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: TBD in PS&E	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 — 09/23/10
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 — 09/23/10
George Washington, Project Manager — *Date*

Paul Revere — 09/23/10
Paul Revere, Designated Maintenance Representative — *Date*

Horatio Gates — 09/23/10
Horatio Gates, Designated Landscape Architect Representative — *Date*

Friedrich Wilhelm von Steuben — 09/23/10
[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.

According to the Project Report (PR), the preferred alternative is the Build Alternative. The ED-50 HOV Lane Project would construct the following improvements within the project limits:

- Replacement of the existing Latrobe Road Undercrossing (UC) (Bridge No. 25-0071L/R);
- Median widening of the Clarksville undercrossing (UC) (Bride 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 will end at PM 2.9.

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 staging and storage of equipment. The existing impervious area is 40.18 acres. The proposed added impervious area is 13.09 acres. The total impervious area after construction is 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. This 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 water body 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

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." 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 where no work will be permitted.

According to the Draft Natural Environment Study (NES), other areas within the project limits are designated as Environmentally Sensitive Areas (ESA) due to the presence of an existing waterway and/or the need to preserve vegetation within the area. All areas determined as an ESA will be detailed in PS&E phase and will be properly fenced off and protected through the use of best management practices (BMPs), and work will be prohibited in these areas.

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. There is relatively little 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).

The United States Geological Survey (USGS) topography map of the area shows the elevation of the project area ranging from 600 to 1300 ft.

Soil Characteristics

The soil data for this project was obtained from historic Caltrans reports. Geotechnical information has been requested and will be completed during PS&E phase. The general soil type was identified as Hydrologic Soil Group (HSG) D. Below is a summary of the soil findings based on the location along the project length:

At the Latrobe Road UC, the December 1963 Caltrans foundation study and log of test borings (LOTB) indicated subsurface materials consisting of clay and full underlain by slate. Studies conducted in June 1999 and May 2002 generally identified the area as being metamorphic rock at elevations ranging from approximately 616 ft mean sea level (msl) to 613 ft msl. In the areas near El Dorado Hills Boulevard and the easterly left structure abutment the borings described the rock as very intensely weathered and fractured.

At the Clarksville UC, the Caltrans 1963 foundation study and LOTB drawings identified the subsurface material at 4 to 9 feet from the original ground surface as stiff clay and slightly compact silty fine sand underlain by sandstone, shale and schist with approximately 17 ft of road embankment overlying at the right structure site.

Along the ED-50 mainline, the Caltrans as-built plans indicated that the subgrade consists of weathered and fractured metavolcanic and metasedimentary bedrock or compacted fill. The plans also showed a series of cut and fill areas along ED-50 within the project limits. An August 1998 study along the ED-50 median identified fills and native soil cover to depths of 1 to 5 feet underlain by variably weathered and fractured metavolcanic rock and schist.

Groundwater Information

Various studies have been performed to date within the project area. The Caltrans 1963 foundation study at the Latrobe Road UC did not encounter any groundwater but did find surface water. An April 2005 materials and geotechnical memorandum from Caltrans states that, during the December 1962 investigation, the highest groundwater elevation was identified at a site with an elevation of 614.5 ft. The Caltrans boring data indicates an average groundwater depth from surface to be approximately 1 ft. Borings conducted in February 1999 identified groundwater at depths ranging from 7 to 14 ft below ground surface.

Hazardous Waste

An Initial Site Assessment was completed but does not show any hazardous waste concerns within the project area. However, based on historic and current projects within this corridor of ED-50, soils containing aerially deposited lead (ADL) are anticipated to be present within the project. Further testing for ADL will occur at later phases of the project. It will be confirmed in the PS&E phase once the Final Site Assessment is available.

Erosion Potential

The Natural Resources Conservations Service (NRCS) provides soil erodibility information in its soil surveys by providing a set of numerical indices for each soil type (K). The K within the project area is primarily 0.37; there is a small pocket of soils near the Latrobe Road interchange with a K value of 0.20, but the weighted average K value is still 0.37.

Risk Assessment

The R factor was determined from the EPA's "Rainfall Erosivity Factor Calculator" to be 67.44. The K factor is 0.37. 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 Supplemental 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 Storm Water Impacts

The project team will coordinate with Caltrans Maintenance to determine if there are any historical slope failures within the project corridor and determine the necessary mitigation measures to be proposed during the design phase.

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. There is currently a retaining wall that will be proposed 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 the ease of maintaining all BMPs, and the project can be scheduled or phased to minimize soil-disturbing work during the project construction period.

Land Use

Currently, the land use for the area is primarily residential and light commercial.

Right-of-Way Requirements

The project is primarily within Caltrans' R/W; no R/W acquisitions or variances are expected. It is anticipated that there is adequate room within the R/W for treatment BMPs.

3. Regional Water Quality Control Board Agreements

The project team met with Elysia Perry of the RWQCB on September20, 2010 to discuss the project. Ms Perry stated that there are no anticipated negotiated understandings or agreements with the RWQCB pertaining to this project.

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

Downstream Effects Related to Potentially Increased Flow

The proposed improvements will increase the impervious area, which will increase velocity and volume of flow within the project limits. This increase will be accounted for in the project design and mitigated through the use of BMPs. Based on preliminary flow analysis and conceptual design information, increased flows within the project limits should have a negligible impact on downstream flow.

This project will incorporate 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 will be incorporated in the development and placement of permanent best management practices (BMPs) during the design phase to the maximum extent practicable. Potential LID measures that will be considered for this project to improve water quality include:

- Minimizing impervious surface area and using pervious material for hardened surfaces outside of the roadway prism;
- Grading slopes to blend with the natural terrain and decrease the need for dikes, promoting sheet flow to vegetated areas that can provide water quality benefits and promote infiltration;
- Designing permanent drainage facilities that mimic the existing drainage pattern of the area through the use of permanent check dams for attenuation of flow and disconnected drainage facilities;
- Constructing permanent vegetated drainage ditches to decrease the velocity of discharge, plus decreasing the volume of discharge by promoting infiltration and allowing for pollutant removal; and
- Maintaining existing vegetated areas.

Treatment devices that will increase the surface roughness and promote infiltration will help to mitigate the increases in velocity and volume. Table 1 shows preliminary flow control calculations. The drainage impact studies state that the post-construction runoff coefficients increase from 0.92 (pre-construction) to 1.00. For the water quality flow, the proposed biofiltration swales with liner plants increase the roughness coefficient from 0.05 in the existing condition to 0.24 in the proposed condition. Thus, the time of concentration increases, and the rainfall intensity decreases. The proposed biofiltration swales are discussed in greater detail in Section 5 of this report.

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 flows infiltrate through the soils as detailed in Section 5 of this report.

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

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

The work along ED-50 and the UCs will result in the creation of new slopes and/or the modification of existing slopes. When possible slopes within the project will be proposed to be 4:1 (H:V) or flatter, 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, will attempt to maintain or match existing slopes to reduce any slope stabilization and erosion concerns. Measures to prevent slope stabilization concerns during construction are discussed in Section 6 of this Report.

At this phase of the project, a general lump sum for design pollution prevention measures is calculated from the total construction cost. Individual design pollution prevention measures, including slope stabilization measures, will be identified during the design phase. The minimum anticipated erosion control measures for this project include:

- Move-in/Move-out (Erosion Control)
- Fiber Rolls
- Erosion Control (Hydroseed)
- Rolled Erosion Control Product (Netting)

The effectiveness of the proposed erosion control materials will be verified during the design phase by using the Revised Universal Soil Loss Equation 2 (RUSLE2).

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

The project proposes to create and modify existing ditches, dikes, and berms.

Existing slopes will be created and modified to satisfy roadway widening drainage and erosion control needs. The existing roadway drainage systems will be either modified to fit with new drainage items or be abandoned and replaced by new systems. The change in drainage will result in changes in the interception of surface runoff. To ensure that the proposed drainage systems do not result in downstream erosion or scour, the project will consider energy dissipation devices at the end of culvert systems and appropriate lining material within proposed ditches.

The proposed drainage design and related calculations for this project will be completed during the design phase of the project. The design of the proposed systems and system components will be done to meet recommendations and requirements that minimize impacts due to scour and erosion, as presented in the Caltrans *Highway Design Manual*, resulting in insignificant effects to downstream water.

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

Clearing and grubbing is primarily 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.

The Railroad Cemetery is an ESA. According to the Draft NES, there are areas throughout the project that are ESAs and there are other areas where construction activities should be prohibited. All areas determined to be an ESA will be enclosed by a temporary fence (type ESA).

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 July 2010 Project Planning and Design Guide (PPDG). As previously stated in Section 2 of this report, the soils are mainly classified as HSG D. Based on this information and to be conservative, it is assumed that the estimated infiltration ranking will be less than 90% for biofiltration and infiltration devices. Because of the anticipated low soil porosity, the project proposes to amend the soils. Details will be provided in the PS&E phase.

The treatment for this project will be to the maximum extent practicable, but the project will attempt to treat all the added impervious area created by the project, which is 13.09 acres. A single T-1, Part 1 Checklist was prepared because all the sub-watershed infiltrates less than 20% of the water quality volume. Table 2 summarizes the T-1, Part 1 Checklists for each su-bwatershed.

Table 2. 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 amendments to the soils, 0% of WQV would infiltrate through the existing HSG Type D soil. With soil amendments, 1% to 10% of the WQV would infiltrate through the amended soils. Because the biofiltration devices cannot infiltrate greater than 20%, the TDC approach should be used. However, there are no TDCs for this project, so Matrix A was used for Treatment BMP consideration. As determined in the PID phase Storm Water Data Report, biofiltration devices were concluded to be the preferred treatment device fro this Project. The sole use of biofiltration devices for this Project was accepted by Mathew Chau, the Storm Water Coordinator, on September 1, 2010.

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. Table 3 lists the locations where biofiltration devices are currently determined to be feasible. Further geotechnical and design investigation into these sites will be completed during the design phase.

Table 3. Summary of Biofiltration Devices

Bioswale No.	County	Line (Rt/Lt)	Start (Station)	End (Station)	WQF (cfs)	Impervious Area Treated (ac)	
1	ED	A2 / Lt	11+50	11+80	0.07	0.42	
2	ED	A2 / Lt	19+84	21+30	0.11	0.70	
3	ED	A2 / Lt	26+00	28+45	0.14	0.88	
4	ED	A2 / Lt	36+62	38+22	0.08	0.50	
5	ED	A2 / Lt	41+09	42+09	0.03	0.18	
6	ED	A2 / Lt	43+00	44+00	0.05	0.31	
7	ED	A2 / Rt	50+30	52+50	0.22	1.36	
Biostrip 1	ED	A2 / Lt	57+80	64+85	0.19	1.16	
8	ED	A2 / Rt	59+00	63+00	0.27	1.69	
9	ED	A2 / Lt	69+20	70+00	0.10	0.64	
10	ED	A2 / Rt	73+00	75+80	0.36	2.23	
11	ED	A2 / Lt	82+00	83+56	0.15	0.91	
12	ED	A2 / Lt	90+35	93+10	0.13	0.80	
13	ED	A2 / Rt	93+90	94+37	0.21	1.31	
14	ED	A2 / Rt	99+50	101+50	0.17	1.09	Total = 14.18

The proposed biofiltration swales and strips for the project have met 100% treatment of the added impervious area. Details of the proposed biofiltration devices will be developed during the design phase and included in the Contract Plans.

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.

Storm Water Pollution Prevention Plan

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.

Rain Event Action Plan

Risk Level 2 projects are required to prepare a Rain Event Action Plan (REAP). The quantity for REAPs is 97, which was calculated based on the *Estimating Guidance for CGP* (September 2010). Precipitation data was obtained from a NOAA station in Placerville.

Construction Site BMP Strategy

The Project is scheduled for over one and a half years. Whenever possible, the scheduling of earth-disturbing construction activities should not be made during anticipated rain events. Construction site BMPs should be installed prior to the start of construction or as early as feasibly possible during construction.

DSAs will be protected in accordance with the Project's pollution control measures. The construction site BMP strategy for this Project shall consist of the following:

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

The design of all construction BMPs will 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*.

A meeting with the Jessie Cruz, the Construction Storm Water Coordinator (CSWC), was held on September 5, 2010. Mr. Cruz provided recommendations and suggestions, which have been incorporated in the construction site BMP strategy.

Soil Stabilization Measures

The following minimum soil stabilization measures should be considered for this Project:

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

Multiple mobilization move-in/move-out locations are suggested for the Project to implement temporary erosion control and construction site measures throughout the project. Temporary Hydraulic Mulch should be placed on any exposed disturbed soils, stockpiles of soils and unprotected slopes that may be susceptible to erosion from either runoff or wind. Temporary Cover should be used to protect DSAs from erosion.

There are identified ESAs within the Project limits. The measures taken to protect these areas include temporary fence (Type ESA). The Type ESA fence is specifically designed to designate an area as being outside the limits of work.

Investigation into additional soil stabilization measures for this Project will continue during the design phase.

Sediment Control Measures

The following minimum sediment control measures should be considered for this Project:

- Temporary Fiber Rolls
- Temporary Drainage Inlet Protection

The temporary fiber rolls will be 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. Temporary drainage inlet protection prevents sediment from entering current or proposed storm drains.

Investigation into additional sediment control measures, including the use of sediment traps, will continue during the design phase. Specific locations to be determined in PS&E.

Tracking Controls

To prevent the tracking of mud and dirt off-site, stabilized construction entrances/exits should be placed at multiple points throughout the project area. Street sweeping should also be implemented to remove tracked sediment.

Waste Management and Materials Pollution Control

The project may result in concrete-related work. Concrete washout bins are considered 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.

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 should be analyzed for both pH and turbidity, and are subject to numeric action levels (NAL). Included in the attachments are potential monitoring locations that will be verified during the PS&E phase.

A cost estimate was calculated for quantities of Construction Site BMPs using the Estimated Unit Cost Sample (Option 3) of the PPDG's Appendix F.

Table 3. Construction Site BMP Quantiteis

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)	5,000	ft
074016	Construction Site Management	1	LS
074019	Water Pollution Control (SWPPP)	1	LS
074028	Temporary Fiber Roll	28,000	ft^2
074029	Temp. Silt Fence	5,000	ft
074031	Temporary Gravel Bag Berm	3,500	ft
074033	Stabilized Constr. Entrance/Exit	8	EA
074034	Temporary Cover	120,000	ft^2
074037	Move-In/Move-out (Temporary Erosion Control)	10	EA
074038	Temp. Drainage Inlet Protection	43	EA
074041	Street Sweeping	1	LS
074043	Temp. Concrete Washout Bin	8	EA
074051	Temp. Hydraulic Mulch	600,000	ft^2
074056	Rain Event Action Plan	97	EA
074057	Storm Water Annual Report	2	EA
074058	Storm Water Sampling and Analysis Day	42	EA

7. Maintenance BMPs (Drain Inlet Stenciling)

The project will require drain inlet stenciling in areas where there is pedestrian access, primarily at the undercrossings. Stenciling will not be required along ED-50 as there will be no pedestrian access. The stenciling detail in the Caltrans Standard Plans will be used for drain inlet stenciling.

Other types of maintenance BMPs, including maintenance vehicle pullouts, will be considered during the design phase and coordinated with the Caltrans Maintenance Area Manager.

Required Attachments

- Vicinity Map
- Evaluation Documentation Form (EDF)
- 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)
- Calculations related to BMPs
- Plans showing BMP Deployment

Source: Microsoft Bing Maps

DATE: 9/23/10

Project ID (or EA): 03-xxxxxx

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. 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. _____ *(Dist./Reg. SW Coordinator initials)* 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. If **No**, document in SWDR go to 5.
5.	Is the project directly or indirectly discharging to surface waters?	✓		If **Yes**, continue to 6. If **No**, go to 10.
6.	Is it a new facility or major reconstruction?	✓		If **Yes**, continue to 8. If **No**, go to 7.
7.	Will there be a change in line/grade or hydraulic capacity?			If **Yes**, continue to 8. 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. If **No**, go to 10. *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. _____*(Dist./Reg. Design SW Coord. Initials)* _____*(Project Engineer Initials)* _____ *(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

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: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml	**No**	**Low**
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? 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	Medium	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
9/23/2010	03-XXXX	3	XXXXXX	ED	50	0	2.9	Lane Ad	PA/ED	TRUE	9/23/2010	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	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: 09/23/10 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: August 2010
• Microsoft Bing Maps	Accessed: August 2010
• Project Geometric Approval Drawings (GAD)	July 2010
Hydraulic	
• California State University, Sacramento. *Water Quality Planning Tool. <http://stormwater.water-programs.com/>*	Accessed August 2010
Soils	
• 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 Report, US 50 Phase 1 HOV Lane CMIA Project, PM 0.0 To PM 2.9 (EA 3A711) El Dorado County, California*.	September 2010
• California Department of Transportation. *Draft Natural Environment Study, US 50 Phase 1 HOV Lane CMIA Project, PM 0.0 To PM 2.9 (EA 3A711) El Dorado County, California*.	March 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: 09/23/10 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: 09/23/10 District-Co-Route: 03-ED-50

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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: 09/23/10 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: 09/23/10 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: 09/23/10 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: 09/23/10 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: 09/23/10 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: 09/23/10 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 NPDES 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 Austin filter (concrete) Austin filter (earthen) Delaware filter MCTT Wet basin	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches* Biofiltration Strip	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches* Biofiltration Strip Biofiltration Swale
Tier 2	Strip: HRT < 5 Biofiltration Swale Detention (unlined)	Austin filter (concrete) Delaware filter Biofiltration Swale MCTT Wet basin	Austin filter (concrete) Delaware filter MCTT Wet basin
HRT = hydraulic residence time (min) *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 Wet basin Austin filter (earthen) Austin filter (concrete) Delaware filter	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches* MCTT Wet basin	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches* MCTT Biofiltration Strip Biofiltration Swale Wet basin
Tier 2	Strip: HRT > 5 Strip: HRT < 5 Biofiltration Swale Detention (unlined)	Austin filter (concrete) Delaware filter Biofiltration Strip Biofiltration Swale	Austin filter (concrete) Delaware filter
HRT = hydraulic residence time (min) *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) Austin filter (concrete) Delaware filter**	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches*	Austin filter (earthen) Detention (unlined) Infiltration basins* Infiltration trenches* Biofiltration Strip Biofiltration Swale
Tier 2	Wet basin Biofiltration Strip Biofiltration Swale Detention (unlined)	Austin filter (concrete) Delaware filter Biofiltration Strip Biofiltration Swale Wet basin	Austin filter (concrete) Delaware filter 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* Austin filter (earthen) Austin filter (concrete) Delaware filter**	Wet basin* Austin filter (earthen) Detention (unlined) Infiltration basins*** Infiltration trenches***	Wet basin* Austin filter (earthen) Detention (unlined) Infiltration basins*** Infiltration trenches*** Biofiltration Strip Biofiltration Swale
Tier 2	Biofiltration Strip Biofiltration Swale Detention (unlined)	Austin filter (concrete) Delaware filter Biofiltration Strip Biofiltration Swale	Austin filter (concrete) 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: 09/23/10 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

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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%**

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		

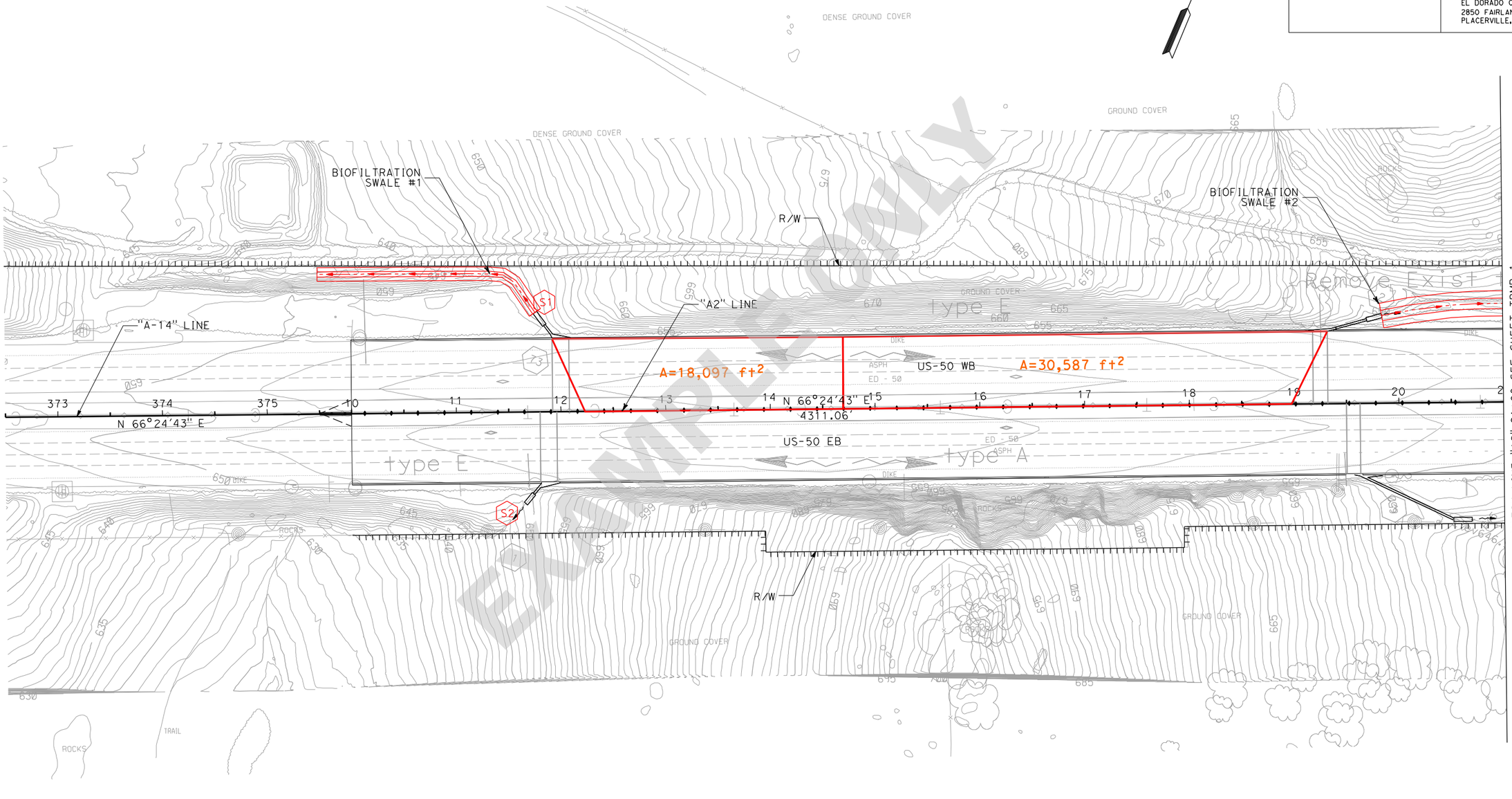
REGISTERED CIVIL ENGINEER DATE

SEPTEMBER 23, 2010
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

EL DORADO COUNTY
2850 FAIRLANE COURT
PLACERVILLE, CA 95667



EXAMPLE ONLY

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP- 1

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00
DATE PLOTTED => 9/24/2010
TIME PLOTTED => 11:47:03 PM

BORDER LAST REVISED 7/2/2010 | USERNAME => wang_chiu | DGN FILE => ...\PAED\33A711ia01.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		

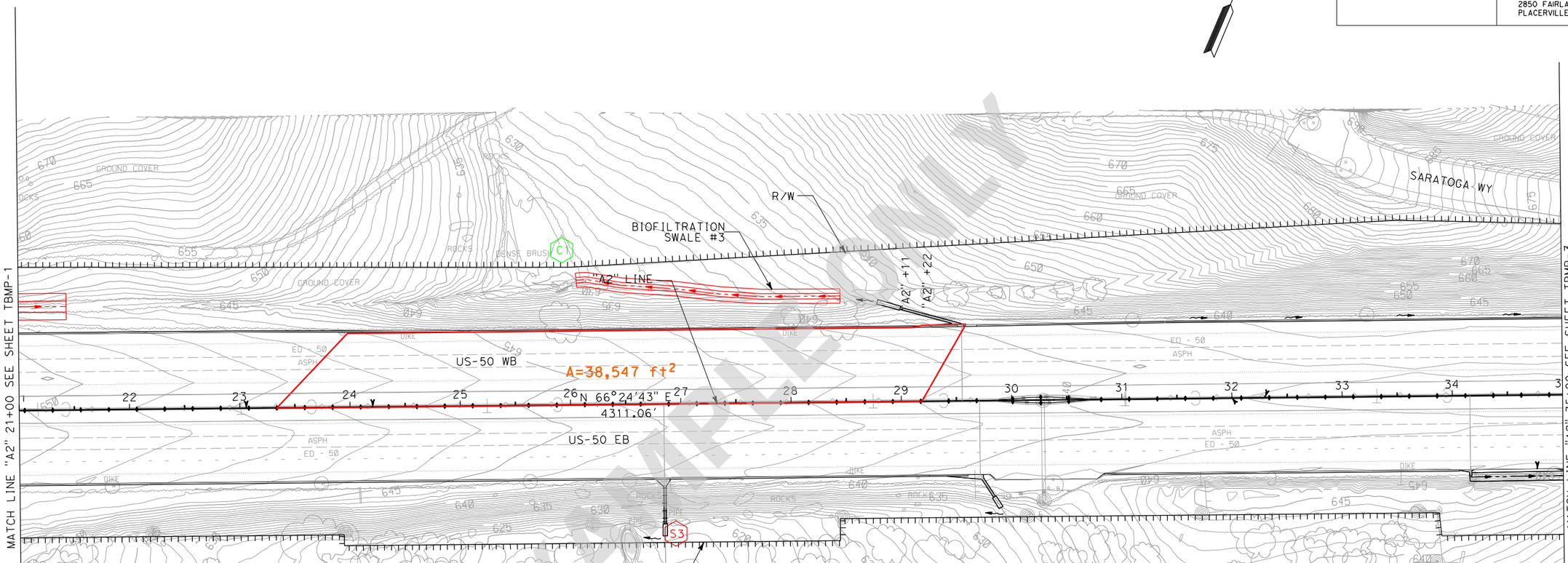
REGISTERED CIVIL ENGINEER DATE

SEPTEMBER 23, 2010
PLANS APPROVAL DATE

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

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

EL DORADO COUNTY
2850 FAIRLANE COURT
PLACERVILLE, CA 95667



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

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-2

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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

SEPTEMBER 23, 2010
PLANS APPROVAL DATE

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

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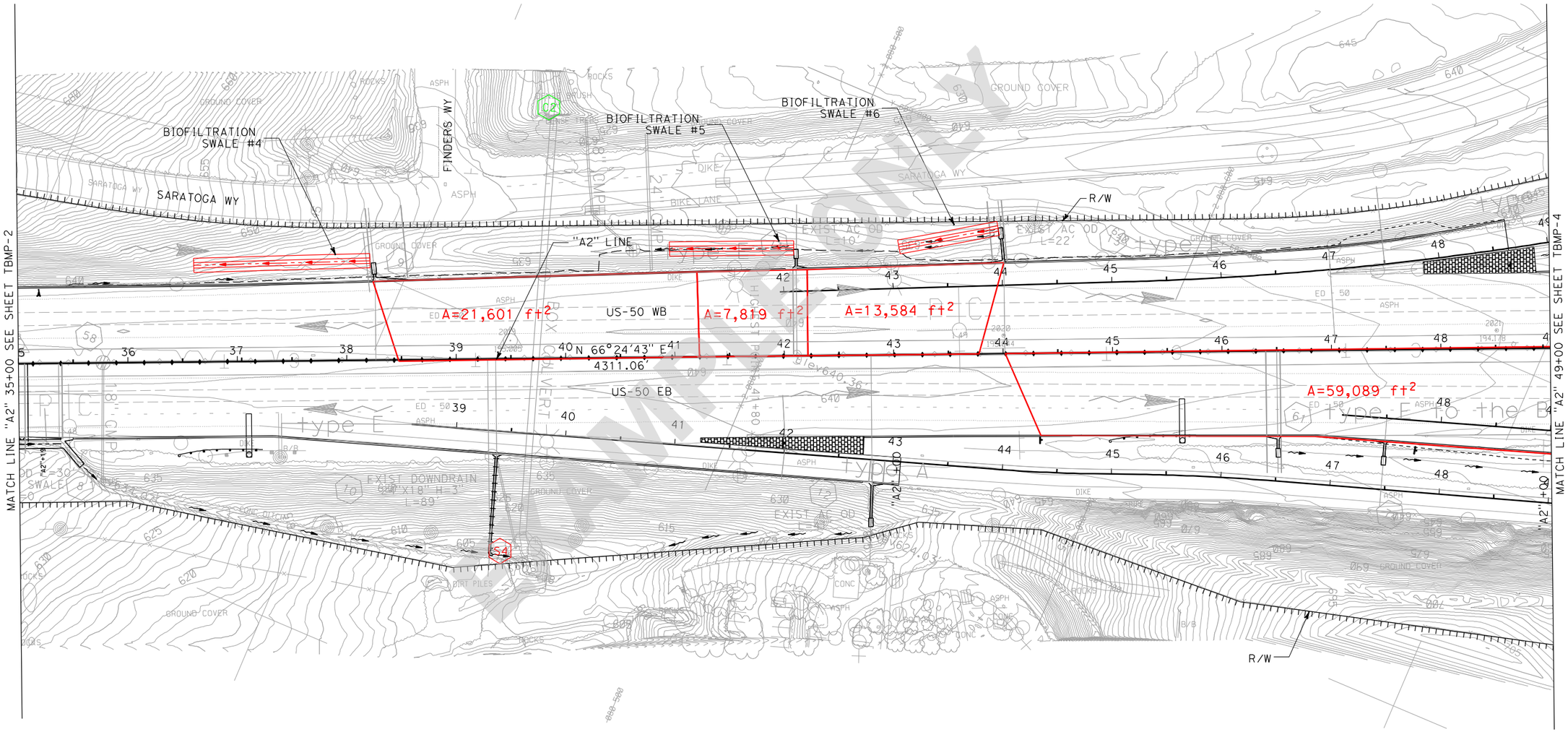

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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BORDER LAST REVISED 7/2/2010
USERNAME => wang_chiu
DGN FILE => ...\PAED\33A711ia03.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

SEPTEMBER 23, 2010
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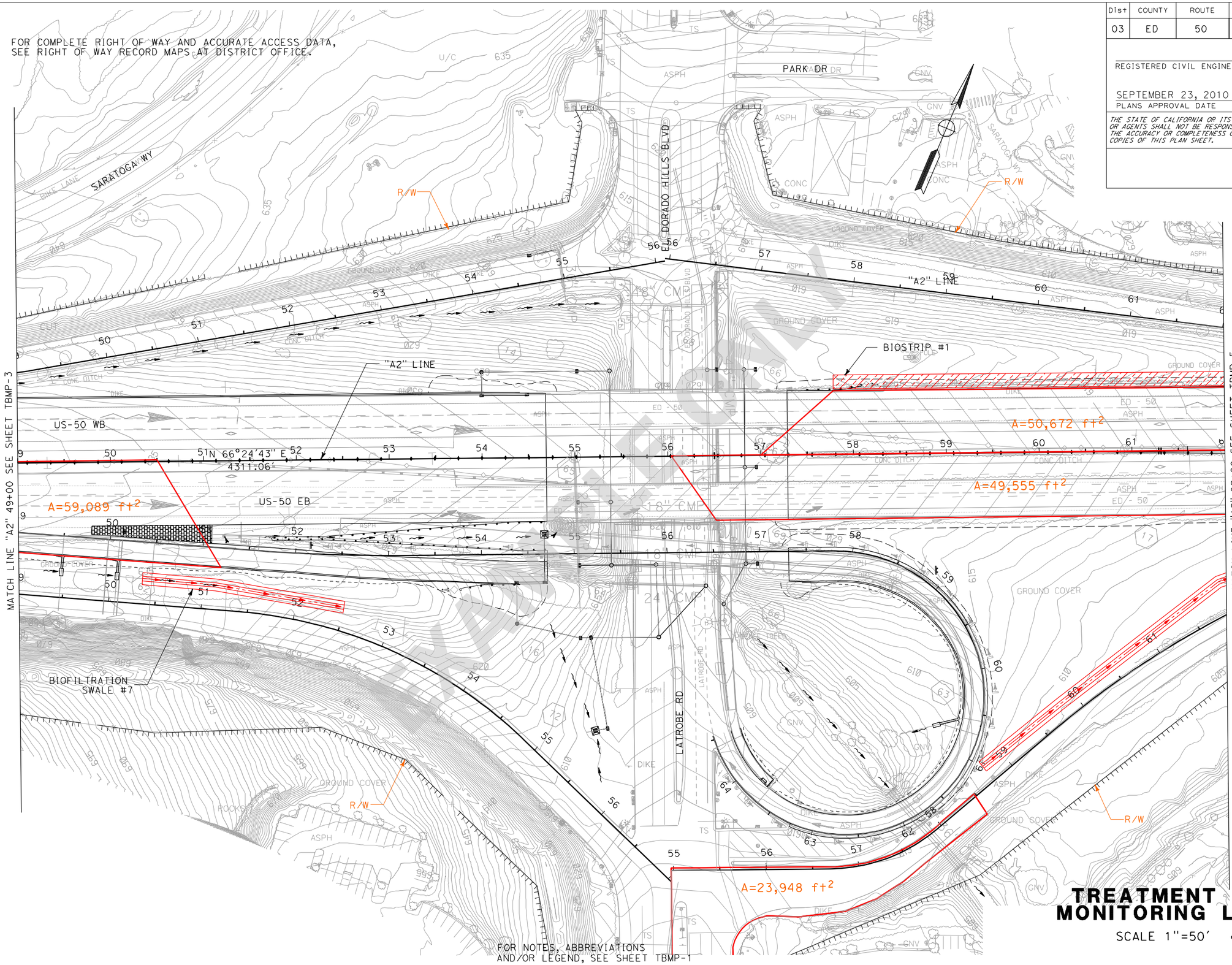

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP- 4

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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

SEPTEMBER 23, 2010
PLANS APPROVAL DATE

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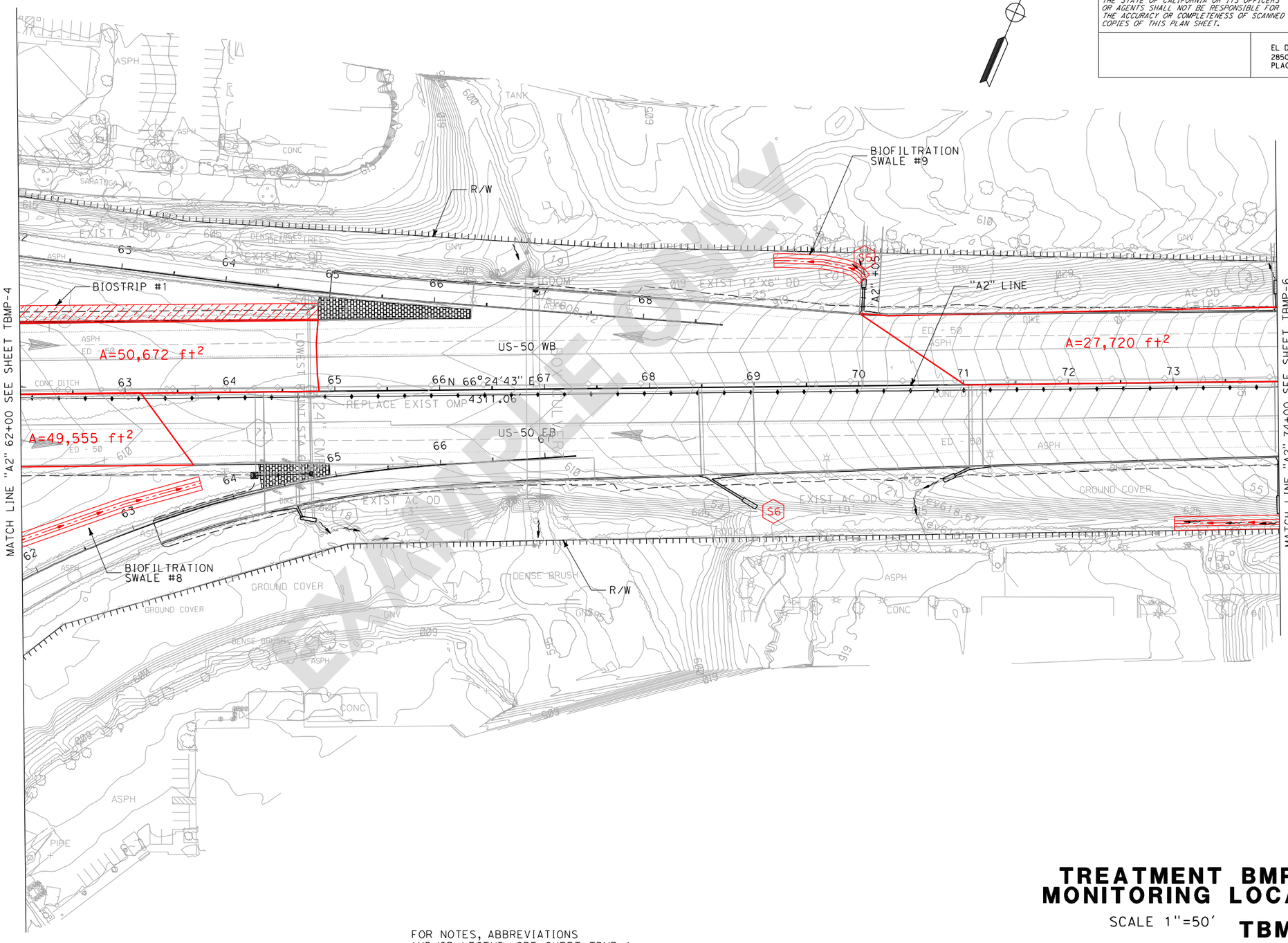

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-5

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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

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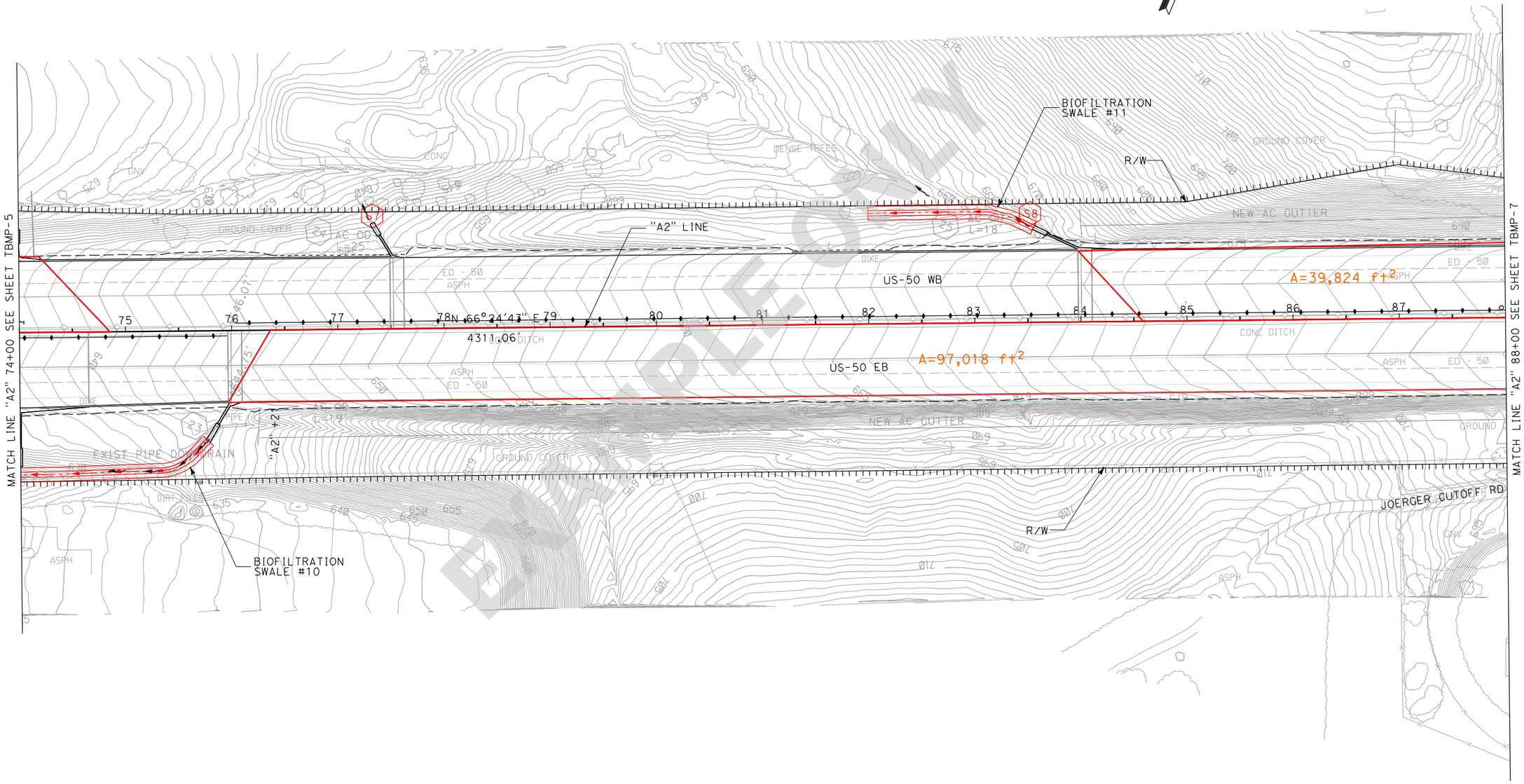

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-6

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

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NOTE:

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

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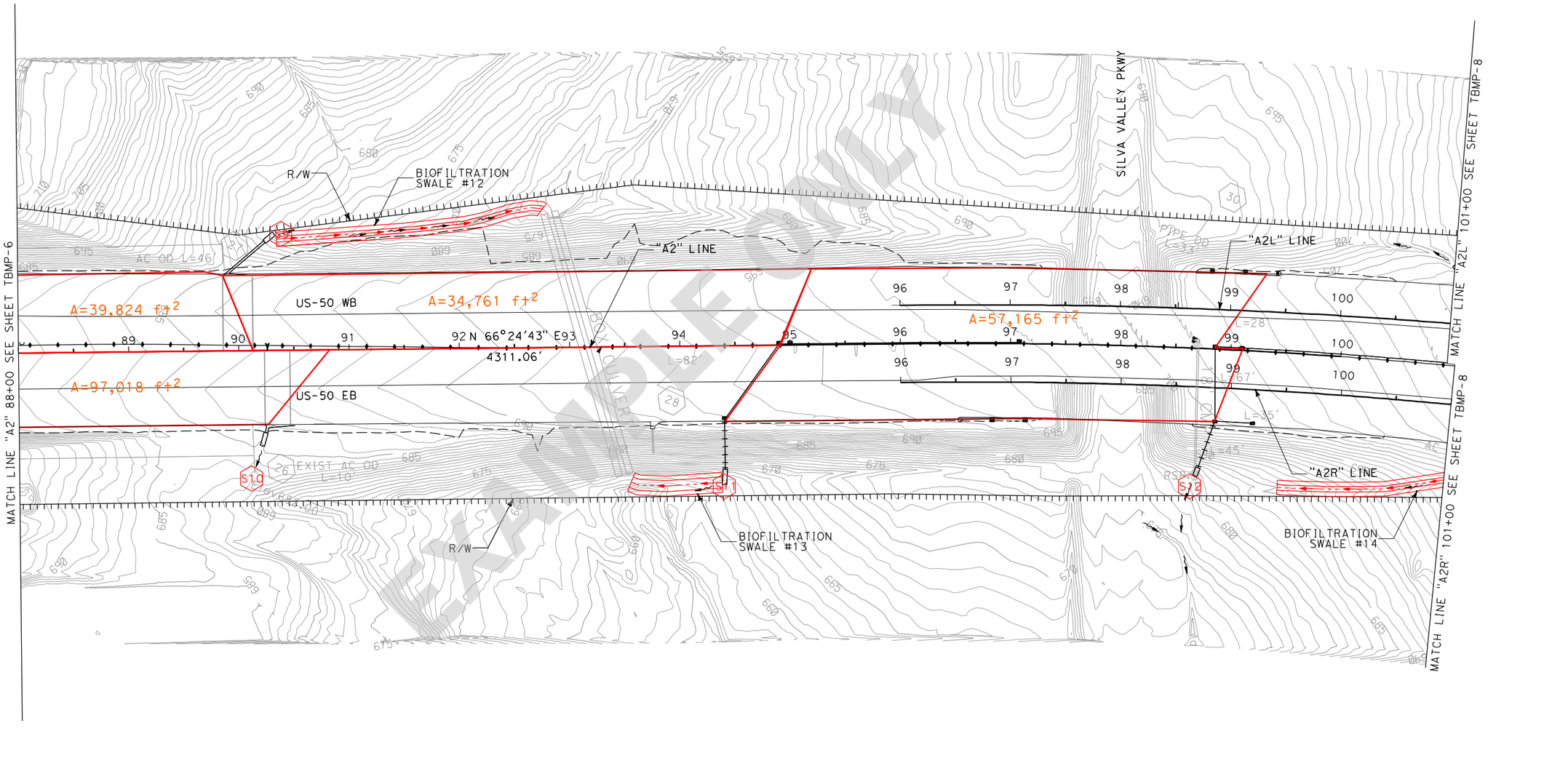

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-7

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DATE PLOTTED => 9/24/2010
TIME PLOTTED => 1:47:42 PM

BORDER LAST REVISED 7/2/2010
USERNAME => wana_chiu
DGN FILE => ...\PAED\33A711ia07.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

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PLANS APPROVAL DATE

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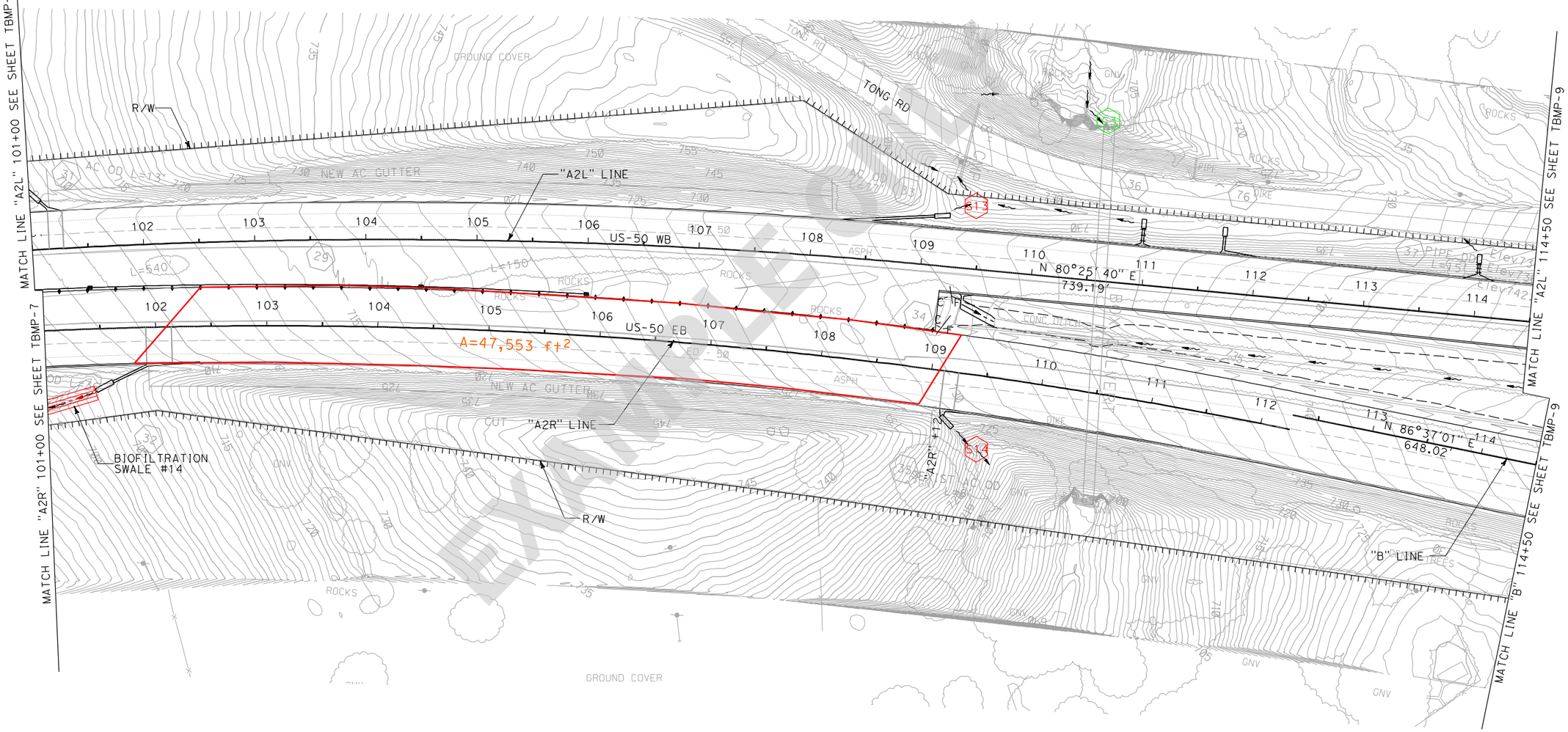

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-8

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NOTE:

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

REGISTERED CIVIL ENGINEER DATE

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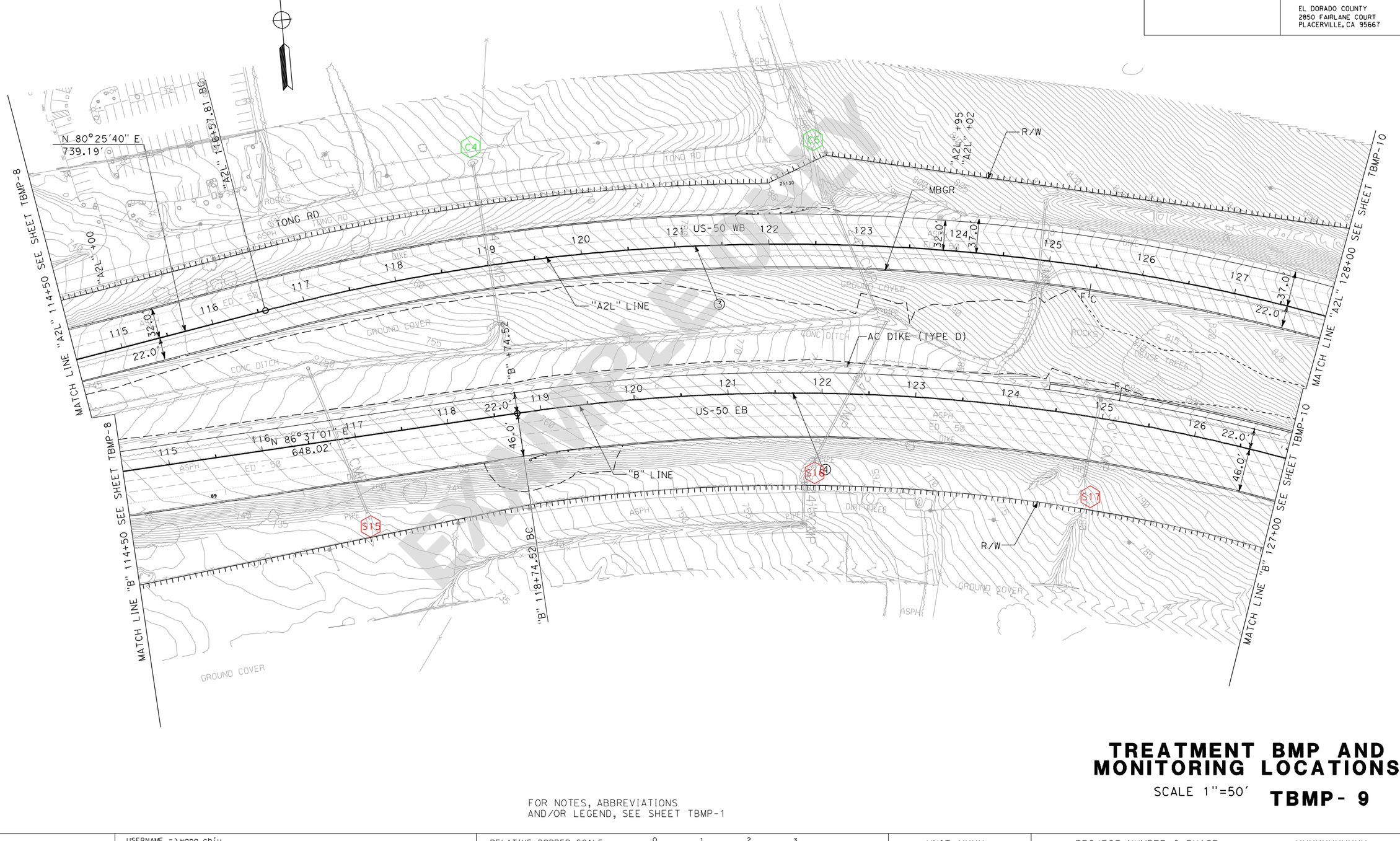

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP- 9

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

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NOTE:

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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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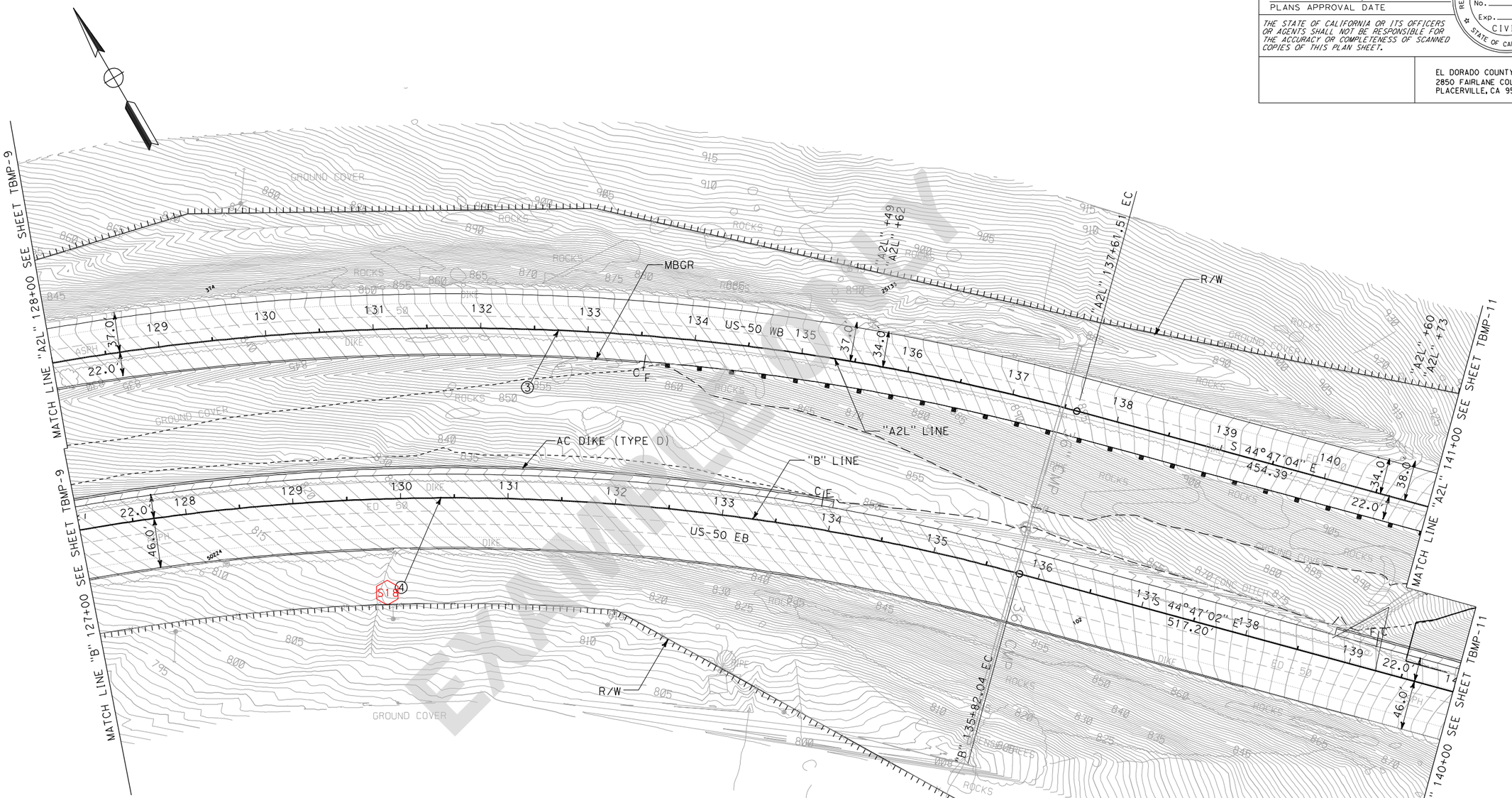

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-10

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

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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

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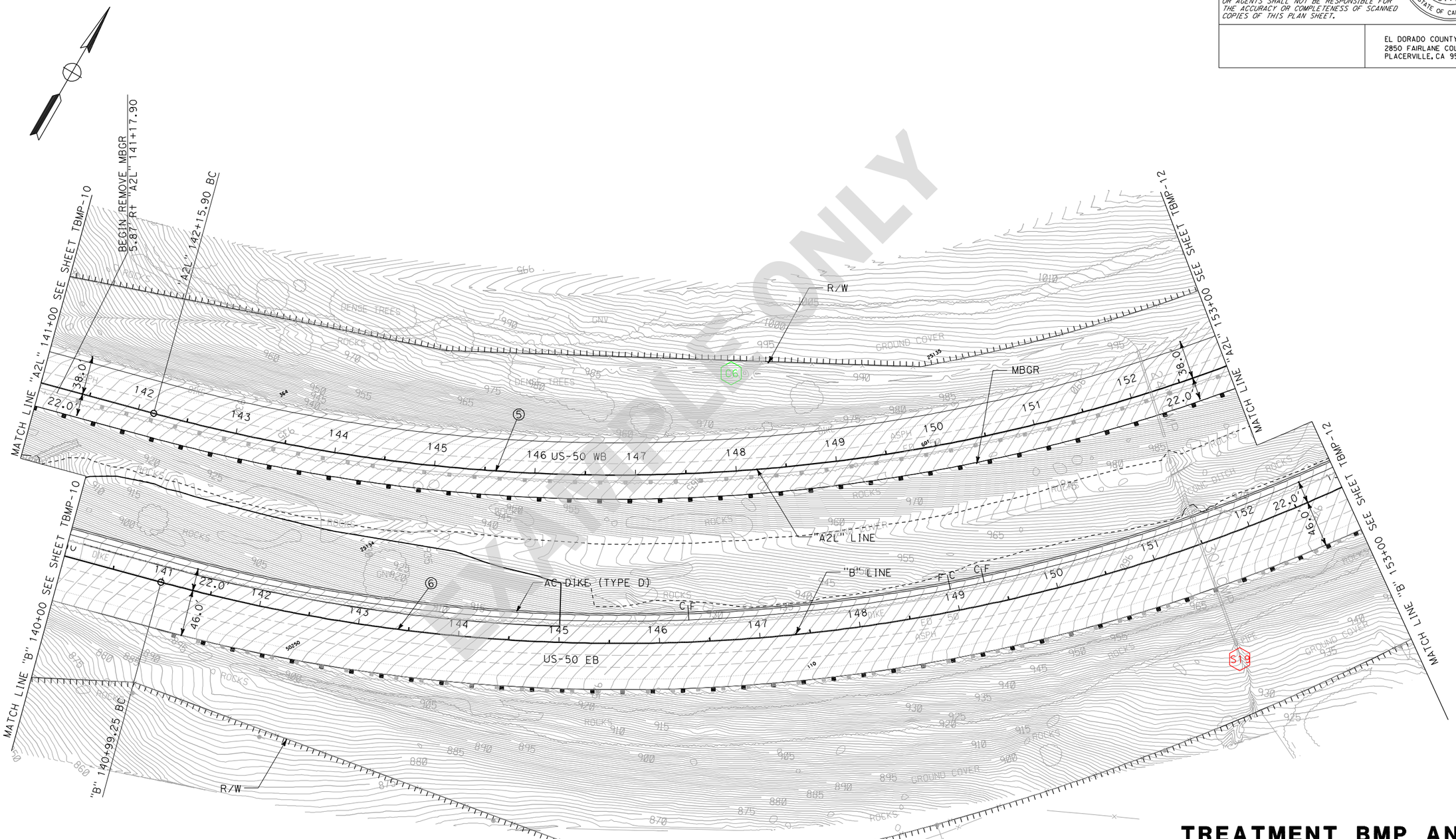

FOR NOTES, ABBREVIATIONS AND/OR LEGEND, SEE SHEET TBMP-1

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-11

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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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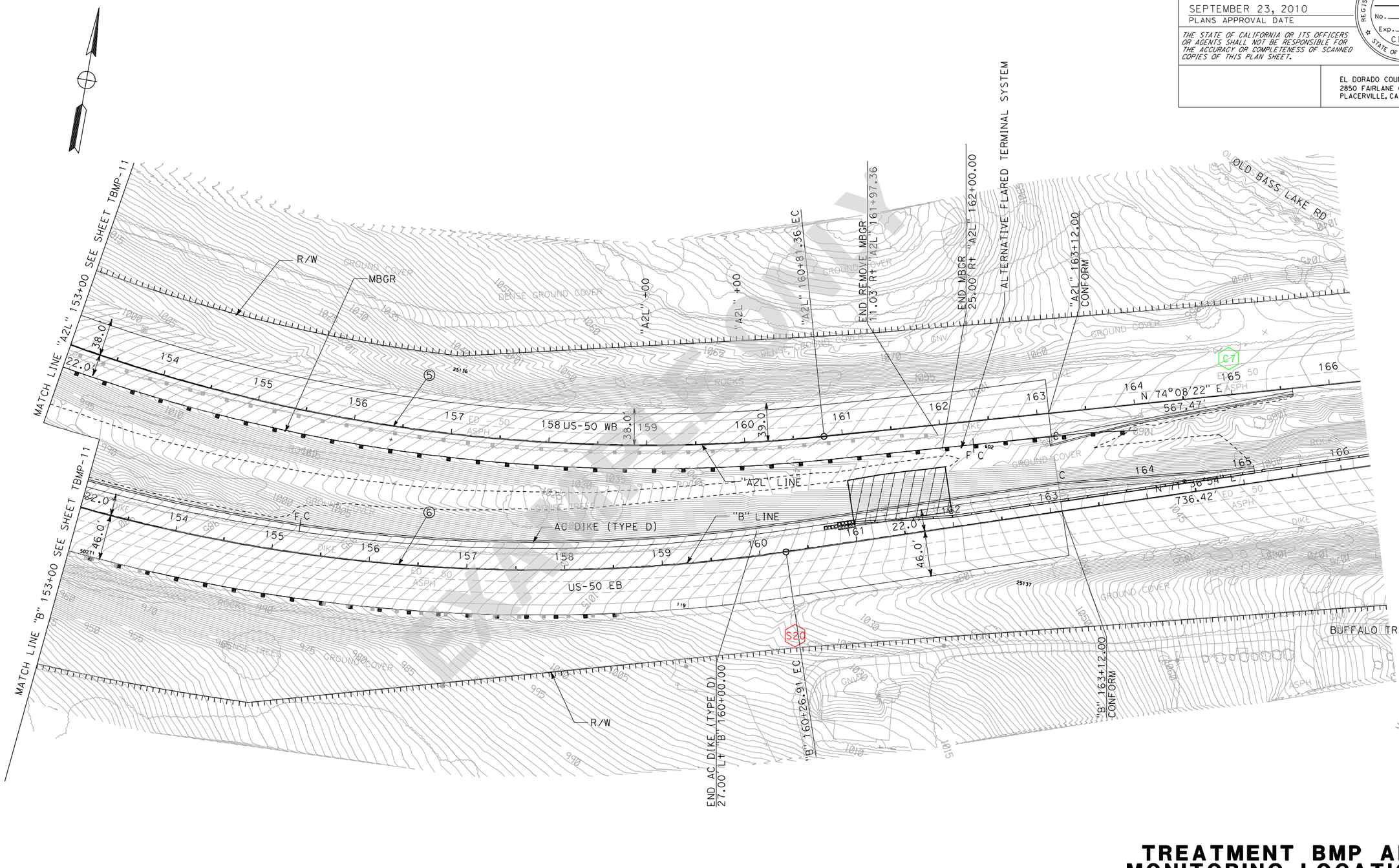

TREATMENT BMP AND MONITORING LOCATIONS

SCALE 1"=50'

TBMP-12

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

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