Meeting of the Central Valley Flood Protection Board
October 26, 2012
Staff Report
California Department of Transportation, District 3
Butte Creek Bridge (No. 12-0126R) Replacement
State Route 99, Butte County

1.0 – ITEM

Consider approval of Permit No. 18767 (Attachment B)

2.0 – APPLICANT

California Department of Transportation (Caltrans), District 3

3.0 – LOCATION

The proposed project is located on State Route (SR) 99 between Estates Drive and Southgate Avenue in Butte County (see Attachment A for Location Map).

4.0 – PROJECT DESCRIPTION

The applicant proposes to replace the Butte Creek Bridge (No. 12-0126R) on SR 99 in Butte County with a new bridge constructed on the existing northbound alignment. The new bridge would replace the existing bridge with a reinforced concrete box girder bridge (RCBGB). The two-span structure would be supported by two abutments and one pier all on pile. Rock slope protection (RSP) will be placed on site in addition to the bridge replacement.

Mitigation for the proposed project will consist of both salmonid habitat streambed enhancement gravel as well as riparian mitigation. The riparian mitigation will consist of planting 100 trees and 100 shrubs at the three upstream mitigation sites, approximated based on a 3:1 replacement ratio for species removed during construction activities. Construction of temporary falsework, cofferdams, and two temporary creek diversions will be required. (see Attachment C for Project Plan).

The applicant is also requesting a variance, per Title 23, §11(a), to the backfill requirements outlined in Title 23, §128(a)(1). See Section 5.5.2 – Backfill Variance herein for specific details.

5.0 – PROJECT ANALYSIS

5.1 – Authority of the Board

- California Code of Regulations, Title 23 (CCR 23), §6 – Need for a Permit; §11 – Variances; §121 – Erosion Control; §128 – Bridges; §131 – Vegetation
- The proposed project encroaches upon a Regulated Stream per Table 8.1 of CCR 23 which has Sacramento River Flood Control Project levees maintained by the Department of Water Resources (DWR) Maintenance Area 5.

5.2 – Project Background

The existing northbound bridge was originally constructed in 1952 and later widened in 1989. The existing structure is 323-feet long and 43.5-feet wide with 12-foot lanes and 8-foot shoulders. The existing bridge is suffering from structural issues including continuous spalling and minor punching failures to the decking, as well as critical scour due to channel degradation and thalweg migration.

5.3 – Project Design

The project proposes to replace the northbound Butte Creek Bridge because the existing bridge is experiencing substructure scour and continued deck deterioration. The bridge has a history of severe deck issues as a result of being constructed with poor materials and is experiencing continual spalling of material. The purpose of the project is to preserve the integrity of SR 99 by replacing the northbound bridge.

The new two-span RCBGB is proposed to have a 6-foot, 4-inch depth, and a 2-foot, 6-inch thick pier wall supported by a spread footing and piles. The abutments would be founded on steel piles. The substructure elements will have no roadway skew (angle between the roadway and the channel). Span lengths are 162-feet from the ends of the structure to the centerline of Pier 2 resulting in an overall structure length of 324 feet.

The southbound roadway and bridge will be utilized for detouring traffic during construction, and will require some reconstruction to strengthen the shoulders and bridge rail replacement to allow for adequate storm water deck drainage.

Mitigation will consist of both salmonid habitat streambed enhancement gravel and riparian mitigation. The riparian mitigation will consist of planting 100 trees and 100 shrubs at the three upstream mitigation sites, approximated based on a 3:1 replacement ratio for species removed during construction activities (for details see Attachment B, Exhibit A for Onsite Mitigation and Monitoring Proposal and Attachment D for a detailed Planting Plan).

The project is expected to require three construction seasons with construction beginning in April 2013 and tentatively ending in November 2016. During this time construction of temporary falsework, cofferdams, and two temporary creek diversions will be required. Special Condition TWENTY-EIGHT requires the applicant to submit two sets of plans for Central Valley Flood Protection Board (Board) staff to approve for all temporary structures prior to construction.

The following additional project analyses have been made during review of the submitted technical information.

5.4 – Hydraulic Analysis

Based upon FEMA 100-year flows of 25,000 cubic feet per second (cfs) for Butte Creek and 3,900 cfs for the Little Chico-Butte Creek Diversion Channel (a tributary to Butte Creek) a corresponding 100-year combined flow at this crossing has been calculated by the applicant to be 28,900 cfs. Current Board standards based on the Operations and Maintenance Manual for the Upper Butte Creek – Part No. 2, specify a design flow of 27,000 cfs. This is less than the 100-year combined flow, however the applicant has chosen to use the more conservative 28,900 cfs 100-year combined flow to model and design this project.

The HEC-RAS version 4.1.0 modeling program was used to compute predicted channel hydraulics for this project. Manning's roughness coefficients of 0.031 for the main channel and 0.034 to 0.100 in the floodplain were used in the model. The mitigation for the project described in Section 5.0 above was accounted for in the modeling of the proposed hydraulics. The U.S. Army Corps of Engineers (USACE) also requested the applicant to perform a sensitivity analysis (Attachment E) by varying the roughness coefficients for more conservative values to determine if there are any significant impacts by varying this factor. The results of this analysis indicate that the model is not adversely sensitive to variations in roughness. The USACE has given their concurrence with the applicant's hydraulic modeling conclusions.

The modeling (with the mitigation described in Section 5.3 above) computed a 100-year water surface elevation (WSE) of 218.45 feet at the bridge. The proposed soffit of the new structure is at elevation 221.64 feet resulting in 3.19 feet of freeboard above the 100-year WSE. This is consistent and compliant with CCR 23 standards which require a minimum of three (3) feet of freeboard above the design WSE. Calculated velocities upstream of the proposed bridge are 7.6 feet per second (fps) and will vary from 7.6 fps to 10.0 fps downstream. The proposed project without mitigation lowers the modeled WSE by approximately one-half inch (0.04 feet) from pre-project conditions. When the proposed mitigation (gravel placement and vegetation) is included in the model the resulting WSE is raised approximately one-inch (0.08 feet) from pre-project conditions. Staff agrees with the applicant's determination that the modeled impact of mitigation gravel and vegetation on the resulting channel WSE is negligible.

5.4.1 – Pier Scour

The HEC-18 modeling program was used to evaluate scour at the proposed bridge. Pier scour was calculated to be 4.8 feet in depth. Butte Creek is an active meandering channel and therefore migration within the main channel is anticipated to continue in the future. The addition of the proposed mitigation salmonid gravel is not expected to provide any structural protection from degradation at the site. The calculated scour for the site indicates that the risk of impairing the structural integrity of the bridge or channel is very low within the life of the bridge.

5.4.2 – Contraction and Abutment Scour

Contraction and abutment scour were calculated using the hydraulic design function within HEC-RAS. The modeling results led to the applicant's determination that both contraction and abutment scour will be negligible for Butte Creek at this location.

Staff agrees with the applicant's assessment and conclusions from the Final Hydraulic Report and finds the project to be hydraulically compliant with CCR 23 and have no significant adverse affects on the Butte Creek channel or levees.

5.5 – Geotechnical Analysis

Board staff agrees with the determination of the applicant's Geotechnical Foundation Report that the proposed project would result in no significant geotechnical impacts to the existing channel or the floodway. Excavation within the floodway occurs at locations

that are not critical to the integrity of the natural stream bank or channel. All fill, rock placement, excavation, and temporary structures will be completed in compliance with Permit No. 18767 (see Attachment B) and CCR 23, with the exception of Section 5.5.2. below that summarizes the applicants' request for a variance from CCR 23 standards.

5.5.1 – Rock Slope Protection (RSP)

RSP will be keyed into the levee with two layers on top of filter fabric. The extent of the RSP is between approximately 27 feet upstream and downstream of the respective northbound bridge faces. The short-term excavation impacts will be offset by the long-term benefits of bank and channel protection. This location has a history of scour and relatively fast natural velocities and staff concurs with the applicant's assessment that the RSP mitigation is needed to protect the channel, structure, and levees in this reach of Butte Creek.

5.5.2 – Backfill Variance

The applicant has submitted a request for a variance (see Attachment F) to the backfill standard in CCR 23, §128(a)(1), which states:

"Any excavation within the levee section or near bridge supports within the floodway must be backfilled in four- (4) inch to six- (6) inch layers with approved material. The levee section must be compacted to a relative compaction of not less than ninety (90) percent per ASTM D1557-91, dated 1991, which is incorporated by reference and above optimum moisture content. Compaction within the floodway must be to the density of the adjacent undisturbed material."

Per the applicant's October 17, 2012 letter (Attachment F) they are proposing that the Board's standard is not appropriate, and are requesting to instead use Caltrans' Standard Specifications (2010) SS19-3.0E which allow up to 8-inch lift layers (see Attachment B – Exhibit C).

Staff has reviewed the applicant's variance request and has determined that Caltrans' standard is suitable for this project and that the requested variance from CCR 23, §128(a)(1) will have no adverse affect on the Board's jurisdiction, the structural integrity of the bridge, or the channel.

Staff has therefore modified the language typically used for Special Condition THIRTY-THREE of Draft Permit No. 18767 to reflect the proposed variance.

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project from all pertinent agencies are shown below:

- The U.S. Army Corps of Engineers comment letter was received for this application on October 17, 2012. The letter indicates that the USACE District Engineer has no objection to the project, subject to conditions and it has been incorporated into the permit as Exhibit B (see Attachment B, Exhibit B).

- DWR Maintenance Area 5 has endorsed the project as proposed by the applicant with no conditions.

7.0 –CEQA ANALYSIS

Board staff has prepared the following CEQA Findings:

The Board, as a Responsible Agency under CEQA, has reviewed the Initial Study/Mitigated Negative Declaration (IS/MND, SCH No. 2010032105, October 2010), and the Mitigation and Monitoring Plan for the Butte Creek Bridge Project, prepared by the lead agency, Caltrans. These documents, including project design, may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2012/10-26-2012.cfm under a link for this agenda item. The documents are also available for review in hard copy at the Board and Caltrans offices.

Caltrans has determined that the project would not have a significant effect on the environment and filed a Notice of Determination on October 26. 2010. On April 2, 2012, Caltrans approved an addendum to the Initial Study/Mitigated Negative Declaration, indicating no new significant environmental effects from the change in environmental commitments.

Board staff finds that although the proposed project could have a potentially significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project proponent has incorporated mandatory mitigation measures into the project plans to avoid identified impacts or to mitigate such impacts to a point where no significant impacts will occur. These mitigation measures are included in the project proponent's Mitigation and Monitoring Plan and address impacts to biological resources.

The description of the mitigation measures are further described in the adopted Mitigation and Monitoring Plan.

8.0 – SECTION 8610.5 CONSIDERATIONS

- Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

  The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group.

- The best available science that related to the scientific issues presented by the executive officer, legal counsel, the Department or other parties that raise credible scientific issues.

  The accepted industry standards for the work proposed under this permit as regulated by Title 23 have been applied to the review of this permit.

- Effects of the decision on the facilities of the State Plan of Flood Control, and consistency of the proposed project with the Central Valley Flood Protection Plan as adopted by Board Resolution 2012-25 on June 29, 2012:

  This project has no adverse effect on facilities of the State Plan of Flood Control and is consistent with the Central Valley Flood Protection Plan.

- Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

  There are no foreseeable projected future events that would impact this project.

9.0 – STAFF RECOMMENDATION

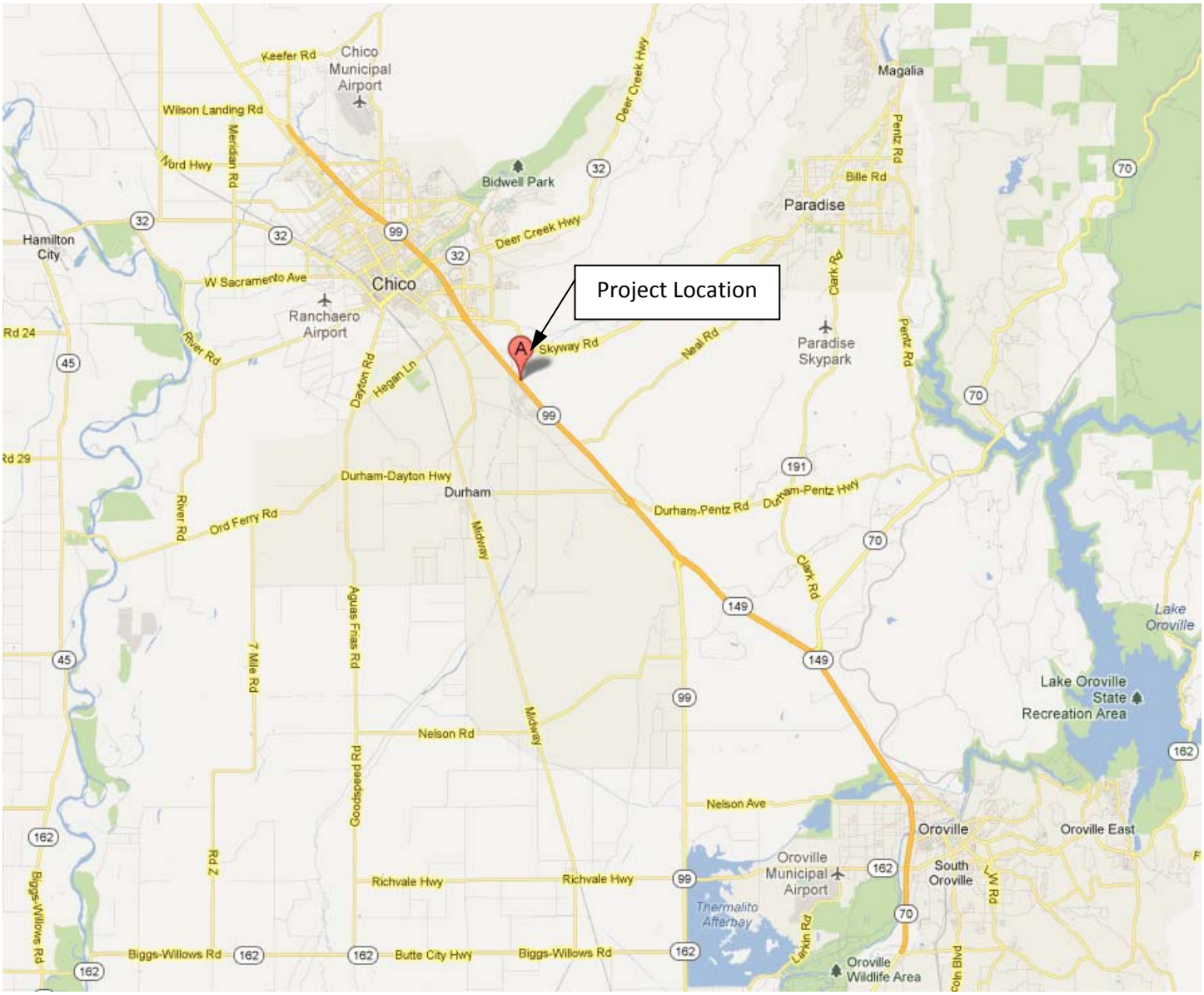
Staff recommends that the Board:

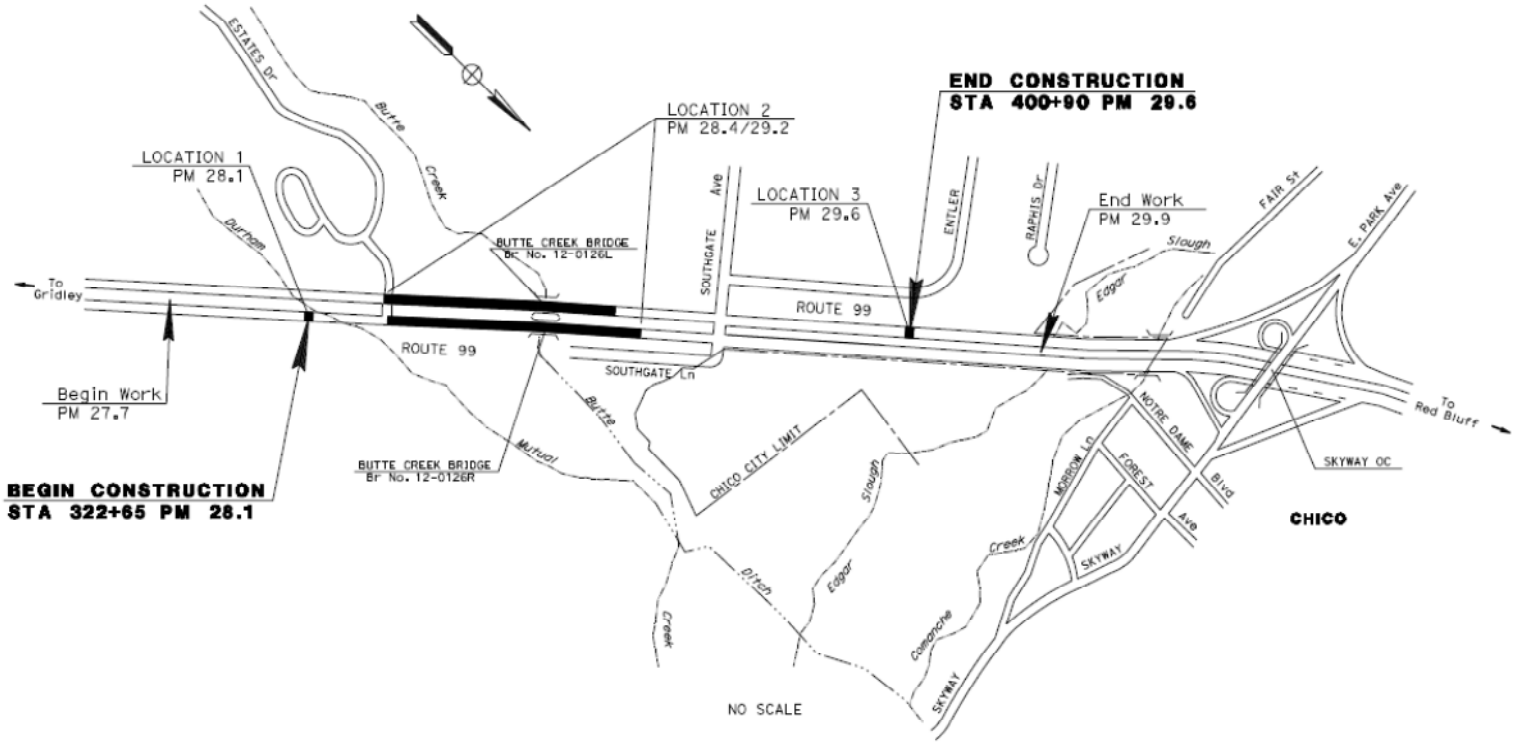
- adopt the CEQA findings,
- conditionally approve the permit with variance to CCR 23, §128(a)(1) upon receipt and approval of the applicant's Long-term Management Plan,
- direct the Executive Officer to take the necessary actions to execute the permit,
- and file a Notice of Determination with the State Clearinghouse.

10.0 – LIST OF ATTACHMENTS

A. Location Maps
B. Draft Permit No. 18767
   Exhibit A: Onsite Mitigation and Monitoring Proposal
   Exhibit B: Caltrans Standard Backfill Specifications
   Exhibit C: USACE Comment Letter (received October 17, 2012)
C. Project Design Plans (General Plan, Index to Plans, C-23 to C-27, X-1, X-2, L-1 to L-3, Foundation Plan, Pier Layout, Typical Section, and Exhibits 1 to 3)
D. Planting Plans
E. Sensitivity Analysis
F. Variance Request Letter from the Applicant

Reviewed by:	Nancy Moricz, PE
Environmental Review:	James Herota, Environmental Scientist
Document Review:	David R. Williams, PE – Projects Section Chief
	Eric R. Butler, PE – Projects and Environmental Branch Chief
	Len Marino, PE – Chief Engineer


Project Location
A
Keefer Rd
Chico Municipal Airport
Wilson Landing Rd
Meridian Rd
Ord Hwy
Bidwell Park
Deer Creek Hwy
Magalia
Pentz Rd
Bille Rd
Paradise
Hamilton City
W Sacramento Ave
Chico
Ranchaero Airport
Skyway Rd
Neal Rd
Paradise Skypark
Clark Rd
River Rd
Dayton Rd
Hegan Ln
Durham-Dayton Hwy
Durham
Durham-Pentz Rd
Ord Ferry Rd
Midway
Aguas Frias Rd
7 Mile Rd
Nelson Rd
Goodspeed Rd
Lake Oroville
Lake Oroville State Recreation Area
Nelson Ave
Oroville
Oroville East
Oroville Municipal Airport
South Oroville
Richvale Hwy
Thermalito Afterbay
Larkin Rd
Oroville Wildlife Area
Biggs-Willows Rd
Butte City Hwy


ESTATES Dr
Butte Creek
LOCATION 1
PM 28.1
Durham
LOCATION 2
PM 28.4/29.2
BUTTE CREEK BRIDGE
Br No. 12-0126L
SOUTHGATE Ave
LOCATION 3
PM 29.6
END CONSTRUCTION
STA 400+90 PM 29.6
ENTLER
RAPHIS Dr
End Work
PM 29.9
FAIR St
E. PARK Ave
Slough
Edgar
To Gridley
ROUTE 99
ROUTE 99
SOUTHGATE Ln
Begin Work
PM 27.7
BEGIN CONSTRUCTION
STA 322+65 PM 28.1
BUTTE CREEK BRIDGE
Br No. 12-0126R
Mutual
Butte
CHICO CITY LIMIT
Slough
Ditch
Creek
Edgar
Comanche
Creek
SKYWAY
NOTRE DAME
MORROW Ln
FOREST
Blvd
Ave
SKYWAY
SKYWAY OC
To Red Bluff
CHICO
NO SCALE

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18767 BD

This Permit is issued to:

California Department of Transportation
703 B Street
Marysville, California 95901

To replace the Butte Creek Bridge (No. 12-0126R) on State Route (SR) 99 in Butte County with a new bridge constructed on the existing northbound alignment. The new bridge would replace the existing bridge with a reinforced concrete box girder bridge (RCBGB). The two-span structure would be supported by two abutments and one pier all on pile. Rock slope protection will be placed on site in addition to bridge replacement. Mitigation for the proposed project will consist of both salmonid habitat streambed enhancement gravel as well as riparian mitigation. The riparian mitigation will consist of planting 100 trees and 100 shrubs at the three upstream mitigation sites, approximated based on a 3:1 replacement ratio for species removed during construction activities. Construction of temporary falsework, cofferdams, and two temporary creek diversions will be required. The project is located on State Route 99 between Estates Drive and Southgate Avenue in Butte County (Section 8, T21N, R2E, MDB&M, Maintenance Area 5, Butte Creek, Butte County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18767 BD

THIRTEEN: All work completed under this permit, as directed by the general and special conditions herein, shall be accomplished to ensure that the work is not injurious to adopted plans of flood control, regulated streams, and designated floodways under Board jurisdiction, as defined in California Code of Regulations, Title 23. This permit only applies to the completion of work in the project description located within, or adjacent to and having bearing on Board jurisdiction, and which directly or indirectly affects the Board's jurisdiction.

FOURTEEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the Central Valley Flood Protection Board, the Department of Water Resources, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim. This condition shall supersede condition TEN, above.

FIFTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

SIXTEEN: All addenda or other changes made to the submitted documents by the permittee after issuance of this permit shall be submitted to the Chief Engineer for review and approval prior to incorporation into the permitted project. The submittal shall include supplemental plans, specifications, and supporting geotechnical, hydrology and hydraulics, or other technical analyses. The Central Valley Flood Protection Board shall acknowledge receipt of the addendum or change submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Central Valley Flood Protection Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or local maintaining agency when necessary. The Central Valley Flood Protection Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days. Upon approval of submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

SEVENTEEN: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions of project conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within thirty (30) calendar days of beginning the project.

EIGHTEEN: No further plantings or work, other than that covered by this application, shall be performed in the project area without prior approval of the Central Valley Flood Protection Board. All project mitigation shall comply with the Onsite Mitigation and Monitoring Proposal, which is attached to this permit as Exhibit A and is incorporated by reference. A Long-term Management Plan must be submitted and deemed satisfactory to Board staff prior to permit issuance. The Long-term Management Plan will be attached to Exhibit A which is incorporated by reference to this permit.

NINETEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board, the Department of Water Resources, and their respective officers, agents, employees, successors and assigns, safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The Central Valley Flood Control Board and the Department of Water Resources expressly reserve the right to supplement or take over their defense, in their sole discretion.

TWENTY: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board, the Department of Water Resources, and their respective officers, agents, employees, successors and assigns, safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The Central Valley Flood Control Board and the Department of Water Resources expressly reserve the right to supplement or take over their defense, in their sole discretion.

TWENTY-ONE: The mitigation measures approved by the CEQA lead agency and the permittee are found in its Mitigation and Monitoring Reporting Program (MMRP) adopted by the CEQA lead agency. The permittee shall implement all such mitigation measures.

TWENTY-TWO: The permittee agrees to incur all costs for compliance with local, State, and federal permitting and resolve conflicts between any of the terms and conditions that agencies might impose

under the laws and regulations it administers and enforces.

TWENTY-THREE: The Central Valley Flood Protection Board and the Department of Water Resources shall not be held liable for damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

TWENTY-FOUR: The permittee shall be responsible for repair of any damages to the Butte Creek levees, channel, and other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY-FIVE: No construction work of any kind shall be done during the flood season from November 1st to April 15th without prior approval of the Central Valley Flood Protection Board.

TWENTY-SIX: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

TWENTY-SEVEN: The permittee shall contact the Department of Water Resources, Inspection Branch by telephone, (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. The permittee shall also contact the Central Valley Flood Protection Board's Construction Supervisor at (916) 574-2646 for quality assurance inspection. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

TWENTY-EIGHT: Thirty (30) calendar days prior to start of any demolition and/or construction activities within the floodway, the permittee shall submit to the Chief Engineer two sets of plans, specifications and supporting geotechnical and / or hydraulic impact analyses, for any and all temporary, in channel cofferdam(s), gravel work pad(s), work trestle(s), scaffolding, piles, and/or other appurtenances that are to remain in the floodway during the flood season from November 1 through April 15. The Central Valley Flood Protection Board shall acknowledge receipt of this submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Central Valley Flood Protection Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or local maintaining agency when necessary. The Central Valley Flood Protection Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days.

TWENTY-NINE: All debris that may accumulate around the bridge piers and abutments within the floodway shall be completely removed from the floodway following each flood season.

THIRTY: All debris generated by this project shall be disposed of outside the floodway.

THIRTY-ONE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY-TWO: Fill material shall be placed only within the area indicated on the approved plans.

THIRTY-THREE: Backfill material for excavations shall be placed in up to 8-inch layers and compacted with material as specified in CalTrans Standard Specifications (2010) SS19-3.0E to the density also specified, which is attached to this permit as Exhibit B and is incorporated by reference.

THIRTY-FOUR: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the channel.

THIRTY-FIVE: In the event existing revetment on the channel bank or levee slope is disturbed or displaced; it shall be restored to its original condition or brought to a higher standard, to the satisfaction of Board staff, upon completion of the proposed work.

THIRTY-SIX: Except with respect to the activities expressly allowed under this permit, the work area shall be restored to the condition that existed prior to start of work.

THIRTY-SEVEN: In the event that levee or bank erosion injurious to the facilities of the State plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

THIRTY-EIGHT: If the permitted encroachment(s) result in any adverse hydraulic impact or if the flows being conveyed in an overland release result in significant scouring the permittee shall provide appropriate mitigation acceptable to the Central Valley Flood Protection Board.

THIRTY-NINE: If the bridge is damaged to the extent that it may impair the channel or floodway capacity, it shall be repaired or removed prior to the next flood season.

FORTY: The permitted encroachment(s) shall not interfere with operation and maintenance of the present or future flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

FORTY-ONE: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

FORTY-TWO: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

FORTY-THREE: At the request of either the permittee or Central Valley Flood Protection Board the permittee and Board shall conduct joint inspections of the project and floodway after significant flood events or flood seasons to assess the integrity and operation of the project, and to assess and respond to any adverse impacts on the floodway or adjacent properties.

FORTY-FOUR: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board. A professional engineer registered in the State of California shall certify that all work was inspected and performed in accordance with submitted drawings, specifications, and permit conditions.

FORTY-FIVE: Upon completion of the project, the permittee shall submit a final completion letter to: Central Valley Flood Protection Board, 3310 El Camino Avenue, Suite 162, Sacramento, California 95821 and the Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite 256, Sacramento, California 95821.

FORTY-SIX: The permittee shall submit as-built drawings to the Department of Water Resources' Flood Project Inspection Section, located at 3310 El Camino Ave, Room 256, Sacramento, California, 95821, upon completion of the project.

FORTY-SEVEN: Within 120 days of completion of the project, the permittee shall submit to the Central Valley Flood Protection Board a certification report, stamped and signed by a professional engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Central Valley Flood Protection Board permit conditions and submitted drawings and specifications.

FORTY-EIGHT: The permittee shall be responsible for securing any necessary permits incidental to habitat manipulation and restoration work completed in the flood control project, and will provide any biological surveying, monitoring, and reporting needed to satisfy those permits.

FORTY-NINE: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

FIFTY: The permittee shall comply with all conditions set forth in the comment letter from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated October 17, 2012, which is attached to this permit as Exhibit C and is incorporated by reference.

Onsite Mitigation and Monitoring Proposal for the California Department of Transportation's

Butte Creek Bridge Replacement Project on State Route 99 in Butte County

03-BUT-99
PM 28.1/29.6
EA: 03-3E6201/EFIS: 03-0000-0509-1

Prepared by:

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INTRODUCTION

The California Department of Transportation (Caltrans), in conjunction with the Federal Highway Administration (FHWA), is proposing a northbound bridge replacement project on State Route (SR) 99 in Butte County from highway post miles (PM) 28.4 to 29.4 (Figures 1 and 2). The project area can be located on the Chico USGS 7.5-minute quadrangle (Section 8 of Township 21N Range 2E). The Environmental Study Limit (ESL) encompasses an area of approximately 11 acres.

This Mitigation Monitoring Proposal (MMP) serves to satisfy the revegetation and water quality requirements of the U.S. Army Corps of Engineers (USACE), the California Department of Fish and Game (CDFG), the National Marine Fisheries Service (NMFS), and the Central Valley Regional Water Quality Board (CVRWQB). The MMP is also being prepared to satisfy General Condition 13 of the USACE's Nationwide Permit 23 (Approved Categorical Exclusions), which states that a pre-construction notification (PCN) must include a compensatory mitigation proposal with reasonable measures to avoid and minimize adverse effects to aquatic resources.

This plan proposes measures to replace woody riparian trees, removed by construction activities, on a 3:1 ratio. Planting is proposed at three locations upstream of the bridge (Exhibit A) on property owned by the California Department of Fish and Game. The three locations were identified during an interagency field meeting on April 24, 2012, between representatives from California Department of Transportation, California Dept. of Fish and Game and California Department of Water Resources. Previously proposed planting locations caused flooding and increased maintenance concerns for the California Department of Water Resources who is responsible for maintaining the floodplain. Maintenance activities currently include clearing, or reducing vegetation and limbing of trees, except within the 15 feet adjacent to the water's edge, which in agreement with the California Department of Fish and Game, the Department of Waters Resources leaves as a vegetated buffer and does not do any maintenance in. The Department of Water Resources requested Caltrans identify planting locations at least 50 feet upstream or downstream of the bridge and within this 15 foot buffer zone.

PROJECT DESCRIPTION

The existing northbound (NB) bridge structure over Butte Creek is experiencing substructure scour and continued deck deterioration and is in need of a replacement. This bridge has a history of severe deck issues as a result of being constructed with poor materials and is experiencing continual spalling, or chipping away of material. The purpose of the project is to maintain the integrity of the transportation facility by replacing the existing bridge structure.

Within the limits of the project, SR 99 is a 4-lane expressway with two lanes traveling southbound (SB) and two lanes traveling NB. The NB roadway consists of two 12-foot lanes and 8-foot shoulders, while the southbound roadway consists of two 12-foot lanes and 5 to 10-foot shoulders.

The existing bridge structure is a 5 span continuous reinforced concrete structure with 4 pier walls that is approximately 323 feet long and 43.5 feet wide. The new bridge would be a 324 feet long reinforced concrete box girder bridge with two 12-foot-wide lanes and a 5-foot wide shoulder on the west side and 10-foot wide shoulder on the east side. Two abutments on piles and 1 pier wall on spread footings would support the 2 span structure. Temporary false work,

cofferdams, and a creek diversion/gravel pad crossing will be required for the demolition and construction of the new bridge.

Roadwork will involve removing and replacing failed pavement areas, reconstructing existing shoulders, placing new Asphalt Concrete (AC) pavement, grinding Portland Cement Concrete (PCC), constructing a temporary crossover median detour, temporary culverts, extending existing culverts, replacing drains, placing Rock Slope Protection (RSP), removing and replacing flashing beacons and traffic sensors, installing temporary highway lighting, and constructing new bridge approach metal beam guard railing (MBGR). The southbound roadway will be utilized for detouring traffic and will require some reconstruction to strengthen the shoulders. The roadways (NB and SB) within the project limits will be paved with an Open Graded Friction Course-OGFC, formally known as Open Graded Asphalt Concrete overlay.

Both the NB and SB lanes will remain open through the construction zone. The SB bridge (#12-0126L) will accommodate three lanes of traffic separated by a temporary concrete barrier (two SB lanes and one NB lane), requiring a one-lane crossover median detour. While the bridge is under construction, it will accommodate one lane of traffic at a time while the other half is in being constructed. Once one half of the bridge is built, traffic will switch to the newly constructed half, and the other half of the bridge will be built.

Vegetation in Butte Creek, adjacent to the bridge varies by channel landform and current maintenance activities. On the upstream side of the bridge there is a 20-foot wide strip of riparian vegetation that borders Butte Creek on the south bank. This vegetation is dominated by large alders (*Alnus rhombifolia.*), along with some sycamore (*Platanus racemosa*) and Oregon ash (*Fraxinus latifolia*), all of which are adjacent to the bridge area and form a dense vegetation band along the bank. The northeast side of the creek is dominated by willows including sandbar willow (*Salix exigua*), arroyo willow (*S. lasiolepsis*), and red willow (*S. laevigata*). This is more of an ephemeral side channel area. The willows here are young and are likely either regularly removed by high flows, or with flood maintenance activities. There are also Fremont cottonwoods (*Populus fremontii*) present immediately north of the willow area, further from the water channel. Sycamore and ash are interspersed here as well, along with an understory of annual grasses and forbs. The riparian vegetation here consists of groupings of trees or individuals scattered over the floodplain, with most of these appearing to be limbed by flood control activities. The southwest and northwest banks of the creek on the downstream side of the bridge, do not currently have riparian trees present near the creek, likely due to vegetation clearing.

The understory in the floodplain adjacent to the bridge consists mainly of yellow star thistle (*Centaures solstitialis*), tree-of-heaven (*Ailanthus altissima*), scotch broom (*Cytisus scoparius*), wild grape (*Vitis californica*), Himalayan blackberry (*Rubus discolor*), mugwort (*Artemesia douglasiana*), sedge (*Cyperus* sp), mint (*Mentha* sp.), plantain (*Plantago major*), and poison oak (*Toxicodendron diversilobum*).

No wetlands will be impacted by the project as there are none within project limits, however; there will be approximately 0.11 acres of permanent impacts, and 0.48 acres of temporary impacts to other waters of the U.S. in Army Corps of Engineers and California Department of Fish and Game jurisdictional areas.

Work windows will be utilized, and construction activities will be conducted during the dry season. Where possible, equipment will be used outside of the active stream channel. Staging areas will be on existing disturbed areas; vegetation will be trimmed rather than removed where feasible; environmentally sensitive areas (ESA's) will be established around elderberry shrubs that will not be impacted by project activities; riparian and stream habitat disturbed by the project will be restored; and Caltrans Best Management Practices (BMPs) for containment measures and erosion control will be utilized as well. Elderberry shrubs permanently lost by project activities will be mitigated for at an approved conservation bank.

NMFS has requested that Caltrans mitigate at a 3:1 ratio for loss of riparian species adjacent to the creek that provide shading. Restoration of the habitat will potentially benefit overall water quality as well as provide shaded riverine habitat for aquatic species, including salmon and trout that utilize Butte Creek as a migration corridor. Having only one pier in the creek along with RSP on the southeast bank, partially in the water, will potentially benefit overall water quality and improve the existing functions and values of surface water systems within and downstream from the ESL.

PROJECT IMPACTS
There are no wetlands within project limits, therefore no compensation for these waters of the U.S. will be necessary.

A total of 0.082 acre of USACE jurisdictional (below the ordinary high water mark) other waters of the U.S., including Butte Creek and the one culvert drainage exhibiting a defined channel, will be permanently impacted by the placement of 461.27 yds^3 of fill. Approximately 460 yds^3 of this fill will come from the construction of a new concrete pier and footing for the new northbound bridge, and placement of Rock Slope Protection (RSP) in the creek.

A total of 0.47 acre of soil and vegetation will be temporarily impacted above the ordinary high water mark in the bridge area. This includes the approximately 16 riparian trees that will be removed due to the construction of temporary access roads, and other project construction related activities. The trees consist mainly of cottonwoods, alders, and sycamores.

There are also five culverts within project limits that will be extended during construction activities. None of these are jurisdictional due to having no connectivity to other waters. These culverts serve only to convey stormwater or roadside runoff after rain events. They are not included under biological impacts or mitigation measures, and will be revegetated as part of Caltrans permanent erosion control measures.

GOAL
A 3:1 replacement ratio of riparian trees removed by construction activities.

OBJECTIVE
The proposed mitigation intends to successfully establish 50 riparian trees at the end of the five year responsibility period.

IMPLEMENTATION AND SCHEDULE
Project construction activities are scheduled to begin in the year 2012 and will most likely extend over three construction seasons. Temporary on-site erosion control will be in place at the end of

each work season, and permanent erosion control will be provided by the close of the final work season. Planting will begin in the fall following completion of construction (approximately fall of 2015). Planting is proposed over the period between October 15 and November 15. This window will allow for plants to establish before the onset of cold temperatures and high flows. If supplemental planting is needed, it will be implemented the following winter/spring, between February 15 and March 15. Caltrans will contract with the California Conservation Corps to implement planting, watering and maintenance. Planning and oversight of all work will be done by the Caltrans Revegetation Specialist.

PLANTING PLAN

Three locations were selected for planting as part of an interagency field review on Tuesday April 24, 2012. These locations were chosen because of their distance from the bridge structure to reduce flood concerns (greater than 50 feet), but also by their current lack of woody vegetation and appropriate conditions for planting (close enough to water). In general, the 15 foot buffer zone along Butte Creek water channel is densely vegetated, but there are areas along the water channel that lack woody riparian vegetation (Exhibit A). There was not one area large enough to ensure adequate room for Caltrans planting needs, so three areas were selected, each with varying site characteristics, and believed acceptable for planting and achieving our mitigation goal (Exhibit A). The limits of these planting areas are provided in Exhibit A. Due to variability in soil and habitat conditions, the specific placement of plants will be determined in the field prior to planting, not on project plans. In general, the lower limit of the 15 foot planting zone will be identified in the field based on the typical water line or lower limit of vegetation establishment.

PLANTING STRATEGY

This plan proposes to plant many small container plants and cuttings, many more than is needed to allow for natural mortality, site conditions and plant variability. Past mitigation results has shown Caltrans that better overall long term plant survival and establishment is achieved when:

- Plant using many small plants, planted over a larger area,
- Use of plants with a natural root to shoot ratios, that have not been in the nursery for long periods of time,
- planted in fall (Oct-Nov) when temperatures are still warm enough for root growth
- planted in fall to take advantage of the full precipitation season
- and require less summer watering or maintenance

This strategy increases our chances of putting the right plant, in the right place, under the right conditions for long term success, rather than using a strategy based on planting just the number needed to be successful and then watering and performing maintenance for several years to ensure success of those specific individual plants.

Site A - Cut Slope: This location is on the south side of the creek, approximately 700-900 feet upstream of the bridge (Exhibit A). This is a cut bank that currently has little vegetation and appears unstable (actively eroding). On close inspection, some areas are stabilizing and vegetation is establishing. Caltrans is proposing to plant a narrow band of alder, mulefat and sandbar willow along the edge of the water channel. Alder will be from container materials and will be planted approximately 20 feet apart. Sandbar willow and mulefat will be from cuttings, both of which are shrub sized plants rather than trees. Cuttings will be 24 inches in length, and

will be planted 18 inches into the soil, approximately 3-5 feet apart. Cuttings have variable success, so many more than is needed will be planted. All planting at this location will be within 1-2 feet of the water line. Planting will only occur at the base of the slope, the upper portions of the slope are too steep for planting.

Site B – Terrace: The second location is a grassy terrace just upstream of Site A, on the south side of the creek, approximately 900-1100 feet upstream of the bridge (Exhibit A). The terrace is a few feet above the water's edge, with just a few widely spaced trees present. Caltrans is proposing to plant on the terrace, over the 15 foot buffer zone from the water's edge. Plantings here will focus on cottonwood, Oregon ash and sycamore, with a few willow and mulefat. Cottonwood and sycamore from containers, will be planted approximately 15 feet apart, with mulefat and willow planted from cuttings, between them approximately 5 feet apart.

Site C – Bedrock Area: The third location is on the north side of the creek approximately 1100-1250 feet upstream of the bridge. This location has a large bare area that extends out into the water channel that corresponds to hardpan or bedrock exposed at the surface (Exhibit 1). Planting areas appear to be present on the west and north sides of the bedrock outcrop. Caltrans is proposing to plant a mix of sycamore, Oregon ash and cottonwood approximately 15 feet apart, with willow and mulefat planted between them approximately 5 feet apart. Planting will only occur within the buffer zone, within the 15 feet of the water's edge, outside of the bedrock.

SPECIES TO BE PLANTED

white alder (*Alnus rhombifoli)*
Oregon ash (*Fraxinus latifolia)*
arroyo willow (*Salix lasiolepsis*)
red willow (*Sali. laevigata)*
California sycamore (*Platanus racemosa*)
sandbar willow (*Salix exigua*)
Fremont cottonwoods (*Populus fremontii*)

PLANT MATERIALS

All cuttings and container plants will be from sources generated from the vicinity of the project. Cuttings will be taken from sources upstream and downstream of the work area, with no more than 50% of willows in the area affected and no more than 30% of individual plants removed. Container plants will be purchased from a commercial nursery and will be from source material from the vicinity of the project and similar elevation and habitat characteristics.

MULCH

No mulching will occur because all planting will be performed in the active channel and any mulch placed will be carried away by water flows.

IRRIGATION

Container plants and cuttings will be watered at planting and will receive supplemental watering by hand, using water from Butte Creek. Watering will be done by the CCC at the direction of the Revegetation Specialist. The watering schedule will be based on natural precipitation, temperature, and site monitoring to determine actual needs. The goal will be to provide water necessary to successfully establish deep-rooted plants that are quickly able to survive on their own, rather than shallow surface-rooted plants that rely on regular watering. To accomplish this goal, the proposed schedule will be to water plants after planting once a week for four weeks, and then once every other week until the onset of rains in fall. Watering will be performed over the first summer, if determined necessary, based on site reviews. Watering will be performed over

the fall and summer of the second year only if additional planting is implemented and watering is determined needed. Irrigation does not need to be long term because planted material will be within reach of water table within the first season.

MAINTENANCE PLAN
Caltrans will maintain the plantings for five years. The plantings are expected to successfully establish within the first season. However, maintenance will be available over the 5 year responsibility period. Maintenance funding will be built into the five year CCC contract to address needed remedial measures. Potential maintenance will include such activities as replacement plantings, removing dead plants or weeding plant basins. All maintenance actions will be under the direction of the Caltrans Revegetation Specialist.

Site inspections are proposed after planting, and then over the following five growing seasons. These site inspections will help identify the need for specific maintenance actions. The mitigation areas will be inspected at least twice the first fall after planting and four times over the first summer to verify plant establishment, growth, watering and maintenance needs, and to check whether any problems have occurred. If no problems have occurred, two inspections per year will be performed during years two through five. If problems are identified, additional inspections may be necessary to verify that adequate remedial action has taken place.

PROTECTIVE SIGNS
Caltrans will mark plantings and work with Water Resources and California Department of Fish and Game to place signs to identify mitigation.

WEEDS
Weeds will be hand removed from planting basins and planting areas to reduce competition. The only weeds we will address will be ones that threaten the survival of the plantings, example giant reed grass, broom, tamarisk, or yellow star thistle that occur immediately adjacent to plantings. Caltrans does not propose to remove invasive weeds from larger areas around the bridge or mitigation planting areas.

LONG TERM MAINTENANCE
No long term maintenance actions are proposed after successfully achieving our mitigation goals and the five year responsibility period is complete. Planting will be completely within the 15 foot buffer along the water channel where routine maintenance is not implemented.

MONITORING
Monitoring will be performed once each year, for 5 years, between April 1 and June 1 of each year. Riparian sites with primarily deciduous plants should be monitored before dry conditions occur and plants loose leaves, leading to possible incorrect conclusions regarding survival. Monitoring for this project will involve a census of plants to determine survival rate of planting and cuttings. Results will be documented on aerials or project plans. Permanent photo points will be set up to document the revegetation effort and show yearly increases in cover

MONITORING REPORT
Results from monitoring will be documented and forwarded to regulatory agencies annually for 5 years. The report would be submitted no later than December 31st of each year. The first monitoring report would be submitted by December 31st of the second year post-construction. If

the mitigation activities have met the criteria described below, then the mitigation will be considered successful, a final annual report will be submitted, and no further monitoring or maintenance activities will be conducted beyond the 5 year monitoring period

SUCCESS CRITERIA

First –Second year success criteria will be met if:

- A minimum of 75 riparian trees have survived from the initial planting.

Third-Fifth year success criteria will be met if:

- A minimum of 50 riparian trees have survived from the initial planting
- Continual increases in plant cover are documented through photos.

ADAPTIVE MANAGEMENT/REMEDIAL MEASURES

If success criteria are not met for all or any portion of the mitigation project in any year, additional effort will be made to meet the requirements. The reason for not meeting the success criteria will be evaluated and corrected. If significant measures are needed, the planting strategy will be re-evaluated, including looking at soil conditions, hydrology, site preparation, planting techniques, and plant materials. Caltrans will coordinate with the regulating agencies to determine appropriate remedial actions, which could include in lieu fees or other off-site measures. If significant remediation measures are needed, the maintenance, monitoring, and reporting obligations will continue for 5 years after implementation of such measures or until the success criteria have been met, whichever occurs first.

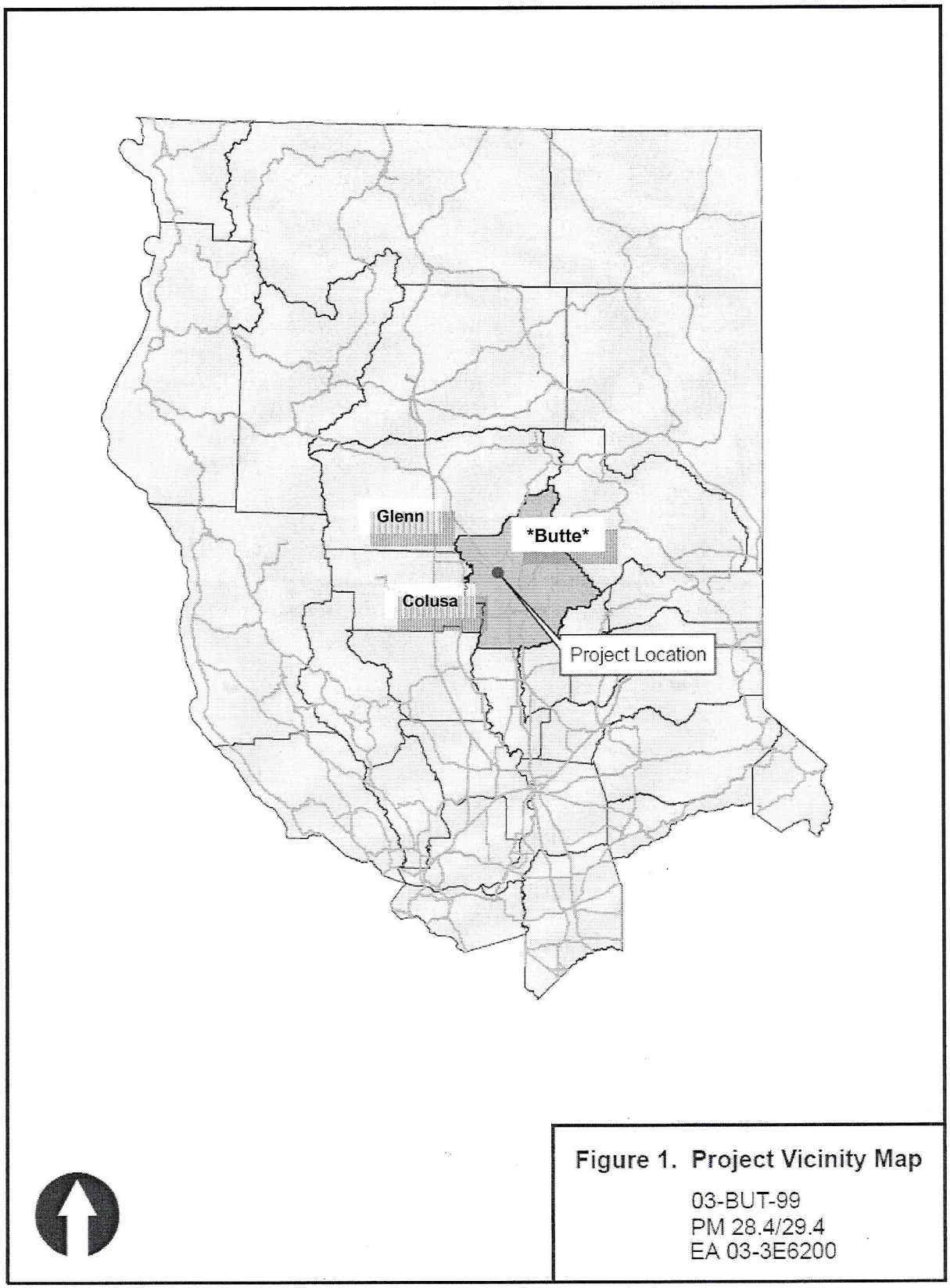

Figure 1. Project Vicinity Map

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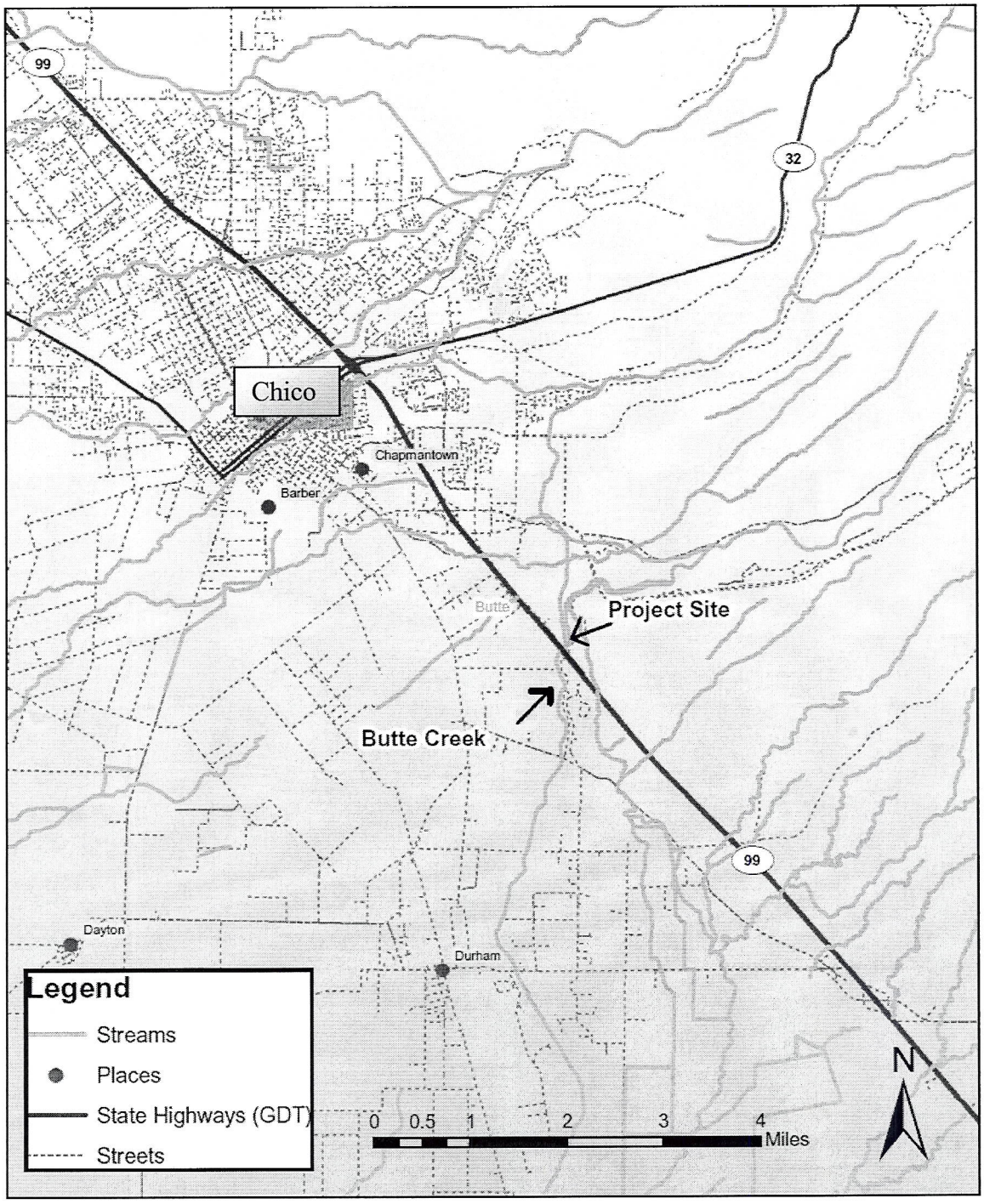


Figure 2. Project Location Map

Attachment B - Exhibit A: Onsite Mitigation and Monitoring Proposal

California Test 216
October 2006

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
Transportation Laboratory
5900 Folsom Boulevard
Sacramento, California 95819-4612

METHOD OF TEST FOR RELATIVE COMPACTION OF UNTREATED AND TREATED SOILS AND AGGREGATES

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section K of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. GENERAL SCOPE

This method of test shall be used to determine the relative compaction of untreated and treated soils and aggregates.

Relative compaction in this method is defined as the ratio of the in-place wet density of a soil or aggregate to the test maximum wet density of the same soil or aggregate when compacted by a specific test method.

The in-place, wet density shall be determined in accordance with Part 1 of this method of test.

The laboratory test maximum wet density and percent relative compaction shall be determined in accordance with Part 2 of this method of test.

PART 1. IN-PLACE WET DENSITY

A. SCOPE

The principal use of the in-place wet density value is in the relative compaction control of earthwork construction; however, the identical procedure and apparatus are also employed to obtain data for volume-to-weight conversion factors and shrinkage or swell factors. The determination of the in-place wet density requires excavating and weighing a sample of soil from the area under investigation, measuring the volume of the sample excavation by back-filling with a calibrated test sand, and calculating the unit wet weight of the excavated sample.

B. TEST PROCEDURE

This test shall be done in accordance with AASHTO T 191, "Density of Soil In-Place by the Sand-Cone Method."

NOTE: Typically, the test hole excavation alone will not provide a sufficient volume of material required for completion of Part 2 of this test method. Therefore, it is necessary to obtain a bulk sample of soil immediately adjacent to the excavated test hole following the completion of the sand volume measurement.

C. RECORDING DATA

The block headed "Sand Volume Data" on the Relative Compaction Test Worksheet provides for the data accumulated at the in-place test hole site.

PART 2. LABORATORY COMPACTED TEST MAXIMUM WET DENSITY AND PERCENT RELATIVE COMPACTION

A. SCOPE

A bulk sample of soil is divided into smaller portions. These portions are prepared with varying moisture contents

to form test specimens, which are individually compacted by a uniform compactive effort, to determine the test maximum density for the particular soil under consideration.

NOTE: The test maximum density determination and percent relative compaction for Class A CTB is determined according to California Test 312.

B. APPARATUS

1. The standard California impact compaction test apparatus consisting of a split cylindrical mold, a 10.0 lb tamper, a metal piston, and a piston-handling rod, as illustrated in Attachment 1. (Note: see CTM 110 for calibration.)

2. A concrete base block, or an equally rigid body, approximately 1 cubic foot in size.

3. A balance or scale of at least 3 kg capacity and sensitive to 1 g.

4. Miscellaneous mixing bowls, spoons and spatulas, five moisture-sealed containers (approximately 1 gallon capacity) to be used to store each specimen and five moisture-sealed containers (approximately ¼ gallon capacity) to be used to store each portion of a specimen.

C. BULK SAMPLE

Obtain a bulk sample of soil, 35 lbs minimum in weight, at the site of the in-place density test hole. It is essential that the bulk sample be preserved at the same moisture as prevailed at the time of excavation for the duration of the test. Use only moisture-proof containers and protect from high temperatures.

D. PREPARATION OF TEST SPECIMENS

1. Separate the bulk sample on the ¾-inch sieve, and weigh both the retained and passing fractions and compute the percentage retained in terms of wet weight of the total bulk sample. If 10 % or more of the total weight is retained on ¾-inch sieve, follow the test procedure set forth in Section I of this Part 2. If the retained ¾-inch fraction comprises less than 10 % by weight of the total bulk sample, discard it and divide the passing ¾-inch fraction into representative test specimens of exactly equal weight, each sufficient in amount to form a compacted test specimen of 10 to 12 inches in height when compacted as specified in the following section E.

2. It is of the utmost importance that all of the bulk sample material be thoroughly mixed. Each test specimen must be representative of the mass, be of equal weight, be weighed in immediate succession, and be placed at once in the one-gallon moisture-sealed individual containers.

3. The correct weight for each test specimen will depend on the soil type and the moisture content; 2200 to 2700 grams wet weight is the usual range of weight.

4. Record the initial weight of the individual test specimens on line “I” of the Relative Compaction Test Worksheet.

E. COMPACTION OF TEST SPECIMENS

1. Divide one of the test specimens prepared as outlined in the foregoing Section D into five approximately equal portions by either weight or volume measurement, and store in separate ¼-gallon moisture-sealed containers. Place one portion in the test mold and compact it with 20 blows of the tamper dropping free from a height of 18 inches above the surface of the material in the mold. Repeat this operation for each of the remaining four portions. After the compaction of the fifth portion, place the piston in the mold and level the top of the compacted specimen with five blows of the tamper dropping free

from a height of 18 inches above the surface of the piston.

2. With the tamper foot resting on the piston atop the compacted test specimen, read the graduated tamper shaft to the nearest graduation at a point level with the top of the mold. Enter this value on line "J."

3. Obtain the adjusted wet density in grams per cubic centimeter from Table 1 corresponding to the tamper shaft graduation reading using the column corresponding to the initial wet weight of test specimen (line "I") and record it on line "K."

4. Save the specimen temporarily for possible later use. (See the first paragraph of Section G of this Part 2).

5. Adjust the moisture contents of the remaining test specimens to satisfy the following conditions:

   a. The object is to have at least one test specimen with a moisture content below test optimum, one close to optimum and one above optimum, at about 2 % moisture content increments, with a minimum of three test specimens. While the actual moisture contents will not be known, the moisture content of the test specimen with the highest adjusted wet density is the test optimum moisture content even though the moisture content is unknown. Therefore, the primary objective is to have a number of test specimens and a range of moisture contents such that at least one specimen will be compacted at a moisture content less than, and one at a moisture content greater than, the moisture content of the specimen having the highest adjusted wet density. If this condition cannot be satisfied with the minimum three test specimens it will be necessary to fabricate additional specimens.

   b. The first test specimen is generally compacted at the moisture content present in the bulk sample. If this specimen appears to be considerably drier than the optimum, mix additional water into each of the remaining specimens. If it appears to be definitely wetter than the optimum, reduce the moisture content of the other specimens by aeration. Partial oven drying may be used, but do not completely oven-dry the specimens and then remix with water. If it appears to be close to the optimum, increase the moisture content of one of the remaining test specimens and reduce it in the other one to bracket the initial specimen thought to be at optimum.

   c. The test optimum moisture content will usually be the minimum moisture content which will ball the soil readily when compressed into a roll by the grip of the hand, but still permit the roll to be broken without crumbling or pulverizing appreciably at the breaking point.

   d. The base plate of the test mold normally shows indications of dampness when a soil is compacted at the test optimum moisture content. Free water on the base plate definitely denotes excessive moisture content. A dry, dusty base plate signifies a deficiency of water.

6. After adjustment of the moisture content, compact each of the remaining test specimens in the mold, then record the water adjustment, tamper reading and the corresponding adjusted wet density from the chart on Table 1 using the column corresponding to the initial wet weight (line "I").

7. Regardless of the soil type or particle sizes involved, fresh soil (not soil

from previously compacted specimens) must be used in the compaction of each test specimen. The compactive effort being equal for each layer, it is also important that the thickness of layers be equal to assure uniformity of compaction between test specimens.

8. Throughout the compacting operation the test mold must stand either on the standard concrete base block or on an equally rigid body.

9. In reassembling the test mold after removing a core, the wing nut should be drawn up only finger tight. The purpose of the wrench is to release the wing nuts when locked by expansive soils in the mold. Excessive tightening of the nuts distorts the circular cross-section of the mold. In gauging the 18-inch height of fall for the tamper, the hook and rod arrangement, shown in Attachment 1, should be used.

F. COMPUTATION OF RELATIVE COMPACTION

Compute the percent relative compaction to the nearest 0.1 % by the formula:

% Relative Compaction = $(D_1/D_2) \times 100$

Where:

D_1 = In-place wet density as shown on line "H."
D_2 = Highest adjusted wet density as determined by this method.

For reporting and specification compliance purposes, show the percent relative compaction as a whole number. If the computed value ends in a number with a fractional portion of 0.5 % or greater, report the relative compaction as the next higher whole number. If the computed value ends in a number with a fractional portion of less than 0.5 %, report it without changing the whole number.

Attachment 3 presents an example of a properly completed Relative Compaction Test Worksheet.

G. MOISTURE CONTENTS

The moisture content of the specimen with the highest adjusted wet density is the optimum moisture. The moisture content of the specimen compacted without addition or reduction of water will represent the in-place moisture content of the soil at the test site. If either moisture content is desired, the determination is made in accordance with California Test 226. Once the moisture contents are determined, percent relative compaction can also be determined by relating dry in-place density to dry test maximum density.

Provision is made at the bottom of the Relative Compaction Test Worksheet for determination of the Moisture Adjustment for Aggregate Base Pay Quantities, if desired.

H. MOISTURE-DENSITY CURVE

A moisture-density curve may be formed by plotting the adjusted wet density versus change in grams of water added or subtracted in adjusting the moisture contents of the test specimens. The sample curve appearing on Attachment 3 was plotted from the data presented on line "K" and the "Water Adjustment" line.

The highest point on the curve represents the maximum density, in this instance 2.14 at 0 grams of water ("0 grams" thus means in-place moisture content at test site is optimum moisture).

I. CORRECTION FOR OVERSIZE MATERIAL

1. The diameter of the test mold limits the size of particles that may be included in the test to that passing ¾-nch sieve. In those instances where the original material from which the test specimens are obtained contains 10 % or more by weight of particles retained on the ¾-inch sieve,

a correction must be applied to the test.

The density correction is calculated by the following:

$$\text{Corrected Density} = \frac{100}{\frac{\%\ -3/4\ \text{inch}}{G_1} + \frac{\%\ +3/4\ \text{inch}}{YG_2}}$$

G_1 = Specific gravity of – 3/4 inch material
G_2 = Specific gravity of +3/4 inch material
Y = Coefficient for +3/4 inch aggregate

% +3/4 inch	Y
20 or less	1.00
21-25	0.99
26-30	0.98
31-35	0.97
36-40	0.96
41-45	0.95
46-50	0.94

2. Record the total weight of bulk sample on line "L."

3. Separate the bulk sample on the ¾-inch sieve, wash the retained ¾-inch material, remove excess surface water by rolling sample in a large, absorbent cloth. Weigh in air and record on line "M."

1. Weigh the retained ¾-inch fraction in water and record on line "N."

5. The impact test is performed on the passing ¾-inch fraction as outlined in Sections C through E of this Part 2.

6. The remainder of the calculations necessary to compensate for the retained ¾-inch material and to determine percent relative compaction is shown on lines "O" through "V."

7. When a number of tests on soil containing essentially the same nature of retained ¾-inch material are anticipated, a constant may be developed to minimize the weighing in air and water operations.

J. SIMPLIFICATIONS FOR CONSTRUCTION CONTROL

Construction control by wet density tests may be expedited. If the relative compaction based on any test specimen density is below the specified minimum it may be immediately reported that the area under test has failed to meet the specifications. It is not necessary to fabricate additional test cores for the reason that if a higher wet density was reached with subsequent test cores the relative compaction based on this higher density would be still lower than that indicated by the single core. When the relative compaction indicated by a single test core is more than the minimum specified, additional cores are necessary to be certain that any increase in wet test maximum density attained with the subsequent cores does not lower the relative compaction value to below the specification minimum.

K. SAFETY AND HEALTH

Prior to handling, testing or disposing of any waste material, testers are required to read Part A, (Section 5.0), Part B, (Section 5.0, 6.0, 10), and Part C, (Section 1.0) of Caltrans Laboratory Safety Manual.

REFERENCES
California Tests 231, 312, 226 and 110
ASTM D 1556

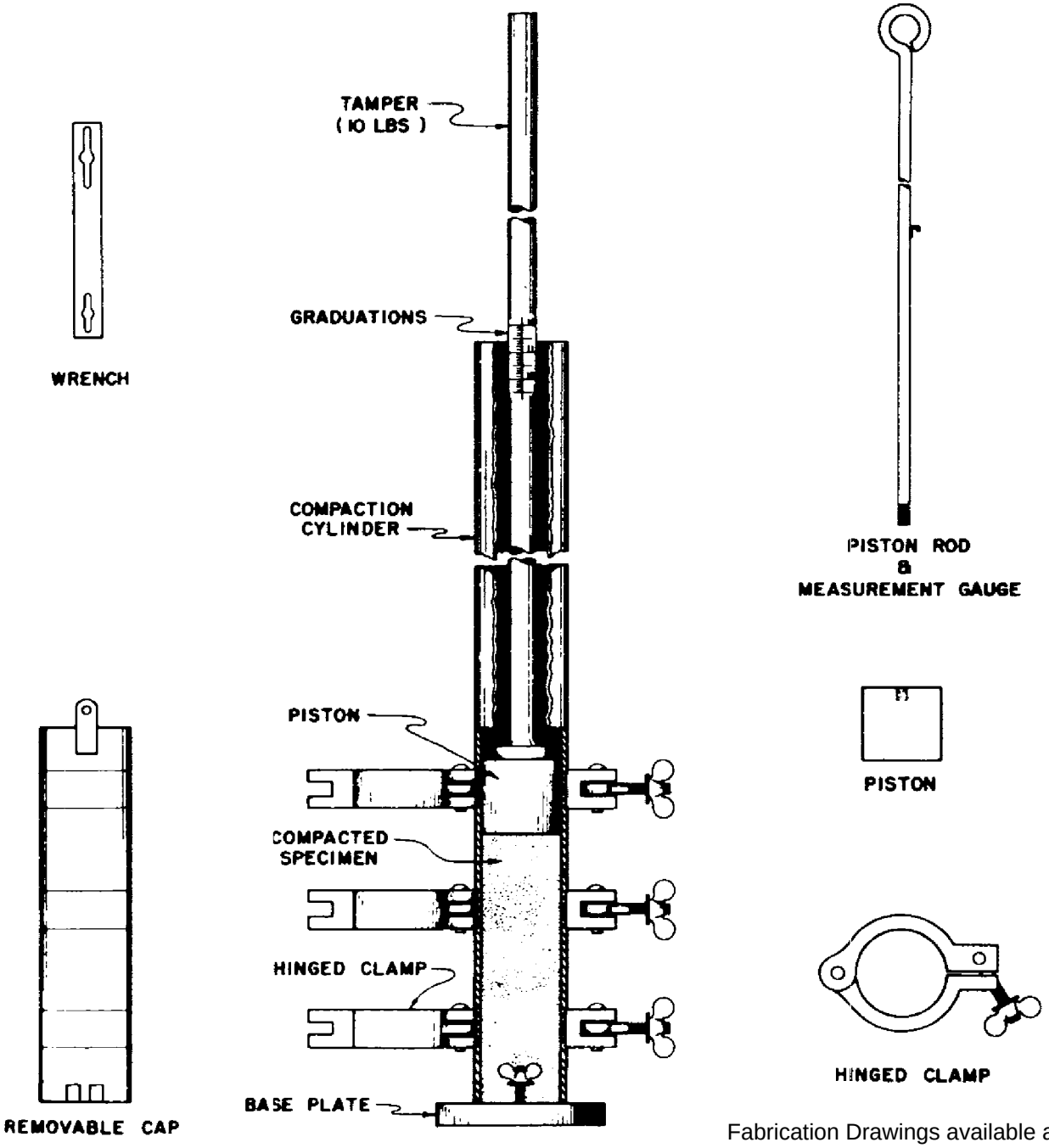
End of Text
(California Test 216 contains 9 pages)

TABLE 1
CALIFORNIA IMPACT TEST APPARATUS CONVERSION TABLE

Tamper Reading to Grams per Cubic Centimeter for Impact Test Core Weights

Tamper Reading	Weight of Test Core (g)										
	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700
10	2.09	2.13	2.18	2.23	2.27	2.32	2.37	2.42	2.46	2.51	2.56
10.1	2.06	2.11	2.16	2.21	2.25	2.30	2.35	2.39	2.44	2.49	2.53
10.2	2.04	2.09	2.14	2.18	2.23	2.28	2.32	2.37	2.42	2.46	2.51
10.3	2.02	2.07	2.12	2.16	2.21	2.25	2.30	2.35	2.39	2.44	2.48
10.4	2.01	2.05	2.10	2.14	2.19	2.23	2.28	2.32	2.37	2.42	2.46
10.5	1.99	2.03	2.08	2.12	2.17	2.21	2.26	2.30	2.35	2.39	2.44
10.6	1.97	2.01	2.06	2.10	2.15	2.19	2.24	2.28	2.33	2.37	2.41
10.7	1.95	1.99	2.04	2.08	2.13	2.17	2.21	2.26	2.30	2.35	2.39
10.8	1.93	1.97	2.02	2.06	2.11	2.15	2.19	2.24	2.28	2.33	2.37
10.9	1.91	1.96	2.00	2.04	2.09	2.13	2.17	2.22	2.26	2.30	2.35
11	1.90	1.94	1.98	2.03	2.07	2.11	2.15	2.20	2.24	2.28	2.33
11.1	1.88	1.92	1.96	2.01	2.05	2.09	2.13	2.18	2.22	2.26	2.31
11.2	1.86	1.90	1.95	1.99	2.03	2.07	2.12	2.16	2.20	2.24	2.29
11.3	1.85	1.89	1.93	1.97	2.01	2.06	2.10	2.14	2.18	2.22	2.26
11.4	1.83	1.87	1.91	1.95	2.00	2.04	2.08	2.12	2.16	2.20	2.25
11.5	1.81	1.85	1.90	1.94	1.98	2.02	2.06	2.10	2.14	2.18	2.23
11.6	1.80	1.84	1.88	1.92	1.96	2.00	2.04	2.08	2.12	2.17	2.21
11.7	1.78	1.82	1.86	1.90	1.94	1.98	2.03	2.07	2.11	2.15	2.19
11.8	1.77	1.81	1.85	1.89	1.93	1.97	2.01	2.05	2.09	2.13	2.17
11.9	1.75	1.79	1.83	1.87	1.91	1.95	1.99	2.03	2.07	2.11	2.15
12	1.74	1.78	1.82	1.86	1.90	1.94	1.97	2.01	2.05	2.09	2.13

CALIFORNIA IMPACT COMPACTION APPARATUS



Fabrication Drawings available at:

Transportation Laboratory
5900 Folsom Blvd
Sacramento, CA 95819
916-227-7000

ATTACHMENT 1

California Test 216
October 2006

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

RELATIVE COMPACTION TEST

TL-297 (REV 10/2005)

Job Stamp	Location	Test No.
	Material	From
	Impact by	Sand Vol. By
	Date	Date

	SAND VOLUME DATA	
A	Initial Wt. of Sand (g)	
B	Wt. of Residue (g)	
C	Wt. of Sand Used (A-B)	
D	Cone Correction (g)	
E	Wt. of Sand in Hole (C-D)	
F	Sand Density (g/cc)	
G	Volume of Hole (E/F)	
H	Wet Density (g/cc) (L/G)	

Remarks:

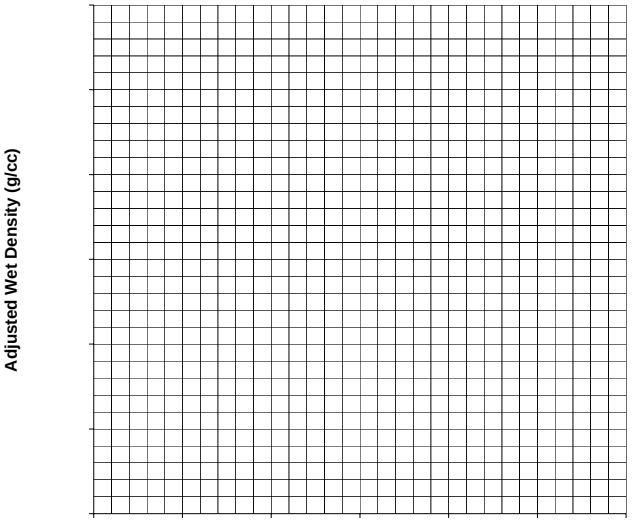
IMPACT TEST DATA

I	Initial Wet Weight of Test Specimen (g)				
	Increment	1	2	3	4
	Water Adjustment (g)				
J	Tamper Reading				
K	Adjusted Wet Density (g/cc)				

	ROCK CORRECTION		
L	Total Sample Weight	(g)	
M	+ 3/4-inch Weight in Air	(g)	
N	+3/4-inch Weight in Water	(g)	
O	+3/4-inch Volume	(M - N)	
P	% +3/4-inch	100 * (M / L)	
Q	% -3/4-inch	100 - P	
R	Density of +3/4-inch	(M / O)	
S	(%+3/4-inch) / Density of +3/4-inch	(P / RY)	
T	(%-3/4-inch) / Density of -3/4-inch	(Q / K)	
U	Sum of S and T	(S + T)	
V	Average Adjusted Wet Density	(100 / U)	

Percent Relative Compaction*	Spec	
		Failed or less
		Passed

*(H / K) for 10% or less +3/4-inch; (H / V) for > 10% +3/4-inch



MOISTURE ADJUSTMENT FOR AGGREGATE BASE PAY QUANTITY

a	In-place Wet wt.		e	Test Spec. Wet Wt. (opt.)	
b	In-place Dry wt.		f	Test Spec. Dry Wt.	
c	In-place Water (a - b)		g	Test Spec. Water (e - f)	
d	In-place % Water (c / b)		h	Test Spec. % Water (g / f)	

Moisture Corr. (h + 1%) - d =

Moisture Corr. in excess of Opt. + 1% | % Moisture by CTM 226

+ 3/4-inch Aggregate Adjustment (Y)

% + 3/4-inch (P)	Adjustment
20 or less	1.00
21-25	0.99
26-30	0.98
31-35	0.97
36-40	0.96
41-45	0.95
46-50	0.94

ATTACHMENT 2

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

RELATIVE COMPACTION TEST

TL-297 (REV 10/2005)

Job Stamp	Location	Test No.
	Material	From
	Impact by	Sand Vol. By
	Date	Date

SAND VOLUME DATA		
A	Initial Wt. of Sand (g)	11250
B	Wt. of Residue (g)	1429
C	Wt. of Sand Used (A-B)	9821
D	Cone Correction (g)	1641
E	Wt. of Sand in Hole (C-D)	8180
F	Sand Density (g/cc)	1.55
G	Volume of Hole (cc) (E/F)	5277
H	Wet Density (g/cc) (L/G)	2.06

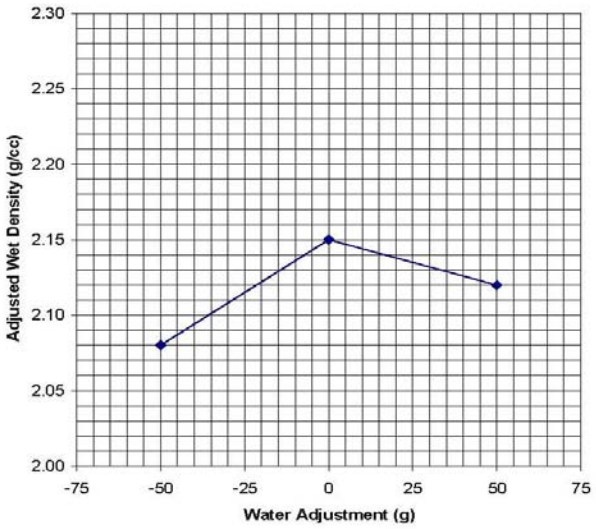
Remarks:

IMPACT TEST DATA					
I	Initial Wet Weight of Test Specimen (g)	2500			
	Increment	1	2	3	4
	Water Adjustment (g)	-50	0	50	
J	Tamper Reading	11.4	11.0	11.2	
K	Adjusted Wet Density (g/cc)	2.08	2.15	2.12	

ROCK CORRECTION			
L	Total Sample Weight	(g)	10865
M	+3/4-inch Weight in Air	(g)	3568
N	+3/4-inch Weight in Water	(g)	2322
O	+3/4-inch Volume	(M - N)	1246
P	% +3/4-inch	100 * (M / L)	32.8
Q	% -3/4-inch	100 - P	67.2
R	Density of +3/4-inch	(M / O)	2.86
S	(%+3/4-inch) / Density of +3/4-inch	(P / RY)	11.8
T	(%-3/4-inch) / Density of -3/4-inch	(Q / K)	31.3
U	Sum of S and T	(S + T)	43.1
V	Average Adjusted Wet Density	(100 / U)	2.32

Percent Relative Compaction*	Spec	Failed 89 or less
	90	Passed

*(H / K) for 10% or less +3/4-inch; (H / V) for > 10% +3/4-inch



MOISTURE ADJUSTMENT FOR AGGREGATE BASE PAY QUANTITY					
a	In-place Wet wt.		e	Test Spec. Wet Wt. (opt.)	
b	In-place Dry wt.		f	Test Spec. Dry Wt.	
c	In-place Water (a - b)		g	Test Spec. Water (e - f)	
d	In-place % Water (c / b)		h	Test Spec. % Water (g / f)	
Moisture Corr. (h + 1%) - d =					
Moisture Corr. in excess of Opt. + 1%				% Moisture by CTM 226	

+ 3/4-inch Aggregate Adjustment (Y)

% + 3/4-inch (P)	Adjustment
20 or less	1.00
21-25	0.99
26-30	0.98
31-35	0.97
36-40	0.96
41-45	0.95
46-50	0.94

ATTACHMENT 3

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

California Test 231
April 2000

DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
Office of Materials Engineering and Testing Services
5900 Folsom Blvd.
Sacramento, California 95819-4612

METHOD OF TEST FOR RELATIVE COMPACTION OF UNTREATED AND TREATED SOILS AND AGGREGATES BY THE AREA CONCEPT UTILIZING NUCLEAR GAGES

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Part III of this method. It is the responsibility of whoever uses this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

OVERVIEW

This test method provides a procedure for selecting a test area, for determining the in-place wet density and moisture of untreated and treated soils and aggregates by the use of a nuclear gage, and for determining relative compaction. Wet density measurements are made in the direct transmission position where the rod is placed into the ground.

Select a direct transmission depth as close as possible to, but not equal to or greater than, the thickness of material being tested, i.e., use a 75 mm direct transmission depth and corresponding calibration to test a layer of material 100 mm thick, and use a 125 mm direct transmission depth and corresponding calibration to a test a layer of material 150 mm thick.

The laboratory wet test maximum density shall be determined as specified in California Test 312 for Class A Cement Treated Base; and as specified in California Test 216 for untreated materials, Class B cement treated base and lime treated soils and aggregates. On the basis of specified acceptance criteria, the relative compaction values are then used to determine the compliance or noncompliance of compaction specifications within the designated area. All calculations are based on wet relationships and are made in the metric system.

NOTE: See California Test 121 of the Manual of Test, Administrative Instructions, regarding use of nuclear gages.

This test method (231) is divided into the following parts:

I. Method of field determination of in-place wet density and moisture.

II. Method of applying the area concept and determining percent relative compaction.

III. Safety and Health

PART I. METHOD OF FIELD DETERMINATION OF IN-PLACE WET DENSITY AND MOISTURE

A. APPARATUS

1. Nuclear gage and standardizing block.

2. Miscellaneous tools such as trowels, scrapers, sieve, etc. for site preparation.

3. Guide plate, approximately 300 x 460 x 6 mm.

4. Pin, approximately 20 mm diameter x 600 mm long.

B. STANDARDIZATION OF NUCLEAR GAGE FOR WET DENSITY AND MOISTURE

1. Set the standardizing block 1.5 m from any object and 8 m from any other nuclear gage. Place the gage on the standardizing block in the closed (safe) position and take four (4) 1-min density counts. Repeat the four 1-min counts for moisture in the safe position. Record on Form TL 2148 (Figure 1) and in the gage logbook. When the nuclear gage is equipped with electronic circuitry capable of automatically averaging four one-minute density and moisture standard counts simultaneously, place the gage on the standardizing block in the closed (safe) position and take the average of the four one-minute counts. Record the density and moisture standard count averages on Form TL 2148 and in the gage logbook. For additional gage operation information not covered in this paragraph, follow instructions given in the manufacturer's manual.

2. The average of the four one-minute counts determined in C.1 is to be within ±ADL (see note) of the value used to establish the calibration table.

   If it is not, contact the Radiation Safety Officer who will establish a new standard count or have the gage sent in to be checked and/or repaired. Perform the standard count *at least* once during every 8 h of operation.

   NOTE: The acceptable deviation limit (ADL) is defined in this test method as $ADL = \sqrt{n}$ where n = number of counts indicated on the gage. This relationship is valid when the number of counts is over 10,000. Table 1 shows values of ADL for various counts.

C. SITE PREPARATION

1. Remove all loose surface material and prepare a plane surface large enough to seat the gage. Where sheepsfoot and similar type tamping rollers have been used, remove the loose surface material to a depth of not less than 50 mm below the deepest penetration by the roller. After the surface has been prepared to a flatness and smoothness within 3 mm, use a No. 4 (4.7 mm) or smaller sieve to obtain native fines to fill minor depressions, protrusions or to correct slight lack of plane. Tamp fines and any loosened material with the guide plate.

2. Make a hole using the pin and guide plate. Extract the pin with a pin puller. A drill may be used in lieu of the pin. The depth of hole shall be 50 mm greater than the transmission depth being used. This hole must be as close as possible to 90 degrees from the plane surface. If the plate is rotated slightly around the pin and the plate does not make contact with the ground, or if it appears that the hole is crooked, make a new hole.

D. FIELD TEST FOR DENSITY DETERMINATION

1. Place the nuclear gage on the prepared surface so that the bottom of the gage is firmly seated in contact with the soil. Insert the rod into the hole to the predetermined depth. Adjust the gage so that the rod is firmly against the side of the hole that is nearest to the gage.

   Obtain a 1-min reading. Record the data as shown on Figure 1.

2. Average counts from all test sites and determine count ratio by dividing the average field count by the average standard count.

3. Find the average count ratio and corresponding direct transmission average wet density (kg/m3) on the table supplied with the gage (Example Table 2). Record the data on Figure 1.

   NOTE: No obstruction or foreign element should be within a distance of 200 mm on both sides of the *source-detector axis.* Density calibration tables for the various depths are determined in accordance with California Test 111.

E. FIELD TEST FOR MOISTURE

This test is used for cases where moistures are desired or when common composite test maximum densities are used (Part II, F).

1. Obtain a standard count for moisture as specified in Section C of this Part I.

2. For site preparation, use procedure in Section D.1 of this Part I.

3. Place the gage on the prepared surface and take a 1-min moisture count. Record the data on Figure 1.

4. Determine a count ratio by dividing the field count by the moisture standard count.

5. Find the count ratio and corresponding moisture (kg/m3) from the table supplied with the gage (Example Table 3)

   NOTE: No obstruction or foreign element should be within a distance of 250 mm *from the side of the gage.* Moisture calibration tables are determined in accordance with California Test 111.

PART II. METHOD OF APPLYING THE AREA CONCEPT AND DETERMINING PERCENT RELATIVE COMPACTION

A. SCOPE

This is a statistical procedure where a number of test measurements are taken to evaluate the state of compaction of a selected area.

B. NUMBER AND LOCATION OF NUCLEAR TESTS

1. The area concept will be used with this test. The engineer will determine from a series of density tests whether to accept or reject a designated area. The engineer shall determine the area by inspection, based on uniformity of factors affecting compaction. Insofar as possible, the area designated shall be generally homogeneous for both character of material and conditions of production and compaction. Portions of the area, which may be observed or suspected to be different from the area as a whole, will be excluded from the test. If a relative compaction test is desired for these different portions, they shall be designated as a separate test area or areas and tested separately. Do not designate test areas which include: (1) materials from separate sources, unless such materials were intermixed during placing of the compacted area; (2) materials which were placed and compacted by different types of operations or processes; or (3) material placed during different periods of production or in nonadjacent areas.

2. Select a *minimum* of 5 test sites for areas 800 m^2 or more by using a set of 10 random sample plans (Figure 3). Follow instructions given in Figure 3.

   Obtain nuclear counts at all test sites and average all counts for the area (Figure 1). If the designated test area, described in B.1, is of limited size (e.g., structure backfill, short length of shoulders, or other areas less than 800 m^2) then a *minimum* of three test sites are required.

C. DETERMINATION OF WET TEST MAXIMUM DENSITY

1. For all treated and untreated soils and aggregates, except Class A Cement Treated Bases, obtain equal representative portions of material from each nuclear test site within the area and thoroughly mix together to form a composite sample. Determine the laboratory wet test maximum density (kg/m^3) on the composite sample in accordance with California Test 216. Record the data on Form TL 2148 in the section identified as "IMPACT TEST DATA" (Figure 1). *The moisture content of the composite sample must be maintained in the same state* as *when the in-place tests were performed.* If the impact test result is to be used in a "common" composite control density, a nuclear moisture, as well as a nuclear density must be taken for each test site in an area and be averaged.

D. CORRECTION FOR OVERSIZE MATERIAL

1. A correction is applied to the composite wet test maximum density in those instances where the composite sample contains more than 10% by weight of aggregate retained on the 19 mm sieve. The data is recorded on Figure 2 in the section titled "SAMPLE FOR ROCK CORRECTION". California Test 216 shows details for handling rock corrections.

E. PERCENT RELATIVE COMPACTION

1. Calculate percent relative compaction as follows:

   Percent relative compaction = [(Average In-Place Wet Density)/(Composite Wet Test Maximum Density)] x 100

2. The calculations for cases where there is 10% or less of +19 mm aggregate is shown on

Figure 1. Note that gage readings for the individual sites are averaged and a mean percent relative compaction calculated for the area.

3. The calculations for cases where there is more than 10% of + 19 mm aggregate is shown in Figure 1.

4. The average relative compaction of the test sites in an area must be at or above the specified minimum compaction density for acceptance of the compaction in the area. The percent relative compaction value is calculated to the nearest 0.1% and then reported as a whole number. For rounding the average percent relative compaction value (Test Result), if the computed value ends in a number with a fractional portion 0.5 or greater, report as the next higher whole number. If the computed value ends in a number with fractional portion less than 0.5, report without changing the whole number.

   Example:

Computed Value	Reporting Value
94.5 to 95.0%	95%
95.0 to 95.4%	

F. WET COMMON-COMPOSITE TEST MAXIMUM VALUE

1. In many cases where the material is the "same", it is permissible to use a *"common"* wet composite test maximum density for use in different areas in lieu of that specified in Section C.1 of this Part II. For a material to be the same, it must comply with the following general criteria:

   a. It must be from the same general source (excavation area, balance point, plant, etc.).

   b. It must generally have the same visual characteristics of color, gradation, and type of soil.

   c. The average in-place moistures must be the "same". Adjustments in moisture are to be made to meet this criteria when *"common"* wet composite test maximum values are used.

2. A *"common"* wet composite test maximum density is initially established by averaging two consecutive wet composite test maximum densities which are within 50 kg/m^3 density and performed within three days. The average moistures between the areas represented by the two consecutive wet composite test maximum values must also be within 50 kg/m^3.

3. Anytime that a wet composite test maximum density is determined for an area, it shall be used to calculate the percent relative compaction for that area.

4. A *"check"* wet composite test maximum must be performed at *least* every 7th calendar day or after the *"common"* wet composite test maximum density has been used for 14 areas, whichever comes first.

   a. If the *"check"* test is within 50 kg/m^3 moisture and density of the *"common"* density, the two values are averaged to establish a new *"common"* density and average moisture. If it is not, wet composite test maximum densities must be performed for each compaction test area until the criteria for F-2 of this PART II are met.

5. If average relative moistures between areas differ and a common composite test maximum is to be established, a correction is applied. The following example illustrates use of a common composite test maximum with moisture corrections. Anytime the engineer judges conditions have changed, a new common composite test maximum should be established. An example where a common composite test maximum is used is shown in Figure 2.

PART III. SAFETY AND HEALTH

Personnel are required to be trained by a qualified instructor approved by the California Department of Health and the Divisions of Industrial Safety.

Caltrans personnel are required to read and be familiar with California Test 121, Administrative Instructions for Use of Nuclear Gages. Caltrans personnel are required to wear a film badge.

This method does not purport to address all the safety problems associated with its use.

REFERENCES:

California Tests 121, 216, 312, and 911

End of Text (14 Pages) on California Test 231

California Test 231
March 2000

Example:	Area I	Area II	Area III	Area IV	Area V	Area VI
Date.....	4-18-96	4-19-96	4-20-96	4-21-96	4-25-96	4-26-96
Average In-Place Wet Density, kg/m^3....	2040	2150	2060	2080	2120	2110
Average In-Place Moisture, kg/m^3.....	90	110	140	80	130	100
Wet Composite Test Maximum Density, kg/m^3.....	2150	2200	-	-	2160	-
Common Composite Wet Test Maximum Density, kg/m^3.....	-	-	2175	2175	-	2168
(Average Moisture, kg/m^3)	-	-	(100)	(100)	-	(115)
Moisture Correction, kg/m^3.....	-	-	-40	+20	-	+15

a. Area I

$$\text{\% Relative Compaction} = \frac{2040}{2150} \times 100 = 95\%$$

b. Area II

$$\text{\% Relative Compaction} = \frac{2150}{2200} \times 100 = 98\%$$

c. Area III

$$\text{Moisture Correction} = \left(\frac{90 + 110}{2}\right) - 140 = -40$$

$$\text{Common Composite Test Max} = \frac{2150 + 2200}{2} = 2175$$

$$\text{\% Relative Compaction} = \frac{2060 - 40}{2175} \times 100 = 93\%$$

See sample forms figures1 and 2.

California Test 231
March 2000

State of California — **Relative Compaction Test-Nuclear** — **Dept of Transportation**

Job Stamp	Contract	Test No.
	Type of Material	
	Material From	
	Impact By	Nuclear By
	Date	Date
Show Test Location and Area Limits	Nonbiased Plan No.	Gage No.

In-Place Test by Nuclear

	Site	Den. Ct.___mm	Std. Ct. Density
A	1		
	2		
	3		Σ
	4		F $\bar{X}$
	5		Moist Count 1
	6		2
	7		3
	8		4
			5
			6
			7
			8
B	Σ		Σ
C	$\bar{X}$		G $\bar{X}$

CR(C/F) CR(G/I

D $\bar{X}$ Den. g/ml H $\bar{X}$ H2O g/ml Σ

E $\bar{X}$ Den. Corr. For Moist.**± I $\bar{X}$

**E = D ± Diff. Bet. $\bar{X}$ Moist.Fr. Common TM & H

Percent Relative Compaction		Spec.	Individual	
			Moving Ave.	

*E/K for10% ≤ + 19mm E/W for > 10% + 19mm

If Common Test Maximum is used ($\bar{X}$) K or W = $\bar{X}$ H2O=

From Tests: Dated:

Remarks:

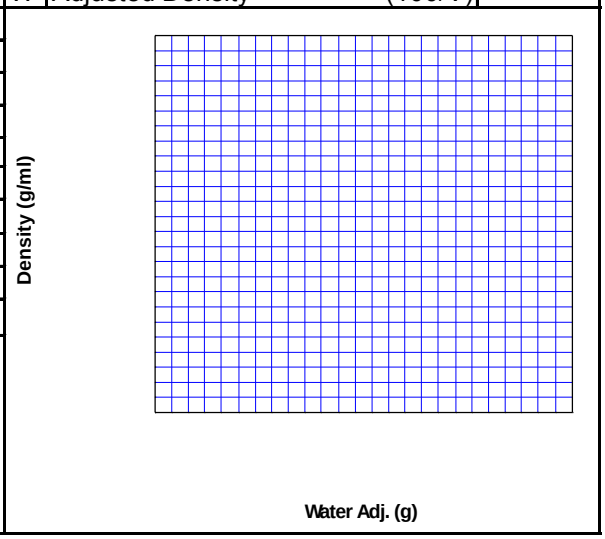
Impact Test Data

J	Initial Wet Weight of Test Specimen (g)				
	Specimen	1	2	3	4
	Water Adjustment				
	Tamper Reading				
K	Wet Density				
	K From Table 1Test Method 216. Highest Density is Test Max.				
L	(+) 19mm Agg. Adj.				

% + 19mm (Q) Adj.
20 or less_ 1.00
21-25_____0.99
26-30_____0.98
31-35_____0.97
36-40_____0.96
41-45_____0.95
46-50_____0.94
Std. Count Moist

Sample for Rock Correction

M	Total Sample Wt.	(g)	
N	+ 19mm Wt.in Air	(g)	
O	+ 19mm Wt. In Water	(g)	
P	+ 19mm Vol	(N-O)	
Q	% + 19mm	100(N/M)	
R	% - 19mm	(100-Q)	
S	Density of + 19mm	(N/P)	
T	% + 19mm /Den. Of + 19mm	(Q/SL)	
U	% -19mm /Den. Of - 19mr	(R/K)	
V	Sum of T and U	(T+U)	
W	Adjusted Density	(100/V)	



TL 2148 (Rev 03/00) Figure 1

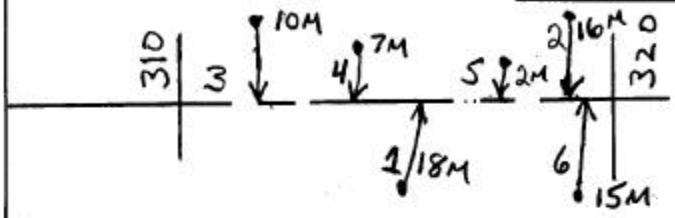
California Test 231
March 2000

State of California — **Relative Compaction Test-Nuclear** — **Dept of Transportation**

Job Stamp

Contract | Test No. 25
Type of Material EMB
Material From
Impact By FC | Nuclear By BL
Date 03/30/00 | Date 03/30/00
Nonbiased Plan No. 8 | Gage No. NE 59

Show Test Location and Area Limits



EXAMPLE ONLY

In-Place Test by Nuclear

	Site	Den. Ct. 200mm	Std. Ct. Density	
A	1	466558	515477	
			515222	
	2	445988	519047	
			512677	K
	3	49747		
			Σ 2062400	L
	4	464533	F x̄ 515600	
			Moist Count	
	5	47741	1	
			2	
	6	46380	3	
			4	
	7		5	
			6	
	8		7	
			8	
B	Σ	2815777	Σ	
C	x̄	469300	G x̄	
CR(C/F)		.910	CR(G/I	
D	x̄ Den. g/ml	2.23	H x̄ H2O g/ml	
E	x̄ Den. Corr. For Moist.** ±		I x̄	

**E = D ± Diff. Bet. x̄ Moist.Fr. Common TM & H

Percent Relative Compaction	89	Spec.	Individual	90
			Moving Ave.	

*E/K for 10% ≤ + 19mm E/W for > 10% + 19mm

If Common Test Maximum is used (x̄) K or W = | x̄ H2O=

From Tests: Dated:

Remarks:

Impact Test Data

J	Initial Wet Weight of Test Specimen (g)				2700
	Specimen	1	2	3	4
	Water Adjustment	0	+50	+100	
	Tamper Reading	10.5	10.3	10.4	
K	Wet Density	2.44	2.48	2.46	

K From Table 1Test Method 216. Highest Density is Test Max.

L (+) 19mm Agg. Adj.

% + 19mm (Q) Adj.
20 or less 1.00
21-25 0.99
26-30 0.98
31-35 0.97
36-40 0.96
41-45 0.95
46-50 0.94

Std. Count Moist

Sample for Rock Correction

M	Total Sample Wt. (g)		14000
N	+ 19mm Wt.in Air (g)		2380
O	+ 19mm Wt. In Water (g)		1465
P	+ 19mm Vol	(N-O)	915
Q	% + 19mm	100(N/M)	17.0
R	% - 19mm	(100-Q)	83.0
S	Density of + 19mm	(N/P)	2.60
T	% + 19mm /Den. Of + 19mm	(Q/SL)	6.5
U	% -19mm /Den. Of - 19mm	(R/K)	33.5
V	Sum of T and U	(T+U)	40.0
W	Adjusted Density	(100/V)	2.50

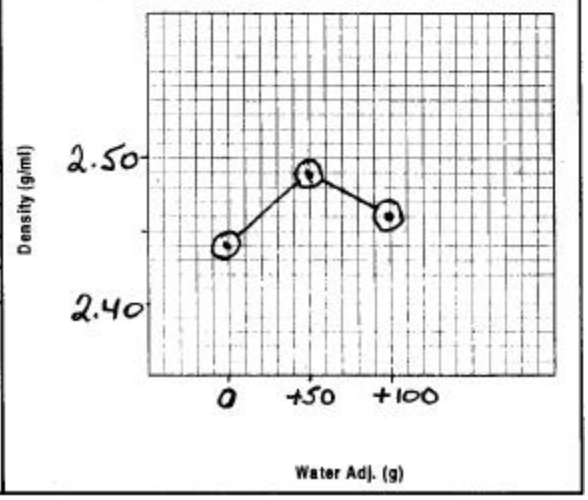


Figure 2

NONBIASED SAMPLE PLANS

Once an area is selected on the basis of uniformity of factors, nonbiased location of measurement sites is required for applying statistical control procedures. The nonbiased sample location plans will randomly locate the approximate measurement sites.

NOTE: The number of measurement sites must be determined after the area has been determined and *before* any tests performed.

PROCEDURE FOR USE OF NONBIASED SAMPLE PLANS

1 a. Use the last digit from the first reading taken for the daily standard count to select the plan for the first area. For subsequent areas, use the last digit from the second, third, and fourth readings. If five through nine areas are tested, use the second to the last digit from the first through the fourth readings taken for the daily standard count.

b. For nuclear gages that electronically average the standard counts — Take a $^{1}/_{4}$ minute count in the safe position at any convenient location, i.e., ground, truck bed, carry case, etc., prior to selecting the plan for an area. Use the last digit of the density reading for selecting the plan. A new count should be taken for each area.

2. Visualize the plan as a map of the area to be sampled.

3. Each dot represents a measurement site. There are ten dots numbered from one (1) through ten (10). If you are to take a five- (5) site test, then use the dots numbered from one (1) through five (5). If a three-site test is going to be used, then use the locations of the first three dots. This procedure will be used for all tests, with Number 1 dot the first site, Number 2 dot the second site and so on until the desired number of sites have been used.

4. Test at the approximate locations on the grade represented by the dots on the plan. Some adjustments are necessary for irregular areas. (See Figure 3)

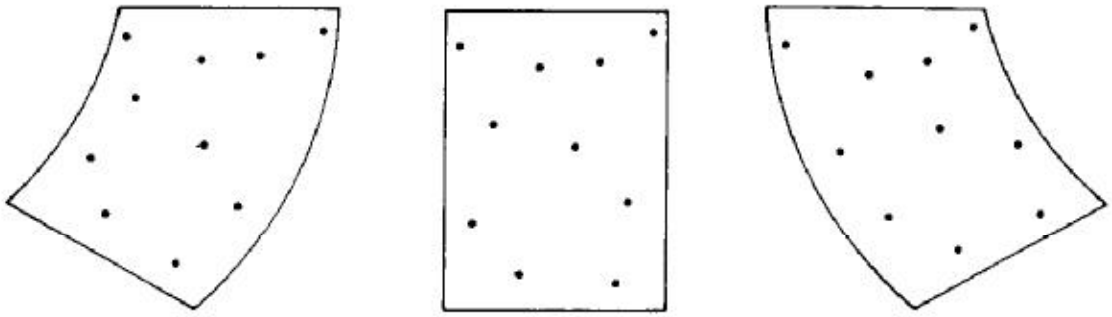
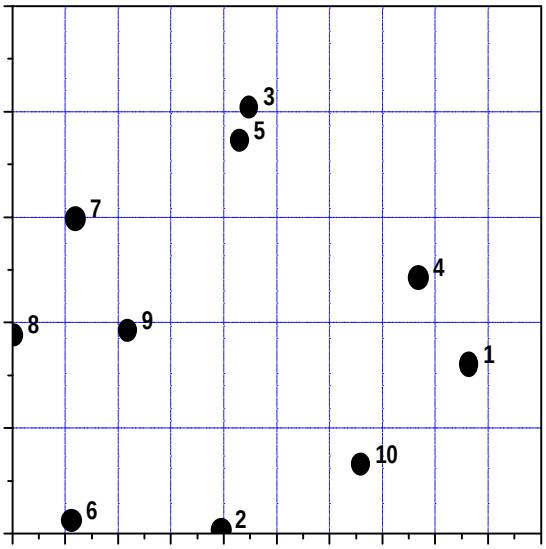


Figure 3

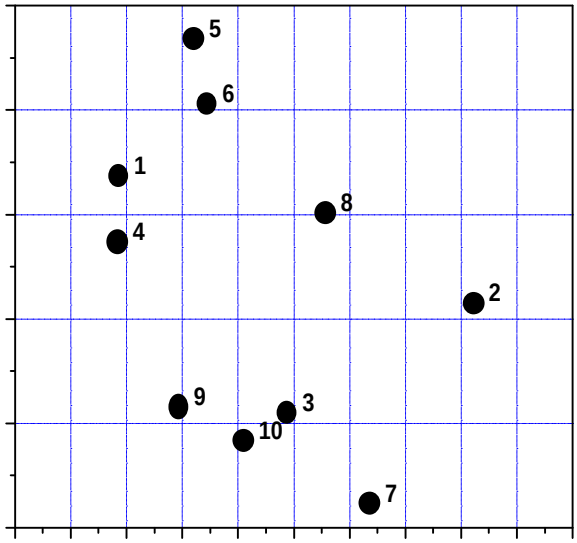
California Test 231
March 2000

Figure 3 Cont.

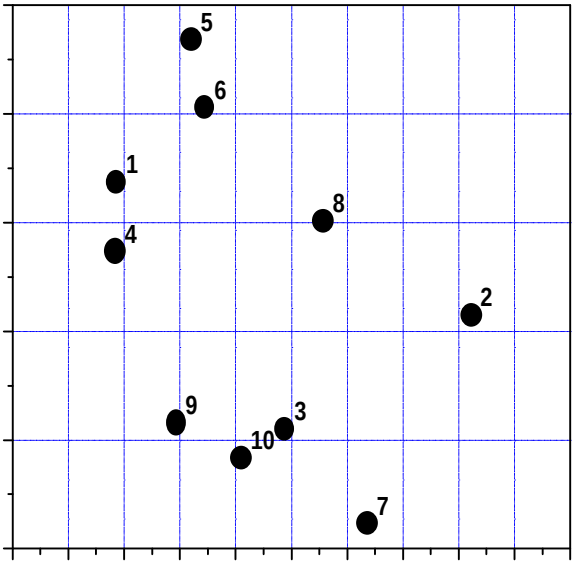
NONBIASED PLAN 1



NONBIASED PLAN 2



NONBIASED PLAN #3



NONBIASED PLAN #4

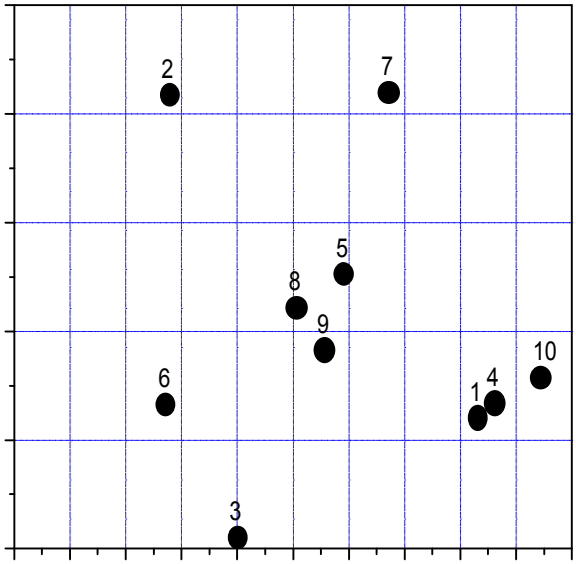
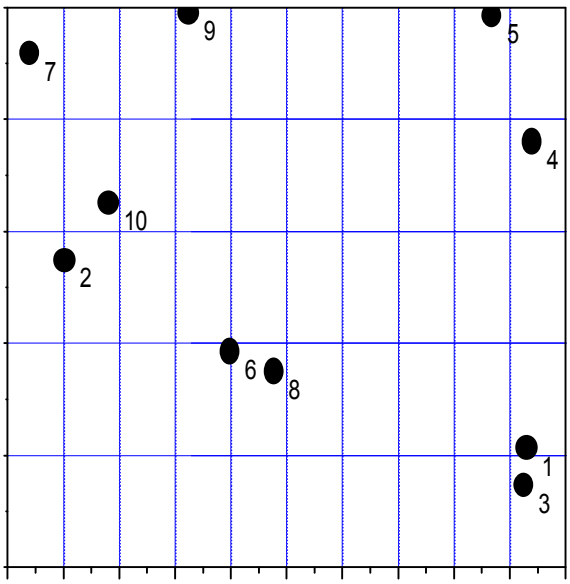
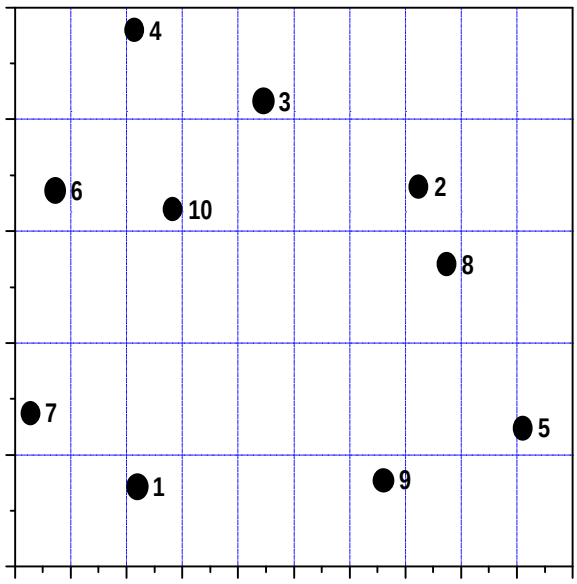


Figure 3 Cont.

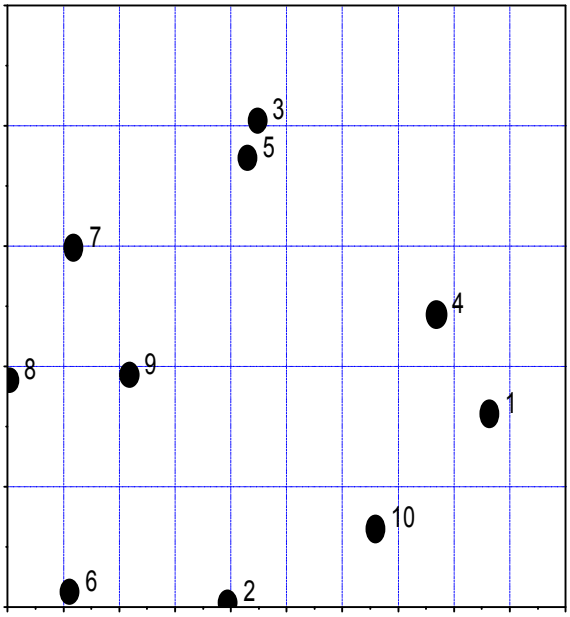
NONBIASED PLAN 5



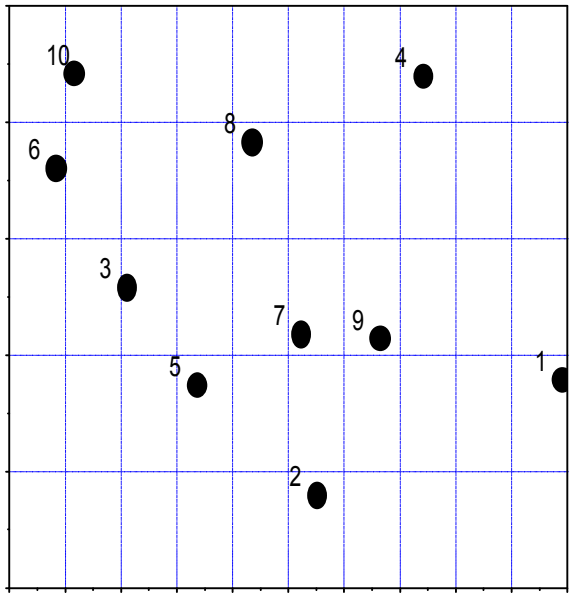
NONBIASED PLAN 6



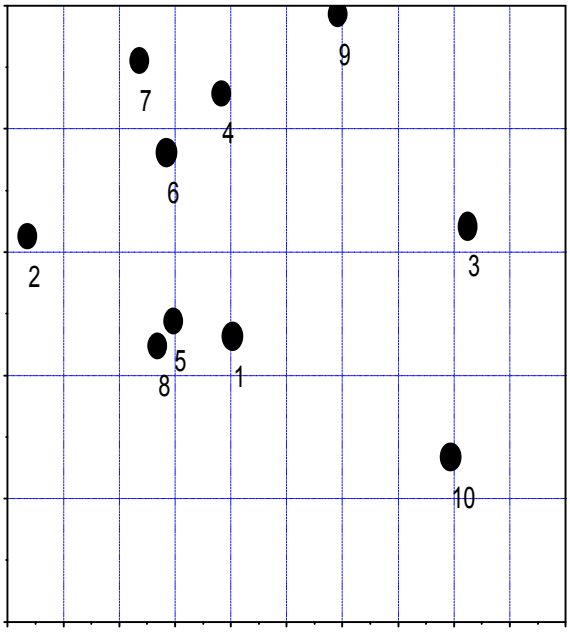
NONBIASED PLAN #7



NONBIASED PLAN #8



NONBIASED PLAN 9



NONBIASED PLAN 10

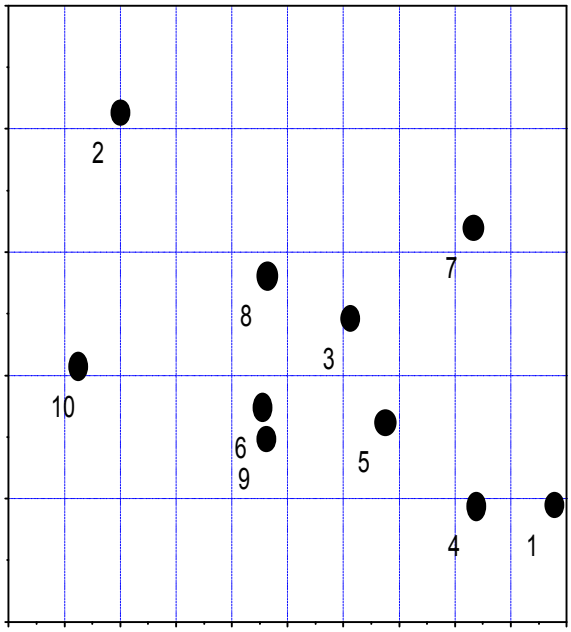


Figure 3 Cont.

TABLE 2
COUNT RATIO VS. DENSITY FOR NUCLEAR GAGE NO. NE 59

District 19 January 3, 1978 Std. Ct 51500 200 mm D/T By B. Lister

BASED ON: DENSITY (kg/m3) 1532 1636 2018 2153 2680 2771

COUNT RATIO 1.791 1.553 1.192 .933 .597 .542

CR TO CR	kg/m3	CR TO CR	kg/m3	CR TO CR	kg/m3
2.000-2.018	1400	1.364-1.376	1800	.931- .939	2200
1.981-1.999	1410	1.351-1.363	1810	.922- .930	2210
1.962-1.980	1420	1.338-1.350	1820	.913- .921	2220
1.943-1.961	1430	1.326-1.337	1830	.905- .912	2230
1.925-1.942	1440	1.313-1.325	1840	.896- .904	2240
1.907-1.924	1450	1.300-1.312	1850	.887- .895	2250
1.888-1.906	1460	1.288-1.299	1860	.879- .886	2260
1.870-1.887	1470	1.276-1.287	1870	.874- .878	2270
1.853-1.869	1480	1.264-1.275	1880	.862- .870	2280
1.835-1.852	1490	1.252-1.263	1890	.854- .861	2290
1.817-1.834	1500	1.240-1.251	1900	.846- .853	2300
1.800-1.816	1510	1.228-1.239	1910	.838- .845	2310
1.783-1.799	1520	1.216-1.227	1920	.830- .837	2320
1.766-1.782	1530	1.205-1.215	1930	.822- .829	2330
1.749-1.765	1540	1.193-1.204	1940	.814- .821	2340
1.733-1.748	1550	1.182-1.192	1950	.807- .813	2350
1.716-1.732	1560	1.171-1.181	1960	.799- .806	2360
1.700-1.715	1570	1.160-1.170	1970	.791- .798	2370
1.684-1.699	1580	1.148-1.159	1980	.784- .790	2380
1.667-1.683	1590	1.138-1.147	1990	.776- .783	2390
1.652-1.666	1600	1.127-1.137	2000	.769- .775	2400
1.636-1.651	1610	1.116-1.126	2010	.762- .768	2410
1.620-1.635	1620	1.105-1.115	2020	.755- .761	2420
1.605-1.619	1630	1.095-1.104	2030	.747- .754	2430
1.590-1.604	1640	1.085-1.094	2040	.740- .746	2440
1.574-1.589	1650	1.074-1.084	2050	.733- .739	2450
1.560-1.573	1660	1.064-1.073	2060	.726- .732	2460
1.545-1.559	1670	1.054-1.063	2070	.719- .725	2470
1.530-1.544	1680	1.044-1.053	2080	.713- .718	2480
1.515-1.529	1690	1.034-1.043	2090	.706- .712	2490
1.501-1.514	1700	1.024-1.033	2100	.699- .705	2500
1.487-1.500	1710	1.014-1.023	2110	.692- .698	2510
1.473-1.486	1720	1.005-1.013	2120	.686- .691	2520
1.458-1.472	1730	.995-1.004	2130	.679- .685	2530
1.445-1.457	1740	.986- .994	2140	.673- .678	2540
1.431-1.444	1750	.976- .985	2150	.667- .672	2550
1.417-1.430	1760	.967- .975	2160	.660- .666	2560
1.404-1.416	1770	.958- .966	2170	.654- .659	2570
1.390-1.403	1780	.949- .957	2180	.648- .653	2580
1.377-1.389	1790	.940- .948	2190	.642- .647	2590

California Test 231
March 2000

TABLE 3

COUNT RATIO VS DENSITY FOR NUCLEAR GAUGE NO. NE 59

District 19, January 3, 1978, Std. Ct 11400 By B. Lister

BASED ON kg/m3	0	303
COUNT RATIO	.168	.686

CR TO CR	kg/m3	CR TO CR	kg/m3	CR TO CR	kg/m3
.155- . 171	00	.501- . 517	200	.847- .863	400
.172- . 188	10	.518- . 534	210	.864- .880	410
.189- .206	20	.535- . 552	220	.881- .897	420
.207- .223	30	.553- .569	230	.898- . 915	430
.224- . 240	40	.570- .586	240	.916- .932	440
.241- .258	50	.587- . 603	250	.933- . 949	450
.259- . 275	60	.604- .621	260	.950- .967	460
.276- .292	70	.622- . 638	270	.968- .984	470
.293- . 309	80	.639- .655	280	.985-1.001	480
.310- .327	90	.656- .673	290	1.002-1.018	490
.328- .344	100	.674- .690	300	1.019-1.036	500
.345- .361	110	.691- .707	310	1.037-1.053	510
.362- . 379	120	.708- .724	320	1.054-1.070	520
.380- .396	130	.725- . 742	330	1.071-1.088	530
.397- .413	140	.743- .759	340	1.089-1.105	540
.414- . 431	150	.760- .776	350	1.106-1.122	550
.432- .448	160	.777- .794	360	1.123-1.140	560
.449- .465	170	.795- . 811	370	1.141-1.157	570
.466- .482	180	.812- . 828	380	1.158-1.174	580
.483- . 500	190	.829- .846	390	1.175-1.191	590

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Flood Protection and Navigation Section (18767)

OCT 17 2012

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, CA 95821

Dear Mr. Punia:

We have reviewed a permit application by Caltrans (application number 18767). This project includes replacing the Butte Creek Bridge (No. 12-0126R) on State Route 99 in Butte County with a new bridge constructed on the existing northbound alignment. The new, reinforced concrete box girder bridge would replace the existing bridge. The two-span structure would be supported by two abutments and one pier all on pile. The proposed work also includes mitigating measures for fish consisting of placing gravel augmentation upstream and downstream of the bridge and planting riparian vegetation (trees and shrubs) between River Mile 22 and River Mile 26. The project is located between Estates Drive and Southgate Avenue, about 1 mile south of the City of Chico, at 39.7386°N 121.8223°W NAD83, Butte County, California.

The District Engineer has no objection to approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That no work shall be performed and no stockpiles of material or equipment shall remain in the channel during the flood season of November 1 to April 15, unless otherwise approved in writing by your Board.

b. That in the event trees and brush are cleared, they shall be properly disposed of outside the limits of the project right-of-way.

c. That in the event erosion occurs at the site, the eroded areas shall be repaired and bank protection shall be placed to prevent future erosion.

d. That the proposed work shall not change the channel flow in such a way that may cause damage to the existing embankment.

e. That the proposed work shall not interfere with the integrity or hydraulic capacity of the flood risk reduction project; easement access; or maintenance, inspection, and flood fighting procedures.

f. That the drainage from the proposed bridge shall not be directed to flow water on the banks without adequate protection from erosion.

g. That the existing bridge shall be completely removed from the project right-of-way.

h. That the proposed rock slope protection shall be properly transitioned into the existing bank.

i. That the proposed plantings shall be maintained so that the project channel capacity is not impacted.

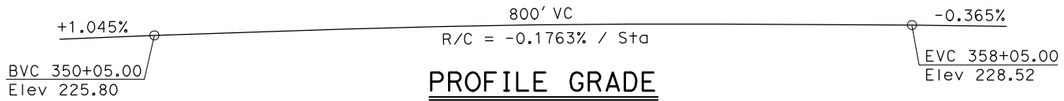
j. That the proposed placing of streambed enhancement gravel in the channel shall be done in a uniform manner which is free of depressions.

A Section 10 and/or Section 404 permit (SPK-2011-389) has been issued for this work.

A copy of this letter is being furnished to Mr. Don Rasmussen, Chief Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite LL30, Sacramento, CA, 95821.

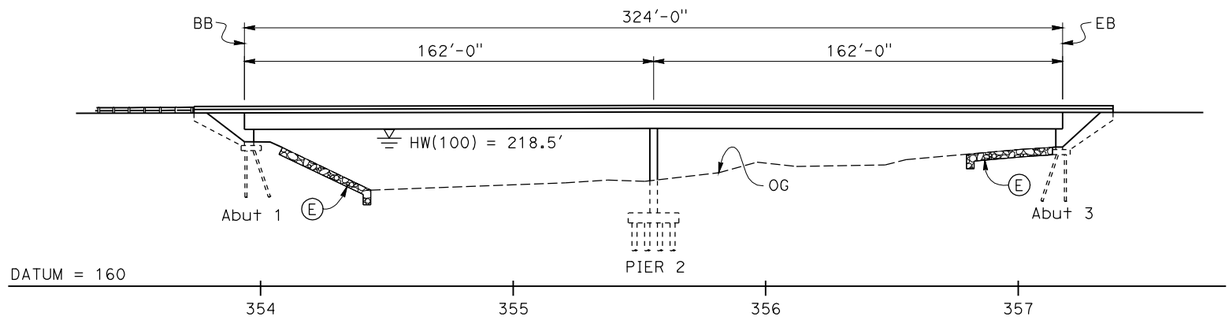
Sincerely,

Rick L. Poeppelman, P.E.
Chief, Engineering Division



PROFILE GRADE

No Scale



ELEVATION

1" = 30'

NOTES:

(A) Paint "Butte Creek Bridge Right"

(B) Paint "Bridge No. 12-0126R"

(C) Approach Slab Type N(30S)

(D) Existing deck drains, Type "B"

(E) RSP at abutments, see "Road Plans"

(F) Concrete Barrier Type 732 (B11-55)

(G) Temporary Railing Type K, see "Road Plans" (T3)

(H) MBGR, see "Road Plans"

(I) Temporary Scupper space every 10'-0". Fill scupper with grout after completion of stage 2.

(J) Prior to Stage 1, Remove existing Type 25 Concrete Barrier and place Temporary Railing Type K, anchored to bridge deck.

(K) After Stage 2, place Concrete Barrier Type 732(Mod)

(L) 3" Electrical Conduit, see "Road Plans"

(M) Deck Drain, Type "B", Total 15. Place near Sta 353+99, 354+10, 354+25, 354+40, 355+30, 355+50, 355+70, 356+15, 356+30, 356+44, 356+58, 356+72, 356+86, 357+00, 357+12. (B7-5)

(N) For General Notes, Index To Plans, Hydrologic Summary and Pile Data, see "INDEX TO PLANS" sheet.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99			

REGISTERED CIVIL ENGINEER — DATE 4-3-12

REGISTERED PROFESSIONAL ENGINEER — Keith Stillmunkes — No. 68878 — Exp. 9/30/13 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

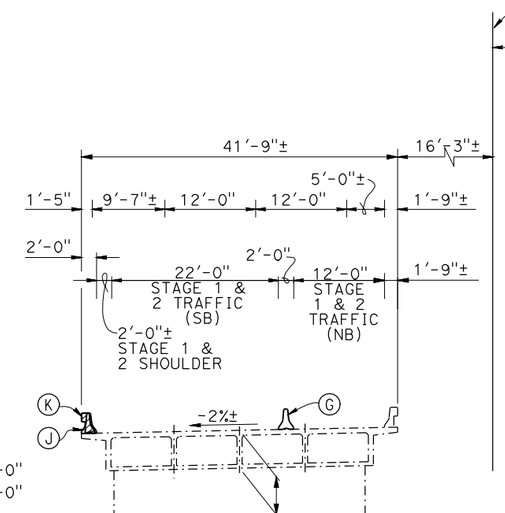
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

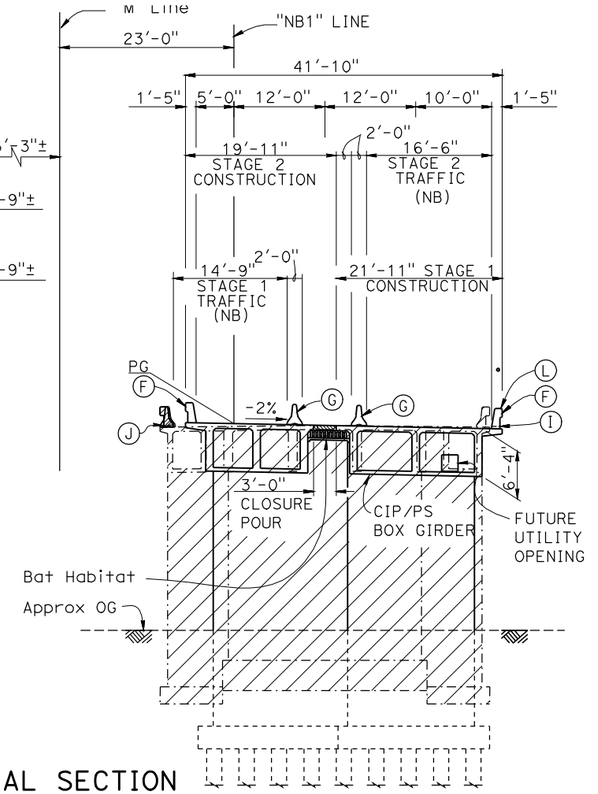
QUANTITIES

ACCESS OPENING, SOFFIT	2	EA
BRIDGE REMOVAL	LUMP	SUM
STRUCTURE EXCAVATION (BRIDGE)	450	CY
STRUCTURE EXCAVATION (TYPE A)	765	CY
STRUCTURE BACKFILL (BRIDGE)	945	CY
FURNISH STEEL PILING (HP 14 X 117)	4,910	LF
DRIVE STEEL PILE (HP 14 X 117)	100	EA
PRESTRESSING CAST-IN-PLACE CONCRETE	LUMP	SUM
BAT HABITAT	4	EA
STRUCTURAL CONCRETE, BRIDGE FOOTING	207	CY
STRUCTURAL CONCRETE, BRIDGE	1,830	CY
STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	98	CY
JOINT SEAL ASSEMBLY (MR 4")	79	LF
BAR REINFORCING STEEL (BRIDGE)	297,610	LB
MISCELLANEOUS METAL (BRIDGE)	4,760	LB
BRIDGE DECK DRAINAGE SYSTEM	10,800	LB
CONCRETE BARRIER (TYPE 732 MODIFIED)	384	LF
CONCRETE BARRIER (TYPE 732)	768	LF

PLAN

1" = 30'





TYPICAL SECTION

1" = 10'

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

LEGEND:

Indicates existing

Indicates bridge removal

Indicates closure pour

X
DESIGN ENGINEER

DESIGN	BY Keith Stillmunkes	CHECKED Mario Guadamuz	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE		
DETAILS	BY G. Dickerson / Y. Feng	CHECKED Mario Guadamuz	LAYOUT	BY Keith Stillmunkes	CHECKED Mario Guadamuz	
QUANTITIES	BY Gerald Dickerson	CHECKED Yingjiue Feng	SPECIFICATIONS	BY Jennifer Ramirez	PLANS AND SPECS COMPARED Jennifer Ramirez	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 7

BRIDGE NO. 12-0126R
POST MILE 28.7

BUTTE CREEK BRIDGE, RIGHT (REPLACE)
GENERAL PLAN

UNIT: 3592
PROJECT NUMBER & PHASE: 0300000509 1
CONTRACT NO.: 03-3E6201

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
1-28-11	4-2-12	2-28-12	2-1-12	1	27

FILE => 12-0126r-a-gp.dgn

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

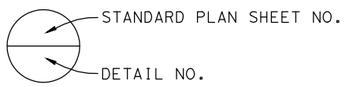
ATTACHMENT C - Project Design Plans

USERNAME => s1157(6 DATE PLOTTED => 03-APR-2012 TIME PLOTTED => 13:36

INDEX TO PLANS

STANDARD PLANS DATED MAY 2006

A10A	ACRONYMS AND ABBREVIATIONS (SHEET 1 OF 2)
A10B	ACRONYMS AND ABBREVIATIONS (SHEET 2 OF 2)
A10C	SYMBOLS (SHEET 1 OF 2)
A10D	SYMBOLS (SHEET 2 OF 2)
A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE
T3	TEMPORARY RAILING (TYPE K)
B0-1	BRIDGE DETAILS
B0-3	BRIDGE DETAILS
B0-5	BRIDGE DETAILS
B0-13	BRIDGE DETAILS
RSP B6-21	JOINT SEALS (MAXIMUM MOVEMENT RATING = 2")
B7-1	BOX GIRDER DETAILS
B7-5	DECK DRAINS
B7-8	DECK DRAINAGE DETAILS
B7-10	UTILITY OPENING - BOX GIRDER
B8-5	CAST-IN-PLACE PRESTRESSED GIRDER DETAILS
B11-55	CONCRETE BARRIER TYPE 732
B14-3	COMMUNICATION AND SPRINKLER CONTROL CONDUITS (CONDUIT LESS THAN 4")
B14-5	WATER SUPPLY LINE (DETAILS) (PIPE SIZES LESS THAN 4")



GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th edition and the Caltrans Amendments, preface dated December 2008.

SEISMIC DESIGN : Caltrans Seismic Design Criteria (SDC), Version 1.6 dated November 2010.

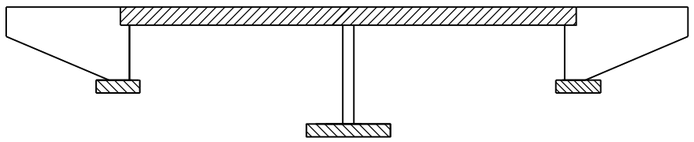
DEAD LOAD: Includes 35 psf for future wearing surface.

LIVE LOADING: HL93 and P-15 permit design vehicle.

SEISMIC LOADING :
Soil profile: V_{530} =1200 ft/sec
Moment Magnitude: 6.7
Peak Ground Acceleration 0.22g
Site Specific Acceleration Response Spectrum as shown.

REINFORCED CONCRETE:
f_y = 60 ksi
f'_c = 3.625 ksi
n = 8

PRESTRESSED CONCRETE: See "Prestressing Notes" on "GIRDER DETAILS" sheet.

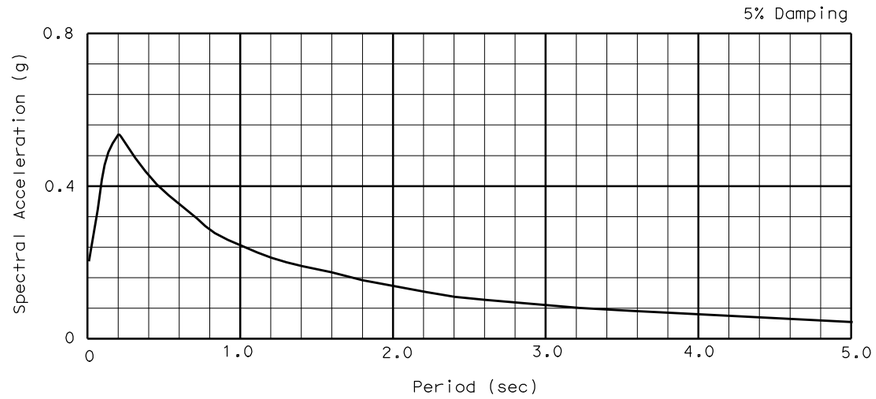


Structural Concrete, Bridge
Structural Concrete, Bridge (6 Ksi at 28 days)
Structural Concrete, Bridge Footing

CONCRETE STRENGTH AND TYPE LIMITS

No Scale

SIZE SPECIFIC ACCELERATION RESPONSE SPECTRUM



HYDROLOGIC SUMMARY FOR BUTTE CREEK BRIDGE, 12-0126R

Drainage Area: 152 mi^2

	Design Flood	Base Flood	CVFPB
Frequency	50-year	100-year	N/A
Discharge	24,300 cfs	28,900 cfs	27,000 cfs
Water Surface Elevation at Bridge	216.6 ft NGVD 29 218.9 ft NAVD 88	218.50 ft NGVD 29 220.8 ft NAVD 88	217.8 ft NGVD 29 220.1 ft NAVD 88

Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirenents. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.

Minimum Soffit Elevation*	221.5 ft NGVD 29 (223.8 ft NAVD 88)
Local Scour Depth	4.8 ft
Local Scour Elevation	191.4 ft NGVD 29

* The Central Valley Flood Protection Board requires 3 feet of Freeboard over the 100-year Flow for new structures at this location.

PILE DATA TABLE

Support Location	Pile Type	Cut-Off Elevation (ft)	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Compression	Tension			
Abut 1	HP 14X117	213.00	240	0	160.0(a)	160.0	300
Pier 2	HP 14X117	185.50	250	0	140.0(a)	140.0	300
Abut 3	HP 14X117	213.50	230	0	160.0(a)	160.0	300

NOTES :

1. Design tip elevations are controlled by:
   (a) Compression, (strength limit).
2. The Specified Tip Elevation shall not be raised above the Design Tip Elevation.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99			

REGISTERED CIVIL ENGINEER — 4-3-12 DATE

REGISTERED PROFESSIONAL ENGINEER — Keith Stillmunkes — No. 68878 — Exp. 9/30/13 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ATTACHMENT C - Project Design Plans
USERNAME =>, 8115764 DATE PLOTTED => 03-APR-2012 13:36
TIME PLOTTED =>

DESIGN	BY Keith Stillmunkes	CHECKED Mario Guadamuz	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 7	BRIDGE NO. 12-0126R
DETAILS	BY Yingjue Feng	CHECKED Mario Guadamuz			POST MILE 28.7
QUANTITIES	BY Gerald Dickerson	CHECKED Yingjue Feng			

BUTTE CREEK BRIDGE, RIGHT (REPLACE)
INDEX TO PLANS

STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REV. 09-01-10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3592
PROJECT NUMBER & PHASE: 0300000509 1 CONTRACT NO.: 03-3E6201

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
8-15-11	2-23-12	4-2-12	12-14-11	2	27

FILE => 12-0126r-a-itp.dgn

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

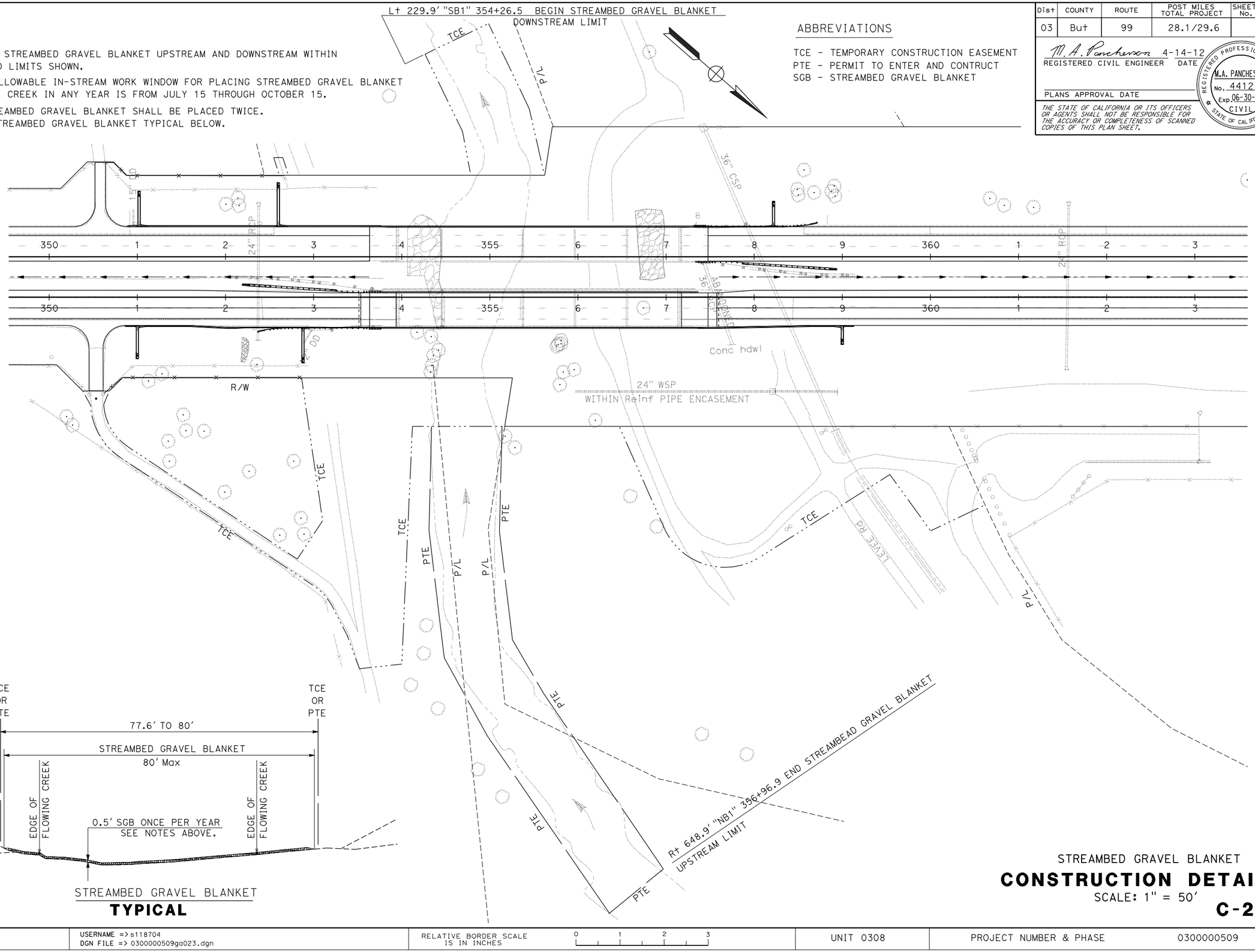
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. PLACE STREAMBED GRAVEL BLANKET UPSTREAM AND DOWNSTREAM WITHIN SPREAD LIMITS SHOWN.
2. THE ALLOWABLE IN-STREAM WORK WINDOW FOR PLACING STREAMBED GRAVEL BLANKET IN THE CREEK IN ANY YEAR IS FROM JULY 15 THROUGH OCTOBER 15.
3. A STREAMBED GRAVEL BLANKET SHALL BE PLACED TWICE. SEE STREAMBED GRAVEL BLANKET TYPICAL BELOW.

ABBREVIATIONS

TCE - TEMPORARY CONSTRUCTION EASEMENT
PTE - PERMIT TO ENTER AND CONTRUCT
SGB - STREAMBED GRAVEL BLANKET



STREAMBED GRAVEL BLANKET
TYPICAL

STREAMBED GRAVEL BLANKET
CONSTRUCTION DETAILS
SCALE: 1" = 50'

C-23

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

REVISED BY	DATE REVISED
MIKE PANCHESSON	DON WEHERLY
CALCULATED-DESIGNED BY	CHECKED BY
FUNCTIONAL SUPERVISOR	
ALI KIANI	

LAST REVISION 00-00-00
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:43

BORDER LAST REVISED 7/2/2010
USERNAME => s118704
DGN FILE => 0300000509ga023.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0308
PROJECT NUMBER & PHASE 0300000509

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

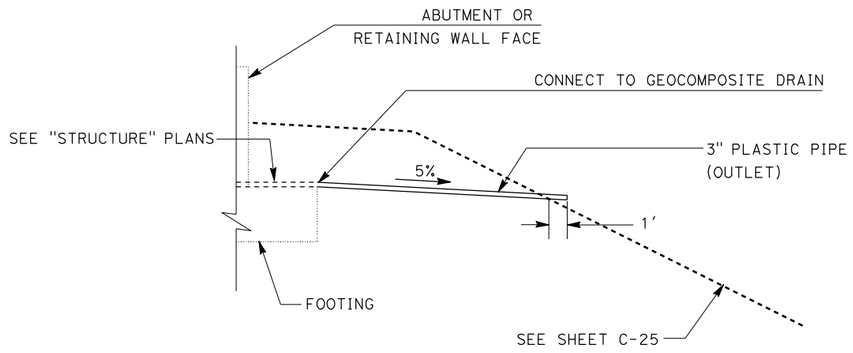
REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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.

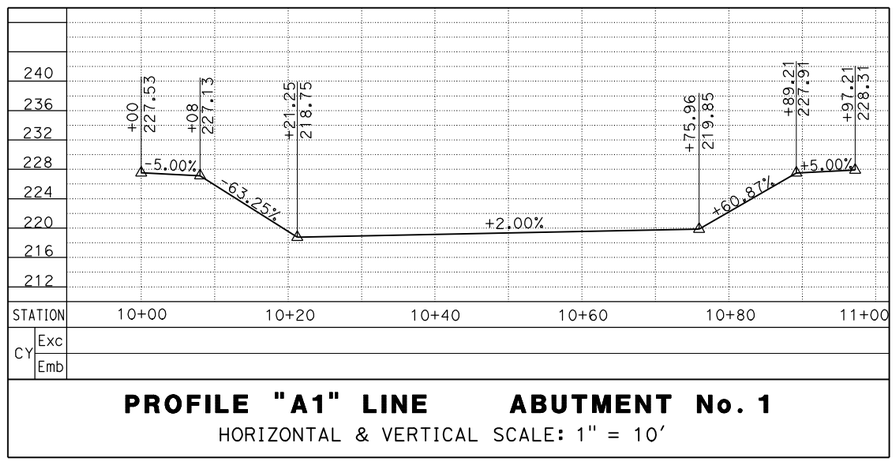
NOTES:

1. IF 3" PLASTIC PIPE (OUTLET) IS ROUTED THRU RSP TO BE PLACED, PROTECT FROM BEING CRUSHED.
2. SEE "CONSTRUCTION DETAILS" PLAN C-25 FOR SECTIONS.

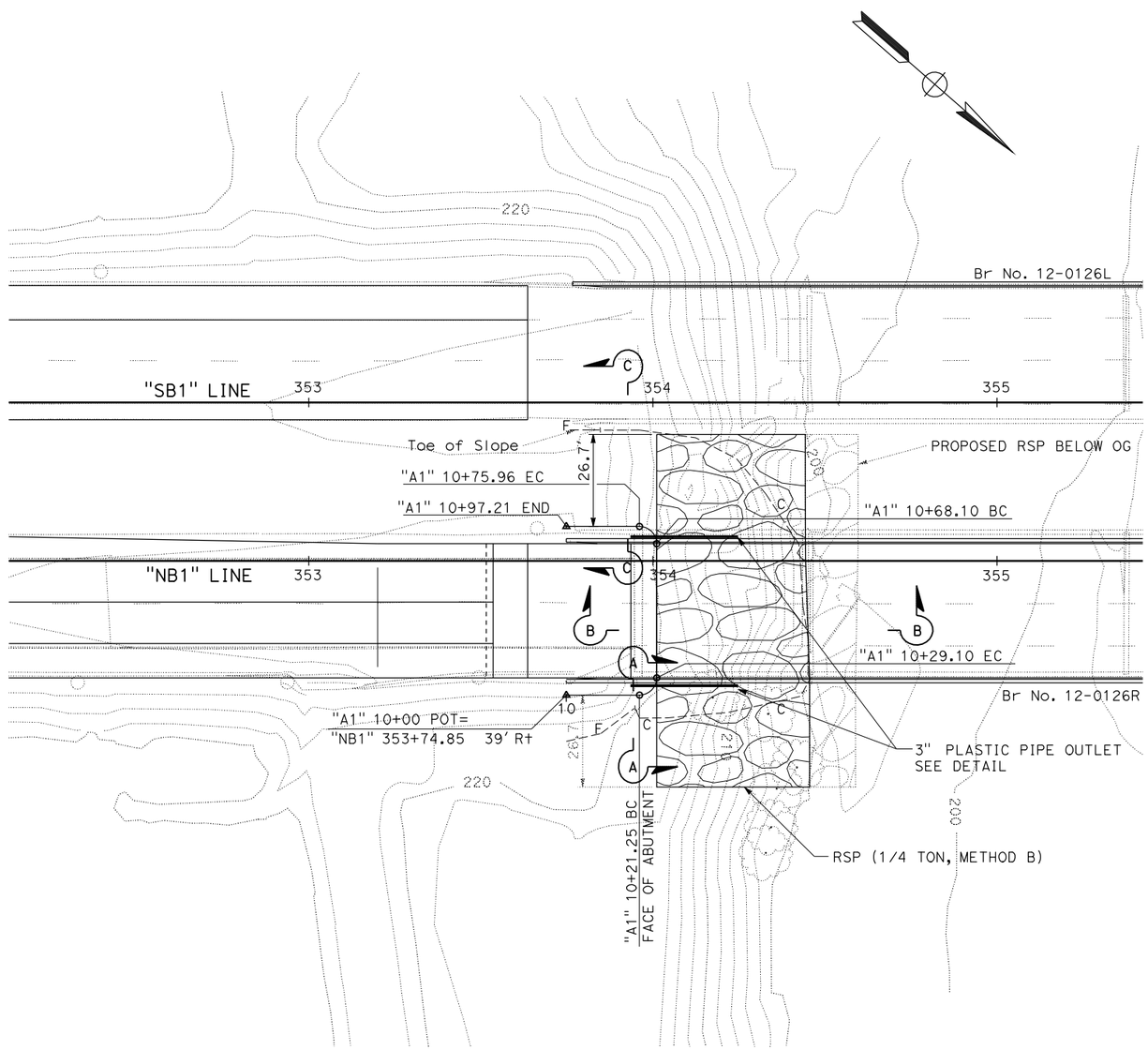


OUTLET DETAIL
NO SCALE

"A1" LINE ALIGNMENT & CURVE DATA					
STATION	R	△	T	L	BEARING
"A1" 10+00.00 PI					
					N 41°02'21.69" W
"A1" 10+21.25 BC					
	5.00'	90°00'00"	5.00'	7.85'	
"A1" 10+29.10 EC					
					S 48°57'38.71" W
"A1" 10+68.10 BC					
	5.00'	90°00'00"	5.00'	7.85'	
"A1" 10+75.96 EC					
					S 41°02'21.36" E
"A1" 10+97.21 PI					



PROFILE "A1" LINE ABUTMENT No. 1
HORIZONTAL & VERTICAL SCALE: 1" = 10'



ROCK SLOPE PROTECTION

CONSTRUCTION DETAILS
SCALE: 1" = 20' C-24

	DAVID HOPPER	CALCULATED-DESIGNED BY
	MIKE PANCHESSON	CHECKED BY
	ALI KIANI	FUNCTIONAL SUPERVISOR
		REVISED BY
		DATE REVISED

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

LAST REVISION | DATE PLOTTED => 17-APR-2012 | TIME PLOTTED => 13:43

ATTACHMENT C - Project Design Plans

BORDER LAST REVISED 7/2/2010 | USERNAME => s118704 | DGN FILE => 0300000509ga024.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0308 | PROJECT NUMBER & PHASE 0300005091

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M. A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

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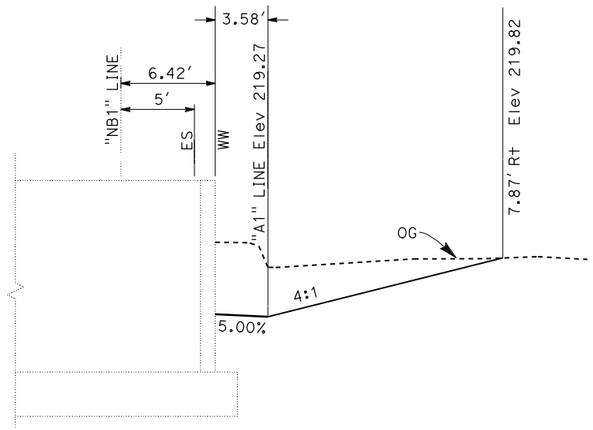
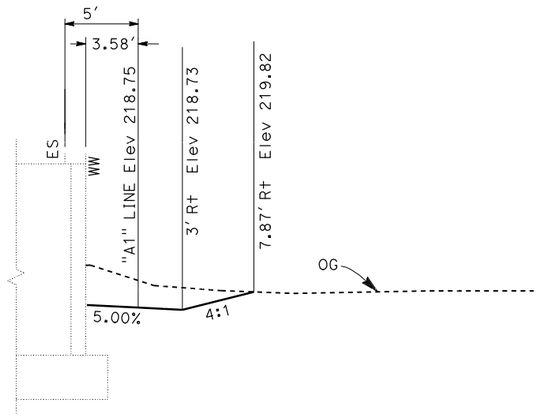


SECTION C-C

ABUTMENT No. 1

"A1" 10+75.960



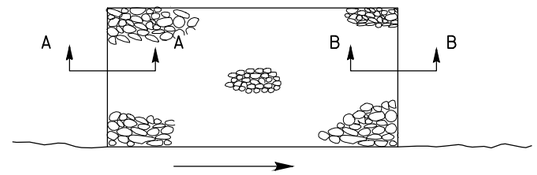
SECTION A-A

ABUTMENT No. 1

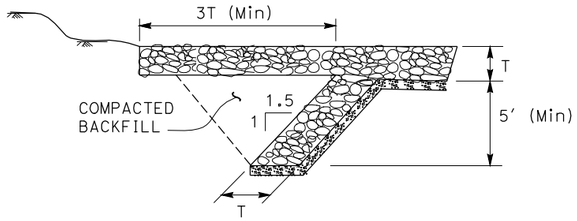
"A1" 10+21.250

ABREVIATIONS

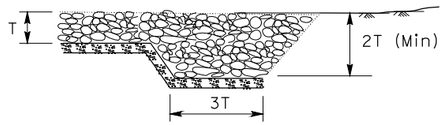
OWM - ORDINARY WATER MARK



DIRECTION OF FLOW



SECTION A-A

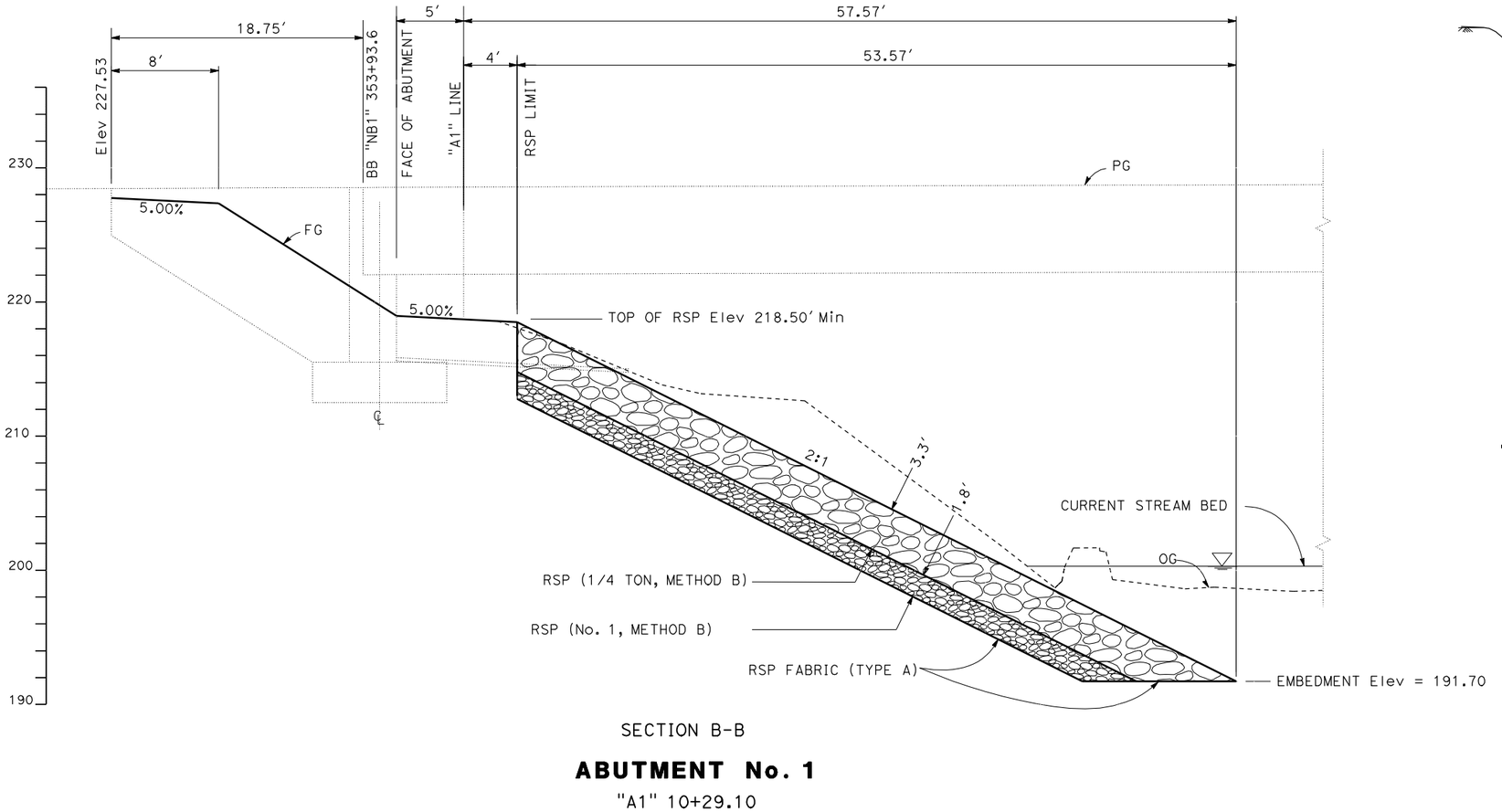


SECTION B-B

TYPICAL PLAN AND FLANK DETAILS

LEGEND:

T = TOTAL THICKNESS OF RSP (5.1 Ft)



SECTION B-B

ABUTMENT No. 1

"A1" 10+29.10

ROCK SLOPE PROTECTION

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-25

LAST REVISION
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:43

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

REVISED BY	DATE REVISED
DAVID HOPPER	
MIKE PANCHESSON	
CALCULATED-DESIGNED BY	
CHECKED BY	
FUNCTIONAL SUPERVISOR	
ALI KIANI	

BORDER LAST REVISED 7/2/2010

USERNAME => s118704
DGN FILE => 0300000509ga025.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0308

PROJECT NUMBER & PHASE 0300005091

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

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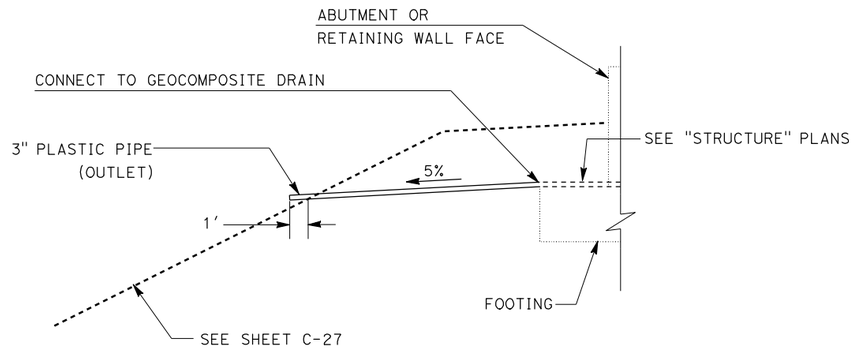


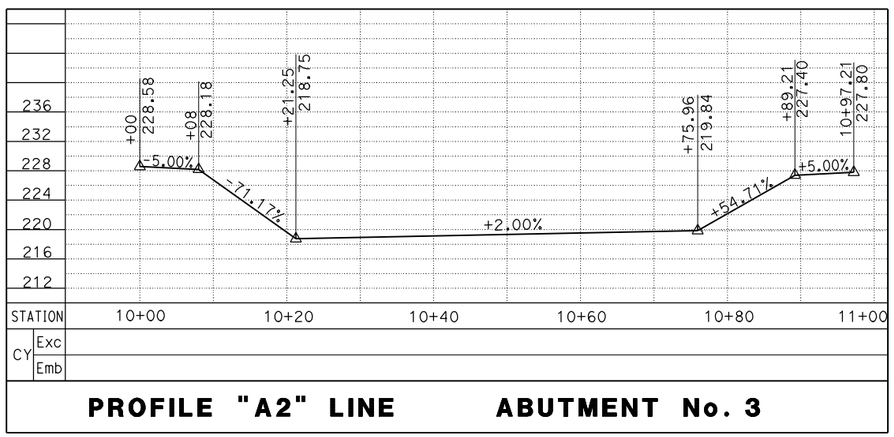
OUTLET DETAIL
NO SCALE

NOTE:

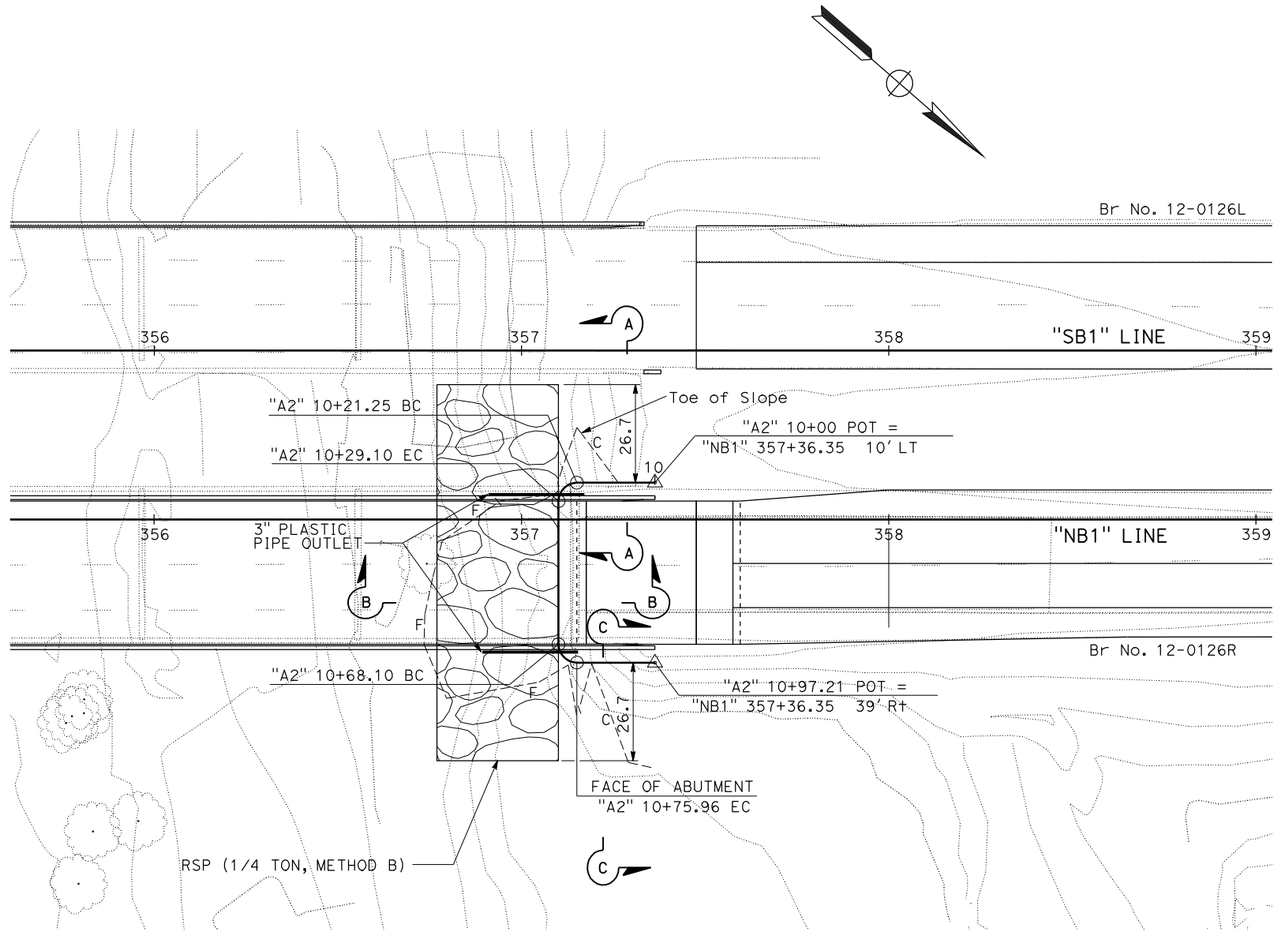
1. IF 3" PLASTIC PIPE (OUTLET) IS ROUTED THRU RSP TO BE PLACED, PROTECT FROM BEING CRUSHED.
2. SEE "CONSTRUCTION DETAILS" PLAN C-27 FOR SECTIONS.

"A2" LINE ALIGNMENT DATA

STATION	R	△	T	L	BEARING
"A2" 10+00.00 PI					
					N 41°02′22.74" W
"A2" 10+21.25 BC					
	5.00′	90°00′00"	5.00′	7.85′	
"A2" 10+29.10 EC					
					S 86°02′21.29" E
"A2" 10+68.10 BC					
	5.00′	90°00′00"	5.00′	7.85′	
"A2" 10+75.96 EC					
					N 41°02′22.22" W
"A2" 10+97.21 PI					



PROFILE "A2" LINE ABUTMENT No. 3



ROCK SLOPE PROTECTION

CONSTRUCTION DETAILS

SCALE: 1" = 20′

C-26

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
DAVID HOPPER	MIKE PANCHESSON		

FUNCTIONAL SUPERVISOR: ALI KIANI

LAST REVISION
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:43

ATTACHMENT C - Project Design Plans

BORDER LAST REVISED 7/2/2010 | USERNAME => s118704 | DGN FILE => 0300000509ga026.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0308 | PROJECT NUMBER & PHASE 0300005091

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M. A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

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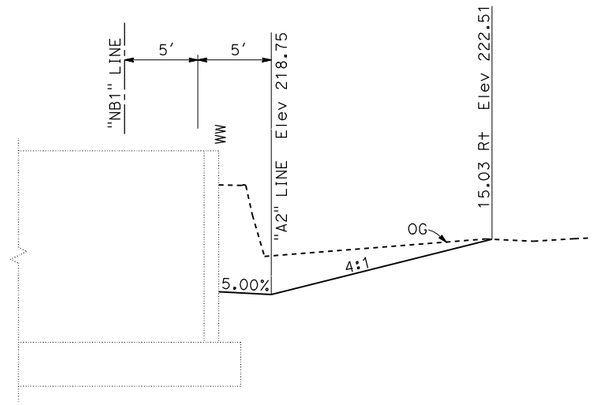
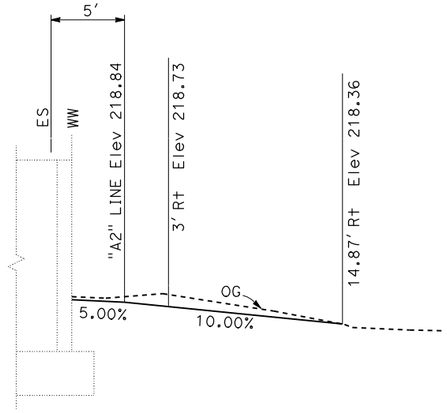


SECTION A-A

ABUTMENT No. 3

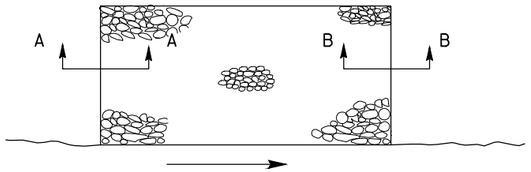
"A2" 10+21.250



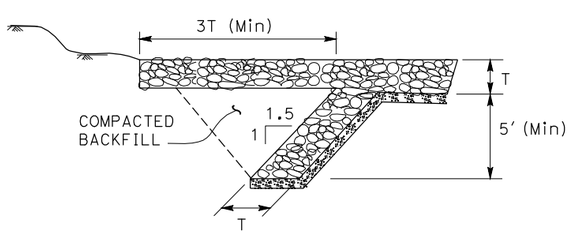
SECTION C-C

ABUTMENT No. 3

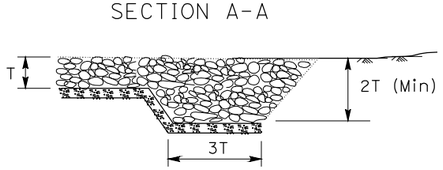
"A2" 10+75.96



DIRECTION OF FLOW



SECTION A-A

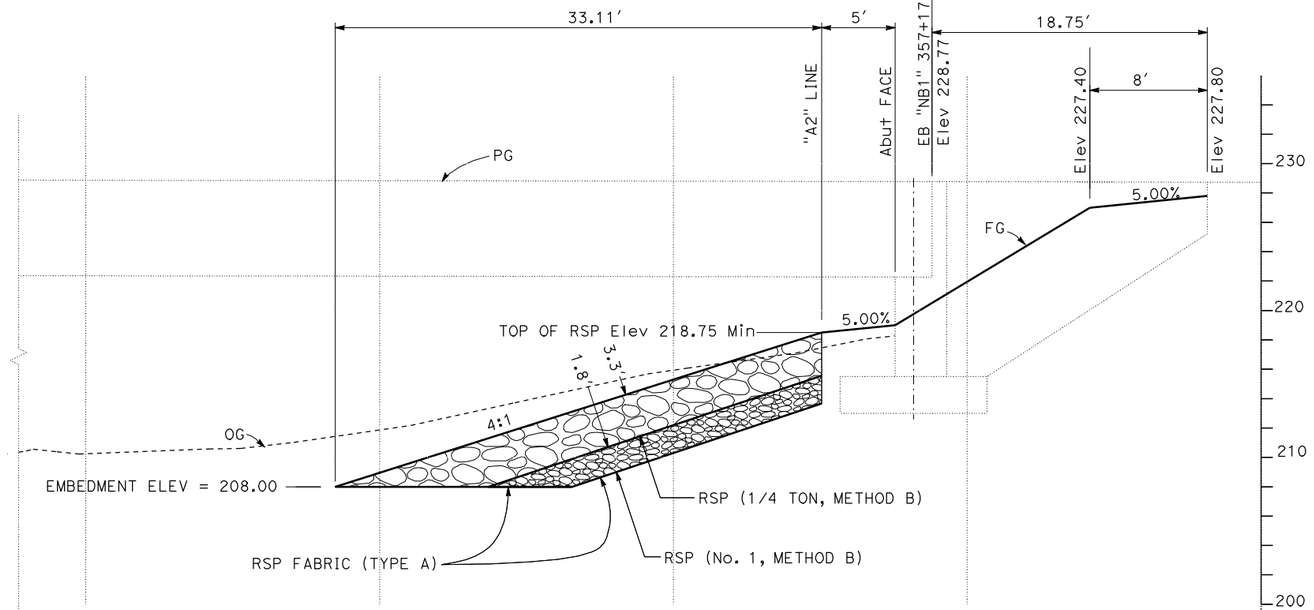


SECTION B-B

TYPICAL PLAN AND FLANK DETAILS

LEGEND:

T = TOTAL THICKNESS OF RSP (5.1 Ft)



SECTION B-B

ABUTMENT No. 3

"A2" 10+68.10

ROCK SLOPE PROTECTION

CONSTRUCTION DETAILS

SCALE: 1" = 5'

C-27

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

FUNCTIONAL SUPERVISOR: ALI KIANI
CALCULATED-DESIGNED BY:
CHECKED BY: MIKE PANCHESSON
DAVID HOPPER

REVISED BY | DATE REVISED

LAST REVISION | DATE PLOTTED => 17-APR-2012 | TIME PLOTTED => 13:43

BORDER LAST REVISED 7/2/2010 | USERNAME => s118704 | DGN FILE => 0300000509ga027.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0308 | PROJECT NUMBER & PHASE 0300005091

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6	2	

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

NOTES:

1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATIONS ARE SHOWN ON THE SUPERELEVATION DIAGRAMS.
3. SEE "CONSTRUCTION DETAILS" PLANS FOR LIMITS OF COLD PLACE AC PAVEMENT, HMA (TYPE A) AND RHMA-O.
4. PROFILE GRADE ON TOP OF HMA (TYPE A) SURFACE.
5. EMBANKMENT SIDE SLOPES AS SHOWN EXCEPT AROUND BRIDGE ABUTMENTS, SLOPES WILL BE 2:1 OR FLATTER.

STRUCTURAL SECTIONS

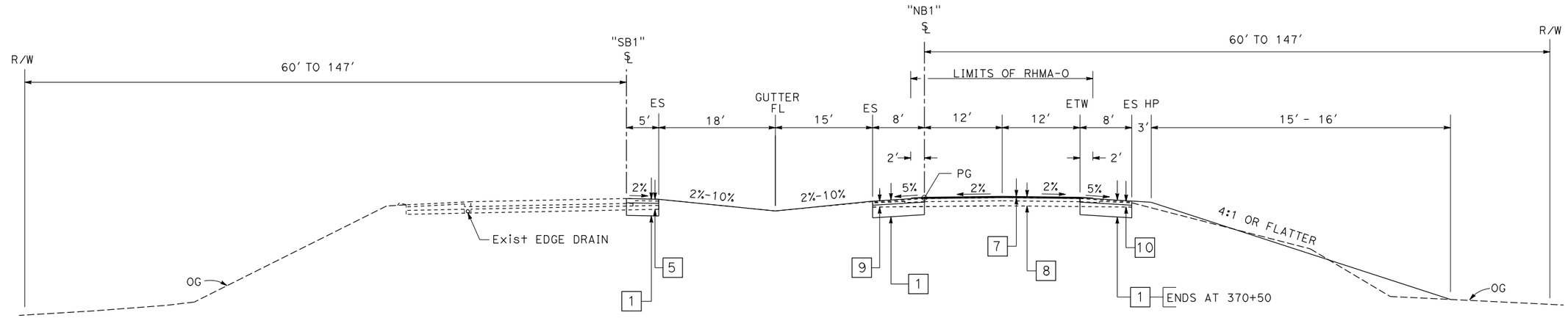
1. 0.65′ HMA (TYPE A)
   1.95′ CLASS 2 AB
2. 0.10′ RHMA-O
   0.65′ HMA (TYPE A)
   1.95′ CLASS 2 AB
3. GRIND Exist Conc Pvmt
   0.05′ Max
4. Exist
   0.75′ Conc Pvmt
   0.40′ ATPB
   0.60′ AS
5. Exist
   0.30′ AC
   0.55′ - 0.82′ AB
   0.60′ AS
6. 0.65′ HMA (TYPE A)
   0.50 ATPB
   1.45′ CLASS 2 AB
7. 0.10′ RHMA-O
   0.10′ HMA (TYPE A) (STAGE 2) (SEE NOTE 4)
   0.10′ COLD PLANE AC Pvmt, Exist OGAC
8. Exist
   0.08′ - 0.10′ OGAC
   0.49′ - 0.54′ AC
   0.75′ AB
9. Exist
   0.39′ - 0.48′ AC
   0.64′ - 0.84′ AB
10. Exist
    0.18′ - 0.27′ AC
    0.64′ - 0.84′ AS

DESIGN DESIGNATION (ROUTE 99)

ADT (2016) = 42,900	D = 54 %
ADT (2036) = 68,900	T = 7.0 %
DHV (2036) = 6,780	TI_{20} = 12.5
ESAL (2036) = 15,473,700	V = 70 MPH

ABBREVIATIONS:

RHMA-O - RUBBERIZED HOT MIX ASPHALT (OPEN GRADED)
S - MATCH EXISTING SLOPE

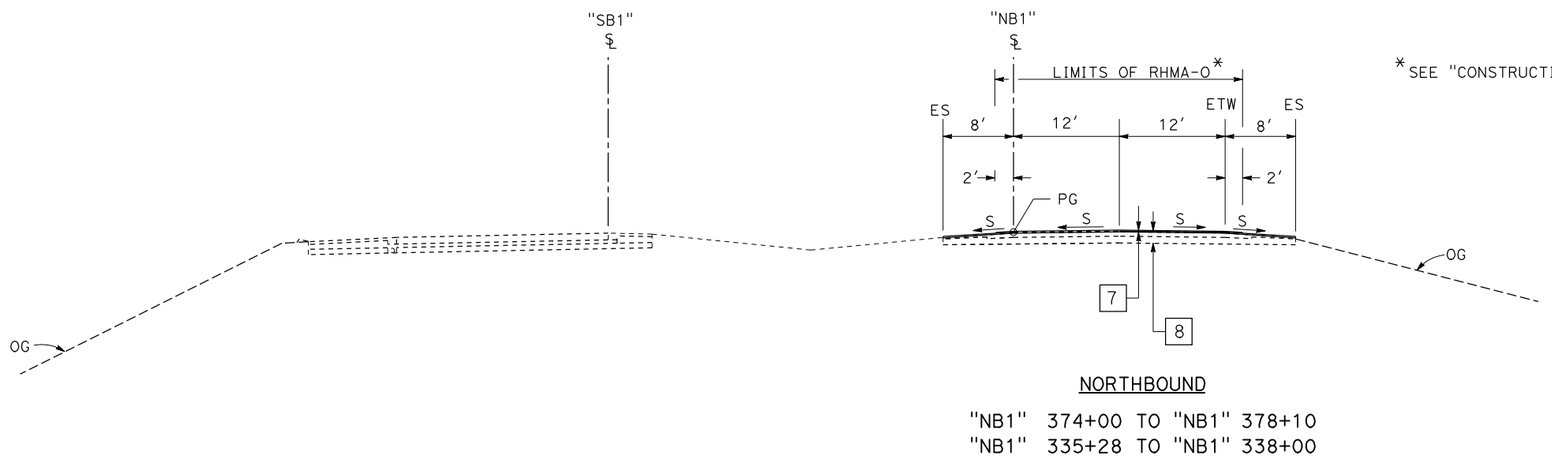


SOUTHBOUND

"SB1" 370+50 TO "SB1" 373+40
"SB1" 339+70 TO "SB1" 341+15

NORTHBOUND

"NB1" 363+55 TO "NB1" 374+00
"NB1" 338+00 TO "NB1" 344+75



*SEE "CONSTRUCTION DETAILS" PLANS FOR EXCEPTION.

NORTHBOUND

"NB1" 374+00 TO "NB1" 378+10
"NB1" 335+28 TO "NB1" 338+00

TYPICAL CROSS SECTIONS

NO SCALE

ROUTE 99

X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

FUNCTIONAL SUPERVISOR: ALI KIANI
CALCULATED-DESIGNED BY: DON WEHRLY
CHECKED BY: LAN NGUYEN
REVISED BY | DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:42

BORDER LAST REVISED 7/2/2010
USERNAME => s118704
DGN FILE => 0300000509ca001.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0308
PROJECT NUMBER & PHASE 0300000509

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

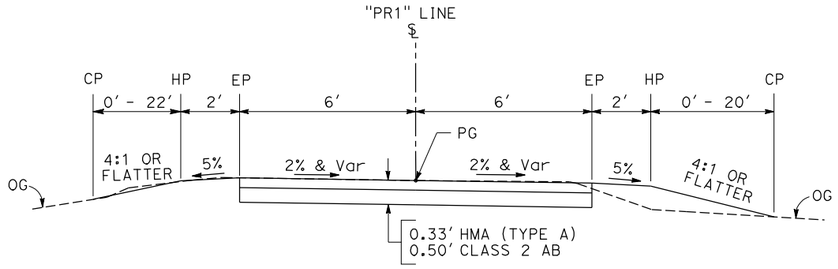
M. A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

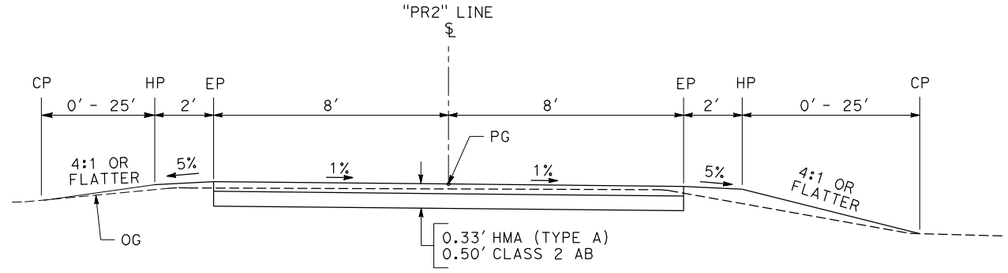
NOTES:

1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. FOR DIKE LOCATIONS, SEE "LAYOUTS" PLANS.
3. REMOVAL OF EDGE DRAINS INCLUDED IN ROADWAY EXCAVATION, STA Lt "SB1"341+15 TO Lt "SB1" 370+50.
4. SEE "CONSTRUCTION DETAILS" PLANS FOR OTHER GRIND Pvmt DETAIL.
5. PLACE ATPB FROM "SB1" 341+15 TO "SB1" 353+63.61 AND "SB1" 357+47.61 TO "SB1" 370+50.



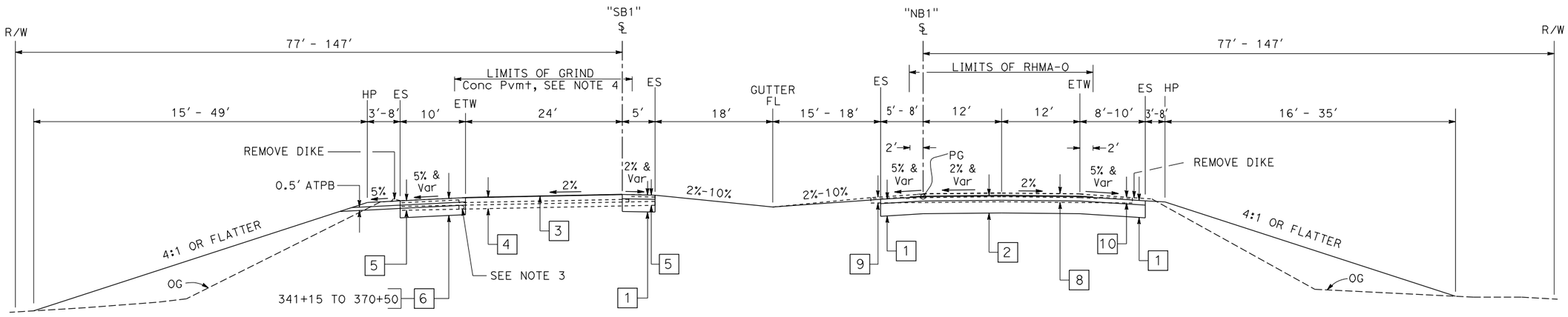
"PR1" 0+59.00 TO "PR1" 1+07.00

PRIVATE ROAD CONNECTION



"PR2" 0+57.00 TO "PR2" 1+06.00

PRIVATE ROAD CONNECTION



SOUTHBOUND

"SB1" 357+47.6 TO "SB1" 373+40
"SB1" 341+10 TO "SB1" 353+63.6

NORTHBOUND

"NB1" 357+59.6 TO "NB1" 363+55
"NB1" 344+75 TO "NB1" 353+51.6

ROUTE 99

TYPICAL CROSS SECTIONS

NO SCALE

X-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

CALCULATED-DESIGNED BY	DW,LN, DB	REVISED BY	
CHECKED BY	DAL BAINS	DATE REVISED	
FUNCTIONAL SUPERVISOR	ALI KIANI		

LAST REVISION 00-00-00
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:42

ATTACHMENT C - Project Design Plans

BORDER LAST REVISED 7/2/2010
USERNAME => s118704
DGN FILE => 0300000509ca002.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0308
PROJECT NUMBER & PHASE 03000005091

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

NOTES:

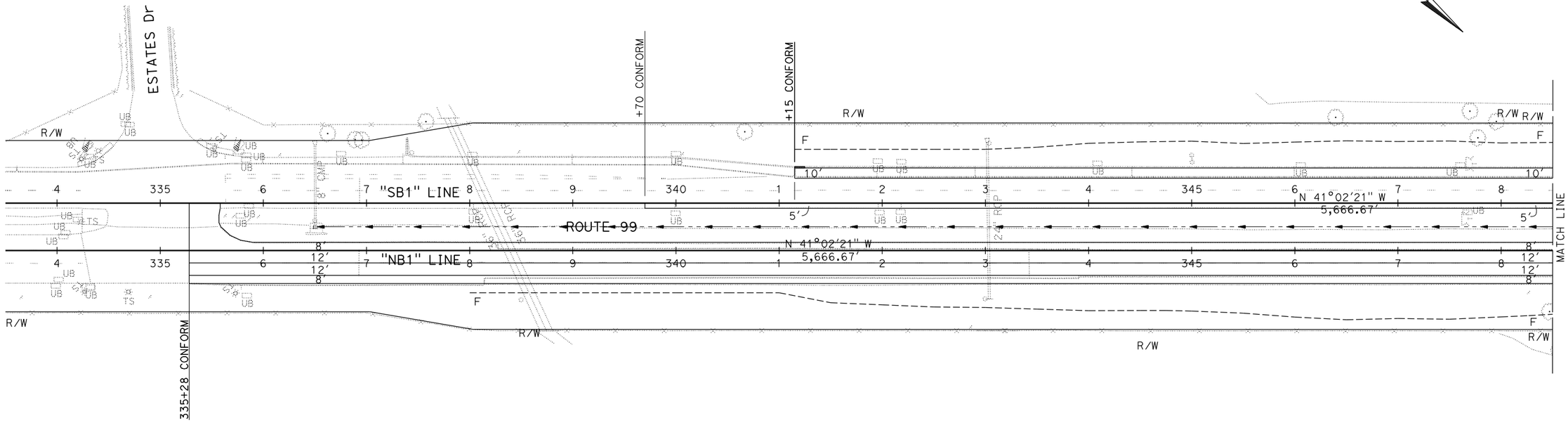
1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. HORIZONTAL CONTROL FOR THIS PROJECT IS CALIFORNIA COORDINATE SYSTEM ZONE. GRID DISTANCES AND GRID BEARINGS SHOWN. TO OBTAIN GROUND DISTANCES, DIVIDE BY THE AVERAGE COMBINED GRID FACTOR OF 0.99996448. THE HORIZONTAL DATUM IS: NAD 83.
3. ELEVATIONS BASED ON THE 1929 NATIONAL GEODETIC VERTICAL DATUM.
4. SEE "SUMMARY OF QUANTITIES" PLANS FOR MBGR AND DIKE LOCATIONS.
5. SB EXISTING LANES ARE OF Conc Pvmt.
6. UTILITY FACILITIES NOT SHOWN. SEE " UTILITY" PLANS.
7. Temp FENCE (TYPE ESA) LOCATIONS WILL BE FIELD LOCATED BY THE ENGINEER.

ABBREVIATIONS:

PTE - PERMIT TO ENTER AND CONTRUCT
TCE - TEMPORARY CONSTRUCTION EASEMENT
SUHV - SUPPLEMENTAL Horiz/Vert CONTROL POINT
Kv - KILO-VOLT
Ct - CALTRANS

LEGEND:

ESA FENCE LOCATIONS



LAYOUT

SCALE: 1" = 50'

L-1

LAST REVISION	DATE PLOTTED => 17-APR-2012
00-00-00	TIME PLOTTED => 13:42

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

CALCULATED-DESIGNED BY	MIKE PANCHESSON	REVISED BY	
CHECKED BY	DON WEHRLY	DATE REVISED	
FUNCTIONAL SUPERVISOR	ALI KIANI		

BORDER LAST REVISED 7/2/2010

USERNAME => s118704
DGN FILE => 0300000509ea001.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0308

PROJECT NUMBER & PHASE 0300000509

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M. A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

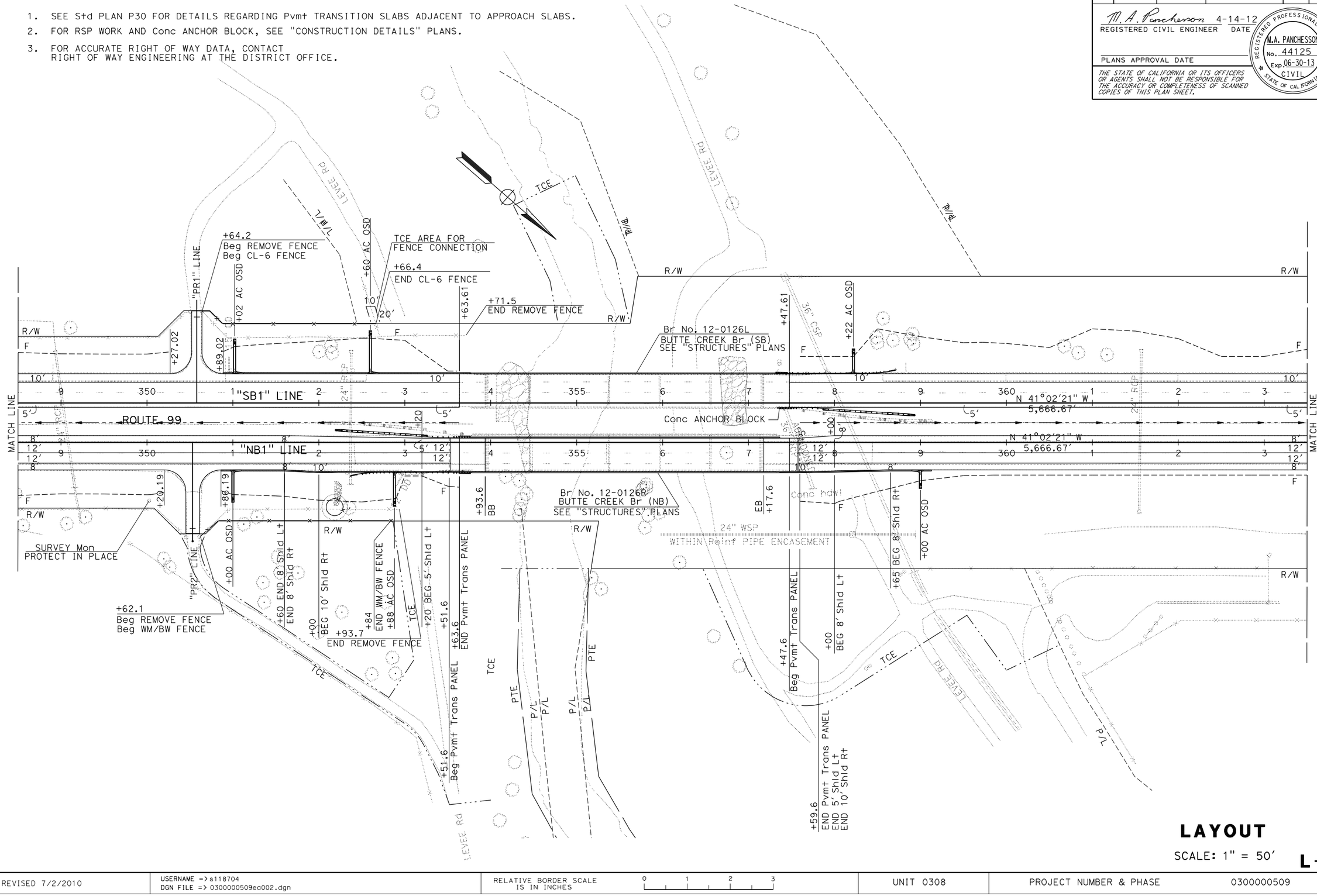
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
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.

NOTES:

1. SEE Std PLAN P30 FOR DETAILS REGARDING Pvmt TRANSITION SLABS ADJACENT TO APPROACH SLABS.
2. FOR RSP WORK AND Conc ANCHOR BLOCK, SEE "CONSTRUCTION DETAILS" PLANS.
3. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



LAYOUT

SCALE: 1" = 50'

L-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MIKE PANCHESSON	DON WEHRLY		

FUNCTIONAL SUPERVISOR: ALI KIANI

LAST REVISION 00-00-00
DATE PLOTTED => 17-APR-2012
TIME PLOTTED => 13:42

BORDER LAST REVISED 7/2/2010

USERNAME => s118704
DGN FILE => 0300000509ea002.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0308

PROJECT NUMBER & PHASE 0300000509

ATTACHMENT C - Project Design Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99	28.1/29.6		

M.A. Panchesson 4-14-12
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M.A. PANCHESSON
No. 44125
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

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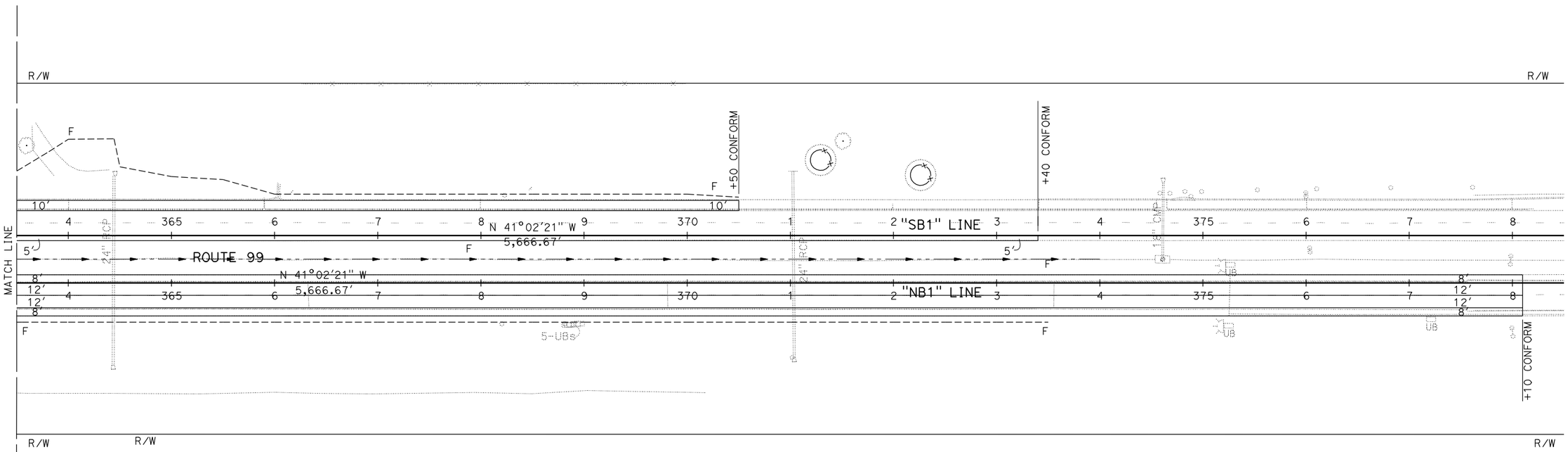
NOTE:

FOR ACCURATE RIGHT OF WAY DATA CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



LAYOUT

SCALE: 1" = 50'

L-3

LAST REVISION	DATE PLOTTED => 17-APR-2012
00-00-00	TIME PLOTTED => 13:42

CALCULATED-DESIGNED BY	MIKE PANCHESSON	REVISED BY	DATE REVISED
CHECKED BY	DON WEHRLY		
FUNCTIONAL SUPERVISOR	ALI KIANI		

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans® DIVISION OF ENGINEERING

BORDER LAST REVISED 7/2/2010	USERNAME => s118704 DGN FILE => 0300000509ea003.dgn	RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3	UNIT 0308	PROJECT NUMBER & PHASE 0300000509

ATTACHMENT C - Project Design Plans

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99			

REGISTERED CIVIL ENGINEER — 4-3-12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Keith Stillmunkes — No. 68878 — Exp. 9/30/13 — CIVIL — STATE OF CALIFORNIA

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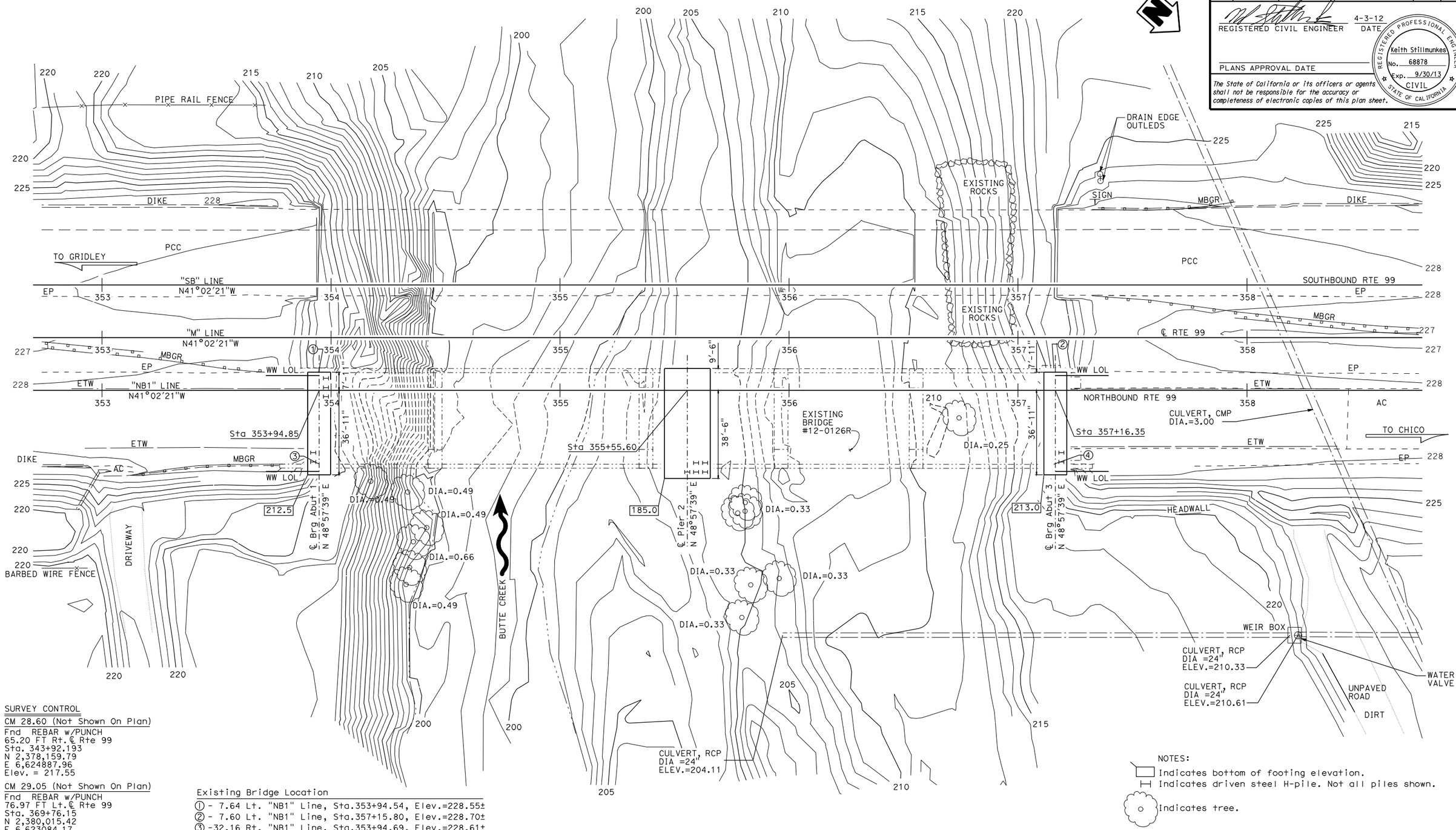

SURVEY CONTROL

CM 28.60 (Not Shown On Plan)
Fnd REBAR w/PUNCH
65.20 FT Rt. ℄ Rte 99
Sta. 343+92.193
N 2,378,159.79
E 6,624887.96
Elev. = 217.55

CM 29.05 (Not Shown On Plan)
Fnd REBAR w/PUNCH
76.97 FT Lt. ℄ Rte 99
Sta. 369+76.15
N 2,380,015.42
E 6,623084.17
Elev. = 220.22

Existing Bridge Location

① - 7.64 Lt. "NB1" Line, Sta.353+94.54, Elev.=228.55±
② - 7.60 Lt. "NB1" Line, Sta.357+15.80, Elev.=228.70±
③ -32.16 Rt. "NB1" Line, Sta.353+94.69, Elev.=228.61±
④ -32.31 Rt. "NB1" Line, Sta.357+15.61, Elev.=228.70±

NOTES:
- Indicates bottom of footing elevation.
- Indicates driven steel H-pile. Not all piles shown.
- Indicates tree.

PRELIMINARY INVESTIGATION SECTION							DESIGN	BY Keith Stillmunkes	CHECKED Mario Guadamuz
SCALE 1"=20'	VERT.DATUM NGVD29	PHOTOGRAMMETRY AS OF: X					DETAILS	BY Anthony Valdez	CHECKED Mario Guadamuz
	HORZ.DATUM NAD83 (1991.35)	SURVEYED	BY District/J. Borden	CHECKED	BY J.Borden 03/2011		QUANTITIES	BY Gerald Dickerson	CHECKED Yingjue Feng
	ALIGNMENT TIES Dist. Traverse Sheet	DRAFTED	BY T.Zolnikov 03/2011	CHECKED	BY T.Schmalz 03/2011				

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH 07

BRIDGE NO. 12-0126R
POST MILE 28.72

BUTTE CREEK BRIDGE, RIGHT (REPLACE)
FOUNDATION PLAN

STRUCTURES FOUNDATION PLAN SHEET (ENGLISH) (REV. 09-01-10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3646
PROJECT NUMBER & PHASE: 0300000509 1 CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES			SHEET	OF
10-14-11	2-23-12	12-6-11	5	27

FILE => 12-0126r-e-fp101.dgn

ATTACHMENT C - Project Design Plans

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99			

REGISTERED CIVIL ENGINEER — DATE 4-3-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Keith Stillmunkers — No. 68878 — Exp. 9/30/13 — CIVIL — STATE OF CALIFORNIA

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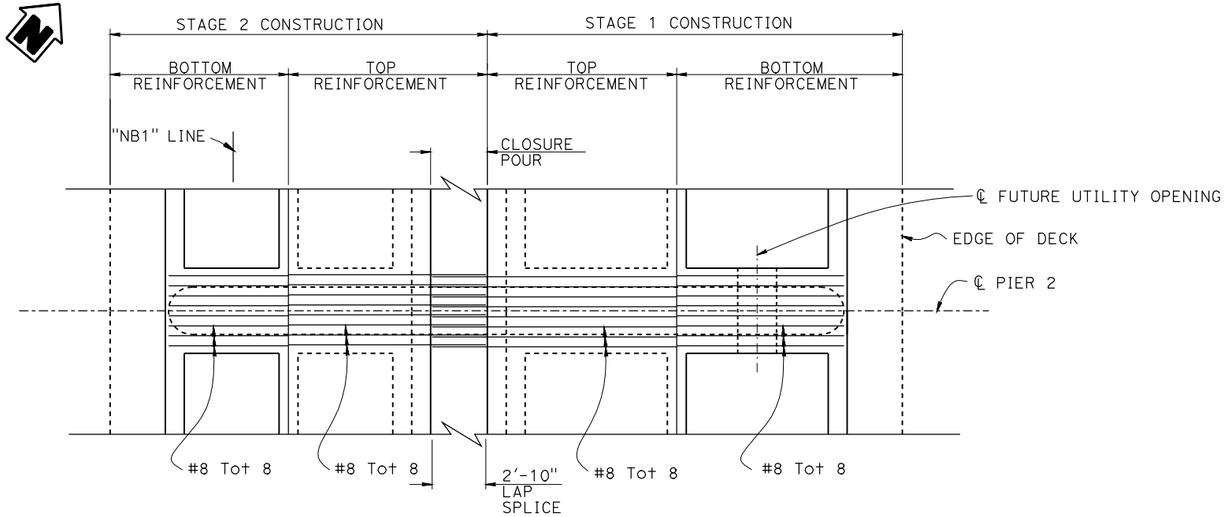
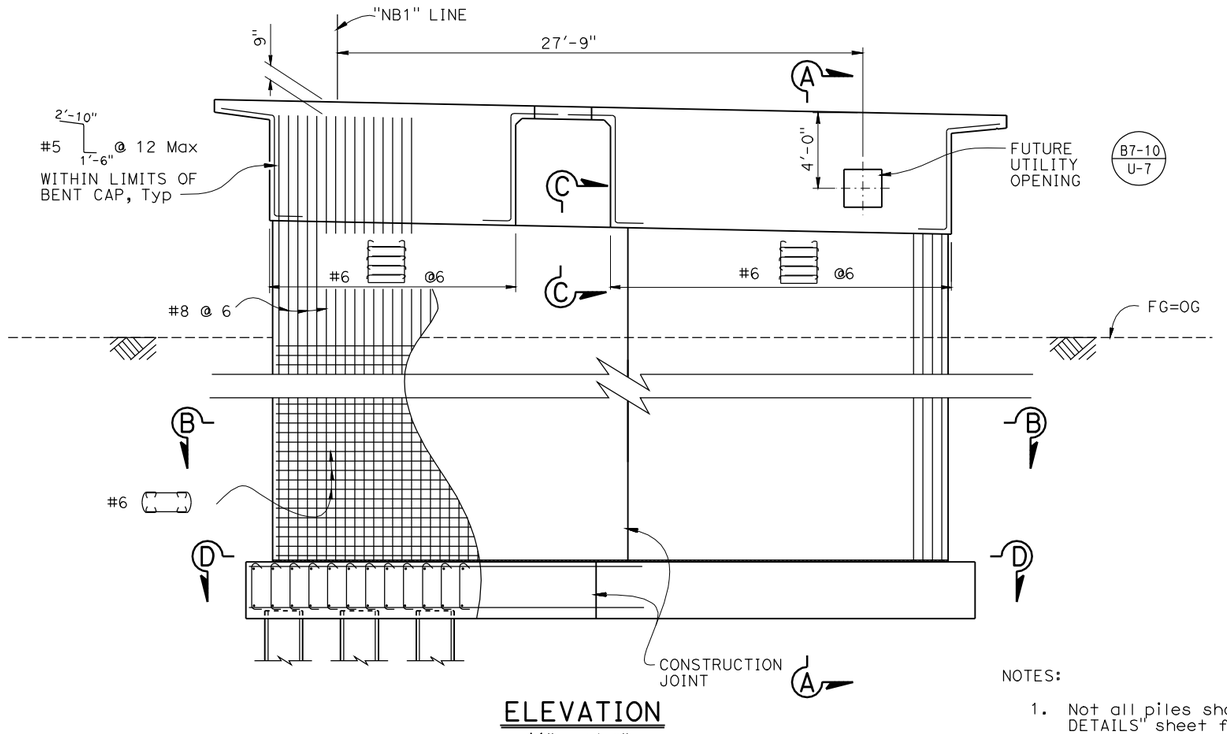
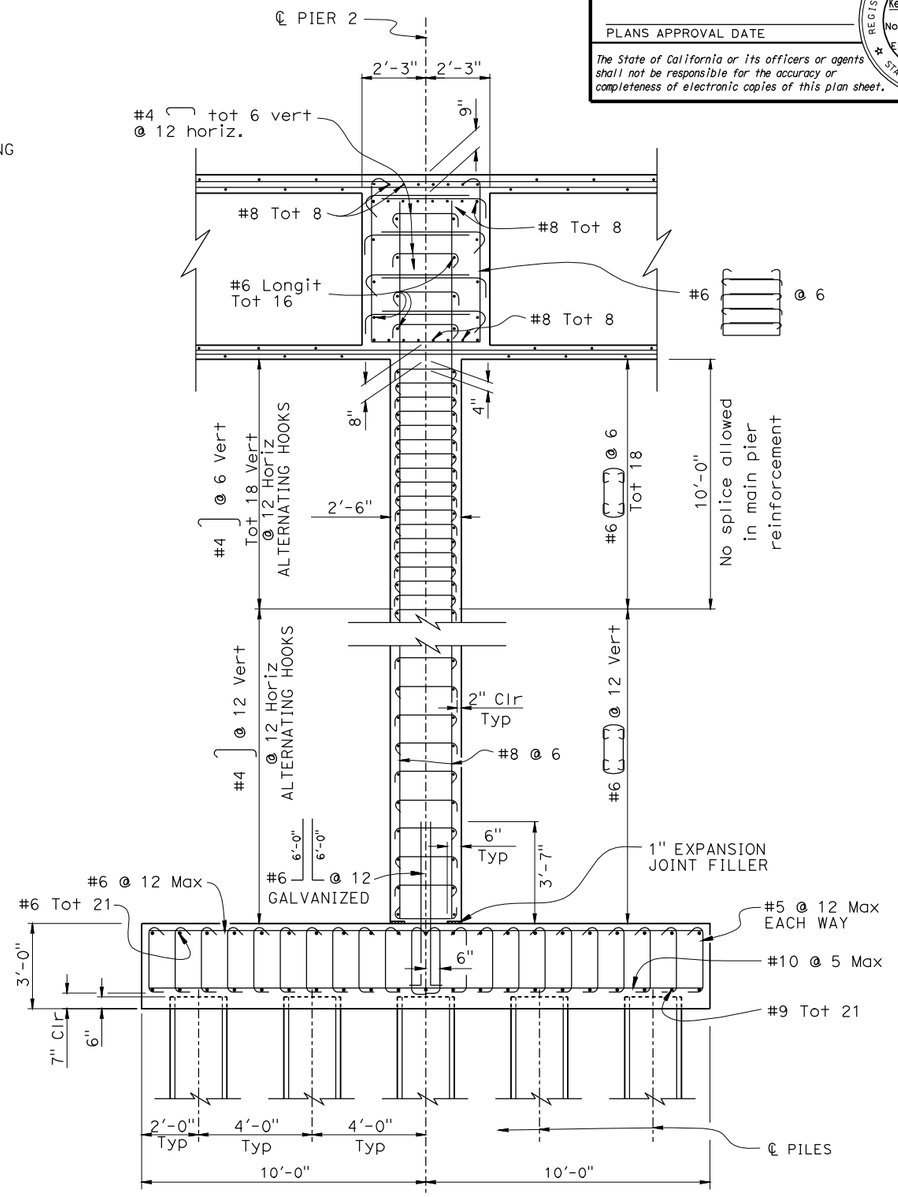


PLAN
1/4" = 1'-0"



ELEVATION
1/4" = 1'-0"



SECTION A-A
3/8" = 1'-0"

NOTES:

1. Not all piles shown, see "PIER DETAILS" sheet for pile placement.
2. For "SECTIONS B-B", "C-C" and "D-D" see "PIER DETAILS" sheet.

DESIGN	BY Keith Stillmunkes	CHECKED Mario Guadamuz	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
DETAILS	BY Yingjue Feng	CHECKED Mario Guadamuz	
QUANTITIES	BY Gerald Dickerson	CHECKED Yingjue Feng	

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN
DESIGN BRANCH 7

BRIDGE NO. 12-0126R
POST MILE 28.7

BUTTE CREEK BRIDGE, RIGHT (REPLACE)
PIER LAYOUT

STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REV. 09-01-10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3592
PROJECT NUMBER & PHASE: 0300000509 1
CONTRACT NO.: 03-3E6201

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
9-1-11	4-3-12	2-28-11	11-17-11	10	27

FILE => 12-0126r-1-p01_10.dgn

USERNAME => s115764 DATE PLOTTED => 03-APR-2012 TIME PLOTTED => 13:38

ATTACHMENT C - Project Design Plans

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99			

REGISTERED CIVIL ENGINEER — 4-3-12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Keith Stillmunkers — No. 68878 — Exp. 9/30/13 — CIVIL — STATE OF CALIFORNIA

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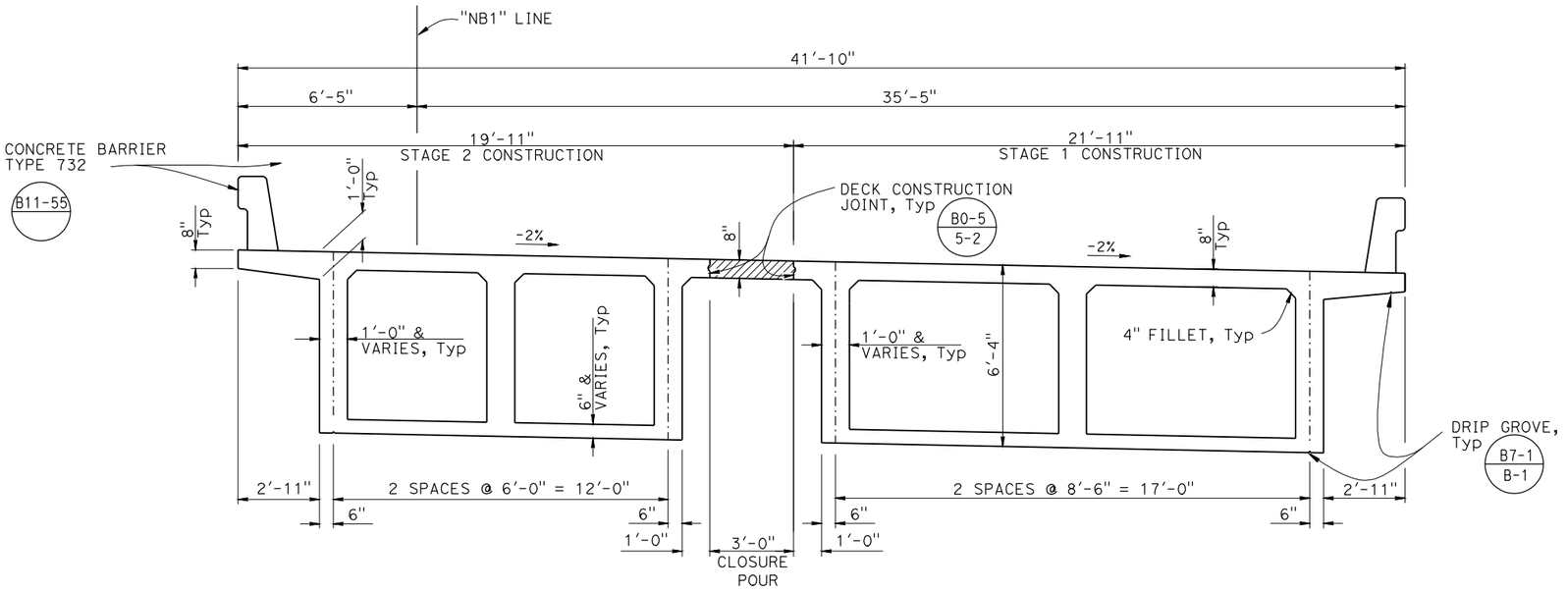
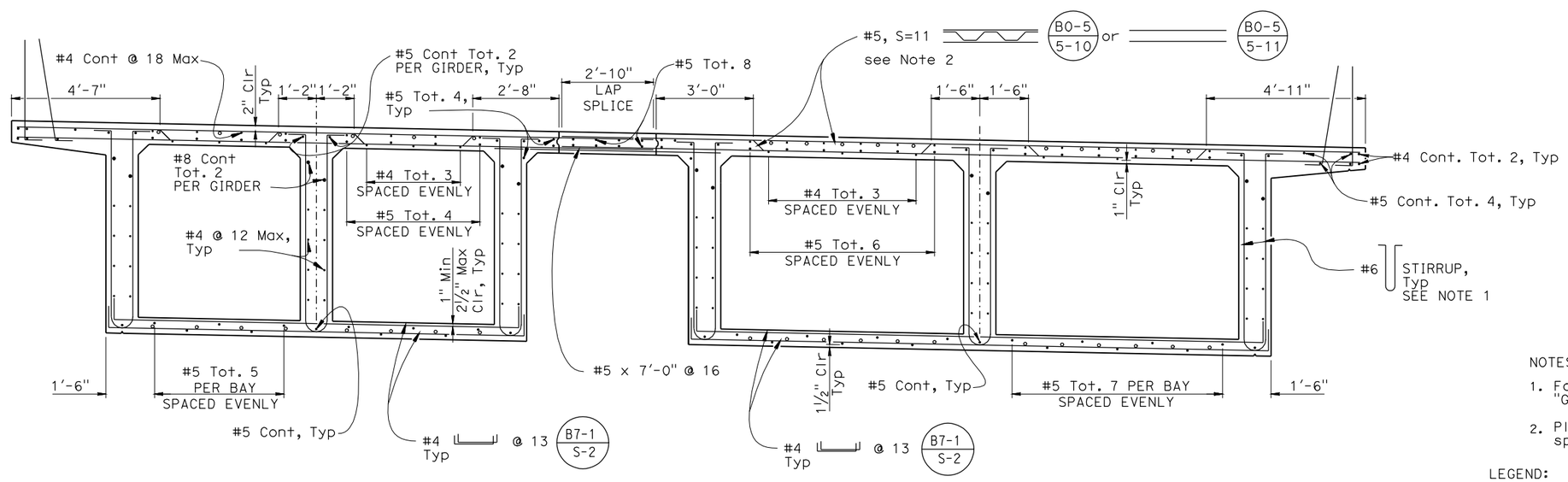


TYPICAL SECTION

3/8" = 1'-0"



PART TYPICAL SECTION

1/2" = 1'-0"

NOTES:

1. For spacing, see "GIRDER LAYOUT" sheet.
2. Place parallel to ℄ bent, space along ℄ bridge.

LEGEND:

Indicates closure pour

∘ Indicates additional reinforcement, see "ADDITIONAL SLAB REINFORCEMENT" sheet.

DESIGN	BY Keith Stillmunkes	CHECKED Mario Guadamuz	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH 7	BRIDGE NO. 12-0126R; POST MILE 28.7
DETAILS	BY Yingjue Feng	CHECKED Mario Guadamuz			
QUANTITIES	BY Gerald Dickerson	CHECKED Yingjue Feng			

BUTTE CREEK BRIDGE, RIGHT (REPLACE)

TYPICAL SECTION

STRUCTURES DESIGN DETAIL SHEET (ENGLISH) (REV. 09-01-10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3592
PROJECT NUMBER & PHASE: 0300000509 1
CONTRACT NO.: 03-3E6201

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
7-29-11	12-6-11	12-16-11	2-24-12	12	27

FILE => 12-0126r-k-ts.dgn

ATTACHMENT C - Project Design Plans

USERNAME => s11576d DATE PLOTTED => 03-APR-2012 TIME PLOTTED => 13:39

NOTES:
1. SEE EXHIBIT 2 FOR PROFILE VIEW OF RSP.
2. SEE RAOD PLAN SWHEET C-24 THROUGH C-27 FOR RSP DETAILS.

LEGEND

PROPOSED RSP

CONTOUR LINE - 100 YEAR HIGH WATER ELEVATION - 218.5 FEET

ABREVIATIONS

RSP - ROCK SLOPE PROTECTION
R/W - RIGHT OF WAY
P/L - PROPERTY LINE
TCE - TEMPORARY CONSTRUCTION EASEMENT

VILLAS AT BUTTE CRK OWNER'S ASSOCIATION, LLC
040-350-099

WESTERN RESOURCES INC
040-020-049

BUTTE CREEK PARK LLC
040-002-075

BUTTE CREEK PARK LLC
040-020-157

CHICO RESEARCH PARK
040-600-049
50.00 AC

State Fish & GAme
040-400-040
4.00 AC

State Fish & GAme
040-400-999
AC

TOP OF LEVEE
P/L
R/W
TCE
BUTTE CREEK
Br No. 12-0126L
Br No. 12-0126R
PROPOSED RSP BELOW OG
ROUTE 99
355
+93.6 BB
EB +17.6
0 20 40 60
FEET
SCALE

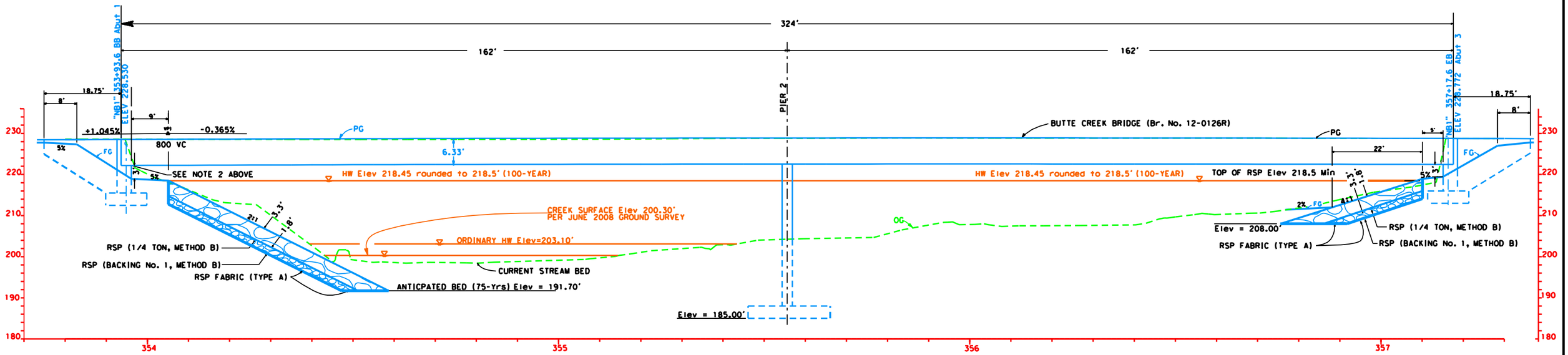
LAYOUT - NB BRIDGE
REPLACE BR NO. 12-0126R
BUTTE CREEK BRIDGE
03-3E6201 Apr 2012

EXHIBIT 1

ATTACHMENT C - Project Design Plans

NOTES:

1. PILES UNDER ABUTMENT AND BRIDGE FOOTINGS NOT SHOWN. SEE STRUCTURE PLAN SHEETS FOR PILE INFO.
2. LOWEST POINT ALONG Br SOFFIT 32.5' Rt, "NB1" 353+96.1, is Elev 221.56' less HWSEL of 218.45'= 3.11' > 3' req'd clearance ok.
3. THE HORIZANOTAL DATUM USED IS NAD 1983.
4. THE VERTICAL DATUM USED IS NGVD 1929.
5. THE VERTICAL DATUM TRANSFORMATION BETWEEN NGVD 1929 AND NAVD 1988 WAS DETERMINED USING VERTCON ORTHOMETRIC HEIGHT CONVERSION PROVIDED BY NGS-NOAA WEBSITE. ACCORDING TO NGS INFORMATION, VALUES OF NAVD 1988 DATUM ARE 2.326-FEET HIGHER THAN FOR NGVD 1929 DATUM AT THE PROJECT SITE.



TOTAL RSP AT ABUTMENT 1 = 1,129 CY
TOTAL RSP AT ABUTMENT 3 = 558 CY

0 10 20 30 40
FEET
Horiz SCALE

VERTICAL SCALE: 1 H : 1 V

PROFILE NB BRIDGE
REPLACE BR NO. 12-0126R
BUTTE CREEK BRIDGE
03-3E6201

Apr 2012

EXHIBIT 2

ATTACHMENT C - Project Design Plans

NOTES:

1. PLACE STREAMBED GRAVEL BLANKET UPSTREAM AND DOWNSTREAM WITHIN SPREAD LIMITS SHOWN.
2. THE ALLOWABLE IN-STREAM WORK WINDOW FOR PLACING STREAMBED GRAVEL BLANKET IN THE CREEK IN ANY YEAR IS FROM JULY 15 THROUGH OCTOBER 15.
3. A STREAMBED GRAVEL BLANKET SHALL BE PLACED TWICE. SEE STREAMBED GRAVEL BLANKET TYPICAL BELOW.

ABBREVIATIONS

TCE - TEMPORARY CONSTRUCTION EASEMENT
PTE - PERMIT TO ENTER AND CONTRUCT
SGB - STREAMBED GRAVEL BLANKET

STREAMBED GRAVEL SPREAD LIMITS
REPLACE BR NO. 12-0126R
BUTTE CREEK BRIDGE
03-3E6201

Apr 2012

EXHIBIT 3

ATTACHMENT C - Project Design Plans

Attachment D - Planting Plan

aerial.dgn 9/5/2012 10:16:14 AM

Butte Creek, HEC-RAS Sensitivity Analysis September 6, 2012

Based on the teleconference with the Army Corps of Engineers (ACE) on the morning of September 6, 2012, the HEC-RAS model was modified to determine how several variables will affect the water surface elevation at the site. The Channel Capacity for Butte Creek of 27,000 cfs (per the State Plan of Flood Control) was used for this analysis.

The tables compare values for 1) the Existing channel configuration, 2) the proposed channel including gravel mitigation, the proposed structure and the three vegetation mitigation Sites using a Manning's n-value of 0.049, 3) the proposed channel using a manning's n-value of 0.060 in the vegetation mitigation Sites, and 4) the proposed channel using the Manning's n-value of 0.049 and adding obstructions to the channel to account for the trees within the mitigation sites.

For scenario 2, the Manning's n-value was estimated using a composite n-value as discussed in Chow as well as USGS and FHWA publications. The value estimated, 0.049, was also compared to Chows Table 5-6, which noted a "Normal" value of 0.050 for "light brush and trees, in winter."

For scenario 3, the Manning's n-value of 0.060 was suggested by Saba (sp?) of the ACE. This value was listed in Chow's Table 5-6 as the maximum n-value for "light brush and trees, in winter," as discussed.

For scenario 4, The Manning's n-value was again set at 0.049, but obstructions were added to the mitigation areas. The width of the obstructions corresponded to the mature diameter of the trees within that specific mitigation Site, while the height was set well above the water surface elevation. For Site A, the largest trees will be White Alders, with a mature diameter of 20"; for Site B and Site C, Fremont Cottonwoods and California Sycamores are proposed, both with mature diameters of 24". Therefore the obstructions at Site A were 20" wide at both RS22 and RS23, while the obstructions were 2 foot wide at RS24, RS25 and RS26. It should also be noted that at RS25, there are obstructions modeled on both banks.

Table 1 shows the water surface elevation for the four scenarios, listed for each cross-section from RS21 to RS27. The values highlight in red are the water surface elevations directly from the HEC-RAS output. The values highlighted in orange are the differences in water surface compared to the existing configuration at the site.

From Table 1, it can be seen that the proposed configuration would have a maximum water surface increase of 0.08 feet (approximately 1") at RS23. Increasing the n-value to 0.060 at the mitigation sites would cause an increase of 0.09 feet, also at RS23. Scenario 4 with the obstructions causes a water surface elevation increase of 0.11 at RS23 and also an increase of 0.12 at RS27. While this is slightly about the typical allowable water surface increase of 0.10 feet, it is also overly conservative, since it still uses the 0.049 n-value. Since the trees are already modeled as "obstructions", it is redundant to also use the 0.049 n-value for the "brush and trees". It should be noted that the water surface elevation is

more than 4.5 ft below the top of the lowest levee at each cross-section in the areas of the vegetation mitigation.

Butte Cre	27	State Plar	Butte Existing	27000	206.21	221.82	6.12	4411.57	0.41	
Butte Cre	27	State Plar	Butte 6 DFG tree	27000	206.21	221.84	6.1	4428.11	0.41	0.02
Butte Cre	27	State Plar	Butte n060	27000	206.21	221.85	6.09	4433.92	0.41	0.03
Butte Cre	27	State Plar	Butte Obstruc	27000	206.21	221.94	6.02	4488.03	0.4	0.12
Butte Cre	26	State Plar	Butte Existing	27000	205.37	221.54	6.18	4371.96	0.36	
Butte Cre	26	State Plar	Butte 6 DFG tree	27000	205.37	221.53	6.18	4369.21	0.36	-0.01
Butte Cre	26	State Plar	Butte n060	27000	205.37	221.54	6.18	4371.82	0.36	0
Butte Cre	26	State Plar	Butte Obstruc	27000	205.37	221.6	6.17	4378.48	0.36	0.06
Butte Cre	25	State Plar	Butte Existing	27000	205.84	221.39	6.62	4076.67	0.39	
Butte Cre	25	State Plar	Butte 6 DFG tree	27000	205.84	221.37	6.66	4069.18	0.38	-0.02
Butte Cre	25	State Plar	Butte n060	27000	205.84	221.37	6.66	4071.15	0.38	-0.02
Butte Cre	25	State Plar	Butte Obstruc	27000	205.84	221.43	6.68	4060.56	0.38	0.04
Butte Cre	24	State Plar	Butte Existing	27000	205.63	218.94	13.23	2040.32	1	
Butte Cre	24	State Plar	Butte 6 DFG tree	27000	205.63	218.94	13.23	2040.45	1	0
Butte Cre	24	State Plar	Butte n060	27000	205.63	218.94	13.23	2040.45	1	0
Butte Cre	24	State Plar	Butte Obstruc	27000	205.63	219	13.23	2040.8	1	0.06
Butte Cre	23	State Plar	Butte Existing	27000	203.62	218.95	7.28	3707.76	0.43	
Butte Cre	23	State Plar	Butte 6 DFG tree	27000	203.62	219.03	7.21	3742.4	0.43	0.08
Butte Cre	23	State Plar	Butte n060	27000	203.62	219.04	7.21	3746.27	0.43	0.09
Butte Cre	23	State Plar	Butte Obstruc	27000	203.62	219.06	7.22	3737.91	0.43	0.11
Butte Cre	22	State Plar	Butte Existing	27000	202.03	218.88	6.06	4455.94	0.33	
Butte Cre	22	State Plar	Butte 6 DFG tree	27000	202.53	218.91	6.22	4338.57	0.35	0.03
Butte Cre	22	State Plar	Butte n060	27000	202.53	218.91	6.22	4339.21	0.35	0.03
Butte Cre	22	State Plar	Butte Obstruc	27000	202.53	218.92	6.25	4321.19	0.35	0.04
Butte Cre	21	State Plar	Butte Existing	27000	200.42	218.78	6.08	4439.14	0.33	
Butte Cre	21	State Plar	Butte 6 DFG tree	27000	200.92	218.82	6.14	4399.17	0.33	0.04
Butte Cre	21	State Plar	Butte n060	27000	200.92	218.82	6.14	4399.16	0.33	0.04
Butte Cre	21	State Plar	Butte Obstruc	27000	200.92	218.82	6.14	4399.15	0.33	0.04

Table 1

Table 2 on the follow page, is the output from the HEC-RAS program showing much of the same data as in Table 1. The HEC-RAS files should be available and distributed as soon as we receive concurrence that this analysis is suitable.

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS River: Butte Creek Reach: Butte Creek Profile: State

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Flow Area	Froude # Chl
				(cfs)	(ft)	(ft)	(ft/s)	(sq ft)	
Butte Creek	27.0	State Plan	Butte Existing	27000.00	206.21	221.82	6.12	4411.57	0.41
Butte Creek	27.0	State Plan	Butte 6 DFG tree	27000.00	206.21	221.84	6.10	4428.11	0.41
Butte Creek	27.0	State Plan	Butte n060	27000.00	206.21	221.85	6.09	4433.92	0.41
Butte Creek	27.0	State Plan	Butte Obstruc	27000.00	206.21	221.94	6.02	4488.03	0.40
Butte Creek	26.0	State Plan	Butte Existing	27000.00	205.37	221.54	6.18	4371.96	0.36
Butte Creek	26.0	State Plan	Butte 6 DFG tree	27000.00	205.37	221.53	6.18	4369.21	0.36
Butte Creek	26.0	State Plan	Butte n060	27000.00	205.37	221.54	6.18	4371.82	0.36
Butte Creek	26.0	State Plan	Butte Obstruc	27000.00	205.37	221.60	6.17	4378.48	0.36
Butte Creek	25.0	State Plan	Butte Existing	27000.00	205.84	221.39	6.62	4076.67	0.39
Butte Creek	25.0	State Plan	Butte 6 DFG tree	27000.00	205.84	221.37	6.66	4069.18	0.38
Butte Creek	25.0	State Plan	Butte n060	27000.00	205.84	221.37	6.66	4071.15	0.38
Butte Creek	25.0	State Plan	Butte Obstruc	27000.00	205.84	221.43	6.68	4060.56	0.38
Butte Creek	24.00	State Plan	Butte Existing	27000.00	205.63	218.94	13.23	2040.32	1.00
Butte Creek	24.00	State Plan	Butte 6 DFG tree	27000.00	205.63	218.94	13.23	2040.45	1.00
Butte Creek	24.00	State Plan	Butte n060	27000.00	205.63	218.94	13.23	2040.45	1.00
Butte Creek	24.00	State Plan	Butte Obstruc	27000.00	205.63	219.00	13.23	2040.80	1.00
Butte Creek	23.00	State Plan	Butte Existing	27000.00	203.62	218.95	7.28	3707.76	0.43
Butte Creek	23.00	State Plan	Butte 6 DFG tree	27000.00	203.62	219.03	7.21	3742.40	0.43
Butte Creek	23.00	State Plan	Butte n060	27000.00	203.62	219.04	7.21	3746.27	0.43
Butte Creek	23.00	State Plan	Butte Obstruc	27000.00	203.62	219.06	7.22	3737.91	0.43
Butte Creek	22.0	State Plan	Butte Existing	27000.00	202.03	218.88	6.06	4455.94	0.33
Butte Creek	22.0	State Plan	Butte 6 DFG tree	27000.00	202.53	218.91	6.22	4338.57	0.35
Butte Creek	22.0	State Plan	Butte n060	27000.00	202.53	218.91	6.22	4339.21	0.35
Butte Creek	22.0	State Plan	Butte Obstruc	27000.00	202.53	218.92	6.25	4321.19	0.35
Butte Creek	21	State Plan	Butte Existing	27000.00	200.42	218.78	6.08	4439.14	0.33
Butte Creek	21	State Plan	Butte 6 DFG tree	27000.00	200.92	218.82	6.14	4399.17	0.33
Butte Creek	21	State Plan	Butte n060	27000.00	200.92	218.82	6.14	4399.16	0.33
Butte Creek	21	State Plan	Butte Obstruc	27000.00	200.92	218.82	6.14	4399.15	0.33

Table 2

DEPARTMENT OF TRANSPORTATION
DISTRICT 3
703 B STREET
MARYSVILLE, CA 95901
PHONE (530) 741-5448
FAX (530) 741-4390
TTY 711

Flex your power!
Be energy efficient!

October 15, 2012

Mr. Jay Punia
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room #151
Sacramento, CA 95821

Dear Mr. Punia:

The letter is in regards to Permit No. 18767 (Butte Creek Bridge). Caltrans is requesting a modification condition thirty-three which is a variance to the standards for backfill compaction which state that "*Backfill material for excavations shall be placed in 4- to 6-inch layers and compacted to at least the density of the adjacent, firm, undisturbed soil.*" Caltrans believes that this variance should be granted because the Central Valley Flood Protection Board's standards for backfill compaction are not appropriate for this project based on the following information:

The California Code of Regulations Title 23, Division 1, Chapter 1, Section 128 (a) (1), states that any backfill within the levee section or near bridge supports within the floodway must be backfilled in four - (4) inch to six - (6) inch layers with approved materials. The levee section must be compacted to a relative compaction of not less than ninety (90) percent per ASTM D1557-91, dated 1991, which is incorporated by reference and above optimum moisture content. Caltrans is requesting a variance from this specification and would prefer to use our 2010 Standard Specifications sections 19-3.03E(1) and 19-5.03B respectively. Our long history of building bridges has made use of these specifications with no adverse affects. Listed below for your use are the specifications.

19-3.03E(1) Structural Backfill General
Place structural backfill in uniform layers. Bring backfill up uniformly on all side of structures. Backfill layers must be at most 0.67 foot thick (*8-inches*) before compacting except when compaction is done by ponding and jetting, the thickness must be at most 4 feet.

19-5.03B Relative Compaction (95 percent)
Obtain a relative compaction of a least 95 percent, as measured by California Test 216 or 231 (See Attached) for at least a depth of:
1. 0.5 foot below the grading plane for the width between the outer edges of shoulders
2. 2.5 feet below the finished grade for the width of the traveled way plus 3 feet on each side

Except for the outer 5 feet measured horizontally from the embankment side slope, compact the full width and depth of the embankment within 150 feet of each bridge abutment to at least 95 percent relative compaction. The 150-foot limit is measured horizontally from the bridge abutment and either parallel or concentric with the roadway centerline.

Thank you for your consideration of this variance. If you have any questions please contact me at (530) 741-5448.

Sincerely,

JOHN HOLDER
Project Manager