**Meeting of the Central Valley Flood Protection Board**
**November 16, 2012**
**Staff Report**
**County of Merced**
**Pump Station at Canal Creek, Merced County**

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## 1.0 – ITEM

Consider approval of Permit No. 18795 (Attachment B)

## 2.0 – APPLICANT

County of Merced

## 3.0 – LOCATION

The project is located on the right bank of Canal Creek, approximately a half mile upstream of State Route 99 in Merced County (see Attachment A for Location Maps).

## 4.0 – PROJECT DESCRIPTION

Merced County has approved the Atwater-Merced Expressway (AME) Project. Merced County and Caltrans have a cooperative agreement that the AME Project (described in Section 5.2, below) will be funded by Caltrans and built in accordance to Caltrans Standards. Merced County will own, operate, and maintain two features of the AME Project – a new bridge at Green Sands Avenue crossing Canal Creek and a new pump station on the east side of Canal Creek. These features are proposed in Encroachment Permit Application Nos. 18794 and 18795 respectively. One other feature of the AME Project will replace the SR-99 north and southbound bridge crossings of Canal Creek and add a new northbound on-ramp to SR-99 (Encroachment Permit Application No. 18796). This feature will be owned, operated, and maintained by Caltrans.

Merced County proposes to construct a pump station, consisting of: 6-inch iron inflow and outflow pipes; an outfall headwall structure; a concrete cut-off wall; a stilling well; a pump station outfall structure; with a temporary impact on earthwork volume of 12 cubic yards of cut; a permanent impact volume of earthwork of 8 cubic yards of cut; to widen a

100-foot section of existing access path on the east side of the creek by approximately 14-feet; remove existing weed growth; and replace existing weed growth with native weed mix. A temporary diversion system will be required to dewater Canal Creek for construction of outfall headwall and stilling well inflow pipe.

Caltrans, on behalf of Merced County is also requesting a variance, per Title 23, §11(b), to the backfill requirements outlined in Title 23, §123(d)(20). See Section 5.5.1 – 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; §123 – Pipelines, Conduits, and Utility Lines; §131 – Vegetation
- The proposed project encroaches upon a Regulated Stream per § 112, Table 8.1 of CCR 23 which is part of the Merced Streams Group operated and maintained by the Merced Irrigation District.

### 5.2 – Project Background

Canal Creek is maintained by Merced Irrigation District, which uses the creek to convey irrigation water during the summer months. During winter, the creek serves as a flood conveyance facility. About five miles upstream of Canal Creek is Castle Dam built in 1991 by the U.S. Army Corps of Engineers (USACE) to regulate flow in Canal Creek as part of their Local Protection Project.

In December 2009, Merced County approved the Project Report for the Atwater-Merced Expressway Project (AME). The approved project consists of a seven-mile expressway facility beginning at State Route (SR)-140 at Gurr Road and ending at SR-59 at Bellevue Road and realignment of SR-99 to accommodate a new interchange just south of the existing Buhach Road interchange.

The proposed project is an important part of the overall AME project that will relieve traffic congestion, improve operations of freeway traffic, improve accesses, and address deficiency of transportation infrastructure in the County of Merced.

### 5.3 – Project Design

The project proposes to construct a pump station with the appropriate appurtenances, as described in Section 4.0 above.

Streambanks will be reseeded with a native weed mix consistent with existing conditions, and will be maintained by the Merced Streams Group, as outlined in the Long-Term Maintenance Commitment (see Attachment B – Exhibit A). The project was designed to preserve the natural floodplain.

The project may require multiple construction seasons. Special Condition TWENTY-EIGHT requires the County to submit two sets of plans for Central Valley Flood Protection Board (Board) staff to approve for all temporary structures prior to construction.

There are 5 traffic intersections in the project area which will operated at acceptable levels of service with the implementation of the proposed project considering evacuation routes and emergency access.

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

### 5.4 – Hydraulic Analysis

The hydraulic analysis is based upon Federal Emergency Management Agency (FEMA) 100-year flows of 970 cubic feet per second (cfs) for Canal Creek. Current USACE standards are based on the Castle Dam Local Protection Project regulated peak flow release of 490 cfs. This is less than the 100-year FEMA flows. The AME Project's Consultant has chosen to use the more conservative 970 cfs for design of the proposed project. The proposed pump station on the east side of Canal Creek is being proposed as part of the overall AME project and it will not discharge into Canal Creek during peak flows.

The HEC-RAS version 4.0 modeling program was used to compute predicted channel hydraulics for this project. A Manning's roughness coefficient of 0.035 was used in the design of this project (relatively straight and clean channel) that the County states is not over-grown with weeds and tall plants. The mitigation for the project described in Section 5.3 above was accounted for in the modeling of the proposed hydraulics. . A conservative method was used to ensure that 100-year FEMA flows would not overtop the banks of Canal Creek, which would output a maximum theoretical water surface

elevation (WSE) for calculating freeboard above the design storm. A floodwall element within the modeling program was used to obtain this confined flow.

Per the letter from the AME Project's Consultant (Attachment D) the only waterside modification will consist of a very minor re-graded area approximately four feet upstream and downstream of the proposed pipe outfall, in order to account for the headwall structure (see Attachment C – Project Design Plans). This very minimal re-grading area has been determined by the project manager for the applicant to have negligible and un-detectable affects on the hydraulics in Canal Creek.

#### 5.4.1 – Overall Project Drainage

The AME Project includes drainage features along SR-99 consisting of roadside ditches, box culverts, and pipe culverts. North of SR-99, runoff ponds in roadside ditches. South of the highway runoff sheet flows into Union Pacific right-of-way. The proposed improvements are separated into two watersheds based on the roadway profile, pipe layout, and retention basin locations. Section 1 collects runoff south of the highway and discharges it into a retention basin. Section 2 collects runoff north of the highway and discharges it into another retention basin adjacent to the Union Pacific Railroad. The AME Project will result in no direct drainage onto Canal Creek's streambanks and will have no significant adverse impact on lands under Board jurisdiction.

Staff agrees with the assessment and conclusions from the Hydrology and Hydraulics Report and the supplementary letter from the project manager stating that the minor re-graded area will not adversely affect the hydraulics and staff finds the project to be hydraulically compliant with CCR 23 and have no significant adverse affects on Canal Creek.

### 5.5 – Geotechnical Analysis

Board staff agrees with the Foundation Report and has concluded 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, excavation, and temporary structures will be completed in compliance with Draft Permit No. 18795 (see Attachment B) and CCR 23, with the exception of Section 5.5.1, below that summarizes the County's request for a variance from CCR 23 standards.

### 5.5.1 – Backfill Variance

Caltrans, on behalf of Merced County has submitted a request for a variance (see Attachment E) based on CCR 23, § 11(b), which states:

*"When approval of an encroachment requires a variance, the applicant must clearly state in the application why compliance with the board's standards is infeasible or not appropriate."*

The request is to vary from the backfill standard in CCR 23, §123(d)(20), 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 Caltrans' November 6, 2012 letter (Attachment E) they are proposing that the Board standards are 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 B).

Staff has reviewed the applicant's variance request and has determined that Caltrans' standard is suitable and more appropriate for this project than Board's standards and that the requested variance from CCR 23, §123(d)(20) will have no adverse affect on the Board's jurisdiction, the structural integrity of the streambank or the channel.

Staff has therefore modified the language typically used for Special Condition THIRTY-THREE of Draft Permit No. 18795 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 September 25, 2012. The letter indicates that the USACE District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project and it has been incorporated into the permit as Exhibit B (see Attachment B, Exhibit C).

- The Merced Stream Group has endorsed the project as proposed by Merced County with no conditions.

## 7.0 –CEQA ANALYSIS

Board staff has prepared the following CEQA Findings:

The Board, acting as a responsible agency under CEQA, has independently reviewed Draft Environmental Impact Statement (DEIR) (SCH No. 2006081138, November 2008); Final EIR (February 2009), and an Addendum (March 2012) on the Atwater-Merced Expressway Project submitted by the Merced County Association of Governments (Merced County). Merced County as the lead agency, determined the project would have a significant effect on the environment and adopted Resolution 2009/03-19-02 on March 19, 2009 (which includes a Statement of Facts, Findings, and Mitigation Measures, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program). Merced County filed a notice of determination with the Merced County Clerk on March 20, 2009. These documents including project design and may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2012/11-16-2012 under a link for this agenda item. The documents are also available for review in hard copy at the Board and Merced County offices.

### Impacts that can be Mitigated

The significant impacts and the mitigation measures to reduce them to less than significant are adopted in the Merced County Resolution 2009/01-19-03 dated February 19, 2009 (which includes a Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations and Mitigation Monitoring and

Reporting Program). The significant impacts associated with the Atwater-Merced Expressway Project, which includes the Green Sands Avenue Bridge crossing Canal Creek and the Canal Creek Pump Station are reduced to a less-than-significant level by mitigation measures identified in the MMRP and have been incorporated into the project for mitigating impacts to visual resources, traffic and transportation, noise, air quality, geology, hydrology, biological resources, cultural resources, and public services.

Based on its independent review of the EIR and the Merced County Resolution 2009/01-19-03, the Board finds that for each of the significant impacts described, changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects as identified in the EIR. Moreover, such changes or alterations are within the responsibility and jurisdictions of another public agency, Merced County, and such changes have been adopted by that agency.

**7.1 – Significant Unavoidable Adverse Impacts of the Project**

The following impact of the proposed project remains significant following adoption and implementation of the mitigation measures described in the FEIR:

Noise – Implementation of the project would cause a substantial increase in ambient noise levels in the project vicinity and expose persons to noise levels in excess of standards established in the City of Atwater or Merced County General Plans.

The Board further finds that none of the significant unavoidable adverse impacts of the project are within the Board's jurisdiction. The Board also finds that the specific economic, legal, social, technological or other benefits of the project outweigh the unavoidable adverse environmental effects, which are thus considered to be "acceptable."

**7.2 – Statement of Overriding Considerations**

Merced County adopted Resolution 2009/01-19-03 including the Statement of Overriding Considerations. The Board concurs with this Statement.

The Board has independently considered the significant and unavoidable environmental impact of the proposed project. The Board has also considered the benefits of the project, including additional north/south roadway capacity to accommodate existing, approved, and planned development within the Cities of Atwater and Merced Spheres of Influence, unincorporated portions of Merced County, and to the new University of

California – Merced Campus. The project will also provide better regional access for public service providers and alternative emergency response routes, which would relieve congestion on existing roadways and potentially create better response times for emergency service providers.

The documents and other materials which constitute the record of the Board's proceedings in this matter are in the custody of Jay Punia, Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Rm. 151, Sacramento, California 95821.

## 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 Resolution No. 2012-46, which:

- adopts the CEQA findings,
- approves the permit with variance to CCR 23, §123(d)(20),
- directs 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. 18794
   Exhibit A: Long-Term Maintenance Commitment
   Exhibit B: Caltrans Standard Backfill Specifications
   Exhibit C: USACE Comment Letter (received September 25, 2012)
C. Project Design Plans
D. Hydraulic Statement Letter
E. Variance Request Letter
F. Resolution No. 2012-46

| | |
|---|---|
| Reviewed by: | Nancy C. 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 |

07-NOV-2012 $TIME$


$FILE$

# ATWATER-MERCED EXPRESSWAY

*LOCATION OF PUMP STATION AND BRIDGES CROSSING CANAL CREEK. AND LOCATION OF CASTLE DAM*

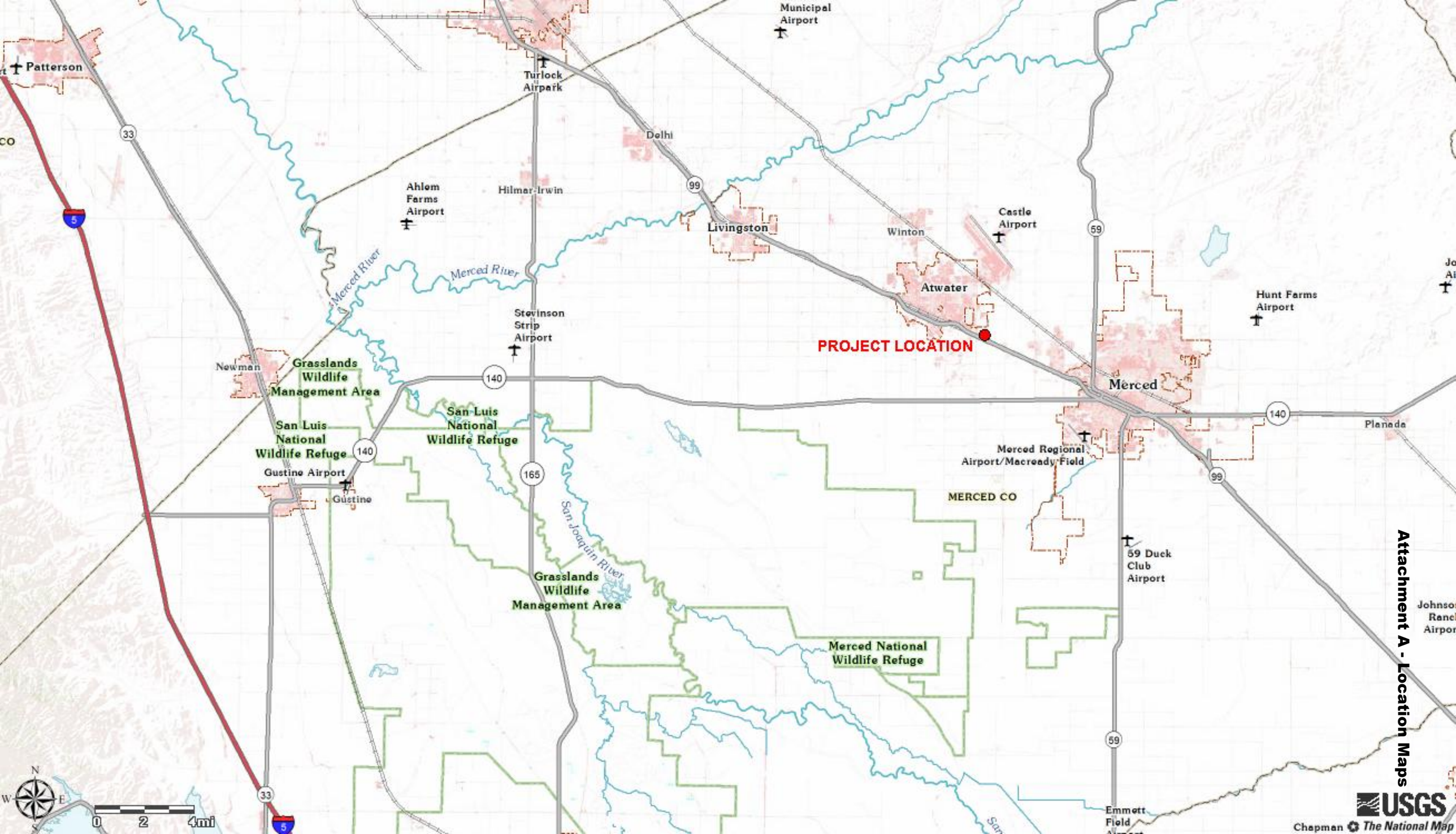
NORTH

NO SCALE

MARK THOMAS & COMPANY, INC.

November 7, 2012

Attachment A - Location Maps




Attachment A - Location Maps

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | 1 | |

STATE OF CALIFORNIA

# DEPARTMENT OF TRANSPORTATION

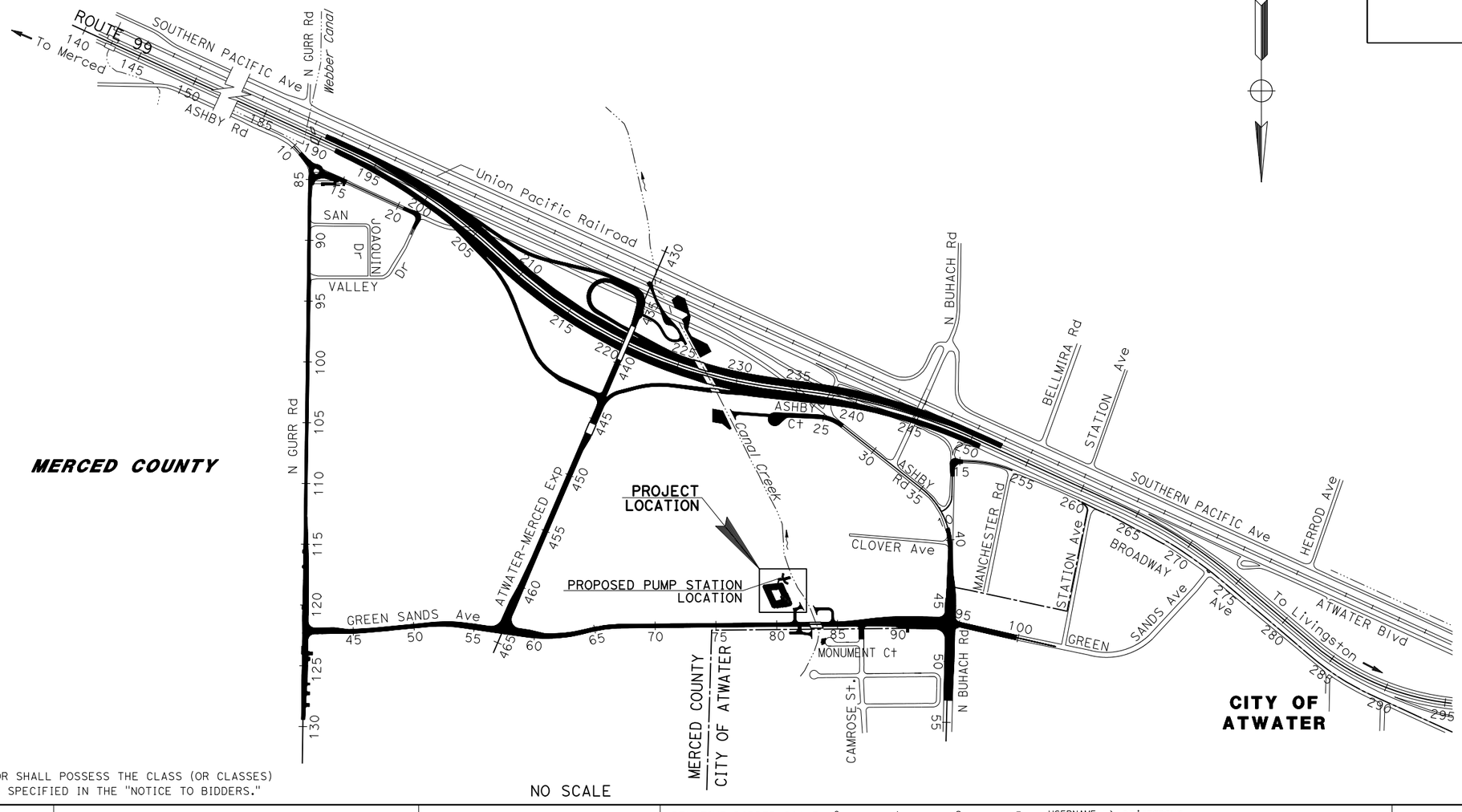
## PROJECT PLANS FOR CONSTRUCTION ON

# STATE HIGHWAY

## IN MERCED COUNTY IN AND NEAR THE CITIES OF MERCED AND ATWATER

### FROM 1.0 MILE SOUTH OF BUHACH ROAD OVERCROSSING
### TO 0.1 MILE NORTH OF BUHACH ROAD OVERCROSSING

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010


**MERCED COUNTY**

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

NO SCALE

APPROVED AS TO IMPACT ON STATE FACILITIES AND CONFORMANCE WITH APPLICABLE STATE STANDARDS AND PRACTICES AND THAT TECHNICAL OVERSIGHT WAS PERFORMED.

| CONSULTANT DESIGN ENGINEER | CALTRANS DESIGN OVERSIGHT APPROVAL | REGISTRATION No. | LICENSE Exp DATE | DATE SIGNED |
|---|---|---|---|---|
| JIMMY W. SIMS | MICHAEL LIM | C46718 | 06/30/2013 | |

**Attachment A - Location Maps**

LAST REVISION 00-00-00
DATE PLOTTED => 11-MAY-2012
TIME PLOTTED => 14:29

BORDER LAST REVISED 7/2/2010 | CALTRANS WEB SITE IS: HTTP//WWW.DOT.CA.GOV/ | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => emirzapour | DGN FILE => PROJECT LOCATION.dgn | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

**DRAFT**

STATE OF CALIFORNIA
THE RESOURCES AGENCY

# THE CENTRAL VALLEY FLOOD PROTECTION BOARD

**PERMIT NO. 18795** BD

**This Permit is issued to**:

County of Merced
715 Martin Luther King Jr. Way
Merced, California 95340

To construct a pump station, consisting of: 6 inch iron inflow and outflow pipes; an outfall headwall structure; a concrete cut-off wall; a stilling well; a pump station outfall structure; with a temporary impact on earthwork volume of 12 CY cut; a permanent impact volume of earthwork of 8 CY cut; to widen a 100 ft section of existing access path on the east side of the creek by approximately 14 ft; remove existing weed growth; and replace existing weed growth with native weed mix. A temporary diversion system will be required to dewater Canal Creek for construction of outfall headwall and stilling well inflow pipe. The project is located on the right bank of Canal Creek, approximately a half mile upstream of State Route 99. (Section 8, T7S, R13E, MDB&M, Canal Creek, Merced 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. 18795 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. This special condition shall apply to all subsequent conditions herein.

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 Long-term Maintenance Commitment, which is attached to this permit as Exhibit A which and incorporated by reference.

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 Canal Creek 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. 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 proposed project 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: The proposed pipes shall be placed in the center of an open trench 2 feet wider than the diameter of the proposed pipes or 2 times the diameter, whichever is greater.

THIRTY-SIX: The proposed pipes shall be placed in an open cut with side slopes of 1 horizontal to 1 vertical or flatter.

THIRTY-SEVEN: The invert of the proposed pipelines through the streambank shall be above the design flood plane elevation.

THIRTY-EIGHT: The waterward end of the discharge pipe shall be constructed to direct the flow away from the bank to prevent erosion.

THIRTY-NINE: The pipe shall be buried at least 12 inches below the streambank slopes and 24 inches below the streambank crown.

FORTY: The pipelines shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Central Valley Flood Protection Board.

FORTY-ONE: A positive-closure device that is readily accessible during periods of high water shall be installed on the waterward side of the streambank.

FORTY-TWO: Grouting pressures shall be adequate to assure complete filling of the voids without causing hydrofracturing.

FORTY-THREE: Excess bentonite or other drilling fluids shall be properly disposed of outside of the floodway. The bentonite or other drilling fluids shall not be used as backfill.

FORTY-FOUR: The permittee shall ensure that all pipe joints are watertight.

FORTY-FIVE: Pipes and joints shall be designed to withstand all anticipated loading conditions.

FORTY-SIX: 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.

FORTY-SEVEN: The access paths and/or turnarounds shall be surfaced with a minimum of 4 inches of compacted, Class 2, aggregate base (Caltrans Specification 26-1.02A).

FORTY-EIGHT: 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.

FORTY-NINE: 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.

FIFTY: 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.

FIFTY-ONE: 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.

FIFTY-TWO: 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.

FIFTY-THREE: The Central Valley Flood Protection Board and Department of Water Resources shall not be responsible for flooding caused by backflow through culverts installed or existing in the levee section below the design flood plane that lack positive-closure devices or where such culverts are inhibited from draining landward runoff due to high floodflows.

FIFTY-FOUR: The permittee is responsible for repairing any damage to the levees caused by the installation or operation of the well or pipelines.

FIFTY-FIVE: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

FIFTY-SIX: 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.

FIFTY-SEVEN: 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.

FIFTY-EIGHT: 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.

FIFTY-NINE: 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.

SIXTY: 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.

SIXTY-ONE: 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.

SIXTY-TWO: 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.

SIXTY-THREE: 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.

SIXTY-FOUR: The Department of the Army (U.S. Army Corps of Engineers, Sacramento District) letter dated September 25, 2012, states that the District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project, this letter is attached to this permit as Exhibit C and is incorporated by reference.

MERCED COUNTY

**DEPARTMENT OF PUBLIC WORKS**

**Dana S. Hertfelder**
*Director*

715 Martin Luther King Jr. Way
Merced, Ca. 95341
Phone: (209) 385-7601
Fax: (209) 722-7690
www.co.merced.ca.us

Building Services
Parks and Recreation
Roads
Fleet Management
County Surveyor
Building & Safety

Equal Opportunity Employer

November 1, 2012

Nancy Moricz, Project Section Engineer
Central Valley Flood Board
Flood System Improvements Section
3310 El Camino Avenue
Sacramento, California 95821-6308

Subject: Long term maintenance

Ref: Pending Central Valley Flood Protection Board (CVFPB) Encroachment Permit Application 18795

Dear Ms. Moricz:

There is no onsite planting mitigation on the project and no irrigation facility was designed. Therefore, mitigation monitoring and long term maintenance plan is not required. The project proposes to replant existing weed growth that will be impacted by the project with a native weed mix.

Following the project, maintenance will be performed by the Merced Streams Group by cutting down the weed growth in the channel as allowed under California Department of Fish and Game Streambed Alteration Permit No. 2005-0168-R4 for routine channel maintenance to ensure that water flow through the floodway is not restricted. The area will be maintained in a manner that is consistent with the permit.

Sincerely,

Dana S. Hertfelder
Director of Public Works
On behalf of the Merced Streams Group
(County of Merced, City of Merced, and Merced Irrigation District)

DSH:ah

M:\Word Files\LETTERS\FILES\2012\Canal Creek Maint Pump Station (CVFB) 110112.doc

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**

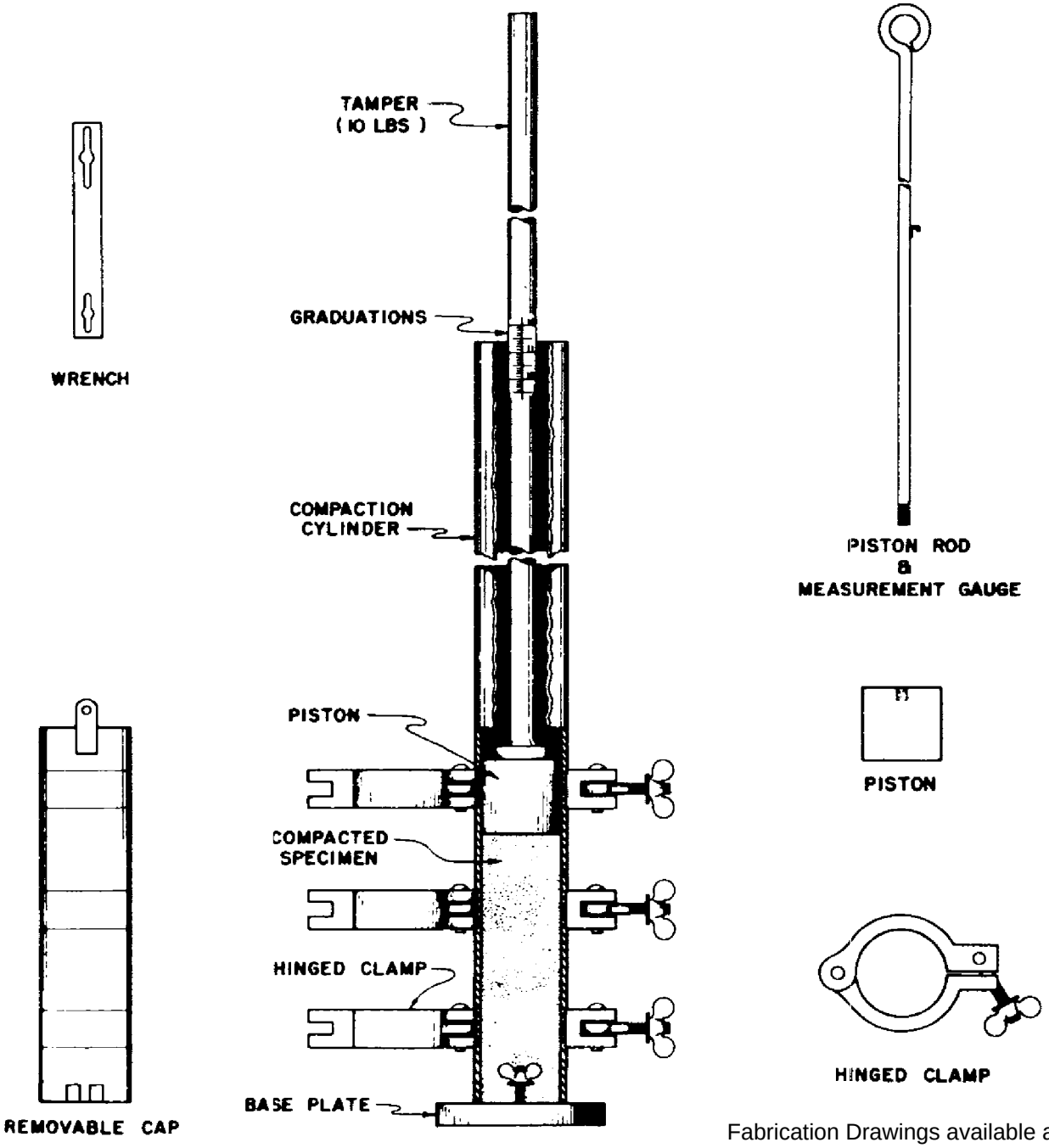
**End of Text**
**(California Test 216 contains 9 pages)**

**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:

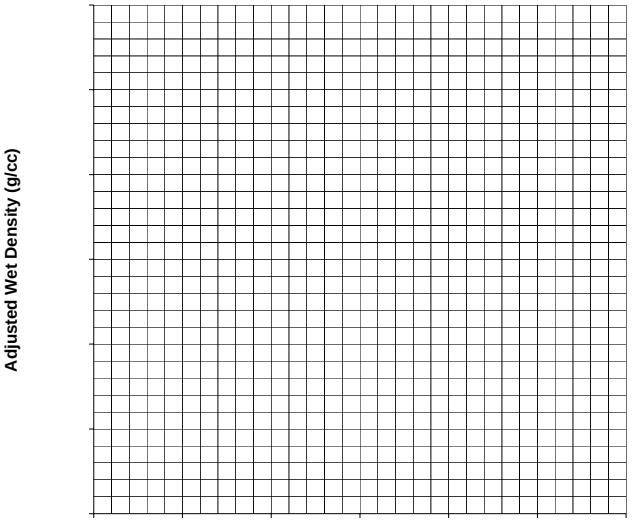
**IMPACT TEST DATA**

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

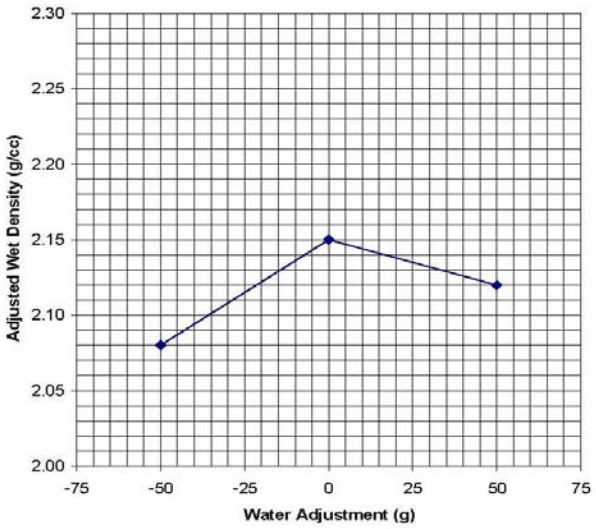
Remarks:

| 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**
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**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:

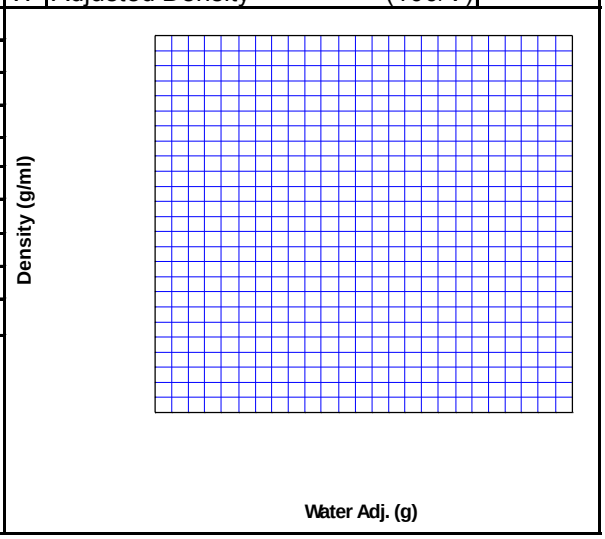
## Impact Test Data

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

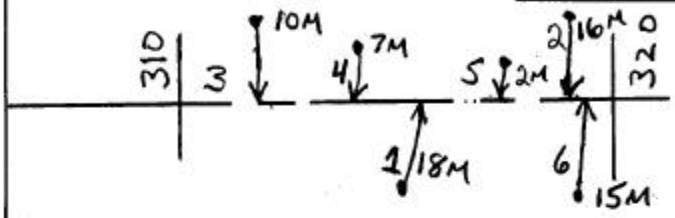
**California Test 231**
**March 2000**

**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 |

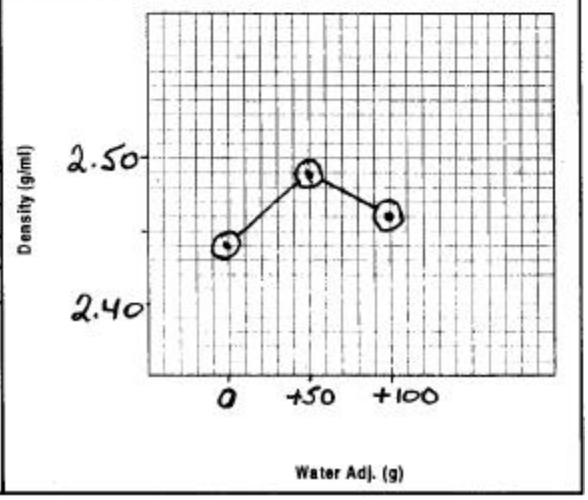



Figure 2

**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)

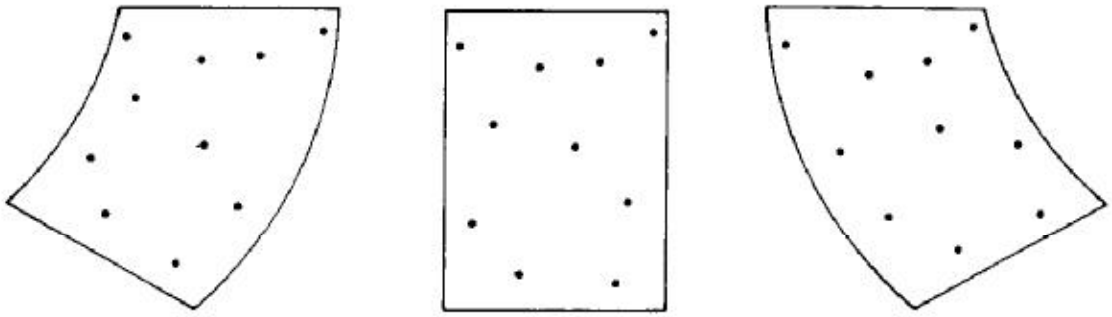
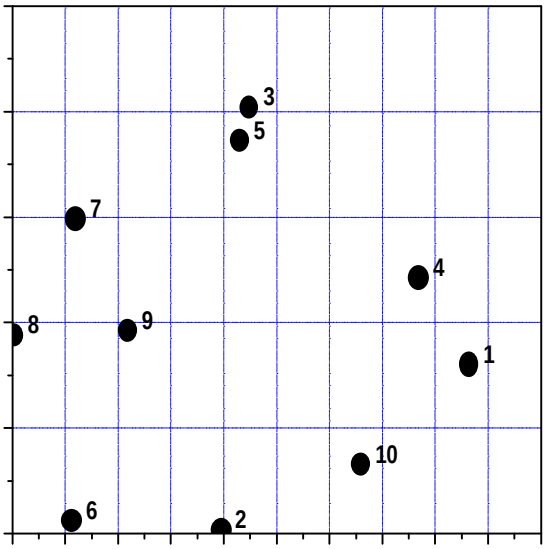


Figure 3

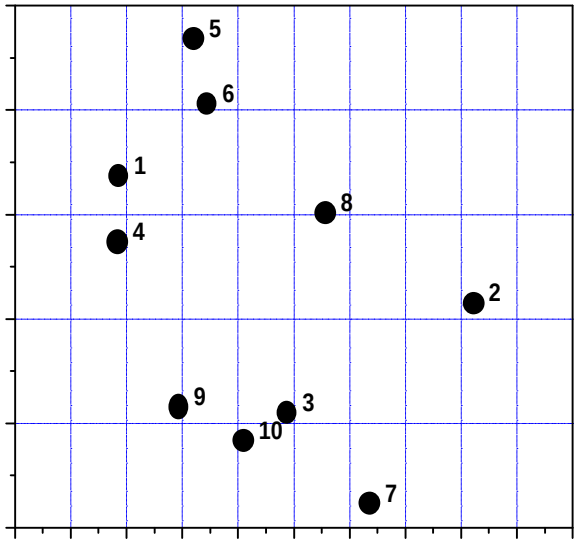
**California Test 231**
**March 2000**

Figure 3 Cont.

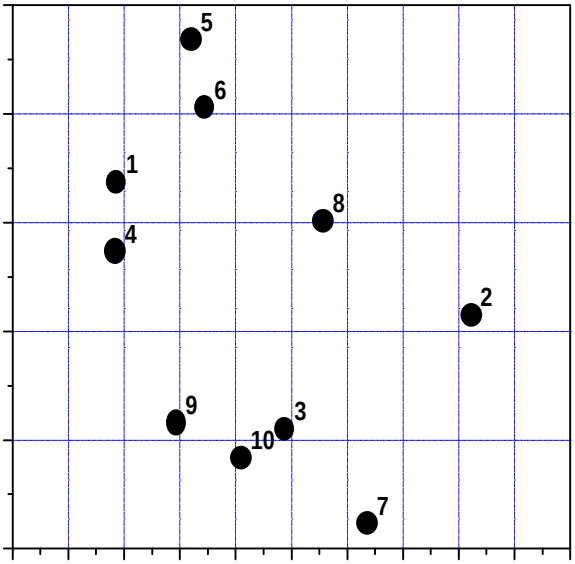
NONBIASED PLAN 1




NONBIASED PLAN 2




NONBIASED PLAN #3




NONBIASED PLAN #4

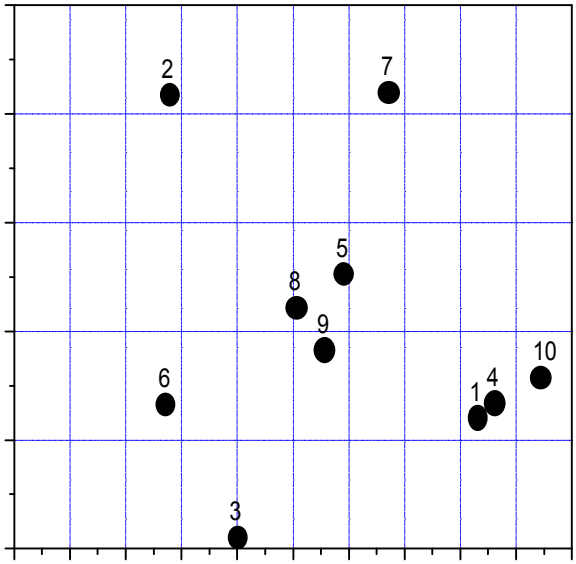
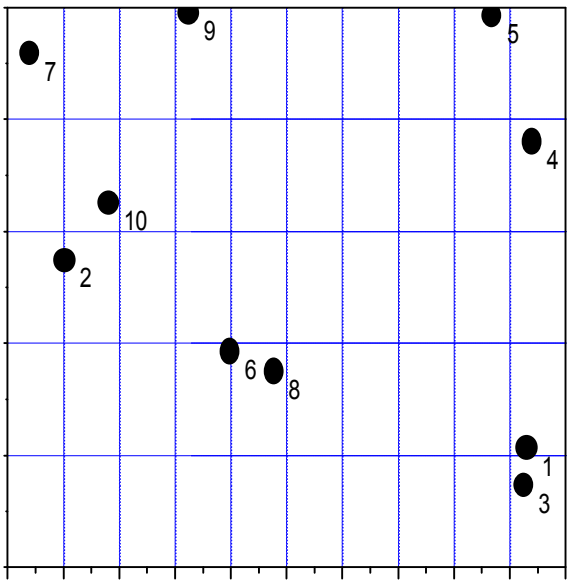
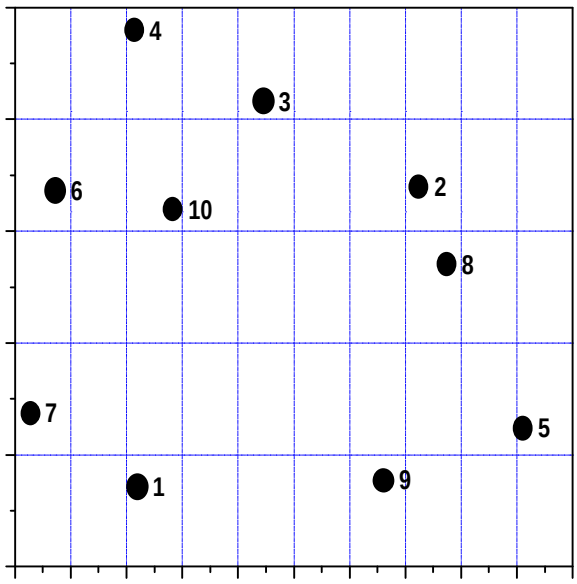


Figure 3 Cont.

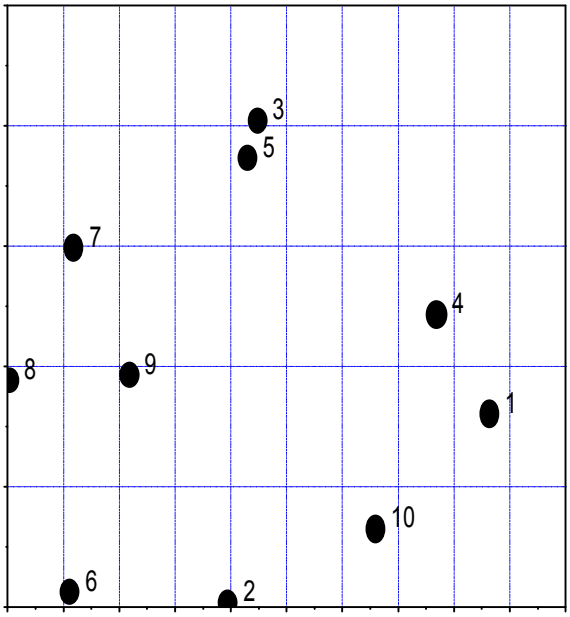
NONBIASED PLAN 5



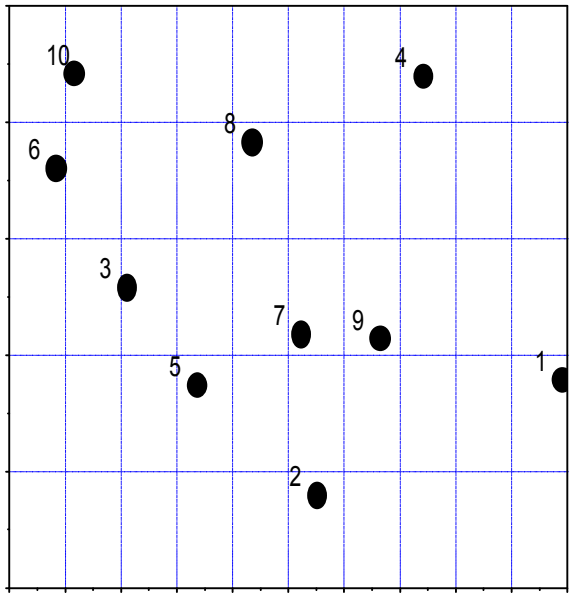

NONBIASED PLAN 6



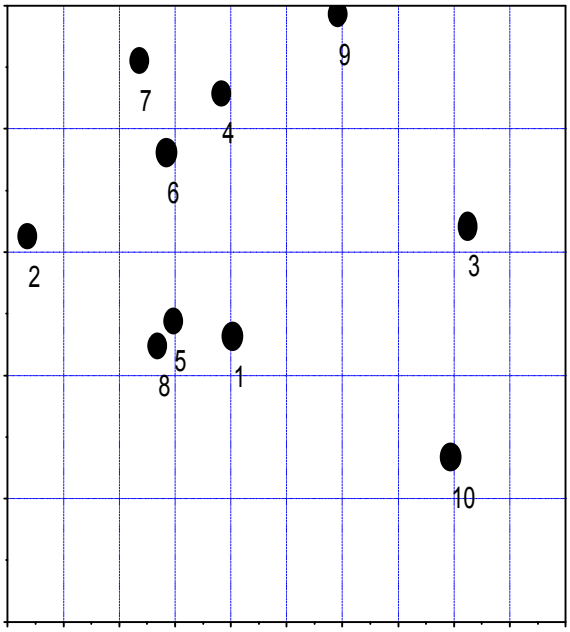

NONBIASED PLAN #7




NONBIASED PLAN #8



NONBIASED PLAN 9




NONBIASED PLAN 10

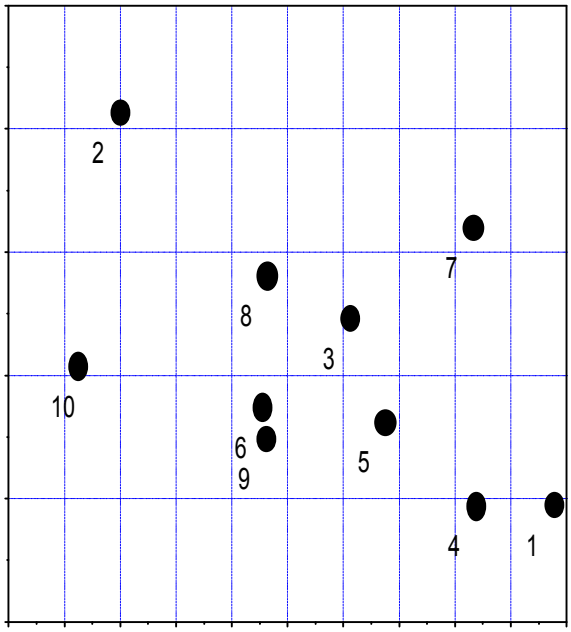



Figure 3 Cont.

## 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 (18795)

SEP 25 2012

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

Dear Mr. Punia:

We have reviewed a permit application by the County of Merced (application number 18795). This project includes constructing a pump station on Canal Creek. The project is located on the right bank of Canal Creek, approximately a half mile upstream of State Route 99, at 37.3378°N 120.5728°W NAD83, Merced County, California.

The District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

A Section 404 permit application (201100576) is in process 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,

Meegan G. Nagy, P.E.
Chief, Flood Protection and Navigation Section

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JIMMY W. SIMS — No. 35458 — Exp. 09/30/13 — CIVIL — STATE OF CALIFORNIA

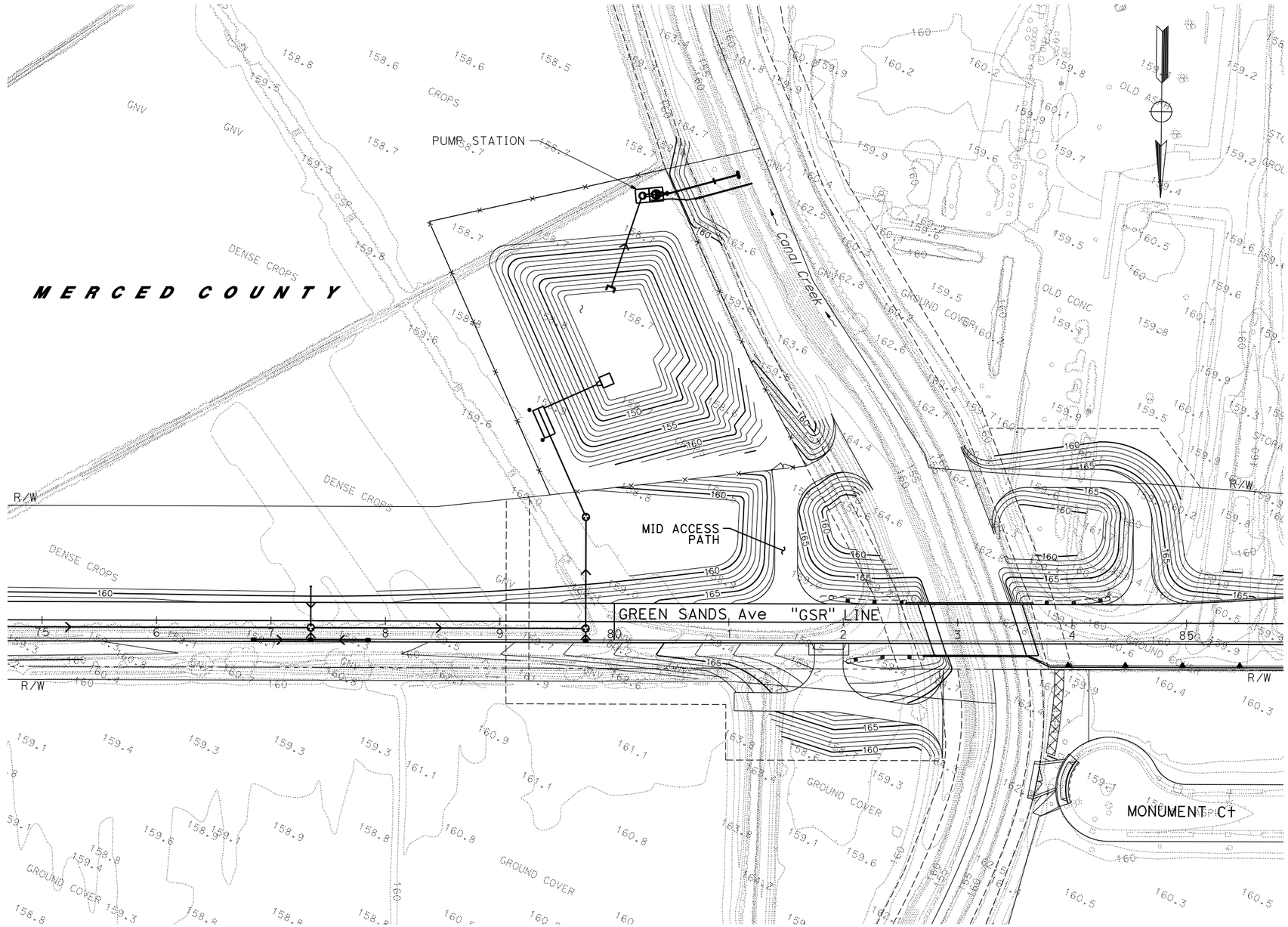


MARK THOMAS & COMPANY, Inc.
1960 ZANKER ROAD
SAN JOSE, CA 95112

MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340

NOTE:

1. FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.




**Pump station is equippped with a shut-off mechanism that prevents flow into Canal Creek when the water level in the creek is high. Therefore, it does not result in increase of the peak flow.**

## STORM DRAINAGE PUMP STATION SITE PLAN

## 1) SITE PLAN

SHEET 1 OF 6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: JIMMY W. SIMS

| CHECKED BY | CALCULATED-DESIGNED BY | REVISED BY | DATE REVISED |
|---|---|---|---|
| | | EUGENE ABREGO | ADMAS ZEWDIE |

LAST REVISION 00-00-00 | DATE PLOTTED => 03-JUL-2012 | TIME PLOTTED => 09:50

BORDER LAST REVISED 7/2/2010 | USERNAME => emirzapour | DGN FILE => SHEET 1 OF 6.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

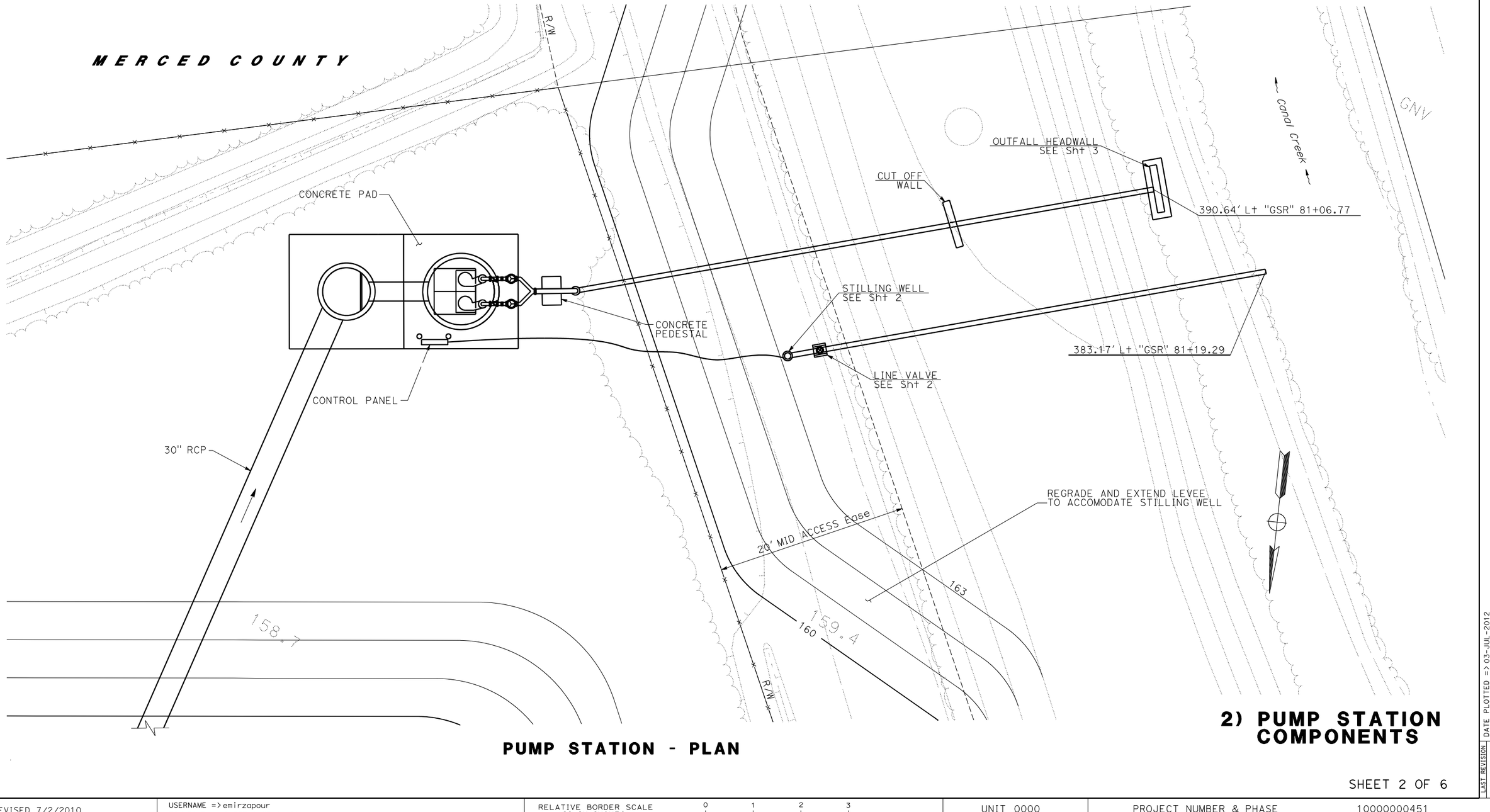
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JIMMY W. SIMS — No. 35458 — Exp. 09/30/13 — CIVIL — STATE OF CALIFORNIA



MARK THOMAS & COMPANY, Inc.
1960 ZANKER ROAD
SAN JOSE, CA 95112

MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340




**PUMP STATION - PLAN**

**2) PUMP STATION COMPONENTS**

SHEET 2 OF 6

EUGENE ABREGO — REVISED BY — DATE REVISED
ADMAS ZEWDIE — CALCULATED-DESIGNED BY — CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR — JIMMY W. SIMS
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

LAST REVISION 00-00-00 — DATE PLOTTED => 03-JUL-2012 — TIME PLOTTED => 09:50

BORDER LAST REVISED 7/2/2010 | USERNAME => emirzapour | DGN FILE => SHEET 2 OF 6.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JIMMY W. SIMS — No. 35458 — Exp. 09/30/13 — CIVIL — STATE OF CALIFORNIA

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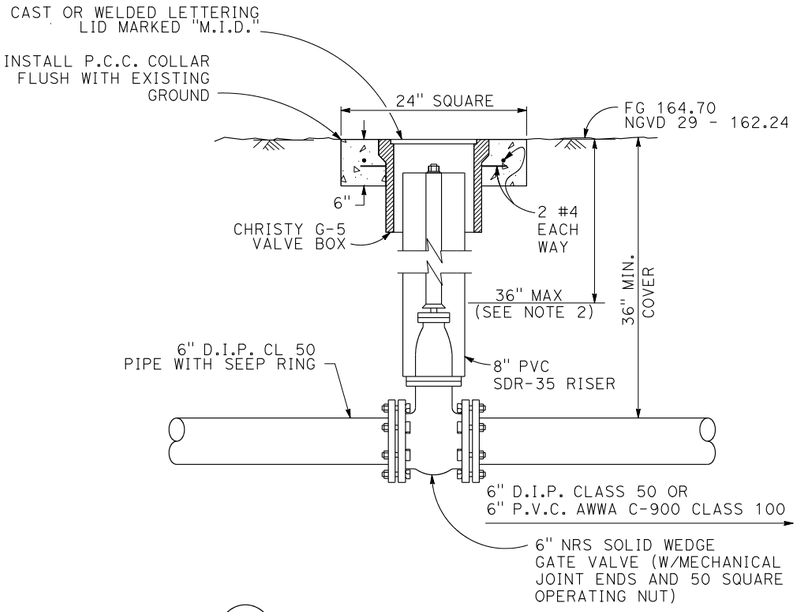
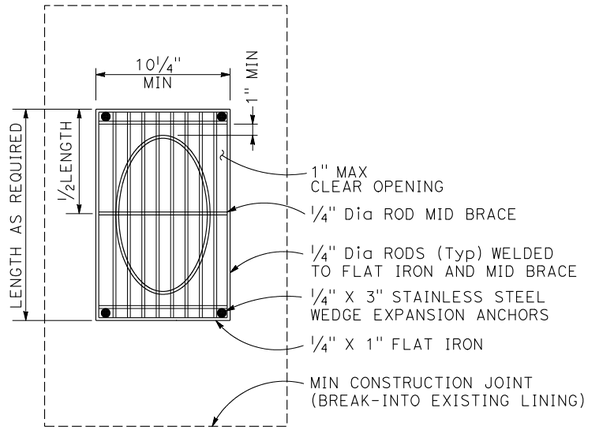
SAN JOSE, CA 95112

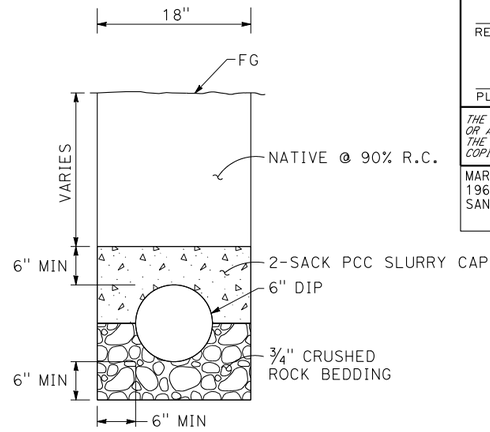
MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340


13 – **LINE VALVE DETAIL**



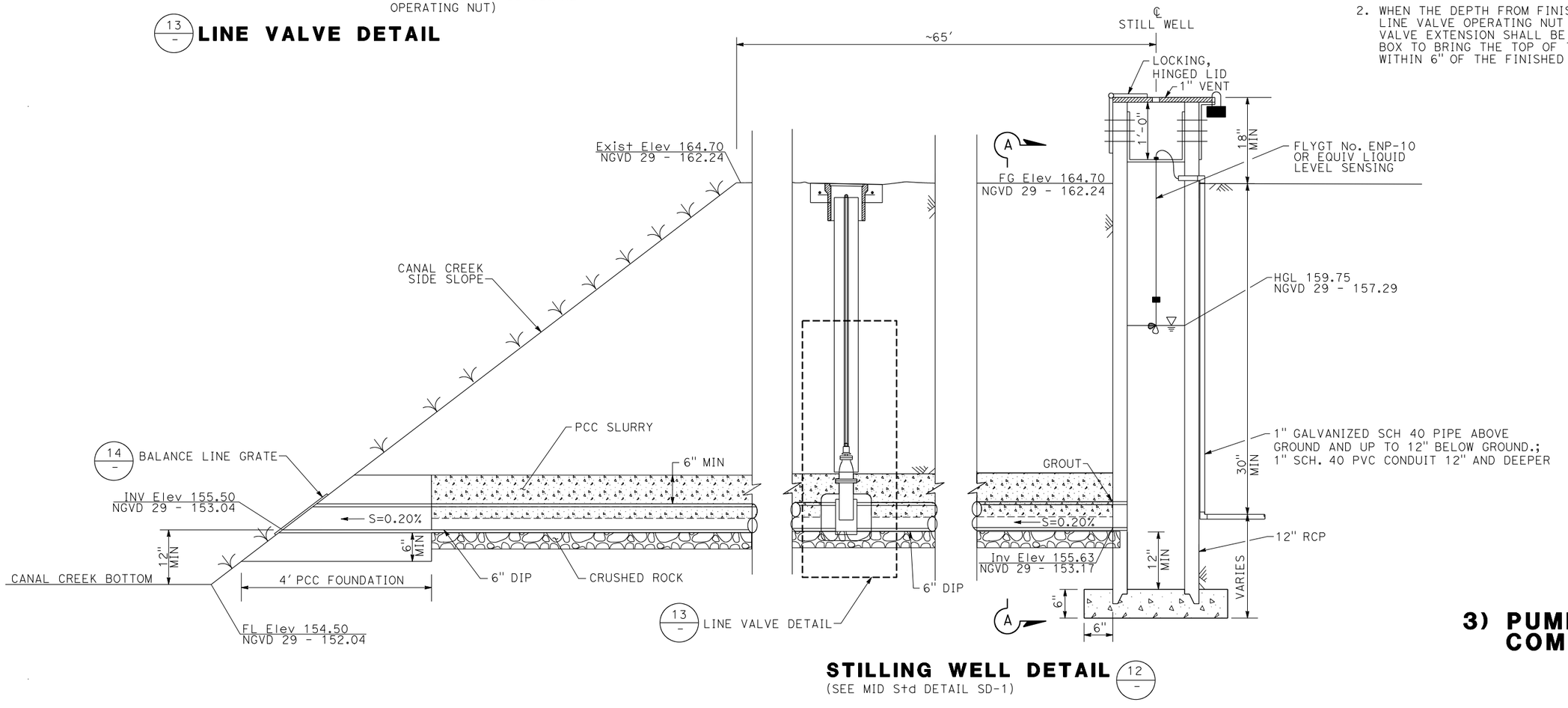

**GRATE DETAIL** 14 –




SECTION A–A

## NOTES:

1. THE LEVEL SENSOR WELL SHALL BE ACCESSIBLE TO M.I.D PERSONNEL FOR INSPECTION.
2. WHEN THE DEPTH FROM FINISHED GROUND TO TOP OF THE LINE VALVE OPERATING NUT EXCEEDS 36", A PERMANENT VALVE EXTENSION SHALL BE INSTALLED IN THE VALVE BOX TO BRING THE TOP OF THE VALVE OPERATING NUT WITHIN 6" OF THE FINISHED GRADE.




**STILLING WELL DETAIL** 12 –
(SEE MID Std DETAIL SD-1)

# 3) PUMP STATION COMPONENTS



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans
CONSULTANT FUNCTIONAL SUPERVISOR: JIMMY W. SIMS
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED
EUGENE ABREGO
ADMAS ZEWDIE
LAST REVISION 00-00-00
DATE PLOTTED => 03-JUL-2012
TIME PLOTTED => 09:50

| | | Vol OF PIPE CY | Vol OF RIP RAP CY | Vol OF HEADWALL CY | Vol OF Exc CY | Tot Vol CY |
|---|---|---|---|---|---|---|
| IMPACTS TO CANAL CREEK | TEMPORARY IMPACT | N/A | N/A | N/A | 11.31 | 11.31 C |
| | PERMANENT IMPACT | .15 | 5.4 | 1.86 | N/A | 7.41 C |

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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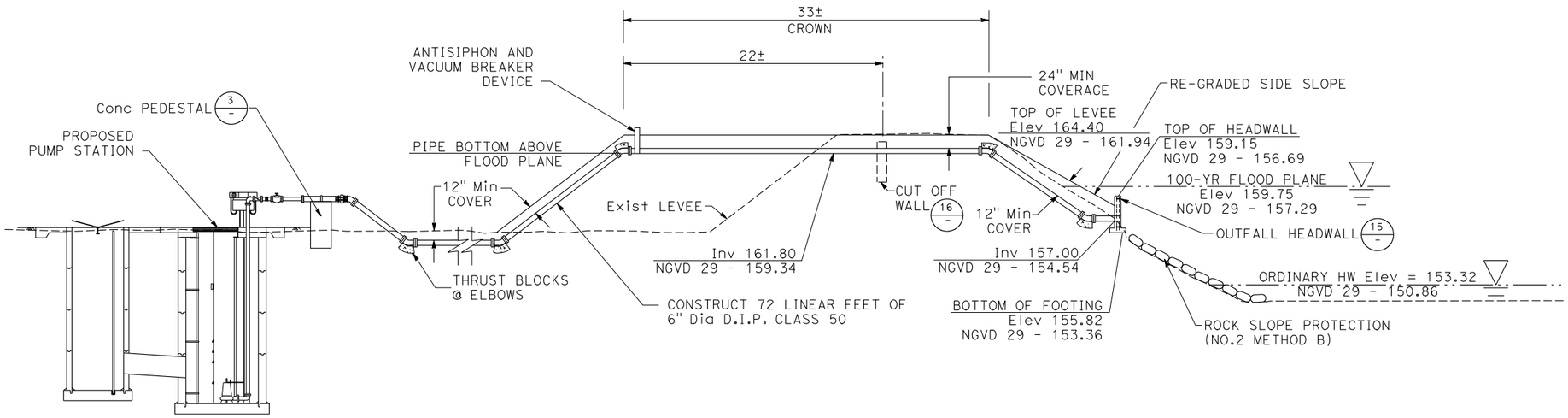
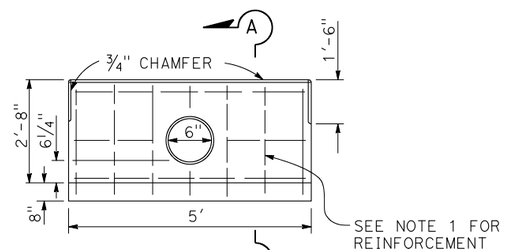
MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340

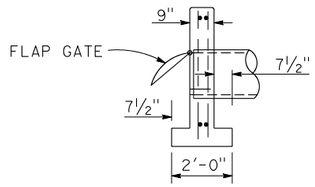



## 6" WELDED STEEL OUTFALL FORCE MAIN DETAIL




FRONT ELEVATION

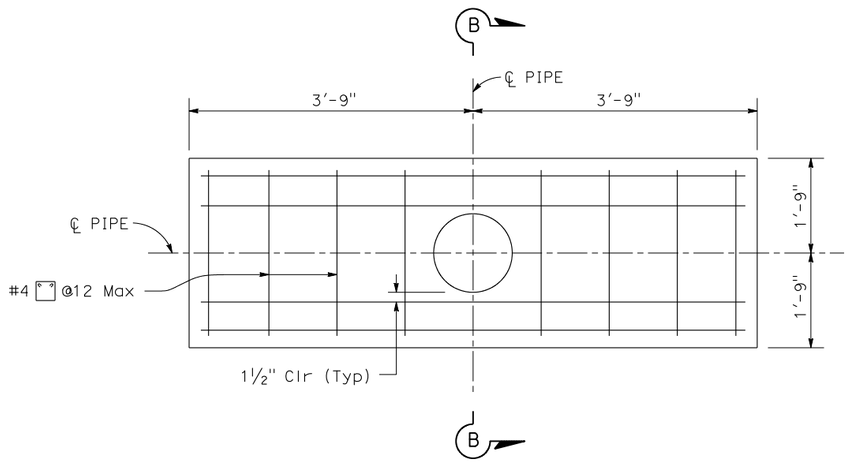
**OUTFALL HEADWALL DETAIL** 15/-




SECTION A–A

NOTE:

1. ALL REINFORCING STEEL #4 BARS. ALL VERTICAL AND HORIZONTAL TIE BARS 1'-6" MAXIMUM SPACING.




ELEVATION

**CUT OFF WALL DETAIL** 16/-




SECTION B–B

## 4) PUMP STATION COMPONENTS

SHEET 4 OF 6

| REVISED BY | DATE REVISED |
|---|---|
| EUGENE ABREGO | ADMAS ZEWDIE |
| CALCULATED-DESIGNED BY | CHECKED BY |
| CONSULTANT FUNCTIONAL SUPERVISOR | JIMMY W. SIMS |
| STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION | Caltrans |

LAST REVISION 00-00-00 DATE PLOTTED => 03-JUL-2012 TIME PLOTTED => 09:51

BORDER LAST REVISED 7/2/2010 | USERNAME => emirzapour DGN FILE => SHEET 4 OF 6.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JIMMY W. SIMS — No. 35458 — Exp. 09/30/13 — CIVIL — STATE OF CALIFORNIA

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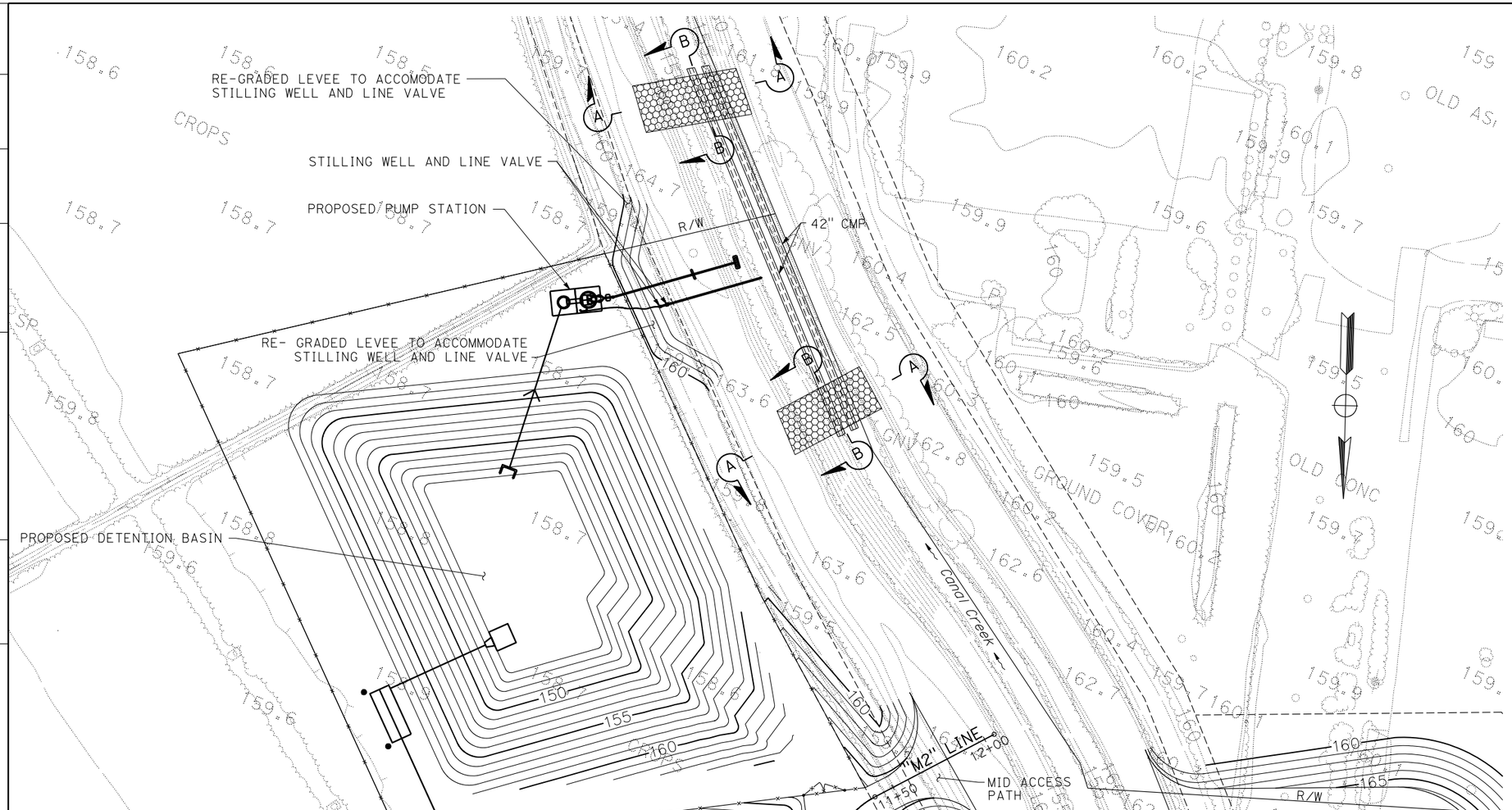
SAN JOSE, CA 95112

MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340


## TEMPORARY CREEK DEWATERING SYSTEM FOR CANAL CREEK AT OUTFALL STRUCTURE

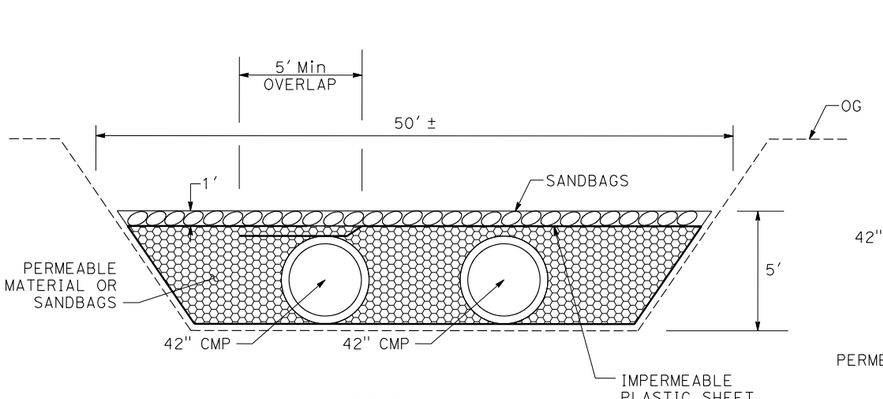
SCALE 1"=30'

LEGEND:

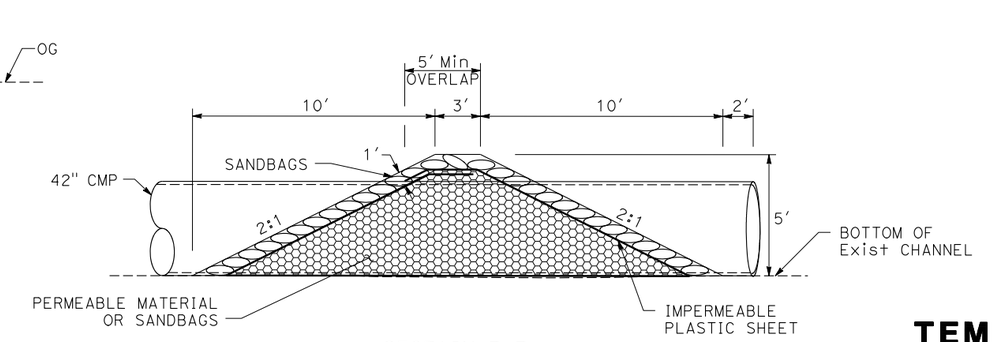
= COFFERDAM AND TEMPORARY IMPACTED AREA = 2,300 SF

NOTES:

1. EXACT LENGTH AND LOCATION OF THE APC TO BE APPROVED IN THE FIELD BY THE ENGINEER.
2. SANDBAG ANCHORS TO BE PLACED AT END OF PIPE AND AT INTERMITTENT LOCATIONS AS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
3. PROVIDE TEMPORARY SUPPORT FOR THE PIPE, AS NECESSARY, DUE TO ELEVATION CHANGES AT STRUCTURE AND CREEK BED.




SECTION A–A
NO SCALE




SECTION B–B
NO SCALE

TEMPORARY CREEK COFFER DAM SYSTEM

| DESCRIPTION | QUANTITY (N) |
|---|---|
| 42" CMP | 383 LF |
| PERMEABLE MATERIAL OR SANDBAGS | 6,500 CF |
| IMPERMEABLE PLASTIC SHEETING | 5,400 SF |
| TEMPORARY SUPPORT SYSTEMS | AS NEEDED |
| SANDBAG ANCHORS | AS NEEDED |

(N) NOT A PAY ITEM, FOR INFORMATION ONLY.

# TEMPORARY DIVERSION SYSTEM

SHEET 5 OF 6

REVISED BY | DATE REVISED
EUGENE ABREGO | ADMAS ZEWDIE
CALCULATED-DESIGNED BY | CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR: JIMMY W. SIMS
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

LAST REVISION | DATE PLOTTED => 03-JUL-2012
00-00-00 | TIME PLOTTED => 09:51

BORDER LAST REVISED 7/2/2010 | USERNAME => emirzapour | DGN FILE => SHEET 5 OF 6.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

| Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS |
|---|---|---|---|---|---|
| 10 | Mer | 99 | 19.5/20.7 | | |

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
JIMMY W. SIMS
No. 35458
Exp. 09/30/13
CIVIL
STATE OF CALIFORNIA

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MARK THOMAS & COMPANY, Inc.
1960 ZANKER ROAD
SAN JOSE, CA 95112

MERCED COUNTY ASSOCIATION OF GOVERNMENTS
369 W. 18TH STREET
MERCED, CA 95340

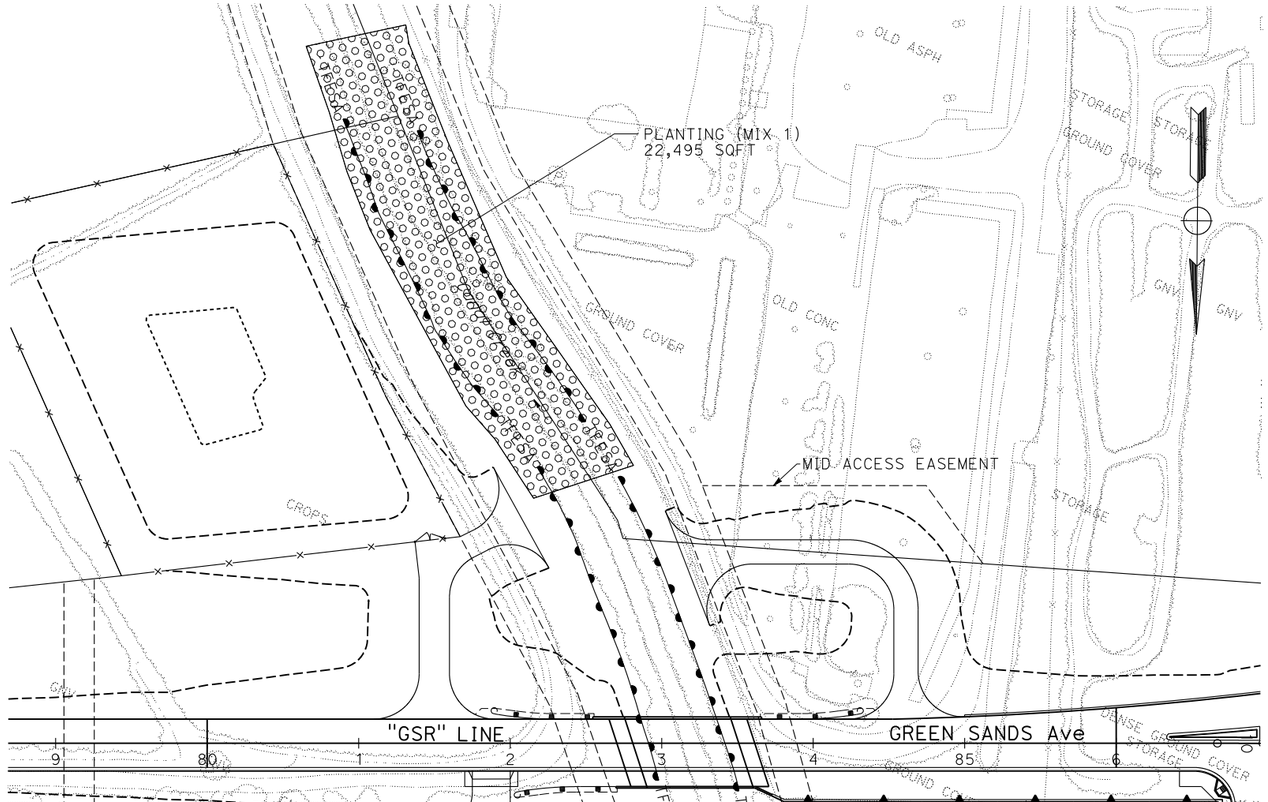
**NOTES:**

1. FOR ACCURATE RIGHT OF WAY AND ACCESS DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**LEGEND:**

PLANTING (MIX 1)

TFESA — TEMPORARY FENCE (TYPE ESA) ENVIRONMENTAL SENSITIVE AREA




## SEED MIX A TABLE

| SEED | BOTANICAL NAME (COMMON NAME) | POUNDS PURE LIVE SEED PER ACRE (SLOPE MEASUREMENT) |
|---|---|---|
| MIX 1 | BROMUS ARINATUS HOOK ET ARN. (CALIFORNIA BROME) | 18 |
| | ELYMUS GLAUCUS BUCKLEY SUBSP. GLAUCUS (BLUE WILDRYE) | 20 |
| | HORDEUM BRACHYANTHERUM NEVSKI SUBSP. CALIFONICUM (BARLEY) | 31 |
| | KOELERIA MACRANTHA (LEDEB.) J.A. SCHULTES (JUNEGRASS) | 17 |
| | MELICA IMPERFECTA TRIN. (MELIC) | 9 |
| | NASSELLA PULCHRA (PURPLE NEEDLEGRASS) | 19 |
| | TOTAL | 114 |

**3) TEMPORARY FENCING**
**4) EROSION CONTROL**

*APPROVED FOR EROSION CONTROL WORK ONLY*

SHEET 6 OF 6

REVISED BY | DATE REVISED
ADMAS ZEWDIE
CALCULATED-DESIGNED BY
CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR: JIMMY W. SIMS
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 00-00-00
DATE PLOTTED => 03-JUL-2012
TIME PLOTTED => 09:51

BORDER LAST REVISED 7/2/2010 | USERNAME => emirzapour | DGN FILE => SHEET 6 OF 6.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 10000000451

**MARK THOMAS & COMPANY, INC.**
*Providing Engineering, Surveying and Planning Services*

November 6, 2012 Permit No. 18795

Ms. Nancy C. Moricz, P.E.
Projects Section
Central Valley Flood Protection Board
3310 El Camino Avenue, Room # 151
Sacramento, CA 95821

Dear Ms. Moricz:

This letter is in regards to **Permit No. 18795** (Atwater-Merced Expressway/SR-99 Interchange Project). As the project manager responsible for preparation of the contract plans, I would like to provide a clarification on the grading associated with the pump station outfall construction on behalf of Merced County, the applicant. The only grading that will occur inside the banks of Canal Creek is at a localized area where the headwall for the outfall pipe will be constructed. Grading will occur 4 feet upstream and 4 feet downstream of the proposed pipe location. This grading will not result in a substantial change to the channel cross section. Therefore, the grading will not adversely affect the capacity of the creek.

Sincerely,

**MARK THOMAS & COMPANY, INC.**

Admas Zewdie, P.E.
Project Manager

Reference initials

c: Steve Rough, Merced County, Department of Public Works
Sinaren Pheng, Caltrans, District 10 Project Management

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**DEPARTMENT OF TRANSPORTATION**
DISTRICT 10 – DIRECTOR'S OFFICE
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November 6, 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. 18795** (Atwater-Merced Expressway/SR-99 Interchange project).

The California Code of Regulations Title 23, Division 1, Chapter 1, Section 123 (d) (20), states that within the levee or within ten feet of levees toes, any excavation for the installation of a pipeline 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 the above specification and would prefer to use our 2010 Standard Specifications sections 19-6.03C for layer thickness. Our long history of building pipes has made use of these specifications with no adverse effects. Listed below for your use is the specification.

**19-6.03C Placing and Compacting**

Do not construct embankments when material is frozen or a blanket of snow prevents proper compaction.

Construct embankment in layers. The loose thickness of each layer must not exceed 8 inches. Break up clods or hard lumps of earth that are over 8 inches in greatest dimension before compacting material in the embankment, except if material, such as hardpan or cemented gravel, cannot be broken readily:

1. Distribute material throughout the embankment.
2. Place enough earth or other fine material around the larger material as you deposit it to fill the interstices and produce a dense, compact embankment.

If embankment material contains the following percentages by volume of rock larger than 8 inches in greatest dimension, before compaction, the loose thickness of each layer of embankment material below a plane 3 feet below finished grade must comply with the following table:

| Percent by volume | Loose layer thickness |
|---|---|
| Over 50 | Max. rock size |
| From 25 to 50 | Max. rock size up to 3 feet |
| Less than 25 | 8 inches in areas between rocks larger than 8 inches |

Reinforcement or metal attached to reinforced concrete rubble placed in embankments must not protrude above the grading plane. Trim reinforcement or metal to less than 3/4 inch from the face of the reinforced concrete rubble material before placing the material within 2 feet below the grading plane.

In a sidehill embankment where the width, including bench cuts for bonding existing and new embankments, is too narrow to accommodate mobile power compacting equipment, you may place the material by end dumping, if authorized.

If end dumping is allowed for constructing embankment against existing slopes or 1/2 the embankment width at a time, then plow or cut the slopes of the original ground or embankment before end dumping starts.

Where embankments are constructed across low, swampy ground that cannot support the weight of hauling equipment, you may construct the lower part of the embankment by dumping successive loads in a uniformly distributed layer that can support equipment for placing subsequent layers. Construct embankments such that each layer has a cross fall less than 5 percent.
At locations where it is impractical to use mobile power compacting equipment, compact embankment layers by any method that obtains the specified compaction.

Thank you for your consideration of this variance. If you have any questions, please contact me at (209) 948-7972.

Sincerely,

SINAREN PHENG
Project Manager

STATE OF CALIFORNIA
THE RESOURCES AGENCY
CENTRAL VALLEY FLOOD PROTECTION BOARD

RESOLUTION NO. 2012-46

FINDINGS AND DECISION AUTHORIZING ISSUANCE OF
ENCROACHMENT PERMIT NOS. 18794 & 18795

MERCED COUNTY ASSOCIATION OF GOVERNMENTS (MERCED COUNTY)
ATWATER-MERCED EXPRESSWAY PROJECT

**WHEREAS**, Merced County Association of Governments (Merced County) submitted Encroachment Permit Application No. 18794 to the Central Valley Flood Protection Board (Board) on July 23, 2012 to construct a bridge at the crossing of Green Sands Avenue and Canal Creek; and also submitted Encroachment Permit Application No. 18795 to construct a pump station on Canal Creek; and

**WHEREAS**, Merced County as lead agency under the California Environmental Quality Act, Public Resources Code sections 21000 *et seq*. ("CEQA") prepared an Environmental Impact Report on the Atwater-Merced Expressway Project ("EIR") (incorporated herein by reference and available at offices of the Board or Merced County); and

**WHEREAS**, Merced County, as lead agency, certified the EIR, adopted mitigation measures and a Mitigation Monitoring Reporting Plan ("MMRP") (incorporated herein by reference and available at offices of the Board or Merced County), approved findings and a statement of overriding considerations pursuant to CEQA and the CEQA Guidelines (incorporated herein by reference); and approved the Project as identified in Modified Alternative 1B of the EIR; and

**WHEREAS,** the Draft EIR (State Clearinghouse (SCH) No. 2006081138) was published on November 18, 2008, for a 45-day public review period that ended on January 5, 2009; and

**WHEREAS,** the Final EIR (FEIR) was published in February 9, 2009 and on March 19, 2009 Merced County certified the Final EIR, made CEQA Findings adopting the Mitigation Monitoring and Reporting Program (MMRP), a Statement of Overriding Considerations (Merced County Resolution 2009/03-19-02); and filed a Notice of Determination with the Merced County Clerk on March 20, 2009; and

**WHEREAS,** Merced County prepared an addendum to the EIR (SCH No. 2006081138, March 27, 2012) on the Atwater-Merced Expressway Project, including bridge structures over Canal Creek and related improvements;

**WHEREAS,** the Board has conducted a hearing on Permit Application Nos. 18794 & 18795 and has reviewed the Reports of its staff, the documents and correspondence in its file, and the environmental documents prepared by Merced County;

NOW, THEREFORE, BE IT RESOLVED THAT,

**Findings of Fact.**

1. The Board hereby adopts as findings the facts set forth in the Staff Report.

2. The Board has reviewed the Attachments listed in the Staff Report.

**CEQA Findings.**

3. The Board, as a responsible agency, has independently reviewed the analysis in the Draft EIR (State Clearinghouse (SCH) No. 2006081138), the FEIR (SCH No. 2006081138, February 2009) and Addendum (SCH No. 2006081138 March 2012) on the Atwater-Merced Expressway has reached its own conclusions regarding them.

4. The Board, after consideration of the FEIR, and Merced County findings, adopts the project description, analysis and findings in the FEIR and Merced County Findings which are relevant to activities authorized by issuance of final encroachment Permit Nos. 18794 & 18795.

5. **Findings regarding significant impacts**. Pursuant to CEQA Guidelines sections 15096(h) and 15091, the Board determines that the Merced County Findings, attached to the Staff Report, and incorporated herein by reference, summarize the EIR's determinations regarding impacts of the modifications to the Atwater-Merced Expressway Project before and after mitigation. Having reviewed the FEIR and the Merced County Findings, the Board makes its findings as follows:

**a. Findings regarding Significant and Unavoidable Impacts.**

The Board finds that the modifications to the Atwater-Merced Expressway Project may have the following significant, unavoidable impacts, as more fully described in the Staff Report, FEIR and the Merced County Findings. Mitigation has been adopted for each of these impacts, although it does not reduce the impacts to less than significant. The impacts and mitigation measures are set forth in more detail in the Staff Report, FEIR and Merced County Findings.

- Noise – Implementation of the project would cause a substantial increase in ambient noise levels in the project vicinity and expose persons to noise levels in excess of standards established in the City of Atwater or Merced County General Plans.

**Finding**: The Board finds that changes or alterations have been required in, or incorporated into, the project which substantially lessen such impacts, as set forth more fully in the Staff Report, Merced County Findings, but that each of the above impacts remains significant

after mitigation. Such mitigation measures are within the responsibility of another agency, Merced County, and Merced County can and should implement the described mitigation measures. Specific economic, legal, social, technological or other considerations, rendered infeasible mitigation or alternatives that would have reduced these impacts to less than significant.

**b. Findings regarding Significant Impacts that can be reduced to Less -Than Significant.**

The FEIR identifies significant impacts which are reduced to a less-than-significant level by mitigation measures identified in the MMRP and have been incorporated into the project for mitigating impacts to visual resources, traffic and transportation, noise, air quality, geology, hydrology, biological resources, cultural resources, and public services.

**Finding.** The Board finds that changes or alterations have been required in, or incorporated into, the project which substantially lessen such impacts, as set forth more fully in the Staff Report, Merced County Findings, which describe the mitigation measures for each impact in detail. With such mitigation, each of the significant impacts will be reduced to less-than-significant. Such mitigation measures are within the responsibility of another agency, Merced County, and Merced County can and should implement the described mitigation measures.

6. As a responsible agency, the Board has responsibility for mitigating or avoiding only the direct or indirect environmental effects of those parts of the Project which it decides to carry out, finance, or approve. The Board confirms that it has reviewed the Mitigation Monitoring and Reporting Plan (MMRP), and confirmed that Merced County has adopted and committed to implementation of the measures identified therein. The Board agrees with the analysis in the MMRP and confirms that there are no feasible mitigation measures within its powers that would substantially lessen or avoid any significant effect the project would have on the environment. None of the mitigation measures in the MMRP require implementation by the Board directly, although continued implementation of the MMRP shall be made a condition of issuance of the Encroachment Permit. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 or 15063.

7. **Statement of Overriding Considerations.** Pursuant to CEQA Guidelines sections 15096(h) and 15093, the Board has balanced the economic, social, technological and other benefits of the Project described in application Nos. 18794 & 18795, against its significant and unavoidable impacts, listed in paragraph 5 (a) above, and finds that the benefits of the Project outweigh these impacts and they may, therefore, be considered "acceptable".

The Board finds the project will provide additional roadway capacity to accommodate existing, approved, and planned development within the Cities of Atwater and Merced Spheres of Influence, and unincorporated portions of Merced County.

8. **Custodian of Record**. The custodian of the CEQA record for the Board is its Executive Officer, Jay Punia, at the Board offices at 3310 El Camino Avenue, Room 151, Sacramento, California 95821.

**Findings pursuant to Water Code section 8610.5**

9. **Evidence Admitted into the Record**. The Board has considered all the evidence presented in this matter, including the original and updated applications, past and present Staff Reports and attachments, the original Environmental Impact Report on the Atwater-Merced Expressway Project (Draft and Final Versions), the MMRP, the Merced County Findings, and the U. S. Army Corps of Engineers recommendations. The Board has also considered all letters and other correspondence received by the Board and in the Board's files related to this matter.

   The custodian of the file is Executive Officer Jay Punia at the Central Valley Flood Protection Board.

10. **Best Available Science**. In making its findings, the Board has used the best available science relating to the issues presented by all parties.

11. **Effects on State Plan of Flood Control**. This project has no negative effect on the State Plan of Flood Control.

12. **Effects of Reasonably Projected Future Events.** There are no foreseeable projected future events that would impact this project

**Other Findings/Conclusions regarding Issuance of the Permit.**

13. Based on the foregoing, and particularly on the evidence that the condition of the existing Merced County bridge and related improvements poses an economic, legal, and social reasons for approving these projects, the Board finds and concludes that the issuance of the Encroachment Permit Nos. 18794 & 18795, is in the public interest.

14. This resolution shall constitute the written decision of the Board in the matter of Encroachment Permit Nos. 18794 & 18795.

**Approval of Encroachment Permit Nos. 18794 & 18795.**

15. Based on the foregoing, the Board hereby approves issuance of Encroachment Permits Nos. 18794 & 18795 in substantially the form provided as Attachment B of the Staff Reports.

16. The Board directs the Executive Officer to take the necessary actions to prepare and execute the permits and related documents and to prepare and file Notices of Determination with the State Clearinghouse.

PASSED AND ADOPTED by vote of the Board on _____, 2012

_____
Bill Edgar
President

_____
Jane Dolan
Secretary