construction are discussed in Section 6 of this report.

Measures that are utilized to prevent the erosion of existing and proposed slopes both during construction and post construction include:

- Move-in/Move-out (Erosion Control)
- Erosion control (Hydroseed)
- Fiber Rolls
- Rolled Erosion Control Project (Netting)
- Compost
- Liner Plant

The move-in/move-out (erosion control) is required due to the size and duration of the project and is utilized to ensure permanent erosion control stabilization is in place upon completion of each stage of construction and after construction activity has been completed. The fiber rolls and erosion control (hydroseed) are proposed for disturbed soils to remain unpaved or unlined and for all biofiltration strip areas. Erosion control (hydroseed) and rolled erosion control product (netting) is proposed for all ditches and on slopes greater than 4:1 (H:V). Compost is placed on all permanent slopes to promote vegetation establishment. The erosion control (hydroseed), rolled erosion control product (netting), and liner plants are used in the proposed biofiltration swales. The effectiveness of the proposed erosion control materials was verified using the Revised Universal Soil Loss Equation 2 (RUSLE2), which is in the attachments.

The Erosion Control Plans were approved by Evelyn Campbell, the District Landscape Architect, on September 26, 2010.

Concentrated Flow Conveyance Systems, Checklist DPP-1, Parts 1 and 4

Currently, there are existing vegetated unlined channels within the project R/W that receive both on-site and off-site runoff. Field site investigation of these existing unlined channels found them to be well vegetated by natural local vegetation. These channels are mostly identifiable from existing contour lines as natural terrain formations. The purpose of these channels, with regards to drainage, is to act as a conveyance system between the on-site systems' outfalls and cross culverts.

The project proposes to create and modify existing ditches, dikes, and berms. Table 2 shows the location of the proposed ditches for this project along with the approximate length and lining material for these ditches. For detailed hydraulic analysis of these ditches, see the Drainage Plans and Drainage Report for this project.

*Table 2. Summary of Proposed Ditches*

| Begin Station | End Station | Alignment and Offset | Approximate Length (ft) | Material Lining | Dimensions available |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| 19+70.16 | 26+00.00 | "A2" Lt | 629.84 | Earth | No |
| 26+00.00 | 29+00.00 | "A2" Lt | 300 | Earth | No |
| 29+50.00 | 34+07.00 | "A2" Lt | 457 | AC | Yes |
| 34+07.00 | 38+30.00 | "A2" Lt | 423 | AC | Yes |
| 38+30.00 | 44+00.00 | "A2" Lt | 570 | Earth | No |
| 52+00.00 | 55+00.00 | "L12" Rt | 300 | Earth | No |
| 53+00.00 | 55+50.00 | "A2" Lt | 250 | Earth | No |
| 61+40.92 | 64+74.00 | "A2" Lt | 333.08 | Earth | No |
| 57+00.00 | 67+80.00 | "L13" Lt | 1080 | Earth | No |
| 90+30.00 | 92+50.00 | "A2" Lt | 220 | Earth | No |
| 93+20.00 | 97+20.00 | "A2" Lt | 400 | Earth | No |
| 98+70.00 | 101+50.00 | "A2R" Rt | 280 | Earth | No |
| 141+30.00 | 152+19.00 | "A2L" Rt | 1089 | gravel | Yes |
| 152+19.00 | 162+20.00 | "A2L" Rt | 1001 | gravel | Yes |

The velocities of water entering and exiting the ditches are gradually attenuated by placement of RSP. Based on Table 2, no significant impacts are anticipated to occur due to increases in flow volume or velocities.

Existing slopes would be created and modified to satisfy drainage and erosion control needs. The existing roadway drainage design would be either modified to fit with new drainage systems or be abandoned and replaced by new systems. This project includes the use of hot mix asphalt overside drains, down-drain pipes and gutters. Methods to disperse and decrease the energy of concentrated flows include flared end sections, rock slope protection, and tee dissipaters. These items are identified and detailed on the Drainage Plans. The design of all drainage facilities are done to meet recommendations and requirements that minimize impacts due to scour and erosion, as presented in the Caltrans *Highway Design Manual*. The proposed drainage work results in changes to the interception of surface runoff; the project Drainage Report provides detailed analysis and calculations for the proposed drainage work.

Preservation of Existing Vegetation, Checklist DPP-1, Parts 1 and 5

Clearing and grubbing is limited to two areas: (1) within the existing median area of ED-50 where the widening will occur, and (2) within the immediate vicinity of the Latrobe Road UC as part of replacing the existing structure.

As stated in Section 2 of this report, there are ESAs within the project, including the Railroad Cemetery, where construction activity is prohibited. All areas determined to be an ESA are identified on the Contract Plans and will be enclosed by a Temporary Fence (Type ESA) during construction. Other BMPs used to protect these ESAs are temporary silt fences and

temporary fiber rolls; these BMPs are utilized to prevent any runoff from earth disturbing activities from entering the ESA areas.

## 5. Proposed Permanent Treatment BMPs to be used on the Project

### Treatment BMP Strategy, Checklist T-1

This project is required to consider treatment BMPs in accordance with the *Project Planning and Design Guide* (PPDG). As previously stated in Section 2 of this report, the soils are mainly classified as HSG D. The feasibility of infiltration type BMPs was evaluated to determine the need for soil amendments and the preferred treatment devices. Table 3 summarizes the infiltration evaluation used for Checklist T-1, Part 1 for each sub-watershed.

*Table 3. Summary of T-1, Part 1 Checklist*

| Sub-Watershed No. | WQV Infiltrated (Question 5b) | WQV Infiltrated w/ Amendments (Question 5d) | WQV Infiltrated w/BMP Combinations (Question 7c) |
|---|---|---|---|
| S1 | 0% | 1% | 1% |
| S2 | 0% | 0% | 0% |
| S3 | 0% | 1% | 1% |
| S4 | 0% | 10% | 10% |
| S5 | 0% | 2% | 2% |
| S6 | 0% | 1% | 1% |
| S7 | 0% | 0% | 0% |
| S8 | 0% | 2% | 2% |
| S9 | 0% | 2% | 2% |
| S10 | 0% | 0% | 0% |
| S11 | 0% | 1% | 1% |
| S12 | 0% | 1% | 1% |
| S13 | 0% | 0% | 0% |
| S14 | 0% | 0% | 0% |
| S15 | 0% | 0% | 0% |
| S16 | 0% | 0% | 0% |
| S17 | 0% | 0% | 0% |
| S18 | 0% | 0% | 0% |
| S19 | 0% | 0% | 0% |
| S20 | 0% | 0% | 0% |



Without amending the existing soils, 0% of WQV infiltrates through the existing HSG D soil. With soil amendments, 1% to 10% of the WQV infiltrates through the amended soils. Because all the sub-watersheds infiltrate less than 20% of the WQV both with and without soil amendments a single Checklist T-1, Part 1 is used. The sole use of biofiltration devices for this Project was accepted by Mathew Chau, the Storm Water Coordinator, on September 1, 2010.

The treatment for this project is to the maximum extent practicable. Treatment for this project is provided by 14 biofiltration swales and 1 biofiltration strip. The total proposed treated impervious area is 14.31 acres, while the net added impervious area for the project is 13.09 acres. The proposed treatment BMPs treat 109% of the net added impervious area.

## Biofiltration Swales/Strips, Checklist T-1, Parts 1 and 2

A single Checklist T-1, Part 2 is completed for all biofiltration devices because the feasibility and design elements for all biofiltration devices are similar. Details for the design of the biofiltration devices are included in the Contract Plans and have been routed, reviewed and approved by the required functional units. The District Landscape Architect has provided vegetation mixes appropriate for the climate and location.

The biofiltration swales treat 13.02 acres of impervious area. The location of the biofiltration swales are listed below along with its water quality flow ($Q_{WQF}$), and hydraulic residence time (HRT) information:

*Table 4. Summary of Biofiltration Swales*

| Sub-Watershed No. | No. | County | Line/(Rt/Lt) | Begin Station (ft) | End Station (ft) | Impervious Area Treated (ac) | WQF (cfs) | HRT (mins) |
|---|---|---|---|---|---|---|---|---|
| S1 | 1 | ED | A2 / Lt | 11+50 | 11+80 | 0.42 | 0.07 | 5.06 |
| | 2 | ED | A2 / Lt | 19+84 | 20+00 | 0.70 | 0.11 | 5.09 |
| S3 | 3 | ED | A2 / Lt | 27+45 | 28+45 | 0.88 | 0.14 | 5.19 |
| | 4 | ED | A2 / Lt | 37+22 | 38+22 | 0.50 | 0.08 | 5.23 |
| S4 | 5 | ED | A2 / Lt | 41+09 | 42+09 | 0.18 | 0.03 | 5.31 |
| | 6 | ED | A2 / Lt | 43+00 | 44+00 | 0.31 | 0.05 | 5.19 |
| | 7 | ED | A2 / Rt | 50+30 | 51+20 | 1.36 | 0.22 | 5.18 |
| | 8 | ED | A2 / Rt | 62+46 | 63+74 | 1.69 | 0.27 | 13.77 |
| S5 | 9 | ED | A2 / Lt | 69+20 | 70+00 | 0.64 | 0.10 | 5.15 |
| S6 | 10 | ED | A2 / Rt | 74+62 | 75+80 | 2.23 | 0.36 | 5.07 |
| S8 | 11 | ED | A2 / Lt | 82+69 | 83+56 | 0.91 | 0.15 | 5.07 |
| S9 | 12 | ED | A2 / Lt | 90+35 | 91+25 | 0.80 | 0.13 | 5.34 |
| S11 | 13 | ED | A2 / Rt | 93+34 | 94+37 | 1.31 | 0.21 | 5.02 |
| S12 | 14 | ED | A2 / Rt | 100+44 | 101+50 | 1.09 | 0.17 | 5.29 |
| | | | | | Total Treated Area | 13.02 | | |



The biofiltration strip treats 1.29 acres of impervious area. *T*able 5 shows the location of the proposed biofiltration strip.

*Table 5. Summary of Biofiltration Strip*

| No. | County | Line/(Rt/Lt) | Start Station (ft) | End Station (ft) | Impervious Area Treated (ac) |
|---|---|---|---|---|---|
| 1 | ED | A2 / Lt | 57+00 | 64+85 | 1.29 |

## 6. Proposed Temporary Construction Site BMPs to be used on Project

As previously mentioned in Section 2 of this report, this project is a Risk Level 2 project. This section presents the temporary construction site BMP strategy to be implemented for this Project. On October 6, 2010, the Construction Storm Water Coordinator has provided concurrence with the BMPs used in this project.

### SWPPP

This project will disturb more than one acre of soil, so a Storm Water Pollution Prevention Plan (SWPPP) must be submitted by the Contractor prior to the start of construction. The SWPPP shall include a Construction Site Monitoring Program (CSMP) that presents procedures and methods related to the visual monitoring and sampling and analysis plans for non-visible pollutants, sediment and turbidity, and pH.

### Construction Site BMP Strategy

The project is scheduled for over one and a half years. The Contract Specifications have been edited so that scheduling of earth-disturbing construction activities will not be made during an anticipated rain event. To mitigate for any potential runoff or run-on within the project area, construction site BMPs should be installed prior to the start of construction or as early as feasibly possible during construction.

Disturbed soil areas (DSAs) are protected in accordance with the project's pollution control measures. Measures that are to be implemented for this project are discussed below. The construction site BMP strategy for this project consists of the following:

- Soil Stabilization Measures
- Sediment Control Measures
- Tracking Control
- Non-storm Water Management Measures
- General Construction Site Management
- Storm Water Sampling and Analysis

The design of all Construction BMPs comply with the design requirements found in the Caltrans *Storm Water Quality Handbooks: Project Planning and Design Guide* and *Construction Site Best Management Practices (BMPs) Manual*.

### Soil Stabilization Measures

The soil stabilization measures proposed as separate bid items for this project are:

- Temporary Move-In/Move-Out (Erosion Control)
- Temporary Hydraulic Mulch
- Temporary Cover
- Temporary Fence (Type ESA)

Since construction is scheduled for one and a half years, there is potential for erosion to occur on existing and newly formed slopes. Multiple mobilization Move-In/Move-Out locations are proposed for the project to implement temporary erosion control and construction site measures throughout the project.

Temporary hydraulic mulch is placed on any exposed disturbed soils, stockpiles of soils and unprotected slopes that are susceptible to erosion from either runoff or wind. Temporary cover is also used to protect disturbed soil areas from erosion. This additional measure to protect disturbed soil areas is necessary when a rain event has the potential to occur before vegetation and mulch are established.

There are identified ESAs within the project limits. Temporary fence (Type ESA) is proposed to encircle all ESAs; this fence type is specifically designed to designate an area as being outside the limits of work.

## Sediment Control Measures

The sediment control measures proposed as separate bid items for this project are:

- Temporary Fiber Rolls
- Gravel Bag Berm
- Temporary Drainage Inlet Protection

The temporary fiber rolls are utilized as a sediment control measure to minimize both sediment-laden sheet flows and concentrated flows from discharging offsite and will minimize run-on upslope of the project.

Gravel bag berms are placed around stockpiles of loose soil to prevent sediment from entering paved areas or from disturbing construction. The berms are also used in coordination with soil stabilization measures to protect disturbed soil areas and slopes where there is potential for sediment laden runoff.

Temporary drainage inlet protection prevents sediment from entering current or proposed storm drains. The Contract Specifications have been edited so that drainage inlet protection Type 5, "Sediment Filter Bag," is excluded from the acceptable drainage inlet protection types due to the difficulty of maintaining the filter bag.

Due to the ESAs, there is not enough space within the R/W to install a desilting basin, sediment traps or an active treatment system. Jessie Cruz, the Construction Storm Water Coordinator, has provided an exemption for this project on October 6, 2010.

## Tracking Controls

The project involves the movement of dirt by construction equipment adjacent to public roadways. In order to prevent the tracking of mud and dirt offsite, stabilized construction

entrances/exits are placed at multiple points throughout the project area. Street sweeping is proposed for removal of tracked sediment.

## Wind Erosion Control

The project is located in an area where standard dust control practices will be adequate to prevent the transport of dust off-site by wind. Therefore, in accordance with Section 10 of the Standard Specifications, wind erosion control measures will not be listed as a separate bid line item.

## Non-Storm Water Management

There is no construction activities located within a waterbody or water course; so, temporary stream crossings and clear water diversions are not required for this project. Other non-storm water management BMPs utilized to decrease the impacts of construction activities that generate waste or residue are covered under the construction site management lump sum mentioned below.

## Waste Management & Materials Pollution Control

The project will result in concrete-related work. Therefore, six temporary concrete washout bins are proposed for this project.

## Construction Site Management

The project's Construction Site Management lump sum consists of controlling potential sources of water pollution before they enter storm water systems or water courses. In addition, Construction Site Management includes training employees and subcontractors. Training shall include the proper selection, deployment, and repair of Construction Site BMPs used within project limits.

Construction Site Management lump sum costs include the following items:

- Spill Prevention and Control
- Materials Management
- Stockpile Management
- Waste Management
- Hazardous Waste Management
- Contaminated Soil
- Sanitary and Septic Waste
- Liquid Waste

Non-Storm Water Management under Construction Site Management consists of:

- Water Control and Conservation

- Illegal Connection and Discharge Detection and Reporting
- Vehicle and Equipment Cleaning
- Vehicle and Equipment Fueling and Maintenance
- Paving
- Sealing
- Saw cutting
- Grinding Operations
- Thermoplastic Striping and Pavement Markers
- Concrete Curing
- Concrete Finishing

## Storm Water Sampling and Analysis

Risk Level 2 projects are required to perform storm water sampling at all discharge locations during a qualifying rain event. The samples are analyzed for both pH and turbidity, and are subject to numeric action levels (NAL). Included in the attachments are suggested monitoring locations; actual monitoring locations will be developed by the Contractor and shown in the SWPPP.

A cost estimate was calculated for quantities of Construction Site BMPs (Table 6) using the Actual Unit Cost (Option 4) of the PPDG's Appendix F.

*Table 6. Construction Site BMP Quantities*

| Item Code | Item Description | Estimated Quantity | Unit of Measure |
|---|---|---|---|
| 066595 | Water Pollution Control Maintenance Sharing | 1 | LS |
| 066596 | Additional Water Pollution Control | 1 | LS |
| 066597 | Storm Water Sampling and Analysis | 1 | LS |
| 071325 | Temporary Fence (Type ESA) | 4,700 | ft |
| 074016 | Construction Site Management | 1 | LS |
| 074019 | Water Pollution Control (SWPPP) | 1 | LS |
| 074028 | Temporary Fiber Roll | 25500 | $ft^2$ |
| 074029 | Temp. Silt Fence | 4700 | ft |
| 074031 | Temporary Gravel Bag Berm | 3000 | ft |
| 074033 | Stabilized Constr. Entrance/Exit | 6 | EA |
| 074034 | Temporary Cover | 108,000 | $ft^2$ |
| 074037 | Move-In/Move-out (Temporary Erosion Control) | 8 | EA |
| 074038 | Temp. Drainage Inlet Protection | 40 | EA |
| 074041 | Street Sweeping | 1 | LS |
| 074043 | Temp. Concrete Washout Bin | 6 | EA |
| 074051 | Temp. Hydraulic Mulch | 540,000 | $ft^2$ |
| 074056 | Rain Event Action Plan | 97 | EA |
| 074057 | Storm Water Annual Report | 2 | EA |
| 074058 | Storm Water Sampling and Analysis Day | 43 | EA |

## 7. Maintenance BMPs (Drain Inlet Stenciling)

Drain inlet stenciling is proposed for all inlets at areas where there is pedestrian access, primarily at the under crossings. Stenciling will not be required along ED-50, as there will be no pedestrian access. The drain inlet stenciling will be constructed as shown in the Caltrans Standard Plans. The locations and quantities for drain inlet stenciling are shown on the Contract Plans.

Joshua Ross, the Caltrans Maintenance Area Manager, requested that maintenance vehicle pullouts and maintenance areas be included in the Project design. These pullout and maintenance areas are incorporated into the roadway design and are shown on the Contract Plans.

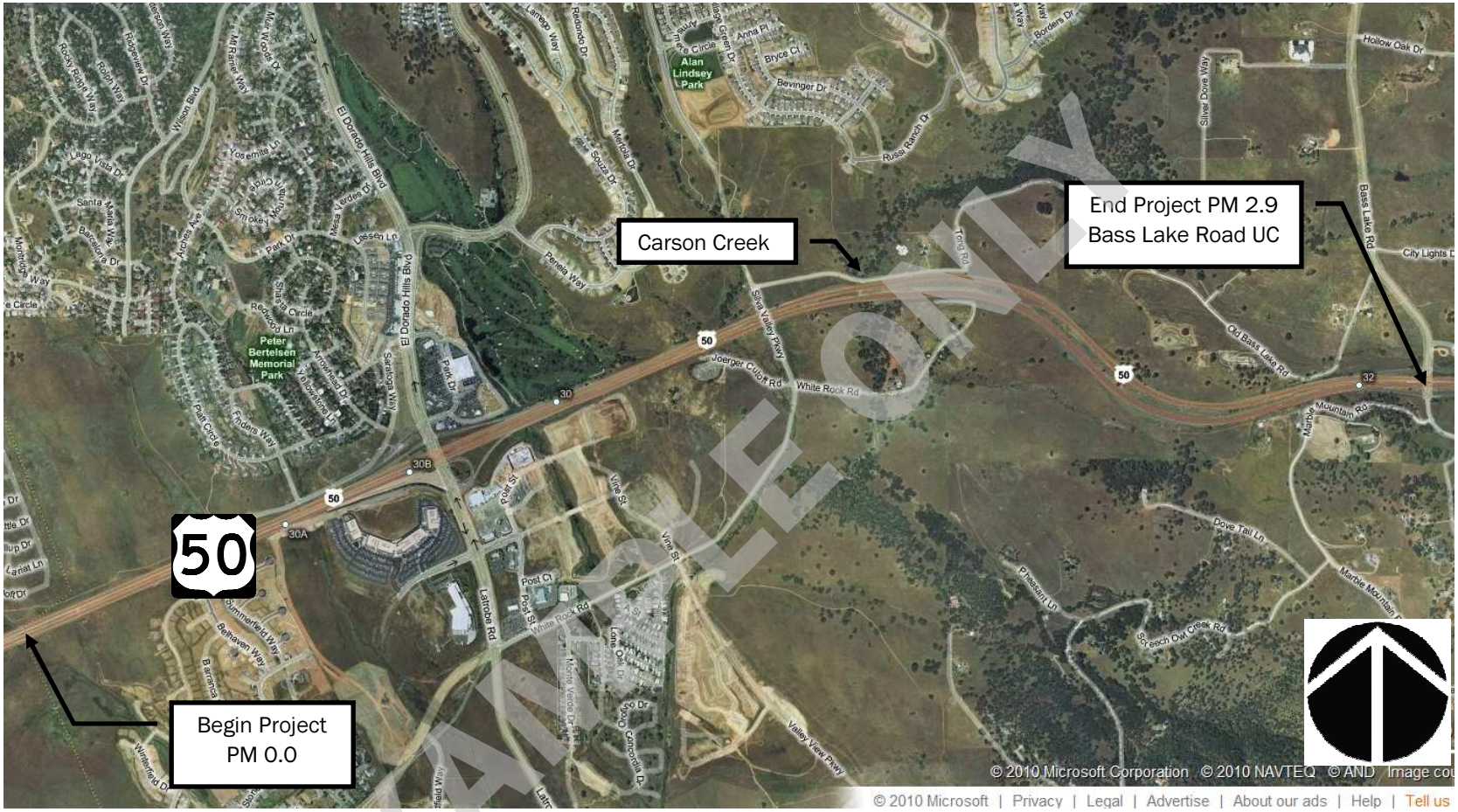
### Required Attachments

- Vicinity Map
- Evaluation Documentation Form (EDF)
- Construction Site BMP Consideration Form
- RUSLE2 Summary Sheet
- Risk Level Determination Documentation
- SWDR Tracking Form

### Supplemental Attachments

***Note: Supplement Attachments are to be supplied during the SWDR approval process; where noted, some of these items may only be required on a project-specific basis.***

- Storm Water BMP Cost Summary
- Checklist SW-1, Site Data Sources
- Checklist SW-2, Storm Water Quality Issues Summary
- Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water BMPs
- Checklists DPP-1, Parts 1–5 (Design Pollution Prevention BMPs)
- Checklists T-1, Parts 1 and 2 (Treatment BMPs)
- Checklists CS-1, Parts 1–6 (Construction Site BMPs)
- Calculations related to BMPs
- Plans showing BMP Deployment




Source: Microsoft Bing Maps

DATE: 10/8/10

Project ID ( or EA): 03-xxxxx

| NO. | CRITERIA | YES ✓ | NO ✓ | SUPPLEMENTAL INFORMATION FOR EVALUATION |
|---|---|---|---|---|
| 1. | Begin Project Evaluation regarding requirement for consideration of Treatment BMPs | ✓ | | See Figure 4-1, Project Evaluation Process for Consideration of Permanent Treatment BMPs. Go to 2 |
| 2. | Is this an emergency project? | | ✓ | If **Yes**, go to 10.<br>If **No**, continue to 3. |
| 3. | Have TMDLs or other Pollution Control Requirements been established for surface waters within the project limits? Information provided in the water quality assessment or equivalent document. | | ✓ | If **Yes**, contact the District/Regional NPDES Coordinator to discuss the Department's obligations under the TMDL (if Applicable) or Pollution Control Requirements, go to 9 or 4.<br>_____ *(Dist./Reg. SW Coordinator initials)*<br>If **No**, continue to 4. |
| 4. | Is the project located within an area of a local MS4 Permittee? | ✓ | | If Yes. *(El Dorado County)*, go to 5.<br>If No, document in SWDR go to 5. |
| 5. | Is the project directly or indirectly discharging to surface waters? | ✓ | | If **Yes**, continue to 6.<br>If **No**, go to 10. |
| 6. | Is it a new facility or major reconstruction? | ✓ | | If **Yes**, continue to 8.<br>If **No**, go to 7. |
| 7. | Will there be a change in line/grade or hydraulic capacity? | | | If **Yes**, continue to 8.<br>If **No**, go to 10. |
| 8. | Does the project result in a net increase of one acre or more of new impervious surface? | ✓ | | If **Yes**, continue to 9.<br>If **No**, go to 10.<br>*13.09 acres (Net Increase New Impervious Surface)* |
| 9. | Project is required to consider approved Treatment BMPs. | ✓ | See Sections 2.4 and either Section 5.5or 6.5 for BMP Evaluation and Selection Process. Complete Checklist T-1 in this Appendix E. | |
| 10. | Project is not required to consider Treatment BMPs.<br>_____*(Dist./Reg. Design SW Coord. Initials)*<br>_____*(Project Engineer Initials)*<br>_____ *(Date)* | | Document for Project Files by completing this form, and attaching it to the SWDR. | |



*See Figure 4-1, Project Evaluation Process for Consideration of Permanent Treatment BMPs*

DATE: 10/8/10

Project ID (or EA): 03-xxxxxx

Project Evaluation Process for the Consideration of Construction Site BMPs

| NO. | CRITERIA | YES ✓ | NO ✓ | SUPPLEMENTAL INFORMATION |
|---|---|---|---|---|
| 1. | Will construction of the project result in areas of disturbed soil as defined by the Project Planning and Design Guide (PPDG)? | ✓ | | If Yes, Construction Site BMPs for Soil Stabilization (SS) will be required. Complete CS-1, Part 1. Continue to 2.<br>If No, Continue to 3. |
| 2. | Is there a potential for disturbed soil areas within the project to discharge to storm drain inlets, drainage ditches, areas outside the right-of-way, etc? | ✓ | | If Yes, Construction Site BMPs for Sediment Control (SC) will be required. Complete CS-1, Part 2.<br>Continue to 3. |
| 3. | Is there a potential for sediment or construction related materials and wastes to be tracked offsite and deposited on private or public paved roads by construction vehicles and equipment? | ✓ | | If Yes, Construction Site BMPs for Tracking Control (TC) will be required. Complete CS-1, Part 3.<br>Continue to 4. |
| 4. | Is there a potential for wind to transport soil and dust offsite during the period of construction? | ✓ | | If Yes, Construction Site BMPs for Wind Erosion Control (WE) will be required. Complete CS-1, Part 4.<br>Continue to 5. |
| 5. | Is dewatering anticipated or will construction activities occur within or adjacent to a live channel or stream? | | ✓ | If Yes, Construction Site BMPs for Non-Storm Water Management (NS) will be required. Complete CS-1, Part 5.<br>Continue to 6. |
| 6. | Will construction include saw-cutting, grinding, drilling, concrete or mortar mixing, hydro-demolition, blasting, sandblasting, painting, paving, or other activities that produce residues? | ✓ | | If Yes, Construction Site BMPs for Non-Storm Water Management (NS) will be required. Complete CS-1, Parts 5 & 6.<br>Continue to 7. |
| 7. | Are stockpiles of soil, construction related materials, and/or wastes anticipated? | ✓ | | If Yes, Construction Site BMPs for Waste Management and Materials Pollution Control (WM) will be required. Complete CS-1, Part 6.<br>Continue to 8. |
| 8. | Is there a potential for construction related materials and wastes to have direct contact with precipitation; stormwater run-on, or stormwater runoff; be dispersed by wind; be dumped and/or spilled into storm drain systems? | ✓ | | If Yes, Construction Site BMPs for Waste Management and Materials Pollution Control (WM) will be required. Complete CS-1, Part 6.<br>Continue to 9. |
| 9. | End of checklist. | ✓ | Document for Project Files by completing this form, and attaching it to the SWDR. | |

Betsy Ross 10/08/10

*PE to initialize after concurrence with Construction (PS&E only)* *Date*

**Project:** 03-ED-50 Lane Addition (HOV)

**Location:** PM 0.0/2.9

## Site Characteristics

| CLIMATE | | SOIL | | TOPOGRAPHY | |
|---|---|---|---|---|---|
| Rainfall Erosivity (R): | | Soil type: | El Dorado Area, Ca\AxD AUBURN VERY ROCKY SILT LOAM, 2 TO 30 PERCENT SLOPES\AUBURN silt loam 75% | Slope % factor (S): | 25 (pre-project)<br>50 (post-project) |
| 30 | | Soil erodibility (K): | 0.37 | Slope length factor (L): | 100 (pre-project)<br>50 (post project) |

## RUSLE2 Program Runs

| PROJECT PHASE | RUSLE2 Run no. | COVER (C) and PRACTICE (P) | | OUTPUT | |
|---|---|---|---|---|---|
| | | Management (Vegetation type / % cover / BMP) | Permeable Barrier | Soil loss (t/ac/yr) | Sediment delivery (t/ac/yr) |
| Pre-Project | 1 | Existing Undisturbed Vegetative Cover\Mixed Grass and shrubs, existing, 25 to 35 pct Canopy Cover | N/A | 16.9 | 16.9 |
| Construction with no BMPs | 2 | Highly disturbed\Construction With Temporary Practices\Construction With No Practices\bare fill slope, track walked | N/A | 80.7 | 80.7 |
| Construction with BMPs | 3 | Highly disturbed\Construction With Temporary Practices\Erosion Control Blankets and Mulch Materials\Hydraulic Mulch 2500 lbs | Fiber roll, wattle 12 inch | 9.86 | 9.84 |
| Post-Construction | 4 | Highly disturbed\Post Construction Cut / Fill Surfaces\Practices With Vegetation\Hydroseeding + fiber + tackifier + blown straw (Type-D) | Fiber roll, wattle 12 inch | 5.54 | 5.54 |

## Risk Level Determination Documentation

### Rainfall Erosivity Factor Calculator for Small Construction Sites

**Facility Information**

Facility Name: ED-50 HOV (PM 0.0/2.9)
Start Date: 12/01/2011
End Date: 06/30/2013
Latitude: 38.6567
Longitutde: -121.0573

**Erosivity Index Calculator Results**

AN EROSIVITY INDEX VALUE OF **67.44** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **12/01/2011 - 06/30/2013**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do not qualify for a waiver from NPDES permitting requirements.**



Source: EPA < http://cfpub.epa.gov/npdes/stormwater/lew/lewcalculator.cfm>


Source: NRCS

| K Factor, Rock Free— Summary by Map Unit — El Dorado Area, California | | | | |
|---|---|---|---|---|
| **Map unit symbol** | **Map unit name** | **Rating** | **Acres in AOI** | **Percent of AOI** |
| AkC | Argonaut gravelly loam, 2 to 15 percent slopes | .37 | 8.8 | 1.8% |
| AwD | Auburn silt loam, 2 to 30 percent slopes | .37 | 233.4 | 46.7% |
| AxD | Auburn very rocky silt loam, 2 to 30 percent slopes | .37 | 244.8 | 49.0% |
| AyF | Auburn extremely rocky silt loam, 3 to 70 percent slopes | .37 | 3.3 | 0.7% |
| PrD | Placer diggings | .32 | 9.3 | 1.9% |
| Rk | Rescue clay, clayey variant | .28 | 0.5 | 0.1% |
| SaF | Serpentine rock land | .02 | 0.0 | 0.0% |
| **Totals for Area of Interest** | | | 500.0 | **100.0%** |

Source: NRCS

| | **Average Watershed Slope (%)** | | | | | |
|---|---|---|---|---|---|---|
| **Sheet Flow Length (ft)** | **0.2** | **1.0** | **3.0** | **5.0** | **8.0** | **10.0** |
| **<3** | 0.05 | 0.09 | 0.17 | 0.23 | 0.32 | 0.35 |
| **6** | 0.05 | 0.09 | 0.17 | 0.23 | 0.32 | 0.37 |
| **9** | 0.05 | 0.09 | 0.17 | 0.23 | 0.32 | 0.38 |
| **12** | 0.05 | 0.09 | 0.17 | 0.23 | 0.32 | 0.39 |
| **15** | 0.05 | 0.09 | 0.17 | 0.23 | 0.32 | 0.40 |
| **25** | 0.05 | 0.10 | 0.21 | 0.31 | 0.45 | 0.57 |
| **50** | 0.05 | 0.13 | 0.30 | 0.46 | 0.70 | 0.91 |
| **75** | 0.05 | 0.14 | 0.36 | 0.58 | 0.91 | 1.20 |
| **100** | 0.05 | 0.15 | 0.41 | 0.68 | 1.10 | 1.46 |
| **150** | 0.05 | 0.17 | 0.50 | 0.86 | 1.43 | 1.92 |
| **200** | 0.06 | 0.18 | 0.57 | 1.02 | 1.72 | 2.34 |
| **250** | 0.06 | 0.19 | 0.64 | 1.16 | 1.99 | 2.72 |
| **300** | 0.06 | 0.20 | 0.69 | 1.28 | 2.24 | 3.09 |
| **400** | 0.06 | 0.22 | 0.80 | 1.51 | 2.70 | 3.75 |
| **600** | 0.06 | 0.24 | 0.96 | 1.91 | 3.52 | 4.95 |
| **800** | 0.06 | 0.26 | 1.10 | 2.25 | 4.24 | 6.03 |
| **1000** | 0.06 | 0.27 | 1.23 | 2.55 | 4.91 | 7.02 |

Source: State Water Resources Control Board

| | A | B | C |
|---|---|---|---|
| 1 | **Sediment Risk Factor Worksheet** | | **Entry** |
| 2 | **A) R Factor** | | |
| 3 | Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site. | | |
| 4 | http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm | | |
| 5 | | **R Factor Value** | 67.44 |
| 6 | **B) K Factor (weighted average, by area, for all site soils)** | | |
| 7 | The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. | | |
| 8 | Site-specific K factor guidance | | |
| 9 | | **K Factor Value** | 0.37 |
| 10 | **C) LS Factor (weighted average, by area, for all slopes)** | | |
| 11 | The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction. | | |
| 12 | LS Table | | |
| 13 | | **LS Factor Value** | 1.46 |
| 14 | | | |
| 15 | | **Watershed Erosion Estimate (=RxKxLS) in tons/acre** | 36 |
| 16 | | **Site Sediment Risk Factor** | **Medium** |
| 17 | | Low Sediment Risk: < 15 tons/acre | |
| 18 | | Medium Sediment Risk: >=15 and <75 tons/acre | |
| 19 | | High Sediment Risk: >= 75 tons/acre | |
| 20 | | | |



Source: State Water Resources Control Board

| Receiving Water (RW) Risk Factor Worksheet | Entry | Score |
|---|---|---|
| **A. Watershed Characteristics** | **yes/no** | |
| A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below:<br>2006 Approved Sediment-impared WBs Worksheet<br>http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml<br>**OR** | **No** | **Low** |
| A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY?<br>http://www.ice.ucdavis.edu/geowbs/asp/wbguse.asp | | |

Source: State Water Resources Control Board

## Combined Risk Level Matrix

| Receiving Water Risk | Sediment Risk: Low | Sediment Risk: Medium | Sediment Risk: High |
|---|---|---|---|
| Low | Level 1 | Level 2 | |
| High | Level 2 | | Level 3 |

**Project Sediment Risk:** Medium
**Project RW Risk:** Low
**Project Combined Risk:** Level 2

Source: State Water Resources Control Board

| Report_Date | Dist_EA | District | EA | County | Route | Beg_PM | End_PM | Descrip | Phase | LongSWDR | PhaseRptDate | Exempt | TBMP | Pollution_Program | Land Disturbance Acreage | AddImpArea | PercentTreated | MS4Area | MS4CiCo | Water Bodies Affected | Criteria | BioStrip | BioSwale | Detention | Infiltration | InfilTrench | GSRD | TST | DryWeath | MedFilter | MCTT | WetBasin | Const_Start | Const_Comp | SWComment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/8/2010 | 03-XXXX | 3 | XXXXXX | ED | 50 | 0 | 2.9 | Lane Ad | PS&E | TRUE | 10/8/2010 | FALSE | TRUE | SWPPP | 18.35 | 13.09 | 100 | TRUE | El Dorado | Carson Creek | N/A | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12/1/2011 | 6/30/2013 | |

## Storm Water BMP Cost Summary – PA/ED Phase

THIS INFORMATION IS FOR CALTRANS INTERNAL USE ONLY

| BEES | Temporary BMPs - PPDG Appendix C | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost ($) |
|---|---|---|---|---|---|---|---|
| | ***Temporary Soil Stabilization*** | | | | | | |
| 074037 | Move-In/Move-out (Temporary Erosion Control) | 07-485 | No | 10 | EA | 1,500 | $ 15,000 |
| 071325 | Temporary Fence (Type ESA) | 07-446 | Yes | 5,000 | ft | 8 | $ 40,000 |
| 074051 | Temp. Hydraulic Mulch | 07-351 | No | 600,000 | $ft^2$ | 0.12 | $ 72,000 |
| 074034 | Temporary Cover | 07-395 | Yes | 120,000 | $ft^2$ | 1 | $ 72,000 |
| | | | | | | **Subtotal Soil Stabilization BMPs** | **$ 199,000** |

| BEES | *Temporary Sediment Control* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| 074029 | Temp. Silt Fence | 07-430 | Yes | 5000 | ft | $6 | $ 30,000 |
| 074028 | Temporary Fiber Roll | 07-420 | Yes | 28000 | $ft^2$ | $5 | $ 140,000 |
| 074031 | Temporary Gravel Bag Berm | 07-470 | No | 3500 | ft | $5 | $ 17,500 |
| 074041 | Street Sweeping | 07-360 | No | 1 | LS | $25,000 | $ 25,000 |
| 074038 | Temp. Drainage Inlet Protection | 07-490 | Yes | 43 | EA | $200 | $ 8,600 |
| | | | | | | **Subtotal Sediment Control BMPs** | **$ 221,100** |

| BEES | *Temporary Wind Erosion Control* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| | | | | | | | $ - |
| | | | | | | **Subtotal Wind Erosion Control BMPs** | **$ -** |

| BEES | *Temporary Tracking Control* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| 074033 | Stabilized Constr. Entrance/Exit | 07-480 | Yes | 8 | EA | 2,500 | $ 20,000 |
| | | | | | | **Subtotal Tracking Control BMPs** | **$ 20,000** |

| BEES | *Temporary Waste Management Control* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| CSM* | Material Delivery and Storage | 07-346 | No | | LS | | $ - |
| CSM* | Material Use | 07-346 | No | | LS | | $ - |
| CSM* | Stockpile Management | 07-346 | No | | LS | | $ - |
| CSM* | Spill Prevention and Control | 07-346 | No | | LS | | $ - |
| CSM* | Solid Waste Management | 07-346 | No | | LS | | $ - |
| CSM* | Hazardous Waste Management | 07-346 | No | | LS | | $ - |
| CSM* | Contaminated Soil Management | 07-346 | No | | LS | | $ - |
| | Concrete Waste Management | 07-346 | No | | LS | | $ - |
| 074043 | Temp. Concrete Washout Bin | 07-406 | No | 8 | EA | 1,350 | $ 10,800 |
| | Grinding PCC (Displ of PCC Pavemt Grooving & Grinding Residues) | 42-600 | No | | LS | | $ - |
| CSM* | Sanitary/Septic Waste Managemt | 07-346 | No | | LS | | $ - |
| CSM* | Liquid Waste Management | 07-346 | No | | LS | | $ - |
| | | | | | | **Subtotal Waste Management & Materials Handling BMPs** | $ 10,800 |

**Temporary Construction Site BMPs (cont'd)**

| BEES | *Temporary Non-Storm Water Management* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| CSM* | Water Conservation Practices | 07-346 | No | | LS | | $ - |
| CSM* | Dewatering Operations | 07-341 | No | | LS | | $ - |
| CSM* | Paving & Grinding Operations | | | | LS | | $ - |
| | Pavements | S5-250 | No | | $ft^2$ | | $ - |
| | Temporary Stream Crossing | 07-495 | No | | LS | | $ - |
| | Clear Water Diversion | | No | | LS | | $ - |
| CSM* | Illicit Connection/Illegal Discharge Detection | 07-346 | No | | LS | | $ - |
| CSM* | Potable Water/Irrigation | 07-346 | No | | LS | | $ - |
| CSM* | Vehicle and Equipment Cleaning | 07-346 | No | | LS | | $ - |
| CSM* | Vehicle and Equipment Fueling | 07-346 | No | | LS | | $ - |
| CSM* | Vehicle and Equipmt Maintenance | 07-346 | No | | LS | | $ - |
| CSM* | Pile Driving Operations | 07-346 | No | | LS | | $ - |
| CSM* | Concrete Curing | 07-346 | No | | LS | | $ - |
| CSM* | Material & Equipmt use over water | 07-346 | No | | LS | | $ - |
| CSM* | Concrete Finishing | 07-346 | No | | LS | | $ - |
| CSM* | Structure Demolition/Removal Over or Adjacent | 07-346 | No | | LS | | $ - |
| | Temporary Batch Plants | | | | LS | | $ - |
| | Streambank Stabilization | | | | LS | | $ - |
| **CSM*** | ***Construction Site Management** | 07-346 | No | 1 | LS | 250,000 | $ 250,000 |
| | | | | | | **Subtotal Non-Storm Water Management** | $ 250,000 |

| BEES | *Miscellaneous Items* | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost |
|---|---|---|---|---|---|---|---|
| 074019 | Prepare Storm Water Pollution Prevention Plan | 07-345 | No | 1 | LS | 28,940 | $ 28,940 |
| 066595 | Water Pollution Control Maintenance Sharing | | | 1 | LS | 69,000 | $ 69,000 |
| 066596 | Additional Water Pollution Control | | | 1 | LS | 6,000 | $ 6,000 |
| 066597 | Storm Water Sampling and Analysis | | No | 1 | LS | 6,000 | $ 6,000 |
| 074056 | Rain Event Action Plan | | | 97 | EA | 500 | $ 48,500 |
| 074057 | Storm Water Annual Report | | | 2 | EA | 2,000 | $ 4,000 |
| 074058 | Storm Water Sampling and Analysis Day | | | 42 | EA | 4,221 | $ 177,267 |
| | | | | | | **Subtotal Miscellaneous Items** | **$ 339,707** |

| | |
|---|---|
| **Total Construction Site BMP Costs** | **$ 1,040,607** |

**Routine Quarterly Monitoring**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 19 | months | / | 3 | + | 1 | | 7 | inspections |
| 27 | discharges | + | 4 | additional discharges | | | 31 | discharges |
| | | | | | | | $ 100 | /hour |
| | | | | | | Total | $ 22,940 | |

**Prepare Storm Water Pollution Prevention Plan**

| | | |
|---|---|---|
| Prepare SWPPP Base Cost | $ | 6,000 |
| Routine Quarterly Monitoring Cost | $ | 22,940 |
| Total | $ | 28,940 |

**Storm Water Annual Report**

| | |
|---|---|
| 2 years | 2 SWA Reports |

**REAP (Storms Generating ≥ 0.10 inches)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 52.9 | rainy days/year | x | 1 | years | | | 53 | days |
| 52.9 | rainy days/year | x | 10 | subsequent months | ÷ | 12 subsequent months/year | 44 | days |
| | | | | | | | 97 | days |
| | | | | | | | 97 | REAPs |

**Storm Water Monitoring Cost**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M Value | | | | | | | 4 | |
| 25.9 | rainy days/year | x | 1 | years | | | 26 | days |
| 25.9 | rainy days/year | x | 7 | subsequent months | ÷ | 12 subsequent months/year | 15 | days |
| | | | | | | | 42 | days |
| Daily Cost to perform sampling and analysis | | | | | | | $ 1,000 | |
| Equipment Maintenance Cost | | | | | | | $ 2,317 | |
| | | | | | | | $ 177,267 | |

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

# Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

**Station: PLACERVILLE, CA** **COOP ID: 046960**

**Climate Division: CA 2** **NWS Call Sign:** **Elevation: 1,850 Feet** **Lat: 38°42N** **Lon: 120°49W**

## Precipitation (inches)

### Precipitation Totals

| Month | Means/ Medians(1) Mean | Means/ Medians(1) Median | Extremes Highest Daily(2) | Extremes Year | Extremes Day | Extremes Highest Monthly(1) | Extremes Year | Extremes Lowest Monthly(1) | Extremes Year |
|---|---|---|---|---|---|---|---|---|---|
| Jan | 7.47 | 6.05 | 4.40 | 1997 | 2 | 19.22 | 1997 | .42 | 1984 |
| Feb | 6.62 | 5.24 | 6.22 | 2000 | 14 | 18.87 | 1986 | .57 | 1988 |
| Mar | 6.03 | 5.66 | 3.65 | 1983 | 13 | 15.93 | 1991 | .28 | 1994 |
| Apr | 2.84 | 2.33 | 3.43 | 1958 | 3 | 7.98 | 1982 | .15 | 1985 |
| May | 1.56 | 1.03 | 2.80 | 1996 | 16 | 8.22 | 1998 | .00+ | 1992 |
| Jun | .45 | .32 | 1.49 | 1995 | 16 | 2.22 | 1995 | .00+ | 1990 |
| Jul | .18 | .00 | 2.78 | 1974 | 9 | 3.62 | 1974 | .00+ | 2000 |
| Aug | .15 | .00 | 1.17 | 1976 | 15 | 1.57 | 1976 | .00+ | 2000 |
| Sep | .94 | .29 | 2.62 | 1989 | 29 | 8.09 | 1989 | .00+ | 1995 |
| Oct | 2.12 | 1.46 | 4.25 | 1962 | 14 | 6.19 | 2000 | .00+ | 1995 |
| Nov | 4.91 | 3.37 | 3.57 | 1983 | 12 | 13.13 | 1983 | .33 | 1995 |
| Dec | 5.48 | 4.43 | 4.11 | 1955 | 22 | 19.86 | 1996 | .00 | 1989 |
| Ann | 38.75 | 35.65 | 6.22 | Feb 2000 | 14 | 19.86 | Dec 1996 | .00+ | Aug 2000 |

### Mean Number of Days (3)

Daily Precipitation

| Month | >= 0.01 | >= 0.10 | >= 0.50 | >= 1.00 |
|---|---|---|---|---|
| Jan | 10.3 | 8.4 | 5.0 | 2.6 |
| Feb | 10.2 | 7.8 | 4.4 | 2.3 |
| Mar | 11.3 | 9.2 | 4.3 | 1.7 |
| Apr | 7.2 | 4.9 | 2.0 | .6 |
| May | 4.1 | 2.8 | 1.1 | .4 |
| Jun | 1.9 | 1.0 | .2 | .1 |
| Jul | .5 | .2 | .1 | @ |
| Aug | 1.0 | .3 | .1 | @ |
| Sep | 2.2 | 1.3 | .6 | .4 |
| Oct | 4.2 | 3.2 | 1.5 | .7 |
| Nov | 9.0 | 6.8 | 3.0 | 1.8 |
| Dec | 8.9 | 7.0 | 3.6 | 1.8 |
| Ann | 70.8 | 52.9 | 25.9 | 12.4 |

### Precipitation Probabilities (1)

Probability that the monthly/annual precipitation will be equal to or less than the indicated amount

Monthly/Annual Precipitation vs Probability Levels
These values were determined from the incomplete gamma distribution

| Month | .05 | .10 | .20 | .30 | .40 | .50 | .60 | .70 | .80 | .90 | .95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | .68 | 1.20 | 2.20 | 3.24 | 4.37 | 5.66 | 7.19 | 9.10 | 11.73 | 16.13 | 20.43 |
| Feb | .83 | 1.36 | 2.29 | 3.22 | 4.19 | 5.27 | 6.53 | 8.09 | 10.19 | 13.65 | 17.00 |
| Mar | .72 | 1.19 | 2.04 | 2.88 | 3.77 | 4.77 | 5.93 | 7.37 | 9.32 | 12.53 | 15.66 |
| Apr | .31 | .52 | .91 | 1.31 | 1.74 | 2.21 | 2.77 | 3.47 | 4.42 | 6.00 | 7.54 |
| May | .00 | .00 | .14 | .35 | .60 | .92 | 1.32 | 1.85 | 2.62 | 3.95 | 5.31 |
| Jun | .00 | .00 | .00 | .08 | .17 | .27 | .40 | .56 | .78 | 1.15 | 1.53 |
| Jul | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .11 | .52 | 1.02 |
| Aug | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .06 | .19 | .49 | .84 |
| Sep | .00 | .00 | .00 | .01 | .10 | .27 | .54 | .95 | 1.58 | 2.79 | 4.06 |
| Oct | .00 | .00 | .43 | .78 | 1.15 | 1.56 | 2.05 | 2.66 | 3.47 | 4.84 | 6.19 |
| Nov | .52 | .89 | 1.57 | 2.25 | 2.98 | 3.81 | 4.78 | 5.99 | 7.64 | 10.37 | 13.03 |
| Dec | .23 | .68 | 1.48 | 2.28 | 3.15 | 4.13 | 5.29 | 6.74 | 8.73 | 12.05 | 15.30 |
| Ann | 18.05 | 21.44 | 26.10 | 29.87 | 33.37 | 36.89 | 40.64 | 44.93 | 50.31 | 58.45 | 65.77 |

+ Also occurred on an earlier date(s)
# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

**Treatment BMPs**

| BEES | Pollution Prevention BMPs PPDG Appendix A | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost ($) |
|---|---|---|---|---|---|---|---|
| | **Biofiltration Strip** | | | | $ft^2$ | | $ - |
| 203025 | Compost Incorporate | 20-056 | | 1,400 | SQYD | 21 | $ 29,400 |
| | **Biofiltration Swale** | | | | EA | | $ - |
| 194001 | Ditch Excavation | No | No | 380 | CY | 54 | $ 20,520 |
| 204013 | Plant (Group M) | 20-502 | | 2,000 | EA | 10 | $ 20,000 |
| 203025 | Compost Incorporate | 20-056 | | 1,700 | SQYD | 21 | $ 35,700 |
| | | | | | | | $ - |
| | | | | | | **Total Treatment BMP Costs** | $ 105,620 |

**Design Pollution Prevention BMPs**

| BEES | Pollution Prevention BMPs PPDG Appendix A | SSP/nSSP (#, Y or N) | STD. Det. (Y or N) | Quantity | Unit | Unit Cost ($/Unit) | Cost ($) |
|---|---|---|---|---|---|---|---|
| | **Downstream Effects/Increased Flow Mitigation** | | | | | | |
| 705011 | - 18" Steel Flared End Section | No | Yes | 6 | EA | 600 | $ 3,600 |
| 705015 | - 24" Steel Flared End Section | No | Yes | 6 | EA | 800 | $ 4,800 |
| 705019 | - 30" Steel Flared End Section | No | Yes | 1 | EA | 900 | $ 900 |
| | | | | | | | |
| | **Slope/Surface Protection Systems- Hard Surfaces** | | | | | | |
| 721007 | - Rock Slope Protection (1/4 Ton, Method | 72-010 | No | 700 | CY | 160 | $ 112,000 |
| 721008 | - Rock Slope Protection (Light, Method B) | 72-010 | No | 900 | CY | 135 | $ 121,500 |
| 729010 | - Rock Slope Protection Fabric | 72-150 | No | 4,000 | SQYD | 2 | $ 8,000 |
| | **Slope/Surface Protection Systems- Vegetated Surfaces** | | | | | | |
| 204096 | - Maintain Existing Planted Areas | | No | 1 | LS | 30,000 | $ 30,000 |
| 203021 | Fiber Rolls | | | 30,000 | LF | 2 | $ 60,000 |
| 203031 | Erosion Control (Hydroseed) | | | 330,000 | SQFT | 0.08 | $ 26,400 |
| | **Concentrated Flow Conveyance Systems** | | | | | | |
| 194001 | - Ditch Excavation | No | No | 1,500 | CY | 25 | $ 37,500 |
| | | | | | | **Total Design Pollution Prevention BMP Costs** | $ 404,700 |

| | |
|---|---|
| **Total Permanent Storm Water BMP Costs** | **$ 510,320** |

| | |
|---|---|
| **Project Name:** | **El Dorado 50 HOV Lane Addition** |
| **District:** | **3** |
| **County:** | **El Dorado** |
| **Route:** | **50** |
| **Postmile Limits:** | **0.0/2.9** |
| **Project ID (or EA):** | **03-xxxxxx** |

| | |
|---|---|
| **Total Treatment BMP Costs** | $ 105,620 |
| **Total Design Pollution Prevention BMP Costs** | $ 404,700 |
| **Total Permanent Storm Water BMP Costs** | $ 510,320 |

| | |
|---|---|
| **Subtotal Soil Stabilization BMPs** | $ 199,000 |
| **Subtotal Sediment Control BMPs** | $ 221,100 |
| **Subtotal Wind Erosion Control BMPs** | $ - |
| **Subtotal Tracking Control BMPs** | $ 20,000 |
| **Subtotal Waste Management & Materials Handling BMPs** | $ 10,800 |
| **Subtotal Non-Storm Water Management** | $ 250,000 |
| **Subtotal Miscellaneous Items** | $ 245,800 |
| **Total Construction Site BMP Costs** | $ 946,700 |

| | |
|---|---|
| **TOTAL COST FOR STORM WATER BMPs** | $ 1,457,020 |

# Checklist SW-1, Site Data Sources

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

Information for the following data categories should be obtained, reviewed and referenced as necessary throughout the project planning phase. Collect any available documents pertaining to the category and list them and reference your data source. For specific examples of documents within these categories, refer to Section 5.5 of this document. Example categories have been listed below; add additional categories, as needed. Summarize pertinent information in Section 2 of the SWDR.

| DATA CATEGORY/SOURCES | Date |
|---|---|
| **Topographic** | |
| • USGS Quadrangle Topography Map | Map Version 1979 |
| • Google Earth | Accessed: October 2010 |
| • Microsoft Bing Maps | Accessed: October 2010 |
| • Project Plan | October 2010 |
| **Hydraulic** | |
| • California State University, Sacramento. *Water Quality Planning Tool. <http://stormwater.water-programs.com/>* | Accessed October 2010 |
| **Soils** | |
| • California Department of Transportation. *Geotechnical Report, US 50 Phase 1 HOV Lane CMIA Project, PM 0.0 To PM 2.9 El Dorado County, California*. | September 2010 |
| • Caltrans. Various Historic Geotechnical Reports and Memorandums | Various |
| **Climatic** | |
| • California Department of Transportation. *Statewide Storm Water Management Plan.* CTSW-RT-02-008 | May 2003 |
| • FEMA, *Flood Insurance Study, El Dorado County, California Unincorporated Areas* Community No. 060040 | October 18, 1995 |
| **Water Quality** | |
| • State Water Resources Control Board. *2006 State Water Resources Control Board 303(d) List for Water Quality Limited Segments.* | USEPA Approval Date June 28, 2007 |
| • California Department of Transportation. *Storm Water Management Program District 3 Work Plan, Fiscal Year 2010-2011.* CTSW-RT-10-182-42.1 | April 1, 2010 |
| • California State Water Resources Control Board (SWRCB). *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.* NPDES Number CAS000002. | September 2, 2009 |

| Other Data Categories | |
|---|---|
| • California Department of Transportation. *Storm Water Quality Handbooks–Construction Site Best Management Practices (BMPs) Manual.* | March 2003 |
| • Project Planning Design Guide, Storm Water Quality Handbooks. Caltrans State of California, Department of Transportation. | July 2010 |
| • California Department of Transportation. *Project Risk Level Determination Guidance* | July 2010 |
| • California Department of Transportation. *Estimating Guidance for CGP.* | September 2010 |

## Checklist SW-2, Storm Water Quality Issues Summary

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

The following questions provide a guide to collecting critical information relevant to project stormwater quality issues. Complete responses to applicable questions, consulting other Caltrans functional units (Environmental, Landscape Architecture, Maintenance, etc.) and the District/Regional Storm Water Coordinator as necessary. Summarize pertinent responses in Section 2 of the SWDR.

| | | |
|---|---|---|
| 1. Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation). | ☒ Complete | ☐ NA |
| 2. For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern. | ☒ Complete | ☐ NA |
| 3. Determine if there are any municipal or domestic water supply reservoirs or groundwater percolation facilities within the project limits. Consider appropriate spill contamination and spill prevention control measures for these new areas. | ☐ Complete | ☒ NA |
| 4. Determine the RWQCB special requirements, including TMDLs, effluent limits, etc. | ☐ Complete | ☒ NA |
| 5. Determine regulatory agencies seasonal construction and construction exclusion dates or restrictions required by federal, state, or local agencies. | ☒ Complete | ☐ NA |
| 6. Determine if a 401 certification will be required. | ☐ Complete | ☒ NA |
| 7. List rainy season dates. | ☒ Complete | ☐ NA |
| 8. Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves. | ☒ Complete | ☐ NA |
| 9. If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater. | ☒ Complete | ☐ NA |
| 10. Determine contaminated soils within the project area. | ☒ Complete | ☐ NA |
| 11. Determine the total disturbed soil area of the project. | ☒ Complete | ☐ NA |
| 12. Describe the topography of the project site. | ☒ Complete | ☐ NA |
| 13. List any areas outside of the Caltrans right-of-way that will be included in the project (e.g. contractor's staging yard, work from barges, easements for staging, etc.). | ☐ Complete | ☒ NA |
| 14. Determine if additional right-of-way acquisition or easements and right-of-entry will be required for design, construction and maintenance of BMPs. If so, how much? | ☐ Complete | ☒ NA |
| 15. Determine if a right-of-way certification is required. | ☐ Complete | ☒ NA |
| 16. Determine the estimated unit costs for right-of-way should it be needed for Treatment BMPs, stabilized conveyance systems, lay-back slopes, or interception ditches. | ☐ Complete | ☒ NA |
| 17. Determine if project area has any slope stabilization concerns. | ☒ Complete | ☐ NA |
| 18. Describe the local land use within the project area and adjacent areas. | ☒ Complete | ☐ NA |
| 19. Evaluate the presence of dry weather flow. | ☒ Complete | ☐ NA |

# Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water Impacts

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

The PE must confer with other functional units, such as Landscape Architecture, Hydraulics, Environmental, Materials, Construction and Maintenance, as needed to assess these issues. Summarize pertinent responses in Section 2 of the SWDR.

Options for avoiding or reducing potential impacts during project planning include the following:

| | | | | |
|---|---|---|---|---|
| 1. | Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions? | ☐ Yes | ☒ No | ☐ NA |
| 2. | Can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts? | ☒ Yes | ☐ No | ☐ NA |
| 3. | Can any of the following methods be utilized to minimize erosion from slopes: | | | |
| | a. Disturbing existing slopes only when necessary? | ☒ Yes | ☐ No | ☐ NA |
| | b. Minimizing cut and fill areas to reduce slope lengths? | ☒ Yes | ☐ No | ☐ NA |
| | c. Incorporating retaining walls to reduce steepness of slopes or to shorten slopes? | ☒ Yes | ☐ No | ☐ NA |
| | d. Acquiring right-of-way easements (such as grading easements) to reduce steepness of slopes? | ☐ Yes | ☐ No | ☒ NA |
| | e. Avoiding soils or formations that will be particularly difficult to re-stabilize? | ☐ Yes | ☐ No | ☒ NA |
| | f. Providing cut and fill slopes flat enough to allow re-vegetation and limit erosion to pre-construction rates? | ☒ Yes | ☐ No | ☐ NA |
| | g. Providing benches or terraces on high cut and fill slopes to reduce concentration of flows? | ☐ Yes | ☐ No | ☒ NA |
| | h. Rounding and shaping slopes to reduce concentrated flow? | ☐ Yes | ☐ No | ☒ NA |
| | i. Collecting concentrated flows in stabilized drains and channels? | ☒ Yes | ☐ No | ☐ NA |
| 4. | Does the project design allow for the ease of maintaining all BMPs? | ☒ Yes | ☐ No | |
| 5. | Can the project be scheduled or phased to minimize soil-disturbing work during the rainy season? | ☒ Yes | ☐ No | |
| 6. | Can permanent storm water pollution controls such as paved slopes, vegetated slopes, basins, and conveyance systems be installed early in the construction process to provide additional protection and to possibly utilize them in addressing construction storm water impacts? | ☒ Yes | ☐ No | ☐ NA |

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 1

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## Consideration of Design Pollution Prevention BMPs

### Consideration of Downstream Effects Related to Potentially Increased Flow [to streams or channels]

| | | | |
|---|---|---|---|
| Will project increase velocity or volume of downstream flow? | ☒ Yes | ☐ No | ☐ NA |
| Will the project discharge to unlined channels? | ☒ Yes | ☐ No | ☐ NA |
| Will project increase potential sediment load of downstream flow? | ☒ Yes | ☐ No | ☐ NA |
| Will project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability? | ☐ Yes | ☒ No | ☐ NA |

If Yes was answered to any of the above questions, consider ***Downstream Effects Related to Potentially Increased Flow***, complete the DPP-1, Part 2 checklist.

### Slope/Surface Protection Systems

| | | | |
|---|---|---|---|
| Will project create new slopes or modify existing slopes? | ☒ Yes | ☐ No | ☐ NA |

If Yes was answered to the above question, consider ***Slope/Surface Protection Systems***, complete the DPP-1, Part 3 checklist.

### Concentrated Flow Conveyance Systems

| | | | |
|---|---|---|---|
| Will the project create or modify ditches, dikes, berms, or swales? | ☒ Yes | ☐ No | ☐ NA |
| Will project create new slopes or modify existing slopes? | ☒ Yes | ☐ No | ☐ NA |
| Will it be necessary to direct or intercept surface runoff? | ☒ Yes | ☐ No | ☐ NA |
| Will cross drains be modified? | ☒ Yes | ☐ No | ☐ NA |

If Yes was answered to any of the above questions, consider ***Concentrated Flow Conveyance Systems***; complete the DPP-1, Part 4 checklist.

### Preservation of Existing Vegetation

It is the goal of the Storm Water Program to maximize the protection of desirable existing vegetation to provide erosion and sediment control benefits on all projects. ☒ Complete

Consider ***Preservation of Existing Vegetation***, complete the DPP-1, Part 5 checklist.

## Design Pollution Prevention BMPs

## Checklist DPP-1, Part 2

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Downstream Effects Related to Potentially Increased Flow

| | | |
|---|---|---|
| 1. | Review total paved area and reduce to the maximum extent practicable. | ☒Complete |
| 2. | Review channel lining materials and design for stream bank erosion control. | ☒Complete |
| | (a) See Chapters 860 and 870 of the HDM. | ☒Complete |
| | (b) Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity. | ☒Complete |
| 3. | Include, where appropriate, energy dissipation devices at culvert outlets. | ☒Complete |
| 4. | Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour. | ☒Complete |
| 5. | Include, if appropriate, peak flow attenuation basins or devices to reduce peak discharges. | ☒Complete |

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 3

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Slope / Surface Protection Systems

| | | | |
|---|---|---|---|
| 1. | What are the proposed areas of cut and fill? (attach plan or map) | ☒Complete | |
| 2. | Were benches or terraces provided on high cut and fill slopes to reduce concentration of flows? | ☐Yes | ☒No |
| 3. | Were slopes rounded and/or shaped to reduce concentrated flow? | ☐Yes | ☒No |
| 4. | Were concentrated flows collected in stabilized drains or channels? | ☒Yes | ☐No |
| 5. | Are new or disturbed slopes > 4:1 horizontal:vertical (h:v)? | ☒Yes | ☐No |
| | If Yes, District Landscape Architect must prepare or approve an erosion control plan, at the District's discretion. | | |
| 6. | Are new or disturbed slopes > 2:1 (h:v)? | ☐Yes | ☒No |
| | If Yes, Geotechnical Services must prepare a Geotechnical Design Report, and the District Landscape Architect should prepare or approve an erosion control plan. Concurrence must be obtained from the District Maintenance Storm Water Coordinator for slopes steeper than 2:1 (h:v). | | |
| 7. | Estimate the net new impervious area that will result from this project. 13.09 acres | ☒Complete | |

**VEGETATED SURFACES**

| | | |
|---|---|---|
| 1. | Identify existing vegetation. | ☒Complete |
| 2. | Evaluate site to determine soil types, appropriate vegetation and planting strategies. | ☒Complete |
| 3. | How long will it take for permanent vegetation to establish? | ☒Complete |
| 4. | Minimize overland and concentrated flow depths and velocities. | ☒Complete |

**HARD SURFACES**

| | | | |
|---|---|---|---|
| 1. | Are hard surfaces required? | ☐Yes | ☒No |
| | If Yes, document purpose (safety, maintenance, soil stabilization, etc.), types, and general locations of the installations. | ☐Complete | |

Review appropriate SSPs for Vegetated Surface and Hard Surface Protection Systems. ☒Complete

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 4

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Concentrated Flow Conveyance Systems

**Ditches, Berms, Dikes and Swales**

1. Consider Ditches, Berms, Dikes, and Swales as per Topics 813, 834.3, and 835, and Chapter 860 of the HDM. ☒Complete
2. Evaluate risks due to erosion, overtopping, flow backups or washout. ☒Complete
3. Consider outlet protection where localized scour is anticipated. ☒Complete
4. Examine the site for run-on from off-site sources. ☒Complete
5. Consider channel lining when velocities exceed scour velocity for soil. ☒Complete

**Overside Drains**

1. Consider downdrains, as per Index 834.4 of the HDM. ☒Complete
2. Consider paved spillways for side slopes flatter than 4:1 h:v. ☒Complete

**Flared Culvert End Sections**

1. Consider flared end sections on culvert inlets and outlets as per Chapter 827 of the HDM. ☒Complete

**Outlet Protection/Velocity Dissipation Devices**

1. Consider outlet protection/velocity dissipation devices at outlets, including cross drains, as per Chapters 827 and 870 of the HDM. ☒Complete

Review appropriate SSPs for Concentrated Flow Conveyance Systems. ☒Complete

## Design Pollution Prevention BMPs

## Checklist DPP-1, Part 5

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Preservation of Existing Vegetation

1. Review Preservation of Property, Standard Specifications 16.1.01 and 16-1.02 (Clearing and Grubbing) to reduce clearing and grubbing and maximize preservation of existing vegetation. ☒Complete

2. Has all vegetation to be retained been coordinated with Environmental, and identified and defined in the contract plans? ☒Yes ☐No

3. Have steps been taken to minimize disturbed areas, such as locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling? ☒Complete

4. Have impacts to preserved vegetation been considered while work is occurring in disturbed areas? ☒Yes ☐No

5. Are all areas to be preserved delineated on the plans? ☒Yes ☐No

# Treatment BMPs

## Checklist T-1, Part 1

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Consideration of Treatment BMPs

This checklist is used for projects that require the consideration of Approved Treatment BMPs, as determined from the process described in Section 4 (Project Treatment Consideration) and the Evaluation Documentation Form (EDF). This checklist will be used to determine which Treatment BMPs should be considered for each watershed and sub-watershed within the project. Supplemental data will be needed to verify siting and design applicability for final incorporation into a project.

**Complete this checklist for each phase of the project, when considering Treatment BMPs. Use the responses to the questions as the basis when developing the narrative in Section 5 of the Storm Water Data Report to document that Treatment BMPs have been appropriately considered.**

**Answer all questions, unless otherwise directed. Questions 14 through 16 should be answered after all subwatershed (drainages) are considered using this checklist.**

1. Is the project in a watershed with prescriptive TMDL treatment BMP requirements in an adopted TMDL implementation plan? ☐Yes ☒No

   If Yes, consult the District/Regional Storm Water Coordinator to determine whether the T-1 checklist should be used to propose alternative BMPs because the prescribed BMPs may not be feasible or other BMPs may be more cost-effective. Special documentation and regulatory response may be necessary.

2. Dry Weather Flow Diversion

   (a) Are dry weather flows generated by Caltrans anticipated to be persistent? ☐Yes ☒No

   (b) Is a sanitary sewer located on or near the site? ☒Yes ☐No

   If Yes to both 2 (a) and (b), continue to (c). If No to either, skip to question 3.

   (c) Is connection to the sanitary sewer possible without extraordinary plumbing, features or construction practices? ☐Yes ☐No

   (d) Is the domestic wastewater treatment authority willing to accept flow? ☐Yes ☐No

   If Yes was answered to all of these questions consider ***Dry Weather Flow Diversion***, complete and attach **Part 3** of this checklist

3. Is the receiving water on the 303(d) list for litter/trash or has a TMDL been issued for litter/trash? ☐Yes ☒No

If Yes, consider ***Gross Solids Removal Devices (GSRDs)***, complete and attach **Part 6** of this checklist. Note: Infiltration Devices, Detention Devices, Media Filters, MCTTs, and Wet Basins also can capture litter. Before considering GSRDs for stand-alone installation or in sequence with other BMPs, consult with District/Regional NPDES Storm Water Coordinator to determine whether Infiltration Devices, Detention Devices, Media Filters, MCTTs, and Wet Basins should be considered instead of GSRDs to meet litter/trash TMDL.

4. Is project located in an area (e.g., mountain regions) where traction sand is applied more than twice a year? ☐Yes ☒No

   If Yes, consider ***Traction Sand Traps***, complete and attach **Part 7** of this checklist.

5. Maximizing Biofiltration Strips and Swales ☒Yes ☐No

   Objectives:

   1) Quantify infiltration from biofiltration alone
   2) Identify highly infiltrating biofiltration (i.e. > 90%) and skip further BMP consideration.
   3) Identify whether amendments can substantially improve infiltration.

   (a) Have biofiltration strips and swales been designed for runoff from all project areas, including sheet flow and concentrated flow conveyance? If no, document justification in Section 5 of the SWDR. ☐Yes ☒No

   (b) Based on site conditions, estimate what percentage of the WQV can be infiltrated. Use the 12-hour WQV for Type A and B soils, the 24-hour WQV for Type C soils, and the 48-hour WQV for Type D soil.

   _x_ < 20%
   ___ 20 % - 50%
   ___ 50% - 90%
   ___ > 90%

   ☒Complete

   (c) Is infiltration greater than 90 percent? If Yes, skip to question 13. ☐Yes ☒No

(d) Can the infiltration ranking in question 5(b) above be increased by using soil amendments? Use the 'drain time' associated with the amended soil (the 12-hour WQV for Type A and B soils, the 24-hour WQV for Type C soils[1]). ☒Yes ☐No

If Yes, consider including soil amendments; increasing the infiltration ranking allows more flexibility in the selection of BMPs (strips and swales will show performance comparable to other BMPs). Record the new infiltration estimate below:

_x_ < 20% (skip to 6)
___ 20 % - 50% (skip to 6)
___ 50% - 90% (skip to 6)
___ >90%

☒Complete

(e) Is infiltration greater than 90 percent? If Yes, skip to question 13. ☐Yes ☒No

6. Biofiltration in Rural Areas

Is the project in a rural area (outside of urban areas that is covered under an NDPES Municipal Stormwater Permit[2]). If Yes proceed to question 13. ☐Yes ☒No

7. Estimating Infiltration for BMP Combinations

Objectives:

1) Identify high-infiltration biofiltration or biofiltration and infiltration BMP combinations and skip further BMP consideration.

2) If high infiltration is infeasible, then identify the infiltration level of all feasible BMP combinations for use in the subsequent BMP selection matrices

(a) Has concentrated infiltration (i.e., via earthen basins or earthen filters) been prohibited? Consult your District/Regional Storm Water Coordinator and/or environmental documents. ☐Yes ☒No



[1] Type D soils are not expected where amendments are incorporated

[2] See pages 39 and 40 of the Fact Sheets for the CGP.
http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_factsheet.pdf

If No proceed to 7 (b); if Yes skip to 7 (e) and do not consider earthen basin-type BMPs

(b) Assess infiltration of an infiltration BMP that is used in conjunction with biofiltration. Include infiltration losses from biofiltration, if biofiltration is feasible. ☒Complete

(use 24 hr WQV)

_x_ < 20% (do not consider this BMP combination)

___ 20% - 50%

___ 50% - 90%

___ >90%

Is at least 90 percent infiltration estimated? If Yes proceed to 13. If No proceed to 7(c). ☐Yes ☒No

(c) Assess infiltration of biofiltration with combinations with remaining approved earthen BMPs using water quality volumes based on the drain time of those BMPs. This assessment will be used in subsequent BMP selection matrices.

| Earthen Detention Basin (use 48 hr WQV) | Earthen Austin SF (use 48 hr WQV) |
|---|---|
| _x_ < 20% | _x_ < 20% |
| ___ 20% - 50% | ___ 20% - 50% |
| ___ > 50% | ___ > 50% |

☒Complete

Continue to Question 8

8. Identifying BMPs based on the Target Design Constituents

(a) Does the project discharge to a water body that has been placed on the 303-d list or has had a TMDL adopted? If "No," use Matrix A to select BMPs, consider designing to treat 100% of the WQV, then skip to question 12. ☐Yes ☒No

If Yes, is the identified pollutant(s) considered a Targeted Design Constituent (TDC) (check all that apply below)?

☐ sediments
☐ phosphorus
☐ nitrogen
☐ copper (dissolved or total)
☐ lead (dissolved or total)
☐ zinc (dissolved or total)
☐ general metals (dissolved or total)[3]

(b) Treating Sediment. Is sediment the only TDC? If Yes, use Matrix A to select BMPs, then skip to question 12. Otherwise, proceed to question 9. ☐Yes ☐No

[3] General metals include cadmium, nickel, chromium, and other trace metals. Note that selenium and arsenic are not metals. Mercury is a metal, but is considered later during BMP selection, under Question 12 below.

| BMP Selection Matrix A: General Purpose Pollutant Removal | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Strip: HRT > 5<br>Austin filter (concrete)<br>Austin filter (earthen)<br>Delaware filter<br>MCTT<br>Wet basin | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Strip: HRT < 5<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Swale<br>MCTT<br>Wet basin | Austin filter (concrete)<br>Delaware filter<br>MCTT<br>Wet basin |
| HRT = hydraulic residence time (min)<br><br>*Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |



9. Treating both Metals and Nutrients.

   Is copper, lead, zinc, or general metals *AND* nitrogen or phosphorous a TDC? If Yes use Matrix D to select BMPs, then skip to question 12. Otherwise, proceed to question 10. ☐Yes ☐No

10. Treating Only Metals.

    Are copper, lead, zinc, or general metals listed TDCs? If Yes use Matrix B below to select BMPs, and skip to question 12. Otherwise, proceed to question 11. ☐Yes ☐No

| BMP Selection Matrix B: Any metal is the TDC, but not nitrogen or phosphorous | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | MCTT<br>Wet basin<br>Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>MCTT<br>Wet basin | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>MCTT<br>Biofiltration Strip<br>Biofiltration Swale<br>Wet basin |
| Tier 2 | Strip: HRT > 5<br>Strip: HRT < 5<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale | Austin filter (concrete)<br>Delaware filter |
| HRT = hydraulic residence time (min)<br>*Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |

11. Treating Only Nutrients.
    Are nitrogen and/or phosphorus listed TDCs? If "Yes," use Matrix C to select BMPs. If "No", please check your answer to 8(a). At this point one of the matrices should have been used for BMP selection for the TDC in question, unless no BMPs are feasible. ☐Yes ☐No

| BMP Selection Matrix C: Phosphorous and / or nitrogen is the TDC, but no metals are the TDC | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter** | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches* | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Wet basin<br>Biofiltration Strip<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale<br>Wet basin | Austin filter (concrete)<br>Delaware filter<br>Wet basin |
| * Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |
| ** Delaware filters would be ranked in Tier 2 if the TDC is nitrogen only, as opposed to phosphorous only or both nitrogen and phosphorous. | | | |

| BMP Selection Matrix D: Any metal, plus phosphorous and / or nitrogen are the TDCs | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Wet basin*<br>Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter** | Wet basin*<br>Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins***<br>Infiltration trenches*** | Wet basin*<br>Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins***<br>Infiltration trenches***<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Biofiltration Strip<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale | Austin filter (concrete)<br>Delaware filter |
| * The wet basin should only be considered for phosphorus | | | |
| ** In cases where earthen BMPs can infiltrate, Delaware filters are ranked in Tier 2 if the TDC is nitrogen only, but they are Tier 1 for phosphorous only or both nitrogen and phosphorous. | | | |
| *** Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |

12. Does the project discharge to a waterbody that has been placed on the 303-d list or has had a TMDL adopted for mercury or low dissolved oxygen? ☐Yes ☒No

    If Yes contact the District/Regional NPDES Storm Water Coordinator to determine if standing water in a Delaware filter, wet basin, or MCTT would be a risk to downstream water quality.

13. After completing the above, identify and attach the checklists shown below for every Treatment BMP under consideration. (use one checklist every time the BMP is considered for a different drainage within the project) ☒Complete

    _x__ Biofiltration Strips and Biofiltration Swales: Checklist T-1, Part 2
    ____ Dry Weather Diversion: Checklist T-1, Part 3
    ____ Infiltration Devices: Checklist T-1, Part 4
    ____ Detention Devices: Checklist T-1, Part 5
    ____ GSRDs: Checklist T-1, Part 6
    ____ Traction Sand Traps: Checklist T-1, Part 7
    ____ Media Filter [Austin Sand Filter and Delaware Filter]: Checklist T-1, Part 8
    ____ Multi-Chambered Treatment Train: Checklist T-1, Part 9
    ____ Wet Basins: Checklist T-1, Part 10

14. Estimate what percentage of WQV (or WQF, depending upon the Treatment BMP selected) will be treated by the preferred Treatment BMP(s): ____100_____% ☒Complete

    (a) Have Treatment BMPs been considered for use in parallel or series to increase this percentage? ☒Yes ☐No

15. Estimate what percentage of the net WQV (for all new impervious surfaces within the project) that will be treated by the preferred treatment BMP(s): ☒Complete
    ____100____%

16. Prepare cost estimate, including right-of-way, and site specific determination of feasibility (Section 2.4.2.1) for selected Treatment BMPs and include as supplemental information for SWDR approval. ☒Complete

# Treatment BMPs

# Checklist T-1, Part 2

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## Biofiltration Swales / Biofiltration Strips

### *Feasibility*

1. Do the climate and site conditions allow vegetation to be established? ☒Yes ☐No

2. Are flow velocities from a peak drainage facility design event < 4 fps (i.e. low enough to prevent scour of the vegetated biofiltration swale as per HDM Table 873.3E)? ☒Yes ☐No

   If "No" to either question above, Biofiltration Swales and Biofiltration Strips are not feasible.

3. Are Biofiltration Swales proposed at sites where known contaminated soils or groundwater plumes exist? ☐Yes ☒No
   If "Yes", consult with District/Regional NPDES Coordinator about how to proceed.

4. Does adequate area exist within the right-of-way to place Biofiltration device(s)? ☒Yes ☐No
   If "Yes", continue to Design Elements section. If "No", continue to Question 5.

5. If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Biofiltration devices and how much right-of-way would be needed to treat WQF? _____ acres ☐Yes ☐No
   If "Yes", continue to Design Elements section. If "No", continue to Question 6.

6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of these Treatment BMPs into the project. ☐Complete

### *Design Elements*

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

1. Has the District Landscape Architect provided vegetation mixes appropriate for climate and location? * ☒Yes ☐No

| | | | |
|---|---|---|---|
| 2. | Can the biofiltration swale be designed as a conveyance system under any expected flows > the WQF event, as per HDM Chapter 800? * (e.g. freeboard, minimum slope, etc.) | ☒Yes | ☐No |
| 3. | Can the biofiltration swale be designed as a water quality treatment device under the WQF while meeting the required HRT, depth, and velocity criteria? (Reference Appendix B, Section B.2.3.1)* | ☒Yes | ☐No |
| 4. | Is the maximum length of a biofiltration strip ≤ 300 ft? * | ☒Yes | ☐No |
| 5. | Has the minimum width (in the direction of flow) of the invert of the biofiltration swale received the concurrence of Maintenance? * | ☒Yes | ☐No |
| 6. | Can biofiltration swales be located in natural or low cut sections to reduce maintenance problems caused by animals burrowing through the berm of the swale? ** | ☒Yes | ☐No |
| 7. | Is the biofiltration strip sized as long as possible in the direction of flow? ** | ☒Yes | ☐No |
| 8. | Have Biofiltration Systems been considered for locations upstream of other Treatment BMPs, as part of a treatment train? ** | ☒Yes | ☐No |

# Construction Site BMPs
# Checklist CS-1, Part 1

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Soil Stabilization*

*General Parameters*

1. How many rainy seasons are anticipated between begin and end of construction? 2

2. What is the total disturbed soil area for the project? (ac) 18.35

   (a) How much of the project DSA consists of slopes 4:1 (h:v) or flatter? (ac) 16.77

   (b) How much of the project DSA consists of 4:1 (h:v) < slopes < 2:1 (h:v)? (ac) 1.58

   (c) How much of the project DSA consists of slopes 2:1 (h:v) and steeper? (ac) _____

   (d) How much of the project DSA consists of slopes with slope lengths longer than 20 ft? (ac) _____

3. What rainfall area does the project lie within? (Refer to Table 2-1 of the Construction Site Best Management Practices Manual ) 3

4. Review the required combination of temporary soil stabilization and temporary sediment controls and barriers for area, slope inclinations, rainy and non-rainy season, and active and non-active disturbed soil areas. (Refer to Tables 2-2, and 2-3 of the Construction Site Best Management Practices Manual for Rainfall Area requirements.) ☒ Complete

*Scheduling* (SS-1)

5. Does the project have a duration of more than one rainy season and have disturbed soil area in excess of 25 acres? ☐ Yes ☒ No

   (a) Include multiple mobilizations (Move-in/Move-out) as a separate contract bid line item to implement permanent erosion control or revegetation work on slopes that are substantially complete. (Estimate at least 6 mobilizations for each additional rainy season. Designated Construction Representative may suggest an alternate number of mobilizations.) ☒ Complete

   (b) Edit Order of Work specifications for permanent erosion control or revegetation work to be implemented on slopes that are substantially complete. ☒ Complete

(c) Edit permanent erosion control or revegetation specifications to require seeding and planting work to be performed when optimal. ☒Complete

*Preservation of Existing Vegetation* (SS-2)

6. Do Environmentally Sensitive Areas (ESAs) exist within or adjacent to the project limits? (Verify the completion of DPP-1, Part 5) ☒Yes ☐No

   (a) Verify the protection of ESAs through delineation on all project plans. ☒Complete

   (b) Protect from clearing and grubbing and other construction disturbance by enclosing the ESA perimeter with high visibility plastic fence or other BMP. ☒Complete

7. Are there areas of existing vegetation (mature trees, native vegetation, landscape planting, etc.) that need not be disturbed by project construction? Will areas designated for proposed treatment BMPs need protection (infiltration characteristics, vegetative cover, etc.)? (Coordinate with District Environmental and Construction to determine limits of work necessary to preserve existing vegetation to the maximum extent practicable.) ☒Yes ☐No

   (a) Designate as outside of limits of work (or designate as ESAs) and show on all project plans. ☒Complete

   (b) Protect with high visibility plastic fence or other BMP. ☒Complete

8. If yes for 6, 7, or both, then designate ESA fencing as a separate contract bid line item, *if not already incorporated as part of design pollution prevention work (See DPP-1, Part 5).* ☒Complete

*Slope Protection*

9. Provide a soil stabilization BMP(s) appropriate for the DSA, slope steepness, slope length, and soil erodibility. (Consult with District/Regional Landscape Architect.)

   (a) Select SS-3 (Hydraulic Mulch), SS-4 (Hydroseeding), SS-5 (Soil Binders), SS-6 (Straw Mulch), SS-7 (Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets), SS-8 (Wood Mulching), other BMPs or a combination to cover the DSA throughout the project's rainy season. ☒Complete

   (b) Increase the quantities by 25% for each additional rainy season. (Designated Construction Representative may suggest an alternate increase.) ☒Complete

   (c) Designate as a separate contract bid line item. ☒Complete

*Slope Interrupter Devices*

10. Provide slope interrupter devices for all slopes with slope lengths equal to or greater than of 20 ft in length. (Consult with District/Regional Landscape Architect and Designated Construction Representative.)

    (a) Select SC-5 (Fiber Rolls) or other BMPs to protect slopes throughout the project's rainy season. ☒Complete

    (b) For slope inclination of 4:1 (h:v) and flatter, SC-5 (Fiber Rolls) or other BMPs shall be placed along the contour and spaced 20 ft on center. ☒Complete

    (c) For slope inclination between 4:1 (h:v) and 2:1 (h:v), SC-5 (Fiber Rolls) or other BMPs shall be placed along the contour and spaced 15 ft on center. ☒Complete

    (d) For slope inclination of 2:1 (h:v) and greater, SC-5 (Fiber Rolls) or other BMPs shall be placed along the contour and spaced 10 ft on center. ☒Complete

    (e) Increase the quantities by 25% for each additional rainy season. (Designated Construction Representative may suggest alternate increase.) ☒Complete

    (f) Designate as a separate contract bid line item. ☒Complete

*Channelized Flow*

11. Identify locations within the project site where concentrated flow from stormwater runoff can erode areas of soil disturbance. Identify locations of concentrated flow that enters the site from outside of the right-of-way (off-site run-on). ☒Complete

    (a) Utilize SS-7 (Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets), SS-9 (Earth Dikes/Swales, Ditches), SS-10 (Outlet Protection/Velocity Dissipation), SS-11 (Slope Drains), SC-4 (Check Dams), or other BMPs to convey concentrated flows in a non-erosive manner. ☒Complete

    (b) Designate as a separate contract bid line item. ☒Complete

# Construction Site BMPs
# Checklist CS-1, Part 2

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Sediment Control*

*Perimeter Controls - Run-off Control*

1. Is there a potential for sediment laden sheet and concentrated flows to discharge offsite from runoff cleared and grubbed areas, below cut slopes, embankment slopes, etc.? ☒Yes ☐No

   (a) Select linear sediment barrier such as SC-1 (Silt Fence), SC-5 (Fiber Rolls), SC-6 (Gravel Bag Berm), SC-8 (Sand Bag Barrier), SC-9 (Straw Bale Barrier), or a combination to protect wetlands, water courses, roads (paved and unpaved), construction activities, and adjacent properties. (Coordinate with District Construction for selection and preference of linear sediment barrier BMPs.) ☒Complete

   (b) Increase the quantities by 25% for each additional rainy season. (Designated Construction Representative may suggest an alternate increase.) ☒Complete

   (c) Designate as a separate contract bid line item. ☒Complete

*Perimeter Controls - Run-on Control*

2. Do locations exist where sheet flow upslope of the project site and where concentrated flow upstream of the project site may contact DSA and construction activities? ☒Yes ☐No

   (a) Utilize linear sediment barriers such as SS-9 (Earth Dike/Drainage Swales and Lined Ditches), SC-5 (Fiber Rolls), SC-6 (Gravel Bag Berm), SC-8 (Sand Bag Barrier), SC-9 (Straw Bale Barrier), or other BMPs to convey flows through and/or around the project site. (Coordinate with District Construction for selection and preference of perimeter control BMPs.) ☒Complete

   (b) Designate as a separate contract bid line item. ☒Complete

*Storm Drain Inlets*

3. Do existing or proposed drainage inlets exist within the project limits? ☒Yes ☐No

   (a) Select SC-10 (Storm Drain Inlet Protection) to protect municipal storm drain systems or receiving waters wetlands at each drainage inlet. (Coordinate with District Construction for selection and preference of inlet protection BMPs.) ☒Complete

   (b) Designate as a separate contract bid line item. ☒Complete

4. Can existing or proposed drainage inlets utilize an excavated sediment trap as described in SC-10 (Storm Drain Inlet Protection- Type 2)? ☒Yes ☐No

   (a) Include with other types of SC-10 (Storm Drain Inlet Protection). ☒Complete

*Sediment/Desilting Basin (SC-2)*

5. Does the project lie within a Rainfall Area where the required combination of temporary soil stabilization and sediment control BMPs includes desilting basins? (Refer to Tables 2-1, 2-2, and 2-3 of the Construction Site Best Management Practices Manual for Rainfall Area requirements.) ☒Yes ☐No

   (a) Consider feasibility for desilting basin allowing for available right-of-way within the project limits, topography, soil type, disturbed soil area within the watershed, and climate conditions. Document if the inclusion of sediment/desilting basins is infeasible. ☐Complete

   *Due to ESAs, there is not enough space within the R/W to install a desilting basin.*

   (b) If feasible, design desilting basin(s) per the guidance in SC-2 Sediment/ Desilting Basins of the Construction Site BMP Manual to maximize capture of sediment-laden runoff. ☐Complete

   Designate as a separate contract bid item. ☐Complete

6. Is ATS to be used for controlling sediment? ☐Yes ☒No

   (a) If "yes", then will desilting basin or other means of natural storage be used? ☐Yes ☐No

   (b) If "no", then plan for storage tanks sufficient to hold treatment volume. ☐Complet

7. Will the project benefit from the early implementation of proposed permanent Treatment BMPs? (Coordinate with District Construction.) ☐Yes ☒No

   (a) Edit Order of Work specifications for permanent treatment BMP work to be implemented in a manner that will allow its use as a construction site BMP. ☐Complete

*Sediment Trap* (SC-3)

8. Can sediment traps be located to collect channelized runoff from disturbed soil areas prior to discharge? ☐Yes ☐No

   (a) Design sediment traps in accordance with the Construction Site BMP Manual. ☐Complete

   (b) Designate as a separate contract bid line item. ☐Complete

# Construction Site BMPs
# Checklist CS-1, Part 3

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Tracking Controls*

*Stabilized Construction Entrance/Exit* (TC-1)

1. Are there points of entrance and exit from the project site to paved roads where mud and dirt could be transported offsite by construction equipment? (Coordinate with District Construction for selection and preference of tracking control BMPs.) ☒Yes ☐No

   (a) Identify and designate these entrance/exit points as stabilized construction entrances (TC-1). ☒Complete

   (b) Designate as a separate contract bid line item. ☒Complete

*Tire/Wheel Wash* (TC-3)

1. Are site conditions anticipated that would require additional or modified tracking controls such as entrance/outlet tire wash? (Coordinate with District Construction.) ☐Yes ☒No

   Designate as a separate contract bid line item. ☐Complete

*Stabilized Construction Roadway* (TC-2)

3. Are temporary access roads necessary to access remote construction activity locations or to transport materials and equipment? (In addition to controlling dust and sediment tracking, access roads limit impact to sensitive areas by limiting ingress, and provide enhanced bearing capacity.) (Coordinate with District Construction.) ☐Yes ☒No

   (a) Designate these temporary access roads as stabilized construction roadways (TC-2). ☐Complete

   (b) Designate as a separate contract bid line item. ☐Complete

*Street Sweeping and Vacuuming* (SC-7)

1. Is there a potential for tracked sediment or construction related residues to be transported offsite and deposited on public or private roads? (Coordinate with District Construction for preference of including street sweeping and vacuuming with tracking control BMPs.) ☒Yes ☐No

   Designate as a separate contract bid line item. ☒Complete

# Construction Site BMPs
# Checklist CS-1, Part 4

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Wind Erosion Controls*

*Wind Erosion Control* (WE-1)

1. Is the project located in an area where standard dust control practices in accordance with Standard Specifications, Section 10: Dust Control, are anticipated to be inadequate during construction to prevent the transport of dust offsite by wind? *(Note: Dust control by water truck application is paid for through the various items of work. Dust palliative, if it is included, is paid for as a separate item.)* ☐ Yes ☒ No

   (a) Select SS-3 (Hydraulic Mulch), SS-4 (Hydroseeding), SS-5 (Soil Binders), SS-7 (Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets), SS-8 (Wood Mulching) or a combination to cover the DSA subject to wind erosion year-round, especially when significant wind and dry conditions are anticipated during project construction. (Coordinate with District Construction for selection and preference of wind erosion control BMPs.) ☐ Complete

   (b) Designate as a separate contract bid line item. ☐ Complete

# Construction Site BMPs
# Checklist CS-1, Part 5

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Non-Storm Water Management*

*Temporary Stream Crossing* (NS-4) *& Clear Water Diversion* (NS-5)

1. Will construction activities occur within a waterbody or watercourse such as a lake, wetland, or stream? (Coordinate with District Construction for selection and preference for stream crossing and clear water diversion BMPs.) ☐ Yes ☒ No

   (a) Select from types offered in NS-4 (Temporary Stream Crossing) to provide access through watercourses consistent with permits and agreements.[1] ☐ Complete

   (b) Select from types offered in NS-5 (Clear Water Diversion) to divert watercourse consistent with permits and agreements.[1] ☐ Complete

   (c) Designate as a separate contract bid line item(s). ☐ Complete

### ***Other Non-Storm Water Management BMPs***

2. Are construction activities anticipated that will generate wastes or residues with the potential to discharge pollutants? ☒ Yes ☐ No

   (a) Identify potential pollutants associated with the anticipated construction activity and select the corresponding BMP such as NS-1 (Water Conservation Practices), NS-2 (Dewatering Operations), NS-3 (Paving and Grinding Operations), NS-7 (Potable Water/Irrigation), NS-8 (Vehicle and Equipment Cleaning), NS-9 (Vehicle and Equipment Fueling), NS-10 (Vehicle and Equipment Maintenance), NS-11 (Pile Driving Operations), NS-12 (Concrete Curing), NS-13 (Material and Equipment Use Over Water), NS-14 (Concrete Finishing), and NS-15 (Structure Demolition/Removal Over or Adjacent to Water).[1] ☒ Complete

   (b) Verify that costs for non-stormwater management BMPs are identified in the contract documents. Designate BMP as a separate contract bid line item if the requirements in Construction Site Management (SSP 07-346) are anticipated to be inadequate or if requested by Construction. ☒ Complete



[1] Coordinate with District Environmental for consistency with US Army Corps of Engineers 404 and 401 permits and Dept. of Fish and Game 1601 Streambed alteration Agreements.

# Construction Site BMPs
# Checklist CS-1, Part 6

Prepared by: B. Ross Date: 10/8/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## *Waste Management & Materials Pollution Control*

*Concrete Waste Management (WM-8)*

1. Does the project include concrete placement or mortar mixing? ☒Yes ☐No

   (a) Select from types offered in WM-8 (Concrete Waste Management) to provide concrete washout facilities. In addition, consider portable concrete washouts and vendor supplied concrete waste management services. (Coordinate with District Construction for selection and preference of waste management and materials pollution control BMPs.) ☒Complete

   (b) Designate as a separate contract bid line item if the quantity of concrete waste and washout are anticipated to exceed 5.2 $yd^3$ or if requested by Construction. ☒Complete

*Other Waste Management and Materials Pollution Controls*

2. Are construction activities anticipated that will generate wastes or residues with the potential to discharge pollutants? ☒Yes ☐No

   (a) Identify potential pollutants associated with the anticipated construction activity and select the corresponding BMP such as WM-1 (Material Delivery and Storage), WM-2 (Material Use), WM-4 (Spill Prevention and Control), WM-5 (Solid Waste Management), WM-6 (Hazardous Waste Management), WM-7 (Contaminated Soil Management), WM-9 (Sanitary/Septic Waste Management) and WM-10 (Liquid Waste Management) ☒Complete

   (b) Verify that costs for waste management and materials pollution control BMPs are identified in the contract documents. Designate BMP as a separate contract bid line item if the requirements in Construction Site Management (SSP 07-346) are anticipated to be inadequate or if requested by Construction. ☒Complete

*Temporary Stockpiles (Soil, Materials, and Wastes)*

3. Are stockpiles of soil, etc. anticipated during construction? ☒Yes ☐No

   (a) Select WM-3 (Stockpile Management), SS-3 (Hydraulic Mulch), SS-4 (Hydroseeding), SS-5 (Soil Binders), SS-7 (Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets), or a combination as appropriate to cover temporary stockpiles of soil, etc. ☒Complete

(b) Select linear sediment barrier such as SC-1 (Silt Fence), SC-5 (Fiber Rolls), SC-6 (Gravel Bag Berm), SC-8 (Sand Bag Barrier), SC-9 (Straw Bale Barrier), or a combination to encircle temporary stockpiles of soil, etc. (Coordinate with District Construction for selection and preference of BMPs related to stockpiles.) ☒Complete

(c) Designate as a separate contract bid line item if the requirements in Construction Site Management (SSP 07-346) are anticipated to be inadequate or if requested by Construction. ☒Complete

4. Is there a potential for dust and debris from construction material (fill material, etc.) and waste (concrete, contaminated soil, etc.) stockpiles to be transported offsite by wind? ☒Yes ☐No

(a) Select SS-7, temporary cover, plastic sheeting or other BMP to cover stockpiles subject to wind erosion year-round, especially when significant wind and dry conditions are anticipated during project construction. (Coordinate with District Construction for selection and preference of wind erosion control BMPs.) ☒Complete

(b) Designate as a separate contract bid line item. ☒Complete

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Strip |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.3 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 45380 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 10575 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 10575 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 4 | in |
| Final bulk density | 1.06 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 0.94 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.50 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **38%** |

**Biofiltration Strip at Station** **57+00** **to** **64+85**
**A2**

| | | |
|---|---|---|
| **Top width** | 15.00 | ft |
| **Length** | 785.00 | ft |
| **Drawdown time** | 48 | hrs |
| **C** | 1 | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **Total area drain into strip** | 56211 | sqft |
| **WQV** | 4544 | cf |
| | | |

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 1 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 18097 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 300 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 300 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 0.99 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.96 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

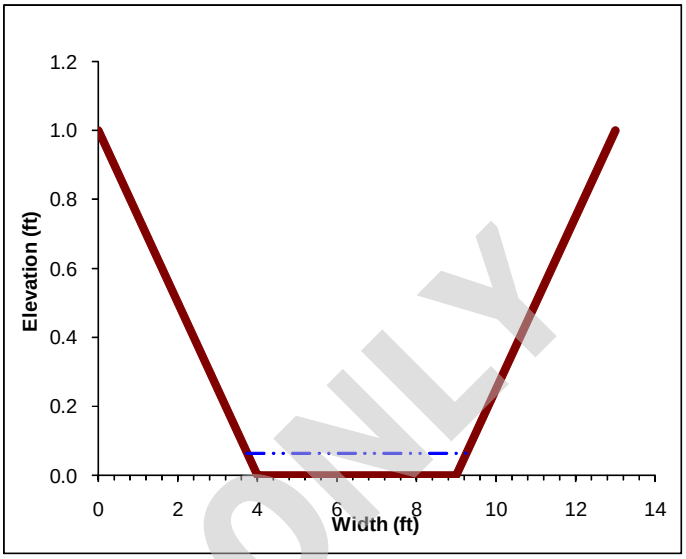
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 1: Biofiltration Swale at Station** **11+50** **to** **11+80** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.043 | ft/ft |
| Design Flow | 0.07 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.063 | ft |
| Area | 0.33 | $ft^2$ |
| Perimeter | 5.52 | ft |
| Rh | 0.06 | ft |
| V | 0.20 | ft/s |
| Q | 0.07 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.07**

**Length of Swale=** 60.00

**HRT (L/(60xV))=** **5.06** **minutes** HRTx60/(DEPTHxVELOCITY) = 24240.49 **GOOD**

FB = 0.94 ft >? 0.2He = 0.013 ft **GOOD**

**Tributary area for paved areas**

18097 sf

0.415 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 1463 | cf |
| | | |

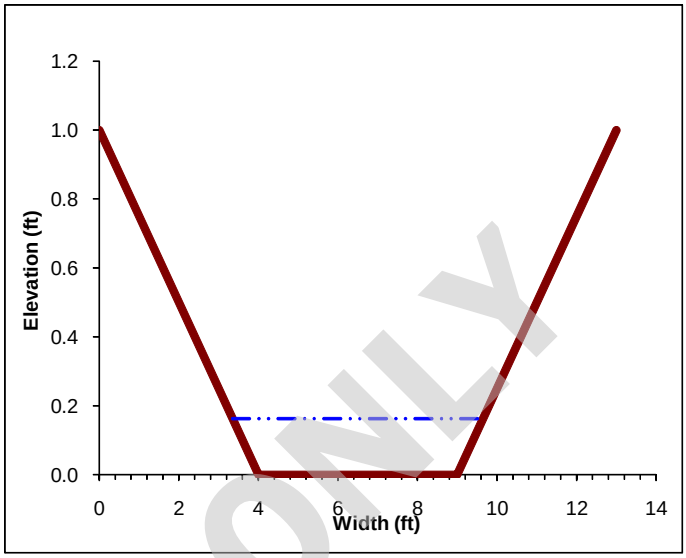
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 1: Biofiltration Swale at Station** **11+50** **to** **11+80** **Lt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 1.85 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.1626424 | ft |
| Area | 0.92 | $ft^2$ |
| Perimeter | 6.34 | ft |
| Rh | 0.14 | ft |
| V | 2.01 | ft/s |
| Q | 1.85 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **1.85**

**Length of Swale=** 60.00

**HRT (L/(60xV))=** **0.5** **minutes**

FB = 0.84 ft >? 0.2He = 0.045 ft **GOOD**

**Tributary area for paved areas**

18097 sf

0.42 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 2 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 30587 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 160 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 160 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.99 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

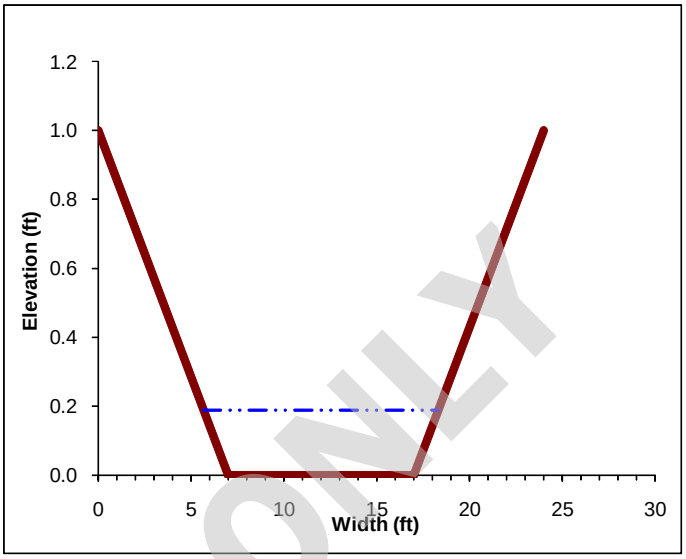
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 2: Biofiltration Swale at Station** **19+84** **to** **20+00** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 10 | ft |
| LT Side Slope | 7 | :1 (h:v) |
| Rt Side Slope | 7 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.0007683 | ft/ft |
| Design Flow | 0.11 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.189 | ft |
| Area | 2.14 | $ft^2$ |
| Perimeter | 12.67 | ft |
| Rh | 0.17 | ft |
| V | 0.05 | ft/s |
| Q | 0.11 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.11**

**Length of Swale=** 16.00

**HRT (L/(60xV))=** **5.09** **minutes** HRTx60/(DEPTHxVELOCITY) = 30882.11 **GOOD**

FB = 0.81 ft >? 0.2He = 0.038 ft **GOOD**

**Tributary area for paved areas**

30587 sf

0.702 ac

1 C for paved areas

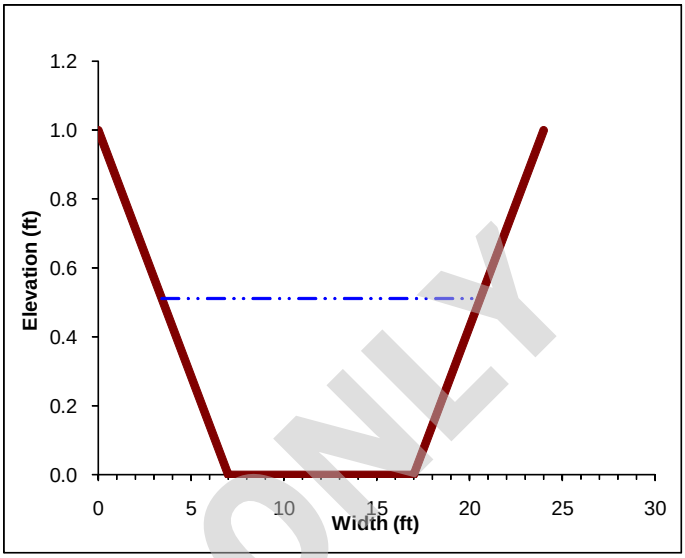
**Top width** 24

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 2472 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**
**BMP 2: Biofiltration Swale at Station** **19+84** **to** **20+00** **Lt**
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 10 | ft |
| LT Side Slope | 7 | :1 (h:v) |
| Rt Side Slope | 7 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.000768 | ft/ft |
| Design Flow | 3.12 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.5113239 | ft |
| Area | 6.94 | $ft^2$ |
| Perimeter | 17.23 | ft |
| Rh | 0.40 | ft |
| V | 0.45 | ft/s |
| Q | 3.12 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **3.12**
**Length of Swale=** 16.00
**HRT (L/(60xV))=** **0.6 minutes**

FB = 0.49 ft >? 0.2He = 0.103 ft **GOOD**

**Tributary area for paved areas**
30587 sf
0.70 acre
1 C for paved areas

**Top width** 24

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 3 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 38547 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 400 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 400 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.97 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

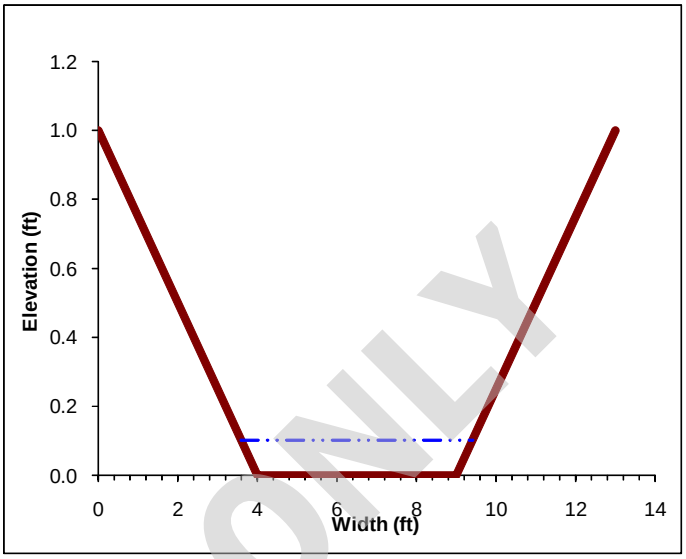
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 3: Biofiltration Swale at Station** **27+45** **to** **28+45** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.04 | ft/ft |
| Design Flow | 0.14 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.102 | ft |
| Area | 0.55 | $ft^2$ |
| Perimeter | 5.84 | ft |
| Rh | 0.09 | ft |
| V | 0.26 | ft/s |
| Q | 0.14 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.14**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **5.19** **minutes** HRTx60/(DEPTHxVELOCITY) = 11897.97 **GOOD**

FB = 0.90 ft >? 0.2He = 0.021 ft **GOOD**

**Tributary area for paved areas**

38547 sf

0.885 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 3116 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 3: Biofiltration Swale at Station** **27+45** **to** **28+45** **Lt**

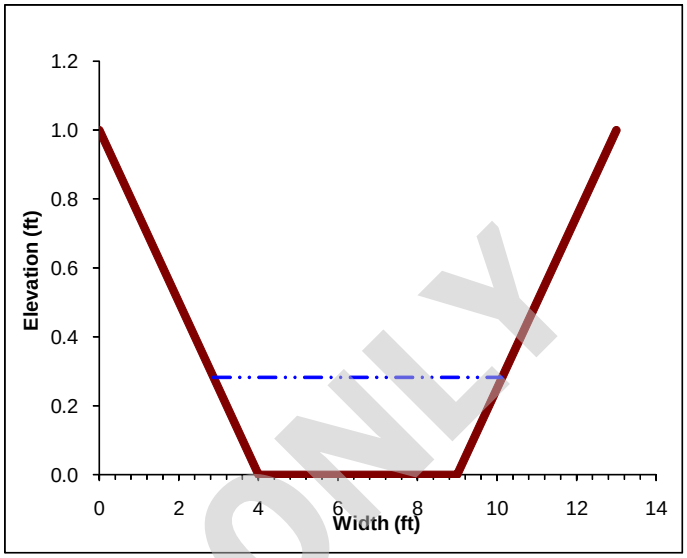
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.04 | ft/ft |
| Design Flow | 3.93 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2824085 | ft |
| Area | 1.73 | $ft^2$ |
| Perimeter | 7.33 | ft |
| Rh | 0.24 | ft |
| V | 2.27 | ft/s |
| Q | 3.93 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **3.93**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.72 ft >? 0.2He = 0.073 ft **GOOD**

**Tributary area for paved areas**

38547 sf

0.885 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 4 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 21601 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 270 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 270 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.97 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

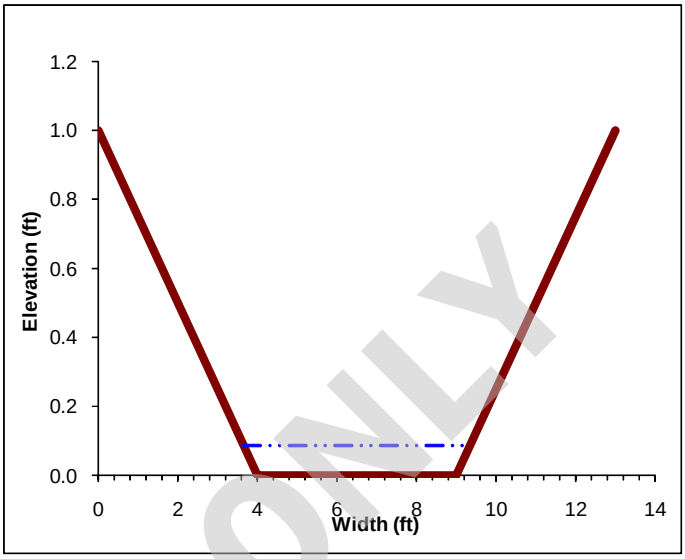
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 4: Biofiltration Swale at Station** **37+22** **to** **38+22** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.022 | ft/ft |
| Design Flow | 0.08 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.087 | ft |
| Area | 0.46 | $ft^2$ |
| Perimeter | 5.72 | ft |
| Rh | 0.08 | ft |
| V | 0.17 | ft/s |
| Q | 0.08 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.08**

**Length of Swale=** 54.00

**HRT (L/(60xV))=** **5.23** **minutes** HRTx60/(DEPTHxVELOCITY) = 20992.49 **GOOD**

FB = 0.91 ft >? 0.2He = 0.017 ft **GOOD**

**Tributary area for paved areas**

21601 sf

0.496 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 1746 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 4: Biofiltration Swale at Station** **37+22** **to** **38+22** **Lt**

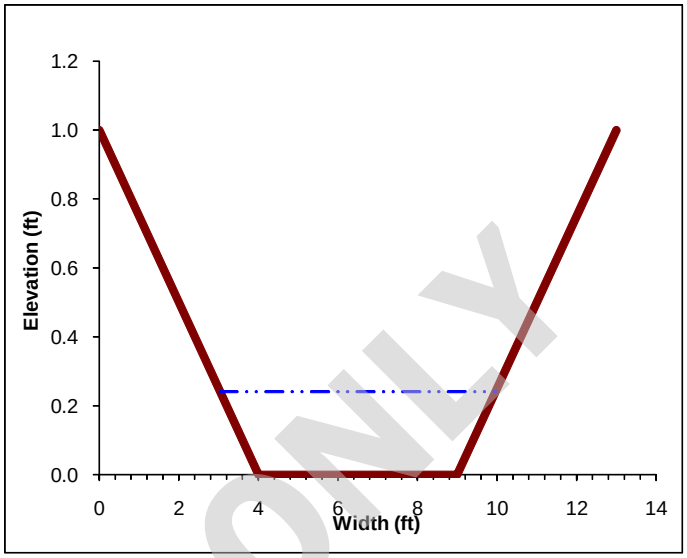
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.022 | ft/ft |
| Design Flow | 2.20 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2406821 | ft |
| Area | 1.44 | $ft^2$ |
| Perimeter | 6.98 | ft |
| Rh | 0.21 | ft |
| V | 1.53 | ft/s |
| Q | 2.20 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **2.20**

**Length of Swale=** 54.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.76 ft >? 0.2He = 0.055 ft **GOOD**

**Tributary area for paved areas**

21601 sf

0.496 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 5 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 7819 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 165 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 165 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 0.99 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.95 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **3%** |

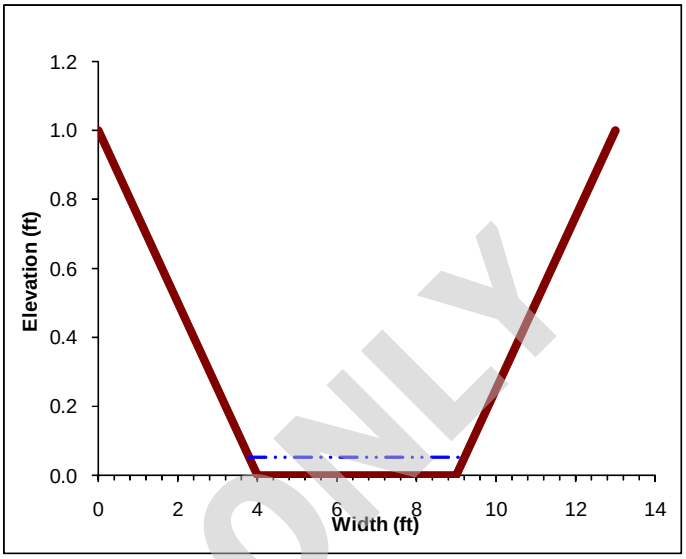
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 5: Biofiltration Swale at Station** **41+09** **to** **42+09** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.015 | ft/ft |
| Design Flow | 0.03 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.053 | ft |
| Area | 0.27 | $ft^2$ |
| Perimeter | 5.43 | ft |
| Rh | 0.05 | ft |
| V | 0.10 | ft/s |
| Q | 0.03 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.03**

**Length of Swale=** 33.00

**HRT (L/(60xV))=** **5.31** **minutes** HRTx60/(DEPTHxVELOCITY) = 58407.7 **GOOD**

FB = 0.95 ft >? 0.2He = 0.011 ft **GOOD**

**Tributary area for paved areas**

7819 sf

0.179 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 632 | cf |
| | | |

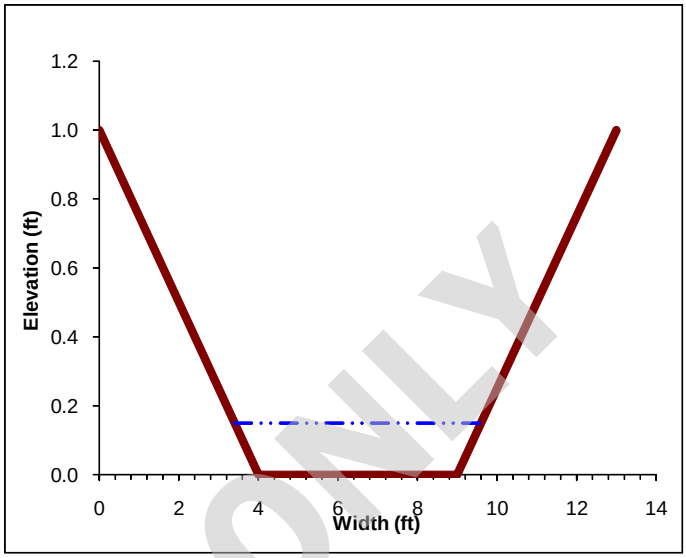
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 5: Biofiltration Swale at Station** **41+09** **to** **42+09** **Lt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.015 | ft/ft |
| Design Flow | 0.80 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.1494041 | ft |
| Area | 0.84 | $ft^2$ |
| Perimeter | 6.23 | ft |
| Rh | 0.13 | ft |
| V | 0.95 | ft/s |
| Q | 0.80 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.80**

**Length of Swale=** 33.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.85 ft >? 0.2He = 0.033 ft **GOOD**

**Tributary area for paved areas**

7819 sf

0.179 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 6 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 13584 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 200 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 200 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

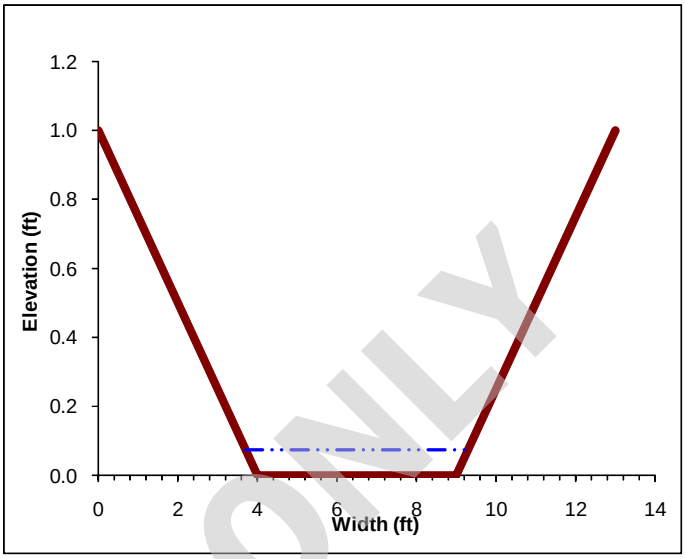
| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 0.99 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.96 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

**Normal Depth Calculations for Channels using Manning's Equation**
**BMP 6: Biofiltration Swale at Station** **43+00** **to** **44+00** **Lt**
**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.015 | ft/ft |
| Design Flow | 0.05 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.074 | ft |
| Area | 0.39 | $ft^2$ |
| Perimeter | 5.61 | ft |
| Rh | 0.07 | ft |
| V | 0.13 | ft/s |
| Q | 0.05 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.05**
**Length of Swale=** 40.00
**HRT (L/(60xV))=** **5.19** **minutes** HRTx60/(DEPTHxVELOCITY) = 32747.06 **GOOD**

FB = 0.93 ft >? 0.2He = 0.015 ft **GOOD**

**Tributary area for paved areas**
13584 sf
0.312 ac
1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 1098 | cf |
| | | |

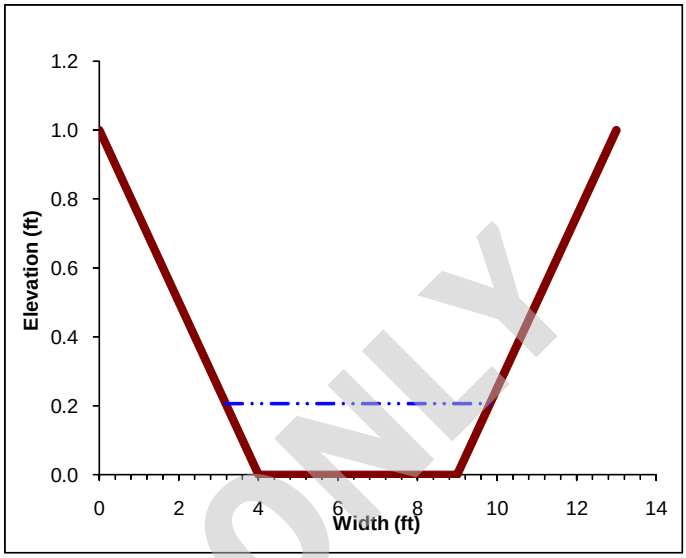
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 6: Biofiltration Swale at Station** **43+00** **to** **44+00** **Lt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.015 | ft/ft |
| Design Flow | 1.39 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2058108 | ft |
| Area | 1.20 | $ft^2$ |
| Perimeter | 6.70 | ft |
| Rh | 0.18 | ft |
| V | 1.16 | ft/s |
| Q | 1.39 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **1.39**

**Length of Swale=** 40.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.79 ft >? 0.2He = 0.045 ft **GOOD**

**Tributary area for paved areas**

13584 sf

0.312 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 7 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 59089 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 400 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 400 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.98 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

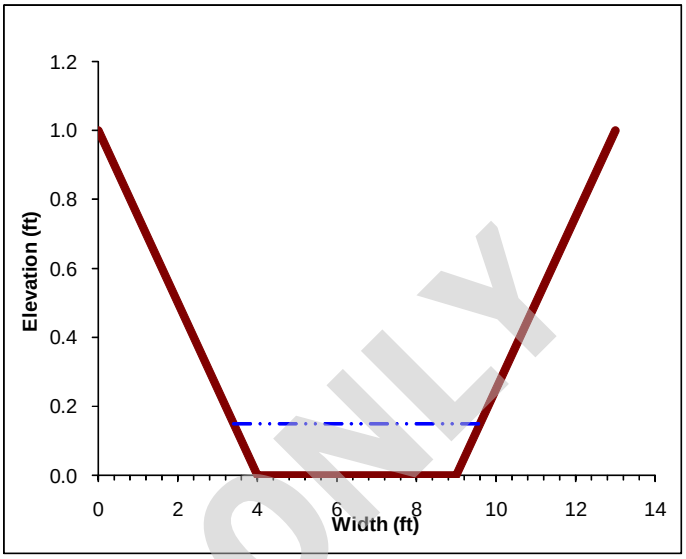
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 7: Biofiltration Swale at Station** **50+30** **to** **51+20** **Rt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.025 | ft/ft |
| Design Flow | 0.22 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.150 | ft |
| Area | 0.84 | $ft^2$ |
| Perimeter | 6.24 | ft |
| Rh | 0.13 | ft |
| V | 0.26 | ft/s |
| Q | 0.22 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.22**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **5.18** **minutes** HRTx60/(DEPTHxVELOCITY) = 8044.449 **GOOD**

FB = 0.85 ft >? 0.2He = 0.03 ft **GOOD**

**Tributary area for paved areas**

59089 sf

1.356 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 4776 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 7: Biofiltration Swale at Station** **50+30** **to** **51+20** **Rt**

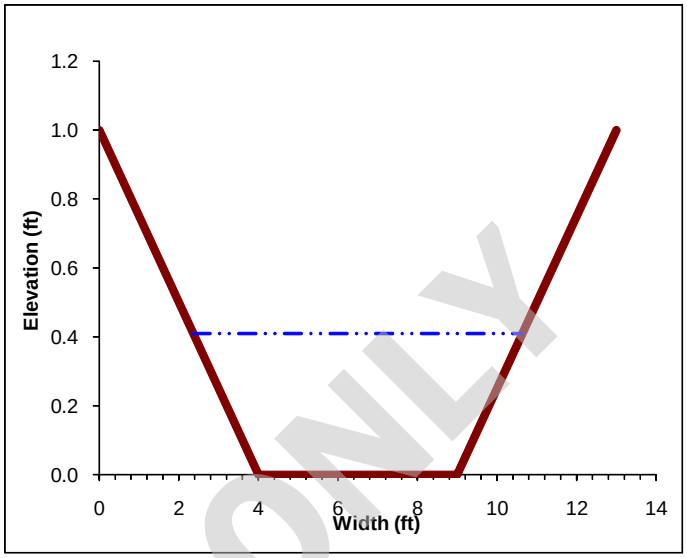
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.025 | ft/ft |
| Design Flow | 6.03 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.4093124 | ft |
| Area | 2.72 | $ft^2$ |
| Perimeter | 8.38 | ft |
| Rh | 0.32 | ft |
| V | 2.22 | ft/s |
| Q | 6.03 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **6.03**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.59 ft >? 0.2He = 0.097 ft **GOOD**

**Tributary area for paved areas**

59089 sf

1.356 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 8 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 73503 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 640 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 640 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.98 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

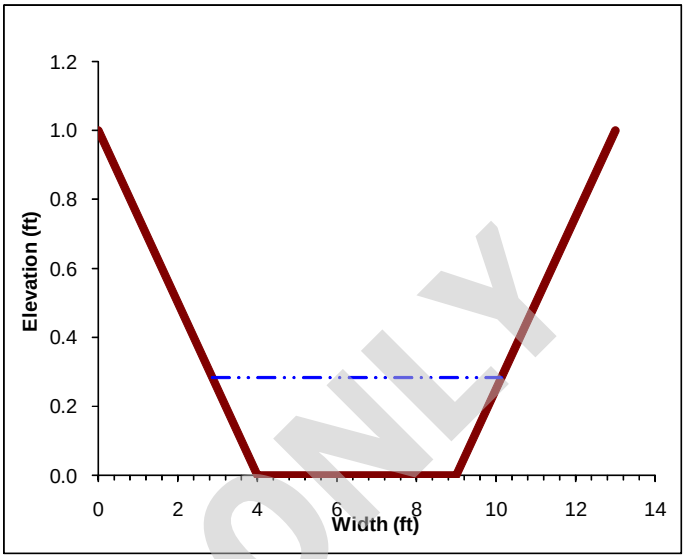
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 8: Biofiltration Swale at Station** **62+46** **to** **63+74** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.00426 | ft/ft |
| Design Flow | 0.27 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.284 | ft |
| Area | 1.74 | $ft^2$ |
| Perimeter | 7.34 | ft |
| Rh | 0.24 | ft |
| V | 0.15 | ft/s |
| Q | 0.27 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.27**

**Length of Swale=** 128.00

**HRT (L/(60xV))=** **13.77** **minutes** HRTx60/(DEPTHxVELOCITY) = 18791.63 **GOOD**

FB = 0.72 ft >? 0.2He = 0.057 ft **GOOD**

**Tributary area for paved areas**

73503 sf

1.687 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 5941 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 8: Biofiltration Swale at Station** **62+46** **to** **63+74** **Lt**

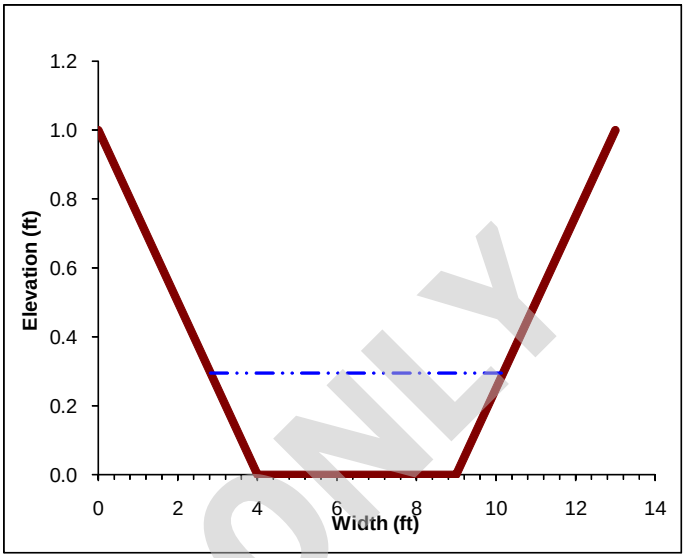
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.00426 | ft/ft |
| Design Flow | 1.39 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2949732 | ft |
| Area | 1.82 | $ft^2$ |
| Perimeter | 7.43 | ft |
| Rh | 0.25 | ft |
| V | 0.76 | ft/s |
| Q | 1.39 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **1.39**

**Length of Swale=** 128.00

**HRT (L/(60xV))=** **2.8** **minutes**

FB = 0.71 ft >? 0.2He = 0.061 ft **GOOD**

**Tributary area for paved areas**

13584 sf

0.312 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 9 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 27720 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 400 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 400 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.96 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

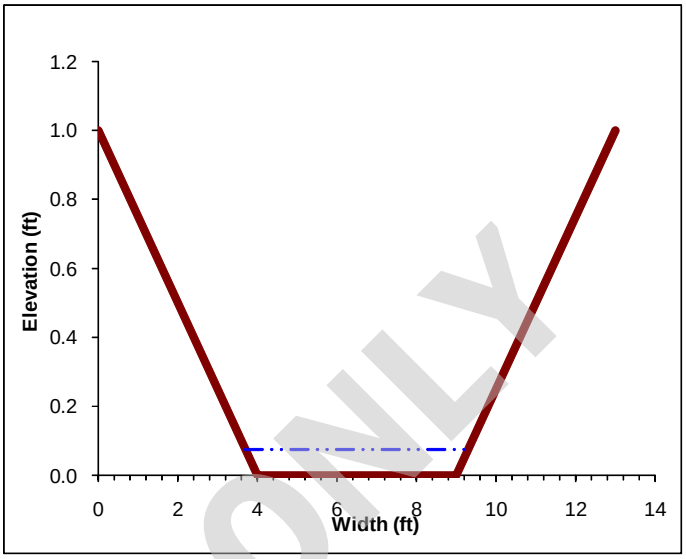
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 9: Biofiltration Swale at Station** **69+20** **to** **70+00** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 0.10 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.075 | ft |
| Area | 0.40 | $ft^2$ |
| Perimeter | 5.62 | ft |
| Rh | 0.07 | ft |
| V | 0.26 | ft/s |
| Q | 0.10 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.10**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **5.15** **minutes** HRTx60/(DEPTHxVELOCITY) = 16001.63 **GOOD**

FB = 0.93 ft >? 0.2He = 0.015 ft **GOOD**

**Tributary area for paved areas**

27720 sf

0.636 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 2241 | cf |
| | | |

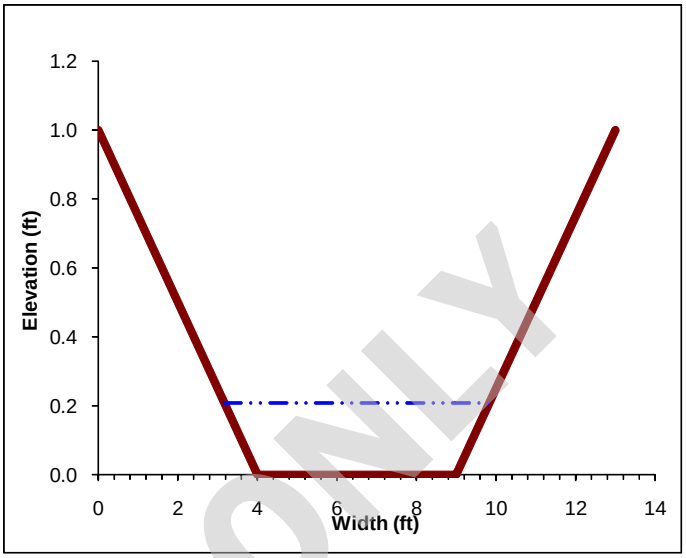
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 9: Biofiltration Swale at Station** **69+20** **to** **70+00** **Lt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 2.83 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2082297 | ft |
| Area | 1.21 | $ft^2$ |
| Perimeter | 6.72 | ft |
| Rh | 0.18 | ft |
| V | 2.33 | ft/s |
| Q | 2.83 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **2.83**

**Length of Swale=** 80.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.79 ft >? 0.2He = 0.058 ft **GOOD**

**Tributary area for paved areas**

27720 sf

0.636 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 10 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 97018 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 620 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 620 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.98 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

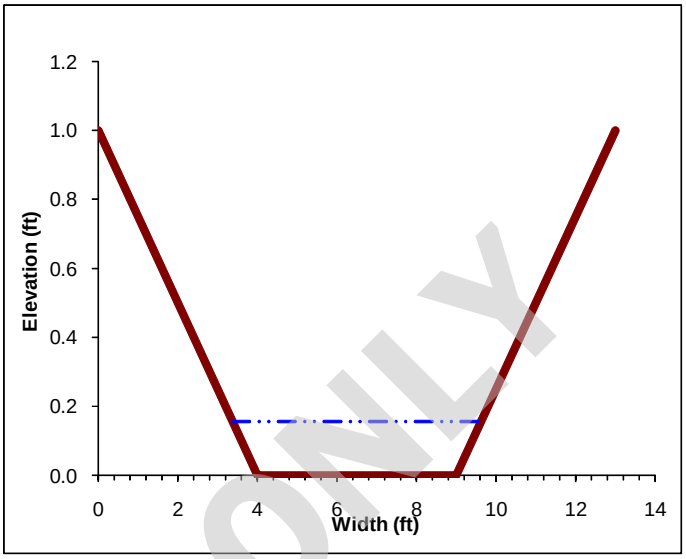
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 10: Biofiltration Swale at Station** **74+62** **to** **75+80** **Rt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 0.36 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.156 | ft |
| Area | 0.87 | $ft^2$ |
| Perimeter | 6.28 | ft |
| Rh | 0.14 | ft |
| V | 0.41 | ft/s |
| Q | 0.36 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.36**

**Length of Swale=** 124.00

**HRT (L/(60xV))=** **5.07** **minutes** HRTx60/(DEPTHxVELOCITY) = 4802.425 **GOOD**

FB = 0.84 ft >? 0.2He = 0.032 ft **GOOD**

**Tributary area for paved areas**

97018 sf

2.227 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 7842 | cf |
| | | |

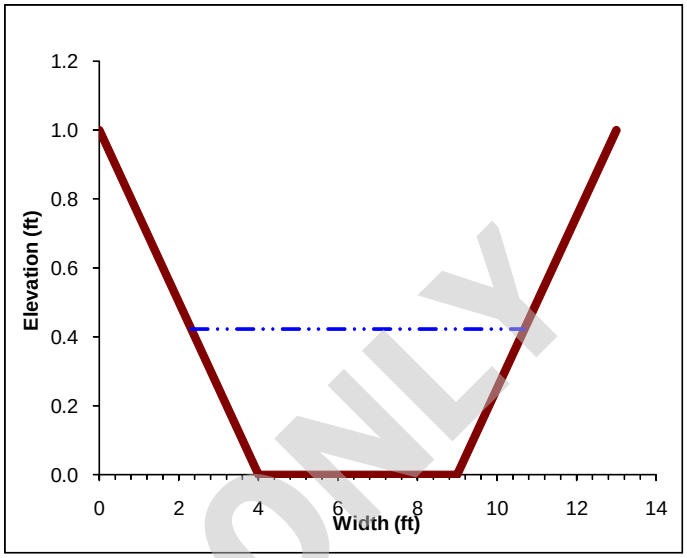
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 10: Biofiltration Swale at Station** **74+62** **to** **75+80** **Rt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 9.90 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.4226447 | ft |
| Area | 2.83 | $ft^2$ |
| Perimeter | 8.49 | ft |
| Rh | 0.33 | ft |
| V | 3.50 | ft/s |
| Q | 9.89 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **9.90**

**Length of Swale=** 124.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.58 ft >? 0.2He = 0.123 ft **GOOD**

**Tributary area for paved areas**

97018 sf

2.227 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 11 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 39824 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 450 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 450 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.97 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

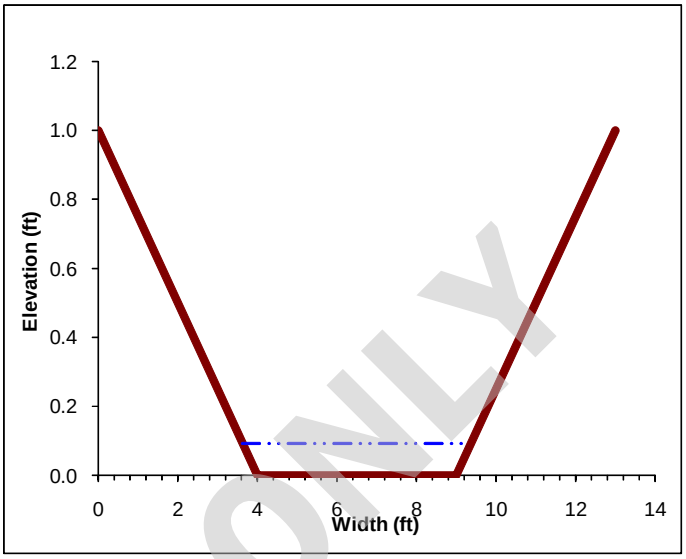
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 11: Biofiltration Swale at Station** **82+69** **to** **83+56** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 0.15 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.092 | ft |
| Area | 0.50 | $ft^2$ |
| Perimeter | 5.76 | ft |
| Rh | 0.09 | ft |
| V | 0.30 | ft/s |
| Q | 0.15 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.15**

**Length of Swale=** 90.00

**HRT (L/(60xV))=** **5.07** **minutes** HRTx60/(DEPTHxVELOCITY) = 11151.5 **GOOD**

FB = 0.91 ft >? 0.2He = 0.019 ft **GOOD**

**Tributary area for paved areas**

39824 sf

0.914 ac

1 C for paved areas

**Top width =** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 3219 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 11: Biofiltration Swale at Station** **82+69** **to** **83+56** **Lt**

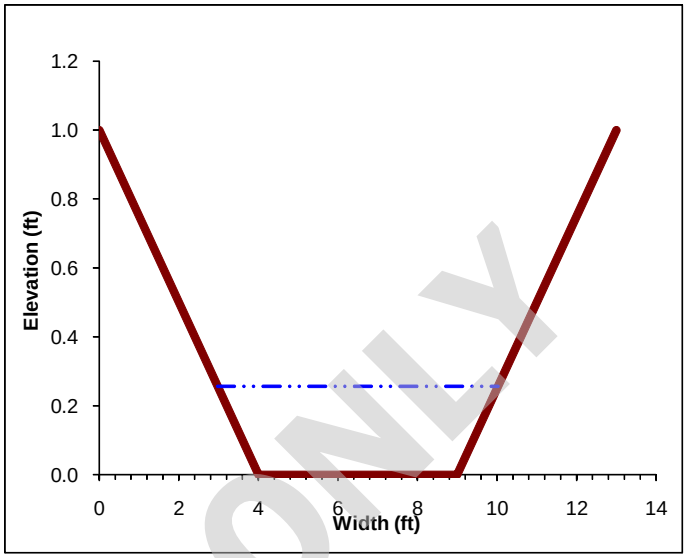
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 4.06 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2563439 | ft |
| Area | 1.54 | $ft^2$ |
| Perimeter | 7.11 | ft |
| Rh | 0.22 | ft |
| V | 2.63 | ft/s |
| Q | 4.06 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **4.06**

**Length of Swale=** 90.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.74 ft >? 0.2He = 0.073 ft **GOOD**

**Tributary area for paved areas**

39824 sf

0.914 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 12 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 34761 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 450 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 450 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.97 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **2%** |

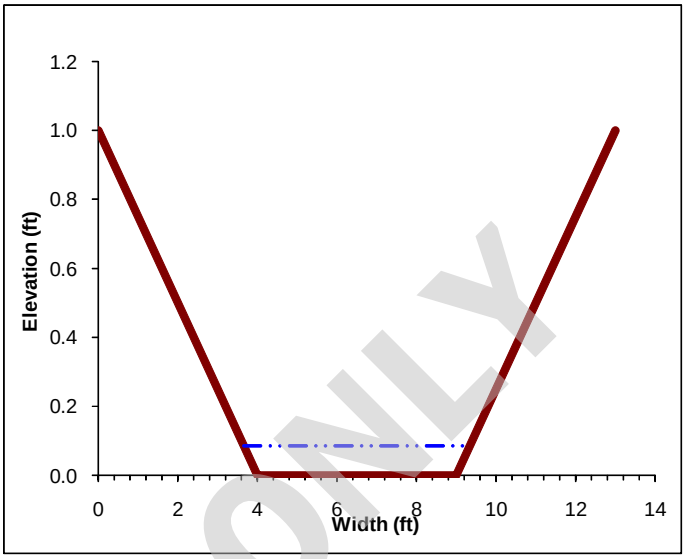
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 12: Biofiltration Swale at Station** **90+35** **to** **91+25** **Lt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 0.13 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.085 | ft |
| Area | 0.46 | $ft^2$ |
| Perimeter | 5.70 | ft |
| Rh | 0.08 | ft |
| V | 0.28 | ft/s |
| Q | 0.13 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.13**

**Length of Swale=** 90.00

**HRT (L/(60xV))=** **5.34** **minutes** HRTx60/(DEPTHxVELOCITY) = 13365 **GOOD**

FB = 0.91 ft >? 0.2He = 0.017 ft **GOOD**

**Tributary area for paved areas**

34761 sf

0.798 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 2810 | cf |
| | | |

**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 12: Biofiltration Swale at Station** **90+35** **to** **91+25** **Lt**

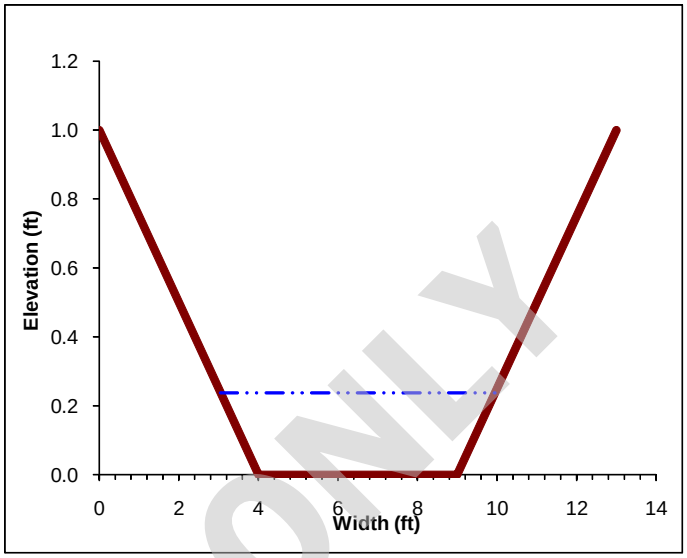
**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 3.55 | cfs |

**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2371676 | ft |
| Area | 1.41 | $ft^2$ |
| Perimeter | 6.96 | ft |
| Rh | 0.20 | ft |
| V | 2.51 | ft/s |
| Q | 3.55 | cfs |
| Goal Seek | 0.00 | |




**WQF(cfs)=** **3.55**

**Length of Swale=** 90.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.76 ft >? 0.2He = 0.067 ft **GOOD**

**Tributary area for paved areas**

34761 sf

0.798 acre

1 C for paved areas

**Top width** 13

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 13 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 57165 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 360 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 360 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.98 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

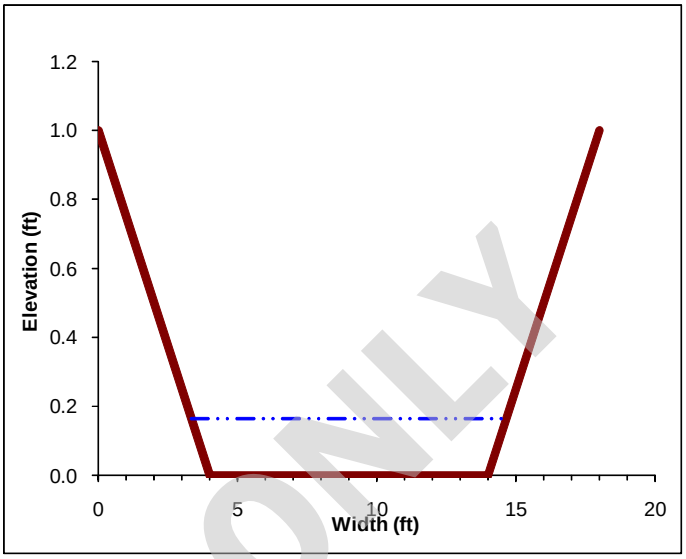
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 13: Biofiltration Swale at Station** **93+34** **to** **94+37** **Rt**

**WQF Calculation, i=** **0.16** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 10 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.0045 | ft/ft |
| Design Flow | 0.21 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.165 | ft |
| Area | 1.76 | $ft^2$ |
| Perimeter | 11.36 | ft |
| Rh | 0.15 | ft |
| V | 0.12 | ft/s |
| Q | 0.21 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.21**

**Length of Swale=** 36.00

**HRT (L/(60xV))=** **5.02** **minutes** HRTx60/(DEPTHxVELOCITY) = 15277.86 **GOOD**

FB = 0.84 ft >? 0.2He = 0.033 ft **GOOD**

**Tributary area for paved areas**

57165 sf

1.312 ac

1 C for paved areas

**Top width** 18

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 4621 | cf |
| | | |

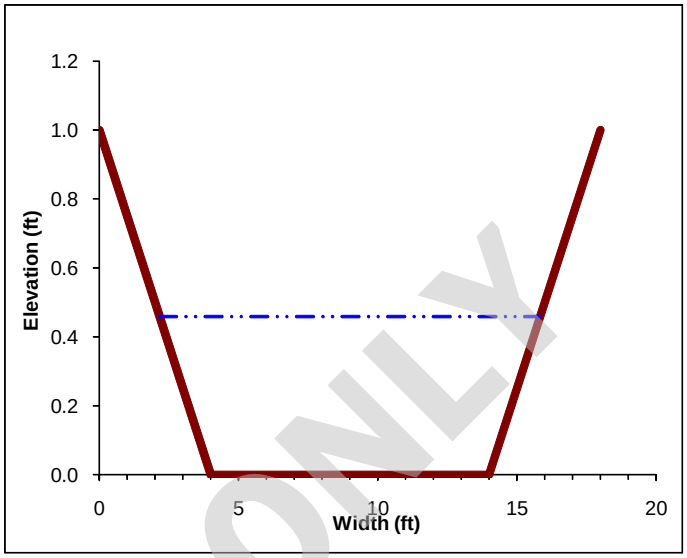
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 13: Biofiltration Swale at Station** **93+34** **to** **94+37** **Rt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 10 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.0045 | ft/ft |
| Design Flow | 5.83 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.4593649 | ft |
| Area | 5.44 | $ft^2$ |
| Perimeter | 13.79 | ft |
| Rh | 0.39 | ft |
| V | 1.07 | ft/s |
| Q | 5.83 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **5.83**

**Length of Swale=** 36.00

**HRT (L/(60xV))=** **0.6 minutes**

FB = 0.54 ft >? 0.2He = 0.095 ft **GOOD**

**Tributary area for paved areas**

57165 sf

1.312 acre

1 C for paved areas

**Top width** 18

## WQV Infiltrated Using the Free-Flow BMP Infiltration Tool

This page presents the results of infiltration with and without ammendment from the infiltration tool. It also provides a summary of the inputs for reference.

**PROJECT INFORMATION**

| | |
|---|---|
| Project | 03-ED-50 |
| Sub-watershed | |
| Free-Flow BMP type | Swale 14 |

| **INPUT** | **Final** | |
|---|---|---|
| Native or fill (underlying) HSG soil type | D | |
| Density of water, g/cm3 | 1 | |
| Bulk density | 1.9 | g/cm3 |
| Specific gravity of soil particles | 2.73 | |
| Depth of incorporation, below FG | 4 | in |
| Unit Basin Storage Volume from Basin Sizer, where C=1.0 | 0.97 | in |
| Drawdown time used in Basin Sizer | 48 | hr |
| Rainfall rate from Basin Sizer "Caltrans Water Quality Flows" | 0.16 | in/hr |
| Contributing drainage area | 47553 | ft2 |
| Contributing drainage area runoff coefficient | 0.9 | |
| BMP area: strip area or swale invert area | 500 | ft2 |
| Infiltration rate of native soil or fill | 0.05 | in/hr |
| Pervious area for non-amended infiltration (may be different than BMP area) | 500 | ft2 |
| Bulk density (of compost) | 0.5 | g/cm3 |
| Specific gravity of compost particles | 0.8 | |
| Depth of placement | 2 | in |
| Final bulk density | 1.38 | g/cm3 |

| **RESULT: Native Soil or Fill** | **Final** |
|---|---|
| C factor for downstream BMP with no amendment | 1.00 |
| **WQV infiltrated with native soil or fill (use for T-1, 5b, %)** | **0%** |

| **RESULTS: Amended Soil** | **Final** |
|---|---|
| C factor for downstream BMP after amendment | 0.97 |
| **WQV infiltrated with amended soil (use for T-1, 5d, %)** | **1%** |

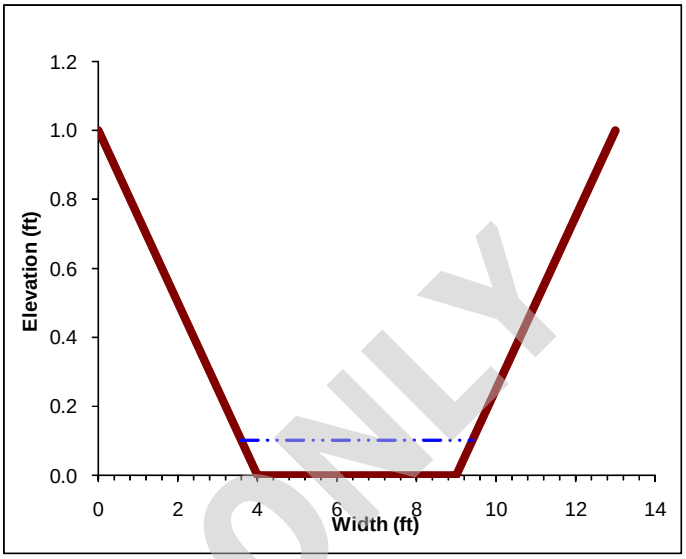
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 14: Biofiltration Swale at Station** **100+44** **to** **101+50** **Lt**

**WQF Calculation, i=** **0.160** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.24 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 0.17 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.102 | ft |
| Area | 0.55 | $ft^2$ |
| Perimeter | 5.84 | ft |
| Rh | 0.09 | ft |
| V | 0.32 | ft/s |
| Q | 0.17 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **0.17**

**Length of Swale=** 100.00

**HRT (L/(60xV))=** **5.29** **minutes** HRTx60/(DEPTHxVELOCITY) = 9819.775 **GOOD**

FB = 0.90 ft >? 0.2He = 0.021 ft **GOOD**

**Tributary area for paved areas**

47553 sf

1.092 ac

1 C for paved areas

**Top width** 13

| | | |
|---|---|---|
| **Drawdown time** | 48 | hrs |
| | | |
| **Unit Basin Storage Volume** | 0.97 | in |
| **WQV** | 3844 | cf |
| | | |

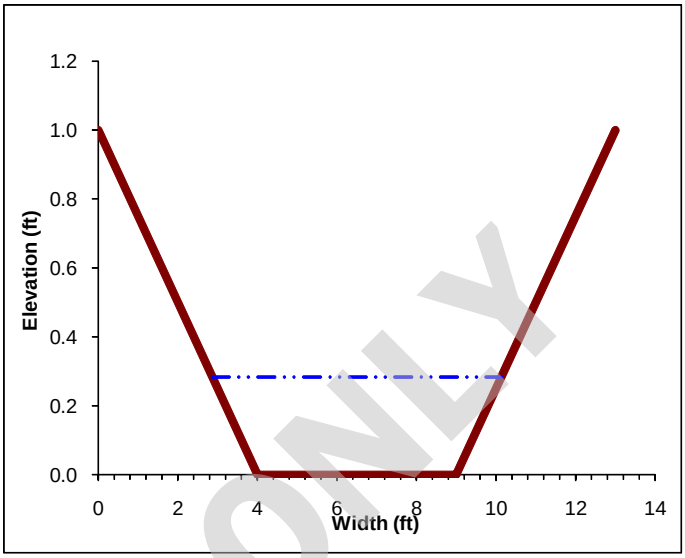
**Normal Depth Calculations for Channels using Manning's Equation**

**BMP 14: Biofiltration Swale at Station** **100+44** **to** **101+50** **Lt**

**Q25 Calculation, i=** **4.443** **in/hr** **A2**

**Input Values**

| | | |
|---|---|---|
| Height | 1.00 | ft |
| Width | 5 | ft |
| LT Side Slope | 4 | :1 (h:v) |
| Rt Side Slope | 4 | :1 (h:v) |
| Mannings | 0.05 | |
| Slope | 0.06 | ft/ft |
| Design Flow | 4.85 | cfs |




**Normal Depth for Channel**

| | | |
|---|---|---|
| Depth | 0.2835709 | ft |
| Area | 1.74 | $ft^2$ |
| Perimeter | 7.34 | ft |
| Rh | 0.24 | ft |
| V | 2.79 | ft/s |
| Q | 4.85 | cfs |
| Goal Seek | 0.00 | |

**WQF(cfs)=** **4.85**

**Length of Swale=** 100.00

**HRT (L/(60xV))=** **0.6** **minutes**

FB = 0.72 ft >? 0.2He = 0.081 ft **GOOD**

**Tributary area for paved areas**

47553 sf

1.092 acre

1 C for paved areas

**Top width** 13

NOTE:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

LEGEND:

BIOFILTRATION SWALE

S# SAMPLING LOCATION

C# CONTROL POINT

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

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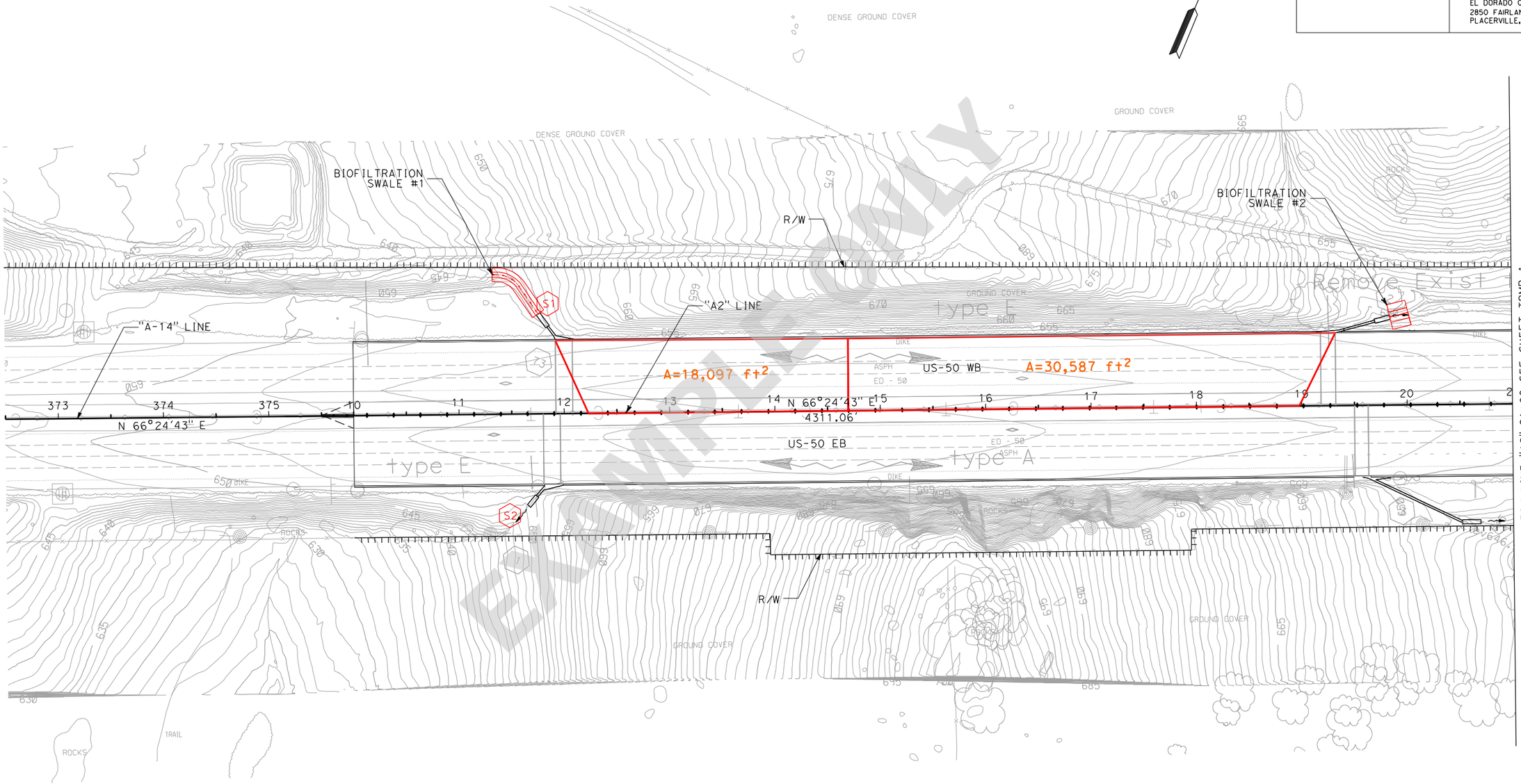


EXAMPLE ONLY

# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP- 1**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR: THOMAS PAINE

CALCULATED-DESIGNED BY: BETSY ROSS

CHECKED BY: GEORGE WASHINGTON

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DATE PLOTTED => 11/30/2010
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BORDER LAST REVISED 7/2/2010

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT XXXX

PROJECT NUMBER & PHASE XXXXXXXXXXX

NOTE:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

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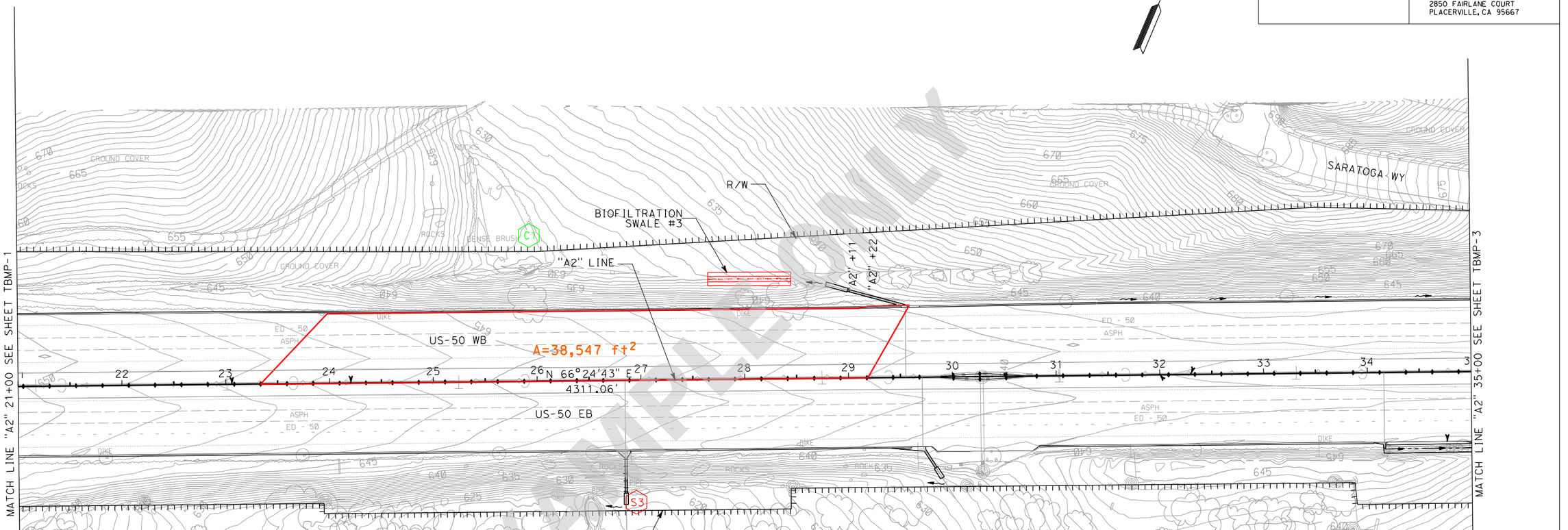




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-2**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

| REVISED BY | DATE REVISED |
|---|---|
| | |
| | |
| | |
| | |

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CONSULTANT FUNCTIONAL SUPERVISOR: THOMAS PAINE
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Caltrans

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UNIT XXXX
PROJECT NUMBER & PHASE XXXXXXXXXXX

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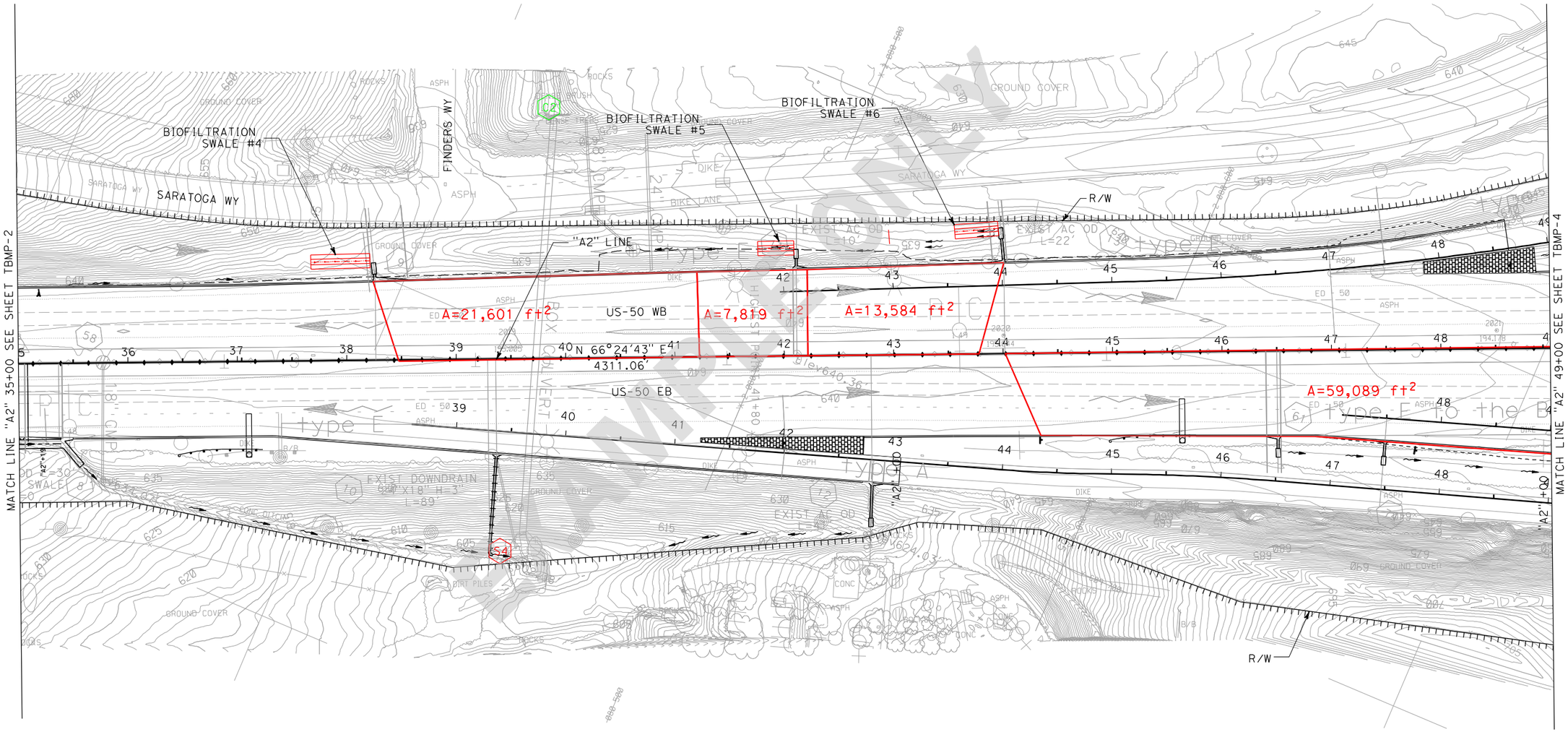


# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-3**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

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|---|---|
| | |

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|---|---|---|---|---|---|
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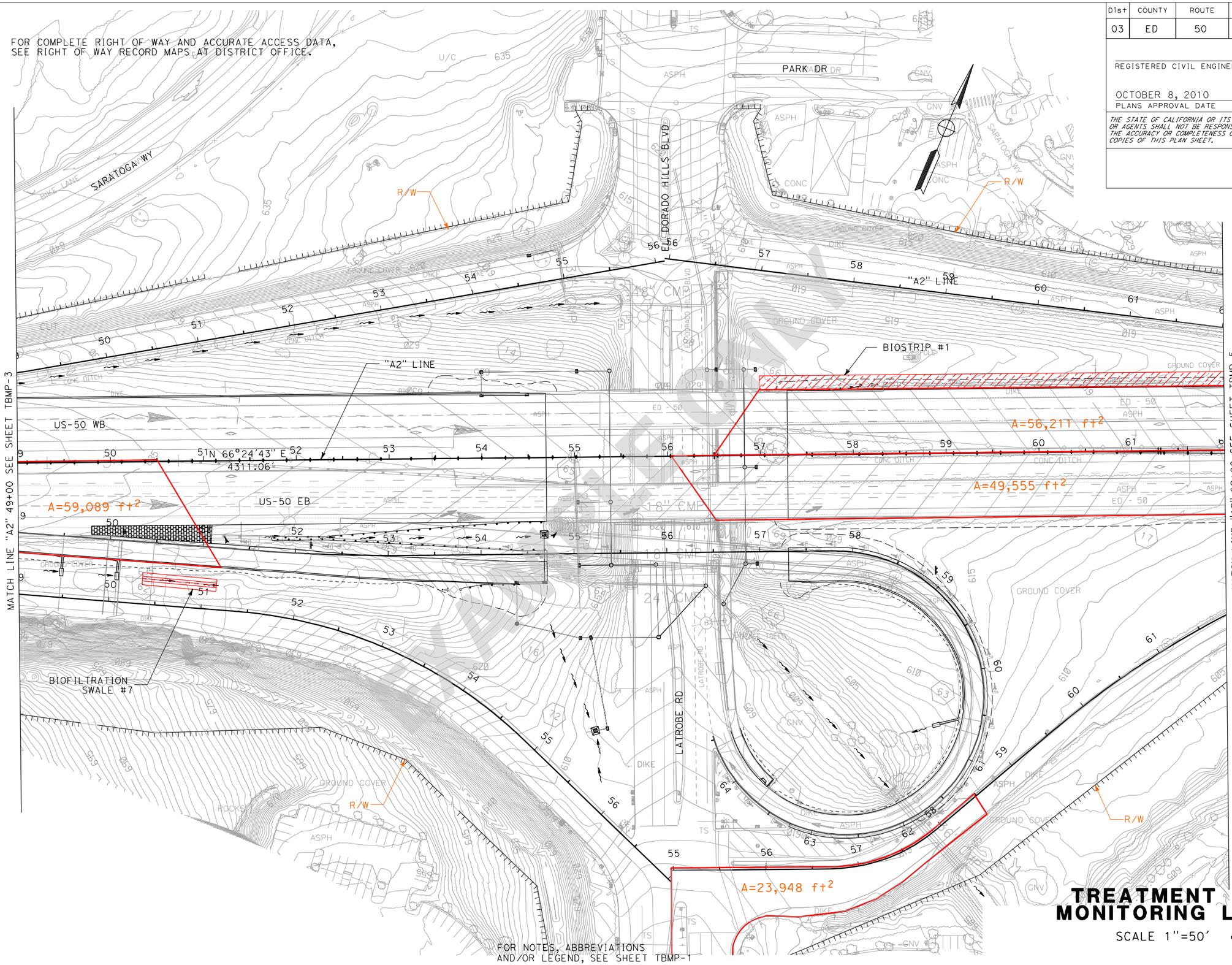


# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP- 4**

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| BETSY ROSS | |
| GEORGE WASHINGTON | |

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CONSULTANT FUNCTIONAL SUPERVISOR: THOMAS PAINE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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NOTE:

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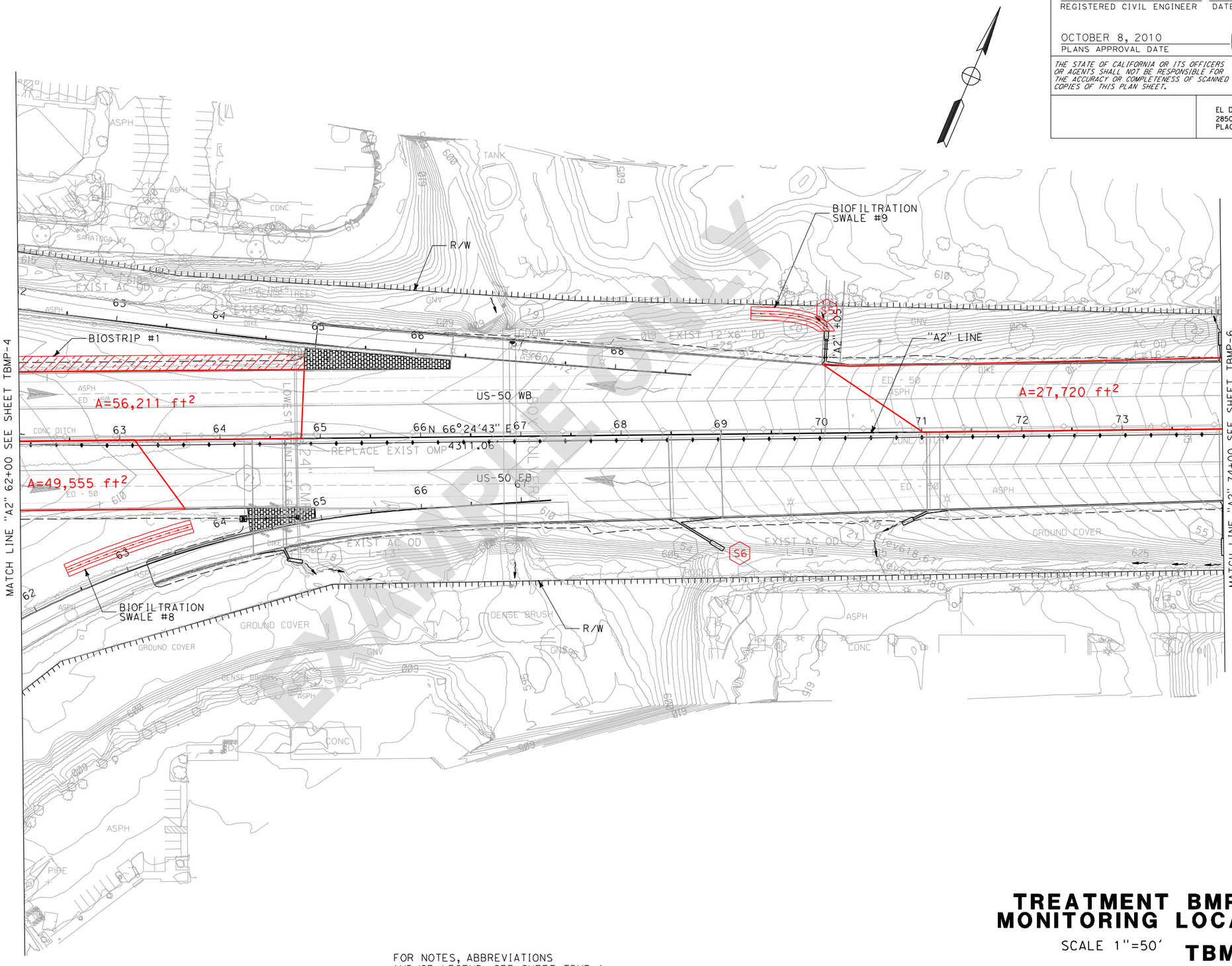




FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-5**

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| | |

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UNIT XXXX
PROJECT NUMBER & PHASE XXXXXXXXXXX

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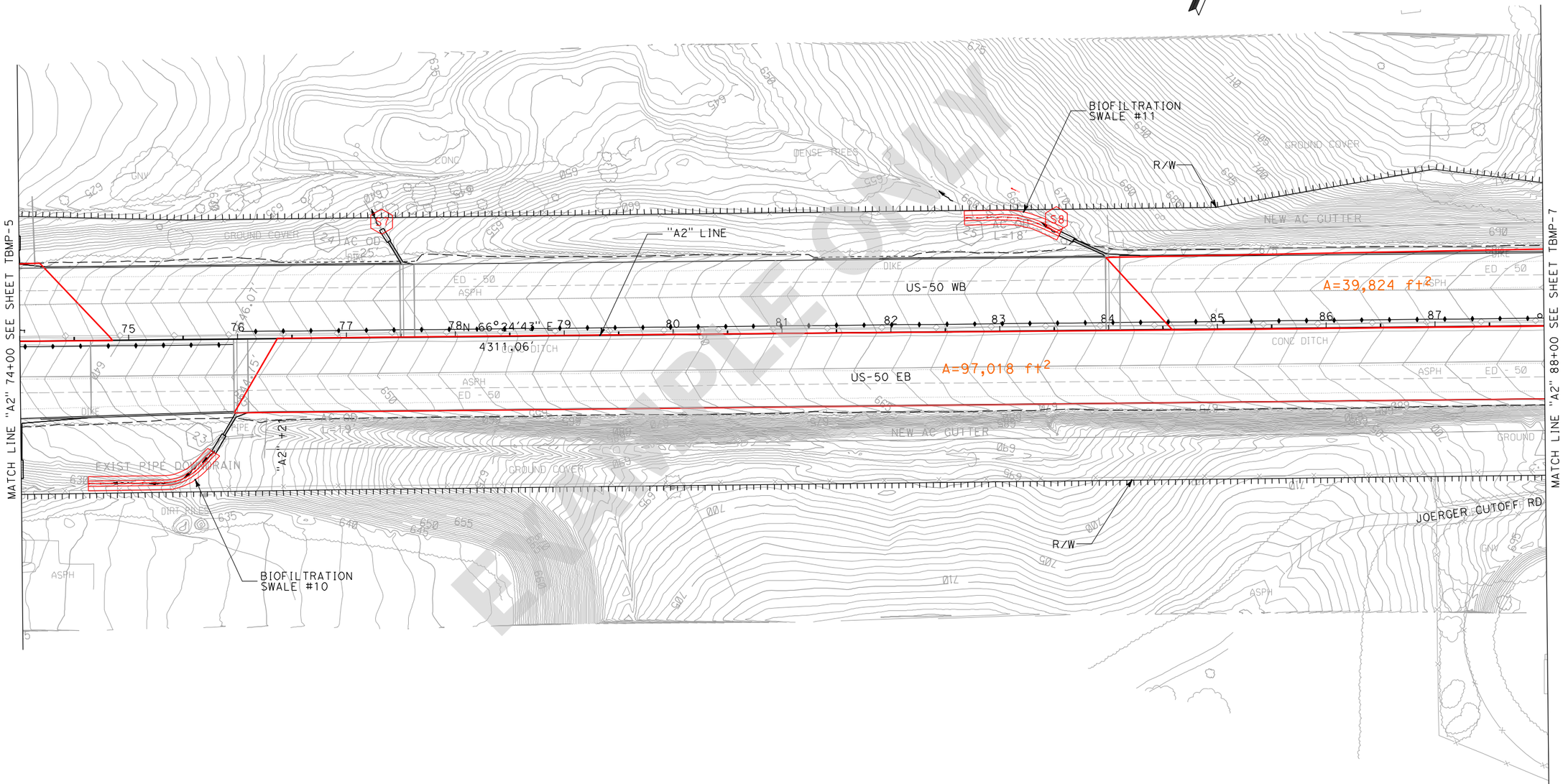




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50' **TBMP-6**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

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NOTE:

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| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
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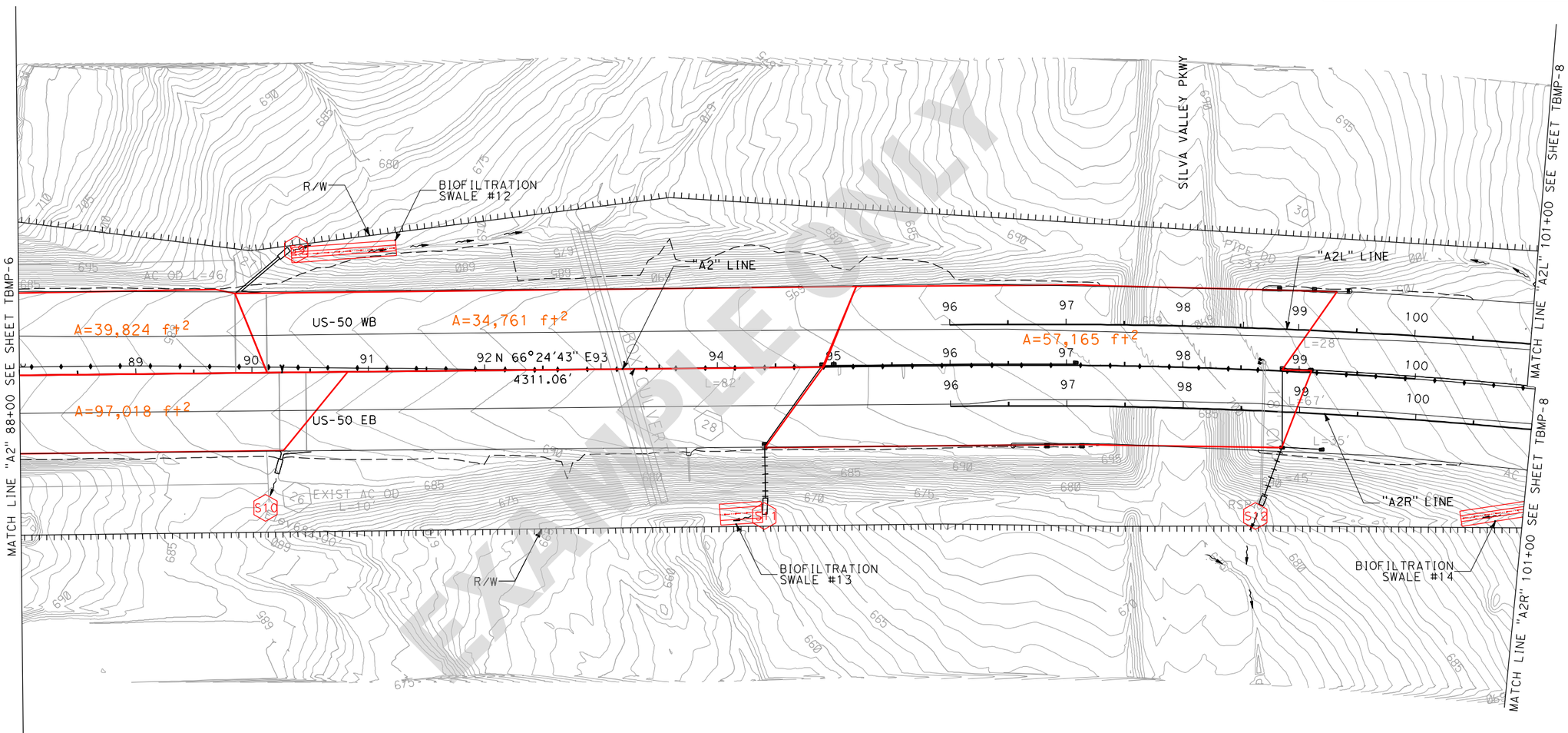




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-7**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

| REVISED BY | DATE REVISED |
|---|---|
| BETSY ROSS | |
| GEORGE WASHINGTON | |

CALCULATED-DESIGNED BY
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CONSULTANT FUNCTIONAL SUPERVISOR
THOMAS PAINE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

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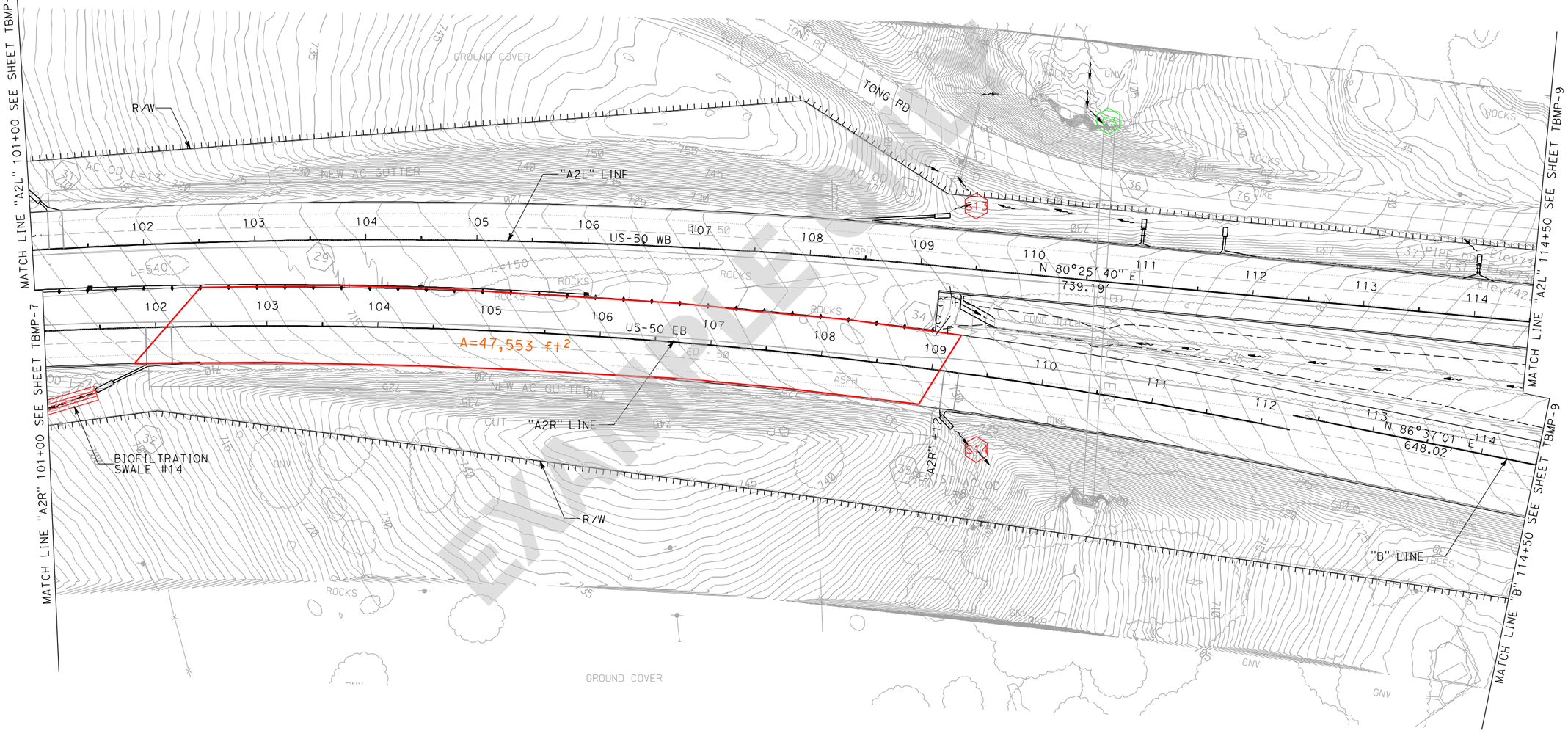




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-8**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

| CALCULATED-DESIGNED BY | REVISED BY |
|---|---|
| BETSY ROSS | |
| CHECKED BY | DATE REVISED |
| GEORGE WASHINGTON | |
| CONSULTANT FUNCTIONAL SUPERVISOR | |
| THOMAS PAINE | |
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | |

LAST REVISION 00-00-00
DATE PLOTTED => 11/30/2010
TIME PLOTTED => 3:33:53 PM

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| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

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OCTOBER 8, 2010
PLANS APPROVAL DATE

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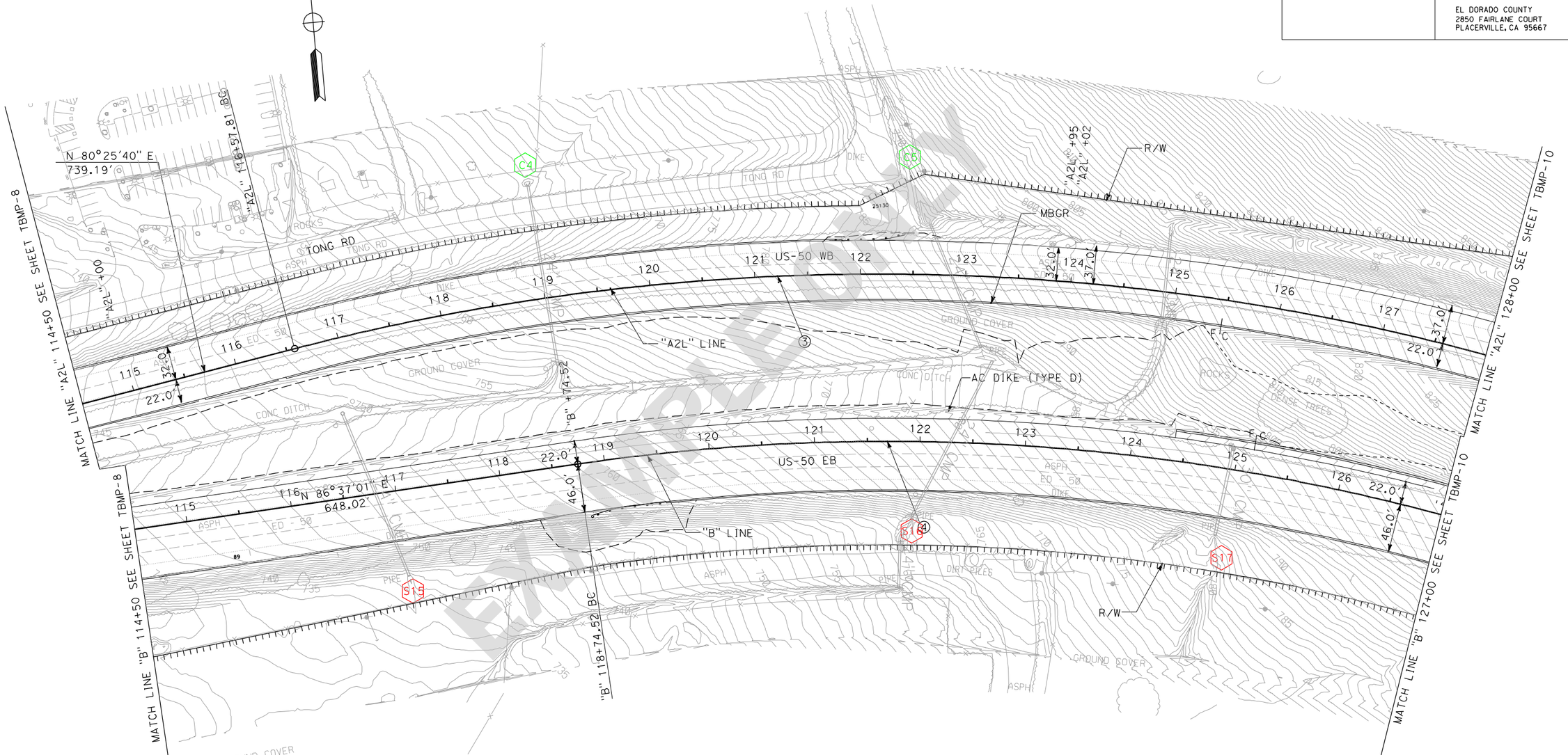


# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP- 9**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
CONSULTANT FUNCTIONAL SUPERVISOR: THOMAS PAINE
CALCULATED-DESIGNED BY: GEORGE WASHINGTON
CHECKED BY: BETSY ROSS
REVISED BY
DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 11/30/2010
TIME PLOTTED => 3:36:48 PM

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UNIT XXXX
PROJECT NUMBER & PHASE XXXXXXXXXXX

NOTE:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

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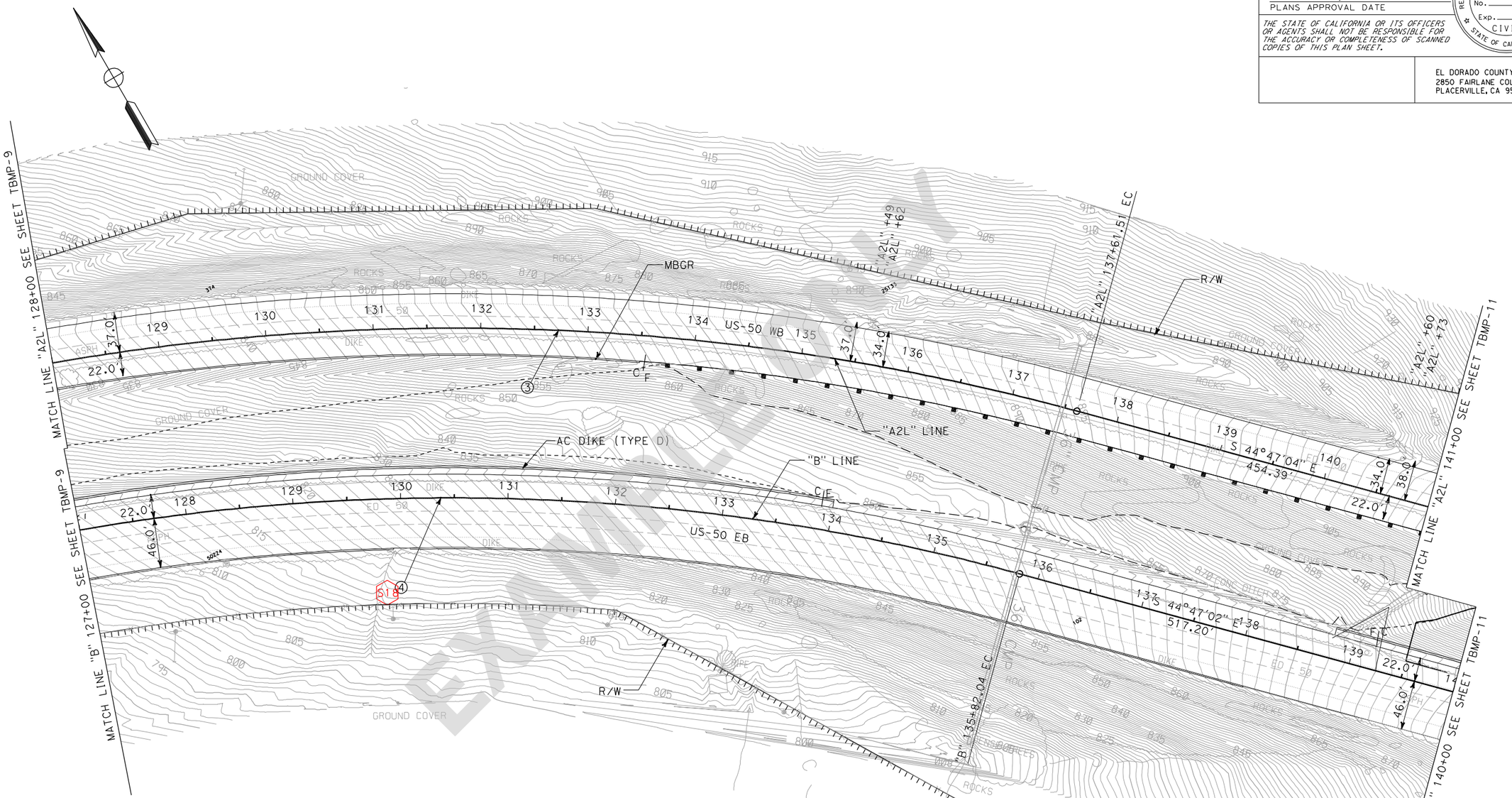
2850 FAIRLANE COURT
PLACERVILLE, CA 95667




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-10**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1



| | | | |
|---|---|---|---|
| REVISED BY | BETSY ROSS | CONSULTANT FUNCTIONAL SUPERVISOR | STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION |
| DATE REVISED | GEORGE WASHINGTON | THOMAS PAINE | Caltrans |
| CALCULATED-DESIGNED BY | | | |
| CHECKED BY | | | |

LAST REVISION 00-00-00 | DATE PLOTTED => 11/30/2010 | TIME PLOTTED => 3:37:29 PM

BORDER LAST REVISED 7/2/2010 | USERNAME => mei_du | DGN FILE => ...\PS&E\33A711ia10.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT XXXX | PROJECT NUMBER & PHASE XXXXXXXXXXX

NOTE:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

REGISTERED CIVIL ENGINEER DATE

OCTOBER 8, 2010
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. Exp. CIVIL — STATE OF CALIFORNIA

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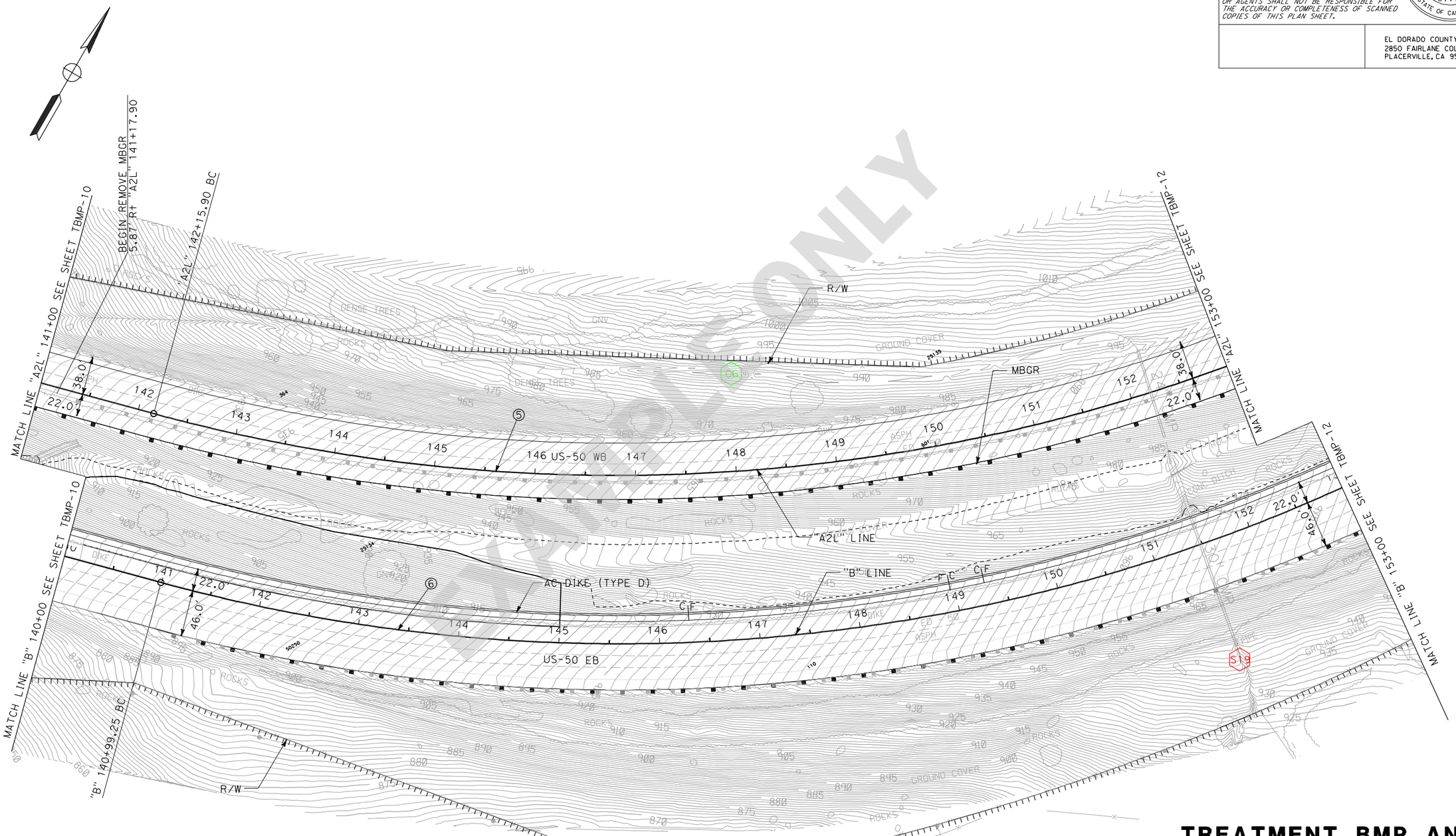
EL DORADO COUNTY
2850 FAIRLANE COURT
PLACERVILLE, CA 95667






# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-11**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

CALCULATED-DESIGNED BY: BETSY ROSS
CHECKED BY: GEORGE WASHINGTON
REVISED BY
DATE REVISED
CONSULTANT FUNCTIONAL SUPERVISOR: THOMAS PAINE
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 00-00-00
DATE PLOTTED => 11/30/2010
TIME PLOTTED => 3:38:56 PM

BORDER LAST REVISED 7/2/2010
USERNAME => mei_du
DGN FILE => ...\PS&E\33A711ia11.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT XXXX
PROJECT NUMBER & PHASE XXXXXXXXXXX

NOTE:

1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 03 | ED | 50 | 0.00/2.90 | | |

REGISTERED CIVIL ENGINEER DATE

OCTOBER 8, 2010
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — No. — Exp. — CIVIL — STATE OF CALIFORNIA

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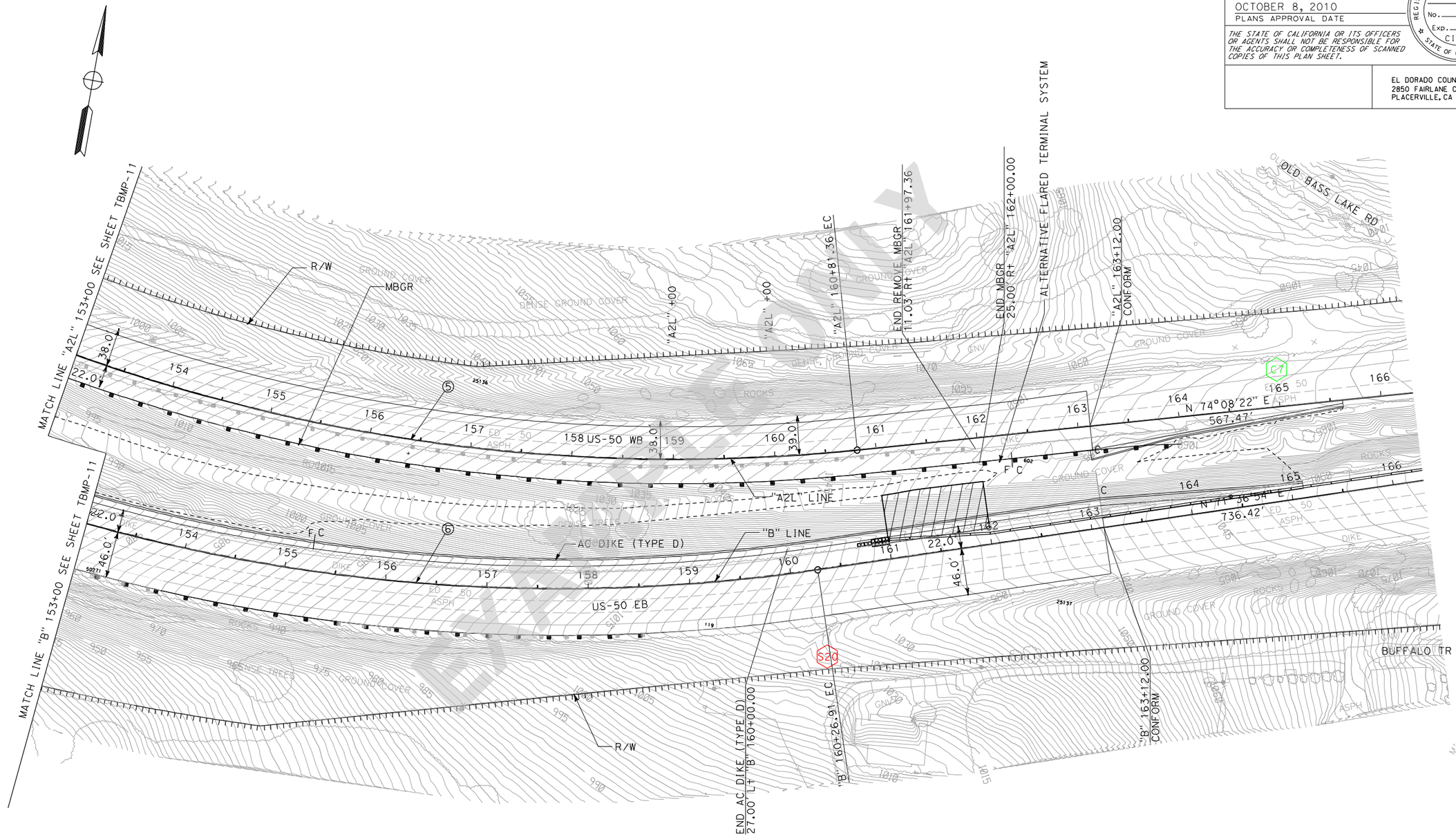
EL DORADO COUNTY
2850 FAIRLANE COURT
PLACERVILLE, CA 95667




# TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

**TBMP-12**

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

| | |
|---|---|
| CONSULTANT FUNCTIONAL SUPERVISOR | THOMAS PAINE |
| CALCULATED-DESIGNED BY | BETSY ROSS |
| CHECKED BY | GEORGE WASHINGTON |
| REVISED BY | |
| DATE REVISED | |

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00
DATE PLOTTED => 11/30/2010
TIME PLOTTED => 3:39:56 PM

BORDER LAST REVISED 7/2/2010 | USERNAME => mei_du | DGN FILE => ...\PS&E\33A711ia12.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT XXXX | PROJECT NUMBER & PHASE XXXXXXXXXXX