

# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## PERMITS

- [1. RWQCB- 401 Certification Number 34214WQ01 dated 5/30/14](#)
- [2. Department of Fish and Game 1602 Stream Alteration Agreement \(SAA\), Permit No.1600-2013-0292-R5 dated 5/30/14](#)
- [3. US Army Corp of Engineer 404 Nationwide Permit No SPL-2013-00554-TS dated 3/12/14.](#)
- [4. Biological Opinion \(BO\) for CRLF/CTS Permit No. 8-8-10-F13 dated 3/12/13](#)
- [5. 2081 Incidental Take Permit \(ITP\) for CTS, Permit No. 2081-2013-064-05 dated 1/3/14](#)

## MATERIALS INFORMATION

- [6. Geotechnical design Report Dated 3/21/12](#)
- [7. Supplemental Geotechnical Design Report Dated 7/26/13](#)
- [8. Supplemental Geotechnical Design Report dated 12/13/13](#)
- [9. Alternative Temporary Crash Cushions](#)
- [10. Alternative Flared Terminal Systems](#)
- [11. Alternative In-line Terminal Systems](#)
- [12. Water Source Information](#)

# INFORMATION HANDOUT

For Contract No. 05-0C6404

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Project ID 0500000021

## PERMITS

[1. RWQCB- 401 Certification Number 34214WQ01 dated 5/30/14](#)

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## Central Coast Regional Water Quality Control Board

May 30, 2014

Larry Bonner  
CalTrans  
50 Higuera St  
San Luis Obispo, CA 93401-5414  
email: larry.bonner@dot.ca.gov

**VIA ELECTRONIC MAIL**

Dear Mr. Bonner:

### **WATER QUALITY CERTIFICATION NUMBER 34214WQ01 FOR HIGHWAY 246 PASSING LANES PROJECT, SANTA BARBARA COUNTY**

Thank you for the opportunity to review your February 21, 2014 application for water quality certification of the Highway 246 Passing Lanes Project (Project). The application was completed on March 13, 2014. The project, if implemented as described in your application and with the additional mitigation and other conditions required by this Clean Water Action Section 401 Water Quality Certification (Certification), appears to be protective of beneficial uses of State waters. We are issuing the enclosed Standard Letter of Certification.

At this time, we do not anticipate issuing additional requirements based on your application. Should new information come to our attention that indicates a water quality problem, we may require additional monitoring and reporting, issue Waste Discharge Requirements, or take other action.

Your Certification application and California Environmental Quality Act (CEQA) documents indicate that project activities have the potential to affect beneficial uses and water quality. The Central Coast Regional Water Quality Control Board (Central Coast Water Board) issues this Certification to protect water quality and associated beneficial uses from project activities. We need reports to determine compliance with this Certification. All technical and monitoring reports requested in this Certification, or any time after, are required per Section 13267 of the California Water Code.

Failure to submit reports required by this Certification, or failure to submit a report of technical quality acceptable to the Executive Officer, may subject you to enforcement action per Section 13268 of the California Water Code. The Central Coast Water Board will base enforcement actions on the date of certification. Any person affected by this Central Coast Water Board action may petition the State Water Resources Control Board (State Water Board) to review this action in accordance with California Water Code Section 13320; and Title 23, California Code of Regulations, Sections 2050 and 3867-3869. The State Water Board, Office of Chief Counsel, PO Box 100, Sacramento, CA 95812, must receive the petition within 30 days of the date of this Certification. We will provide upon request copies of the law and regulations applicable to filing petitions.

If you have questions please contact **David Innis** at (805) 549-3150 or via email at David.Innis@waterboards.ca.gov, or Phil Hammer at (805) 549-3882. Please mention the above certification number in all future correspondence pertaining to this project.

Sincerely,

for  
Kenneth A. Harris, Jr.  
Executive Officer

R:\RB3\Shared\401\Certifications\Santa Barbara\2014\Hwy 246 Passing Lanes 34214WQ01\R3\_246 Passing Lanes\_34214WQ01\_Cert\_140530\_final.doc

Enclosure: Action on Request for CWA Section 401 Water Quality Certification

cc: With enclosures

Theresa Stevens, Ph.D.  
U.S. Army Corps of Engineers  
Ventura Office  
Regulatory Section  
2151 Alessandro Drive, Suite 110  
Ventura, CA 93001  
email: Theresa.Stevens@usace.army.mil

401 Program Manager  
State Water Resources Control Board  
Division of Water Quality  
email: Stateboard401@waterboards.ca.gov

U.S. Environmental Protection Agency  
email: R9-WTR8-Mailbox@epa.gov

Paul Andreano, Associate Biologist  
CalTrans  
50 Higuera Street  
San Luis Obispo, CA 93401  
Email: paul.andreano@dot.ca.gov

Ashley Betance-Kearn  
Central Coast Water Board  
email:  
Ashley.Betance-Kearn@waterboards.ca.gov

Ed Pert  
California Department of Fish and Wildlife  
Lake and Streambed Alteration  
3883 Ruffin Road  
San Diego, CA 92123  
email: Ed.Pert@wildlife.ca.gov

David Innis  
Central Coast Water Board  
email: David.Innis@waterboards.ca.gov

Jamie Jackson  
California Department of Fish and Wildlife  
3883 Ruffin Road  
San Diego, CA 92123  
email: Jamie.Jackson@wildlife.ca.gov

Action on Request for  
Clean Water Act Section 401 Water Quality Certification  
for Discharge of Dredged and/or Fill Materials

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**PROJECT:** Highway 246 Passing Lanes Project

**APPLICANT:** Larry Bonner  
CalTrans  
Environmental Planning  
50 Higuera St  
San Luis Obispo, CA 93401-5414

**ACTION:**

1.  Order for Standard Certification
2.  Order for Technically-conditioned Certification
3.  Order for Denial of Certification

**STANDARD CONDITIONS:**

1. This Certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment per section 13330 of the California Water Code and section 3867 of Title 23 of the California Code of Regulations (23 CCR).
2. This Certification action is not intended to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent Certification application was filed per 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license was being sought.
3. The validity of any non-denial Certification action (Actions 1 and 2) is conditioned upon total payment of the fee required under 23 CCR section 3833, unless otherwise stated in writing by the certifying agency.

**ADMINISTRATIVE CONDITIONS:**

1. This Certification is subject to the acquisition of all local, regional, state, and federal permits and approvals as required by law. Failure to meet any conditions contained herein or any conditions contained in any other permit or approval issued by the State of California or any subdivision thereof may result in the revocation of this Certification and civil or criminal liability.
2. In the event of a violation or threatened violation of this Certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under state law. For purposes of Section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this Certification.

3. In response to a suspected violation of any condition of this Certification, the Central Coast Water Board may require the holder of any permit or license subject to this Certification to furnish, under penalty of perjury, any technical or monitoring reports the Central Coast Water Board deems appropriate, provided that the burden, including costs, of the reports shall have a reasonable relationship to the need for the reports and the benefits obtained from the reports.
4. In response to any violation of the conditions of this Certification, the Central Coast Water Board may add to or modify the conditions of this Certification as appropriate to ensure compliance.
5. The Central Coast Water Board reserves the right to suspend, cancel, or modify and reissue this Certification, after providing notice to the applicant, if the Central Coast Water Board determines that the Project fails to comply with any of the terms or conditions of this Certification.
6. A copy of this Certification, the application, and supporting documentation must be available at the Project site during construction for review by site personnel and agencies. A copy of this Certification must also be provided to the contractor and all subcontractors who will work at the Project site. All personnel performing work on the proposed Project shall be familiar with the content of this Certification and its posted location on the Project site.
7. The Applicant shall grant Central Coast Water Board staff, or an authorized representative, upon presentation of credentials and other documents as may be required by law, permission to enter the Project site at reasonable times, to ensure compliance with the terms and conditions of this Certification and/or to determine the impacts the Project may have on waters of the State.
8. The Applicant must, at all times, fully comply with the application, engineering plans, specifications, and technical reports submitted to support this Certification; all subsequent submittals required as part of this Certification; and the attached Project Information and Conditions. The conditions within this Certification and attachment(s) supersede conflicting provisions within applicant submittals.
9. The Applicant shall notify the Central Coast Water Board within 24 hours of any unauthorized discharge to waters of the U.S. and/or State; measures that were implemented to stop and contain the discharge; measures implemented to clean-up the discharge; the volume and type of materials discharged and recovered; and additional BMPs or other measures that will be implemented to prevent future discharges.
10. This Certification is not transferable to any person except after notice to the Executive Officer of the Central Coast Water Board. The Applicant shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new responsible party containing a specific date for the transfer of this Certification's responsibility and coverage between the current responsible party and the new responsible party. This agreement shall include an acknowledgement that the existing responsible party is liable for compliance and violations up to the transfer date and that the new responsible party is liable from the transfer date on.

11. This Certification expires if Project construction does not begin (a) prior to expiration of the associated U.S. Army Corps of Engineers (Corps) authorization or permit for the Project, or (b) within five years from the date of this Certification. If a Corps authorization or permit was unnecessary for this Project due to coverage under a non-reporting Nationwide Permit (NWP), and Project construction has not begun, this Certification expires when the non-reporting NWP expires. If the Corps issues a one-year grace period for uncompleted projects that began under a NWP that has since expired, this Certification is valid during the grace period for such projects. If this Certification does not expire as described above, it remains in effect until the Applicant complies with all Certification requirements and conditions.

12. The total fee for this project is \$16,829. The remaining fee payable to the Central Coast Water Board is \$0.

**CENTRAL COAST WATER BOARD CONTACT PERSON:**

David Innis  
(805) 549-3150  
David.Innis@waterboards.ca.gov

Please refer to the above certification number when corresponding with the Central Coast Water Board concerning this project.

**WATER QUALITY CERTIFICATION:**

I hereby issue an order certifying that as long as all the conditions listed in this Certification are met, any discharge from the Highway 246 Passing Lanes Project shall comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated pursuant to State Water Board Water Quality Order No. 2003-0017-DWQ, which requires compliance with all conditions of this Certification.

Except insofar as may be modified by any preceding conditions, all Certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with the applicant's project description and the attached Project Information and Conditions, and (b) compliance with all applicable requirements of the Central Coast Water Board's policies and Water Quality Control Plan (Basin Plan).

for \_\_\_\_\_  
Kenneth A. Harris, Jr.  
Executive Officer  
Central Coast Water Board

\_\_\_\_\_  
May 30, 2014  
Date

**PROJECT INFORMATION AND CONDITIONS**

Application Date	Received: February 21, 2014 Completed: March 13, 2014
Applicant	Larry Bonner CalTrans 50 Higuera St San Luis Obispo, CA 93401-5414 email: larry.bonner@dot.ca.gov phone: (805) 549-3337
Applicant Representatives	Paul Andreano CalTrans 50 Higuera Street San Luis Obispo, CA 93401 Email: paul.andreano@dot.ca.gov Phone: (805) 542-4688
Project Name	Highway 246 Passing Lanes Project
Application Number	34314WQ01
Type of Project	Construct culverts
Project Location	East of Lompoc/West of Buellton Latitude: 34.664476° N      Longitude: -120.407545°W
County	Santa Barbara
Receiving Water(s)	Two unnamed tributaries to the Santa Ynez River 314.00 Santa Ynez Hydrologic Unit
Water Body Type	Seasonal drainages and irrigation ditches
Designated Beneficial Uses	Municipal and Domestic Supply (MUN) Agricultural Supply (AGR) Industrial Process Supply (PROC) Industrial Service Supply (IND) Ground Water Recharge (GWR) Water Contact Recreation (REC-1) Non-Contact Recreation (REC-2) Wildlife Habitat (WILD) Cold Fresh Water Habitat (COLD) Warm Fresh Water Habitat (WARM) Migration of Aquatic Organisms (MIGR) Spawning, Reproduction, and/or Early Development (SPWN) Rare, Threatened or Endangered Species (RARE) Freshwater Replenishment (FRSH) Commercial and Sport Fishing (COMM)
Project Description (purpose/goal)	The purpose of this project is to construct new culverts and reconstruct and extend existing culverts.  Central Coast Regional Water Quality Control Board (Central Coast Water Board) staff understands that the project includes the following activities: 1. Construction of new culverts and extensions and replacements of various existing culverts. The end of culverts will be 30 feet from the edge of the traveled way on freeways and expressways

	and 20 feet from the edge of the traveled way on conventional highways. 2. Construction of a new wildlife under-crossing system of dry viaducts and 18 culverts.
U.S. Army Corps of Engineers Permit No.	SPL-2013-00554-TS Nationwide Permit 13 – Bank Stabilization Nationwide Permit 14 – Linear Transportation Projects
Federal Public Notice	NA
U.S Fish and Wildlife Service No.	Biological Opinion 8-8-10-F-13 issued March 12, 2012 and amended on March 1, 2013
Dept. of Fish and Wildlife Streambed Alteration Agreement	Streambed Alteration Agreement is pending. Final, signed copy shall be forwarded immediately upon execution.  2018(b) Incidental Take Permit for California Tiger Salamander approved January 10, 2014
Status of CEQA Compliance	Mitigated Negative Declaration approved June 16, 2010 and revalidated on September 9, 2013 Lead Agency: CalTrans
Total Certification Fee	\$ 16,829
Area of Disturbance	Approximately 0.37/1,063 (acres/linear feet) total  Streambed: 0.28/846 (acres/linear feet) permanent, 0.015/91 (acres/linear feet) temporary Riparian Area: 0.07/104(acres/linear feet) permanent, 0.01/20 (acres/linear feet) temporary
Dredge Volume	Approximately 5,114 total cubic yards Streambed: 1,395 cubic yards Riparian Area: 3,719 cubic yards
Fill Volume	Approximately 7,616 total cubic yards Streambed: 2,057 cubic yards Riparian Area: 5,559 cubic yards

<p>Compensatory Mitigation Requirements</p>	<ol style="list-style-type: none"> <li>1. The project shall include the following compensatory mitigation:             <ol style="list-style-type: none"> <li>a. 0.295/937 (acre/linear feet) of permanent and temporary streambed impacts shall be mitigated at a 1.25:1 ratio through the establishment of 0.02 acre and enhancement of 0.297 acre of streambed habitat (total 0.317 acres).</li> <li>b. 0.08/124(acres/linear feet) of permanent and temporary riparian impacts shall be mitigated at a 17.3:1 ratio through the enhancement of 1.386 acre of riparian habitat.</li> </ol> </li> <li>2. The Applicant shall implement compensatory mitigation installation, maintenance, and monitoring as described in:             <ol style="list-style-type: none"> <li>a. Other Waters of the United States On-site Mitigation and Monitoring Proposal for the California Department of Transportation’s Highway 246 Passing Lanes Project in Santa Barbara County (File No. SPL-2013-00554-TS), dated March 5, 2014; and</li> <li>b. Non-Wetland Jurisdictional Habitat Mitigation and Monitoring Plan for the California Department of Transportation’s Highway 246 Passing Lanes Project in Santa Barbara County (LSA No. 1600-2013-0292-R5), dated May 29, 2014.</li> </ol> </li> <li>3. Offsite compensatory mitigation shall be installed within 12 months of the commencement of project construction. Onsite compensatory mitigation shall be installed within 12 months of completion of project construction.</li> </ol>
<p>Project Requirements</p>	<p><u>Project practices that are required to comply with 401 Water Quality Certification are as follows:</u></p> <ol style="list-style-type: none"> <li>1. All work performed within waters of the State shall be completed in a manner that minimizes impacts to beneficial uses and habitat. Measures shall be employed to minimize land disturbances that will adversely impact the water quality of waters of the State. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete Project implementation.</li> <li>2. No construction activities shall be conducted below top of creek banks or in other waters of the State during the winter period October 31 – May 1, unless prior written approval has been obtained from Central Coast Water Board staff. Requests to conduct construction activities below top of creek banks or in other waters of the State during the winter period shall be submitted to Central Coast Water Board staff at least 21 days prior to the planned winter period work date.</li> <li>3. Erosion and sediment control measures shall be on site prior to the start of construction and kept on site at all times so they are immediately available for installation in anticipation of rain events.</li> <li>4. The Applicant shall implement and maintain an effective combination of erosion and sediment control measures (e.g., revegetation, fiber rolls, erosion control blankets, hydromulching, compost, straw with tackifiers, temporary basins) to prevent erosion and capture sediment. The Applicant shall implement and maintain washout, trackout, dust control, and any other applicable source control BMPs.</li> </ol>

	<ol style="list-style-type: none"><li>5. Erosion and sediment control measures and other construction BMPs shall be implemented and maintained in accordance with all specifications governing their proper design, installation, operation, and maintenance.</li><li>6. The Applicant shall not conduct construction activities below top of creek banks or in other waters of the State during rain events. The Applicant shall implement effective erosion control, sediment control, and other protective measures prior to the start of any rain events. If work below top of creek banks or in other waters of the State is allowed during the time period between October 1 and May 30 (pursuant to Project Requirement No. 2 above), the Applicant shall not conduct construction activities below top of creek banks or in other waters of the State on any day for which the National Weather Service has predicted a 25% or more chance of at least 0.1 inch rain in 24 hours. In preparation for any such predicted rain event between October 1 and May 30, the Applicant shall install effective erosion control, sediment control, and other protective measures no later than the day prior to the predicted rain event. Construction activities below top of creek banks or in other waters of the State may resume after the rain has ceased, the National Weather Service predicts clear weather, and site conditions are dry enough to continue work without discharge of sediment or other pollutants from the project site.</li><li>7. Any material stockpiled that is not actively being used during construction shall be covered with plastic unless reserved for seed banking, which requires alternative erosion and dust control BMPs.</li><li>8. The Applicant shall retain a spill plan and appropriate spill control and clean up materials (e.g., oil absorbent pads) onsite in case spills occur.</li><li>9. The Applicant shall confine all trash and debris in appropriate enclosed bins and dispose of the trash and debris at an approved site at least weekly.</li><li>10. All construction vehicles and equipment used on site shall be well maintained and checked daily for fuel, oil, and hydraulic fluid leaks or other problems that could result in spills of toxic materials.</li><li>11. The Applicant shall designate a staging area for equipment and vehicle fueling and storage at least 100 feet away from waterways, in a location where fluids or accidental discharges cannot flow into waterways.</li><li>12. All vehicle fueling and maintenance activity shall occur at least 100 feet away from waterways, and in designated staging areas.</li><li>13. Dewatering and stream diversion measures are not authorized based on the application. If the project requires dewatering or diversion, the Applicant shall submit detailed dewatering/diversion plans for Central Coast Water Board staff approval at least 21 days prior to any dewatering or diversion. Dewatering/diversion plans shall include the area to be dewatered, timing of dewatering, and method of dewatering to</li></ol>
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	<p>be implemented. All temporary dewatering/diversion methods shall be designed to have the minimum necessary impacts to waters of the State to isolate the immediate work area. All dewatering/diversion methods shall be installed such that natural flow is maintained upstream and downstream of the project area. Any temporary dams or diversions shall be installed such that the diversion does not cause sedimentation, siltation, or erosion upstream or downstream of the project area. All dewatering/diversion methods shall be removed immediately upon completion of dewatering/diversion activities. Dewatering or diversion shall not commence until applicant has obtained Central Coast Water Board staff approval of the dewatering/diversion plans.</p> <p>14. All (100%) of the Post-Construction Water Quality Volume (WQV) from the project's new impervious surface shall be infiltrated utilizing bio-filtration strips, soil based vegetation enhanced infiltration areas, and any other measures identified in the 05-0000-0021 (05-0C6401) 246 Passing Lanes Infiltration Tool, dated April 29, 2014. All post-construction BMPs shall be implemented and functioning prior to completion of the project.</p> <p>15. All construction-related equipment, materials, and any temporary BMPs no longer needed shall be removed and cleaned from the site upon completion of the project.</p> <p>16. Central Coast Water Board staff shall be notified if mitigations as described in the 401 Water Quality Certification application for this project are altered by the imposition of subsequent permit conditions by any local, state or federal regulatory authority. The Applicant shall inform Central Coast Water Board staff of any modifications that interfere with compliance with this Certification.</p>
<p>Monitoring and Reporting Requirements</p>	<p>The Applicant shall conduct the following monitoring:</p> <ol style="list-style-type: none"> <li>1. Visually inspect the project site and areas of waters of the State adjacent to project impact areas following completion of project construction and for five subsequent rainy seasons to ensure that the project is not causing excessive erosion, stream instability, or other water quality problems. If the project does cause water quality problems, contact the Central Coast Water Board staff member overseeing the project. You will be responsible for obtaining any additional permits necessary for implementing plans for restoration to prevent further water quality problems.</li> <li>2. Monitor the compensatory mitigation site for five years. If success criteria are not achieved within that time, continue annual monitoring and maintenance until success criteria are achieved. Compensatory mitigation monitoring shall include assessment of growth, survival, percent cover, general health and stature, signs of reproduction, progress towards achieving success criteria, and any other measures identified in the:             <ol style="list-style-type: none"> <li>a. Other Waters of the United States On-site Mitigation and Monitoring Proposal for the California</li> </ol> </li> </ol>

	<p>Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (File No. SPL-2013-00554-TS), dated March 5, 2014; and</p> <p>b. Non-Wetland Jurisdictional Habitat Mitigation and Monitoring Plan for the California Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (LSA No. 1600-2013-0292-R5), dated May 29, 2014.</p> <p>The Applicant shall provide the following reporting to RB3_401Reporting@waterboards.ca.gov:</p> <ol style="list-style-type: none"> <li>3. Project Commencement Notification - Contact Central Coast Water Board staff when the project begins to allow for a site visit.</li> <li>4. Streambed Alteration Agreement - Submit a signed copy of the Department of Fish and Wildlife's streambed alteration agreement to the Central Coast Water Board immediately upon execution and prior to any discharge to waters of the State.</li> <li>5. Project Completion Report - Within 30 days of project completion, submit a project completion report that contains:       <ol style="list-style-type: none"> <li>a. Date of construction initiation;</li> <li>b. Date of construction completion;</li> <li>c. Status of post-construction BMPs;</li> <li>d. A summary of daily activities, monitoring and inspection observations, and problems incurred and actions taken;</li> </ol> </li> <li>6. Clearly identified photo-documentation of all areas of permanent and temporary impact, prior to and after project construction;</li> <li>7. Clearly identified representative photo-documentation of other project areas, prior to and after project construction; and</li> <li>8. Photo-documentation of all permanent post-construction BMPs.</li> <li>9. Annual Report – The Applicant shall submit to the Central Coast Water Board an Annual Report by May 31 of each year following the issuance of this Certification, regardless of whether project construction has started or not. The Applicant shall submit Annual Reports until the Applicant has conducted all required monitoring, mitigation has achieved all success criteria, and the Applicant has notified the Central Coast Water Board of mitigation completion. Each Annual Report shall include at a minimum:       <ol style="list-style-type: none"> <li>a. The status of the project: construction not started, construction started, or construction complete.</li> <li>b. The date of construction initiation, if applicable.</li> <li>c. The date of construction completion, if applicable.</li> <li>d. If project construction is complete, a description of the results of the annual visual inspection of the project site and areas of waters of the State adjacent to project</li> </ol> </li> </ol>
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	<p>impact areas, including:</p> <ul style="list-style-type: none"><li>i. Erosion conditions;</li><li>ii. Stream stability conditions;</li><li>iii. Water quality and beneficial use conditions;</li><li>iv. Representative photographs of the project site and areas of waters of the State adjacent to project impact areas; and</li><li>v. If the visual inspection monitoring period is over, but water quality problems persist, the Annual Report shall identify corrective measures to be undertaken, including extension of the monitoring period until the project is no longer causing excessive erosion, stream instability, or other water quality problems.</li></ul> <p>e. Mitigation reporting, if mitigation installation has started, including the following information:</p> <ul style="list-style-type: none"><li>i. Date of initiation of mitigation installation and date mitigation installation was completed;</li><li>ii. If mitigation installation was completed, confirmation mitigation was installed according to the requirements of this Certification and as described in the application, Other Waters of the United States On-site Mitigation and Monitoring Proposal for the California Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (File No. SPL-2013-00554-TS), dated March 5, 2014 and Non-Wetland Jurisdictional Habitat Mitigation and Monitoring Plan for the California Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (LSA No. 1600-2013-0292-R5), dated May 29, 2014, and any other associated submittals;</li><li>iii. Analysis of monitoring data collected in the field;</li><li>iv. Quantification of growth, percent cover, survival, general health and stature, signs of reproduction, and documentation of progress toward achieving all mitigation performance criteria;</li><li>v. Qualitative and quantitative comparisons of current mitigation conditions with preconstruction conditions and previous mitigation monitoring results;</li><li>vi. Any remedial or maintenance actions taken or needed;</li><li>vii. Any additional information specified in the Other Waters of the United States On-site Mitigation and Monitoring Proposal for the California Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (File No. SPL-2013-00554-TS), dated March 5, 2014; and Non-Wetland Jurisdictional Habitat Mitigation and Monitoring Plan for the California Department of Transportation's Highway 246 Passing Lanes Project in Santa Barbara County (LSA No. 1600-2013-0292-R5),</li></ul>
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	<p>dated May 29, 2014.; and</p> <ul style="list-style-type: none"><li>viii. Annual photo-documentation representative of all mitigation areas, taken from vantage points from which Central Coast Water Board staff can identify changes in size and cover of plants. Compare photos of installed mitigation with photos of the mitigation areas prior to installation.</li><li>f. A description of mitigation completion status, that identifies the amount of mitigation monitoring and maintenance remaining, or certifies that mitigation is complete and all required mitigation monitoring and maintenance has been conducted and all success criteria achieved. If the monitoring period is over, but all success criteria have not been achieved, the Annual Report shall identify corrective measures to be undertaken, including extension of the monitoring period until the criteria are met.</li></ul>
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# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## PERMITS

[2. Department of Fish and Game 1602 Stream Alteration Agreement \(SAA\),  
Permit No.1600-2013-0292-R5 dated 5/30/14](#)



May 30, 2014

Mr. Larry Bonner  
California Department of Transportation  
50 Higuera Street  
San Luis Obispo, California 90012

Subject: Final Lake or Streambed Alteration Agreement  
Notification No. 1600-2013-0292-R5  
HIGHWAY 246 PASSING LANES PROJECT

Dear Larry Bonner:

Enclosed is the final Streambed Alteration Agreement (Agreement) for the HIGHWAY 246 PASSING LANES PROJECT (Project). Before the Department of Fish and Wildlife (CDFW) may issue an Agreement, it must comply with the California Environmental Quality Act (CEQA). In this case, CDFW, acting as a Responsible Agency, filed a notice of determination (NOD) on the same date it signed the Agreement. The NOD was based on information contained in the Negative Declaration the lead agency prepared for the Project.

Under CEQA, filing a NOD starts a 30-day period within which a party may challenge the filing agency's approval of the Project. You may begin your Project before the 30-day period expires if you have obtained all necessary local, state, and federal permits or other authorizations. However, if you elect to do so, it will be at your own risk.

If you have any questions regarding this matter, please contact Ms. Jamie Jackson at 805-382-6906 or [jamie.jackson@wildlife.ca.gov](mailto:jamie.jackson@wildlife.ca.gov).

Sincerely,

A handwritten signature in blue ink that reads "Betty J. Courtney".

Betty J. Courtney  
Environmental Program Manager

ec: Jamie Jackson, Senior Environmental Scientist (Specialist)

**CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE**  
SOUTH COAST REGION  
3883 Ruffin Road  
San Diego, CA 92123



**STREAMBED ALTERATION AGREEMENT**  
NOTIFICATION No. 1600-2013-0292-R5 – REVISION 4  
NUMEROUS STREAMS/CHANNELS/CULVERTS/DITCHES

California Department of Transportation  
HIGHWAY 246 PASSING LANES PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and California Department of Transportation (Permittee), as represented by Mr. Larry Bonner acting on behalf of Permittee.

All measures listed in the CESA Incidental Take Permit (ITP) No. 2081-2013-064-05 shall be adhered to explicitly, specifically in instances of conflict with this Agreement, unless specifically stated otherwise.

## **RECITALS**

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified CDFW on December 19, 2013, that Permittee intends to complete the Project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the Project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the Project in accordance with the Agreement.

## **PROJECT LOCATION**

The proposed Highway 246 Passing Lanes Project (Project) is located on State Route 246 (SR-246) between the cities of Lompoc and Buellton, in Santa Barbara County. The Project will be conducted in two proposed locations. Project Location 1 (PL1) is located approximately 0.1-mile east of Purisima Road at Post Mile (PM) 12.3 to 0.4-mile west of Santa Rita Road at PM 16.7. Project Location 2 (PL2) is located east of Lompoc on SR-246 at 0.2-mile east of Cebada Canyon Road at PM R12.95 and ends at PM R16.7 at Hapgood Road. The Project site is bounded by SR-246 that transverses the Santa Rita Valley and western Santa Rita Hills between the cities of Buellton and Lompoc.

## PROJECT DESCRIPTION

Permittees proposed Project is to construct two sets of passing lanes (one eastbound set and one westbound set) along a 5.3-mile section of SR-246, between the cities of Lompoc and Buellton. The two 1.7-mile sets of passing lanes will be constructed between Cebada Canyon Road and Hapgood Road (west) and Cebada Canyon Road to Tularosa Road (east). Both passing lanes would end near the apex of the grade near Tularosa Road. Left turn channelization at Tularosa Road and Hapgood Road (west) would be constructed to improve traffic flow and reduce potential turning movement conflicts at four locations within the Project limits. SR-246 would be widened, and extensions and/or replacements to existing culverts would be built throughout the Project, to accommodate the highway widening. The Project would also correct the road profile and realign the highway at Tularosa Road. No water diversions or work in wetted channels will be required. Six culvert undercrossings would be constructed to facilitate passage of sensitive wildlife under the highway. The existing Class III bicycle lane would be included throughout the Project limits.

The purpose and need for the Project are to 1) improve mainline operations and provide safer passing opportunities along SR-246 between Purisima Road and Santa Rita Road; 2) to improve mainline operations and safety by providing increased sight distance (the visibility of the road ahead) and reduce the incline of the approaching uphill grade near the intersection of SR-246 and Tularosa Road; and 3) to improve operations and safety by improving traffic flow and reducing potential turning conflicts at several intersections, including Tularosa Road, Hapgood Road (west) and Santa Rita Road.

## PROJECT IMPACTS

Existing fish or wildlife resources the Project could substantially adversely affect, based on information received from the Permittee, include: **Amphibians:** California tiger salamander (*Ambystoma californiense*)\*\*(ST)\*(CH)\*; California red-legged frog (*Rana aurora draytonii*) (CSC), western spadefoot toad (*Spea hammondi*)( CSC)\*, California newt (*Taricha torosa*) (CSC); **Reptiles:** coast horned lizard (*Phrynosoma coronatum frontale*)(CSC), Southwestern pond turtle (*Actinemys marmorata pallida*)( CSC); **Birds:** least Bell's vireo (*Vireo bellii pusillus*)(SE), loggerhead shrike (*Lanius ludovicianus*)( CSC), western scrub jay (*Aphelocoma californica*), northern mockingbird (*Mimus polyglottos*), swallow (*Hirundinidae* spp.), Cooper's hawk (*Accipiter cooperii*); **Mammals:** American badger (*Taxidea taxus*) (CSC), Mexican free-tailed bat (*Tadarida brasiliensis*), western pocket gopher (*Thomomys mazama*), black-tailed jackrabbit (*Lepus californicus*), gray fox (*Urocyon cinereoargenteus*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), brush rabbit (*Sylvilagus bachmani*), bobcat (*Lynx rufus*); **Native Plants:** black-flowered figwort (*Scrophularia atrata*)(CNPS 1B.2)\*, coast live oak (*Quercus agrifolia*)(CSC) sand mesa manzanita (*Arctostaphylos rudis*)(CNPS 1B.2), arroyo willow (*Salix lasiolepis*), elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*), red willow (*Salix laevigata*); and coast live oak woodland; and all other aquatic and wildlife resources in the area, including the riparian vegetation which provides habitat for such species in the area.

\*Status: State Endangered (SE); State Threatened (ST); California Special Concern species (CSC); California Native Plant Society (CNPS), Critical Habitat (CH), California Native Plant Society Listings: 1B.2 Rare, threatened, or endangered in California and elsewhere, fairly endangered in California.

\*\* Incidental Take Permit No. 2081-2013-064-05

**Table 1- Impacts Analyses.**

(Additional information is available in the Exhibits located in the Notification package for this Agreement)

Post Mile	Drainage System	Map Location	Dominant Plant Communities	Perm. Linear Impacts (ft)	Perm. Impacts (ac)	Temp. Linear Impacts (ft)	Temp. Impacts (ac)	Excavated Volume (yd <sup>3</sup> )	Fill Volume (yd <sup>3</sup> )
12.95	2	CDFW1N	Red Willow	0	0.000	3.51	0.000	Total: 0	Total: 0
13.34	4	CDFW2N	Coyote Brush Scrub	297.31	0.097	13.16	0.011	Soil: 581 Total: 581	RSP: 581 Total: 581
13.64	7/8	CDFW3N CDFW3S	Ruderal, Herbaceous Coast Live Oak Woodland Red Willow Eucalyptus	474.4	0.452	243.61	0.076	Concrete: 51 Soil: 1200 Stump/Root: 97 Total: 1348	Concrete: 359 RSP: 1185 Soil: 1150 Total: 2694
13.76	9	CDFW4S	Coyote Brush Scrub	59.28	0.059	18.73	0.014	Soil: 156 Total: 156	RSP: 185 Total: 185
14.02	12	CDFW5N CDFW5S	Coast Live Oak Woodland Coyote Brush Scrub	171.20	0.113	20.85	0.036	Concrete: 32 Soil: 1341 Stump/Root: 22 Total: 1395	Concrete: 3.1 RSP: 1214 Soil: 840 Total: 2057.1
15.17	21	CDFW7S	Ruderal Herbaceous Red Willow	16.56	0.007	5.45	0.006	Soil: 326 Stump/Root: 0 Total: 326	RSP: 110 Soil: 1150 Total: 1260
15.39	22	CDFW8N CDFW8S	Ruderal Coyote Brush Scrub	110.85	0.078	39.63	0.016	Concrete: 108 Soil: 1861 Stump/Root: 0 Total: 1969	Concrete: 337 RSP: 814 Soil: 485 Total: 1636
15.52	24	CDFW9N CDFW9S	Ruderal Coyote Brush Scrub Herbaceous	90.05	0.009	15.03	0.001	Concrete: 22 Soil: 330 Total: 352	RSP: 188 Soil: 690 Total: 878
16.15	27	CDFW10N CDFW10S	Ruderal Coyote Brush Scrub Herbaceous	94.59	0.072	11.8	0.008	Concrete: 20 Soil: 226 Stump/Root: 0 Total: 246	Concrete: 77 RSP: 740 Soil: 227 Total: 1044
<b>Totals</b>				<b>1436.95</b>	<b>0.899</b>	<b>924.53</b>	<b>0.328</b>	<b>Concrete: 233 Soil: 5865 Stump/Root: 119 Total: 6336</b>	<b>Concrete: 773.1 RSP: 5017 Soil: Total: 10335</b>
<b>Riparian Only Totals</b>				<b>171.20</b>	<b>0.125</b>	<b>24.36</b>	<b>0.196</b>	<b>Concrete: 32 Soil: 1341 Stump/Root: 22 Total: 1395</b>	<b>Concrete: 3.1 RSP: 1214 Soil: 840 Total: 2057.1</b>

The Permittee shall implement the Project as proposed and the work area shall be limited to the streams/channels/culverts/ditches indicated for impacts as part of this notification and listed in Table 1 pg. 3; this includes all impacts as described in the original Project description in the notification for this Agreement, including staging, storage and access roads necessary to complete the Project as described. If additional impacts beyond those expressly stated herein occur CDFW must be notified and additional mitigation and/or measures to protect resources may be required.

## **MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES**

### **1. Administrative Measures**

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the Project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the Project at the Project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify CDFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the Project by another local, state, or federal agency. In that event, CDFW shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that CDFW personnel may enter the Project site at any time to verify compliance with the Agreement.

1.5 Regional Water Quality Control Board. CDFW believes that permit/certification(s) may be required from the Regional Water Quality Control Board for this Project. Should such permits/certification(s) be required, a copy shall be submitted to CDFW.

1.6 Personnel Compliance On Site. If the Permittee or any employees, agents, contractors and/or subcontractors violate any of the terms or conditions of this Agreement, all work shall terminate immediately and shall not proceed until CDFW has taken all of its legal actions.

1.7 Pre-Project Briefing. A pre-maintenance meeting/briefing shall be held involving all the contractors and subcontractors, concerning the conditions in this Agreement.

1.8 Notification Prior to Work. The Permittee shall notify CDFW, in writing, at least five (5) days prior to initiation of mitigation (Project) activities and at least five (5) days prior to completion of mitigation (Project) activities. Notification shall be sent to electronically to CDFW at [R5LSACompliance@wildlife.ca.gov](mailto:R5LSACompliance@wildlife.ca.gov) Reference # 1600-2013-0292-R5.

**1.9 Notification Requirements.** CDFW requires that the Permittee:

1.9.1 Immediately notify CDFW in writing if monitoring reveals that any of the protective measures were not implemented during the period indicated in this Agreement, or if it anticipates that measures will not be implemented within the time period specified.

1.9.2 Immediately notify CDFW if any of the protective measures are not providing the level of protection that is appropriate for the impact that is occurring, and recommendations, if any, for alternative protective measures.

1.9.3 CDFW shall verify compliance with protective measures to ensure the accuracy of the Permittee's mitigation, monitoring and reporting efforts. CDFW may, at its sole discretion, review relevant documents maintained by the Permittee, interview the Permittee's employees and agents, inspect the work site, and take other actions to assess compliance with or effectiveness of protective measures in this Agreement.

**1.10 Implementation Requirements.** The agreed work includes activities associated with the Project Location and Project Description that is provided above (Please see pg.1-2). Specific work areas and mitigation measures are described on/in the plans and documents submitted by the Permittee with the Notification Package, and shall be implemented as proposed unless directed differently by this Agreement.

**2. Avoidance and Minimization Measures**

To avoid or minimize adverse impacts to fish and wildlife resources identified above (Please see pg. 2), Permittee shall implement each measure listed below. Avoidance and minimization measures for this Project include biological monitoring for the protection of animals and that all equipment entering the construction work area is washed to reduce the likelihood of transfer of exotic wildland pests' species. In addition to Permittee-proposed Best Management Practices (BMPs), the following additional measures shall be implemented to fully protect aquatic and terrestrial species during Project-related activities.

**Aquatic and Terrestrial Species Specific Protection**

2.1 Contractor Education. Permittee shall have a qualified biologist prepare for distribution to all Permittee contractors, subcontractors, Project supervisors, and consignees a "Contractor Education Brochure" with pictures and descriptions of the life history and ecology of California tiger salamander, California red-legged frog, Arroyo toad, coast horned lizard, southwestern pond turtle, locally occurring or known bat species (Please see Measure 2.2.2 pg. 6), American badger, black-flowered figwort, and sand mesa manzanita. Permittee contractors and consignees shall be instructed to bring to the attention of any qualified biologist assigned monitoring duties any sightings of these species to the onsite designated lead biological monitor (this may or may not apply to the Designated Monitor for CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS). A copy of the brochure shall be provided to CDFW prior to Project-implementation.

2.2 Bats. To prevent harm or death to any adult bat or their young that could be roosting in coast live oak trees in the Project limits, the Permittee shall implement all the following protective measures.

2.2.1 Bat Surveys. A qualified biologist familiar with the life history of bats shall conduct a survey to determine the specific species of locally occurring bats utilizing the oak woodland within the proposed work area. Once surveys are completed they shall be submitted to CDFW for review PRIOR to any impacts to coast live oak trees within the project limits, this includes trimming of branches or pruning of limbs to accommodate equipment clearance or project staging. The same biologists shall prepare a "Bat Avoidance and Minimization Plan" (BAMP) and that plan shall be submitted to CDFW and CDFW must notify the Permittee in writing that CDFW concurs with the survey findings and the bat avoidance plan. Only after receiving written concurrence from CDFW regarding surveys and the avoidance plan may impacts within the coast live oak woodlands be initiated.

2.2.2 Coast Live Oak Tree(s) Removal. Performing all tree removal activities shall only occur after appropriate surveys (Please see measure 2.2.1) have been conducted to establish the species of locally occurring bats and roosting habitats of that/those bat(s) species has been established. All coast live oak tree removal shall occur only when the absence of bats has been verified by the same biologist responsible for bat surveys and preparation of the BAMP. Once the biologist has determined the tree(s) slated for removal are free of bats, by conducting a presence/absence survey and keeping a record of those surveys, then the tree(s) may be removed. If however, bat(s) are observed in any tree(s) designated for removal the tree(s) shall remain untouched until such time the bat(s) leave of their own accord to minimize and reduce potential negative impacts to natal bat(s) within the Project area.

2.2.2.a Baseline Establishment. Once the species of bats utilizing the coast live oak woodlands has been determined (Please see measure 2.2.1) the area shall be observed to determine if the already established work period (no work 30 minutes before sunrise and no work 30 minutes prior to sunset) captures the actual activity times of the bats in the area. No work that includes the removal of trees shall occur when bats are known to be present, as established through presence/absence surveys. If after surveys it is determined the bats do not come and go within the already established work period the work period shall be adjusted to accommodate the bats. Adjustment of the work period to accommodate bats will not conflict with the work periods established in the ITP.

2.2.3 Bridge/Culvert/Drain Inspection. Prior to any disturbance to existing structures within the Project limits by the construction crew, the area will be cleared to ensure that no bats or other wildlife are using the structures for habitat.

2.3 Swallows. It is anticipated that swallows may nest on oak trees and other structures between February 15<sup>th</sup> and September 1<sup>st</sup>. The Permittee shall take such measures as necessary to prevent nesting on trees and structures that will cause a conflict between performing necessary work and nesting swallows during the recognized nesting bird season to avoid violation of the Federal Migratory Bird Treaty Act (MBTA) of 1918 (50 C.F.R. Section

10.13) and Sections 3503, 3503.5 and 3513 of the FGC. Swallows shall be allowed to nest on oak trees and structures where conflicts are not anticipated.

2.4 Presence/Absence Surveys. Due to the high potential for occurrence or known presence of species listed in the fish and wildlife resource section (Please see pg. 2) of this Agreement (this does not apply to CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS) pre-construction presence/absence surveys shall be conducted by any qualified biologist assigned monitoring duties in work areas no more than 72 hours prior to Project-related activities: If any of the species listed in the fish and wildlife resource section are identified in Project work areas activities shall cease until the species has moved to a different location on its own accord or until a qualified biological monitor has successfully relocated the species to an area out of harm's way. The Permittee must make every effort above and beyond ordinary measures to ensure no unnecessary harm befalls any wildlife caught in the path of construction (this does not apply to CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS). A system shall be developed to document ALL areas where tree(s) removal, grubbing, grading, or other potentially negative activities for wildlife are to occur and these areas shall be cleared by the assigned biological monitor, in writing, and approved by the biological monitor for impacts. These logs/journals shall be submitted to CDFW on a weekly basis until all vegetation, grubbing, and grading has been concluded. Reports shall be submitted electronically to [R5LSACompliance@wildlife.ca.gov](mailto:R5LSACompliance@wildlife.ca.gov).

2.5 Special Status Species. A qualified biologist shall be assigned monitoring duties and shall be directed to focus on protecting any animal species within the project limits (this does not apply to CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS). Any qualified biologist assigned monitoring duties shall have stop-work-related authority if necessary to allow an animal to move, on its own accord, from the work area. The monitor shall prevent animal species from entering/re-entering the disturbance area using non-intrusive, hands-off, low stress methods. The Permittee shall prepare a plan for CDFW approval to demonstrate how animals encountered shall be relocated using a non-intrusive, hands-off, low stress method. This protocol must be approved in writing by CDFW PRIOR to any Project-related activities, including staging and storage of Project-related equipment and materials. Any Biologist mandated with capture/relocation efforts must possess all required authorizations and permits.

2.6 Rare Natural Communities. Several CNPS List 1B.2 plants have been identified as occurring within the Project limits (see plant and animal resources section of this Agreement, pg. 2). A thorough assessment of rare plants and rare natural communities, following the Department's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (see: <http://www.dfg.ca.gov/habcon/plant/>) (hard copy available on request) shall be used to identify any special status plants and plant communities within the project limits and an avoidance and minimization plan shall be created to maintain the integrity of those populations onsite as much as practical. A Habitat Mitigation and Monitoring Plan (HMMP) (Please see section 3 of this Agreement pg. 12) shall be created that fully describes what the onsite restoration efforts shall be and where they are to be conducted. PRIOR to any impacts associated with the project, including staging and storage of Project-related equipment and materials, the HMMP must be received, reviewed, and approved in writing by CDFW. The HMMP shall be received no later than **June 30, 2014**, or if the project is slated to go into construction prior to that date as specified above.

**2.6.1 Revegetation.** Plans for restoration and revegetation should be prepared by persons with expertise in southern California ecosystems and native plant revegetation techniques. Each plan should include, at a minimum: (a) the location of the mitigation site; an assessment of the proposed mitigation area including historic condition analysis to ensure any proposed restoration is biologically suitable, soils, topography, complete plant species compendium conducted during the appropriate blooming season, and justification as to why this site is being proposed as mitigation (b) the plant species to be used, referencing all species back to the impact site's species composition, container sizes and seeding rates referenced to the density of each species as it occurs at the impact site; (c) a schematic depicting the mitigation area; (d) planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) specific quantitative success criteria linked back to the impacted sites' species diversity, percent total and canopy cover, and density/abundance for each vegetation layer; (h) a detailed monitoring program including detailed sampling methodology, data analysis to be used and specific timing of monitoring activities; (i) contingency measures should the success criteria not be met; and (j) as this is onsite revegetation, if future State transportation needs require new construction activities within the mitigation area, those impacts shall be re-mitigated within 1-year of final construction, with similar species composition, based off the original impacts analyses for the Highway 246 Widening Project.

**2.6.2 Reference Sites.** The HMMP shall utilize a reference site that contains the same vegetation characteristics of the impact site, outside the project limits to establish success criteria for the restoration on site. The focus of the restoration efforts should be to mimic the species composition, diversity and richness of the reference site. In addition, post-restoration, the percent cover (canopy/absolute) of each component species, within the reference site shall be used as an ecosystem indicator to compare trends over time for management decisions. On-site plantings of mitigation plants within the mitigation area should not deviate more than or less than 10% of the total species composition of the impact site pre-project or over/under dominant the percent cover of the species in the reference site post-project. Before CDFW mitigation compliance can be received by the Permittee a site visit will be required and both the reference site and mitigation site shall be visited to assess the success criteria as stated above. The reference site chosen by the Permittee must be visited and approved by CDFW PRIOR to any impacts to ready the Project site for Project-related activities, this includes any staging or storage of equipment or materials within the Project limits.

**2.7 Threatened and/or Endangered Species.** CDFW anticipates potential impacts to the California Endangered Species Act (CESA) species California tiger salamander as a result of Permittee's implemented Project. All measures listed in the CESA Incidental Take Permit (ITP) No. 2081-2013-064-05 shall be adhered to explicitly, specifically in instances of conflict with this Agreement, unless specifically stated otherwise. All Permittees Project-related activities shall take place when there is no flow present in the streams/channels/culverts/ditches listed in Table 1 (pg. 2). However, if any flow is present, and any of the above species are indicated during pre-construction surveys, and a diversion is deemed necessary, no work shall occur until the Permittee has consulted with the appropriate agencies regarding permits for take of threatened or endangered species. The Permittee shall contact the Caltrans liaison for CDFW to obtain information on applying for additional CESA coverage for CTS or CESA-listed species, such as least Bell's vireo, if any

potential for take exists as a result of Permittee's Project-related activities.

### **Biological Surveys and Time Restrictions**

**2.8 Breeding and/or Nesting Birds.** To avoid impacts to breeding/nesting birds, if breeding activities are observed (bringing nesting material to habitat within the Project footprint, and/or nest(s) are located during surveys) from March 1<sup>st</sup> to September 15<sup>th</sup> the breeding habitat/nest(s) site shall be fenced and/or flagged in all directions. Flagged habitat/nest(s) site(s) shall not be disturbed until the nest(s) becomes inactive, and/or the young have fledged, and/or the young are no longer being fed by the parents, and/or the young have left the area, and/or the young will no longer be impacted by the Project.<sup>1</sup> Non-disturbance buffer zones shall be established by a qualified biologist with experience in identifying and monitoring nesting bird behaviors and nesting birds based on, but not limited to, site lines from the nest(s) to the work site and observations of the nesting bird's reaction to Project activities. Continuous monitoring of the nest(s) site by the qualified biologist shall occur during disturbance activities, and a nest(s) observation log shall be updated once per hour during construction activities while any work occurs within close proximity to flagged boundaries. If the qualified biologist assigned monitoring duties determines nesting activities may fail as a result of work activities, all work shall cease within the recommended avoidance area until the biologist determines the adults and young are no longer reliant on the nest site.

**2.9 Migratory Birds.** Be advised, migratory non-game native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (50 C.F.R. Section 10.13) and sections 3503, 3503.5 and 3513 of the FGC that prohibit take of all birds and their active nests including raptors and other migratory non-game birds (as listed under the Federal MBTA).

**2.10 Reporting Observations to CNDDDB.** The Permittee shall be responsible for reporting all observations of threatened/endangered species or of California special concern to CDFW's Natural Diversity Data Base within ten (10) days of sighting. Any submittals to the CNDDDB shall be reported to the [R5LSAcompliance@wildlife.ca.gov](mailto:R5LSAcompliance@wildlife.ca.gov)

**2.11 Work Suspension.** The Permittee shall not continue work once listed (threatened/endangered, candidate, or rare) species are discovered until CDFW has been notified and concurrence has been received by CDFW that work may continue (this does not apply to CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS). CDFW will have 72 hours to review the circumstances and notify the Permittee if work may continue.

### **Habitat Protection**

**2.12 Access Roads.** All access roads shall be expressly identified and authorized by the assigned biological monitor. Caltrans may not construct access roads until all areas have been cleared for use by the assigned monitor to avoid unnecessary impacts to critical habitat

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<sup>1</sup> NOTE: A Buffer and Avoidance Plan (BAP) shall be submitted to the Department for review to prevent take of any nest or egg of any bird. If any endangered, threatened, or CDFW species of special concern are identified during pre-construction presence/absence surveys the BAP should outline the avoidance measures to be implemented to avoid take of nesting birds.

within the Project limits (this does not apply to CTS-covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS).

**2.13 Authorized Vehicles.** Where practical, rubber-tired vehicles shall be used in streams/channels/culverts/ditches to avoid unnecessary damage to sensitive resources that may otherwise remain undisturbed during Project-related activities. If it becomes necessary to place equipment into any wetted stream/channel/culvert/ditch, Permittee must first notify CDFW and explain why work in a wetted stream must be conducted and conducted using non-rubber tired vehicles.

**2.14 Vehicle Access Where Vegetation May be Impacted.** This Agreement does not authorize impacts to any vegetation, native or otherwise, outside the flagged area of the Project limit. If it is determined that additional impacts may occur as a result of Project-related activities please see Impacts and Mitigation Sections of this Agreement (Please see pg. 2 and pg. 12, respectively) and notify CDFW immediately.

**2.15 Tree and Shrub Removal.** This Agreement does not authorize impacts to any tree(s) or shrubs, native or otherwise, except as expressly provided for by this Agreement, and based on a complete tree(s) inventory at the time of the execution of this Agreement. If it is determined that additional impacts may occur as a result of Project-related activities notify CDFW immediately (Please see pg. 2 and pg. 12, respectively). A qualified biologist shall be assigned monitoring duties and shall be directed to focus on protecting any plant communities or sensitive plants within the project limits (this does not apply to vegetation covered under Incidental Take Permit No. 2081-2013-064-05 which has measures specific to the protection of CTS vegetation and plant communities). Any qualified biologist assigned monitoring duties shall have stop-work-related authority, if necessary, to avoid unnecessary impacts to resources that may otherwise remain undisturbed during Project-related activities; and to the best of their ability, prevent the introduction of exotic wildland pests into the work area.

**2.16 Alteration of Streambed.** This Agreement does not authorize modification to stream, bank, or channel other than explicitly authorized by this Agreement in Table 1, pg. 2. If it is determined that additional impacts may occur as a result of Project-related activities notify CDFW immediately (Please see pg. 2 and pg. 12, respectively)

**2.17 Debris Catchment.** All Permittees BMPs will be in place to contain any debris generated from cutting, grubbing, grading, and all construction-related activities from entering any portion of a stream/channel/culvert/ditch outside the Project limits. In addition, Permittees contractor will adhere to Caltrans's Best Management Strategies Manual Sections 13-4.03D (3) and 14-10; Concrete Waste and Solid Waste Disposal and Recycling.

**2.18 Substrate.** This Agreement does not authorize the removal of or placement of rock, gravel, and/or other materials into any stream/channel/culvert/ditch except as expressly identified in Table 1, pg. 2 of this Agreement.

**2.19 Domestic Animals.** The Permittee shall not permit pets on or adjacent to the construction site.

2.20 Weapons. The Permittee shall ensure that no guns/or other weapons are on site during construction, with the exception of the security personnel and only for security type functions. No hunting shall be authorized/permited during Project-related activities.

### **Fill and Spoils**

2.21 Fill. This Agreement does not authorize the use of any fill except as expressly authorized by this Agreement in Table 1, pg. 2.

### **Placement of In-stream Structures**

2.22 Working in Streams/Channels/Culverts/Ditches. Work will be performed when there is no flow and the above described features are completely dry.

2.23 Diversions. This Agreement does not authorize a water diversion of any kind, regardless of size or type.

2.24 Temporary Installation of Bridges, Culverts, or Other Structures. This Agreement does not authorize any temporary bridge, culvert, or other structure or obstruction except as expressly authorized in the Project description received as part of the Permittees Notification for this Agreement. Any work in a wetted portion of a streambed requires PRIOR approval, in writing, from CDFW prior to implementation.

2.25 Temporary Dams. This Agreement does not authorize any temporary dam or other artificial obstruction. Any work in a wetted portion of a streambed requires PRIOR approval, in writing, from CDFW prior to implementation.

2.26 Predicted Rain. Given the unpredictability of forecast for rain in the southern California area, if measurable rain with 70% chance or greater probability is predicted within 48 hours during Project-related activities, all measures listed in the CESA Incidental Take Permit (ITP) No. 2081-2013-064-05 shall be adhered to explicitly, specifically in instances of conflict with this permit, unless specifically stated otherwise. Protective measures to prevent siltation/erosion shall be implemented/maintained if it could rain during the proposed construction term. If it rains while Project-related activities are underway, all activities shall cease, and protective measures to prevent siltation/erosion shall be implemented/maintained. If any concrete is poured after November 1<sup>st</sup>, Caltrans MUST ensure no concrete used in the contract for construction-related activities may cause harm to ANY aquatic organism if poured within 150 feet of a wetted stream.

2.27 Unauthorized Materials. This Agreement does not authorize placement of any materials, other than those specifically identified in this Agreement, into any stream/channel/culvert/ditch.

### **Turbidity and Siltation**

2.28 Runoff Control. Preparation shall be made so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.

2.29 Contaminated Site Water. Water containing mud, silt, or other pollutants from equipment washing or other activities, shall not be allowed to enter a flowing stream, or dry ephemeral stream, or placed in locations that may be subjected to high storm flows.

### **Equipment and Access**

2.30 Staging and Vehicle Storage. Staging/storage areas for equipment and materials shall be located outside critical habitat for any special status species, such as, black-flowered figwort and sand mesa manzanita, within the Project limits (this applies to any other species than CTS-which is specifically covered under Incidental Take Permit No. 2081-2013-064-05 and has measures specific to the protection of CTS critical habitat). Staging and storage areas shall be selected due to either a non-vegetated status or in an effort to reduce Project-related impacts. Staging in all other areas is prohibited by this Agreement unless otherwise approved PRIOR to staging activities by CDFW.

2.31 Authorized Vehicles. This Agreement does NOT authorize any vehicle(s) to be driven, or equipment operated in, any water-covered portions of a stream/channel/culvert/ditch, or where wetland vegetation, riparian vegetation, or aquatic organisms may be harmed or destroyed. CDFW shall be notified within 24 hours by email or fax PRIOR to work in a wetted portion of any stream/channel/culvert/ditch, at which time additional mitigation and/or protective measures may be required to protect resources.

2.32 Vehicle Maintenance. Any equipment or vehicles driven and/or operated adjacent to a stream/channel/culvert/ditch shall be checked and maintained daily, to prevent leaks of materials that if introduced to the stream/channel/culvert/ditch, could be deleterious to aquatic life.

### **Pollution, Litter and Cleanup**

2.33 Pollutants and Debris. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, construction waste, cement or concrete or washings thereof, asphalt, paint, oil or other petroleum products or any other substances which could be hazardous to aquatic life, or other organic or earthen material from any logging, construction, or other associated Project-related activity shall be allowed to contaminate the soil and/or enter into or placed where it may be washed by rainfall or runoff into, any stream/channel/culvert/ditch. Any of these materials, placed within or where they may enter a stream/channel/culvert/ditch, by the Permittee or any party working under contract, or with the permission of the Permittee, shall be removed immediately. When Project-related activities are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake.

2.34 Pollution Compliance. The Permittee shall comply with all litter and pollution laws. All contractors, subcontractors and employees shall also obey these laws and it shall be the responsibility of the Permittee to insure compliance.

2.35 Pollution Prevention. Stationary equipment such as motors, pumps, generators, and welders, located within or adjacent to any stream/channel/culvert/ditch shall be positioned over drip pans. Stationary heavy equipment shall have suitable containment to handle a

catastrophic spill/leak. Clean up equipment such as extra boom, absorbent pads, skimmers, shall be on site prior to the start of Project-related activities. No equipment maintenance shall be done within or near any stream/channel/culvert/ditch where petroleum products or other pollutants from the equipment may enter these areas under any circumstances that create flow in the stream/channel/culvert/ditch.

2.36 Pollution Clean-up. The clean-up of all spills shall begin immediately. CDFW shall be notified immediately by the Permittee of any spills that release hazardous material (oil, cement, fuel, etc.) into any stream/channel/culvert/ditch and CDFW shall be consulted regarding clean-up procedures.

2.37 Trash Receptacles. The Permittee shall install and use fully covered trash receptacles with secure lids (wildlife proof) that contain all food, food scrapes, food wrappers, beverage containers and other miscellaneous trash generated by work force personnel.

### 3. Compensatory Mitigation Measures

**NOTE:** Mitigation proposed in Measure 3.1 is in addition to required mitigation for the ITP issued for this Project and is specifically to be carried out onsite.

3.1 Mitigation for 0.899-Acre of Permanent Impacts and 0.35-Acre of Temporary Impacts: Dominant vegetation along the banks of the streams/channels/culverts/ditches within the Project limits consists of riparian coast live oak woodland and willow mulefat scrub plant communities. Compensatory Mitigation for the removal of 0.899 acres of riparian habitat shall be as follows. Unless otherwise agreed upon in writing mitigation installation shall be completed onsite by **October 01, 2017** biannual reporting shall begin **December 31, 2018**.

3.1.1 Restoration All impacted areas shall be restored onsite. A suitable reference site (Please see measure 2.6 pg. 7) on the adjacent lands outside the Project limits shall be selected by the Permittee and used to judge success criteria for all onsite restoration efforts. The Permittee shall restore 1.635 acres onsite in the following areas and as directed in the CDFW approved HMMP for the Project. Please see Table 2 below for a description of the habitat components and acreage of onsite restoration efforts.

3.1.2 Habitat, Mitigation and Monitoring Plan (HMMP). Caltrans must submit within 60 days of impacts, or **June 30, 2014** a HMMP designed for the Project. The HMMP shall be developed to determine type and quantity of container plants to be installed onsite. Caltrans must submit the HMMP to CDFW for review; written approval by CDFW must be received before site preparation efforts begin. Restoration areas shall be monitored for a period of seven-years from date of installation, biannually, for signs of stress, and plants monitored for survival and growth; four of the seven years must be irrigation free. During the four-year irrigation free period, a trend analysis should show no decline in the health, vigor, or survivability of the installation plants, as a minimum for success, to be considered along with the Department's more detailed, site specific, success criteria. Though some trees die soon after being stressed, others may not succumb for 5 years or more after irrigation is turned off. If it is determined that plants are failing to progress in maturity or survival the Permittee shall continue supplemental plant installations and watering as necessary until the restoration area meets a suitable comparison to the adjacent reference area.

Table 2 - Onsite Mitigation Acres by Location and Mitigation Type.

Restoration Location	Stream Bank	Riparian	Total
<sup>R</sup> Stream 2 (PM R12.95)	0.000	0.000	0.000
Stream 4 (PM R13.34)	0.000	0.044	0.044
Stream 7 (PM R13.64)	0.047	0.514	0.561
Stream 9 (PM R13.76)	0.145	0.162	0.307
<sup>R</sup> Stream 12 (PM R14.02)	0.030	0.130	0.160
<sup>R</sup> Stream 16 (PM R14.91)	0.000	0.287	0.287
Stream 21 (PM R15.17)	0.000	0.052	0.052
Stream 22 (PM R15.39)	0.003	0.121	0.124
Stream 24 (PM R15.52)	0.000	0.024	0.024
Stream 27 (PM R16.15)	0.002	0.074	0.076
<b>Totals</b>	<b>0.227</b>	<b>1.408</b>	<b>1.635</b>
<b>Coast Live Oak Totals</b>	<b>0.030</b>	<b>0.417</b>	<b>0.447</b>

<sup>R</sup> = Coast Live Oak Woodland

3.1.3 Funding Assurances. As outlined in the Permittees *Interim Policy for Establishing Funding Assurance for Mitigation Requirements* dated November 2007 the Permittee shall provide to the CDFW PRIOR to any Project-related site preparations, including storage and staging of equipment and materials, the program funding source, estimated cost of the mitigation and monitoring HMMP. The above document requires the Permittee submit the requested information as issuance of this Agreement triggers submittal of the requested information. The information shall be submitted to CDFW in the form of Attachment A of the above referenced document .

#### 4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 Final Construction Report. Permittee shall provide a final construction report to CDFW no later than two weeks after the Project is fully completed. This requirement may be waived by CDFW if Permittee submits 65% plans no later than two weeks after Project completion, that at a minimum must include color photographs of before and after Project-related activities, including the surrounding staging areas. The final construction report shall contain pre-Project photographs, total amount of area impacted post-Project, and post-Project photographs. Permittee shall submit the construction report no later than **December 31, 2016.**

#### CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or CDFW specifies by written notice to the other.

To Permittee:  
 California Department of Transportation  
 Mr. Larry Bonner  
 50 Higuera Street  
 San Luis Obispo, California, 93401

To CDFW:  
 Department of Fish and Wildlife  
 South Coast Region  
 Lake and Streambed Alteration Program  
 3883 Ruffin Road

Tel. (805) 549-3337 Fax. (805) 549-3233 San Diego, California 92123  
Notification #1600-2013-0292-R5

## **LIABILITY**

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the Project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require Permittee to proceed with the Project. The decision to proceed with the Project is Permittee's alone.

## **SUSPENSION AND REVOCATION**

CDFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

## **ENFORCEMENT**

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

## **OTHER LEGAL OBLIGATIONS**

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the Project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 *et seq.* (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

### **AMENDMENT**

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and Permittee. To request an amendment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

### **TRANSFER AND ASSIGNMENT**

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

### **EXTENSIONS**

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement for the original term of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the Project the Agreement covers (Fish & G. Code, § 1605, subd. (f)).

### **EFFECTIVE DATE**

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at [http://www.dfg.ca.gov/habcon/ceqa/ceqa\\_changes.html](http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html)

## **TERM**

This Agreement shall expire on **October 20, 2019** unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a) (2) requires.

## **EXHIBITS**

The documents listed below are included as exhibits to the Agreement and incorporated herein by reference and may be found in the Agreement file located in the CDFW South Coast Regional Office.

Exhibit A: Natural Environment Study-Highway 246 Passing Lanes Project  
From 0.3 miles west of Purisima Road to 0.2 miles east of Domingos Road  
State Route 246, Santa Barbara County, California 05-SB-246-PM 11.9/R20.9/EA05-0C6400  
Dated July 2009

Exhibit B: California Department of Fish and Wildlife Streambed Alteration Agreement  
Application Supplemental Information for the California Department of Transportation's  
Highway 246 Passing Lanes Project in Santa Barbara County SB-246-PM 12.3/R16.705-  
0C640 / 05-0000-0021

## **AUTHORITY**

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

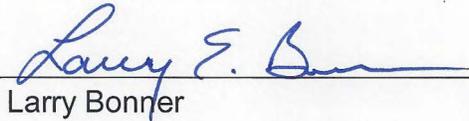
## **AUTHORIZATION**

This Agreement authorizes only the Project described herein. If Permittee begins or completes a Project different from the Project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with FGC section 1602.

**CONCURRENCE**

The undersigned accepts and agrees to comply with all provisions contained herein.

**FOR** California Department of Transportation

  
Larry Bonner

Senior Environmental Planner

5-19-14  
Date

**FOR** California Department Of Fish And Wildlife

  
Betty J. Courtney

Environmental Program Manager

May 30, 2014  
Date

Prepared by: Jamie Jackson  
Senior Environmental Scientist (Specialist)

# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## PERMITS

[3. US Army Corp of Engineer 404 Nationwide Permit No SPL-2013-00554-TS dated 3/12/14.](#)



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT  
VENTURA FIELD OFFICE  
2151 ALESSANDRO DRIVE, SUITE 110  
VENTURA, CALIFORNIA 93001

March 12, 2014

Paul Andreano  
California Department of Transportation  
District 5  
50 Higuera Street  
San Luis Obispo, California 93401

**DEPARTMENT OF THE ARMY NATIONWIDE PERMIT VERIFICATION**

Dear Mr. Andreano:

I am responding to your request dated September 9, 2013 and amended February 18, 2014 for a Department of the Army permit (Corps File No. SPL-2013-00554-TS). Your proposed project, the State Route 246 Passing Lanes Project (Post Miles 12.3 to 17.6), is located near the La Purisima golf course between the cities of Lompoc and Buellton, Santa Barbara County, California.

This project would result in a discharge of dredged and/or fill material into waters of the United States. Therefore, pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344; 33 C.F.R. parts 323 and 330), your proposed project requires a Department of the Army permit.

I have determined construction of your proposed project would comply with Nationwide Permit (NWP) No. 14 (*Linear Transportation Projects*), if constructed as described in your application. Specifically, and as shown on the drawing(s) and map(s) included with your amended permit application, you are authorized to modify six existing culverts located in unnamed tributaries to the Santa Ynez River associated with widening an approximately 5.3-mile-long reach of SR 246 for the purpose of installing passing lanes. Culverts would either be extended, or replaced with larger culverts. Impacts to non-wetland waters of the U.S. would occur in these unnamed tributaries at Post Miles 12.95, 13.64, 13.76, 14.02, 15.39, and 16.15. Temporary impacts for all culverts would be approximately 0.025 acres. Permanent impacts for all culverts would be approximately 0.35 acres (no permanent impact associated with culvert modification at Post Mile 12.95 and no temporary impact at Post Mile 16.15). In addition, six culvert-type undercrossings would be constructed to facilitate passage of sensitive wildlife species under the roadway in non-jurisdictional uplands.

For this NWP verification letter to be valid, you must comply with all of the terms and conditions in Enclosure 1. Furthermore, you must comply with the non-discretionary Special Conditions listed below:

1. This permit is contingent upon the issuance of a section 401 Water Quality Certification (WQC). The Permittee shall abide by the terms and conditions of the section 401 WQC. The Permittee shall submit the section 401 WQC to the Corps Regulatory Division

(preferably via email) within two weeks of receipt from the issuing state agency. The Permittee shall not proceed with construction until receiving an e-mail or other written notification from Corps Regulatory Division acknowledging the section 401 WQC has been received, reviewed, and determined to be acceptable. If the RWQCB fails to act on a valid request for certification within 60 days after receipt of a complete application, please notify the Corps so we may consider whether a waiver of water quality certification is warranted.

2. The Permittee shall clearly mark the limits of the workspace with flagging or similar means to ensure mechanized equipment does not enter preserved waters of the U.S. and riparian wetland/habitat areas on all construction plans; these plans shall be submitted to the Corps prior to construction in waters of the United States. Adverse impacts to waters of the U.S. beyond the Corps-approved construction footprint are not authorized. Such impacts could result in permit suspension and revocation, administrative, civil or criminal penalties, and/or substantial, additional, compensatory mitigation requirements.
3. Prior to construction in waters of the U.S., the Permittee shall provide financial assurances to the Corps to implement the mitigation plan. Financial assurances shall be sufficient to cover all costs associated with construction and three years of maintenance and monitoring, and to insure the mitigation site(s) achieve the Caltrans-proposed performance standards described in the *Other Waters of the United States On-site Mitigation and Monitoring Plan* (submitted February 18, 2014). Financial assurances may be in the form of a Caltrans-approved contract, or Corps-approved letter of credit.
4. Within 45 calendar days of completion of authorized work in waters of the U.S., the Permittee shall submit to the Corps Regulatory Division a post-project implementation memorandum including the following information:
  - A) Date(s) work within waters of the U.S. was initiated and completed;
  - B) Summary of compliance status with each special condition of this permit (including any noncompliance that previously occurred or is currently occurring and corrective actions taken or proposed to achieve compliance);
  - C) Color photographs (including map of photopoints) taken at the project site before and after construction for those aspects directly associated with permanent impacts to waters of the U.S. such that the extent of authorized fills can be verified;
  - D) One copy of "as built" drawings for the entire project. Electronic submittal (Adobe PDF format) is preferred. All sheets must be signed, dated, and to scale. If submitting paper copies, sheets must be no larger than 11 x 17 inches; and
  - E) Signed Certification of Compliance (attached as part of this permit package).
5. Within 45 calendar days of complete installation of all mitigation, the Permittee shall submit to the Corps Regulatory Division a memorandum including the following information:
  - A) Date(s) all mitigation was installed and monitoring was initiated;
  - B) Schedule for future mitigation monitoring and reporting pursuant to final, Corps-approved mitigation plan;

- C) Color photographs and map of photopoints taken at each mitigation site before and after installation;
  - D) One copy of "as built" drawings for the entire project, including all mitigation sites. Electronic submittal (Adobe PDF format) is preferred. All sheets must be signed, dated, and to-scale. If submitting paper copies, sheets must be no larger than 11 x 17 inches; and
  - E) Summary of compliance status with each special condition of this permit (including any noncompliance that previously occurred or is currently occurring and corrective actions taken or proposed to achieve compliance).
6. This Corps permit does not authorize you to take any threatened or endangered species, in particular the California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*) or adversely modify designated critical habitat for these species. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you must comply). The FWS BO (FWS file no. 8-8-10-F-13 dated March 12, 2010, amended March 1, 2013) contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a "take" of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The FWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.
7. Pursuant to 36 C.F.R. section 800.13, in the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property, the Permittee shall notify, within 24 hours, the Corps' Regulatory Division Staff (Theresa Stevens, Ph.D. at 805-585-2146) and Corps' Archeology Staff (Steve Dibble at 213-452-3849 or John Killeen at 213-452-3861). The Permittee shall immediately suspend all work in any area where potential cultural resources are discovered. The Permittee shall not resume construction in the area surrounding the potential cultural resources until the Corps Regulatory Division re-authorizes project construction, per 36 C.F.R. section 800.13.
8. At the conclusion of the project, all temporary fill shall be removed and all temporarily impacted areas shall be restored to pre-construction conditions (contours and vegetated condition) to the maximum extent practicable. The Permittee shall hydroseed the disturbed portions of the earthen stream banks with non-invasive native vegetation of appropriate to the soil type, and moisture content. The Permittee shall submit the proposed planting palette for review and approval by the Corps prior to initiation of construction. The Permittee shall ensure the hydroseeded areas are maintained and monitored for a period of two years after completing the seeding activities, such that less than 10 percent of the areas disturbed by the project are vegetated by non-native and invasive plant species. Monitoring

reports shall be submitted by the Permittee to the Corps by May 15th annually, one and two years following hydroseeding, documenting the recovery of the restored areas.

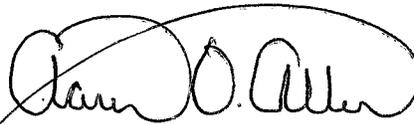
9. No later than 45 days following completion of authorized work in waters of the U.S., the Permittee shall ensure all temporary impacts in waters of the U.S. are restored to the maximum extent practicable to pre-project alignments, elevation contours, and conditions to ensure expeditious resumption of aquatic resource functions. The Permittee shall submit a memorandum documenting compliance with this special condition.

**This verification is valid through March 18, 2017.** If you have commenced or are under contract to commence the permitted activity by that date, you will have an additional twelve (12) months to complete the activity under the present NWP terms and conditions. It is incumbent upon you to comply with all of the terms and conditions of this NWP verification and to remain informed of any change to the NWPs.

A NWP does not grant any property rights or exclusive privileges. Additionally, it does not authorize any injury to the property, rights of others, nor does it authorize interference with any existing or proposed Federal project. Furthermore, it does not obviate the need to obtain other Federal, state, or local authorizations required by law.

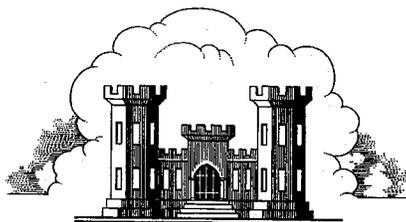
Thank you for participating in the regulatory program. If you have any questions, please contact Theresa Stevens, Ph.D. at 805-585-2146 or via e-mail at [theresa.stevens@usace.army.mil](mailto:theresa.stevens@usace.army.mil). Please complete the customer survey form at <http://per2.nwp.usace.army.mil/survey.html>, which would help me to evaluate and improve the regulatory experience for others.

Sincerely,

A handwritten signature in black ink, appearing to read "Aaron O. Allen". The signature is fluid and cursive, with a large loop at the end.

Aaron O. Allen, Ph.D.  
Chief, North Coast Branch  
Regulatory Division

Enclosure



**LOS ANGELES DISTRICT  
US ARMY CORPS OF ENGINEERS**

**CERTIFICATE OF COMPLIANCE WITH  
DEPARTMENT OF THE ARMY NATIONWIDE PERMIT**

**Permit Number:** *SPL-2013-00554-TS*

**Name of Permittee:** *California Department of Transportation, District 5*

**Date of Issuance:** *March 12, 2014*

Upon completion of the activity authorized by this permit and the mitigation required by this permit, sign this certificate, and return it by **ONE** of the following methods;

1) Email a digital scan of the signed certificate to [theresa.stevens@usace.army.mil](mailto:theresa.stevens@usace.army.mil)  
**OR**

2) Mail the signed certificate to  
US Army Corps of Engineers  
Ventura Field Office  
ATTN: SPL-2013-00554-TS  
2151 Alessandro Drive, Suite 110  
Ventura, CA 93001

I hereby certify the authorized work and any required compensatory mitigation has been completed in accordance with the NWP authorization, including all general, regional, or activity-specific conditions. Furthermore, if credits from a mitigation bank or in-lieu fee program were used to satisfy compensatory mitigation requirements I have attached the documentation required by 33 C.F.R. 332.3(l)(3) to confirm the appropriate number and resource type of credits have been secured.

\_\_\_\_\_  
Signature of Permittee

\_\_\_\_\_  
Date

# **INFORMATION HANDOUT**

**For Contract No. 05-0C6404**

**At 05-SB-246-12.3/R16.7**

**Identified by**

**Project ID 0500000021**

## **PERMITS**

[4. Biological Opinion \(BO\) for CRLF/CTS Permit No. 8-8-10-F13 dated 3/12/13](#)



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Ventura Fish and Wildlife Office  
2493 Portola Road, Suite B  
Ventura, California 93003



IN REPLY REFER TO:  
81440-2010-F-0021

March 12, 2010

Chuck Cesena  
Senior Environmental Planner  
California Department of Transportation  
50 Higuera Street  
San Luis Obispo, California 93401-5415

Subject: Biological Opinion for the Highway 246 Passing Lanes Project, Santa Barbara County, California (8-8-10-F-13)

Dear Mr. Cesena:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Highway 246 Passing Lanes Project in Santa Barbara County and its effects on the federally endangered California tiger salamander (*Ambystoma californiense*) and its critical habitat, and the federally threatened California red-legged frog (*Rana aurora draytonii*), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your October 5, 2009, request for formal consultation was received on October 15, 2009.

You also determined that the proposed action is not likely to adversely affect vernal pool fairy shrimp (*Branchinecta lynchi*). Surveys were negative during the first season of sampling. The pools were not accessible for a second season of surveys as the water level did not rise into the right-of-way in 2009. Although 2-year protocol surveys were not conducted at these locations, a long season of surveys was completed during the first season with negative results. Due to the perennial nature of the aquatic habitat, the irregular occurrence of ponded water within the area proposed for construction, the disturbed nature of this area within the Caltrans right-of-way, and the negative survey result, we concur with your determination.

This biological opinion is based on information which accompanied your October 5, 2009, request for consultation, including the biological assessment (Caltrans 2009). A complete administrative record of this consultation is available at the Ventura Fish and Wildlife Office.

## CONSULTATION HISTORY

Caltrans and the Service coordinated on the implementation of a drift fence study for the California tiger salamander and the need for, and design of, amphibian undercrossing structures on multiple occasions between 2007 and 2009. The following is a synopsis of key events:





# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Ventura Fish and Wildlife Office  
2493 Portola Road, Suite B  
Ventura, California 93003

IN REPLY REFER TO:  
08EVEN00-2013-TA-0130

March 1, 2013

Paul Andreano  
Associate Environmental Planner/Biologist  
California Department of Transportation  
50 Higuera Street  
San Luis Obispo, California 93401-5415

Subject: Amendment of the Project Description for the Highway 246 Passing Lanes Project, Santa Barbara County, California (8-8-1-F-13)

Dear Mr. Andreano:

We have reviewed your request, dated February 11, 2013, and received in our office on February 13, 2013, to amend the project description of the biological opinion for the Highway 246 Passing Lanes Project (Project), in Santa Barbara County, California. The project description can be amended without reinitiating the biological opinion if the revised project description would not result in additional effects to the federally endangered California tiger salamander (*Ambystoma californiense*) or threatened California red-legged frog (*Rana draytonii*) beyond those considered in the biological opinion (8-8-1-F-13).

According to the California Department of Transportation (Caltrans), the project has been down-scoped as a result of funding issues. The project has been reduced in length by approximately 4.5 miles. The project is now proposed to begin between post miles (PM) 12.3 and R16.7.

The original project description was designed with amphibian under-crossings at four locations where California tiger salamanders were captured during drift fence surveys (i.e., Sites #3, #4, #5 and #6). Based on the revised project limits, Caltrans would no longer construct the amphibian under-crossings at Site #5 and Site #6 because the project would not occur at those locations. A total of six under-crossings are still proposed, based on capture locations and the potential for breeding at Site #3 and Site #4. Three under-crossings are proposed at Site #3 and three under-crossings are proposed at Site #4. Caltrans would conduct a 5-year study to assess the efficacy of the under-crossings.

In addition, the revised project description would include the removal of approximately 6 acres of pavement along the north side of the highway between PM 13.75 and PM 15.45 to accommodate the new alignment. The 6 acres of removed pavement would be restored to, and maintained as, suitable habitat (annual grassland) for the California tiger salamander.

Caltrans anticipates that construction will begin in September 2014 and will take the previously anticipated 350 days to complete. Consistent with the biological opinion, nighttime work is not planned. Apart from the reduction in project limits and the construction start date, the basic design elements and purpose for the project have not changed and therefore are accurately reflected in our March 2010 biological opinion (8-8-1-F-13).

Your proposed changes to the Highway 246 Passing Lanes Project are consistent with our analysis in the biological opinion; therefore, reinitiation of consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1972, as amended, is not necessary. Your letter and this response will serve as the amendment to the project description in the biological opinion.

As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this matter, please contact Colleen Mehlberg of my staff at (805) 644-1766, extension 221.

Sincerely,



Diane K. Noda  
Field Supervisor

- October 25, 2007, Caltrans biologist Virginia Strohl and (former) Service biologist Katherine Drexhage, discussed performing protocol level surveys for California tiger salamander and California red-legged frog. Ms. Drexhage recommended protocol-level surveys for California tiger salamander and California red-legged.
- November 14, 2007, Virginia Strohl and Katherine Drexhage reviewed the study design for the California tiger salamander upland studies.
- March 25, 2008, Virginia Strohl and Katherine Drexhage discussed results of the first year California tiger salamander studies and agreed that upland studies for the second year would not need to be repeated at locations where California tiger salamanders were detected during first year studies.
- May 11, 2008, Caltrans and their biological consultant, John Storrer, met with Service biologist Steve Kirkland at the proposed project site to review the results of the biological studies to date and the current project design.
- May 14 – Oct 8, 2008, Virginia Strohl and Steve Kirkland coordinated on various occasions to design a feasible and effective amphibian undercrossing design for the portion of the proposed action that would be constructed adjacent to the largest of the known California tiger salamander breeding ponds (Sites 5 and 6) within the action area.
- April 2, 2009, Steve Kirkland, John Storrer and Virginia Strohl discussed results of the second season of California tiger salamander upland drift fence surveys and potential minimization measures, including undercrossings, for the proposed project.
- April 23, 2009, Virginia Strohl, Steve Kirkland and John Storrer met at the project site to review the proposed undercrossing locations.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

Caltrans would create two sets of passing lanes in each direction (east and west) along Highway 246 (highway). The passing lanes would vary in length from 1.4 to 2.2 miles. The proposed project would begin at 0.3-mile west of Purisima Road at post mile (PM) 11.8 and extend 0.2-mile east of Domingos Road at PM 20.9; a distance of approximately 9 miles. On the western end of the proposed project a passing lane would extend in the eastbound direction from Cebada Canyon Road to Tularosa Road, and in the westbound direction from Hapgood Road to Tularosa Road. On the eastern end of the proposed project a passing lane would extend in the eastbound direction from Santa Rita Road to Campbell Road.

The existing highway has one lane in both the eastbound westbound direction. Each lane is 12 feet wide with 8 foot-wide shoulders, for a total paved width of 40 feet. The proposed action

would add 24 feet of pavement to the existing highway in the form of two 12 foot-wide passing lanes. The highway would be 64 feet wide in those areas where the passing lanes are proposed.

The proposed action would also include intersection improvements consisting of left-turn channelizations where the following County roads intersect the highway: Tularosa Road, Hapgood Road, Campbell Road, and Drum Canyon/Mail Road. To accommodate the left-turn channelization at Drum Canyon/Mail Road, Caltrans would widen the Santa Rosa Creek Bridge. At Tularosa Road, Highway 246 would be realigned to the south and the profile of the road would be lowered to reduce uphill grades and increase sight distance. There would be a two-way continuous left-turn channelization lane beginning at Hapgood Road and ending west of Campbell Road. The existing class III bicycle route would be maintained.

Caltrans anticipates construction on the proposed action would start in October 2012 and would take approximately 350 work days to complete. No nighttime work is planned.

Caltrans has proposed to include the following avoidance and minimization measures in the proposed action:

1. Only Service-approved biologists will participate in activities associated with the capture, handling, and monitoring of the California tiger salamander and California red-legged frog;
2. Ground disturbance will not begin until written approval is received from the Service that biologist(s) are qualified to conduct the requested activities;
3. Before any activities begin, the Service-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the California tiger salamander and California red-legged frog and their habitats, the project-specific measures that will be implemented to conserve the California tiger salamander and California red-legged frog, and the boundaries within which the project may be accomplished;
4. Based on their survey results, Caltrans anticipates that a larger number of California tiger salamanders (both juveniles and adults) will disperse from sites 3, 4, 5, and 6. Metamorphosed California tiger salamanders may also attempt to enter the construction area from Sites 5 and 6. Exclusionary fencing will be installed at these locations to stop California tiger salamanders and California red-legged frogs from entering the construction area. Exclusionary fencing will be installed along both sides of the highway at the limits of the construction zone near breeding ponds at these sites. The exclusionary fencing may need to be relocated along the north side of the highway at sites 5 and 6 as

the ephemeral pond(s) fills and recedes. Installation of the fencing will be monitored by the Service-approved biologist;

5. Construction activities will not occur within the breeding pond(s) at sites 5 and 6 when the pond is flooded into the construction zone;
6. Prior to vegetation removal and grading activities, the Service-approved biologist will survey for and relocate any California tiger salamanders found within upland habitat;
7. A yet to be determined percentage of small mammal burrows in potential California tiger salamander upland habitat will be hand-excavated prior to construction. Any California tiger salamanders found during hand excavation will be relocated to the nearest suitable habitat outside the construction area. A rodent-burrow hand-excavation plan, including a proposed percentage of burrows to be surveyed, will be submitted to the Service for approval prior to commencement of excavation activities;
8. The Service-approved biologist will be present at the work site until all attempts to relocate California tiger salamanders are complete, workers have received their training, and disturbance of habitat is completed. After this time, Caltrans will designate a person to monitor on-site compliance with all minimization measures;
9. During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas;
10. All refueling, maintenance, and staging of equipment and vehicles will occur at least 60 feet from riparian and pond habitat. Measures will be taken to avoid situations where a spill could drain directly toward aquatic habitat;
11. The project will be re-vegetated with an assemblage of native riparian, wetland, and upland vegetation suitable for the area. Invasive, exotic plants will be controlled to the maximum extent practicable. To ensure the amphibian undercrossings are not blocked by this native re-vegetation component, the openings to the undercrossings will only be seeded with annual plant species for the first year following construction. Caltrans anticipates local native wetland vegetation will establish itself in these locations over time;
12. The number of access routes, size of staging areas, and total area of construction activity will be limited to the minimum necessary to achieve the project goal. Environmental Sensitive Areas (ESAs) will be established to confine access routes and construction areas to the minimum area necessary to complete construction, and minimize adverse affects to the California tiger salamander and California red-legged frog;
13. To control sedimentation during and after project implementation, Caltrans will

implement Best Management Practices outlined in any authorizations or permits, issued for the Highway 246 Passing Lanes Project, under the authorities of the Clean Water Act. If Best Management Practices are found to be ineffective, Caltrans will remedy the situation immediately, in consultation with the Service;

14. To ensure that diseases are not conveyed between work sites by the Service-approved biologist, the Fieldwork Code of Practice developed by the Declining Amphibian Populations Task Force will be followed at all times;
15. At Sites 5 and 6, Caltrans will construct amphibian undercrossing structures under the entire facility for the length of road adjacent to both breeding ponds. This will consist of 6-foot diameter, round, pre-cast concrete culverts, spaced 150 feet apart, a 60-foot long viaduct. The culverts would be sunk below grade and filled with approximately one foot of earthen fill. The 60-foot long viaduct will be constructed adjacent to site 5, where most adult salamanders were detected during upland surveys. The viaduct will be split (open) between the north and south-bound lanes. An amphibian barrier would be constructed between the culvert openings and viaduct, to guide animals into the undercrossings, and prohibit them from climbing onto the highway. This barrier will consist of a 14-inch high concrete (or similar material) wall with an overhanging lip. Additional undercrossing structures consisting of a series of three 6-foot diameter, round, pre-cast concrete culverts, all spaced approximately 150 feet apart, will be installed at sites 3 and 4;
16. Caltrans will monitor the use and effectiveness of the amphibian undercrossings for up to five years. The details of the monitoring will be identified in an Undercrossing Monitoring Plan submitted to, and approved by the Service prior to the completion of the undercrossing structures.
17. To minimize impacts to the breeding ponds at sites 5 and 6, the slopes on the north side of the proposed highway alignment will be maintained at their current 2:1 slope, instead of Caltrans' standard 4:1 slope;
18. Caltrans will designate the willow thicket within the Caltrans right-of-way on the north side of the highway, and east of Hapgood Road where California tiger salamanders have been documented, as an Environmentally Sensitive Area (ESA), and will avoid this area during construction;
19. Caltrans will design or modify structures such as curbs, drainage grades, and steep drainage ditches to allow movement of California tiger salamanders, in those areas of the proposed project where California tiger salamanders have been documented.

## ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

### Jeopardy Determination

The jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which describes the range-wide condition of the California tiger salamander and California red-legged frog, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the California tiger salamander and California red-legged frog in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the California tiger salamander and California red-legged frog; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California tiger salamander and California red-legged frog; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the California tiger salamander and California red-legged frog.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the California tiger salamander and California red-legged frog, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the California tiger salamander and California red-legged frog in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California tiger salamander and California red-legged frog and the role of the action area in the survival and recovery of the California tiger salamander and California red-legged frog as the context for evaluation of the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

### Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied on the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the range-wide condition of designated critical habitat for the California tiger salamander in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the *Environmental Baseline*, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the *Effects of the Action*, which

determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the PCEs and how that will influence the recovery role of the affected critical habitat units; and (4) *Cumulative Effects*, which evaluates the effects of future non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed federal action on the critical habitat of the California tiger salamander are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the California tiger salamander.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the California tiger salamander and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

## STATUS OF THE SPECIES

### **California Tiger Salamander**

The California tiger salamander in Santa Barbara County was emergency listed as endangered on January 19, 2000 (65 Federal Register (FR) 3096). On September 21, 2000, we listed the Santa Barbara County Distinct Population Segment (DPS) of the California tiger salamander as endangered (65 FR 57242).

On May 23, 2003, the Service published a proposed rule to list the Central California population of California tiger salamander and to reclassify the Santa Barbara County and Sonoma County populations from endangered to threatened (68 FR 28648). A final rule listing the California tiger salamander as a single threatened species rangewide was published on August 4, 2004 (69 FR 47212). As a result of that action, California tiger salamanders in Santa Barbara County were listed as threatened and no longer considered to represent a distinct population segment. In addition, concurrently with the rule listing the California tiger salamander as threatened, the Service promulgated a special rule pursuant to section 4(d) of the Act exempting from the Act's prohibitions take of California tiger salamanders as a result of "routine ranching activities." However, on August 19, 2005 the U.S. District Court for the Eastern District of California in *Center For Biological Diversity v. U.S. Fish and Wildlife Service*, No. C04-04324 WHA, held that the reclassification of the Santa Barbara County and Sonoma County populations from endangered to threatened was arbitrary and capricious and should be vacated and remanded to the Service. Under this ruling, California tiger salamanders in Santa Barbara County currently remain separately listed and classified as endangered. Additionally, the 4(d) rule (which can apply only to threatened species) does not apply to the Santa Barbara County California tiger

salamander.

This species is currently known from 60 extant breeding ponds in northern Santa Barbara County. The range extends from Santa Rita Valley northward to Santa Maria Valley. The California tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Adults may reach a total length of 8.2 inches, with males generally averaging about 8 inches and females averaging 6.8 inches. For both sexes, the average snout-to-vent length is approximately 3.6 inches. The small eyes have black irises and protrude from the head. Coloration consists of white or pale yellow spots or bars on a black background on the back and sides and a yellow belly. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae (a common chamber into which the intestinal, urinary, and reproductive canals discharge), more developed tail fins, and larger overall size (Stebbins 1962; Loredó and Van Vuren 1996).

The California tiger salamander inhabits low elevation vernal pools and seasonal ponds and associated grassland, oak savannah, and coastal scrub plant communities of the Santa Maria, Los Alamos, and Santa Rita valleys in northwestern Santa Barbara County. Although California tiger salamanders are adapted to natural vernal pools and ponds, they also use manmade or modified ephemeral and permanent ponds. Some ponds may not fill to capacity or fill at all in years of below-normal precipitation.

California tiger salamanders prefer open grassland over areas of continuous woody vegetation. The ponds available to salamanders for breeding have been degraded and reduced in number, and the associated upland habitats inhabited by salamanders for most of their life cycle have been degraded and reduced in area through agriculture, urbanization, building of roads and highways, and chemical applications.

Although California tiger salamanders spend most of their lives in underground burrows in upland habitats, their reproduction is tied to aquatic habitats. Historically, they bred primarily in natural vernal pools, but they have been able to breed successfully in human-made stock ponds created for ranching and agricultural purposes. Migrations to and from breeding ponds occur during the rainy season (November to May), with the greatest activity from December to February (Storer 1925; Loredó and Van Vuren 1996; Trenham et al. 2000). Breeding migrations are strongly associated with rainfall events (Loredó and Van Vuren 1996; Trenham et al. 2000). Breeding may occur in one major bout or during a prolonged period of several months, depending on the rainfall pattern (Loredó and Van Vuren 1996; Trenham et al. 2000).

Lifetime reproductive success for other tiger salamanders is typically low, with fewer than 30 metamorphic juveniles per breeding female. Trenham et al. (2000) found even lower numbers for California tiger salamanders, with roughly 12 lifetime metamorphic offspring per breeding female. In part, this low reproductive success is due to the extended time it takes for California tiger salamanders to reach sexual maturity; most do not breed until 4 or 5 years of age. While individuals may survive for more than 10 years, fewer than 50 percent survive to breed more than once (Trenham et al. 2000). Combined with low survivorship of metamorphosed

individuals (in some populations, less than 5 percent of marked juveniles survive to become breeding adults (Trenham et al. 2000)), reproductive output in most years is not sufficient to maintain populations. This trend suggests that the species requires occasional “boom” breeding events to prevent extirpation (temporary or permanent loss of the species from a particular habitat) or extinction (Trenham et al. 2000). With such low recruitment, isolated subpopulations can decline greatly as a result of unusual, randomly occurring natural events and human-caused factors that reduce breeding success and individual survival.

Movements made by California tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders between a pond and the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live for several years (on average, 4 years). Upon reaching sexual maturity, most individuals return to their natal/birth pond to breed, while 20 percent disperse to other ponds (Trenham et al. 2001). Following breeding, adult California tiger salamanders return to upland habitats, where they may live for one or more years before breeding again (Trenham et al. 2000).

California tiger salamanders are known to travel large distances from breeding ponds into upland habitats. They have been recorded up to 1.2 miles from breeding ponds (Sweet, pers. comm. 1998). California tiger salamanders are known to travel between breeding ponds; one study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at ponds approximately 1,900 and 2,200 feet away (Trenham et al. 2001).

Evidence suggests that juvenile California tiger salamanders disperse farther into upland habitats than adults. A trapping study conducted in Solano County during winter 2002–2003 found that juveniles used upland habitats farther from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile salamanders were captured at distances of 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Large numbers (approximately 20 percent of total captures) were found 1,312 feet from a breeding pond.

Trapping efforts in 2003 through 2004 detected juvenile California tiger salamanders at even farther distances, with a large proportion of the total salamanders caught at 2,297 feet from the breeding pond. Most juveniles captured, even those at 2,297 feet, were still moving away from ponds (Fitzpatrick, pers. comm. 2004). These data show that many California tiger salamanders travel far while still in the juvenile stage. Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post-breeding emigration, radio-equipped adult California tiger salamanders were tracked to burrows between 62 and 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult California tiger salamanders having depleted physical reserves following breeding.

The spatial distribution of California tiger salamanders in the uplands surrounding breeding ponds is a key issue for conservation planning. Although logic would suggest that California tiger salamanders will move only short distances if abundant burrows are found near their ponds, this is not the case. In the aforementioned study in Solano County, while abundant burrows are

available near the pond, a nearly equal number of California tiger salamanders were captured at 328, 656, and 1,312 feet from the breeding pond (Trenham and Shaffer 2005). Similarly, Trenham (2001) tracked salamanders to burrows up to 813 feet from a breeding pond, although burrows were abundant at distances nearer to the pond. In addition, rather than staying in a single burrow, most individuals used several successive burrows at increasing distances from the pond.

The primary cause of the decline of the Santa Barbara County population of California tiger salamanders is the loss, degradation, and fragmentation of habitat due to human activities. Several other factors, including competition from introduced species, disturbance due to oil production, and over-grazing may have negative effects on California tiger salamanders and their aquatic and upland habitats. Non-native or introduced predators of California tiger salamanders include bullfrogs, mosquito fish, Louisiana red swamp crayfish (*Procambarus clarkii*), catfish (*Ictalurus* sp.), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), fathead minnow (*Pimephales promelas*) and other introduced fish (Shaffer et al. 1993, Graf 1993; Gamradt and Kats 1996, Anderson 1968, Morey and Guinn 1992).

Various nonnative subspecies of the tiger salamander within the *Ambystoma tigrinum* complex have been imported into California for use as fish bait. The introduced salamanders may out-compete the California tiger salamanders. Tiger salamanders at the Lompoc Federal Penitentiary grounds are non-native salamanders. Recent discovery of hybridization with native California tiger salamanders and non-native salamanders was documented in the range of the Santa Barbara County DPS of California tiger salamanders (Hunt 2009). Introduced species can have negative effects on California tiger salamander populations through hybridization (Shaffer et al. 1993), and introduced salamanders may interbreed with the natives to create hybrids. Riley et al. (2003) have shown that the hybrids are able to breed with California tiger salamanders, resulting in the loss of pure native salamanders (i.e., genetic loss). In addition, non-native tiger salamanders and hybrids pose a direct predation threat to California tiger salamanders and other native species in pond ecosystems (Ryan et al. 2009).

A deformity-causing infection, possibly caused by a parasite in the presence of other factors, has affected pond-breeding amphibians at known California tiger salamander breeding sites. This same infection has become widespread among amphibian populations in Minnesota and poses the threat of becoming widespread in California.

Reduction of ground squirrel populations to low levels through widespread rodent control programs may reduce availability of burrows and adversely affect the California tiger salamander. Poison typically used on ground squirrels is likely to have a disproportionately adverse effect on California tiger salamanders, which are smaller than the target species and have permeable skins. Use of pesticides, such as methoprene, in mosquito abatement may have an indirect adverse effect on the California tiger salamander by reducing the availability of prey. Automobiles and off-road vehicles can kill migrating California tiger salamanders, and contaminated runoff from roads, highways and agriculture can degrade California tiger salamander breeding habitat.

The most imminent threat to the continued survival of the Santa Barbara County DPS of the California tiger salamander is the loss and fragmentation of habitat. Federal, State, and local laws have not been sufficient to prevent past and ongoing losses of California tiger salamander habitat during a formal permitting process. Urban development and agricultural conversion continue to threaten the species. All but one metapopulation is under the threat of development or agricultural conversion. Three of the six metapopulations of California tiger salamanders in Santa Barbara County face on-going and future threats from agricultural conversion and/or urban development (West Santa Maria/Orcutt, East Santa Maria, and Santa Rita Valley). Depending on how land is zoned and how much land is affected by an individual action, some of these conversions do not require Santa Barbara County permits and, therefore, may not consider impacts to California tiger salamanders or their habitat.

### **Critical habitat for the California tiger salamander**

On November 24, 2004, we designated critical habitat for the Santa Barbara County DPS of California tiger salamander in six disparate areas of Santa Barbara County (69 FR 68568). A total of 11,180 acres in six separate units is designated as critical habitat for the California tiger salamander in Santa Barbara County. Most of the project area is located within critical habitat unit 1 (Western Santa Maria/Orcutt) (69 FR 68568). Per the final critical habitat designation, the principal biological or physical constituent elements (i.e., primary constituent elements or PCEs) within the defined area that are essential to the conservation of the species include:

1. Standing bodies of fresh water, including natural and man-made (e.g., stock) ponds, vernal pools, and dune ponds, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a sufficient length of time (i.e., 12 weeks) necessary for the species to complete the aquatic portion of its life cycle;
2. Barrier-free uplands adjacent to breeding ponds that contain small mammal burrows. Small mammals are essential in creating the underground habitat that adult California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and
3. Upland areas between breeding locations (PCE 1) and areas with small mammal burrows (PCE 2) that allow for dispersal among such sites (69 FR 68584).

### California red-legged frog

The California red-legged frog was federally listed as threatened on May 23, 1996 (61 FR 25813). Critical habitat for the California red-legged frog was first designated on March 13, 2001 (66 FR 14625). On November 6, 2002, the United States District Court for the District of Columbia set aside the designation and ordered the Service to publish a new final rule with respect to the designation of critical habitat for the California red-legged frog (*Home Builders Association of Northern California et al. versus Gale A Norton, Secretary of the Department of Interior et al.* Civil Action No. 01-1291 (RJL) U.S. District Court, District of Columbia.). The Service published a new proposed rule to designate critical habitat for the California red-legged frog on April 13, 2004 (69 FR 19620). Critical habitat for the California red-legged frog was re-designated on April 13, 2006 (71 FR 19244). On September 16, 2008, the Service proposed a new, revised rule to designate 1.8 million acres as critical habitat for the California red-legged frog, an area that is 300 percent larger than the 2006 designation for the subspecies (73 FR 53492). The project site is not within designated or proposed critical habitat and it will not be discussed further. The Service completed a recovery plan for the subspecies in 2002 (Service 2002).

Detailed information on the biology of California red-legged frogs can be found in Storer (1925), Stebbins (2003), and Jennings et al. (1992). This species is the largest native frog in the western United States, ranging from 1.5 to 5.1 inches long. The abdomen and hind legs of adults are largely red; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers, and dorsolateral folds are prominent on the back. Tadpoles range from 0.6 to 3.1 inches long and are dark brown and yellow with dark spots.

The California red-legged frog uses a variety of habitat types, including various aquatic systems, riparian, and upland habitats. The diet of California red-legged frogs is highly variable. Tadpoles eat algae and a variety of organic detritus (Jennings et al. 1992). Hayes and Tennant (1985) found invertebrates to be the most common food item of adults. Feeding activity probably occurs along the shoreline and on the surface of the water. Hayes and Tennant (1985) found juveniles to be active diurnally and nocturnally, whereas adults were largely nocturnal.

California red-legged frogs breed from November through March; earlier breeding has been recorded in southern localities (Storer 1925). Males appear at breeding sites from 2 to 4 weeks before females (Storer 1925). California red-legged frogs are often prolific breeders, typically laying their eggs during or shortly after large rainfall events in late winter and early spring. Female California red-legged frogs deposit egg masses on emergent vegetation so that the masses float on the surface of the water (Hayes and Miyamoto 1984). Egg masses contain about 2,000 to 5,000 moderately-sized (0.08 to 0.11 inch in diameter), dark reddish brown eggs (Storer 1925, Jennings and Hayes 1985). Eggs hatch in 6 to 14 days (Storer 1925). Larvae undergo metamorphosis between 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949).

Sexual maturity can be attained at 2 years of age by males and 3 years of age by females and is usually reached at 3 to 4 years of age (Jennings and Hayes 1985); adults may live 8 to 10 years (Jennings et al. 1992) although the average life span is considered to be much lower.

California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. Deep pools with dense stands of overhanging willows and an intermixed fringe of cattails are considered optimal habitat. California red-legged frogs breed in aquatic habitats. Eggs, larvae, transformed juveniles, and adults also have been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation. California red-legged frogs frequently breed in artificial impoundments such as stock ponds, if conditions are appropriate. Although California red-legged frogs successfully breed in streams and riparian systems, high seasonal flows and cold temperatures in streams often make these sites risky environments for eggs and tadpoles. The importance of riparian vegetation for this species is not well understood. When riparian vegetation is present, California red-legged frogs spend considerable time resting and feeding in it; the moisture and camouflage provided by the riparian plant community likely provide good foraging habitat and may facilitate dispersal in addition to providing pools and backwater aquatic areas for breeding. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting population numbers and distribution.

Juvenile and adult California red-legged frogs may disperse long distances from breeding sites throughout the year. They can be encountered living within streams at distances exceeding 1.8 miles from the nearest breeding site, and have been found up to 400 feet from water in adjacent dense riparian vegetation (Bulger et al. 2003). Some California red-legged frogs have moved long distances over land between water sources during winter rains. Adult California red-legged frogs have been documented to move more than 2 miles in northern Santa Cruz County “without apparent regard to topography, vegetation type, or riparian corridors” (Bulger et al. 2003). Most of these overland movements occur at night. These individual frogs were observed to make long-distance movements that are straight-line, point-to-point migrations over variable upland terrain rather than using riparian corridors for movement between habitats. For the California red-legged frog, suitable habitat is considered to include all aquatic and riparian areas within the range of the species and includes any landscape features that provide cover and moisture (61 FR 25813).

California red-legged frogs have been found at elevations that range from sea level to about 5,000 feet. In the Sierra Nevada Mountains, California red-legged frogs typically occur below 4,000 feet in elevation (61 FR 25813).

The historical range of the California red-legged frog extended coastally from southern Mendocino County and inland from the vicinity of Redding, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985, Storer 1925). The California red-legged frog has been extirpated or nearly extirpated from 70 percent of its former range. Historically, this subspecies was found throughout the Central Valley and Sierra Nevada foothills. California red-legged frogs have been documented in 46 counties in California, but

now remain in only 238 streams or drainages in 31 counties in California and one region in Baja California, Mexico (Grismer 2002, Fidenci 2004, Smith and Krofta 2005).

The most secure aggregations of California red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators. Over-harvesting, habitat loss, non-native species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes 1985, Hayes and Jennings 1988). Habitat loss and degradation, combined with over-exploitation and introduction of exotic predators, were important factors in the decline of the California red-legged frog in the early to mid-1900s. Continuing threats to the California red-legged frog include direct habitat loss due to stream alteration and loss of aquatic habitat, indirect effects of expanding urbanization, and competition or predation from non-native species including the bullfrog, catfish (*Ictalurus* spp.), bass (*Micropterus* spp.), mosquito fish, red swamp crayfish, and signal crayfish. Chytrid fungus (*Batrachochytrium dendrobatidis*) is a waterborne fungus that can decimate amphibian populations, and is considered a threat to California red-legged frog populations.

Although the presence of California red-legged frogs is correlated with still water deeper than approximately 1.6 ft, riparian shrubbery, and emergent vegetation (Jennings and Hayes 1985), there are numerous locations in the species' historical range where these elements are well represented yet California red-legged frogs appear to be absent. The cause of local extirpations does not appear to be restricted solely to loss of aquatic habitat. The most likely causes of local extirpation are thought to be changes in faunal composition of aquatic ecosystems (i.e., the introduction of non-native predators and competitors) and landscape-scale disturbances that disrupt California red-legged frog population processes, such as dispersal and colonization. The introduction of contaminants or changes in water temperature may also play a role in local extirpations. These changes may also promote the spread of predators, competitors, parasites, and diseases.

## ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 *Code of Federal Regulations* 402.02). For the purposes of this biological opinion, we consider the action area to include all areas where people and equipment would be working or staging.

Based on the information contained in the biological assessment (Caltrans 2009), we have identified the action area as follows: the entire 9.1 miles of the highway where construction is proposed, extending out perpendicularly from the existing pavement to the boundary of the Caltrans right-of-way will include the areas where California tiger salamanders and California red-legged frogs are likely to be directly and indirectly affected by the proposed action.

### **California Tiger Salamander**

Caltrans (2008) documented California tiger salamanders at five locations within the action area. California tiger salamander studies consisted of two seasons of upland drift fence surveys, and aquatic sampling. Aquatic sampling was only conducted at three of the sites due to restricted access onto private property where breeding ponds were located. The five sites where California tiger salamanders were found are described below:

**Site 3:**

Site 3 is approximately 1,400 feet west of the intersection of Tularosa Road and Highway 246, south of the highway. A 0.40-acre stock pond is located on the nearby hillside, about 375 feet south of the Caltrans right-of-way. The pond appears to have been constructed by blocking a natural drainage with an earthen dam. The pond is surrounded by coast live oak woodland, coastal sage scrub, and annual grassland. An area directly north of the highway is vegetated with annual grassland, coastal sage scrub and coast live oak.

Two California tiger salamanders, one adult and one juvenile, were captured in the upland drift fence at this site during the second season of surveys. Aquatic surveys were not conducted at this site. This is a new location for the Santa Rita Valley population and it is highly likely that California tiger salamanders breed in the pond.

**Site 4:**

Site 4 is along the south side of the highway, approximately 535 feet east of the intersection of Tularosa Road and Highway 246, south of 246. A large 2.60-acre irrigation pond is located about 300 feet south of the highway. A shallow 0.49-acre depression, between the northern berm of the irrigation pond and the highway embankment also sustained surface water for several weeks in 2008. The larger pond is used as a reservoir for irrigation. Large cultivated fields lie east of the ponds. Coast live oak woodland and coast sage scrub cover the hillsides to the west. A low-density residential development with intact stands of coastal sage scrub and annual grassland is present north of Highway 246.

Three adult California tiger salamanders were captured in the upland drift fence at this site during the first season of surveys. Upland surveys were not conducted at this site during the second year of the study. Aquatic surveys were not conducted at this site. The capture of adult California tiger salamanders indicates that breeding occurs at this pond and that it is a new breeding location for the Santa Rita Valley population

**Site 5 and 6:**

The known breeding ponds at Sites 5 and 6 are northeast of the junction of Highway 246 and Campbell Road. They are natural, ephemeral pools, small portions of which have been modified (deepened) to increase storage capacity. The western and eastern ponds are respectively 6.41 and 3.78 acres in size at maximum capacity. The two sites are contiguous. The two ponds are separated topographically, but surface runoff connecting them was observed at maximum inundation on January 28, 2008. The southern margins of the both ponds extend into the Caltrans right-of-way when at full capacity.

A little over half of the immediate hillsides surrounding the ponds are used for dry farming or irrigated row crops. Beyond the area under cultivation, vegetation consists of annual grassland,

coastal sage scrub, and coast love oak woodland. Conditions south of the highway are very similar.

Five adult California tiger salamanders were captured in the upland drift fence at this site during the first season of surveys. Upland surveys were not conducted at this site during the second year of the study. Drift fencing was installed on both sides of the road, not only to reaffirm the presence of California tiger salamanders, but to also determine where California tiger salamanders were attempting to cross the highway. The results were then used to design adequate undercrossings for the proposed project. Four of the five locations where California tiger salamanders were captured were almost evenly spaced and adjacent to the pond at Site 5. One California tiger salamander was captured adjacent to Site 6. An adult male was captured on the south side of the drift fence, opposite the pond at Site 5 early in the survey period. Because there were parallel lines of drift fence on both sides of the highway at Site 5, this capture suggests that the animal harbored within the Caltrans right-of-way.

Both ponds filled into the right of way in 2008 allowing aquatic surveys. California tiger salamander larvae were caught in both ponds. Prior to the surveys, California tiger salamander breeding at ponds 5 and 6 had been inferred from road-kill specimens collected on Highway 246 in the early 1980s (Santa Barbara Museum of Natural History specimen records). Additionally, approximately 100 juvenile California tiger salamanders were captured late in the second season of the survey effort. Because the drift fence was deconstructed at this time and only a few of the traps were still functional, the capture of approximately 100 individuals indicates a that substantial number of California tiger salamanders likely occupy this site. Capture of adult, juvenile, and larval California tiger salamanders at this location confirms that the population is extant.

### **Site 8:**

The confirmed California tiger salamander breeding pond at Site 8 is about 200 feet north of Caltrans right-of-way and 500 feet west of Domingos Road. This feature is a 0.20-acre stock pond that was constructed by damming an ephemeral, southward-trending drainage. The hillsides surrounding the pond are vegetated with sparse scrub and annual grassland. The area is used as livestock pasture. Irrigated agricultural fields are present east and west of the pasture. Prevailing vegetation south of Highway 246 is similar, with horse pasture, annual grassland, and agricultural lands.

During the second year survey, 18 juvenile California tiger salamanders were captured during aquatic surveys, and one adult was captured in the upland drift fence at this site. Discovery of larval California tiger salamanders at this site confirms a new breeding location for the Santa Rita Valley population.

### **Critical Habitat for the California tiger salamander**

The proposed action would occur within critical habitat unit 6: Santa Rita Valley. This 638-ac unit constitutes the southernmost locality for California tiger salamanders in Santa Barbara County. The unit is bisected by Highway 246, between the towns of Buellton and Lompoc. Five confirmed breeding locations are known to occur in the Santa Rita Valley. Three of these locations are new, and were found during surveys conducted in association with the proposed

action. Two hydrobasins, at Site 5 and 6, are within 50 feet of one another and adjacent to Highway 246. These basins form the largest, and likely the most productive pond within critical habitat unit 6. During years with heavy rainfall, the two basins merge together to form one large pond. Adult California tiger salamanders were often found dead on roads after rain events during the 1980s. Three ponds on a neighboring property to the east and two ponds on the south side of Highway 246 likely formed a complex with this pond in the past. However, the ponds to the east were degraded by introduced fish and vineyards, while Highway 246 forms a substantial barrier to the southern ponds. The ponds south of Highway 246 have never been surveyed for California tiger salamanders. Although one landowner reported finding a California tiger salamander in a water pump in 2000, we have been unable to obtain permission to conduct surveys to confirm or refute this record. However, Caltrans conducted upland habitat drift fence surveys within their right-of-way and adjacent to all potential ponds in the action area and found three new breeding locations. This unit contains primary constituent elements essential to the conservation of the California tiger salamander because it constitutes the only known extant subpopulation remaining within the Santa Rita Valley. In addition, due to the numbers of salamanders found dead on the roads in the 1980s, the ponds were likely productive in the past. Highway 246 constitutes the main threat to the breeding location at Sites 5 and 6. Even without the proposed highway widening, the mortality by vehicular traffic and contaminated runoff entering the pond provide substantial threats to the breeding site (Service 2004).

### **California red-legged frog**

Due to restrictive access issues onto private property, Caltrans was only able to conduct California red-legged frog surveys at three of the eight potential water bodies that could support breeding habitat within the action area. The existing highway likely impedes California red-legged frog dispersal, at least partially, between ponds in the Santa Rita Valley that are separated by the highway. One adult California red-legged frog was identified at the western limits of the pond at Site 5 under a willow tree during night time surveys. Sweet (pers. comm. 2007) has reported observations of California red-legged frog egg masses in the pond at Site 6.

## **EFFECTS OF THE ACTION**

### **California tiger salamander and California red-legged frog**

California tiger salamanders that are using small mammal burrows within the construction footprint of the proposed action as refugia, are likely to be destroyed during grading and ground compaction activities as burrows are crushed or as inhabitants of burrows are entombed. California red-legged are susceptible to the same threat. California tiger salamanders and California red-legged frogs may be killed or injured from inadvertent trampling by workers from foot traffic and operation of construction equipment during construction activities. Construction activities may disturb California tiger salamanders or California red-legged frogs, causing them to leave their upland habitat increasing their exposure to desiccation and predation. California tiger salamanders and California red-legged frogs may also become trapped in open excavations or construction trenches, making them vulnerable to desiccation, starvation, and predation and

may also be injured or killed if they fall into deep excavations. The proposed capture and relocation program should minimize these threats.

California tiger salamanders and California red-legged frogs could be injured or killed if they are improperly handled or contained during capture and relocation efforts. This threat should be minimized by Caltrans' use of Service-approved biologists with experience in the capture and relocation of these species.

The handling of California tiger salamanders and California red-legged frogs, or introducing equipment into their breeding ponds, can also result in the spread of chytrid fungus (*Batrachochytrium dendrobatidis*), a pathogen linked to global declines in amphibians. Chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. Caltrans has proposed to implement the Fieldwork Code of Practice developed by the Declining Amphibian Populations Task Force to minimize this threat.

Relocated California red-legged frogs may be at risk of injury or death through predation or dehydration during an attempt to return to a work area from which they had been moved. This risk may increase with the distance of the relocation site from the work area; however, relocating individuals will minimize their risk of injury or mortality as a result of construction activities.

Two primary impacts to wildlife from highways are vehicle-caused mortality and habitat fragmentation. California tiger salamanders have been found dead on the existing two-lane highway (Sweet, pers. comm. 2007) and Caltrans (2008) trapped California tiger salamanders on both the north and south sides of the highway, within the Caltrans right-of-way during drift fence studies. This indicates that California tiger salamanders are currently able to make some successful crossing attempts across the existing two-lane highway. The proposed project would result in an additional 24 feet of pavement, and four lanes of vehicle traffic, California tiger salamanders and California red-legged frogs would have to negotiate in order to reach uplands and additional aquatic habitat on the south side of the highway. We anticipate these additional lane of traffic would result in fewer successful crossing attempts due to increased mortality of individuals from vehicle strikes (Foreman et al. 2003), subsequently increasing the barrier effect of the highway, and further limiting California tiger salamanders and California red-legged frogs from reaching upland habitat and potential breeding habitat south of the highway. Such increased habitat fragmentation could adversely affect the functionality of the California tiger salamander meta-population dynamic in this area, as isolated ponds that experience local extirpation may not have a source from which to be re-populated. This could lead to a reduction in the amount of genetic exchange within the population, causing long term problems such as inbreeding, or inbreeding depression that results in weak or sterile offspring as well as genetic drift (Foreman et al. 2003).

For most terrestrial as well as aquatic or semi-aquatic animals, the combination of a crossing structure, through or over a highway, combined with a barrier or diversion structure is the most effective measure reducing or eliminating vehicle strikes and habitat fragmentation (Dodd et al. 2004, Forman et al. 2003). The amphibian undercrossing structures proposed by Caltrans at Sites 3, 4, 5, and 6 were designed to include both of these attributes, and should be effective in reducing or eliminating direct mortalities of California tiger salamanders and California red-legged frogs, as well as fragmentation of their habitat, and minimizing the potential for reduced genetic exchange.

Additionally, the large number of culverts included in the design of the crossing structure at Sites 5 and 6, and to a lesser extent Sites 3 and 4, reduces amount of barrier wall necessary to keep animals from climbing up onto the highway. This in turn, should reduce the potential for increased predation on that has been observed at barrier fences where the target species have been concentrated (Reading 1989).

An increase in the permeability of the highway would be an improvement over the existing conditions where California tiger salamanders and California red-legged frogs occur, and road kill of California tiger salamanders has been documented, and is very likely to contribute toward the recovery of these species by reducing or eliminating direct mortality as a result of vehicle strikes, and increasing habitat connectivity and genetic exchange.

Sediment-laden storm water runoff during highway construction could also adversely affect water quality in breeding ponds. Erosion control measures and best management practices should minimize the potential for a decrease in the water quality of the breeding ponds.

### **Critical habitat for the California tiger salamander**

The known breeding ponds at Sites 5 and 6 are located within critical habitat unit 6. A potential breeding pond at Site 7 also occurs within this critical habitat unit, although Caltrans (2009) did not detect California tiger salamanders during upland surveys. The temporary disturbance of approximately 0.069-acre of California tiger salamander breeding habitat would occur at Sites 5 and 6, and the loss of a small amount known and potential upland refugia and dispersal habitat would occur within the Caltrans right-of-way adjacent to Sites 5, 6, and 7 during construction. However, the proposed undercrossing structure that would be located at Sites 5 and 6, are designed to minimize the effects of the proposed action on critical habitat for the California tiger salamander. We anticipate this undercrossing structure will result in a more permeable highway, reducing, if not eliminating, the barrier effect of the existing highway and increase the

functionality of the Santa Rita Valley critical habitat unit. These, and the additional beneficial effects the undercrossings described previously, likely outweigh the loss of small amount of upland refugia.

#### CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Caltrans (2009) reports that, based on information provided by the County, the only approved project on the County's list of projects under construction, and those approved without entitlement to begin construction, for the area defined by the Lompoc Community Plan is a residential development project (Bluffs at Mesa Oaks) consisting of 72 single-family homes and two duplexes, located east of Highway 1. Santa Barbara County is proposing to widen the shoulder of Purisima Road by five feet from Highway 246 to Highway 1. This area is outside the boundaries of designated critical habitat for the California tiger salamander and beyond the known dispersal distance of the California tiger salamander, from the nearest known and potential breeding ponds. A residential development could be built in this general area that could adversely affect the California red-legged frog; however, at this time we are unaware of any project details or the proximity of California red-legged frogs to the Bluffs at Mesa Oaks development.

A potential private left turn channelization project in the vicinity of Sites 5 and 6 was recently brought to our attention by the branch of Caltrans that issues encroachment permits for work in its right-of way. This potential project, if constructed, could overlap with the portion of the proposed action adjacent to Sites 5 and 6. We are unaware of any Federal nexus with this potential project, nor have we received an application for an incidental take permit pursuant to Section 10(a)(1)(b) of the Act. Therefore, we assume the proposed action will be constructed prior to this potential left-turn channelization project.

#### CONCLUSION

After reviewing the current status of California tiger salamander and California red-legged frog, the environmental baseline for the action area, the effects of the proposed Highway 246 Passing Lanes Project, and the cumulative effects, it is the Service's biological opinion that the Highway 246 Passing Lanes Project, as proposed, is not likely to jeopardize the continued existence of the California tiger salamander or California red-legged frog, and is not likely to destroy or adversely modify designated critical habitat for the California tiger salamander for the following reasons:

1. Caltrans has included numerous protective measures for the California tiger salamander and California red-legged frog including undercrossing structures, designed in

conjunction with the Service, that should reduce or eliminate direct vehicle-caused mortality, increase the permeability of the existing highway and improve habitat connectivity for these species, resulting in the reduction, or elimination of detrimental population-level effects such as a loss of genetic diversity;

2. Few California tiger salamanders are likely to be injured or killed;
3. No permanent loss of breeding habitat would occur;
4. Only a small amount of upland habitat would be lost, relative to the amount of available upland habitat; and
5. The proposed undercrossing structures would increase the functionality of the Santa Rita Valley critical habitat unit by reducing or eliminating the barrier effect of Highway 246.

#### INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and Caltrans must include them as binding conditions of any contracts associated with the proposed action, for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans fails to require its' contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to its authorization, or contracts, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, Caltrans must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

All California tiger salamanders and California red-legged frogs found within the project area may be subject to take in the form of capture during relocation efforts. A subset of captured California tiger salamanders and California red-legged frogs may experience a significant

disruption of normal behavioral patterns to the point that reaches the level of harassment. California tiger salamanders and California red-legged frogs that remain in the project area may be subject to increased predation, crushed or entombed during construction activities, or be otherwise injured or killed.

We cannot determine the precise number of California tiger salamanders or California red-legged frogs that may be killed, injured, harassed, or harmed as a result of the proposed action. Numbers and locations of California tiger salamanders and California red-legged frogs within a population vary from year to year. Incidental take of the California tiger salamander or the California red-legged frog would be difficult to detect because of their small body size and finding dead or injured specimens is unlikely. Take by predation would likely be impossible to detect. However, because Caltrans has proposed to use the protective measures described in the project description section of this document, we anticipate that few, if any, California red-legged frogs or California tiger salamanders are likely to be killed or injured during this work.

This biological opinion does not exempt any activity from the prohibitions against take contained in section 9 of the Act that is not incidental to the action as described in this biological opinion. Take that occurs outside of the action area or from any activity not described in this biological opinion is not exempted from the prohibitions against take described in section 9 of the Act.

#### REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the incidental take of the California tiger salamander and California red-legged frog:

1. Caltrans must ensure that the level of incidental take during project implementation is commensurate with the analysis contained in this biological opinion.
2. Biologists must be authorized by the Service before they survey for, capture, and move California tiger salamanders and California red-legged frogs from the construction area.
3. Caltrans must implement additional measures to further minimize adverse effects associated with the proposed action.

#### TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following term and condition implements reasonable and prudent measure 1:

If more than one (1) California red-legged frog or one (1) California tiger salamander is found dead or injured, operations causing such take must cease and Caltrans must contact our office immediately so we can review the project activities to determine if additional protective measures are needed. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. Other project activities, not resulting in incidental take, may continue during this review period, provided that all protective measures proposed by Caltrans and the terms and conditions of this biological opinion have been, and continue to be, implemented.

2. The following terms and conditions implement reasonable and prudent measure 2:

- a. Caltrans must request our approval of any biologists, or construction monitor, that they employ to conduct project activities associated with the California tiger salamander and California red-legged frog, pursuant to this biological opinion. Such requests must be in writing, and be received by the Ventura Fish and Wildlife Office at least 30 days prior to any such activities being conducted. Please be advised that possession of a 10(a)(1)(A) permit for the covered species does not substitute for the implementation of this measure. A section 10(a)(1)(A) recovery permit is limited to any act otherwise prohibited by section 9 of the Act for scientific purposes or to enhance the propagation or survival of the affected species. Capture and relocation of listed species can only be authorized through the incidental take anticipated by this biological opinion or through the section 10(a)(1)(B) incidental take permitting process. Authorization of Service-approved biologists is valid for this project only.
- b. California tiger salamanders that are removed from burrows and captured for relocation out of harm's way, must be placed at the entrance to the nearest suitable small mammal burrow, outside the construction area, or other suitable habitat as approved by the Service. This may vary depending on the time of year the animals are captured, local precipitation, and water level within breeding ponds.

3. The following terms and conditions implement reasonable and prudent measure 3:

- c. Prior to ground disturbance, Caltrans must ensure that construction contractors, and sub-contractors, identify staging and stockpile areas, or other locations where project-related spoils (i.e. soils, trees, rock, etc. ) will be stockpiled or disposed of, and demonstrate to the Service that use of those areas will not result in take of California tiger salamanders or California red-legged frogs;
- d. Caltrans must ensure a Service-approved biologist or construction monitor checks the barrier fencing identified in Avoidance and Minimization Measure #4, in the

Description of the Proposed Action section of this biological opinion, daily, for the duration of time the fencing is in place. California tiger salamanders or California red-legged frogs that are found along the temporary barrier fencing must be relocated across the highway in the direction they were assumed to be moving. Animals moving from the ponds should be placed outside the fencing on the south side of the highway and animals moving towards the ponds should be placed on the north side of the fencing, and outside of the construction area.

## REPORTING REQUIREMENTS

Caltrans must provide a written report to the Service within 90 days following completion of the proposed project. The report must document the number and size of any California red-legged frogs and (or) California tiger salamanders relocated from the action area, the date and time of relocation, and a description of relocation sites. The report must also state the number of California red-legged frogs and (or) California tiger salamanders killed or injured, describing the circumstances of the mortalities or injuries if known. The report must contain a brief discussion of any problems encountered in implementing minimization measures, results of biological surveys and sighting records, and any other pertinent information such as the acreage affected and restored or undergoing restoration of each habitat type.

In addition, Caltrans must submit the results of the proposed undercrossing monitoring, annually for each year monitoring is conducted. Caltrans must then submit the completed Undercrossing Monitoring Report to the Service within 6 months of the completion of the study. This timeframe may be modified with approval from the Service. We encourage you to submit recommendations regarding modification of or additional measures that would improve or maintain protection of the California red-legged frog, and California tiger salamander, while simplifying compliance with the Act.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Caltrans should continue to coordinate with the Service early in the design phase of their projects and work with us to design and include wildlife undercrossings into their projects where these structures would provide a benefit to endangered and threatened species.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request for consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Steve Kirkland of my staff at (805) 644-1766, extension 267.

Sincerely,

/s/: Carl Benz, for

Diane K. Noda  
Field Supervisor

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# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## PERMITS

[5. 2081 Incidental Take Permit \(ITP\) for CTS, Permit No. 2081-2013-064-05 dated 1/3/14](#)



California Department of Fish and Wildlife  
South Coast Region  
3883 RUFFIN ROAD  
SAN DIEGO, CA 92123

California Endangered Species Act  
Incidental Take Permit No. **2081-2013-064-05**

**HIGHWAY 246 PASSING LANES PROJECT (EA 05-0C640)**

**Authority.**

This California Endangered Species Act (CESA) incidental take permit (ITP) is issued by the California Department of Fish and Wildlife (CDFW) pursuant to Fish and Game Code section 2081, subdivisions (b) and (c), and California Code of Regulations, Title 14, section 783.0 et seq. CESA prohibits the take<sup>1</sup> of any species of wildlife designated by the California Fish and Game Commission as an endangered, threatened, or candidate species.<sup>2</sup> CDFW may authorize the take of any such species by permit if the conditions set forth in Fish and Game Code section 2081, subdivisions (b) and (c) are met. (See Cal. Code Regs., tit. 14, § 783.4).

**Permittee:** California Department of Transportation (Caltrans)  
**Principal Officer:** Larry Bonner, Senior Environmental Planner  
**Contact Person:** Paul Andreano, Associate Biologist 805-542-4688  
**Mailing Address:** 50 Higuera Street  
San Luis Obispo, CA 93401-5415

**Effective Date and Expiration Date of this ITP.**

This ITP shall be executed in duplicate original form and shall become effective once a duplicate original is acknowledged by signature of the Permittee on the last page of this ITP and returned to CDFW's Habitat Conservation Planning Branch at the address listed in the Notices section of this ITP. Unless renewed by CDFW, this ITP's authorization to take the Covered Species shall expire on **01/10/2019**.

Notwithstanding the expiration date on the take authorization provided by this ITP, Permittee's obligations pursuant to this ITP do not end until CDFW accepts as complete the Permittee's Final Mitigation Report required by Condition of Approval 7.7 of this ITP

<sup>1</sup>Pursuant to Fish and Game Code section 86, "'Take' means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." See also *Environmental Protection Information Center v. California Department of Forestry and Fire Protection* (2008) 44 Cal.4th 459, 507 (for purposes of incidental take permitting under Fish and Game Code section 2081, subdivision (b), "'take' ... means to catch, capture or kill").

<sup>2</sup>The definition of an endangered, threatened, and candidate species for purposes of CESA are found in Fish and Game Code sections 2062, 2067, and 2068, respectively.

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**Project Location.**

The Highway 246 Passing Lanes project (Project) is located on State Route 246 (SR-246) between the cities of Lompoc and Buellton, in Santa Barbara County (See Figure 1). The Project is located approximately 0.1 miles east of Purisma Road at Post Mile (PM) 12.3 to 0.4 miles west of Santa Rita Road at PM 16.7. The Project site is bounded by SR-246 transverses the Santa Rita Valley and western Santa Rita Hills between the cities of Buellton and Lompoc. Please see Figure 1- page 28 for Project Location Map.

**Project Description.**

This 2081 permit is for Caltrans proposed Project to construct two sets of passing lanes (one eastbound set and one westbound set) along a 5.3-mile section of SR-246, between the cities of Lompoc and Buellton. An ITP application has been submitted by the Applicant and the following has been summarized from that document.

Construction for the proposed Project would occur between PM 12.3 and PM 16.7; between Purisima Road and Santa Rita Road. On the western end of the Project, a 2-mile long passing lane would extend eastbound from Cebada Canyon Road to Tularosa Road. In the same vicinity in the westbound direction, a 1.7-mile long passing lane would extend from Hapgood Road to Tularosa Road. Left turn pocket improvements would be constructed at four locations within the Project limits. The Project would also correct the road profile and realign the highway at Tularosa Road. Drainage improvements would be built throughout the Project, and existing cross culverts within the Project limits will be extended to accommodate the highway widening.

The purpose and need for the Project are to: 1) improve mainline operations and provide safer passing opportunities along SR-246 between Purisima Road and Santa Rita Road; 2) to improve mainline operations and safety by providing increased sight distance (the visibility of the road ahead) and reduce the incline of the approaching uphill grade near the intersection of SR-246 and Tularosa Road; and 3) to improve operations and safety by improving traffic flow and reducing potential turning conflicts at several intersections, including Tularosa Road, Hapgood Road (west), and Santa Rita Road.

**Road Construction Activities.**

Road construction activities could result in the injury or mortality (via crushing by equipment) of an unknown number of California tiger salamanders (Covered Species) residing in ponds and small mammal burrows in upland habitat within the Project footprint. This could be particularly detrimental during rain events within the breeding season (typically from about November 1 to May 6) when adults could potentially disperse to a pond through the Project footprint to breed, or during other rain events when dispersal events to other ponds within the region could occur. Covered Species could also be entombed in small mammal burrows collapsed by construction activities, which could result in injury or mortality. Finally, the potential need to capture and relocate individuals of the Covered Species could subject these animals to stresses that could result in adverse effects. Take avoidance and minimization measures have been recommended to protect the Covered Species and are included in Section 6 of this permit.

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**Ground Disturbance/Excavation.**

When excavation is necessary, the work space will be clearly marked and will include space for supplies (such as sand and pipe), equipment, topsoil salvage and protection, spoil storage, erosion control, and vehicle parking. Work requiring excavation will normally be conducted by a private contractor. Equipment expected to be used includes a rubber-tired backhoe (for minor excavations), front-end loader, tracked excavator (for deep or large excavations), dump truck (to deliver sand or haul away excess spoil), and pickup trucks. Pipe delivery, if needed, will be by semi-truck. The contract documents for such work will contain provisions for environmental protection such as topsoil salvage and replacement, environmental training, erosion control, and restoration with plant species appropriate for the site.

**Routine Maintenance.**

Routine maintenance and unforeseen repairs may also require vegetation removal and ground disturbance in localized areas. This includes periodic erosion-control work and maintenance of dirt/gravel access roads. Buried structures may occasionally need to be excavated for inspection, repairs, or access. Such excavations will generally involve removal of topsoil followed by excavation of a sloped pit large enough to safely access the structure in question. The disturbance will occur in areas previously disturbed by construction and will be limited to several hundred square feet in most cases, but could be 0.2 acre or more if structures need to be replaced. Other than inspections, repair work is not to be routine, and the ITP may need to be amended to authorize such repairs.

**Covered Species Subject to Take Authorization Provided by this ITP.**

This ITP covers the following species:

<b>Name</b>	<b>CESA Status</b>
California tiger salamander ( <i>Ambystoma californiense</i> )	Threatened <sup>3</sup>

This species and only this species is the "Covered Species" for the purposes of this ITP.

**Impacts of the Taking on Covered Species.**

Project-related activities (Covered Activities) and their resulting impacts are expected to result in the incidental take of individuals of the California Tiger salamander (Covered Species).

**Estimated Take of Covered Species.**

The activities described above that are expected to result in take of individuals of the Covered Species include aspects related to road construction; excavation, clearing and grubbing of vegetation, and staging (Covered Activities). Incidental take of individuals of the Covered Species may occur from the Covered Activities in the form of mortality ("kill") from; 1) collision with Project vehicles on Project access roads; 2) ground disturbance and excavation activities associated with road construction; and incidental take of individuals of the Covered Species may occur in the form of pursue and or capture of the Covered Species. Additionally, take of an unknown number of animals may occur from excavation activities, or

<sup>3</sup>See Cal. Code Regs. tit. 14 § 670.5, subd. (b)(3)(G).

trapped individuals unnoticed in excavation areas. The areas where authorized take of the Covered Species is expected to occur include: the Caltrans right-of-way (ROW) along SR-246 approximately 0.1 miles east of Purisma Road at Post Mile (PM) 12.3 to 0.4 miles west of Santa Rita Road at PM 16.7 (collectively, the Project Area). The activities described above are expected to result in incidental take of individuals of the Covered Species.

### **Santa Barbara County.**

The Project is expected to cause permanent impacts to 15.35 acres of the Covered Species upland habitat; and an additional 28.56 acres of temporary impacts. Please see Appendix B of the ITP Application which provides detailed mapping of all anticipated permanent and temporary impacts associated with the Project.

Impacts of the authorized taking also include adverse impacts to the Covered Species related to temporal losses, increased habitat fragmentation and edge effects, and the Project's incremental contribution to cumulative impacts (indirect impacts). These impacts include: stress resulting from noise and vibrations during tunneling operations, capture and relocation, and long-term effects due to increased pollution, displacement from preferred habitat, increased competition for food and space, and increased vulnerability to predation.

### **Cumulative Effects Analysis.**

The California Environmental Quality Act (CEQA) defines a cumulative effect as "two or more individual effects which, when considered together, are considerable or compound or increase other environmental impacts." While construction activities could contribute to cumulative effects (e.g., injury and/or mortality, disturbance and/or habitat loss) that could adversely affect the Covered Species, the potential for cumulative effects are estimated to be low considering the avoidance of impacts to breeding habitat, the creation of habitat, the small amount of potential upland habitat that would be affected, and the low amount of take (e.g., injury and/or mortality to the Covered Species) that is anticipated to occur as a result of the Project. Providing the extensive under-crossings at Site 3/LOAL-64 and Site 4/LOAL-43 (Please see Appendix G of the ITP Application) would compensate for the potential direct losses, thereby eliminating any contribution to the cumulative effect.

Given the relatively small percentage of a potential local population that would be affected, the project is not expected to jeopardize the continued existence of the Covered Species. The greatest impact to the Covered Species upland habitat in the Project vicinity during the last two decades is the conversion of grazing land to more intensive agriculture, including row crops and vineyards. Livestock grazing is generally compatible with sustained use of upland habitat by the Covered Species. Conversion to intensive agriculture eliminates or greatly reduces availability of small mammal burrows that are essential for refuge of the Covered Species.

The Santa Barbara County Planning and Development Department provided a list of projects under construction and those approved without entitlement to begin construction for the area defined by the Lompoc Community Plan (McCurdy, 2013 pers. comm.). At least one project may result in a net increase in breeding habitat through the creation of aquatic features (retention ponds, reservoirs, and stock ponds). Other projects may result in a net

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loss of the Covered Species habitat due to fragmentation of uplands. All development in the vicinity has the potential to increase traffic volume on SR-246, thereby increasing the potential for Covered Species mortality on the roadway and furthering the value of the under-crossings proposed with the Project.

**Incidental Take Authorization of Covered Species.**

This ITP authorizes incidental take of the Covered Species and only the Covered Species. With respect to incidental take of the Covered Species, CDFW authorizes the Permittee, its employees, contractors, and agents to take Covered Species incidentally in carrying out the Covered Activities, subject to the limitations described in this section and the Conditions of Approval identified below. This ITP does not authorize take of Covered Species from activities outside the scope of the Covered Activities, take of Covered Species outside of the Project Area, take of Covered Species resulting from violation of this ITP, or intentional take of Covered Species except for the inadvertent crushing of one Covered Species within the Project Area during Covered Activities and the capture and relocation of Covered Species as authorized by this ITP.

**Conditions of Approval.**

Unless specified otherwise, the following measures apply to all Covered Activities within the Project Area, including areas used for vehicle ingress and egress, vehicle parking, staging and storage of construction equipment, staging and storage of materials, and noise- and vibration-generating activities that may/will cause take. CDFW's issuance of this ITP and Permittee's authorization to take the Covered Species are subject to Permittee's compliance with and implementation of the following Conditions of Approval:

1. **Legal Compliance.** Permittee shall comply with all applicable federal, state, and local laws in existence on the effective date of this ITP or adopted thereafter.
2. **CEQA Compliance.** Permittee shall implement and adhere to the mitigation measures related to the Covered Species in the Biological Resources section Initial Study with Mitigated Negative Declaration and Finding of No Significant Impact (SCH No.: 2009081063) adopted by Caltrans in June of 2010 as lead agency for the Project pursuant to the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). After the final Environmental document was approved in June 2010 California tiger Salamander became a Covered Species. Subsequently, the Lead Agency revalidated the June 2010 environmental document in 2013 and included avoidance and minimization measures, as-well-as monitoring, notification, and reporting measures.

Permittee shall implement and adhere to the terms and conditions related to the Covered Species in the HCP for the Project pursuant to the Federal Endangered Species Act (FESA). For purposes of this ITP, where the terms and conditions for the Covered Species in the federal authorization are less protective of the Covered Species or otherwise conflict with this ITP, the conditions of approval set forth in this ITP shall control.

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3. **LSA Agreement Compliance.** It is anticipated several culverts will be upgraded or improved as part of the Project-related activities. An LSA Agreement, No. 1600-2013-0292-R5 has been/will be issued for the Project. Permittee shall implement and adhere to the mitigation measures and conditions related to the Covered Species in the Lake and Streambed Alteration Agreement (LSAA for the Project executed by CDFW pursuant to Fish and Game Code section 1600 *et seq*).
4. **ESA Compliance.** Permittee shall implement and adhere to the terms and conditions related to the Covered Species in the Biological Opinion for the Highway 246 Passing Lanes Project (8-8-1-F-13) for the Project pursuant to the Federal Endangered Species Act (ESA). For purposes of this ITP, where the terms and conditions for the Covered Species in the federal authorization are less protective of the Covered Species or otherwise conflict with this ITP, the conditions of approval set forth in this ITP shall control.
5. **ITP Time Frame Compliance.** Permittee shall fully implement and adhere to the conditions of this ITP within the time frames set forth below and as set forth in the Mitigation Monitoring and Reporting Program (MMRP), which is included as part of the ITP Application (Please see Section 4.1.2 items 15-23) and included herein to this ITP.
6. **General Provisions.**
  - 6.1. **Designated Representative.** Before starting Covered Activities, Permittee shall designate a representative (Designated Representative) responsible for communications with CDFW and overseeing compliance with this ITP. Permittee shall notify CDFW in writing before starting Covered Activities of the Designated Representative's name, business address, and contact information, and shall notify CDFW in writing if a substitute Designated Representative is selected or identified at any time during the term of this ITP.
  - 6.2. **Designated Biologist.** Permittee shall submit to CDFW in writing the name, qualifications, business address, and contact information of a biological monitor (Designated Biologist) at least 14 days before starting Covered Activities. Permittee shall ensure that the Designated Biologist is knowledgeable and experienced in the biology, natural history, and proper capturing and handling techniques of the Covered Species. The Designated Biologist shall be responsible for monitoring Covered Activities to help minimize and fully mitigate or avoid the incidental take of individual Covered Species and to minimize disturbance of Covered Species' habitat. Permittee shall obtain CDFW approval of the Designated Biologist in writing before starting Covered Activities, and shall also obtain approval in advance in writing if the Designated Biologist must be changed.
  - 6.3. **Designated Biologist Authority.** To ensure compliance with the Conditions of Approval of this ITP, the Designated Biologist shall have authority to immediately stop any activity that does not comply with this ITP, and/or to order any reasonable measure to avoid the unauthorized take of an individual of the Covered Species.

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Neither the Designated Biologist, Designated Monitors, nor CDFW shall be liable for any costs incurred in complying with the terms and conditions of the ITP, including cease-work orders issued by CDFW.

- 6.4. Education Program. Permittee shall conduct an education program for all persons employed or otherwise working in the Project Area before performing any work. The program shall consist of a presentation from the Designated Biologist, Designated Monitor, or Designated Representative that includes a discussion of the biology and general behavior of the Covered Species, information about the distribution and habitat needs of the Covered Species, sensitivity of the Covered Species to human activities, its status pursuant to CESA including legal protection, recovery efforts, penalties for violations and Project-specific protective measures described in this ITP. Permittee shall provide interpretation for non-English speaking workers, and the same instruction shall be provided to any new workers before they are authorized to perform work in the Project Area. Permittee shall prepare and distribute wallet-sized cards or a fact sheet handout containing this information for workers to carry in the Project Area. Upon completion of the program, employees shall sign a form stating they attended the program and understand all protection measures. This training shall be repeated at least once annually for long-term and/or permanent employees that will be conducting work in the Project Area.
- 6.5. Construction Monitoring Notebook. The Designated Biologist shall maintain a construction-monitoring notebook on-site throughout the construction period, which shall include a copy of this ITP with attachments and a list of signatures of all personnel who have successfully completed the education program. Permittee shall ensure a copy of the construction-monitoring notebook is available for review at the Project site upon request by CDFW.
- 6.6. Trash Abatement. Permittee shall initiate a trash abatement program before starting Covered Activities and shall continue the program for the duration of the Project. Permittee shall ensure that trash and food items are contained in animal-proof containers and removed at least once a week to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs.
- 6.7. Dust Control. Permittee shall implement dust control measures during Covered Activities to facilitate visibility for monitoring of the Covered Species by the Designated Biologist. Permittee shall keep the amount of water used to the minimum amount needed, and shall not allow water to form puddles.
- 6.8. Erosion Control Materials. Permittee shall prohibit use of erosion control materials potentially harmful to Covered Species and other species, such as monofilament netting (erosion control matting) or similar material, in potential Covered Species' habitat.
- 6.9. Delineation of Property Boundaries. Before starting Covered Activities along each part of the route in active construction, Permittee shall clearly delineate the boundaries of the Project Area with fencing, stakes, or flags. Permittee shall restrict

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all Covered Activities to within the fenced, staked, or flagged areas. Permittee shall maintain all fencing, stakes, and flags until the completion of Covered Activities in that area. To ensure the environmentally sensitive area (ESA) fencing (orange plastic mesh) is placed and maintained. Contract plans will include the ESA fencing and therefore the contractor must install the fencing.

- 6.10. Delineation of Habitat. Permittee shall clearly delineate habitat of the Covered Species within the Project Area with posted signs, posting stakes, flags, and/or rope or cord, and place fencing as necessary to minimize the disturbance of Covered Species' habitat.
- 6.11. Project Access. Project-related personnel shall access the Project Area using existing routes, or routes identified in the Project Description and shall not cross Covered Species' habitat outside of or en route to the Project Area. Permittee shall restrict Project-related vehicle traffic to established roads, staging, and parking areas. Permittee shall ensure that vehicle speeds do not exceed 20 miles per hour to avoid Covered Species on or traversing the roads. If Permittee determines construction of routes for travel are necessary outside of the Project Area, the Designated Representative shall contact CDFW for written approval before carrying out such an activity. CDFW may require an amendment to this ITP, among other reasons, if additional take of Covered Species will occur as a result of the Project modification.
- 6.12. Staging Areas. Permittee shall confine all Project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to the Project Area using, to the extent possible, previously disturbed areas. Additionally, Permittee shall not use or cross Covered Species' habitat outside of the marked Project Area unless provided for as described in Condition of Approval 6.11 (Project Access) of this ITP. Caltrans shall confine project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities within the Caltrans right-of-way to previously disturbed area, to the greatest extent possible.
- 6.13. Hazardous Waste. Permittee shall immediately stop and, pursuant to pertinent state and federal statutes and regulations, arrange for repair and clean up by qualified individuals of any fuel or hazardous waste leaks or spills at the time of occurrence, or as soon as it is safe to do so. Permittee shall exclude the storage and handling of hazardous materials from the Project Area and shall properly contain and dispose of any unused or leftover hazardous products off-site.
- 6.14. CDFW Access. Permittee shall provide CDFW staff with reasonable access to the Project and shall otherwise fully cooperate with CDFW efforts to verify compliance with or effectiveness of mitigation measures set forth in this ITP.
- 6.15. Refuse Removal. Upon completion of Covered Activities, Permittee shall remove from the Project Area and properly dispose of all temporary fill and construction

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refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes.

**7. Monitoring, Notification and Reporting Provisions.**

Monitoring will be required to ensure compliance with all avoidance and minimization measures to protect the Covered Species.

- 7.1. Notification Before Commencement. The Designated Representative shall notify CDFW 14 calendar days before starting Covered Activities and shall document compliance with all pre-Project Conditions of Approval before starting Covered Activities.
- 7.2. Notification of Non-compliance. The Designated Representative shall immediately notify CDFW in writing if it determines that the Permittee is not in compliance with any Condition of Approval of this ITP, including but not limited to any actual or anticipated failure to implement measures within the time periods indicated in this ITP and/or the MMRP. The Designated Representative shall report any non-compliance with this ITP to CDFW within 24 hours.
- 7.3. Compliance Monitoring. The Designated Biologist shall be on-site daily when Covered Activities include ground disturbance or potential for handling and relocation of the Covered Species exists. Designated Monitor shall be on site daily. The Designated Biologist shall conduct compliance inspections to (1) minimize incidental take of the Covered Species; (2) prevent unlawful take of species; (3) check for compliance with all measures of this ITP; (4) check all exclusion zones; (5) ensure that signs, stakes, ESA fencing and other fencing are intact, (6) that human activities are restricted to outside of any protective zones; and (7) that Covered Activities are only occurring in the Project Area. The Designated Biologist, Designated Monitor, or Designated Representative shall prepare daily written observation and inspection records summarizing: oversight activities and compliance inspections, observations of Covered Species and their sign, survey results, and monitoring activities required by this ITP. The Designated Biologist, Designated Monitor, or Designated Representative shall conduct compliance inspections a minimum of once per week during periods of inactivity and after clearing, grubbing, and grading are completed.
- 7.4. Monthly Compliance Report. The Designated Representative or Designated Biologist shall compile the observation and inspection records identified in Condition of Approval 7.3 (Compliance Monitoring) into a Monthly Compliance Report and submit it to CDFW along with a copy of the MMRP table with notes showing the current implementation status of each mitigation measure. Monthly Compliance Reports shall be submitted to CDFW's Regional Office at the office listed in the Notices section of this ITP and via e-mail to CDFW's Regional Representative. At the time of this ITP's approval, the CDFW Regional Representative Ms. Jamie Jackson ([jamie.jackson@wildlife.ca.gov](mailto:jamie.jackson@wildlife.ca.gov)). CDFW may at any time increase the timing and number of compliance inspections and reports required under this provision depending upon the results of previous compliance inspections. If CDFW determines

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the reporting schedule must be changed, CDFW will notify Permittee in writing of the new reporting schedule.

- 7.5. Annual Status Report. Permittee shall provide CDFW with an Annual Status Report (ASR) no later than January 31 of every year beginning with issuance of this ITP and continuing until CDFW accepts the Final Mitigation Report identified below. Each ASR shall include, at a minimum: (1) a summary of all Monthly Compliance Reports for that year identified in Condition of Approval 7.4 (Monthly Compliance Report); (2) a general description of the status of the Project Area and Covered Activities, including actual or projected completion dates, if known; (3) a copy of the table in the MMRP with notes showing the current implementation status of each mitigation measure; (4) an assessment of the effectiveness of each completed or partially completed mitigation measure in avoiding, minimizing and mitigating Project impacts; (5) all available information about Project-related incidental take of the Covered Species; (6) an accounting of the number of acres subject to both temporary and permanent disturbance, both for the prior calendar year, and a total since ITP issuance; and (7) information about other Project impacts on the Covered Species.
- 7.6. CNDDDB Observations. The Designated Biologist shall submit all observations of Covered Species to CDFW's California Natural Diversity Database (CNDDDB) within 60 calendar days of the observation and the Designated Biologist shall include copies of the submitted forms with the next Monthly Compliance Report or ASR, whichever is submitted first relative to the observation.
- 7.7. Final Mitigation Report. No later than 45 days after completion of the Project, including all mitigation measures, Permittee shall provide CDFW with a Final Mitigation Report. The Designated Biologist shall prepare the Final Mitigation Report which shall include, at a minimum: (1) a summary of all Monthly Compliance Reports and all ASRs; (2) a copy of the table in the MMRP with notes showing when each of the mitigation measures was implemented; (3) all available information about Project-related incidental take of the Covered Species; (4) information about other Project impacts on the Covered Species; (5) beginning and ending dates of Covered Activities; (6) an assessment of the effectiveness of this ITP's Conditions of Approval in minimizing and fully mitigating Project impacts of the taking on Covered Species; (7) recommendations on how mitigation measures might be changed to more effectively minimize take and mitigate the impacts of future projects on the Covered Species; and (8) any other pertinent information.
- 7.8. Notification of Take or Injury. Permittee shall immediately notify the Designated Biologist if a Covered Species is taken or injured by a Project-related activity, or if a Covered Species is otherwise found dead or injured within the vicinity of the Project. The Designated Biologist or Designated Representative shall provide initial notification to CDFW by calling the Regional Office at (858) 467-4201. The initial notification to CDFW shall include information regarding the location, species, and number of animals taken or injured and the ITP Number. Following initial notification, Permittee shall send CDFW a written report within two calendar days. The report

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shall include the date and time of the finding or incident, location of the animal or carcass, and if possible provide a photograph, explanation as to cause of take or injury, and any other pertinent information.

**8. Take Minimization Measures.**

The following requirements are intended to ensure the minimization of incidental take of Covered Species in the Project Area during Covered Activities. Permittee shall implement and adhere to the following conditions to minimize take of Covered Species:

- 8.1 California Tiger Salamander (Covered Species) Relocation Plan. The Designated Biologist shall prepare a Covered Species relocation plan and submit to CDFW for review at least 14 days prior to Covered Activities occurring within 1.24 miles of known and/or potential Covered Species breeding ponds. Covered Activities within these areas may not proceed until CDFW has given written authorization to the Permittee that the relocation plan has been reviewed and accepted.
- 8.2 Pre-Work Surveys. Permittee shall conduct pre-work surveys in Project Areas where ground disturbance would occur to characterize the habitat (e.g., number of burrows) and photograph pre-work conditions. Fiber optic cameras may be used to inspect burrows for presence of Covered Species. If Covered Species are discovered or likely to be present a site-specific plan for avoiding or minimizing effects shall be developed and implemented prior to the work. This plan may include hand excavation of burrows to the depth allowed by soil conditions with capture (by hand) and relocation of any individuals found to nearby burrows.
- 8.3 Pre-construction Surveys. Prior to any activities, a CDFW-approved Designated Biologist shall survey the work site. If any life stages of the Covered Species (adults, eggs, or larvae) are found, the approved Designated Biologist shall contact CDFW. Only the approved Designated Biologist is authorized to capture and handle Covered Species. The Designated Biologist may be assisted by the Designated Monitors.
- 8.4 Surface Disturbance. Initial surface disturbing actions that occur in the vicinity of any ponds potentially occupied by the Covered Species shall be monitored by a Designated Biologist. The Designated Biologist shall be on site until all Covered Species have been relocated (if necessary), workers are instructed, and disturbance of habitat is completed. After that time, the state or local sponsoring agency may retain the Designated Biologist on site or designate a Designated Monitor to monitor on-site compliance with all avoidance and minimization measures. In the event a Covered Species is observed by the Designated Monitor, the Designated Biologist shall be recalled to the site.
- 8.5 Area of Disturbance. Permittee shall minimize the area to be disturbed whenever vegetation must be cleared, underground structures need to be excavated, or access roads need to be repaired. The need to minimize the area disturbed and the limits of the work area shall be clearly explained to all contractors and equipment operators by Permittee inspectors, the Designated Representative, the Designated Biologist, or Designated Monitor.

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- 8.6 Covered Species Occurrence. If any Covered Species are found in the project footprint during construction, all work that could potentially harm the Covered Species shall stop immediately. Caltrans shall immediately contact CDFW regarding the sighting to determine if relocation of the Covered Species is required before work may recommence. All Covered Species sightings confirmed by the Designated Biologist shall include the following documented information: the date, time, and location of each occurrence using Global Positioning System (GPS), the name of the party that identified the animal, circumstances of the incident, the general condition and health of each individual, any diagnostic markings, sex, age (juvenile or adult), and actions undertaken. Caltrans shall submit this information to the CNDDDB.
- 8.7 Covered Species Relocation. Covered Species found within the project Area of Potential Impact (API) shall be relocated to an active rodent burrow system in a CDFW-approved relocation area. Relocation areas shall be identified by the Designated Biologist prior to the start of construction, and are subject to CDFW approval pursuant to Condition 8.1(California Tiger Salamander Relocation Plan) of this ITP.
- 8.8 Work in Dry Weather. Activities within potential Covered Species habitat shall be restricted to periods of low rainfall (less than ½ inch per 24 hour period), or time periods with less than a 70% forecasted chance of rain. Caltrans shall monitor the National Weather Service (NWS) 24-hour forecast for the project area. If work must continue when greater than 70% chance of rain is forecast, then a Designated Biologist must survey the Project site before construction begins each day that rain is forecast. If a Designated Monitor is used to conduct surveys, a Designated Biologist must still be available to capture and relocate any Covered Species that are discovered during the surveys. If rain exceeds ½ inch during a 24 hour period, work shall cease until no further rain (greater than 70% chance) is forecast.
- 8.9 Ground Clearing. All Covered Activities where there is potential upland habitat for the Covered Species shall be restricted to the dry season (May 7 to October 31), or periods of low rainfall (less than ½ inch per 24 hour period, or time periods with less than 70% forecasted chance of rain).
- 8.10 Work During Day Light. All Covered Activities within Covered Species potential upland habitat shall terminate 30 minutes before sunset and shall not resume until 30 minutes after sunrise during the Covered Species migration/active season from November 1 to June 14. Caltrans shall use sunrise and sunset times established by the U.S. Naval Observatory Astronomical Applications Department for the geographic area where the project is located. If night work cannot be avoided during this time period then a Designated Biologist must survey the project site before construction begins each night. If a Designated Monitor is used to conduct surveys, a Designated Biologist must still be available to capture and relocate any Covered Species that are discovered during the surveys.
- 8.11 Work on Wet Nights Prohibited. Ground-disturbing night work within potential Covered Species habitat shall be strictly prohibited when a 70% or greater chance of

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rainfall is predicted within 24 hours of project activity. Ground disturbing night work may not resume until a 70% or greater chance of rainfall is not predicted within 24 hours.

- 8.12 Soil Stockpiles. Soil stockpiles shall be placed where soil shall not pass into potential Covered Species breeding pools; nor shall it pass into any other waters of the state as per Fish and Game Code sections 5650 and 5652. Stockpiles shall be appropriately protected to prevent soil erosion.
- 8.13 Disease Prevention. To ensure that disease are not conveyed between work sites by the Designated Biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force (Attachment 5) must be followed at all times. All equipment that may come in contact with aquatic habitat must first be disinfected with ethanol solution. The Designated Biologist may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care must be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
- 8.14 Inspection of Excavated Areas. The Designated Monitor(s) shall inspect all open trenches, auger holes, and other excavations that may trap Covered Species prior to any work in or around them and before they are backfilled. Designated Biologist shall safely remove and relocate any Covered Species they find in accordance with this ITP and as conditioned in Measure 8.1 (California Tiger Salamander Relocation Plan).
- 8.15 Injured Covered Species. If a Covered Species is injured as a result of project-related activities, it shall be immediately taken to a CDFW approved wildlife rehabilitation or veterinary facility. Caltrans shall identify the facility prior to the start of ground or vegetation disturbing activities and provide this information as part of the Relocation Plan as Conditioned in Measure 8.1 (California Tiger Salamander Relocation Plan) of this ITP. Caltrans shall bear any costs associated with the care or treatment of such injured Covered Species. Caltrans shall notify CDFW of the injury to the Covered Species immediately unless the incident occurs outside of normal business hours. In that event CDFW shall be notified no later than 12 PM on the next business day. Notification to CDFW shall be via telephone or email, followed by a written incident report. Notification shall include the date, time, location and circumstances of the incident and the name of the facility where the animal was taken.
- 8.16 Existing and New Construction Activities. Within 1.24 miles of known occupied, or potential occupied Covered Species breeding pond site(s) (including but not limited to the sites shown in Figures 2 and 3 [Covered Species Breeding Locations and Covered Species Critical Habitat]) Caltrans shall follow their Standard Plan Type E curbs and Type D and Type E Dikes designs as the preferred designs (refer to Caltrans Standard Plan A87, Curbs, Dikes, and Driveways) when such structures require replacement, rehabilitation, or new construction.

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**9. Impacts and Mitigation Analysis.**

The impact areas for the Project are represented as the API. The API includes potential disturbance areas for both permanent and temporary impacts and assumes the maximum amount of disturbance/impact associated with the grading, cut/fill limits, and construction of the project. Since the Covered Species potentially use the annual grassland habitat within the project API, impacts to Covered Species upland habitat will require mitigation. Caltrans is proposing a mitigation strategy for temporary and permanent impacts to the Covered Species upland habitat with three components: (1) conversion of pavement within the project limits to annual grassland (creation of Covered Species upland habitat); (2) purchase of credits at a CDFW-approved mitigation bank; and (3) construction of six amphibian under-crossings to facilitate movement of the Covered Species under SR-246. Caltrans is proposing a 2:1 mitigation ratio for all permanent impacts and a 0.5:1 mitigation ratio for all temporary impacts.

Figures 4-11, pages 31-38, illustrates the API for the entire project length.

9.1 Breeding Ponds. No impacts to Covered Species aquatic habitat are anticipated to occur as a result of the Project. There is no aquatic habitat for the Covered Species within the Project limits. Please see Figure 2 and 3 (Covered Species Breeding Locations and Covered Species Critical Habitat),

9.2 Permanent Impacts. Permanent impacts of 15.35 acres are anticipated to occur within potential upland Covered Species habitat. Caltrans proposes compensation for the permanent loss of 15.35 acres of potential upland Covered Species habitat by acquiring 30.7 acres of quality upland habitat in known occupied Covered Species territory at an approved mitigation bank. This is at a rate of two compensation acres for every one acre of permanent impacts (2:1).

9.3 Temporary Impacts. Temporary Impacts of 28.56 acres are anticipated to occur within potential upland Covered Species habitat. The required compensation for the temporary loss of 28.56 acres of potential upland Covered Species habitat is 14.28 acres. This is at a rate of one-half compensation acre for every one acre of temporary impacts (0.5:1).

9.4 Creation Component. Approximately 6.15 acres of pavement within the Project API will be removed and restored to annual grassland and managed as quality Covered Species upland habitat (refer to Appendix B for location). Based on early coordination with CDFW, this "habitat creation" could offset required mitigation for permanent impacts at the rate of two habitat creation acres for every one acre of required compensation for permanent impacts (2:1) Using this ratio, the pavement obliteration/habitat restoration will reduce the requirement for permanent impacts mitigation by 12.3 acres. A total of 12.3 acres will be reduced from the 30.7 acres required compensation for the permanent loss of potential upland Covered Species

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habitat bringing the total required off site compensation for permanent impacts to Covered Species upland habitat to 18.4 acres.

- 9.5 Amphibian Under-Crossings. Caltrans proposes to construct six amphibian under-crossings clustered in closest proximity to known occupied breeding ponds. Please see Figures 4-11 and Exhibit G.

Table 1. Summary of potential impacts, proposed mitigation ratios, and required mitigation acres.

	<i>Area (Acres)</i>	<i>Mitigation Ratio</i>	<i>Required Mitigation (Acres)</i>
<b>Potential Impacts</b>			
Permanent Impacts (new roadway, RSP, drainage features)	15.35	2:1	30.7
Temporary Impacts (cut/fill, drainage features, and stockpiles)	28.56	0.5:1	14.28
<b>Credits for Creation</b>			
Pavement restored to upland habitat (credit toward required mitigation)	6.15	1:2	(-)12.3 credit
<b>Total required mitigation acres</b>			<b>32.68</b>

**10. Habitat Management Land Acquisition and Restoration.**

CDFW has determined that permanent protection and perpetual management of compensatory habitat is necessary and required pursuant to CESA to fully mitigate Project-related impacts of the taking on the Covered Species that will result with implementation of the Covered Activities. This determination is based on factors including an assessment of the importance of the habitat in the Project Area, the extent to which the Covered Activities will impact the habitat, and CDFW's estimate of the acreage required to provide for adequate compensation.

To meet this requirement, the Permittee, Caltrans shall implement the following Measures to provide for both the permanent protection and management of 32.68 acres of Habitat Management (HM) lands pursuant to Condition of Approval 10.1-10.3 below. Permanent protection and funding for perpetual management of compensatory habitat must be complete before starting Covered Activities, or within 18 months of the signing of the ITP.

- 10.1 Mitigation at an approved Conservation Bank. Permittee shall purchase 32.68 acres of Covered Species credits from a CDFW-approved mitigation or conservation bank prior to initiating Covered Activities or no later than 18 months from the issuance of

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this ITP if Security is provided pursuant to Condition of Approval 11 (Performance Security) below. Mitigation funding for offsite habitat acquisition will involve mitigation by purchase of lands, according to Measures 1-5 of Mitigation Compensation for Take (Section 4.2 of the ITP Application). Caltrans will ensure funding to complete activities by providing to CDFW written documentation that Caltrans has allocated sufficient funds in the Expenditure Authorization for the Project to ensure implementation of the Conditions of Approval.

- 10.2 Covered Species Credits. To mitigate for permanent and temporary loss of Covered Species upland habitat, Caltrans shall provide compensatory mitigation in the form of 32.68 acres of Habitat Management Lands (HM Lands). As part of this ITP, Caltrans plans to purchase credits at a CDFW-approved mitigation bank, The La Purisima Conservation Bank (Bank). The Bank site is located in the Purisima Hills, and approximately 2.3 miles due north of the Project. Caltrans has conducted early coordination with CDFW South Coast Region Mitigation Banking Coordinator David Lawhead, CDFW Senior Environmental Scientist (Specialist) Martin Potter, and USFWS Biologist Andrea Adams, all of whom have conducted site visits to the Bank. Although the Bank has not been formally approved to sell credits at the time of this application, CDFW staff has indicated they believe the Bank will be approved within the current calendar year. Refer to Appendix F for the La Purisima Conservation Bank Proposal and mapping. Caltrans intends to purchase the required credits at a CESA certified and CDFW-approved Covered Species Conservation Bank. Ground- or vegetation-disturbing activities in Covered Species potential habitat are not authorized to commence until credits are purchased or no later than 18 months from the effective date of the ITP, if an approved bank cannot be found Caltrans shall move forward using Conditions of Approval 11(Performance Security) of this ITP.
- 10.3.Cost Estimates. Caltrans shall estimate the cost of acquisition, protection, and perpetual management of 32.68 acres of HM lands, including restoration of 6.15 acres, according to the following guidelines:
- 10.3.1. Land Acquisition. Costs for HM lands identified in Condition of Approval 10.5 (Habitat Acquisition and Protection). Caltrans must provide an estimate of acquisition price per acre for 32.68 acres. Land acquisitions costs are estimated using local fair market current value for lands with habitat values meeting mitigation requirements.
- 10.3.2. Start-Up Costs. Caltrans must provide an estimate for start-up costs for HM lands, including initial site protection and enhancement costs as described in Condition of Approval 10.5.5 (Start-up Activities) below.
- 10.3.3. Interim Management. Caltrans must provide an estimate for an Interim management period as described in Condition of Approval 10.5.6 (Interim Management [Initial and Capital]) below.

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- 10.3.4. Long-Term Management. Caltrans must provide an estimate for the long-term management funding as described in Condition of Approval 10.6 (Endowment Fund) below, with an estimate \$XX/acre for 32.68 acres: Long-term management funding is estimated initially for the purpose of providing Security to ensure implementation of HM lands management.
- 10.3.5. Transaction Fees. Caltrans must provide an estimate for related transaction fees including but not limited to account set-up fees, administrative fees, title and documentation review and related title transactions, expenses incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW as described in Condition of Approval 10.7 (Reimburse CDFW) below.
- 10.3.6. Restoration. Caltrans must provide an estimate for restoration of on-site temporary effects to Covered Species habitat as described in Condition of Approval 10.8 (Habitat Mitigation Monitoring and Restoration Plan) calculated at \$XX/acre for 6.15 acres.
- 10.4. Covered Species Credits. Permittee shall purchase 32.68 acres of Covered Species credits from a CDFW-approved mitigation or conservation bank prior to initiating Covered Activities or no later than 18 months from the issuance of this ITP if Security is provided pursuant to Condition of Approval 11 (Performance Security) below.

OR

- 10.5. Habitat Acquisition and Protection. To provide for the acquisition and perpetual protection and management of the HM lands, the Permittee shall:
- 10.5.1. Fee Title/Conservation Easement. Transfer fee title to the HM lands to CDFW pursuant to terms approved in writing by CDFW. Alternatively, CDFW, in its sole discretion, may authorize a governmental entity, special district, non-profit organization, for-profit entity, person, or another entity to hold title to and manage the property provided that the district, organization, entity, or person meets the requirements of Government Code sections 65965-65968, as amended. If CDFW does not hold fee title to the HM lands, CDFW shall act as grantee for a conservation easement over the HM lands or shall, in its sole discretion, approve a non-profit entity, public agency, or Native American tribe to act as grantee for a conservation easement over the HM lands provided that the entity, agency, or tribe meets the requirements of Civil Code section 815.3. If CDFW does not hold the conservation easement, CDFW shall be expressly named in the conservation easement as a third-party beneficiary. The Permittee shall obtain CDFW written approval of any conservation easement before its execution or recordation. No conservation easement shall be approved by CDFW unless it complies with Government Code sections

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65965-6598, as amended and includes provisions expressly addressing Government Code sections 65966(j) and 65967(e);

- 10.5.2. HM Lands Approval. Obtain CDFW written approval of the HM lands before acquisition and/or transfer of the land by submitting, at least three months before acquisition and/or transfer of the HM lands, a formal Proposed Lands for Acquisition Form (see Attachment 2B) identifying the land to be purchased or property interest conveyed to an approved entity as mitigation for the Project's impacts on Covered Species;
- 10.5.3. HM Lands Documentation. Provide a recent preliminary title report, initial hazardous materials survey report, and other necessary documents (see Attachment 2A). All documents conveying the HM lands and all conditions of title are subject to the approval of CDFW, and if applicable, the Wildlife Conservation Board and the Department of General Services;
- 10.5.4. Land Manager. Designate both an interim and long-term land manager approved by CDFW. The interim and long-term land managers may, but need not, be the same. The interim and/or long-term land managers may be the landowner or another party. Documents related to land management shall identify both the interim and long-term land managers. Permittee shall notify CDFW of any subsequent changes in the land manager within 30 days of the change. If CDFW will hold fee title to the mitigation land, CDFW will also act as both the interim and long-term land manager unless otherwise specified.
- 10.5.5. Start-up Activities. Provide for the implementation of start-up activities, including the initial site protection and enhancement of HM lands, once the HM lands have been approved by CDFW. Start-up activities include, at a minimum: (1) preparing a final management plan for CDFW approval (see <http://www.dfg.ca.gov/habcon/conplan/mitbank/>); (2) conducting a baseline biological assessment and land survey report within four months of recording or transfer; (3) developing and transferring Geographic Information Systems (GIS) data if applicable; (4) establishing initial fencing; (5) conducting litter removal; (6) conducting initial habitat restoration or enhancement, if applicable; and (7) installing signage.
- 10.5.6. Interim Management (Initial and Capital). Provide for the interim management of the HM lands. The Permittee shall ensure that the interim land manager implements the interim management of the HM lands as described in the final management plan and conservation easement approved by CDFW. The interim management period shall be a minimum of three years from the date of HM land acquisition and protection and full funding of the Endowment and includes expected management following start-up activities. Interim management period activities described in the final management plan shall include fence repair, continuing trash removal, site monitoring, and vegetation and invasive species management. Permittee shall either (1) provide a

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security to CDFW for the minimum of three years of interim management that the land owner, Permittee, or land manager agrees to manage and pay for at their own expense, (2) establish an escrow account with written instructions approved in advance in writing by CDFW to pay the land manager annually in advance, or (3) establish a short-term enhancement account with CDFW or a CDFW-approved entity for payment to the land manager.

10.6. Endowment Fund. If the Permittee will permanently protect and perpetually manage compensatory habitat as described in Condition of Approval 10.5 (Habitat Acquisition and Protection), the Permittee shall ensure that the HM lands are perpetually managed, maintained, and monitored by the long-term land manager as described in this ITP, the conservation easement, and the final management plan approved by CDFW. After obtaining CDFW approval of the HM lands, Permittee shall provide long-term management funding for the perpetual management of the HM lands by establishing a long-term management fund (Endowment). The Endowment is a sum of money, held in a CDFW-approved fund that provides funds for the perpetual management, maintenance, monitoring, and other activities on the HM lands consistent with the management plan(s) required by Condition of Approval 10.8 (Habitat Mitigation Monitoring and Restoration Plan). Endowment as used in this ITP shall refer to the endowment deposit and all interest, dividends, other earnings, additions and appreciation thereon. The Endowment shall be governed by this ITP, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended.

After the interim management period, Permittee shall ensure that the designated long-term land manager implements the management and monitoring of the HM lands according to the final management plan. The long-term land manager shall be obligated to manage and monitor the HM lands in perpetuity to preserve their conservation values in accordance with this ITP, the conservation easement, and the final management plan. Such activities shall be funded through the Endowment.

10.6.1 Identify an Endowment Manager. The Endowment shall be held by the Endowment Manager, which shall be either CDFW or another entity qualified pursuant to Government Code sections 65965-65968, as amended. Permittee shall submit to CDFW a written proposal that includes: (i) the name of the proposed Endowment Manager; (ii) whether the proposed Endowment Manager is a governmental entity, special district, nonprofit organization, community foundation, or congressionally chartered foundation; (iii) whether the proposed Endowment Manager holds the property or an interest in the property for conservation purposes as required by Government Code section 65968(b)(1) or, in the alternative, the basis for finding that the Project qualifies for an exception pursuant to Government Code section 65968(b)(2); and (iv) a copy of the proposed Endowment Manager's certification pursuant to Government Code section 65968(e). Within thirty days of CDFW's receipt of Permittee's written proposal, CDFW shall inform Permittee in writing if it determines the proposal does not satisfy the requirements of Fish and Game

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Code section 2081(b)(4) and, if so, shall provide Permittee with a written explanation of the reasons for its determination. If CDFW does not provide Permittee with a written determination within the thirty-day period, the proposal shall be deemed consistent with Section 2081(b)(4).;

10.6.2 Calculate the Endowment Funds Deposit. After obtaining CDFW written approval of the HM lands, long-term management plan, and Endowment Manager, Permittee shall prepare a Property Analysis Record (PAR) or PAR-equivalent analysis (hereinafter "PAR") to calculate the amount of funding necessary to ensure the long-term management of the HM lands (Endowment Deposit Amount). The Permittee shall submit to CDFW for review and approval the results of the PAR before transferring funds to the Endowment Manager.

10.6.2.1 Capitalization Rate and Fees. Permittee shall obtain the capitalization rate from the selected Endowment Manager for use in calculating the PAR and adjust for any additional administrative, periodic, or annual fees.

10.6.2.2. Endowment Buffers/Assumptions. Permittee shall include in PAR assumptions the following buffers for endowment establishment and use that will substantially ensure long-term viability and security of the Endowment:

10.6.2.2.1. 10 Percent Contingency. A 10 percent contingency shall be added to each endowment calculation to hedge against underestimation of the fund, unanticipated expenditures, inflation, or catastrophic events.

10.6.2.2.2. Three Years Delayed Spending. The endowment shall be established assuming spending will not occur for the first three years after full funding.

10.6.2.2.3. Non-annualized Expenses. For all large capital expenses to occur periodically but not annually such as fence replacement or well replacement, payments shall be withheld from the annual disbursement until the year of anticipated need or upon request to Endowment Manager and CDFW.

10.6.3 Transfer Long-term Endowment Funds. Permittee shall transfer the long-term endowment funds to the Endowment Manager upon CDFW approval of the Endowment Deposit Amount identified above. The approved Endowment Manager may pool the Endowment with other endowments for the operation, management, and protection of HM lands for local populations of the Covered Species but shall maintain separate accounting for each Endowment. The Endowment Manager shall, at all times, hold and manage the Endowment in

compliance with this ITP, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended.

- 10.7 Reimburse CDFW. Permittee shall reimburse CDFW for all reasonable expenses incurred by CDFW such as transaction fees, account set-up fees, administrative fees, title and documentation review and related title transactions, expenses incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW.
- 10.8 Habitat Mitigation Monitoring and Restoration Plan (HMMP). Permittee shall create on-site 6.15 acres of Covered Species habitat that will be maintained as optimal upland habitat for the Covered Species. Within 6 months of issuance of this ITP, the Permittee shall prepare a Vegetation Restoration Plan to facilitate revegetation of the 6.15 acres and shall ensure that the Plan is successfully implemented by the contractor. The Plan shall include detailed specifications for restoring all temporarily disturbed areas, such as seed mixes and application methods. The plan shall also indicate the best time of year for seeding to occur. Plantings undertaken between May and October shall include regular watering to ensure adequate growth. Described below are the minimum avoidance, minimization, restoration measures and success criteria that must be included in the Vegetation Restoration Plan. The HMMP must be approved by the Department in writing prior to any Project related disturbances at the Project site. Described below are the minimum avoidance, minimization, restoration measures and success criteria that must be included in the HMMP
- The Covered Species Habitat Restoration (HR) site shall include no more than 5% non-native percent cover in any vegetation layer (tree, shrub, liana, herb, forbs, and grass) in any year.
  - The HMMP shall contain measurements of species diversity, abundance, cover, etc., to ensure the health of the habitat is at least as healthy as that of an identified, healthy, reference site. This data shall be collected for each vegetation layer (tree, shrub, liana, herb, forbs, and grass) every year.
  - The HMMP shall contain a detailed plan to monitor the success of the Covered Species HR lands, including the use of a reference site and scientifically accepted sampling methodology for assessing success.

#### **11. Performance Security.**

If Caltrans fails to implement Condition 10 (Habitat Management Land Acquisition and Restoration) of this ITP prior to the issuance of the Executed ITP, or any portion of Condition of Approval 10 (Habitat Management Land Acquisition and Restoration) that have not been completed before Covered Activities begin, Caltrans may only proceed with Covered Activities after the Permittee has ensured funding (Security) to complete any activity required by Condition of Approval 10 (Habitat Management Land Acquisition and Restoration); Caltrans shall provide Security as follows:

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11.1 Security Amount. The Security for all uncompleted obligations shall be in the form of an Irrevocable Letter of Credit (See Conditions of Approval 11.2 [Security Form]) in the amount of \$2,600,000.00, to include the purchase of 32.68 acres of HM lands and perform an additional restoration of 6.15 acres HM lands.

11.2 Security Form. The Security shall be in the form of an irrevocable letter of credit (see Attachment 3 [Letter of Credit Form]) or another form of Security approved in advance in writing by CDFW's Office of the General Counsel.

11.3 Security Timeline. The Security shall be provided to CDFW before Covered Activities begin or within 30 days after the effective date of this ITP, whichever occurs first.

11.4 Security Holder. The Security shall be held by CDFW or in a manner approved in advance in writing by CDFW.

11.5 Security Transmittal. If CDFW holds the Security, Permittee shall transmit it to CDFW with a completed Mitigation Payment Transmittal Form (see Attachment 4) or by way of an approved instrument such as escrow, irrevocable letter of credit, or other.

11.6 Security Drawing. The Security shall allow CDFW to draw on the principal sum if CDFW, in its sole discretion, determines that the Permittee has failed to comply with the Conditions of Approval of this ITP.

11.7 Security Release. The Security (or any portion of the Security then remaining) shall be released to the Permittee after CDFW has conducted an on-site inspection and received confirmation that all secured requirements have been satisfied, as evidenced by:

- Written documentation of the acquisition of the HM lands;
- Copies of all executed and recorded conservation easements;
- Written confirmation from the approved Endowment Manager of its receipt of the full Endowment; and
- Timely submission of all required reports.

Even if Security is provided, the Permittee must complete the required acquisition, protection and transfer of all HM lands and record any required conservation easements no later than 18 months from the effective date of this ITP. CDFW may require the Permittee to provide additional HM lands and/or additional funding to ensure the impacts of the taking are minimized and fully mitigated, as required by law, if the Permittee does not complete these requirements within the specified timeframe.

**Amendment.**

This ITP may be amended as provided by California Code of Regulations, Title 14, section

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783.6, subdivision (c), and other applicable law. This ITP may be amended without the concurrence of the Permittee as required by law, including if CDFW determines that continued implementation of the Project as authorized under this ITP would jeopardize the continued existence of the Covered Species or where Project changes or changed biological conditions necessitate an ITP amendment to ensure that all Project-related impacts of the taking to the Covered Species are minimized and fully mitigated.

**Stop-Work Order.**

CDFW may issue Permittee a written stop-work order requiring Permittee to suspend any Covered Activity for an initial period of up to 25 days to prevent or remedy a violation of this ITP, including but not limited to the failure to comply with reporting or monitoring obligations, or to prevent the unauthorized take of any CESA endangered, threatened, or candidate species. Permittee shall stop work immediately as directed by CDFW upon receipt of any such stop-work order. Upon written notice to Permittee, CDFW may extend any stop-work order issued to Permittee for a period not to exceed 25 additional days. Suspension and revocation of this ITP shall be governed by California Code of Regulations, Title 14, section 783.7, and any other applicable law. Neither the Designated Biologist nor CDFW shall be liable for any costs incurred in complying with stop-work orders.

**Compliance with Other Laws.**

This ITP sets forth CDFW's requirements for the Permittee to implement the Project pursuant to CESA. This ITP does not necessarily create an entitlement to proceed with the Project. Permittee is responsible for complying with all other applicable federal, state, and local law.

**Notices.**

The Permittee shall deliver a fully executed duplicate original ITP by registered first class mail or overnight delivery to the following address:

Habitat Conservation Planning Branch  
California Department of Fish and Wildlife  
Attention: CESA Permitting Program  
1416 Ninth Street, Suite 1260  
Sacramento, CA 95814

Written notices, reports and other communications relating to this ITP shall be delivered to CDFW by registered first class mail at the following address, or at addresses CDFW may subsequently provide the Permittee. Notices, reports, and other communications shall reference the Project name, Permittee, and ITP Number (2081-2013-064-05) in a cover letter and on any other associated documents.

Original cover with attachment(s) to:

Edmund J Pert, Regional Manager  
California Department of Fish and Wildlife  
3883 Ruffin Road  
San Diego, CA 92123

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Telephone (858) 467-4201  
Fax (858) 467-4299

Unless Permittee is notified otherwise, CDFW's Regional Representative for purposes of addressing issues that arise during implementation of this ITP is:

Ms. Jamie Jackson, Senior Environmental Scientist (Specialist)  
P.O. BOX 1179  
Ventura, CA 90012  
Telephone (805) 382-6906  
Fax (805) 382-6906

**Compliance with CEQA.**

CDFW's issuance of this ITP is subject to CEQA. CDFW is a responsible agency pursuant to CEQA with respect to this ITP because of prior environmental review of the Project by the lead agency, Caltrans. (See generally Pub. Resources Code, §§ 21067, 21069.) The lead agency's prior environmental review of the Project is set forth in the Initial Study with Mitigated Negative Declaration and Finding of No Significant Impact (SCH No.: 2009081063) dated June 2010 that Caltrans adopted for the Highway 246 Passing Lanes. The MND was revalidated in September of 2013 and at the time the lead agency adopted various mitigation measures for the Covered Species as conditions of Project approval.

This ITP, along with CDFW's related CEQA findings, which are available as a separate document, provide evidence of CDFW's consideration of the lead agency's Mitigated Negative Declaration for the Project and the environmental effects related to issuance of this ITP (CEQA Guidelines, § 15096, subd. (f)). CDFW finds that issuance of this ITP will not result in any previously undisclosed potentially significant effects on the environment or a substantial increase in the severity of any potentially significant environmental effects previously disclosed by the lead agency. Furthermore, to the extent the potential for such effects exists, CDFW finds adherence to and implementation of the Conditions of Project Approval adopted by the lead agency, and that adherence to and implementation of the Conditions of Approval imposed by CDFW through the issuance of this ITP, will avoid or reduce to below a level of significance any such potential effects. CDFW consequently finds that issuance of this ITP will not result in any significant, adverse impacts on the environment.

**Findings Pursuant to CESA.**

These findings are intended to document CDFW's compliance with the specific findings requirements set forth in CESA and related regulations. (Fish & G. Code § 2081, subs. (b)-(c); Cal. Code Regs., tit. 14, §§ 783.4, subds, (a)-(b), 783.5, subd. (c)(2).)

CDFW finds based on substantial evidence in the ITP application, Initial Study with Mitigated Negative Declaration and Finding of No Significant Impact (SCH No.: 2009081063), and subsequent revalidation of the MND in 2013, the results of 3 site visits and numerous consultations, and the administrative record of proceedings, that issuance of this ITP complies and is consistent with the criteria governing the issuance of ITPs pursuant to CESA:

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- (1) Take of Covered Species as defined in this ITP will be incidental to the otherwise lawful activities covered under this ITP;
- (2) Impacts of the taking on Covered Species will be minimized and fully mitigated through the implementation of measures required by this ITP and as described in the MMRP. Measures include: (1) permanent habitat protection; (2) establishment of avoidance zones; (3) worker education; and (4) Monthly Compliance Reports. CDFW evaluated factors including an assessment of the importance of the habitat in the Project Area, the extent to which the Covered Activities will impact the habitat, and CDFW's estimate of the acreage required to provide for adequate compensation. Based on this evaluation, CDFW determined that the protection and management in perpetuity of 32.68 acres of compensatory habitat that is contiguous with other protected Covered Species habitat and/or is of higher quality than the habitat being destroyed by the Project, along with the minimization, monitoring, reporting, and funding requirements of this ITP minimizes and fully mitigates the impacts of the taking caused by the Project;
- (3) The take avoidance and mitigation measures required pursuant to the conditions of this ITP and its attachments are roughly proportional in extent to the impacts of the taking authorized by this ITP;
- (4) The measures required by this ITP maintain Permittee's objectives to the greatest extent possible;
- (5) All required measures are capable of successful implementation;
- (6) This ITP is consistent with any regulations adopted pursuant to Fish and Game Code sections 2112 and 2114;
- (7) Permittee has ensured adequate funding to implement the measures required by this ITP as well as for monitoring compliance with, and the effectiveness of, those measures for the Project; and
- (8) Issuance of this ITP will not jeopardize the continued existence of the Covered Species based on the best scientific and other information reasonably available, and this finding includes consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of (1) known population trends; (2) known threats to the species; and (3) reasonably foreseeable impacts on the species from other related projects and activities. Moreover, CDFW's finding is based, in part, on CDFW's express authority to amend the terms and conditions of this ITP without concurrence of the Permittee as necessary to avoid jeopardy and as required by law.

**List of Tables and Figures.**

TABLE 1	Impacts and Mitigation Analysis	pg. 15
TABLE 2	Covered Species Dispersal Relative to Project	pg. 29 (insert)
FIGURE 1	Project Vicinity/Location Map	pg. 28
FIGURE 2	Covered Species Breeding Locations	pg. 29
FIGURE 3	Covered Species Critical Habitat	pg. 30
FIGURE 4	Map of Project Impacts – Sheet A	pg. 31
FIGURE 5	Map of Project Impacts - Sheet B	pg. 32
FIGURE 6	Map of Project Impacts – Sheet C	pg. 33
FIGURE 7	Map of Project Impacts – Sheet D	pg. 34
FIGURE 8	Map of Project Impacts – Sheet E	pg. 35
FIGURE 9	Map of Project Impacts – Sheet F	pg. 36
FIGURE 10	Map of Project Impacts – Sheet G	pg. 37
FIGURE 11	Map of Project Impacts – Sheet H	pg. 38

**Attachments.**

ATTACHMENT 1	Mitigation Monitoring and Reporting Program	pg. 39-50
ATTACHMENT 2A	Habitat Management Lands Checklist	pg. 51
ATTACHMENT 2B	Proposed Lands for Acquisition Form	pg. 52
ATTACHMENT 3	Letter of Credit Form	pg. 53-57
ATTACHMENT 4	Mitigation Payment Transmittal Form	pg. 58
ATTACHMENT 5	Declining Amphibian Code of Practice	pg. 59

**Exhibits.**

- A. CTS Upland Habitat
- B. Potential Impacts to Uplands
- C. CTS Critical Habitat
- D. CNDDDB Records
- E. CTS Study
- F. FLP Mitigation Bank Proposal
- G. CTS Under-Crossing Design Sheets

ISSUED BY THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

on January 3, 2014

Betty Caskey  
for Edmund J Pert, Regional Manager  
South Coast Region – Region Five

ACKNOWLEDGMENT

The undersigned: (1) warrants that he or she is acting as a duly authorized representative of the Permittee, (2) acknowledges receipt of this ITP, and (3) agrees on behalf of the Permittee to comply with all terms and conditions

By: Larry E. Bonner Date: 1-22-14

Printed Name: Larry E. Bonner Title: Senior Environmental Planner

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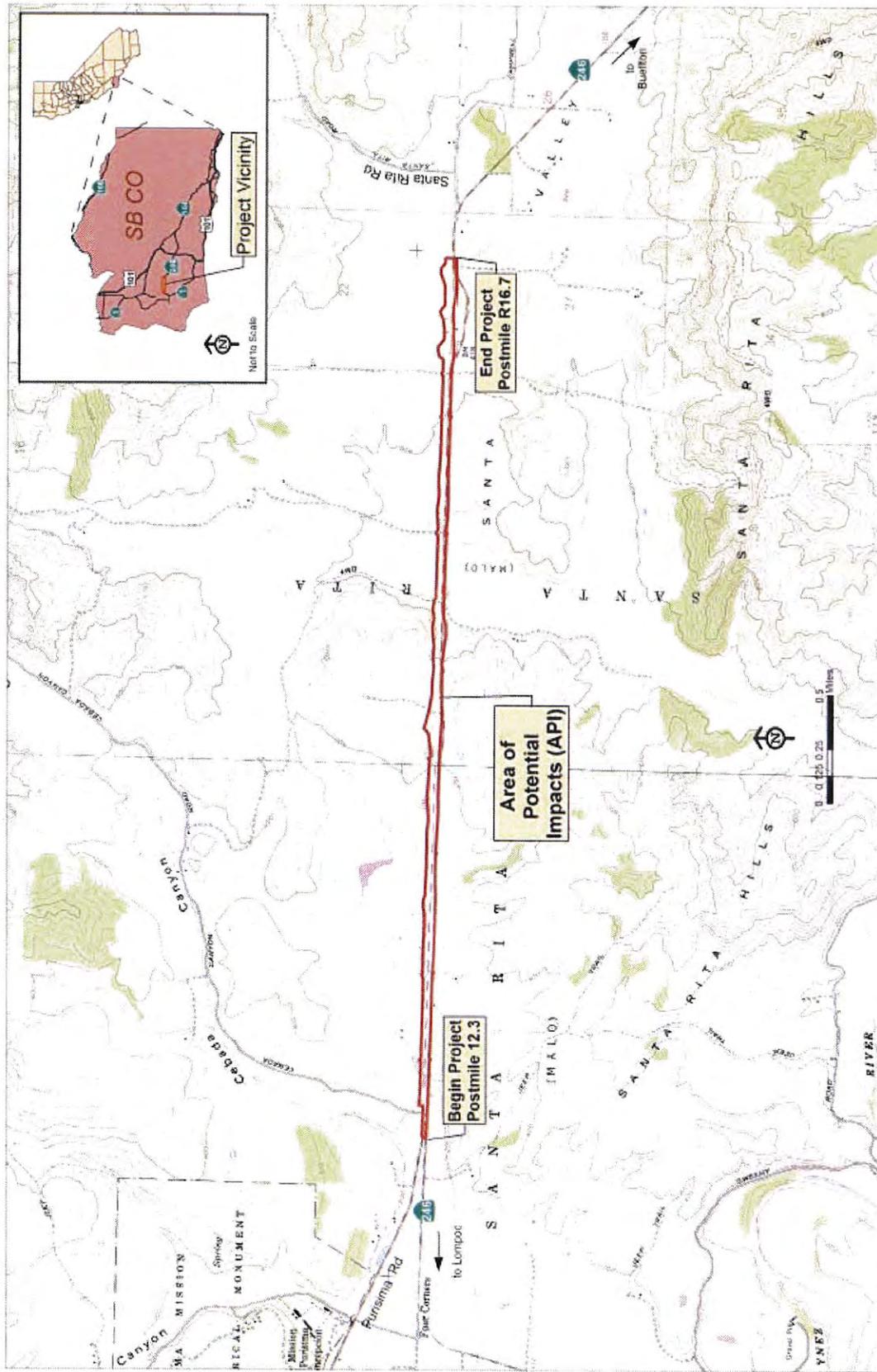
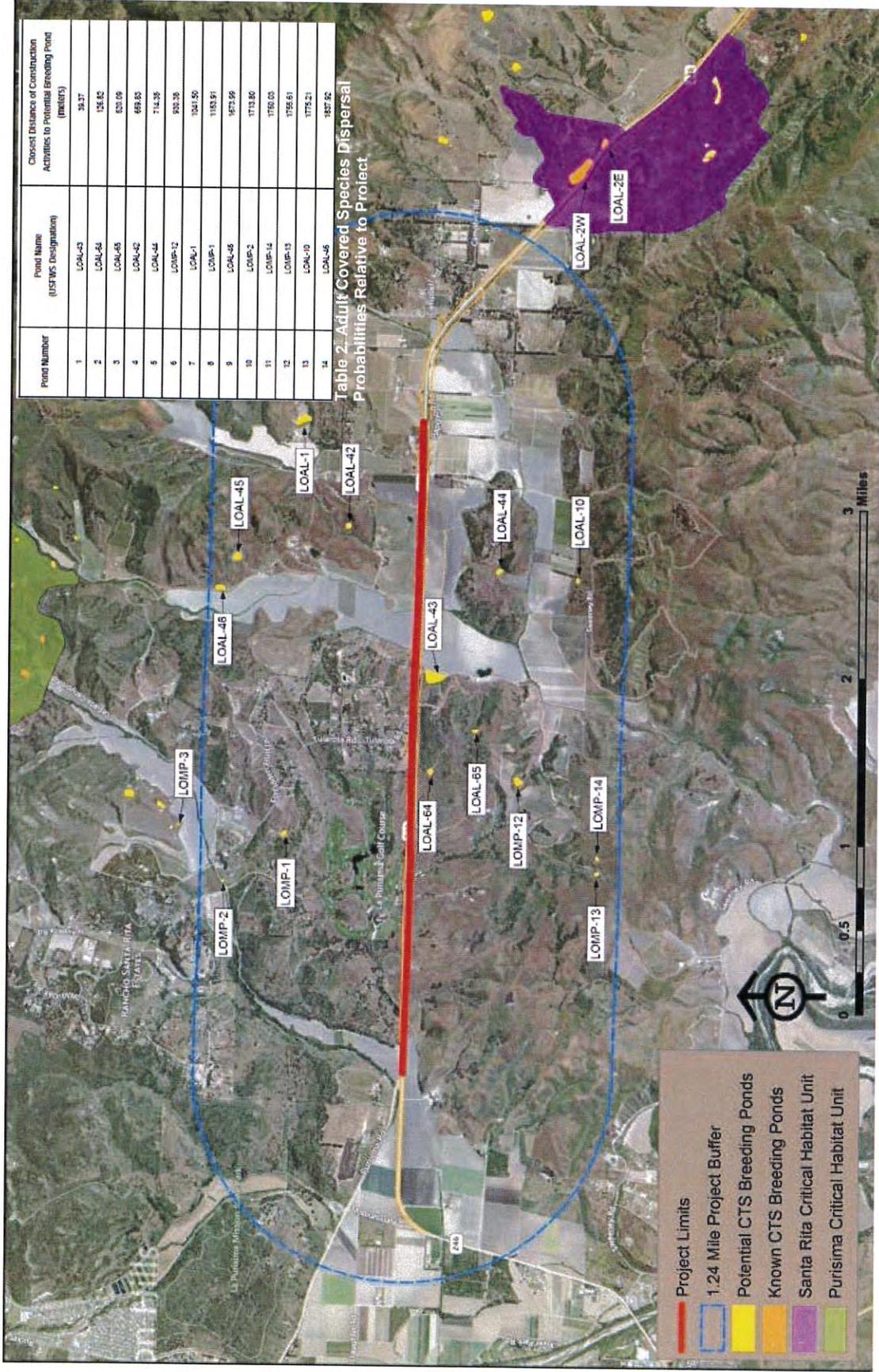


Figure 1. Project Vicinity - Location Map

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Pond Number	Pond Name (USFWS Designation)	Closest Distance of Construction Activities to Potential Breeding Pond (meters)
1	LOAL-43	39.37
2	LOAL-64	126.82
3	LOAL-65	520.09
4	LOAL-42	669.65
5	LOAL-44	714.35
6	LOAL-12	928.28
7	LOAL-1	1041.50
8	LOAL-1	1183.91
9	LOAL-48	1673.99
10	LOAL-2	1713.80
11	LOAL-14	1750.03
12	LOAL-19	1756.61
13	LOAL-10	1775.21
14	LOAL-45	1837.92

Table 2. Adult Covered Species Dispersal Probabilities Relative to Project

Figure 2. Nearest Known and Potential Covered Species Breeding Sites

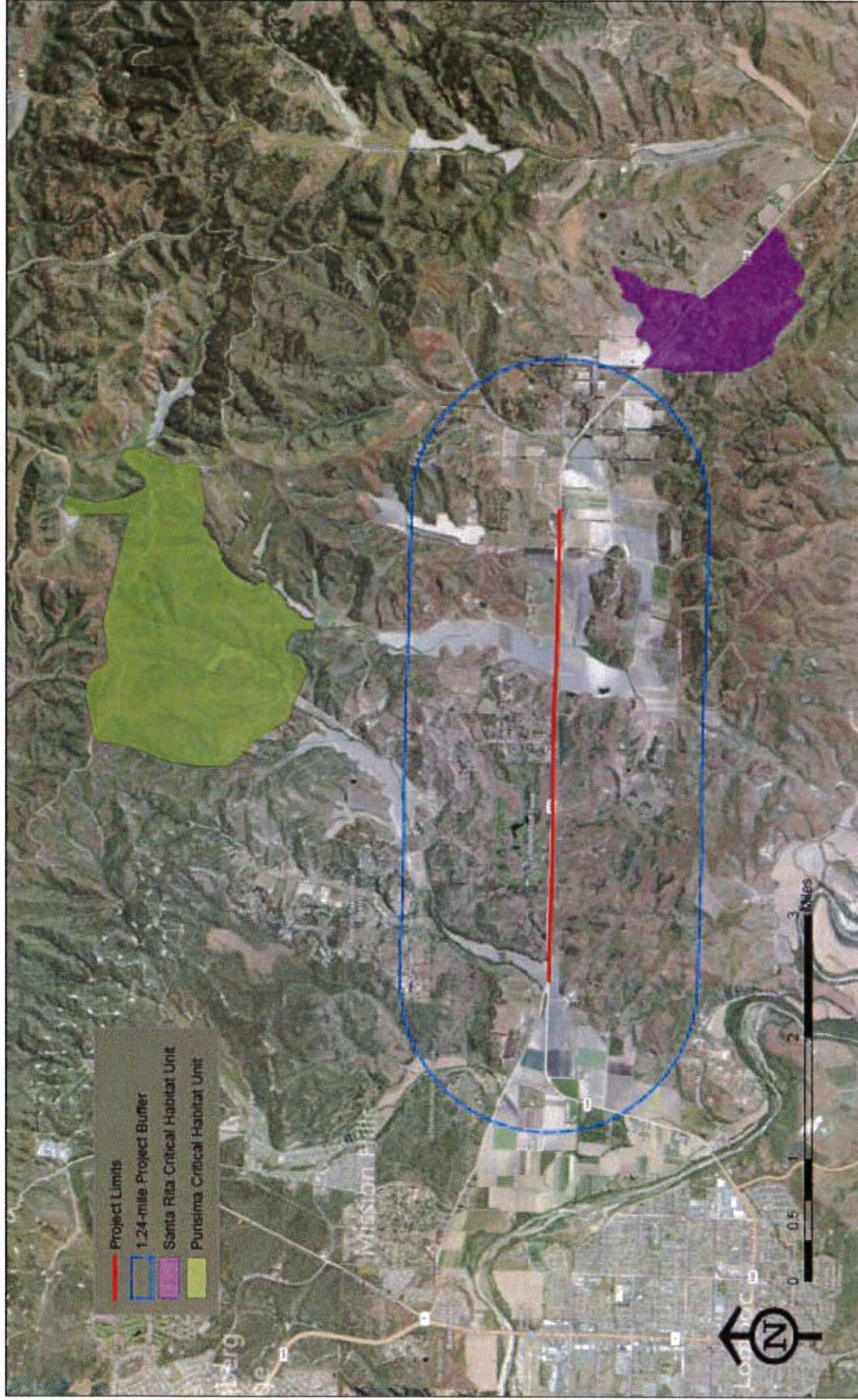


Figure 3. Covered Species Critical Habitat Near Project Vicinity.



Figure 4. Project Impacts



Figure 5. Project Impacts



Figure 6. Project Impacts

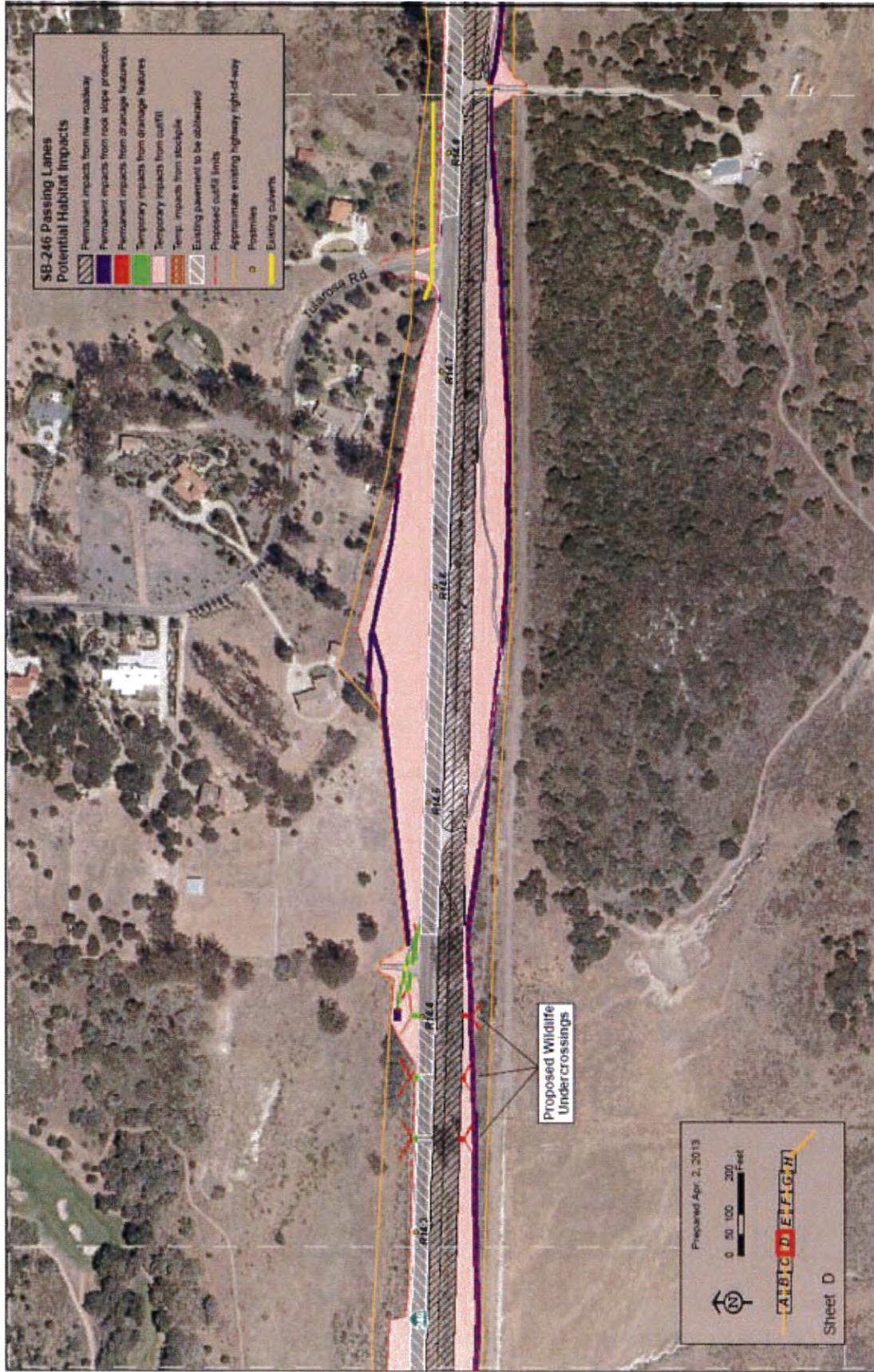


Figure 7. Project Impacts



Figure 8. Project Impacts



Figure 9. Project Impacts

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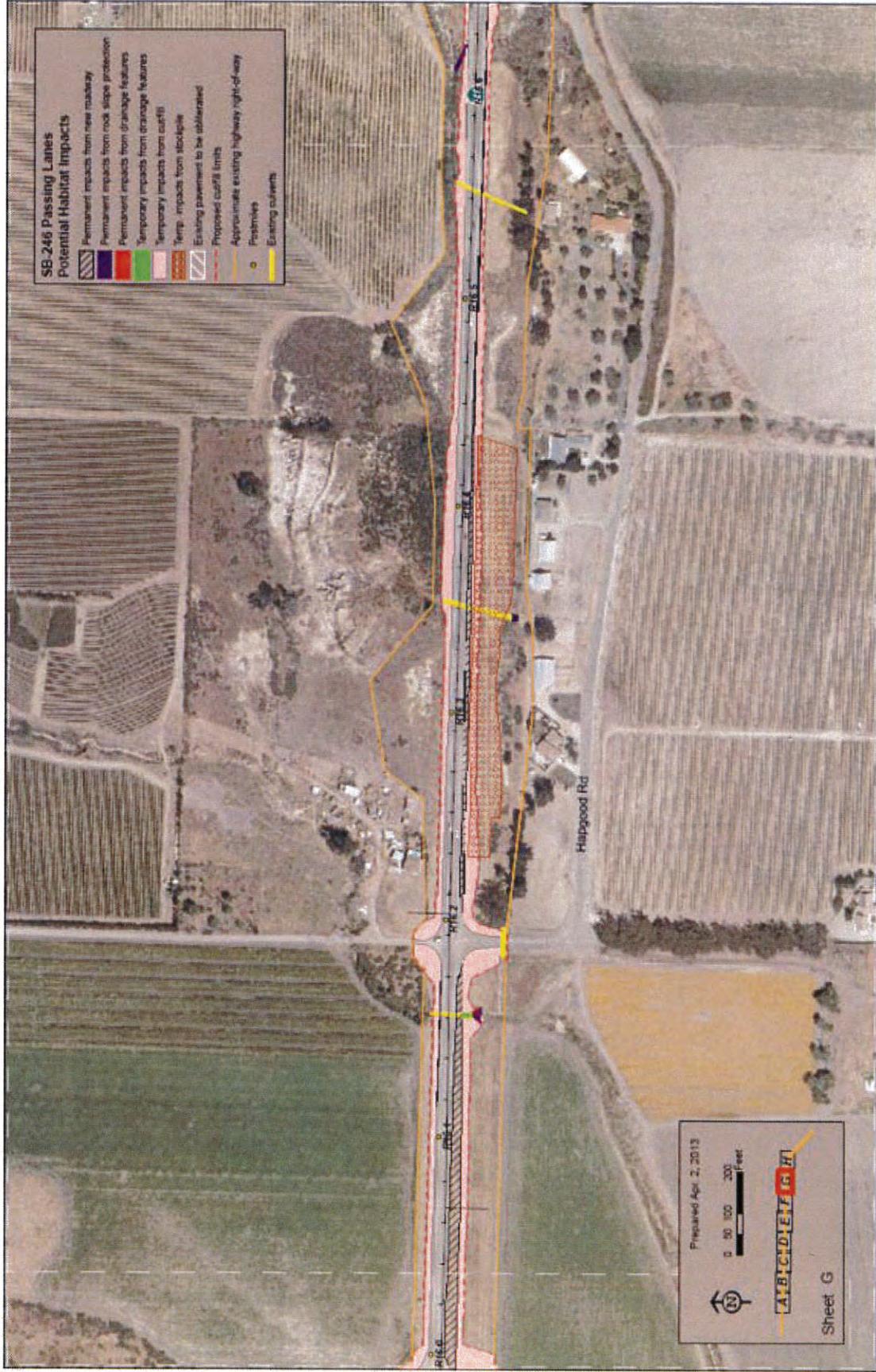


Figure 10. Project Impacts



Figure 11. Project Impacts

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**CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE  
MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)  
CALIFORNIA ENDANGERED SPECIES ACT  
INCIDENTAL TAKE PERMIT NO. 2081-2013-064-05**

**PERMITTEE:** California Department of Transportation (Caltrans)

**PROJECT:** Highway 246 (SR-246) Passing Lanes Project

**PURPOSE OF THE MMRP**

The purpose of the MMRP is to ensure that the impacts minimization and mitigation measures required by the Department of Fish and Wildlife (CDFW) for the above-referenced Project are properly implemented, and thereby to ensure compliance with section 2081(b) of the Fish and Game Code and section 21081.6 of the Public Resources Code. A table summarizing the measures required by CDFW is attached. This table is a tool for use in monitoring and reporting in implementation of minimization and mitigation measures set forth in the California Incidental Take Permit (ITP) and in attachments to the ITP, and the omission of an ITP requirement from the attached table does not relieve the Permittee of the obligation to ensure the requirement is performed.

**OBLIGATIONS OF PERMITTEE**

Minimization and mitigation measures must be implemented within the time periods indicated in the table that appears below. Permittee has the primary responsibility for monitoring compliance of all measures and for reporting to CDFW on the progress in implementing those measures. These monitoring and reporting requirements are set forth in the ITP itself and are summarized at the front of the attached table.

**VERIFICATION OF COMPLIANCE, EFFECTIVENESS**

CDFW may, at its sole discretion, verify compliance with any mitigation measure or independently assess the effectiveness of any mitigation measure.

**TABLE OF MINIMIZATION AND MITIGATION MEASURES**

The following items are identified for each measure: Minimization/Mitigation Measure, Source, Implementation Schedule, Responsible Party, and Status/Date/Initials. The Minimization/Mitigation Measure column summarizes the requirements of the ITP. The Source column identifies the ITP condition that sets form the measure. The Implementation Schedule column shows the date or phase when each measure will be implemented. The Responsible Party column identifies the person or agency that is primarily responsible for implementing the measure. The status/Date/Initials column shall be completed by the Permittee during preparation of each Status Report and the Final Mitigation Report, and must identify the implementation status of each measure, the date that status was determined, and the initials of the person determining the status.

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	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
<b>PRIOR TO START OF COVERED ACTIVITIES</b>					
1	<p>Permittee shall purchase 32.68 acres of Covered Species credits from a CDFW-approved mitigation or conservation bank prior to initiating Covered Activities or no later than 18 months from the issuance of this ITP if Security is provided pursuant to Condition of Approval 11 below.</p> <p>Mitigation funding for offsite habitat acquisition will involve mitigation by purchase of lands, according to Measures 1-5 of Mitigation Compensation for Take (Section 4.2 of the ITP Application). Caltrans will ensure funding to complete activities by providing to CDFW written documentation that Caltrans has allocated sufficient funds in the Expenditure Authorization for the Project to ensure implementation of the Conditions of Approval.</p>	ITP Condition #10.1	Before starting Covered Activities	Permittee	
2	<p>To mitigate for permanent and temporary loss of COVERED Species upland habitat, Caltrans shall provide compensatory mitigation in the form of 32.68 acres of Habitat Management Lands (HIM Lands). As part of this ITP, Caltrans plans to purchase credits at a CDFW-approved mitigation bank, The La Purisima Conservation Bank (Bank). The Bank site is located in the Purisima Hills, and approximately 2.3 miles due north of the Project. Caltrans has conducted early coordination with CDFW South Coast Region Mitigation Banking Coordinator David Lawhead, CDFW Senior Environmental Scientist (Specialist) Martin Potter, and USFWS Biologist Andrea Adams, all of whom have conducted site visits to the Bank. Although the Bank has not been formally approved to sell credits at the time of this application, CDFW staff has indicated they believe the Bank will be approved within the current calendar year. Refer to Appendix F for the La Purisima Conservation Bank Proposal and mapping. Caltrans intends to purchase the required credits at a CESA certified and CDFW-approved CTS Conservation Bank. Ground- or vegetation-disturbing activities in Covered Species potential habitat are not authorized to commence until credits are purchased or no later than 18 months from the effective date of the ITP, if an approved bank cannot be found Caltrans shall precede using Conditions of Approval 11 of this ITP.</p>	ITP Condition #10.2	Before starting Covered Activities	Permittee	
3	<p>Before starting Covered Activities, Permittee shall designate a representative (Designated Representative) responsible for communications with CDFW and overseeing compliance with this ITP. Permittee shall notify CDFW in writing before starting Covered Activities of the Designated Representative's name, business address, and contact information, and shall notify CDFW in writing if a substitute Designated Representative is selected or identified at any time during the term of this</p>	ITP Condition #6.1	Before starting Covered Activities	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
4	<p>ITP.</p> <p>Permittee shall submit to CDFW in writing the name, qualifications, business address, and contact information of a biological monitor (Designated Biologist) at least 14 days before starting Covered Activities. Permittee shall ensure that the Designated Biologist is knowledgeable and experienced in the biology, natural history, and proper capturing and handling techniques of the Covered. The Designated Biologist shall be responsible for monitoring Covered Activities to help minimize and fully mitigate or avoid the incidental take of individual Covered Species and to minimize disturbance of Covered Species' habitat. Permittee shall obtain CDFW approval of the Designated Biologist in writing before starting Covered Activities, and shall also obtain approval in advance in writing if the Designated Biologist must be changed.</p>	ITP Condition #6.2	At least 14 days before starting Covered Activities	Permittee	
5	<p>Permittee shall conduct an education program for all persons employed or otherwise working in the Project Area before performing any work. The program shall consist of a presentation from the Designated Biologist, Designated Monitor, or Designated Representative that includes a discussion of the biology and general behavior of the Covered Species, information about the distribution and habitat needs of the Covered Species, sensitivity of the Covered Species to human activities, its status pursuant to CESA including legal protection, recovery efforts, penalties for violations and Project-specific protective measures described in this ITP. Permittee shall provide interpretation for non-English speaking workers, and the same instruction shall be provided to any new workers before they are authorized to perform work in the Project Area. Permittee shall prepare and distribute wallet-sized cards or a fact sheet handout containing this information for workers to carry in the Project Area. Upon completion of the program, employees shall sign a form stating they attended the program and understand all protection measures. This training shall be repeated at least once annually for long-term and/or permanent employees that will be conducting work in the Project Area.</p>	ITP Condition #6.4	Before starting Covered Activities	Permittee	
6	<p>Permittee shall initiate a trash abatement program before starting Covered Activities and shall continue the program for the duration of the Project. Permittee shall ensure that trash and food items are contained in animal-proof containers and removed at least once a week to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs.</p>	ITP Condition #6.6	Before starting Covered Activities	Permittee	
7	<p>Before starting Covered Activities along each part of the route in active construction, Permittee shall clearly delineate the boundaries of the Project</p>	ITP Condition	Before starting Covered Activities	Permittee	

	<b>Minimization/Mitigation Measure</b>	<b>Source</b>	<b>Implementation Schedule</b>	<b>Responsible Party</b>	<b>Status/Date/Initials</b>
	Area with fencing, stakes, or flags. Permittee shall restrict all Covered Activities to within the fenced, staked, or flagged areas. Permittee shall maintain all fencing, stakes, and flags until the completion of Covered Activities in that area. To ensure the environmentally sensitive area (ESA) fencing (orange plastic mesh) is placed and maintained. Contract plans will include the ESA fencing and therefore the contractor must install the fencing.	#6.9			
8	Permittee shall clearly delineate habitat of the Covered Species within the Project Area with posted signs, posting stakes, flags, and/or rope or cord, and place fencing as necessary to minimize the disturbance of Covered Species' habitat.	ITP Condition #6.10	Before starting Covered Activities	Permittee	
9	Project-related personnel shall access the Project Area using existing routes, or routes identified in the Project Description and shall not cross Covered Species' habitat outside of or en route to the Project Area. Permittee shall restrict Project-related vehicle traffic to established roads, staging, and parking areas. Permittee shall ensure that vehicle speeds do not exceed 20 miles per hour to avoid Covered Species on or traversing the roads. If Permittee determines construction of routes for travel are necessary outside of the Project Area, the Designated Representative shall contact CDFW for written approval before carrying out such an activity. CDFW may require an amendment to this ITP, among other reasons, if additional take of Covered Species will occur as a result of the Project modification.	ITP Condition #6.11	Before starting Covered Activities	Permittee	
10	Permittee shall confine all Project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to the Project Area using, to the extent possible, previously disturbed areas. Additionally, Permittee shall not use or cross Covered Species' habitat outside of the marked Project Area unless provided for as described in Condition of Approval 6.11 of this ITP. Caltrans shall confine project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities within the Caltrans right-of-way to previously disturbed area, to the greatest extent possible.	ITP Condition #6.12	Before starting Covered Activities	Permittee	
11	The Designated Representative shall notify CDFW 14 calendar days before starting Covered Activities and shall document compliance with all pre-Project Conditions of Approval before starting Covered Activities.	ITP Condition #7.1	Before starting Covered Activities	Permittee	
12	The Designated Biologist shall prepare a Covered Species relocation plan and submit to CDFW for review at least 14 days prior to Covered Activities	ITP Condition	At least 14 days before starting	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
	occurring within 1.24 miles of known and/or potential Covered Species breeding ponds. Covered Activities within these areas may not proceed until CDFW has given written authorization to the Permittee that the relocation plan has been reviewed and accepted.	#8.1	Covered Activities		
13	Permittee shall conduct pre-work surveys in Project Areas where ground disturbance would occur to characterize the habitat (e.g., number of burrows) and photograph pre-work conditions. Fiber optic cameras may be used to inspect burrows for presence of Covered Species. If Covered Species are discovered or likely to be present, a site-specific plan for avoiding or minimizing effects shall be developed and implemented prior to the work. This plan may include hand excavation of burrows to the depth allowed by soil conditions with capture (by hand) and relocation of any individuals found to nearby burrows.	ITP Condition #8.2	Before starting Covered Activities	Permittee	
<b>DURING COVERED ACTIVITIES</b>					
14	To ensure compliance with the Conditions of Approval of this ITP, the Designated Biologist shall have authority to immediately stop any activity that does not comply with this ITP, and/or to order any reasonable measure to avoid the unauthorized take of an individual of the Covered Species. Neither the Designated Biologist, Designated Monitors, nor CDFW shall be liable for any costs incurred in complying with the terms and conditions of the ITP, including cease-work orders issued by CDFW.	ITP Condition #6.3	During Covered Activities	Permittee	
15	The Designated Biologist shall maintain a construction-monitoring notebook on-site throughout the construction period, which shall include a copy of this ITP with attachments and a list of signatures of all personnel who have successfully completed the education program. Permittee shall ensure a copy of the construction-monitoring notebook is available for review at the Project site upon request by CDFW.	ITP Condition #6.5	During Covered Activities	Permittee	
16	Permittee shall continue the trash abatement program for the duration of Covered Activities. Permittee shall ensure that trash and food items are contained in closed (animal-proof) containers and removed regularly (at least once a week) to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs.	ITP Condition #6.6	During Covered Activities	Permittee	
17	Permittee shall restrict all Covered Activities to within the fenced, staked, or flagged areas. Permittee shall maintain all fencing, stakes, and flags until completion of Covered Activities in that area.	ITP Condition #6.10	During Covered Activities	Permittee	
18	Project-related personnel shall access the Project Area using existing routes, or routes identified in the Project Description and shall not cross	ITP Condition	During Covered Activities	Permittee	

	<b>Minimization/Mitigation Measure</b>	<b>Source</b>	<b>Implementation Schedule</b>	<b>Responsible Party</b>	<b>Status/Date/Initials</b>
	Covered Species' habitat outside of or en route to the Project Area. Permittee shall restrict Project-related vehicle traffic to established roads, staging, and parking areas. Permittee shall ensure that vehicle speeds do not exceed 20 miles per hour to avoid Covered Species on or traversing the roads. If Permittee determines construction of routes for travel are necessary outside of the Project Area, the Designated Representative shall contact CDFW for written approval before carrying out such an activity. CDFW may require an amendment to this ITP, among other reasons, if additional take of Covered Species will occur as a result of the Project modification.	#6.11			
19	Permittee shall confine all Project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to the Project Area using, to the extent possible, previously disturbed areas. Additionally, Permittee shall not use or cross Covered Species' habitat outside of the marked Project Area unless provided for as described in Condition of Approval 6.11 of this ITP. Caltrans shall confine project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities within the Caltrans right-of-way to previously disturbed area, to the greatest extent possible.	ITP Condition #6.12	During Covered Activities	Permittee	
20	Permittee shall immediately stop and, pursuant to pertinent state and federal statutes and regulations, arrange for repair and clean up by qualified individuals of any fuel or hazardous waste leaks or spills at the time of occurrence, or as soon as it is safe to do so. Permittee shall exclude the storage and handling of hazardous materials from the Project Area and shall properly contain and dispose of any unused or leftover hazardous products off-site.	ITP Condition #6.13	During Covered Activities	Permittee	
21	Permittee shall provide CDFW staff with reasonable access to the Project and shall otherwise fully cooperate with CDFW efforts to verify compliance with or effectiveness of mitigation measures set forth in this ITP.	ITP Condition #6.14	During Covered Activities	Permittee	
22	Permittee shall prohibit use of erosion control materials potentially harmful to Covered Species and other species, such as mono-filament netting (erosion control matting) or similar material, in potential Covered Species' habitat.	ITP Condition #6.8	During Covered Activities	Permittee	
23	The Designated Representative shall immediately notify CDFW in writing if it determines that the Permittee is not in compliance with any Condition of Approval of this ITP, including but not limited to any actual or anticipated failure to implement measures within the time periods indicated in this ITP	ITP Condition #7.2	During Covered Activities	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
	and/or the MMRP. The Designated Representative shall report any non-compliance with this ITP to CDFW within 24 hours.				
24	<p>The Designated Biologist shall be on-site daily when Covered Activities include ground disturbance or potential for handling and relocation of the Covered Species exists. Designated Monitor shall be on site daily. The Designated Biologist shall conduct compliance inspections to (1) minimize incidental take of the Covered Species; (2) prevent unlawful take of species; (3) check for compliance with all measures of this ITP; (4) check all exclusion zones; (5) ensure that signs, stakes, ESA fencing and other fencing are intact, (6) that human activities are restricted to outside of any protective zones; and (7) that Covered Activities are only occurring in the Project Area. The Designated Biologist, Designated Monitor, or Designated Representative shall prepare daily written observation and inspection records summarizing: oversight activities and compliance inspections, observations of Covered Species and their sign, survey results, and monitoring activities required by this ITP. The Designated Biologist, Designated Monitor, or Designated Representative shall conduct compliance inspections a minimum of once per week during periods of inactivity and after clearing, grubbing, and grading are completed.</p>	ITP Condition #7.3	During Covered Activities	Permittee	
25	<p>The Designated Representative or Designated Biologist shall compile the observation and inspection records identified in Condition of Approval 7.3 into a Monthly Compliance Report and submit it to CDFW along with a copy of the MMRP table with notes showing the current implementation status of each mitigation measure. Monthly Compliance Reports shall be submitted to CDFW's Regional Office at the office listed in the Notices section of this ITP and via e-mail to CDFW's Regional Representative. At the time of this ITP's approval, the CDFW Regional Representative Ms. Jamie Jackson (jamie.jackson@wildlife.ca.gov). CDFW may at any time increase the timing and number of compliance inspections and reports required under this provision depending upon the results of previous compliance inspections. If CDFW determines the reporting schedule must be changed, CDFW will notify Permittee in writing of the new reporting schedule.</p>	ITP Condition #7.4	During Covered Activities	Permittee, CDFW	
26	<p>Permittee shall provide CDFW with an Annual Status Report (ASR) no later than January 31 of every year beginning with issuance of this ITP and continuing until CDFW accepts the Final Mitigation Report identified below. Each ASR shall include, at a minimum: (1) a summary of all Monthly Compliance Reports for that year identified in Condition of Approval 7.4; (2) a general description of the status of the Project Area</p>	ITP Condition #7.5	During Covered Activities	Permittee	

	<b>Minimization/Mitigation Measure</b>	<b>Source</b>	<b>Implementation Schedule</b>	<b>Responsible Party</b>	<b>Status/Date/Initials</b>
	<p>and Covered Activities, including actual or projected completion dates, if known; (3) a copy of the table in the MMRP with notes showing the current implementation status of each mitigation measure; (4) an assessment of the effectiveness of each completed or partially completed mitigation measure in avoiding, minimizing and mitigating Project impacts; (5) all available information about Project-related incidental take of the Covered Species; (6) an accounting of the number of acres subject to both temporary and permanent disturbance, both for the prior calendar year, and a total since ITP issuance; and (7) information about other Project impacts on the Covered Species.</p>				
27	<p>The Designated Biologist shall submit all observations of Covered Species to CDFW's California Natural Diversity Database (CNDDDB) within 60 calendar days of the observation and the Designated Biologist shall include copies of the submitted forms with the next Monthly Compliance Report or ASR, whichever is submitted first relative to the observation.</p>	ITP Condition #7.6	During Covered Activities	Permittee	
28	<p>Permittee shall immediately notify the Designated Biologist if a Covered Species is taken or injured by a Project-related activity, or if a Covered Species is otherwise found dead or injured within the vicinity of the Project. The Designated Biologist or Designated Representative shall provide initial notification to CDFW by calling the Regional Office at (858) 467-4201. The initial notification to CDFW shall include information regarding the location, species, and number of animals taken or injured and the ITP Number. Following initial notification, Permittee shall send CDFW a written report within two calendar days. The report shall include the date and time of the finding or incident, location of the animal or carcass, and if possible provide a photograph, explanation as to cause of take or injury, and any other pertinent information.</p>	ITP Condition #7.8	During Covered Activities	Permittee	
29	<p>Permittee shall minimize the area to be disturbed whenever vegetation must be cleared, underground structures need to be excavated, or access roads need to be repaired. The need to minimize the area disturbed and the limits of the work area shall be clearly explained to all contractors and equipment operators by Permittee inspectors, the Designated Representative, or the Designated Biologist, or the Designated Monitor.</p>	ITP Condition #8.5	During Covered Activities	Permittee	
30	<p>Covered Species found within the project API shall be relocated to an active rodent burrow system in a CDFW-approved relocation area. Relocation areas shall be identified by the Designated Biologist prior to the start of construction, and are subject to CDFW approval pursuant to</p>	ITP Condition #8.7	During Covered Activities	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
	Condition 8.1 of this ITP.				
31	Activities within potential Covered Species habitat shall be restricted to periods of low rainfall (less than ½ inch per 24 hour period), or time periods with less than a 70% forecasted chance of rain. Caltrans shall monitor the National Weather Service (NWS) 24hour forecast for the project area. If work must continue when greater than 70% chance of rain is forecast, then a Designated Biologist must survey the Project site before construction begins each day that rain is forecast. If a Designated Monitor is used to conduct surveys, a Designated Biologist must still be available to capture and relocate any Covered Species that are discovered during the surveys. If rain exceeds ½ inch during a 24 hour period, work shall cease until no further rain (greater than 70% chance) is forecast.	ITP Condition #8.8	During Covered Activities	Permittee	
32	All Covered Activities where there is potential upland habitat for the Covered Species shall be restricted to the dry season (May 7 to October 31), or periods of low rainfall (less than ½ inch per 24 hour period, or time periods with less than 70% forecasted chance of rain).	ITP Condition #8.9	During Covered Activities	Permittee	
33	All Covered Activities within Covered Species potential upland habitat shall terminate 30 minutes before sunset and shall not resume until 30 minutes after sunrise during the Covered Species migration/active season from November 1 to June 14. Caltrans shall use sunrise and sunset times established by the U.S. Naval Observatory Astronomical Applications Department for the geographic area where the project is located. If night work cannot be avoided during this time period then a Designated Biologist must survey the project site before construction begins each night. If a Designated Monitor is used to conduct surveys, a Designated Biologist must still be available to capture and relocate any Covered Species that are discovered during the surveys.	ITP Condition #8.10	During Covered Activities	Permittee	
34	Ground-disturbing night work within potential Covered Species habitat shall be strictly prohibited when a 70% or greater chance of rainfall is predicted within 24 hours of project activity. Ground disturbing night work may not resume until a 70% or greater chance of rainfall is not predicted within 24 hours.	ITP Condition #8.11	During Covered Activities	Permittee	
35	To ensure that disease are not conveyed between work sites by the Designated Biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force must be followed at all times. All equipment that may come in contact with aquatic habitat must first be disinfected with ethanol solution. The Designated Biologist may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the	ITP Condition #8.13	During Covered Activities	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
	ethanol solution. Care must be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.				
36	The Designated Monitor(s) shall inspect all open trenches, auger holes, and other excavations that may trap Covered Species prior to any work in or around them and before they are backfilled. Designated Biologist shall safely remove and relocate any Covered Species they find in accordance with this ITP and as conditioned in 8.1.	ITP Condition #8.14	During Covered Activities	Permittee	
37	If a Covered Species is injured as a result of project-related activities, it shall be immediately taken to a CDFW approved wildlife rehabilitation or veterinary facility. Caltrans shall identify the facility prior to the start of ground or vegetation disturbing activities and provide this information as part of the Relocation Plan as Conditioned in Measure 8.1 of this ITP. Caltrans shall bear any costs associated with the care or treatment of such injured Covered Species. Caltrans shall notify CDFW of the injury to the Covered Species immediately unless the incident occurs outside of normal business hours. In that event CDFW shall be notified no later than noon on the next business day. Notification to CDFW shall be via telephone or email, followed by a written incident report. Notification shall include the date, time, location and circumstances of the incident and the name of the facility where the animal was taken.	ITP Condition #8.15	During Covered Activities	Permittee	
<b>POST COVERED ACTIVITIES</b>					
38	Upon completion of Covered Activities, Permittee shall remove from the Project Area and properly dispose of all temporary fill and construction refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes.	ITP Condition #6.15	After Covered Activities Completed	Permittee	
39	No later than 45 days after completion of the Project, including all mitigation measures, Permittee shall provide CDFW with a Final Mitigation Report. The Designated Biologist shall prepare the Final Mitigation Report which shall include, at a minimum: (1) a summary of all Monthly Compliance Reports and all ASRs; (2) a copy of the table in the MMRP with notes showing when each of the mitigation measures was implemented; (3) all available information about Project-related incidental take of the Covered Species; (4) information about other Project impacts on the Covered Species; (5) beginning and ending dates of Covered Activities; (6) an assessment of the effectiveness of this ITP's Conditions of Approval in minimizing and fully mitigating Project impacts of the taking	ITP Condition #7.7	After Covered Activities Completed	Permittee	

	<b>Minimization/Mitigation Measure</b>	<b>Source</b>	<b>Implementation Schedule</b>	<b>Responsible Party</b>	<b>Status/Date/Initials</b>
	<p>on Covered Species; (7) recommendations on how mitigation measures might be changed to more effectively minimize take and mitigate the impacts of future projects on the Covered Species; and (8) any other pertinent information.</p>				
40	<p>Within 1.24 miles of known occupied, or potential occupied Covered Species breeding pond site(s) (including but not limited to the sites shown in Figure 3) Caltrans shall follow their Standard Plan Type E curbs and Type D and Type E Dikes designs as the preferred designs (refer to Caltrans Standard Plan A87, Curbs, Dikes, and Driveways) when such structures require replacement, rehabilitation, or new construction.</p>	ITP Condition #8.16	After Covered Activities Completed	Permittee	
41	<p>Approximately 6.15 acres of pavement within the Project API will be obliterated and restored to annual grassland and managed as quality Covered Species upland habitat (refer to Appendix D for location). Based on early coordination with CDFW, this "habitat creation" could offset required mitigation for permanent impacts at the rate of two habitat creation acres for every one acre of required compensation for permanent impacts (2:1) Using this ratio, the pavement obliteration/habitat restoration will reduce the requirement for permanent impacts mitigation by 12.3 acres. A total of 12.3 acres will be reduced from the 30.7 acres required compensation for the permanent loss of potential upland Covered Species habitat bringing the total required off site compensation for permanent impacts to Covered Species upland habitat to 18.4 acres.</p>	ITP Condition 9.4	After Covered Activities Completed	Permittee	
42	<p>Caltrans proposes to construct six amphibian under-crossings clustered in closest proximity to known occupied breeding ponds. See Figures 4-11 for locations of proposed under-crossings.</p>	ITP Condition 9.5	After Covered Activities Completed	Permittee	
43	<p>Habitat Mitigation Monitoring and Restoration Plan (HMMP). Permittee shall create on-site 6.15 acres of Covered Species habitat that will be maintained as optimal upland habitat for the Covered Species. Within 6 months of issuance of this ITP, the Permittee shall prepare a Vegetation Restoration Plan to facilitate revegetation of the 6.15 acres and shall ensure that the Plan is successfully implemented by the contractor. The Plan shall include detailed specifications for restoring all temporarily disturbed areas, such as seed mixes and application methods. The plan shall also indicate the best time of year for seeding to occur. Plantings undertaken between May and October shall include regular watering to ensure adequate growth. Described below are the minimum avoidance, minimization, restoration measures and success criteria that must be</p>	ITP Condition 10.8	After Covered Activities Completed	Permittee	

	Minimization/Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status/Date/Initials
	<p>included in the Vegetation Restoration Plan. The HMMP must be approved by the Department in writing prior to any Project related disturbances at the Project site. Described below are the minimum avoidance, minimization, restoration measures and success criteria that must be included in the HMMP</p> <ul style="list-style-type: none"> <li>•The creation habitat site shall include no more than 5% non-native percent cover in any vegetation layer (tree, shrub, liana, herb, forbs, and grass) in any year.</li> <li>•The HMMP shall contain measurements of species diversity, abundance, cover, etc., to ensure the health of the habitat is at least as healthy as that of an identified, healthy, reference site. This data shall be collected for each vegetation layer (tree, shrub, liana, herb, forbs, and grass) every year.</li> <li>•The HMMP shall contain a detailed plan to monitor the success of the Covered Species HR lands, including the use of a reference site and scientifically accepted sampling methodology for assessing success.</li> </ul>				

**ATTACHMENT 2A**

DEPARTMENT OF FISH AND WILDLIFE

**HABITAT MANAGEMENT LAND ACQUISITION PACKAGE CHECKLIST FOR PROJECT APPLICANTS**

The following checklist is provided to inform you of what documents are necessary to expedite the Department of Fish and Wildlife (CDFW) processing of your Habitat Management Land acquisition proposal. Any land acquisition processing requests which are incomplete when received, will be returned. The Region contact will review and approve the document package and forward it to the Habitat Conservation Planning Branch Senior Land Agent with a request to process the land acquisition for formal acceptance.

To: \_\_\_\_\_  
Regional Manager, Region Name

From: \_\_\_\_\_  
Project Applicant

Phone: \_\_\_\_\_

Tracking #: \_\_\_\_\_  
CDFW assigned permit or agreement #

Project Name: \_\_\_\_\_

Enclosed is the complete package for the  Conservation Easement OR  Grant Deed Documents in this package include:

Fully executed, approved as to form Conservation Easement Deed or Grant Deed.  
Date executed: \_\_\_\_\_

Proposed Lands for Acquisition Form (PLFAF)

Phase I Environmental Site Assessment Report Date on report: \_\_\_\_\_  
(An existing report may be used, but it must be less than two years old.)

Preliminary Title Report(s) for subject property is enclosed and has been reviewed for encumbrances and other easements. The title report must be less than six months old when final processing is conducted.

Included are additional documents:

document(s) to support title exceptions

document(s) to explain title encumbrances

a plot or map of easements/encumbrances on the property

Policy of Title Insurance (an existing title policy is not acceptable)

County Assessor Parcel Map(s) for subject property

Site Location Map (Site location with property boundaries outline on a USGS 1:24,000 scale topo)

Final Permit or Agreement (or other appropriate instrument)

Type of agreement:  Bank Agreement  Mitigation Agreement

Permit \_\_\_\_\_ Other: \_\_\_\_\_  
(write in type of permit)

Final Management Plan (if required prior to finalizing permit or agreement or if this package is for a Grant Deed)

Biological Resources Report

Draft Summary of Transactions  hard copy  electronic copy (both are required)

ATTACHMENT 2B

PROPOSED LANDS FOR ACQUISITION FORM ("PLFAF")

Date: \_\_\_\_\_

TO: Regional Representative  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Facsimile: \_\_\_\_\_

FROM: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Applicant proposes that the following parcel of land be considered for approval by the CDFW as suitable for purposes of habitat management lands to replace the adverse environmental impacts of the Project:

<u>Section</u>	<u>Township</u>
	<u>Range</u>
	<u>Number of Acres</u>
_____	_____
	_____
	_____

Current Legal Owner(s), include Parcel Number(s):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Location of Parcel:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPROVED \_\_\_\_\_ By: \_\_\_\_\_ DATE: \_\_\_\_\_  
REJECTED \_\_\_\_\_ \_\_\_\_\_  
Region \_\_\_\_\_

Explanation: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

IRREVOCABLE STANDBY LETTER OF CREDIT  
NO. [*Number issued by financial institution*]

---

Issue Date: [*date*]

Beneficiary:

Department of Fish and Wildlife  
1416 Ninth Street, 12<sup>th</sup> Floor  
Sacramento, CA 95814  
Attn: HCPB Mitigation Account Coordinator

Amount: U.S. \$[*dollar number*] [(*dollar amount*)]

Expiry: [*Date*] at our counters

Dear Sirs:

1. At the request and on the instruction of our customer, [*name of applicant*] ("Applicant"), we, [*Name of financial institution*] ("Issuer"), hereby establish in favor of the beneficiary, the California Department of Fish and Wildlife ("CDFW"), this irrevocable standby letter of credit ("Credit") in the principal sum of U.S. \$[*dollar number*] [(*dollar amount*)] ("Principal Sum").
2. We are informed this Credit is and has been established for the benefit of the CDFW pursuant to the terms of the incidental take permit for the [*name of project*] issued by the CDFW to the Applicant on [*date*] (No. [*number*]) ("Permit").
3. We are further informed that pursuant to the Permit, the Applicant has agreed to complete certain mitigation requirements, as set forth in Conditions [*numbers*] in the Permit ("Mitigation Requirements").
4. We are finally informed that this Credit is intended by the CDFW and the Applicant to serve as a security device for the performance by the Applicant of the Mitigation Requirements.
5. The CDFW shall be entitled to draw upon this Credit only by presentation of a duly executed Certificate for Drawing ("Certificate") in the same form as Attachment A, which is attached hereto, at our office located at [*name and address of financial institution*].
6. The Certificate shall be completed and signed by an "Authorized Representative" of the CDFW as defined in paragraph 12 below. Presentation by the CDFW of a completed Certificate may be made in person or by registered mail, return receipt requested, or by overnight courier.

7. Upon presentation of a duly executed Certificate as above provided, payment shall be made to the CDFW, or to the account of the CDFW, in immediately available funds, as the CDFW shall specify.
8. If a demand for payment does not conform to the terms and conditions of this Credit, we shall give the CDFW prompt notice that the demand for payment was not effected in accordance with the terms and conditions of this Credit, state the reasons therefore, and await further instruction.
9. Upon being notified that the demand for payment was not effected in conformity with the Credit, the CDFW may correct any such non-conforming demand for payment under the terms and conditions stated herein.
10. All drawings under this Credit shall be paid with our funds. Each drawing honored by us hereunder shall reduce, *pro tanto*, the Principal Sum. By paying to the CDFW an amount demanded in accordance herewith, we make no representations as to the correctness of the amount demanded.
11. This Credit will be cancelled upon receipt by us of Certificate of Cancellation, which: (i) shall be in the form of Attachment B, which is attached hereto, and (ii) shall be completed and signed by an Authorized Representative of the CDFW, as defined in paragraph 12 below.
12. An "Authorized Representative" shall mean either the Director of the Department of Fish and Wildlife, the General Counsel of the Department of Fish and Wildlife, or a Regional Manager of the Department of Fish and Wildlife.
13. This Credit shall be automatically extended without amendment for additional periods of one year from the present or any future expiration date hereof, unless at least sixty (60) days prior to any such date, we notify the CDFW in writing by registered mail, return receipt requested, or by overnight courier that we elect not to consider this Credit extended for any such period.
14. Communications with respect to this Credit shall be in writing and addressed to us at **[name and address of financial institution]**, specifically referring upon such writing to this credit by number. The address for notices with respect to this Credit shall be: (i) for the CDFW: Department of Fish and Wildlife, Habitat Conservation Planning Branch, 1416 Ninth Street, 12th Floor, Sacramento, California 95814-2090 Attn: HCPB Mitigation Account Coordinator; and (ii) for the Applicant: **[name and address of applicant]**.
15. This Credit may not be transferred.
16. This Credit is subject to the International Standby Practices 1998 ("ISP 98"). As to matters not covered by the ISP 98 and to the extent not inconsistent with the ISP 98, this credit shall be governed by and construed in accordance with the Uniform Commercial Code, Article 5 of the State of California.
17. This Credit shall, if not canceled, expire on **[expiration date]**, or any extended expiration date.

18. We hereby agree with the CDFW that documents presented in compliance with the terms of this Credit will be duly honored upon presentation, as specified herein.

19. This Credit sets forth in full the terms of our undertaking. Such undertaking shall not in any way be modified, amended or amplified by reference to any document or instrument referred to herein or in which this Credit is referred to or to which this Credit relates and any such reference shall not be deemed to incorporate herein by reference any document or instrument.

**[Name of financial institution]**

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Attachment A (PART OF ATTACHMENT 3)

IRREVOCABLE STANDBY LETTER OF CREDIT NO. [**Number issued by financial institution**]  
CERTIFICATE FOR DRAWING

To:

[**Name and address of financial institution**]

Re: Incidental Take Permit No. [**permit number**]

The undersigned, a duly Authorized Representative of the Department of Fish and Wildlife ("CDFW"), as defined in paragraph 12 in the above-referenced Irrevocable Standby Letter of Credit ("Credit"), hereby certifies to the Issuer that:

1. [**Insert one of the following statements:** "In the opinion of the CDFW, the Applicant has failed to complete the Mitigation Requirements referenced in paragraph 3 of the Credit." **or** "As set forth in paragraph 13, the Issuer has informed the CDFW that the Credit will not be extended and the Applicant has not provided the CDFW with an equivalent security approved by the CDFW to replace the Credit."]
2. The undersigned is authorized under the terms of the Credit to present this Certificate as the sole means of demanding payment on the Credit.
3. The CDFW is therefore making a drawing under the Credit in amount of U.S. \$ \_\_\_\_\_.
4. The amount demanded does not exceed the Principal Sum of the Credit.

Therefore, the CDFW has executed and delivered this Certificate as of the \_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

BY: \_\_\_\_\_

[**Insert one of the following:** "DIRECTOR" **or** "GENERAL COUNSEL" **or** "REGIONAL MANAGER, [**NAME OF REGIONAL OFFICE**"]]

Attachment B (PART OF ATTACHMENT 3)  
IRREVOCABLE LETTER OF CREDIT NO. **[Number issued by financial institution]**  
CERTIFICATE FOR CANCELLATION

To:

**[Name of financial institution and address]**

Re: Incidental Take Permit No. **[permit number]**

The undersigned, a duly Authorized Representative of the California Department of Fish and Wildlife ("CDFW"), as defined in the paragraph 12 in the above-referenced Irrevocable Standby Letter of Credit ("Credit"), hereby certifies to the Issuer that:

1. **[Insert one of the following statements:** "The Applicant has presented documentary evidence of full compliance with the Mitigation Requirements referenced in paragraph 3 of the Credit." **or** "The natural expiration of this Credit has occurred."]
2. The CDFW therefore requests the cancellation of the Credit.

Therefore, the CDFW has executed and delivered this Certificate for Cancellation as of the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

BY: \_\_\_\_\_

**[Insert one of the following: "DIRECTOR" or "GENERAL COUNSEL" or "REGIONAL MANAGER, [NAME OF REGIONAL OFFICE]"]**

California Department of Fish and Wildlife  
**Mitigation Payment Transmittal Form**

**Project Applicant Instructions:** Please fill out and attach this form to payment. For conservation banks, also attach the Bill(s) of Sale for credits sold. One form may be used for multiple transactions, **BUT YOU MUST USE A SEPARATE FORM FOR EACH CHECK YOU TRANSMIT.** Make sure to include Project Name, Project Tracking Number, and FASB Mitigation Tracking Number (if available) on the attached payment type.

(1) **DATE:** \_\_\_\_\_

**TO:** \_\_\_\_\_  
 [CDFW Regional Manager]  
 \_\_\_\_\_  
 [CDFW Region Office Address]

(2) **FROM:** \_\_\_\_\_  
 Name  
 \_\_\_\_\_  
 Mailing Address  
 \_\_\_\_\_  
 City, State, Zip  
 \_\_\_\_\_  
 Telephone Number/FAX Number

(3) **RE:** \_\_\_\_\_  
 [Project Name as appears on permit/agreement]

(4) **AGREEMENT/ACCOUNT INFORMATION:**  
 (Check the applicable type)

2081 Permit     Conservation Bank     1802 Agreement  
 2835 NCCP     Other \_\_\_\_\_

\_\_\_\_\_  
 XXXX-XXXX-XXX-XX  
 [Project Tracking Number]

\_\_\_\_\_  
 [FASB Mitigation Tracking Number (if available)]

Index \_\_\_\_\_ PCA \_\_\_\_\_

(5) **PAYMENT TYPE** (One check per form only): The following funds are being remitted in connection with the above referenced project:

Check information:

Total \$ \_\_\_\_\_ Check No. \_\_\_\_\_

Account No. \_\_\_\_\_ Bank Routing No. \_\_\_\_\_

a. Endowment: for Long-Term Management                      Subtotal \$ \_\_\_\_\_

b. Habitat Enhancement    Subtotal \$ \_\_\_\_\_

c. Security:

1. Cash Refundable Security Deposit                      Subtotal \$ \_\_\_\_\_

2. Letter of Credit    Subtotal \$ \_\_\_\_\_

1. Financial Institution: \_\_\_\_\_

2. Letter of Credit Number: \_\_\_\_\_

3. Date of Expiration: \_\_\_\_\_

### The Declining Amphibian Task Force Fieldwork Code of Practice

A code of practice, prepared by the Declining Amphibian Task Force (DAPTF) to provide guidelines for use by anyone conducting field work at amphibian breeding sites or in other aquatic habitats. Observations of diseased and parasite-infected amphibians are now being frequently reported from sites all over the world. This has given rise to concerns that releasing amphibians following a period of captivity, during which time they can pick up unapparent infections of novel disease agents, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried in a variety of ways between habitats on the hands, footwear, or equipment of fieldworkers, which can spread them to novel localities containing species which have had little or no prior contact with such pathogens or parasites. Such occurrences may be implicated in some instances where amphibian populations have declined. Therefore, it is vitally important for those involved in amphibian research (and other wetland/pond studies including those on fish, invertebrates and plants) to take steps to minimize the spread of disease and parasites between study sites.

1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires and all other surfaces. Rinse cleaned items with sterilized (e.g. boiled or treated) water before leaving each study site.
2. Boots, nets, traps, etc., should then be scrubbed with 70% ethanol solution (or sodium hypochlorite 3 to 6%) and rinsed clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond or wetland.
3. In remote locations, clean all equipment as described above upon return to the lab or "base camp". Elsewhere, when washing machine facilities are available, remove nets from poles and wash with bleach on a "delicates" cycle, contained in a protective mesh laundry bag.
4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated species, wear disposable gloves and change them between handling each animal. Dedicate sets of nets, boots, traps, and other equipment to each site being visited. Clean and store them separately at the end of each field day.
5. When amphibians are collected, ensure the separation of animals from different sites and take great care to avoid indirect contact between them (e.g. via handling, reuse of containers) or with other captive animals. Isolation from un-sterilized plants or soils which have been taken from other sites is also essential. Always use disinfected/disposable husbandry equipment.
6. Examine collected amphibians for the presence of diseases and parasites soon after capture. Prior to their release or the release of any progeny, amphibians should be quarantined for a period and thoroughly screened for the presence of any potential disease agents.
7. Used cleaning materials (liquids, etc.) should be disposed of safely and if necessary taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

Incidental Take Permit  
No. 2081-2013-064-05

California Department of Transportation (Caltrans)  
HIGHWAY 246 PASSING LANES PROJECT (EA 05-0C640)

# **INFORMATION HANDOUT**

**For Contract No. 05-0C6404**

**At 05-SB-246-12.3/R16.7**

**Identified by**

**Project ID 0500000021**

## **MATERIALS INFORMATION**

[6. Geotechnical design Report Dated 3/21/12](#)

**M e m o r a n d u m** *Flex your power!*

*Be energy efficient!*

**To:** FOAD AL-HAMDANI  
Senior Design Engineer  
Central Region Project Development  
Office of Design II, Branch H

**Date:** March 21, 2012

**File:** 05-0C6401 (0500000021)  
05-SB-246-R12.8/R17.6  
Construct Passing Lanes

**Attn:** Apurva N. Gokal  
Project Engineer

**From:** DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES

**Subject:** Geotechnical Design Report

A Geotechnical Design Report (GDR) is provided for the above referenced project per your request, dated August 4, 2011. The project proposes to construct passing lanes and operational improvements on Route 246 in Santa Barbara County between post mile R12.8 and post mile R17.6 to improve traffic safety, mobility, reliability and multi-modal functionality along that segment of highway. A Vicinity Map showing the project location is presented as Attachment 1.

The recommendations presented herein are based on reviews of published data, site reconnaissance, subsurface investigations, and laboratory testing. The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of differing site conditions.

This report is intended for use by the project design engineer, construction personnel, bidders, and contractors.

**Existing Facilities and Proposed Improvements**

**Classification**

State Route 246 in the project area is a Class I two-lane highway as defined by the Highway Capacity Manual. Class I highways are facilities on which drivers expect to travel at relatively high speeds. These facilities share the following characteristics:

- Major intercity routes
- Primary arterials connecting major traffic generators
- Daily commuter routes

- Primary links in state or national highway networks
- Generally serve long-distance trips

Route 246 is an intercity daily commuter route between the City of Lompoc and the City of Buellton. It serves as a primary link to the national highway network at U.S. Route 101. It also serves as an alternative route to Route 1 when the highway is closed south of Lompoc.

### **Existing Embankments**

The existing roadway between "LOL" Stations 236+00 and 259+00 was constructed on an embankment, up to 25 feet in height. The slopes are inclined at 2:1. The embankment is constructed of fine sand, probably derived from cuts in the Orcutt Sand Formation. The slopes are well vegetated with grasses and abundant brush, and appear globally stable. The slope faces are generally in good condition, but exhibit minor irregularities that were probably caused by erosion.

### **Existing Cut slopes**

There are several cut slopes along the existing highway alignment within the project limits. They range in height from 10 feet to 60 feet. Slope inclinations are typically 2:1. The slopes appear globally stable, but most are experiencing some degree of erosion damage.

#### Station 208+00 to Station 222+00

This section of roadway is within Quaternary Orcutt Sand (geologic unit  $Q_o$ ), and is in a through cut. The slopes are inclined at 2:1 and flatter, and are up to approximately 14 feet in height. The slopes are vegetated with grasses. There is severe erosion on the slope on the south side of the roadway between approximate Stations 214+75 and 215+60, and on the slope on the north side of the roadway between approximate Stations 219+50 and 221+00.

#### Station 260+00 to Station 276+00

This section of roadway lies within Quaternary Orcutt Sand (geologic unit  $Q_o$ ), and is in a through cut. The slope on the northerly side of the road is up to approximately 40 feet high and is inclined at 2:1. The slope is sparsely vegetated with grasses and has significant erosion damage.

The slope on the southerly side of the highway at this location is up to about 20 feet high and is inclined at 2.5:1. It is sparsely vegetated with grasses. There are minor surficial irregularities, but the slope appears to be performing significantly better than the one on the north side of the road.

#### Station 286+00 to Station 297+50

This portion of the roadway is also within Quaternary Orcutt Sand (geologic unit  $Q_o$ ). There is a cut slope on the northerly side of the roadway that is approximately 30 feet high and is inclined at 2:1.

It is vegetated with grasses and brush and is performing well with the exception of some localized erosion damage at approximately mid slope between Stations 290+80 and 291+40.

#### Station 356+50 to Station 361+00

This section of roadway is within Quaternary older alluvial deposits (geologic unit  $Q_{oa}$ ). There is a cut slope on the northerly side of the roadway that is approximately 50 feet high and is inclined at 2.3:1. The slope is vegetated with grasses and exhibits severe erosion damage.

#### Station 366+00 to Station 369+00

This portion of the project area is within Quaternary older alluvial deposits (geologic unit  $Q_{oa}$ ) and the roadway is in a through cut. The slope on the northerly side of the roadway is approximately 60 feet high and is inclined at 2.3:1. It is severely eroded. The slope on the southerly side of the highway is approximately 15 feet high and is inclined at 2:1. It is vegetated with grasses and brush and is generally in good condition.

#### Station 374+50 to Station 391+00

This section of highway is within Quaternary older alluvial deposits (geologic unit  $Q_{oa}$ ) and is in a through cut. The slope on the northerly side of the roadway is up to 45 feet high and is inclined at 1.7:1 to 2.3:1. It is severely eroded, even though a concrete lined ditch was provided at approximately mid slope. An earthen berm was constructed at the top of slope in an attempt to prevent off site water from running down the face of the slope. Unfortunately, the berm concentrated runoff transverse to the cut face, which resulted in erosion that cut gullies as deep as 10 feet along the top of the cut face.

The slope on the southerly side of the highway is up to 30 feet high and is inclined at 2:1. It too is severely eroded.

#### Station 406+00 to Station 416+50

This section of roadway is within Quaternary older alluvial deposits (geologic unit  $Q_{oa}$ ). There is a cut slope on the northerly side of the roadway that is up to 30 feet in height, and is inclined at approximately 2:1. It is severely eroded.

### **Roadway**

The existing roadway consists of two 10-foot to 12-foot lanes and outside shoulders varying in width between 1 foot and 8 feet. The proposed project will construct passing lanes and will provide turn channelization and other operational improvements at intersections within the project limits. A vertical curve correction is proposed in the vicinity of the intersection of Route 246 with Tularosa Road to improve sight distance. The roadway will be realigned to the south of the existing lanes so that the vertical curve correction can be completed without impacting traffic during construction.

### **Pertinent Reports and Investigations**

The following publications and references were used to assist in the evaluation of site conditions:

1. Caltrans ARS Online.
2. *Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California*, Thomas W. Dibblee, Jr., 1988.
3. *Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California*, Thomas W. Dibblee, Jr., 1993.
4. *Geotechnical Services Design Manual, Version 1.0*, Division of Engineering Services, August 2009.
5. *Soil Survey of Northern Santa Barbara Area, California*, United States Department of Agriculture, Natural Resource Conservation Service.

Field reviews of the project area have been performed by personnel from this office to determine potential geologic and geotechnical issues that may impact the construction and performance of the facility over its design life. In addition, a subsurface investigation was conducted in the area of the proposed vertical curve correction to assess foundation conditions for embankment construction and to determine strength parameters of the soil that will be used to construct the embankments.

### **Physical Setting**

The project area is located near the northern margin of the Transverse Ranges Geomorphic Province, just outside of the southern margin of the Coast Ranges Geomorphic Province. The Transverse Ranges province is characterized by east-west trending mountain ranges and faults. It contains hills and dissected plains between the Santa Ynez River and Santa Ynez Fault to the south, the Santa Maria Valley to the north, and the San Rafael Mountains to the northeast.

### **Climate**

The climate in the project area is mild with a strong coastal influence. Daytime temperatures during the summer months are generally in the low to mid 70's (°F) with occasional extreme temperatures into the 100's. Nighttime summer temperatures are normally in the low to mid 50's. Winter temperatures generally have lows in the low 40's with highs in the mid to upper 60's. The area typically receives almost all of its rainfall between October and May with the heaviest rains occurring during the winter months. Average annual rainfall is approximately 15 inches.

Fog is a common feature of the weather in the project area during the summer months. The marine layer typically rolls in during the late night or early morning hours, and dissipates in the late morning or early afternoon. High winds are also common in the project area.

## **Topography and Drainage**

The project site is located in the Santa Rita Valley of Santa Barbara County. The terrain along the roadway alignment within the project limits is flat to moderately sloping. Roadway elevations in the project area range between approximately 130 feet and 560 feet. Adjacent land use is primarily agricultural.

The project traverses several watersheds including Purisima Canyon, Thompson Park, Cebada Canyon, and Santa Rita Valley. All of these watersheds ultimately drain to the Santa Ynez River, which lies to the south of the project area. The Santa Ynez River outlets to the Pacific Ocean north of Surf, within Vandenberg Air Force Base property.

## **Regional Geology**

Route 246 is located in the Santa Rita Valley at the western end of the Transverse Ranges geomorphic province, characterized by east-west trending mountains and valleys. The western Transverse Ranges are mostly composed of thick (thousands of feet) marine and non-marine sedimentary rocks. Route 246 is bounded to the south by the Santa Ynez Range and the north by the Purisima Hills. This region is rapidly uplifting and shortening along a system of east-west trending faults and folds (synclines and anticlines) from dextral transverse movement on the San Andreas Fault system past the Big Bend. Regional compression has generated a system of steeply dipping reverse and transverse faults. The Santa Ynez River Fault Zone, which parallels the northern flanks of the Santa Ynez Range and Route 246, is the primary mechanism for rapid uplift of the Santa Ynez Range. The resulting structure and rocks of marine origin are the source of numerous oil fields in the region, the closest to the site being the Lompoc Oil Field in the Purisima Hills.

The Santa Rita Valley is structurally controlled by the Santa Rita Syncline, which creates a topographic depression for locally derived Holocene valley and floodplain deposits (Attachment 2). The Santa Rita Valley is bounded on either side by the Orcutt and Paso Robles Formations. The Orcutt Formation is generally regarded as a terrace deposit of aeolian sand and interbedded coarse rounded gravels with minor amounts of silt and clay with a maximum thickness of about 200-feet. The Paso Robles Formation within the Santa Rita Valley, is up to 700-feet thick, and composed of fluvial, lenticular deposits sands and gravels, interbedded with silt and clay.

## **Seismicity**

The project is located within a seismically active region of California. There are several earthquake faults in close proximity to the project area. Table 1 lists the active and potentially active faults in the project vicinity as described in Caltrans's *2007 Fault Database*. Corresponding Moment Magnitudes and distances to the project area are also given. A fault map is included in the attachments to this report.

**Table 1: Active and Potentially Active Faults**

Fault	Moment Magnitude of Maximum Credible Earthquake <sup>1</sup>	Type of Fault <sup>2</sup>	Distance to Fault from Project Area (kilometers)	
			Westerly Project Limit	Easterly Project Limit
Santa Ynez River Fault Zone	7.1	LLSS	2.6	1.5
Canada Honda Fault	6.5	RLSS	4.7	11.6
Lions Head Fault	6.6	R	5.9	5.9
Los Alamos Fault	6.9	R	12.0	10.5
Santa Ynez Fault Zone (Pacífico section)	7.1	LLSS	17.1	16.5
Casmalia Fault	6.5	R	17.5	18.4
Santa Ynez Fault Zone (Santa Ynez section)	7.1	LLSS	24.7	18.7
Little Pine Fault	7.1	R	26.0	21.1
North Channel Slope	7.4	R	22.9	22.7
Southern San Luis Range Fault Zone	7.2	R	25.8	22.9

**Soil Survey Mapping**

According to *Soil Survey of Northern Santa Barbara Area, California*, (United States Department of Agriculture, Natural Resource Conservation Service) the following soil types are present in the project area. Included in the soil descriptions are recommended values for the erodibility factor, “K,” to be used in the Universal Soil Loss Equation (USLE):

- ArD: Arnold sand, 5 to 15 percent slopes; somewhat excessively drained; form on backslopes of hills; parent material is residual soil weathered from sandstone; K=0.17.
- ArF: Arnold sand, 15 to 45 percent slopes; somewhat excessively drained; form on backslopes of hills; parent material is residual soil weathered from sandstone; K=0.20.
- ArF3: Arnold sand, 9 to 45 percent slopes, severely eroded; somewhat excessively drained; form on backslopes of hills; parent material is residual soil weathered from sandstone; K=0.17.
- BtA2: Botella clay loam, 0 to 2 percent slopes, eroded; well drained; form on toeslopes of alluvial fans; parent material is alluvium derived from acid sandstone and shale; K=0.20.

<sup>1</sup> According to Caltrans 2007 Fault Database

<sup>2</sup> LLSS=left-lateral strike-slip fault; RLSS=right-lateral strike-slip fault; R=reverse fault; N=normal fault

- CuA: Corralitos loamy sand, 0 to 2 percent slopes; somewhat excessively drained; form on footslopes of alluvial fans; parent material is sandy alluvium;  $K=0.20$ .
- CuC: Corralitos loamy sand, 2 to 9 percent slopes; somewhat excessively drained; form on footslopes of alluvial fans; parent material is sandy alluvium;  $K=0.20$ .
- EdA2: Elder sandy loam, 0 to 2 percent slopes, eroded; well drained; form on toeslopes of flood plains; parent material is alluvium derived from acid sandstone and shale;  $K=0.24$ .
- EdC2: Elder sandy loam, 2 to 9 percent slopes, eroded; well drained; form on footslopes of alluvial fans; parent material is alluvium derived from acid sandstone and shale;  $K=0.24$ .
- EmC: Elder loam, 2 to 9 percent slopes; well drained; form on footslopes of alluvial fans; parent material is alluvium derived from acid sandstone and shale;  $K=0.20$ .
- MaE: Marina sand, 9 to 30 percent slopes; somewhat excessively drained; form on toeslopes of terraces; parent material is eolian deposits;  $K=0.24$ .
- TnC: Tierra sandy loam, 2 to 9 percent slopes; moderately well drained; form on toeslopes of terraces; parent material is alluvium;  $K=0.37$ .
- TnD2: Tierra sandy loam, 9 to 15 percent slopes, eroded; moderately well drained; form on toeslopes of terraces; parent material is alluvium;  $K=0.37$ .
- TnE2: Tierra sandy loam, 15 to 30 percent slopes, eroded; moderately well drained; form on toeslopes of terraces; parent material is alluvium;  $K=0.37$ .
- TrE3: Tierra loam, 5 to 30 percent slopes, severely eroded; moderately well drained; form on toeslopes of terraces; parent material is alluvium;  $K=0.37$ .
- TsF: Tierra clay loam, 15 to 45 percent slopes; moderately well drained; form on scarp slopes; parent material is alluvium;  $K=0.28$ .

The distribution of the different soil types through the project area is as follows:

**Table 2: Soil Type Distribution**

"LOL" Station Limits	Soil Classification														
	ArD	ArF	ArF 3	BtA 2	CuA	CuC	EdA 2	EdC 2	EmC	MaE	TnC	TnD 2	TnE 2	TrE 3	TsF
170-181				X											
181-207											X				
207-217													X		
217-221															X
221-226									X						
226-232												X			
232-257														X	
257-270										X					
270-288	X														
288-296			X												
296-310				X											
310-314							X								
314-317												X			
317-318							X								
318-323												X			
323-326							X								
326-330												X			
330-345							X								
345-351								X							
351-357												X			
357-360														X	
360-364					X										
364-368														X	
368-372					X										
372-375														X	
375-384					X										
384-390						X									
390-393								X							
393-396							X								
396-402				X											
402-415		X													
415-449						X									

**Exploration**

Field investigations performed at the project site include visual evaluations of the performance of existing slopes, geotechnical borings, cone penetrometer testing (CPT), and monitoring of ground water elevations.

**Drilling and Sampling**

Ten cone penetrometer soundings (CPT-11-001 through CPT-11-010) and four mud rotary borings (RC-11-001 through RC-11-004) were conducted in the project area during November and

December 2011 to provide information for this report. Holes were drilled and cone penetrometer soundings were conducted in the area of the proposed vertical curve correction to assess the strength of the foundation soils that will support embankments. One geotechnical boring was drilled in a cut slope location to evaluate the engineering properties of the material that will be used for embankment construction. The maximum depth of investigation was approximately 52 feet. The locations of the geotechnical borings and CPT soundings, and descriptions of the soils encountered in the borings are shown on the attached Log of Test Borings (LOTB).

**Table 3: 2011 Drilling Summary**

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Location		Ground Surface Elevation (ft)	Boring Depth (ft)
					Station ("LOL" Line)	Offset		
RC-11-001	12/13/2011	Acker MP3	Automatic	77	248+02	38' Rt.	341.8	52.2
RC-11-002	12/13/2011	Acker MP3	Automatic	77	244+02	34' Rt.	328.5	51.8
RC-11-003	12/14/2011	Acker MP3	Automatic	77	276+50	22' Rt.	438.0	52.6
RC-11-004	12/14/2011	Acker MP3	Automatic	77	291+00	16' Rt.	371.1	52.2

The mud rotary borings were advanced using a self-cased wireline drilling apparatus that provided continuous soil samples. Soils were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010). Soil samples were also collected and submitted to the Headquarters Geotechnical Laboratory for mechanical analyses, direct shear testing, corrosion potential testing, and determination of Atterburg limits. Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the native soil. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements of unconfined compressive strength were used to estimate the undrained shear strength of clay samples.

**Site Geology and Subsurface Conditions**

**Lithology**

The "Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California" and the "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicate that the project area is underlain by Quaternary valley and floodplain deposits (geologic unit Q<sub>a</sub>) consisting of silt, sand, and gravel; Quaternary older alluvial deposits (geologic unit Q<sub>oa</sub>) consisting of gravel, sand, and clay; and Quaternary Orcutt Sand (geologic unit Q<sub>o</sub>), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

## **Subsurface Conditions**

The soils encountered during subsurface investigation are not entirely consistent with the formations indicated on the geologic map. The geologic map suggests that borings RC-11-001 and RC-11-002 are in Orcutt Sand, but the soils encountered in the borings are more indicative of older alluvial deposits. The soils from those borings included very stiff to hard lean clay and sandy clay; and medium dense to very dense silty sand, poorly graded (mostly fine grained) sand, and poorly graded sand with silt. Boring RC-11-003 is also shown to be in Orcutt Sand, and the soils encountered in the hole are consistent with that formation. Boring RC-11-003 primarily encountered dense to very dense silty sand. The geologic map indicates that boring RC-11-004 is in Quaternary valley and flood plain deposits, and the boring records support that finding. The boring encountered approximately 25 feet of loose to medium dense silty sand overlying very dense fine sand and silty sand. The well consolidated underlying soils are likely from the Orcutt Sand formation.

## **Ground Water**

Ground water was encountered 33.8' feet below the ground surface in boring RC-11-002 and 42.6 feet below the ground surface in CPT sounding CPT-11-010. These depths correspond to ground water elevations of 294.7 feet and 316.0 feet respectively.

Springs were observed exiting the cut slope north of the roadway between "LOL" Stations 262+00 and 270+00. Several horizontal drains are present in the slope, but none are producing any water.

High ground water and pumping subgrade soils were encountered during construction of the Purisma Roundabout Project on Route 246, immediately west of the project area. Three holes, averaging 4.7 feet deep, were drilled with a hand auger in the eastbound dirt shoulder of the highway between "LOL" Stations 172+00 and 176+00 to see if ground water would be encountered in the current project area. No water was encountered.

## **Project Site Seismicity**

### **Ground Motion**

Peak ground acceleration (PGA) in the project area due to an earthquake on one of the nearby faults was estimated using the *2009 Caltrans Seismic Design Procedure*. The procedure was developed to calculate the minimum seismic design requirements for bridges on State highways. The method calculates design response spectra over a range of periods. The design response spectrum is based on the envelope of a deterministic and a probabilistic spectrum. The deterministic spectrum is calculated as the arithmetic average of median response spectra computed using the Chiou & Youngs and Campbell & Bozorgnia ground motion prediction equations (CY-CB GMPE). These equations are applied to all faults in or near California considered to be active in the last 700,000 years (late Quaternary age) and capable of producing a moment magnitude earthquake of 6.0 or greater.

The probabilistic spectrum is obtained from the 2008 USGS Seismic Hazard Map for the 5% in 50 years probability of exceedance (or 975 year return period). The spectral values are adjusted with a soil amplification factor based on an average of the Boore-Atkinson (2008), Campbell Bozorgnia (2008), and Chiou-Youngs (2008) ground motion prediction models. For sites underlain by soils having an average shear wave velocity for the upper 30 meters of soil ( $V_{S30}$ ) of less than 300 meters per second, the 2009 USGS Probabilistic Seismic Hazard Analysis Interactive Deaggregation Tool is used to develop the probabilistic spectrum.

The controlling fault in the project area is the Los Alamos Fault, a reverse fault with a maximum magnitude of 6.9. The peak ground acceleration at the westerly end of the project is estimated to be 0.48 g (gravity). The peak ground acceleration is estimated to be 0.64 g at the easterly project limit. The deterministic spectrum with a soil amplification factor for a  $V_{S30}$  of 270 meters per second governed the design response spectrum for both ends of the project area. 270 meters per second is an average shear wave velocity for Type D soil profiles. Type D soils are stiff soils having either a standard penetration resistance (SPT) of between 15 and 50 blows per foot or undrained shear strength of between 1000 and 2000 pounds per square foot.

### **Ground Rupture**

According to the 2007 *Caltrans Deterministic PGA Map*, no known active or potentially active faults project towards or cross the highway alignment within the project limits. Therefore, there is no potential for surface fault rupture to occur and no mitigation efforts are necessary.

### **Liquefaction**

Soil liquefaction occurs when loose, water-saturated soils lose shear strength in response to the sudden shaking from an earthquake and begin behaving like a liquid, reducing their ability to support embankments and structures. Loose sands and gravels with 35 percent fines or less that have the potential of being saturated are susceptible to liquefaction. Generally, the younger and looser the sediment, and the shallower the water table, the more susceptible the soil is to liquefaction. Sediments most susceptible to liquefaction include historical and late Holocene-age river channel and flood plain deposits, and poorly compacted fills. Bedrock and dense soils, including well-compacted fills, have a low susceptibility to liquefaction. Liquefaction is most prevalent in areas where groundwater lies within 30 feet of the ground surface; liquefaction rarely occurs in areas with groundwater deeper than 50 feet.

Liquefaction potential is low in the area of the project where the subsurface investigation was conducted. No loose cohesionless soils were encountered at a depth where they may become saturated with ground water. However, liquefaction potential may be significant in areas of the project that are underlain by Quaternary valley and floodplain deposits (geologic unit  $Q_a$ ). Fortunately there are no structures or tall embankments planned in these areas, so damage to the highway infrastructure should be minimal if the underlying soils do liquefy.

**Corrosion**

Soils samples from boring RC-11-003 were tested for corrosion potential. Material from the location of the boring will be used to construct roadway embankments.

The Department considers a site corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water samples taken at the site:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- The pH is 5.5 or less

Since resistivity serves as an indicator parameter for the possible presence of soluble salts, tests for sulfate and chloride are usually not performed unless the resistivity of the soil is 1,000 ohm-cm or less.

**Table 4: Corrosion Test Summary**

Boring	Depth	SIC Number	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RC-11-003	4'-15'	C246309	3828	7.27	N/A	N/A
RC-11-003	15'-36'	C246309	4563	6.90	N/A	N/A
RC-11-003	36'-50'	C246310	3518	6.34	N/A	N/A
<b>Corrosive if:</b>				<b>≤ 5.5</b>	<b>≥ 500</b>	<b>≥ 2000</b>

Based on corrosion test results, and because the project area is not within 1000 feet of salt or brackish water, the site is considered non-corrosive.

**Geotechnical Analysis and Design**

**Embankment Settlement**

Settlement analyses were performed at the proposed locations of the tallest embankments along the highway alignment using soil strength parameters obtained from field testing. Elastic settlement in cohesionless soils was calculated using Hough's Method, which correlates soil grain size distribution and SPT values with a bearing capacity factor that is used in a settlement equation. Settlement in cohesive soils was calculated using recompression indices estimated from correlations with index properties of the soils. Based on relationships between in situ moisture content and index properties, the clay soils encountered in the subsurface investigation were assumed to be preconsolidated, meaning that at some time in the past the clay has been subjected to greater stress than in the present.

The following table summarizes the calculated settlements at the locations of borings in fill sections. The calculated settlement is elastic settlement that should mostly occur during construction.

**Table 5: Embankment Settlement**

Station	Boring ID	Embankment Height (feet)	Elastic Settlement		Total Settlement (inches)
			Cohesionless Soils (inches)	Cohesive Soils (inches)	
244+02	RC-11-002	17	0.5	1.1	1.6
248+02	RC-11-001	27	0.9	1.8	2.7

**Embankment Stability**

The embankments proposed for this project shall be constructed with side slopes inclined at 2:1 or flatter. The global stability of this slope geometry was evaluated by modeling the slopes in SLOPE/W, a slope stability computer program. Factors of safety were calculated using the Morgenstern-Price method, a limit equilibrium type of analysis for assessing slope stability that satisfies both force equilibrium and moment equilibrium equations of statics. A design factor of safety of 1.5, the minimum factor of safety for a Caltrans critical facility, was specified for a static analysis. A factor of safety of 1.1 was specified for a dynamic analysis of slope stability with an applied horizontal seismic load of 0.2 g. Caltrans Guidelines for Foundation Investigations and Reports dated June 2002 recommends using one-third of the horizontal (PGA) with an upper limit of 0.2 g for the seismic assessment of slopes and retaining systems with a minimum factor of safety of 1.1.

For the purpose of evaluating slope stability, it was assumed that embankments would be constructed using soils from excavations in Orcutt Sand Formation. Embankment soil strength parameters were based on direct shear test results on material extracted from boring RC-11-003. Strength parameters of the foundation soils were estimated from SPT blow count correlations in cohesionless soils, and pocket penetrometer measurements of unconfined compressive strength in cohesive soils. A phreatic water surface was modeled in the slope stability analysis based on ground water levels observed during the subsurface investigation. Traffic loading was modeled in the analysis by applying a 240-psf surcharge over the paved portion of the embankment, as specified in Caltrans Standard Plans.

The calculated factor of safety for the static condition was approximately 1.8. The calculated factor of safety for a pseudostatic analysis with an applied horizontal load of 0.2 g was approximately 1.2.

Surficial stability of the proposed fill slopes is expected to be marginal due to the erodibility of the soil that will be used to construct the embankments. An aggressive erosion control plan is essential to prevent soil loss during construction and to encourage plant establishment for long term slope stability.

### **Cut Slope Recommendations**

It is recommended that all new cut slopes be excavated no steeper than 2:1. Paved top-of-cut ditches should be provided where necessary to prevent off site run-off from flowing down slope faces. It is further suggested that excavations 3:1 and steeper be stepped in accordance with the recommendations of Topic 304.5 "Stepped Slopes," of the Highway Design Manual to encourage revegetation and minimize erosion. Stepped slopes consist of a series of small benches, typically 1 foot to 2 feet wide. The purpose of the steps is to capture loose soil, seed, and moisture. Topsoil or compost should be applied to stepped slopes to encourage revegetation.

Construction details for the stepped slopes are provided in Attachment 4. For appearance sake, and to best manage drainage, it is recommended that the steps be cut parallel to the roadway profile grade. Natural ravel from construction should be left on the steps to minimize storm water runoff. In general, steps less than one-half full should not be cleaned. The contract special provisions should allow for about a 20 percent construction tolerance in the width and height of the steps. Some irregularity will help improve the look of the slopes by giving them a more natural appearance.

If cut slope excavations encounter springs, the affected area of slope should be over excavated and buttressed with soil-filled rock slope protection (RSP). Construction details for soil-filled RSP slopes are provided in Attachment 4.

The material in the proposed cuts can be expected to be readily rippable. Based on comparisons of in-place density with maximum dry density, an earthwork factor of 0.90 is estimated for the project. Soil samples of known volume from boring RC-11-003 were dried and weighed to determine their in-place density. Maximum dry densities of soil samples from boring RC-11-003 were determined from moisture density curves generated in accordance with California Test Method 216, "Method of Test for Relative Compaction of Treated and Untreated Soils and Aggregates."

Based on observations of the condition of existing cut slopes, erosion of the new cut slopes is a serious concern. An aggressive revegetation plan should be implemented as part of the design. The District Landscape Architect should be consulted for recommendations regarding plant selection and proper application of erosion control materials.

### **Ground Water Mitigation**

Standing water and saturated soils are present at the toe of the existing cut slope along the northerly side of the roadway between "LOL" Stations 262+00 and 270+00. It is likely that the condition will persist after the proposed vertical curve correction for that location is completed. Pumping subgrade soils are possible during construction. An underdrain and/or a permeable blanket may be necessary to mitigate for the ground water, both during construction and to eliminate the possibility of a saturated structural section after construction is complete. The contract plans should include bid items and details for the construction of a subsurface drainage system. If the system is found to

be unnecessary while construction is in progress, the items can be eliminated by contract change order. Details of a combination underdrain/permeable blanket system are provided in Attachment 5.

### **Construction Considerations**

Foundation soils are generally adequate to support the proposed highway embankments throughout the project limits. Localized areas of unconsolidated or saturated foundation materials, however, may require stripping and recompaction, or removal of material deemed unsuitable. If standing water or unsuitable material is encountered to a depth where it cannot be economically removed, it is recommended that the unsuitable material be sub excavated 18 inches and replaced with Class 1, Type B permeable material encapsulated in Class B3 subgrade enhancement geotextile. Subgrade enhancement geotextile along the sides of the excavation shall be cut 3 feet longer than the depth of the excavation and the excess shall be lapped over the top of the permeable material prior to placing the top layer of geotextile. The permeable material will allow water to fill its pore spaces without a loss of strength. The subgrade enhancement geotextile will act as a separator, preventing the soils around the fabric from filling the voids in the permeable material, and preventing the permeable material from penetrating the soft soils beneath the geotextile. The subgrade enhancement geotextile will also serve to reinforce the subgrade soil. The permeable blanket will provide a dry and stable working platform for embankment or drainage structure construction.

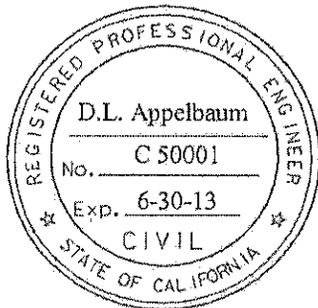
### **Recommendations**

Refer to the preceding sections for detailed recommendations. The following list summarizes the recommendations provided in this report:

- Roadway embankments are to be constructed with side slopes inclined at 2:1 or flatter.
- Cut slopes are to be constructed with slope inclinations of 2:1 or flatter. Top of cut ditches should be provided where necessary to prevent off-site drainage from flowing down slope faces. Slopes inclined at 3:1 or steeper should be stepped to help mitigate erosion.
- Re-vegetate all exposed slopes and implement erosion control measures to increase resistance to shallow slope instabilities.
- Construct a permeable blanket and underdrain system between “LOL” Stations 262+00 and 270+00 to mitigate for high ground water.

Closure

The recommendations contained in this report are based on specific project information that has been provided by Office of Design II, Branch H. If any conceptual changes are made during final project design, the Office of Geotechnical Design – North, Branch D should review those changes to determine if the recommendations contained in this report are still applicable. Any questions regarding the recommendations contained herein should be directed to the attention of Dan Appelbaum, (805) 549-3745, or Mike Finegan, (805) 549-3194, at the Office of Geotechnical Design – North, Branch D.



Supervised by,

DANIEL L. APPELBAUM, PE  
Transportation Engineer  
Geotechnical Design – North  
Branch D

MICHAEL S. FINEGAN, PE, Chief  
Geotechnical Design - North  
Branch D

- c: Roy Bibbens / GDN File (E-copy)  
Paul Martinez – Project Manager (E-copy)  
Pat Bolger – Landscape Architect (E-copy)  
Mark Willian – GS Corporate (E-copy)  
R.E. Pending File  
Doug Lambert – District Materials Engineer (E-copy)  
Job File / Branch D Records

## **LIST OF ATTACHMENTS**

<b>ATTACHMENT 1</b>	<b>VICINITY MAP</b>
<b>ATTACHMENT 2</b>	<b>GEOLOGIC MAP</b>
<b>ATTACHMENT 3</b>	<b>EARTHQUAKE FAULTS</b>
<b>ATTACHMENT 4</b>	<b>CUT SLOPE DETAILS</b>
<b>ATTACHMENT 5</b>	<b>UNDERDRAIN/PERMEABLE BLANKET DETAILS</b>
<b>ATTACHMENT 6</b>	<b>LOG OF TEST BORINGS</b>
<b>ATTACHMENT 7</b>	<b>MATERIAL PROPERTIES</b>

INDEX OF PLANS

# STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY

## IN SANTA BARBARA COUNTY NEAR LOMPOC FROM CEBADA CANYON ROAD TO 0.2 MILES EAST OF SANTA RITA ROAD

TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006

**BEGIN CONSTRUCTION  
STA 172+00 PM R12.8**

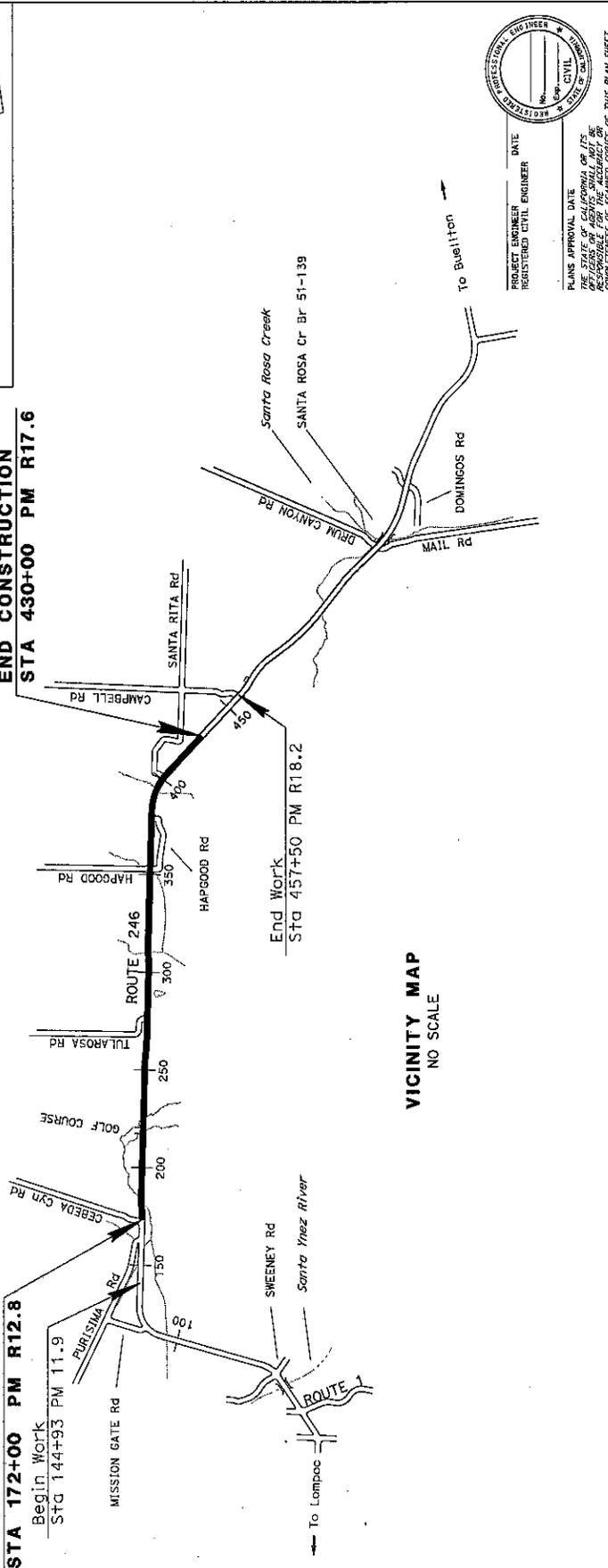
Begin Work  
Sta 144+93 PM 11.9

**END CONSTRUCTION  
STA 430+00 PM R17.6**

End Work  
Sta 457+50 PM R18.2

DESIGN COUNTY ROUTE DISTRICT SHEET NO. TOTAL SHEETS

**LOCATION MAP**



PROJECT ENGINEER  
REGISTERED CIVIL ENGINEER

DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS  
OFFICIALS OR AGENTS SHALL NOT BE  
LIABLE FOR DAMAGES OF ANY KIND  
COMPLETENESS OF THESE PLANS SHEET.

CONTRACT NO. **05-OC6404**

PROJECT ID **0500000021**

**ATTACHMENT 1**

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

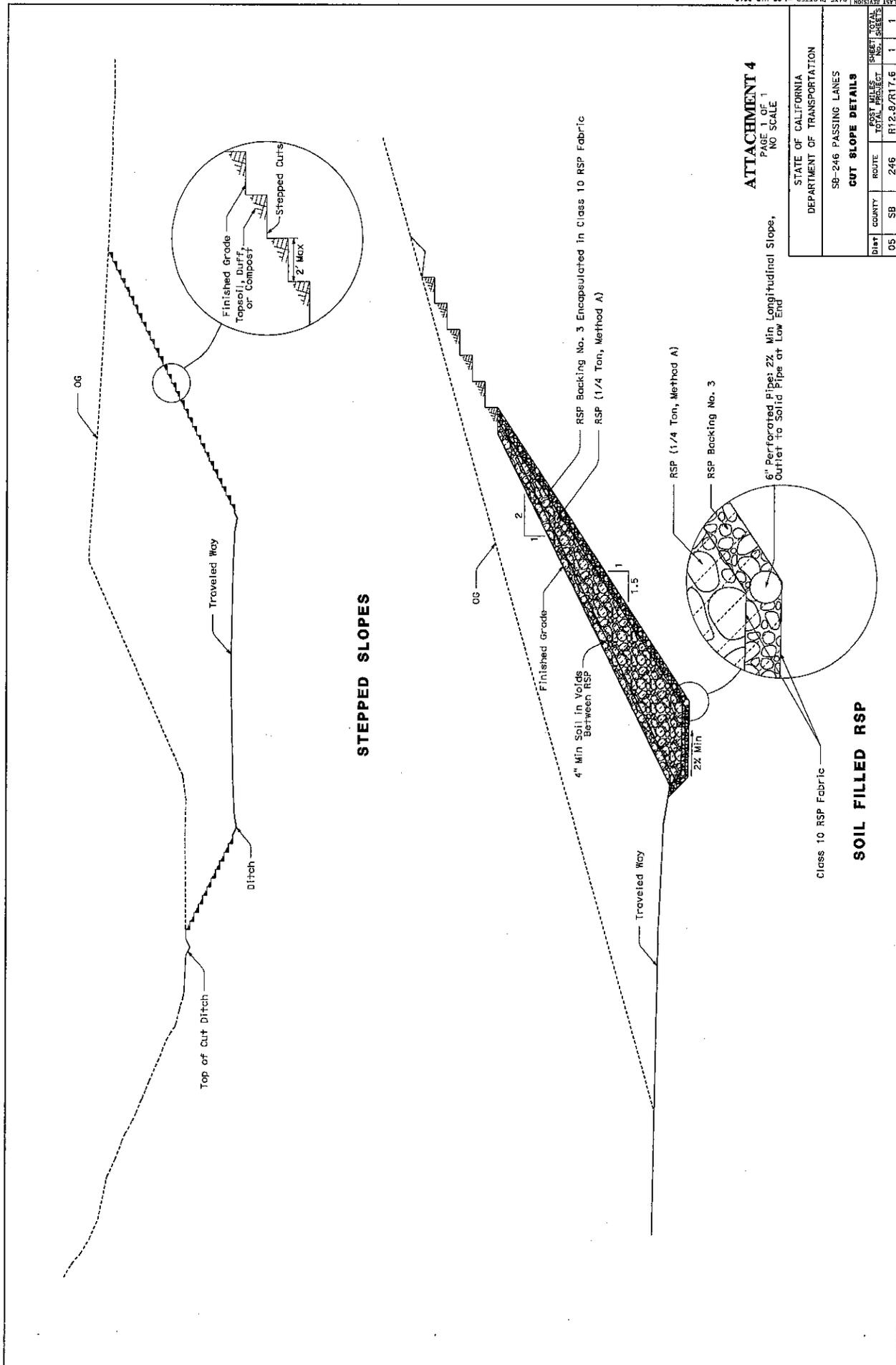
DESIGN ENGINEER

PROJECT MANAGER





STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION		SUPERVISING ENGINEER		MICHAEL FINEGAN		CHECKED BY		DATE REVISED	
CALCULATED/DESIGNED BY									
REVISED BY									



**STEPPED SLOPES**

**SOIL FILLED RSP**

**ATTACHMENT 4**

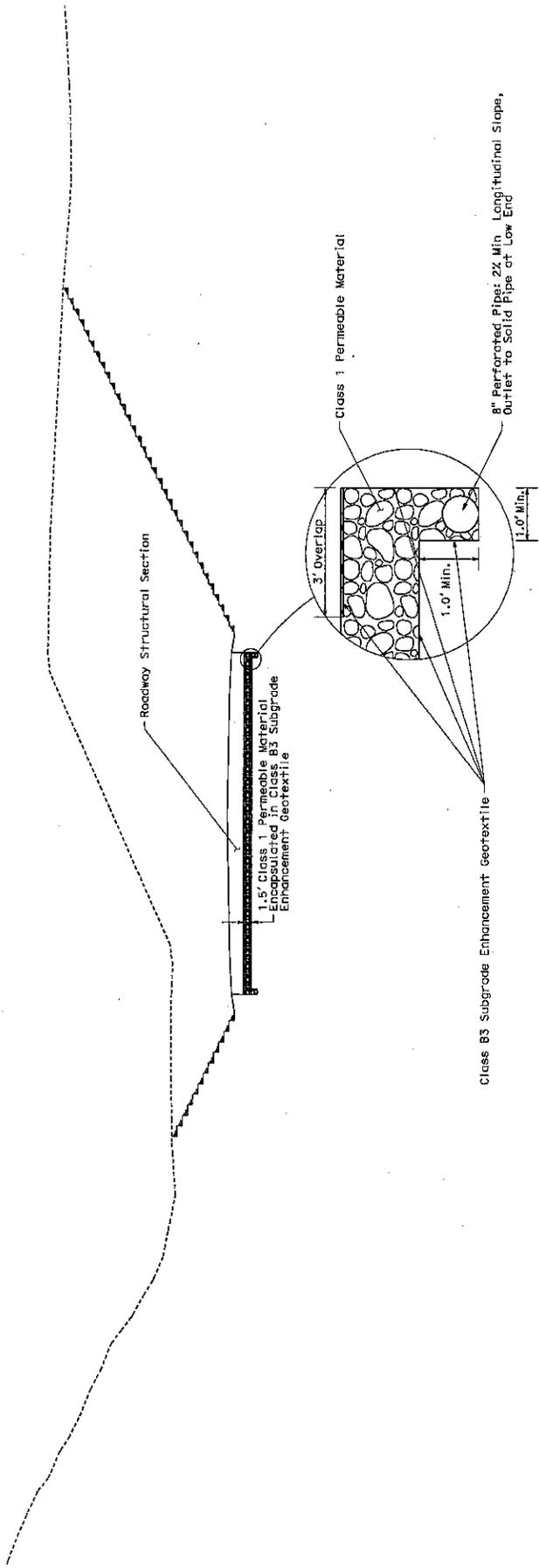
PAGE 1 OF 1  
NO SCALE

6" Perforated Pipes 24" Min Longitudinal Slope, Curved to Solid Pipe at Low End

STATE OF CALIFORNIA			
DEPARTMENT OF TRANSPORTATION			
SB-246 PASSING LANES			
<b>CUT SLOPE DETAILS</b>			
DIST	COUNTY	ROUTE	TOTAL PROJECT
05	SB	246	R12.8/R17.5
			1
			1

10/20/2004

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	DESIGNED BY	DATE REVISID
Supervising Engineer	CHECKED BY	DATE REVISID
MIKE FINEGAN		
DESIGNED BY		
CHECKED BY		



"LOL" STATION 262+00 TO 270+00

**ATTACHMENT 5**  
PAGE 1 OF 1  
NO SCALE

STATE OF CALIFORNIA		DEPARTMENT OF TRANSPORTATION	
SB-246 PASSING LANES			
<b>UNDERDRAIN/PERMEABLE BLANKET DETAILS</b>			
DIST	COUNTY	ROUTE	MILE TOTAL PROJECT
05	SB	246	R12.8/R17.6
SHEET NO.			TOTAL SHEETS
1			1

# **ATTACHMENT 6**

Geotechnical Design Report  
SB-246 Passing Lanes  
05-SB-246- R12.8/R17.6  
EA 05-0C6401, Project ID 0500000021

## **Log of Test Borings**





DATE	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS
05	SB	246	12.3/RT7.6		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of any data or information furnished by the contractor or any other person.

RECEIVED

NON ASSURANCE

NO. 55000

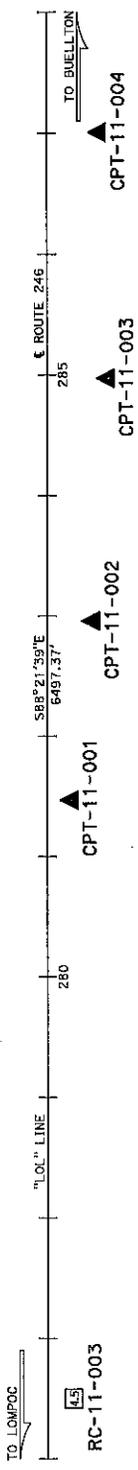
EXPIRES 1-30-13

CIVIL

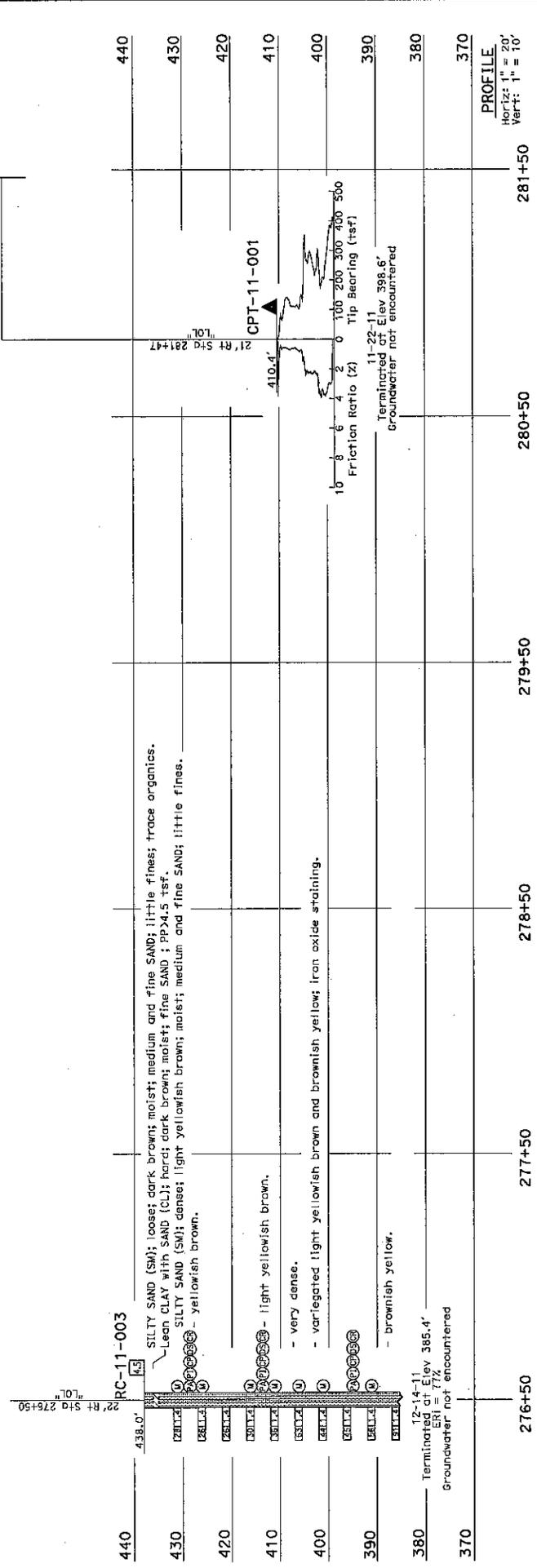
This LTB sheet was prepared in accordance with the California Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition).

**BENCH MARK**

SB 246 PM 14.77  
 Fwd 1" in w/const rd & nail  
 Sta 2384+57.02  
 N 2,072,690.20  
 E 5,849,256.41  
 Elev = 437.755' (NAVD88)



PLAN  
 1" = 50'



ENGINEERING SERVICES	STATE OF CALIFORNIA	DIVISION OF ENGINEERING SERVICES	SB 246 PASSING LANES
FUNCTIONAL SUPERVISOR	DEPARTMENT OF TRANSPORTATION	DESIGN BRANCH X	LOG OF TEST BORINGS 3 OF 8
MAKER: M. F. Hegarty	PROJECT NUMBER & PHASE: 65000000211	CONTRACT NO.: 05-05401	
DATE: 05/11/11	UNIT: 3643	PROJECT NUMBER & PHASE: 65000000211	
	SCALE: 1" = 20'		
	SCALE: 1" = 10'		





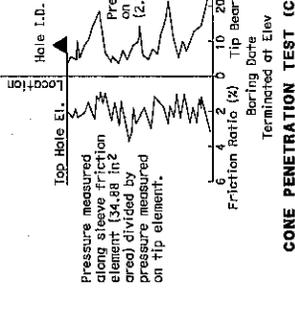
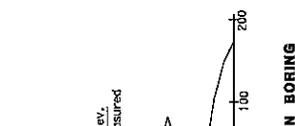
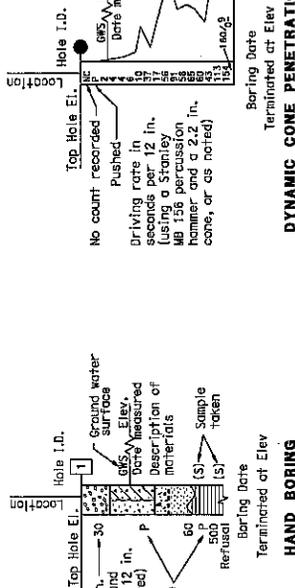
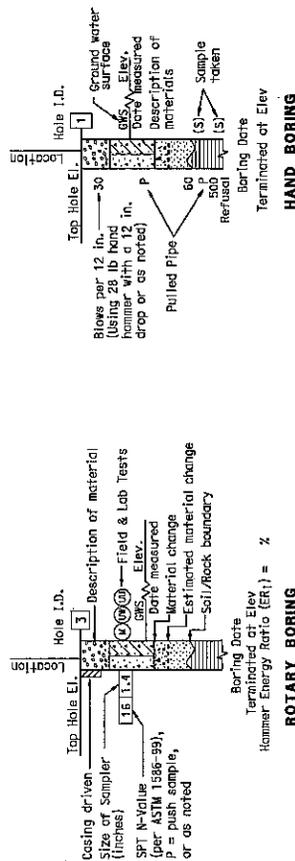


REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

CEMENTATION	
Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

BOREHOLE IDENTIFICATION	
Symbol	Description
A	Auger Boring (hollow or solid stem bucket)
RW	Rotary drilled boring (conventional)
RC	Rotary drilled with self-casing wire-line
P	Rotary core with continuously-sampled, self-casing wire-line rotary percussion boring (air)
R	Rotary drilled diamond core
HD	Hand driven (1-inch soil tube)
HA	Hand Auger
D	Dynamic Cone Penetration Boring
CPT	Cone Penetration Test (ASTM D 5778)
O	Other (note on LOTB)

Note: Size in inches.



CONSISTENCY OF COHESIVE SOILS				
Description	Shear Strength (tsf)	Pocket Penetration Measurement, PP <sub>p</sub> (tsf)	Torvane Measurement, TV <sub>p</sub> (tsf)	Vane Shear Measurement, VS <sub>p</sub> (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

The State of California or the officers or agents thereof, shall not be held liable for any errors or omissions or for any consequences or actions resulting from the use of the plans or specifications or for any consequences or actions resulting from the use of the plans or specifications or for any consequences or actions resulting from the use of the plans or specifications.

PROJECT: TOTAL PROJECT NO. 12.13/R17.5

ROUTE: 246

COUNTY: SB

DIST: 05

SHEET NO. 7 OF 8

DATE: 12.13/R17.5

DESIGNER: CIVIL ENGINEER

SCALE: AS SHOWN

ENGINEERING SERVICES

GEOTECHNICAL SERVICES

DESIGN BRANCH X

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

STRUCTURE DESIGN

CONTRACT NO. 05-056401

SB 246 PASSING LANES

LOG OF TEST BORINGS 7 OF 8

DATE: 12.13/R17.5

PROJECT: TOTAL PROJECT NO. 12.13/R17.5

ROUTE: 246

COUNTY: SB

DIST: 05

SHEET NO. 7 OF 8

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES		Graphic/Symbol	Group Names
GW	Well-graded GRAVEL with SAND		Lean CLAY Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY with SAND
GP	Poorly-graded GRAVEL		
GH-GM	Poorly-graded GRAVEL with SILT		SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY)		
GP-GM	Poorly-graded GRAVEL with SILT and SAND		SILT with SAND SILT with GRAVEL SANDY SILT with GRAVEL SANDY SILT with SAND GRAVELLY SILT with SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY)		
GM	SILTY GRAVEL		ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL		
CC-GM	SILTY, CLAYEY GRAVEL		ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND		
SP	Poorly-graded SAND		fat CLAY with SAND fat CLAY with GRAVEL SANDY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-silty SAND with CLAY (or SILTY CLAY and GRAVEL)		Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT with SAND
SP-SM	Poorly-graded SAND with SILT and GRAVEL		
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY and GRAVEL)		ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND		
SC	CLAYEY SAND		ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND		
PT	PEAT		ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL with SAND
	COBBLES and BOULDERS		

FIELD AND LABORATORY		Graphic/Symbol	Group Names
(C)	Consolidation (ASTM D 2435)		Lean CLAY Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY with SAND
(CL)	Collapse Potential (ASTM D 5333)		
(CP)	Compaction Curve (CTM 216)		SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY
(CR)	Corrosivity Testing (CTM 643, CTM 422, CTM 417)		
(CU)	Consolidated Undrained Triaxial (ASTM D 4767)		SILT with SAND SILT with GRAVEL SANDY SILT with GRAVEL SANDY SILT with SAND GRAVELLY SILT with SAND
(CS)	Direct Shear (ASTM D 3080)		
(EI)	Expansion Index (ASTM D 4829)		ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
(M)	Moisture Content (ASTM D 2216)		
(OC)	Organic Content-% (ASTM D 2974)		ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT with SAND
(P)	Permeability (CTM 220)		
(PA)	Particle Size Analysis (ASTM D 422)		fat CLAY with SAND fat CLAY with GRAVEL SANDY fat CLAY GRAVELLY fat CLAY with SAND
(PI)	Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)		
(PL)	Point Load Index (ASTM D 5731)		Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT with SAND
(PM)	Pressure Meter		
(R)	R-Value (CTM 301)		ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY with SAND
(SE)	Sand Equivalent (CTM 217)		
(SG)	Specific Gravity (AASHTO T 100)		ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT with SAND
(SL)	Shrinkage Limit (ASTM D 427)		
(SN)	Swell Potential (ASTM D 4546)		ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL with SAND
(UC)	Unconfined Compression-Soil (ASTM D 2166)		
(UU)	Unconsolidated Undrained Triaxial (ASTM D 2850)		ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL with SAND
(UW)	Unit Weight (ASTM D 4767)		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE: \_\_\_\_\_

The State of California or the engineer or geologist is not responsible for the accuracy or completeness of the data shown on this plan sheet.

PROJECT: SB 246

ROUTE: 246

TOTAL SHEETS: 8

SHEET NO: 8

DATE: 12.3.17/17.6

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	SPT N60 (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE		
Description	Size (in.)	
Boulder	Greater than 12	
Cobble	3 - 12	
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
Silt and Clay	Fine	1/300 - 1/64
	Less than	1/300

ENGINEERING SERVICES

PREPARED BY: D. Appelbaum

GEOTECHNICAL SERVICES

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DESIGN BRANCH X

SB 246 PASSING LANES

LOG OF TEST BORINGS 8 OF 8

CONTRACT NO. 05-056401

DATE: 12.3.17/17.6

PROJECT NUMBER & PHASE: 050000021 1

UNIT: 3057

PROJECT NUMBER & PHASE: 050000021 1

DATE: 12.3.17/17.6

PROJECT NUMBER & PHASE: 050000021 1

DATE: 12.3.17/17.6

PROJECT NUMBER & PHASE: 050000021 1

DATE: 12.3.17/17.6

**MATERIALS PROPERTIES SUMMARY**  
**SB-246 PASSING LANES**  
 SB-246-R12.8/R17.6

DESCRIPTION	RC-11-001				RC-11-002			
	Station	248+02	246+02	244+02	Station	248+02	246+02	244+02
Line	"LOL"							
Offset	38' Rt.				34' Rt.			
Date Sampled	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011	12/13/2011
Sample ID	246101	246102	246103	246104	246105	246201	246202	246203
Depth Below OG	3.2'-4.7'/5.1'-7.2'	8.2'-9.7'	10.0'-11.2'	23.5'-25.0'	35.7'-37.2'	8.3'-9.8'	15.8'-17.3'	35.8'-37.3'
USCS Classification	CL	CL	CL	CL	CL	CL	CL	SM
50 mm (2")								
37.5 mm (1 1/2")								
25 mm (1")								
19 mm (3/4")								
12.5 mm (1/2")								
9.5 mm (3/8")								
4.75 mm (No. 4)								
2.36 mm (No. 8)								
1.18 mm (No. 16)	100			100				100
600 um (No. 30)	98	100		99				96
300 um (No. 50)	81	94		86				64
150 um (No. 100)	60	80		79				32
75 um (No. 200)	54	71		55				23
5 um								
1 um								
Liquid Limit	30	35	25	30	37	36	29	
Plasticity Index	16	18	10	15	17	19	16	NP
EXPANSION INDEX								
Resistivity (ohm-cm)								
pH								
Chlorides (ppm)								
Sulfates (ppm)								
Dry Density (pcf)								
Moisture (%)	11.6	14.1	18.9	13.9	33.4	16.3	16.0	15.8
Dry Density (pcf)								
Moisture (%)								
Specific Gravity								
Friction Angle (°)								
Cohesion (psf)								
UNCONFINED COMPRESSIVE STRENGTH (psi)								
Consolidation Index (Cc)								
Recompression Index (Cr)								
Initial Void Ratio								

**MATERIALS PROPERTIES SUMMARY**  
**SB-246 PASSING LANES**  
 SB-246-R12.8/R17.6

Boring No.		RC-11-003									
Station		276+50									
Line		"LOL"									
Offset		22' Rt.									
DESCRIPTION	Date Sampled	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011	12/14/2011
	Sample ID	246301	246302	246303	246304	246305	246306	246307	246308	246309	246310
PARTICLE SIZE ANALYSIS	Depth Below OG	6.1'-7.6'	11.1'-12.6'	21.1'-22.6'	26.1'-27.6'	31.1'-32.6'	36.1'-37.6'	46.1'-47.6'	4'-15'	15'-36'	
	USCS Classification	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	50 mm (2")										
	37.5 mm (1 1/2")										
	25 mm (1")										
	19 mm (3/4")										
	12.5 mm (1/2")										
	9.5 mm (3/8")										
	4.75 mm (No. 4)										
	2.36 mm (No. 8)										
	1.18 mm (No. 16)										
	600 um (No. 30)								100	100	
	300 um (No. 50)								94	96	
	150 um (No. 100)								58	56	
	75 um (No. 200)								21	25	
	5 um								13	19	
	1 um								11	18	
	Liquid Limit								10	15	
	Plasticity Index								NP	NP	
	EXPANSION INDEX										
	Resistivity (ohm-cm)								3828	4563	
	pH								7.27	6.90	
	Chlorides (ppm)								N/A	N/A	
	Sulfates (ppm)								N/A	N/A	
	Dry Density (pcf)										
	Moisture (%)	14.2	14.1	13.6	17.4	16.4	15.6	16.4			
	Dry Density (pcf)								120.0	125.2	
	Moisture (%)								10.0	9.6	
	Specific Gravity										
	Friction Angle (°)										
	Shear Cohesion (psf)								42.5	50.2	
	UNCONFINED COMPRESSIVE STRENGTH (psi)								0	0	
	Consolidation Index (Cc)										
	Recompression Index (Cr)										
	Initial Void Ratio										

**MATERIALS PROPERTIES SUMMARY**  
**SB-246 PASSING LANES**  
 SB-246-R12.8/R17.6

Boring No.	RC-11-003	RC-11-004						
Station	276+50	291+00						
Line	"LOL"	"LOL"						
Offset	22' Rt.	16' Rt.						
Date Sampled	12/14/2011	12/14/2011						
Sample ID	246310	246401						
Depth Below OG	36'-50'	14'-16'						
USCS Classification	SM	SM						
50 mm (2")								
37.5 mm (1 1/2")								
25 mm (1")								
19 mm (3/4")								
12.5 mm (1/2")								
9.5 mm (3/8")		100						
4.75 mm (No. 4)		91						
2.36 mm (No. 8)		90						
1.18 mm (No. 16)	100							
600 um (No. 30)	95	89						
300 um (No. 50)	53	86						
150 um (No. 100)	24	73						
75 um (No. 200)	15	45						
5 um	13							
1 um	11							
Liquid Limit								
Plasticity Index	NP	NP						
EXPANSION INDEX								
Resistivity (ohm-cm)	3518							
pH	6.34							
Chlorides (ppm)	N/A							
Sulfates (ppm)	N/A							
Dry Density (pcf)								
Moisture (%)		23.1						
Dry Density (pcf)	121.5							
Moisture (%)	10.5							
Specific Gravity								
Friction Angle (°)	37.6							
Cohesion (psf)	229							
UNCONFINED COMPRESSIVE STRENGTH (psi)								
Consolidation Index (Cc)								
Recompression Index (Cr)								
Initial Void Ratio								

# **INFORMATION HANDOUT**

**For Contract No. 05-0C6404**

**At 05-SB-246-12.3/R16.7**

**Identified by**

**Project ID 0500000021**

## **MATERIALS INFORMATION**

[7. Supplemental Geotechnical Design Report Dated 7/26/13](#)

**M e m o r a n d u m** *Flex your power!*

*Be energy efficient!*

To: FOAD AL-HAMDANI  
Senior Design Engineer  
Central Region Project Development  
Office of Design II, Branch H

Date: July 26, 2013

File: 05-0C6401 (0500000021)  
05-SB-246-12.3/R16.7  
Construct Passing Lanes

Attn: Apurva N. Gokal  
Project Engineer

From: **DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES**

Subject: Supplemental Geotechnical Design Report for SB 246 Passing Lanes

A Supplemental Geotechnical Design Report is provided for the above referenced project per your request, dated February 21, 2013.

The project proposes to construct passing lanes and operational improvements on Route 246 in Santa Barbara County between post mile 12.3 and post mile R16.7 to improve traffic safety, mobility, reliability and multi-modal functionality along that segment of highway. Review of published geologic data and previous geotechnical reports, field reconnaissance, and geotechnical calculations were performed as part of the geotechnical investigation.

The purpose of this report is to document geotechnical conditions and provide foundation recommendations for proposed Drainage System Nos. 7, 12, 21, 22, and 24 and Wildlife Crossings 1 through 6 wingwalls.

#### **Existing Facilities and Proposed Improvements**

The existing roadway consists of two 10-foot to 12-foot lanes and outside shoulders varying in width between 1 foot and 8 feet. The proposed project will construct passing lanes and will provide turn channelization and other operational improvements at intersections within the project limits. A vertical curve correction is proposed in the vicinity of the intersection of Route 246 with Tularosa Road to improve sight distance. The roadway will be realigned to the south of the existing lanes in that area so that the vertical curve correction can be completed without impacting traffic during construction.

Several existing drainage systems will be extended or replaced as part of the project. Also, six 72-inch reinforced concrete pipe (RCP) culverts will be placed to serve as wildlife crossings. Reinforced concrete headwalls and wingwalls will be constructed at the ends of the drainage

systems and wildlife crossings to reduce the length of pipe needed and to improve hydraulic efficiencies of the drainage systems.

### **Pertinent Reports and Investigations**

The following publications and references were used to assist in the evaluation of site conditions:

1. *Caltrans ARS Online (v2.1.06)*.
2. *Caltrans Seismic Design Criteria, Version 1.6*, November 2012.
3. *District Preliminary Geotechnical Report*, Daniel L. Appelbaum; EA 05-0C6400; July 28, 2008.
4. *Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California*; Thomas W. Dibblee, Jr.; 1988.
5. *Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California*; Thomas W. Dibblee, Jr.; 1993.
6. *Geotechnical Design Report*; Daniel L. Appelbaum; EA 05-0C6401; March 21, 2012.

Subsurface investigations were conducted at the locations of the proposed drainage structures and wildlife crossings in to assess foundation conditions for the proposed wingwalls.

### **Physical Setting**

The project area is located near the northern margin of the Transverse Ranges Geomorphic Province, just outside of the southern margin of the Coast Ranges Geomorphic Province. The Transverse Ranges province is characterized by east-west trending mountain ranges and faults. It contains hills and dissected plains between the Santa Ynez River and Santa Ynez Fault to the south, the Santa Maria Valley to the north, and the San Rafael Mountains to the northeast.

### **Climate**

The climate in the project area is mild with a strong coastal influence. Daytime temperatures during the summer months are generally in the low to mid 70's (°F) with occasional extreme temperatures into the 100's. Nighttime summer temperatures are normally in the low to mid 50's. Winter temperatures generally have lows in the low 40's with highs in the mid to upper 60's. The area typically receives almost all of its rainfall between October and May with the heaviest rains occurring during the winter months. Average annual rainfall is approximately 15 inches.

Fog is a common feature of the weather in the project area during the summer months. The marine layer typically rolls in during the late night or early morning hours, and dissipates in the late morning or early afternoon. High winds are also common in the project area.

### **Topography and Drainage**

The project site is located in the Santa Rita Valley of Santa Barbara County. The terrain along the roadway alignment within the project limits is flat to moderately sloping. Roadway elevations in the project area range between approximately 130 feet and 560 feet. Adjacent land use is primarily agricultural.

The project traverses several watersheds including Purisima Canyon, Thompson Park, Cebada Canyon, and Santa Rita Valley. All of these watersheds ultimately drain to the Santa Ynez River, which lies to the south of the project area. The Santa Ynez River outlets to the Pacific Ocean north of Surf, within Vandenberg Air Force Base property.

### **Regional Geology**

Route 246 is located in the Santa Rita Valley at the western end of the Transverse Ranges geomorphic province. The province is characterized by east-west trending mountains and valleys. The western Transverse Ranges are mostly composed of thick (thousands of feet) marine and non-marine sedimentary rocks. Route 246 is bounded to the south by the Santa Ynez Range and to the north by the Purisima Hills. The region is rapidly uplifting and shortening along a system of east-west trending faults and folds (synclines and anticlines) from dextral transverse movement on the San Andreas Fault system past the Big Bend. Regional compression has generated a system of steeply dipping reverse and transverse faults. The Santa Ynez River Fault Zone, which parallels the northern flanks of the Santa Ynez Range and Route 246, is the primary mechanism for rapid uplift of the Santa Ynez Range. The resulting structure, and rocks of marine origin are the source of numerous oil fields in the region, the closest to the site being the Lompoc Oil Field in the Purisima Hills.

The Santa Rita Valley is structurally controlled by the Santa Rita Syncline, which creates a topographic depression for locally derived Holocene valley and floodplain deposits. The valley is bounded on either side by the Orcutt and Paso Robles Formations. The Orcutt Formation is generally regarded as a terrace deposit of aeolian sand and interbedded coarse rounded gravels with minor amounts of silt and clay. The formation has a maximum thickness of about 200-feet. The Paso Robles Formation within the Santa Rita Valley is up to 700-feet thick, and is composed of fluvial, lenticular deposits of sands and gravels interbedded with silt and clay.

### **Seismicity**

The project is located within a seismically active region of California. There are several earthquake faults in close proximity to the project area. Table 1 lists the active and potentially active faults in the project vicinity as described in Caltrans's *2012 Fault Database*. Corresponding Moment

Magnitudes and distances to the project area are also given. A fault map is included in the attachments to this report.

**Table 1: Active and Potentially Active Faults**

Fault	Moment Magnitude of Maximum Credible Earthquake <sup>1</sup>	Type of Fault <sup>2</sup>	Distance to Fault from Project Area <sup>3</sup> (kilometers)	
			Westerly Project Limit	Easterly Project Limit
Santa Ynez River	6.4	R	2.4	2.0
Santa Ynez River fault zone (Honda Fault)	6.4	SS	5.0	10.6
Lions Head 2011 CFM	6.8	R	6.3	5.1
Los Alamos 2011 CFM	6.8	R	11.9	9.8

A design response spectrum for the project area was estimated using *Caltrans ARS Online (v2.1.06)*, a web-based tool that calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in Appendix B of *Caltrans Seismic Design Criteria*. The procedure used by ARS Online was developed to calculate the minimum seismic design requirements for bridges on State highways. The method calculates design response spectra over a range of periods. The design response spectrum is based on the envelope of a deterministic and a probabilistic spectrum. The deterministic spectrum is calculated as the arithmetic average of median response spectra computed using the Chiou & Youngs and Campbell & Bozorgnia ground motion prediction equations (CY-CB GMPE). These equations are applied to all faults in or near California considered to be active in the last 700,000 years (late Quaternary age) and capable of producing a moment magnitude earthquake of 6.0 or greater.

The probabilistic spectrum is obtained from the *2008 USGS Seismic Hazard Map* for the 5% in 50 years probability of exceedance (or 975 year return period). The spectral values are adjusted with a soil amplification factor based on an average of the Boore-Atkinson (2008), Campbell Bozorgnia (2008), and Chiou-Youngs (2008) ground motion prediction models. For sites underlain by soils having an average shear wave velocity for the upper 30 meters of soil ( $V_{S30}$ ) of less than 300 meters per second, the *2009 USGS Probabilistic Seismic Hazard Analysis Interactive Deaggregation Tool* is used to develop the probabilistic spectrum.

<sup>1</sup> According to *Caltrans 2012 Fault Database*

<sup>2</sup> SS=strike-slip fault; R=reverse fault; N=normal fault

<sup>3</sup> Perpendicular distance to fault or fictitious extension of fault

The controlling fault in the project area is the Santa Ynez River Fault, a reverse fault with a maximum magnitude of 6.4. The peak ground acceleration is estimated to be 0.53 g (gravity) at the westerly end of the project, and 0.54 g at the easterly project limit. The deterministic spectrum with a soil amplification factor for a  $V_{S30}$  of 270 meters per second governed the design response spectrum for both ends of the project area. 270 meters per second is an average shear wave velocity for Type D soil profiles. Type D soils are stiff soils having either a standard penetration resistance (SPT) of between 15 and 50 blows per foot or undrained shear strength of between 1000 and 2000 pounds per square foot.

The project area is not located within an Alquist-Priolo Earthquake Fault Zone nor is it within 1,000 feet of an un-zoned fault 15,000 years or younger in age so, based on Caltrans policy, a fault rupture evaluation is not warranted.

Soil liquefaction occurs when loose, water-saturated soils lose shear strength in response to the sudden shaking from an earthquake, and begin behaving like a liquid, reducing their ability to support embankments and structures. Loose sands and gravels with 35 percent fines or less that have the potential of being saturated are susceptible to liquefaction. Generally, the younger and looser the sediment, and the shallower the water table, the more susceptible the soil is to liquefaction. Sediments most susceptible to liquefaction include historical and late Holocene-age river channel and flood plain deposits, and poorly compacted fills. Bedrock and dense soils, including well-compacted fills, have a low susceptibility to liquefaction. Liquefaction is most prevalent in areas where groundwater lies within 30 feet of the ground surface; liquefaction rarely occurs in areas with groundwater deeper than 50 feet.

Based on inspection of the Log of Test Borings (LOTB), liquefaction potential may be moderate in areas of the project that are underlain by Quaternary valley and floodplain deposits (geologic unit Qa). There are zones of medium dense cohesionless soils present at elevations that may be saturated by groundwater. Surface expression of settlement of any liquefiable layers is unlikely, however. Similarly, perceptible settlement of shallow foundations is not expected.

### **Exploration**

Field investigations performed at the project site include geotechnical borings, cone penetrometer testing (CPT), and monitoring of groundwater elevations.

### **Drilling and Sampling**

Ten cone penetrometer soundings (CPT-11-001 through CPT-11-010) and four mud rotary borings (RC-11-001 through RC-11-004) were conducted in the project area during November and December 2011 to provide information for the Geotechnical Design Report. Six additional mud rotary borings (RC-13-001 through RC-13-006) were drilled in April 2013 to provide subsurface data for Drainage Systems Nos. 7, 12, 22, and 24. The maximum depth of investigation was

approximately 53 feet. The locations of the geotechnical borings and CPT soundings, and descriptions of the soils encountered in the borings are shown on the attached LOTB.

**Table 2: 2011 and 2013 Drilling Summary**

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Location		Ground Surface Elevation (ft)	Boring Depth (ft)
					Station ("LOL" Line)	Offset		
RC-11-001	12/13/2011	Acker MP3	Automatic	77	248+02	38' Rt.	341.8	52.2
RC-11-002	12/13/2011	Acker MP3	Automatic	77	244+02	34' Rt.	328.5	51.8
RC-11-003	12/14/2011	Acker MP3	Automatic	77	276+50	22' Rt.	438.0	52.6
RC-11-004	12/14/2011	Acker MP3	Automatic	77	291+00	16' Rt.	371.1	52.2
RC-13-001	4/9/2013	Acker MP3	Automatic	71	218+33	129' Rt.	275.0	52.0
RC-13-002	4/9/2013	Acker MP3	Automatic	71	310+75	75' Rt.	354.5	52.5
RC-13-003	4/10/2013	Acker MP3	Automatic	71	317+52	106' Rt.	353.5	52.2
RC-13-004	4/10/2013	Acker MP3	Automatic	71	350+81	95' Rt.	410.9	52.7
RC-13-005	4/23/2013	Deidrich D-50	Automatic	64	310+51	49' Lt.	360.7	52.1
RC-13-006	4/24/2013	Deidrich D-50	Automatic	64	238+73	62' Lt.	318.0	52.5

The mud rotary borings were advanced using a self-cased wireline drilling apparatus that provided continuous soil samples. Soils were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010). Soil samples were also collected and submitted to the Headquarters Geotechnical Laboratory and the District 5 Materials Laboratory for mechanical analyses, determination of Atterburg limits, and corrosion potential testing. Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the native soil. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements of unconfined compressive strength were used to estimate the undrained shear strength of clay samples.

**Corrosion**

Representative soil samples taken during the subsurface investigation were tested for corrosion potential. The Department considers a site corrosive to foundation elements if one or more of the following conditions exist:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- The pH is 5.5 or less

Since resistivity serves as an indicator parameter for the possible presence of soluble salts, tests for sulfate and chloride are usually not performed unless the resistivity of the soil is 1,000 ohm-cm or less.

**Table 3: Corrosion Test Summary**

Boring	Depth (ft.)	SIC Number	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RC-11-003	4-15	C246309	3828	7.27	N/A	N/A
RC-11-003	15-36	C246309	4563	6.90	N/A	N/A
RC-11-003	36-50	C246310	3518	6.34	N/A	N/A
RC-13-003	11.7-13.0	C246001	3787	8.44	N/A	N/A
RC-13-003	17.7-18.7	C246003	5549	6.89	N/A	N/A
RC-13-003	21.7-22.7	C246002	1774	7.47	N/A	N/A
RC-13-003	51.7-52.7	C246004	1262	8.34	N/A	N/A
RC-13-005	11.6-12.1	C512461	1301	6.70	N/A	N/A
RC-13-005	20-22	C512462	2115	7.73	N/A	N/A
RC-13-006	10.5-12.5	C512463	589	7.00	**	**
RC-13-006	46-47.5	C512464	364	6.38	**	**
RC-13-006	48-52.5	C512465	1155	7.95	N/A	N/A
<b>Corrosive if:</b>				<b>≤ 5.5</b>	<b>≥ 500</b>	<b>≥ 2000</b>

\*\*Insufficient sample quantity to test for chloride and sulfate content

Corrosion test results are inconclusive because of insufficient sample quantity to test for sulfate and chloride for SIC Numbers C512463 and C512464. The two soil samples were obtained from boring RC-13-006 which was drilled adjacent to Drainage System # 12. Resistivity numbers indicate that the samples may be corrosive. Inspections of the drainage system, however, indicated that the concrete headwalls and wingwalls at both the inlet and outlet ends of the existing 60" corrugated metal pipe (CMP) culvert show no signs of corrosion damage. The CMP itself is in fair condition; there is some corrosion of the invert, but it is relatively minor given that the culvert is over 40 years old (the drainage system was constructed in 1970). The damage is likely attributable to abrasion from the bed load of the water that has flowed through the pipe. Since all other test results indicate non-corrosive conditions, and because the project area is not within 1000 feet of salt or brackish water, the site should be considered non-corrosive.

**Drainage System #7**

**Lithology**

The "Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California" compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #7 is underlain by

Quaternary Orcutt Sand (geologic unit Q<sub>o</sub>), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

### Subsurface Conditions

Boring RC-13-001 was drilled near the inlet end of Drainage System #7. The boring encountered approximately 30 feet of dense to very dense poorly graded sand with clay overlying very dense poorly graded sand.

### Groundwater

Groundwater was not measured in boring RC-13-001 because there was standing water below the invert of the existing culvert, and it was assumed that the water surface elevation measured in the hole would closely mirror the standing water surface. Groundwater was assumed to be at the bottom of footing elevation in the calculation of bearing capacity.

### Foundation Recommendations

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case I provided in 2010 Standard Plan D84 were used to evaluate bearing capacity of the foundation soil. Foundation soil types and density were assumed to be similar at both ends of the culvert, so the bearing capacity was assumed to be equal for the wingwalls at the inlet and outlet ends of the drainage structure. The Standard Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

**Table 4: Drainage System #7 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{qN} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #7 Lt. (Outlet)	12	256.59	5.17	6.2	3.9
DS #7 Rt. (Inlet)	12	261.37	5.17	6.2	3.9

## **Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

Groundwater is expected to be encountered in foundation excavations, particularly on the inlet side of the drainage system. Pumping may be required to prepare the excavation for concrete placement.

Localized areas of unconsolidated or saturated foundation materials may require stripping and recompaction, or removal of material deemed unsuitable. If standing water or unsuitable material is encountered to a depth where it cannot be economically removed, it is recommended that the unsuitable material be sub excavated 18 inches to one foot beyond the heel and toe of the footing, and replaced with Class 1, Type B permeable material encapsulated in Class B3 subgrade enhancement geotextile. The permeable material will allow water to fill its pore spaces without a loss of strength. The subgrade enhancement geotextile will act as a separator, preventing the soils around the fabric from filling the voids in the permeable material, and preventing the permeable material from penetrating the soft soils beneath the geotextile. The subgrade enhancement geotextile will also serve to reinforce the subgrade soil. The permeable blanket will provide a dry and stable working platform for construction.

## **Drainage System #12**

### **Lithology**

The “*Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California*” compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #12 is underlain by Quaternary Orcutt Sand (geologic unit Q<sub>o</sub>), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

### **Subsurface Conditions**

Boring RC-13-006 was drilled in the westbound lane of the highway, adjacent to the existing 60-inch culvert. The boring encountered approximately 8 feet of stiff clay and sandy clay overlying 9 feet of medium dense to dense clayey sand, which in turn was underlain by dense to very dense silty sand and sand with silt with a few minor layers of stiff to very stiff clay.

### **Groundwater**

Groundwater was not measured in boring RC-13-006 because the hole was located in a travelled lane. The groundwater elevation was measured at 294.7 feet on December 19, 2011 in boring RC-11-002, located approximately 500 feet east of the inlet end of Drainage System #12. That puts groundwater at approximately 9.1 feet below the bottom of footing elevation of the inlet end wingwalls.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D90 were used to evaluate bearing capacity of the foundation soil. The Standard Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

**Table 5: Drainage System #12 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{qN} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #12 Rt. (Inlet)	12	303.84	7.84	9.0	2.5

**Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are sufficiently consolidated to support the proposed structures.

**Wildlife Crossings #1, #2, and #3**

**Lithology**

The "Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California" compiled by Thomas W. Dibblee, Jr. indicates that the sites of Wildlife Crossings #1, #2, and #3 are underlain by Quaternary Orcutt Sand (geologic unit  $Q_0$ ), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

**Subsurface Conditions**

The proposed locations of the wildlife crossings were not readily accessible for drilling by State forces, so subsurface information obtained from Boring RC-11-001, located 38 feet right of "LOL"

Station 248+02 was used to estimate foundation soil bearing capacity for the culvert wingwalls. The boring encountered approximately 38 feet of hard clay with sand and dense clayey sand overlying medium dense to dense silty sand.

**Groundwater**

Groundwater was not measured in boring RC-11-001. The groundwater elevation was measured at 294.7 feet on December 19, 2011 in boring RC-11-002, located approximately 1100 feet west of the westernmost wildlife crossing. That puts groundwater well below bottom of footing elevations of the wingwalls, so groundwater effects were neglected in the calculation of bearing capacity.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The wildlife crossing cross sections provided by Central Region Design indicate that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D90 were used to evaluate bearing capacity of the foundation soil. Foundation soil types and density were assumed to be similar throughout the area where the wildlife crossings will be constructed, so the bearing capacity was assumed to be equal for the wingwalls at the inlet and outlet ends of all of the culverts. The Standard Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

**Table 6: Wildlife Crossings #1, #2, and #3 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{q_N} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
WC #1 Lt.	12	376.93	7.84	7.7	2.5
WC #1 Rt.	12	378.98	7.84	7.7	2.5
WC #2 Lt.	12	385.18	7.84	7.7	2.5
WC #2 Rt.	12	383.87	7.84	7.7	2.5
WC #3 Lt.	12	389.93	7.84	7.7	2.5
WC #3 Rt.	12	389.93	7.84	7.7	2.5

**Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are suitable to support the proposed structures.

While regional groundwater appears to be well below bottom of footing elevations, springs have been observed exiting the existing cut slope to the north of the westbound lane between "LOL" Stations 262+00 and 270+00. Footing excavations may encounter perched groundwater.

### **Wildlife Crossings #4, #5, and #6**

#### **Lithology**

The "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicates that the sites of Wildlife Crossings 4, 5, and 6 are underlain by Quaternary Orcutt Sand (geologic unit Q<sub>o</sub>), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

#### **Subsurface Conditions**

Cone penetrometer soundings CPT-11-003, CPT-11-004, and CPT-11-005 were conducted in close proximity to Wildlife Crossings #3, #4, and #5 respectively. CPT interpretation software suggests that the subsurface stratigraphy consists primarily of sand, silty sand, and "sand mix." Tip stress was relatively high throughout the sampled depth in all three soundings. Boring RC-11-004, located 16 feet right of "LOL" Station 291+00, encountered approximately 25 feet of medium dense silty sand overlying very dense poorly graded sand.

#### **Groundwater**

Groundwater was not encountered in any of the three representative CPT soundings and was not measured in RC-11-004. The maximum depth to "refusal" for the CPT soundings was approximately 39 feet, so it can be inferred that groundwater is more than 39 feet below the ground surface.

#### **Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The wildlife crossing cross sections provided by Central Region Design indicate that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case II provided in 2010 Standard Plan D90 were used to evaluate bearing capacity of the foundation soil. The Standard Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

Foundation soil bearing capacity was first calculated using the Terzaghi bearing capacity equation with bearing capacity factors estimated from average cone tip bearing from bottom of footing elevation to 1.5B below bottom of footing (B=footing width). The resulting bearing capacities seemed unrealistically high, so calculations were again performed using the Terzaghi equation, but with bearing capacity factors calculated from estimated friction angles ( $\phi$ ) of soils encountered in boring RC-11-004. The latter results were far more conservative than the former, so those values are reported in the following table.

**Table 7: Wildlife Crossings #4, #5, and #6 Wingwall Foundation Recommendations**

Location	Design Height (ft)	Bottom of Footing Elevation (ft)	Effective Footing Width (ft)	Strength Limit Factored Bearing Resistance $\Phi_{qN} \Phi=0.33$ (ksf)	Strength Limit Factored Gross Uniform Bearing Stress $q_u$ (ksf)
WC #4 Lt.	12	394.60	8.14	10.3	2.8
WC #4 Rt.	12	386.60	8.14	10.3	2.8
WC #5 Lt.	12	380.60	8.14	10.3	2.8
WC #5 Rt.	12	374.60	8.14	10.3	2.8
WC #6 Lt.	12	370.57	8.14	10.3	2.8
WC #6 Rt.	12	366.31	8.14	10.3	2.8

**Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are suitable to support the proposed structures.

**Drainage System #21**

**Lithology**

The "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #21 is underlain by Quaternary valley and floodplain deposits (geologic unit  $Q_a$ ) consisting of silt, sand, and gravel.

**Subsurface Conditions**

The results of cone penetrometer sounding CPT-11-010 were used to estimate bearing capacity at the site of Drainage System #21. CPT interpretation software suggests that the subsurface stratigraphy consists of 7.5 feet of “sand mix,” sandy silt, and “silt mix” overlying 14 feet of clay, which overlies interbedded sandy silt, “sand mix,” silty sand, and sand.

**Groundwater**

Groundwater was encountered at elevation 316.0 in CPT-11-010 on November 22, 2011. That places groundwater approximately 30.5 feet below the bottom of footing of the wingwalls at the inlet end of the culvert, and 29 feet below the bottom of footing elevation at the outlet end.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D84 were used to evaluate bearing capacity of the foundation soil. CPT-11-010 was conducted near the middle of the proposed box culvert, so observed soil conditions were considered representative of both ends of the box. The Standard Plans do not provide net bearing pressure and effective footing widths for Service I Limit State loads, so a settlement analysis was not conducted.

Foundation soil bearing capacity was calculated using the Terzaghi bearing capacity equation with the undrained shear strengths of clays estimated from average cone tip bearing from bottom of footing elevation to 1.5B below bottom of footing (B=footing width).

**Table 8: Drainage System #21 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{qN} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #21 Lt. (Inlet)	14	346.66	8.59	5.3	2.8
DS #21 Rt. (Outlet)	14	345.00	8.59	5.3	2.8

### **Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are suitable to support the proposed structures. If unsuitable material is encountered at bottom of footing elevation, it is recommended that the material be removed to a maximum depth of four feet to 2 feet beyond the footprint of the structure footing, and replaced with moisture conditioned Class 2 aggregate base (AB), compacted to 95% relative density.

### **Drainage System #22**

#### **Lithology**

The "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #22 is underlain by Quaternary valley and floodplain deposits (geologic unit Q<sub>a</sub>) consisting of silt, sand, and gravel.

#### **Subsurface Conditions**

Boring RC-13-005, located near the left (inlet) end of Drainage System #22, encountered 10 feet of loose silty sand; overlying 12 feet of stiff sandy clay; overlying 24 feet of loose to medium dense silty sand; overlying medium dense clayey sand. Boring RC-13-002, located near the right (outlet) end of the proposed culvert, encountered 5 feet of loose poorly graded sand; overlying 13 feet of loose to medium dense clayey sand and very stiff clay with sand; overlying medium dense to dense poorly graded sand.

#### **Groundwater**

Groundwater was measured at 34.8 feet below the ground surface in boring RC-13-005 on April 24, 2013, and at 30.9 feet below the ground surface in boring RC-13-002 on April 10, 2013. Those depths correspond to groundwater elevations of 325.9 feet and 323.6 feet respectively.

#### **Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D84 were used to evaluate bearing capacity of the foundation soil. The Standard

Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

**Table 9: Drainage System #22 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{qN} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #22 Lt. (Inlet)	13	348.53	8.12	2.8	2.7
DS #22 Rt. (Outlet)	13	346.63	8.12	3.3	2.7

**Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are suitable to support the proposed structures. If unsuitable material is encountered at bottom of footing elevation, it is recommended that the material be removed to a maximum depth of four feet to 2 feet beyond the footprint of the structure footing, and replaced with moisture conditioned Class 2 AB, compacted to 95% relative density.

**Drainage System #24**

**Lithology**

The “*Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California*,” compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #24 is underlain by Quaternary valley and floodplain deposits (geologic unit  $Q_a$ ) consisting of silt, sand, and gravel.

**Subsurface Conditions**

Boring RC-13-003, located near the right (outlet) end of Drainage System #24, encountered silty sand with a few minor lenses of clayey sand. The material was in a loose condition to a depth of approximately 20 feet, and a medium dense condition from 20 feet deep to the bottom of the boring.

**Groundwater**

Groundwater was measured at 44.1 feet below the ground surface in boring RC-13-003 on April 16, 2013. That depth corresponds to a groundwater elevation of 309.4 feet.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the depth of the wingwall footings will be 5.4 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case II provided in 2010 Standard Plan D84 were used to evaluate bearing capacity of the foundation soil. Foundation soil types and density were assumed to be similar at both ends of the culvert, so bearing capacity was assumed to be equal for the wingwall footings at the inlet and outlet ends of the drainage structure. The Standard Plans do not provide net bearing pressure and effective footing widths for Service 1 Limit State loads, so a settlement analysis was not conducted.

**Table 10: Drainage System #24 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{qN} \Phi=0.33</math> (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #24 Lt. (Inlet)	11	352.08	7.86	5.6	2.5
DS #24 Rt. (Outlet)	11	349.38	7.86	5.6	2.5

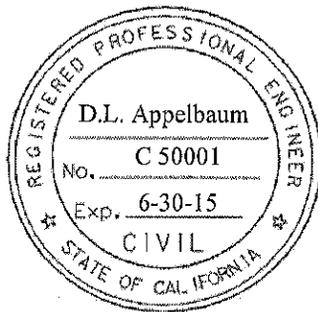
**Construction Considerations**

Temporary slopes or shoring may be required to support excavations to construct the wingwall foundations. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

This Office should be notified when footing excavation is complete. A site inspection should be conducted by Geotechnical Design personnel to confirm that foundation soils are suitable to support the proposed structures. If unsuitable material is encountered at bottom of footing elevation, it is recommended that the material be removed to a maximum depth of four feet to 2 feet beyond the footprint of the structure footing, and replaced with moisture conditioned Class 2 AB, compacted to 95% relative density.

### Closure

The recommendations contained in this report are based on specific project information that has been provided by Office of Design II, Branch H. If any conceptual changes are made during final project design, the Office of Geotechnical Design – North, Branch D should review those changes to determine if the recommendations contained in this report are still applicable. Any questions regarding the recommendations contained herein should be directed to the attention of Dan Appelbaum, (805) 549-3745, or Mike Finegan, (805) 549-3194, at the Office of Geotechnical Design – North, Branch D.



Supervised by,

DANIEL L. APPELBAUM, PE  
Transportation Engineer  
Geotechnical Design – North  
Branch D

MICHAEL S. FINEGAN, PE, Chief  
Geotechnical Design - North  
Branch D

- c: Roy Bibbens / GDN File (E-copy)  
Paul Martinez – Project Manager (E-copy)  
GeoDOG - Digital Archive of Geotechnical Data (E-copy)  
R.E. Pending File  
Doug Lambert – District Materials Engineer (E-copy)  
Job File / Branch D Records

## LIST OF ATTACHMENTS

ATTACHMENT 1

VICINITY MAP

ATTACHMENT 2

GEOLOGIC MAP

ATTACHMENT 3

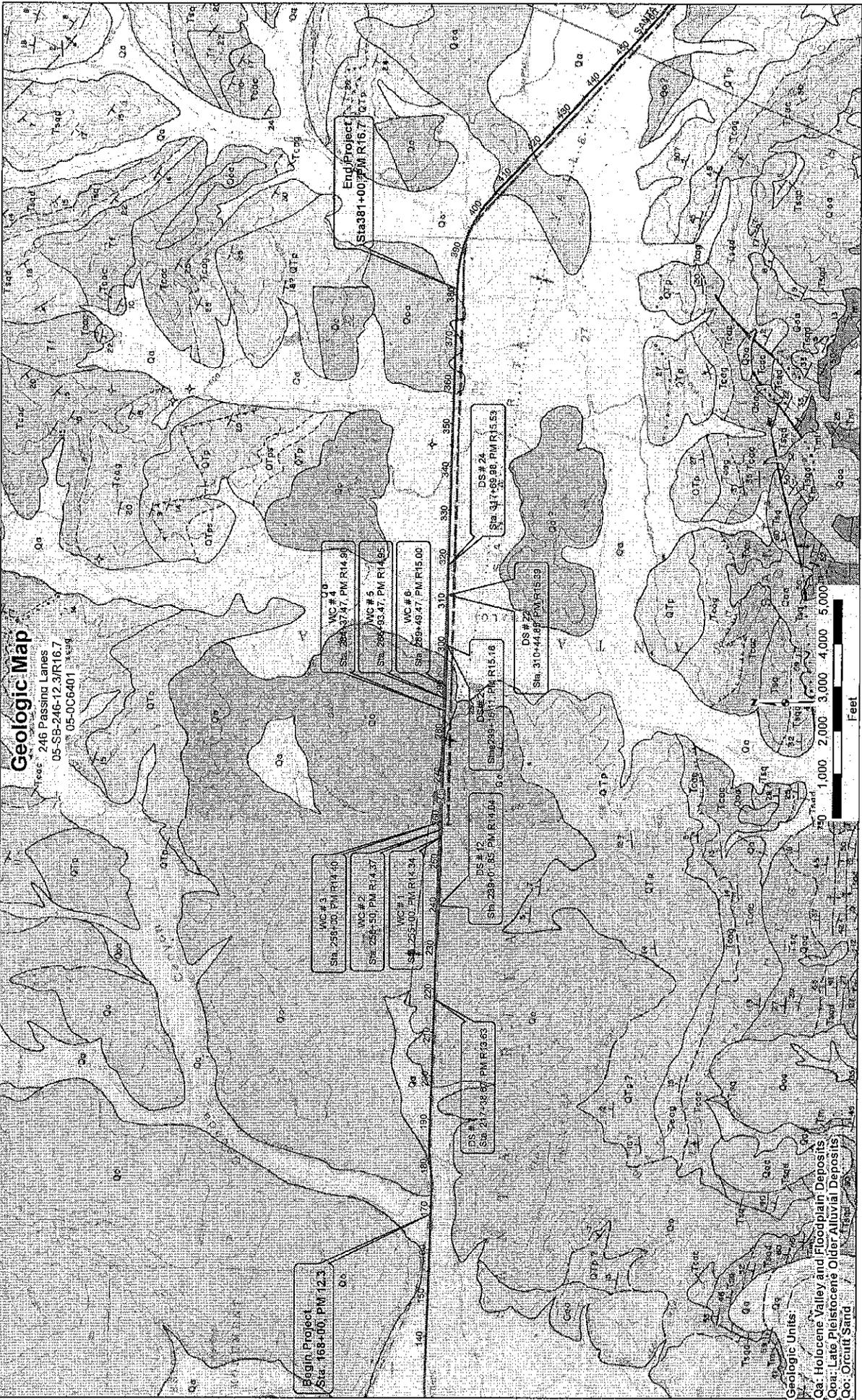
EARTHQUAKE FAULTS

ATTACHMENT 4

LOG OF TEST BORINGS

DRAFT







# **ATTACHMENT 4**

Supplemental Geotechnical Design Report

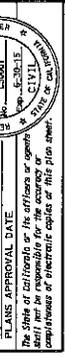
SB-246 Passing Lanes

05-SB-246- R12.3/R16.7

EA 05-0C6401, Project ID 0500000021

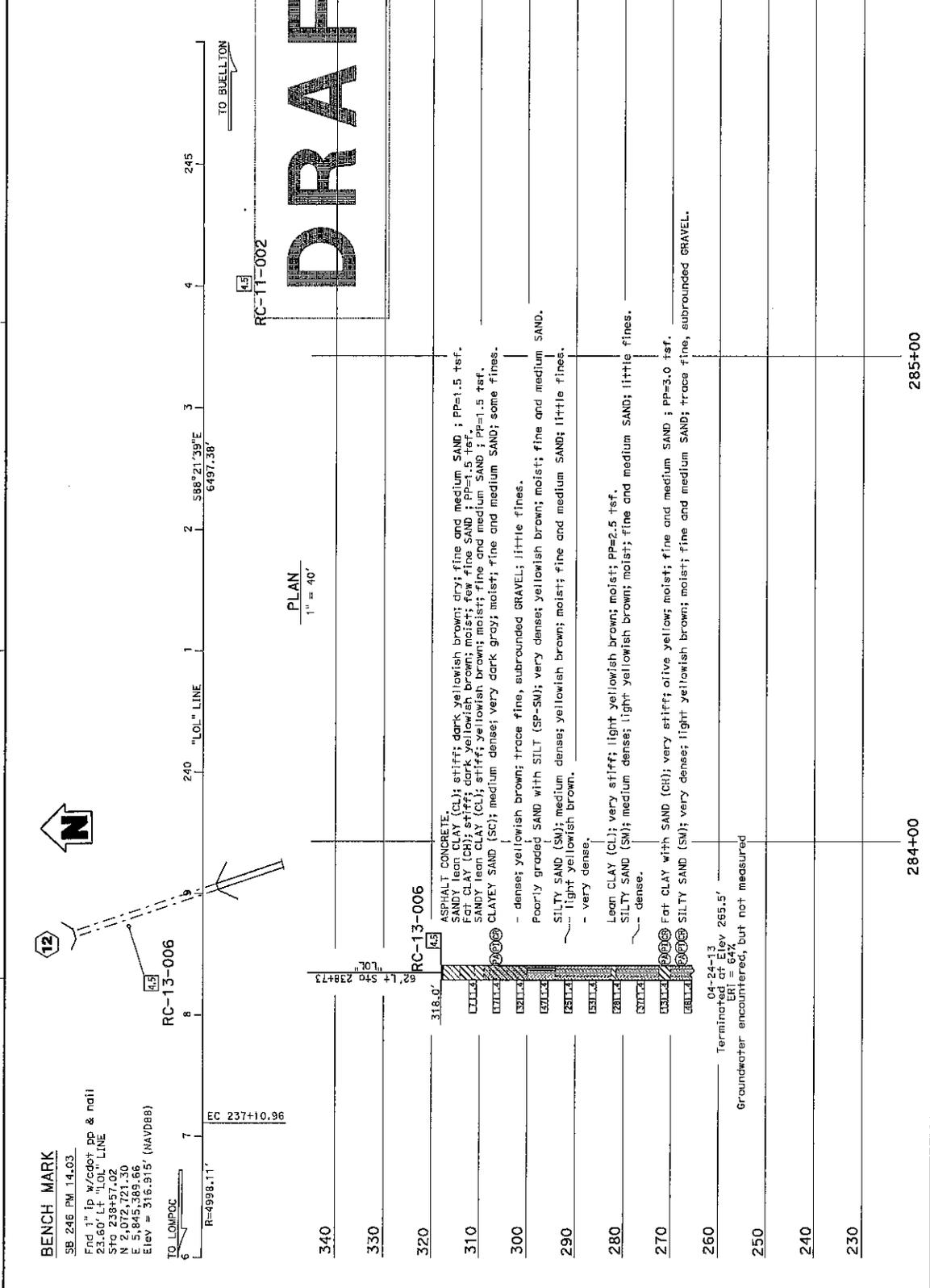
## **Log of Test Borings**





REGISTERED CIVIL ENGINEER  
 PLANS APPROVAL DATE  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of these plans after their approval.

This LOGS sheet was prepared in accordance with the California Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition), and the A108 and A106 for Soil Legend, and A108 for Rock Legend.



<b>ENGINEERING SERVICES</b> DRAWN BY: D. Appelbaum CHECKED BY:		<b>GEOTECHNICAL SERVICES</b> FIELD INVESTIGATION BY: D. Appelbaum		<b>STATE OF CALIFORNIA</b> DEPARTMENT OF TRANSPORTATION		<b>DIVISION OF ENGINEERING SERVICES</b> STRUCTURE DESIGN <b>DESIGN BRANCH X</b>		ISSUE NO. N/A POST DATE 12.3.R16.7		SB 246 PASSING LANES <b>LOG OF TEST BORINGS 2 OF 8</b>	
FUNCTIONAL SUPERVISOR NAME: M. Fregon		PROJECT NUMBER & PHASE: 050000000211		CONTRACT NO.: 05-065401		SHEET NO. 2 OF 8		SCALE: AS SHOWN		DATE:	



BIST	COUNTY	ROUTE	POST MILES	SHEET TOTAL
05	SB	246	12.3/RT16.7	NO. SHEETS

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be held responsible for any errors or omissions in this plan or for any consequences arising therefrom.

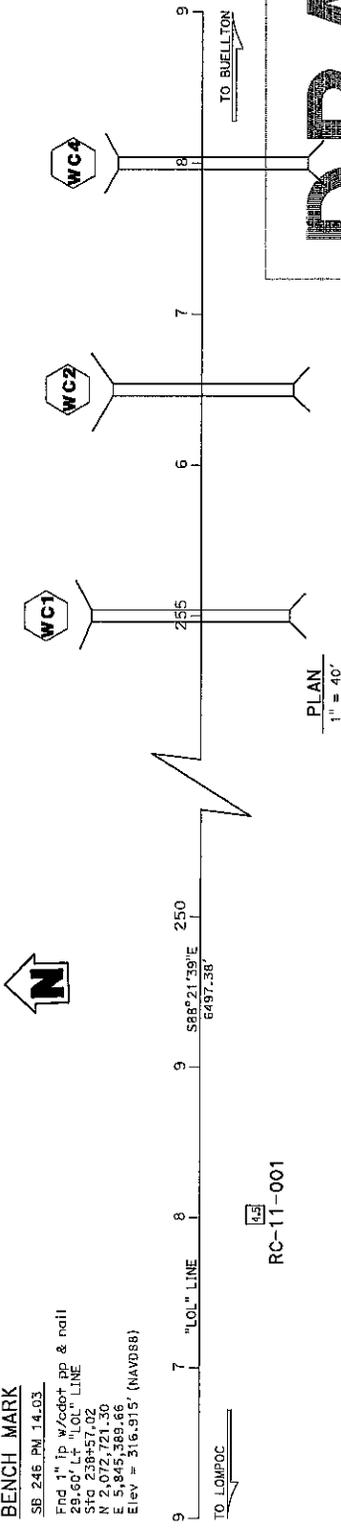
APPROVED FOR THE ENGINEER

DO NOT SCALE

DATE: 6-30-15

CIVIL

This LOGS sheet was prepared in accordance with the California Soil & Rock Logging Classification, S&R 2010 Edition, Manual (2010 Edition), S&R 2010 Edition, Part 10, A100, A106 for Soil Legend, and A104 for Rock Legend.



**DRAFT**

360			
350			
340	RC-11-001	SILTY SAND (SM); loose; dark brown; moist; medium and fine SAND; little fines; trace fine, subrounded GRAVEL; trace organics.	360
330		SANDY lean CLAY (CL); hard; brown; moist; medium and fine SAND; PP=4.5 tsf.	350
320		Lean CLAY with SAND (CL); hard; brown; moist; fine SAND; PP=4.5 tsf.	340
310		SANDY lean CLAY (CL); hard; yellowish brown; moist; medium and fine SAND; PP=4.5 tsf.	330
300		Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown; moist; medium and fine SAND.	320
290		Lean CLAY with SAND (CL); hard; dark brown; moist; medium and fine SAND; PP=4.5 tsf.	310
280		CLAYEY SAND (SC); dense; grayish brown; moist; medium and fine SAND; little fines.	300
270		Lean CLAY with SAND (CL); hard; dark brown; moist; medium and fine SAND; PP=4.5 tsf.	290
260		CLAYEY SAND (SC); dense; grayish brown; moist; medium and fine SAND; little fines.	280
		trace fine, angular GRAVEL; scattered 1"-2" lenses of Lean CLAY (CL); hard; grayish brown; moist; PP=4.5 tsf.	270
		variegated grayish brown and brownish yellow; iron oxide staining.	260
		Lean CLAY (CL); very stiff; light yellowish brown; moist; PP=2.5 tsf.	250+00
		SILTY SAND (SM); medium dense; light yellowish brown; moist; medium and fine SAND; some fines.	
		scattered 2"-3" lenses of lean CLAY (CL); stiff; light yellowish brown; moist; PP=2.0 tsf.	
		- dense; trace fine, subrounded GRAVEL.	
248+00			
249+00			
250+00			

**ENGINEERING SERVICES**

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

DESIGN BRANCH X

STRUCTURE DESIGN

CONTRACT NO. 05-055401

PROJECT NUMBER & PHASE: 050000020211

DATE: 6-30-15

SCALE: 1" = 40'

DATE: 6-30-15

SCALE: 1" = 40'

DATE: 6-30-15

SCALE: 1" = 40'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL SHEETS
05	SB	246	12.3/R16.7	

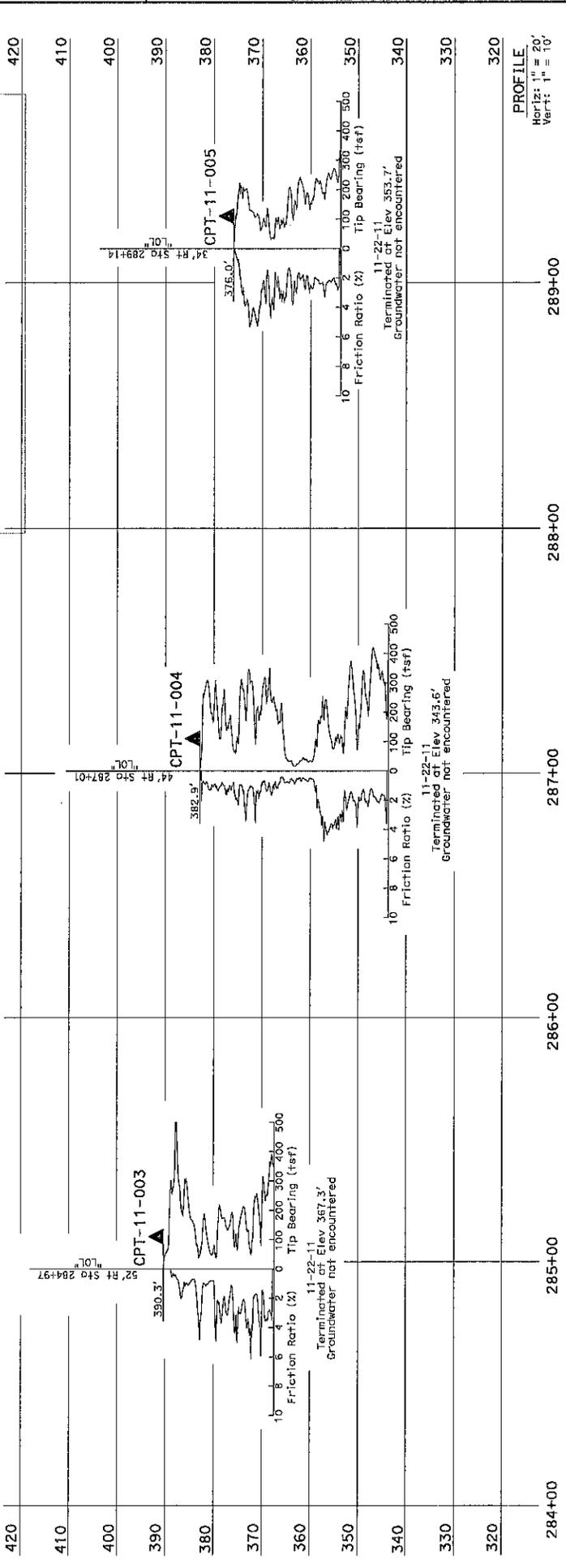
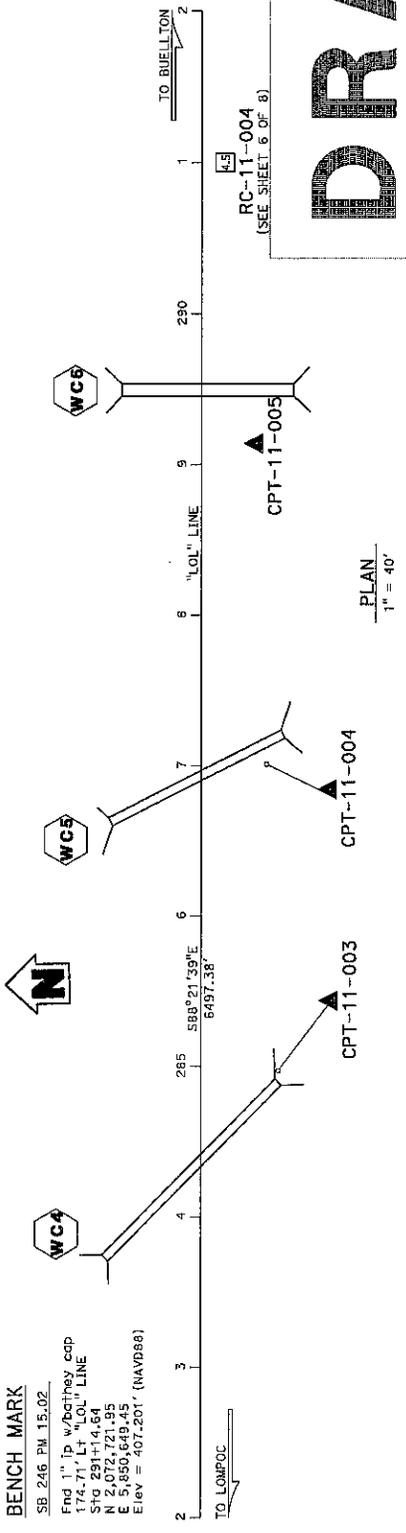
**BENCH MARK**  
 SB 246 PM 15.02  
 Fnd 1" dia w/brassy cap  
 174.71' Lt "LOL" LINE  
 S to 291+14.64  
 N 2,072.721.95  
 E 5,850.649.45  
 Elev = 407.201' (NAVD88)

**REGISTERED CIVIL ENGINEER**  
 PLANS APPROVAL DATE: \_\_\_\_\_  
 The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

This LOTB sheet was prepared in accordance with the California Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition). See 2010 Standard Plans A10F and A10G for Soil Legend, and A10H for Rock Legend.

RC-11-004  
 (SEE SHEET 6 OF 8)

**DRAFT**



ENGINEERING SERVICES	STATE OF CALIFORNIA	DIVISION OF ENGINEERING SERVICES	PROJECT NO.: 05-050000021
FUNCTIONAL SUPERVISOR	DEPARTMENT OF TRANSPORTATION	DESIGN BRANCH X	CONTRACT NO.: 05-050000021
NAME: H. F. FROST	FIELD INVESTIGATION BY: D. Appelbaum	DESIGNED BY: D. Appelbaum	UNIT: 3843
DATE: 12/3/16	OFFICIAL SCALE IN INCHES FOR PRINTED PLAN	DISCARD PRINTS BEARING BARBER REVISION SERIES	DATE: 12/3/16
SB 246 PASSING LANES	LOG OF TEST BORINGS 5 OF 8		

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
05	SB	246	12.3/RT16.7		

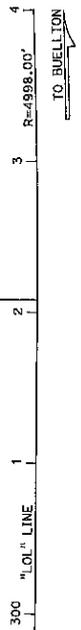
REGISTERED CIVIL ENGINEER  
 PLANS APPROVAL DATE  
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This LOTB sheet was prepared in accordance with the California Soil & Rock Logging, Classification, and Reporting Manual (2010 Edition). See 2010 Standard Plans of A106 for Soil Legend, and A104 for Rock Legend.



BC 302+08.33

CPT-11-010



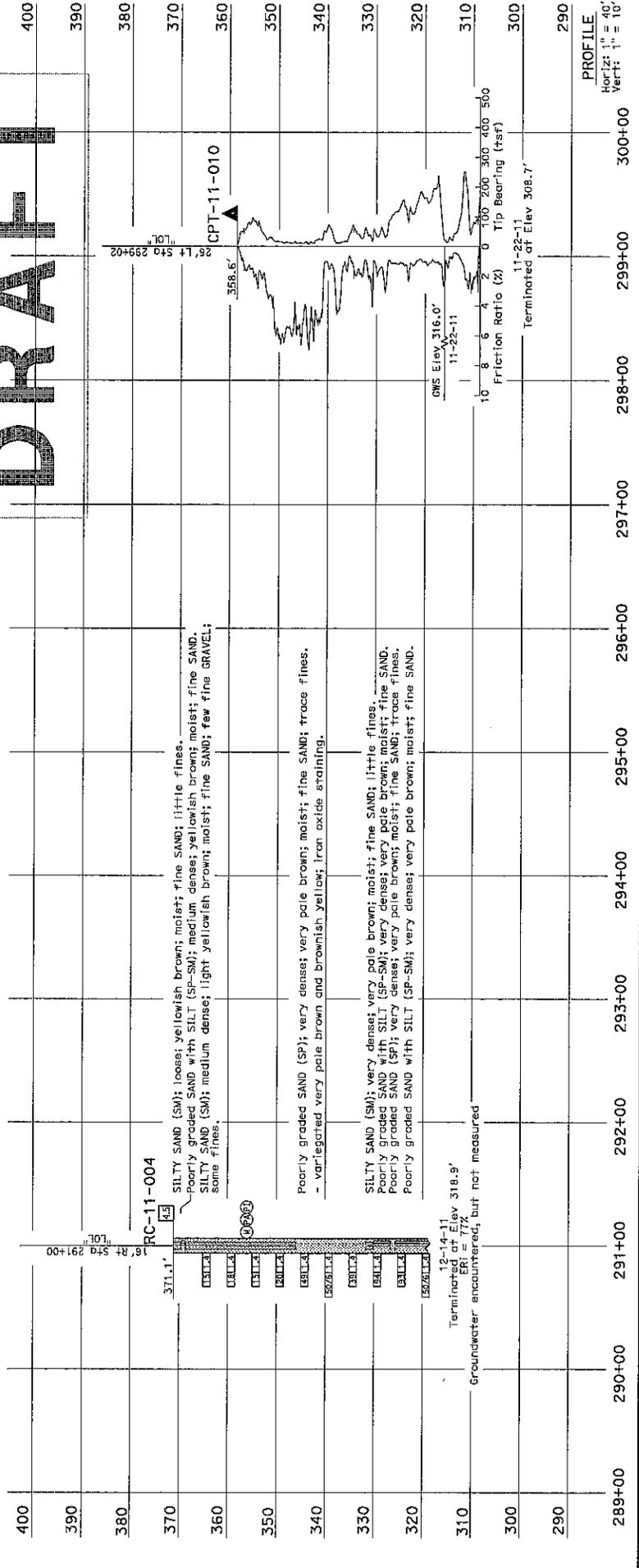
PLAN  
1" = 40'

388° 21' 39" E  
6497.38'

TO LOMPOC

RC-11-004

DRAFT



ENGINEERING SERVICES		GEO TECHNICAL SERVICES		STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		SB 246 PASSING LANES	
FUNCTIONAL SUPERVISOR	DRIVEN BY	FIELD INVESTIGATION BY	PROJECT NUMBER & PHASE	CONTRACT NO.	UNIT	DATE	REVISION
NAME: M. F. Fagan	D. Applebaum	D. Applebaum	05-05-025401	05-05-025401	302	12.3/RT16.7	1
CHECKED BY:		PROJECT NUMBER & PHASE		CONTRACT NO.	UNIT	DATE	REVISION
		05-05-025401		05-05-025401	302	12.3/RT16.7	1

SB 246 PASSING LANES  
 LOG OF TEST BORINGS 6 OF 8  
 HORIZ: 1" = 40'  
 VERT: 1" = 10'



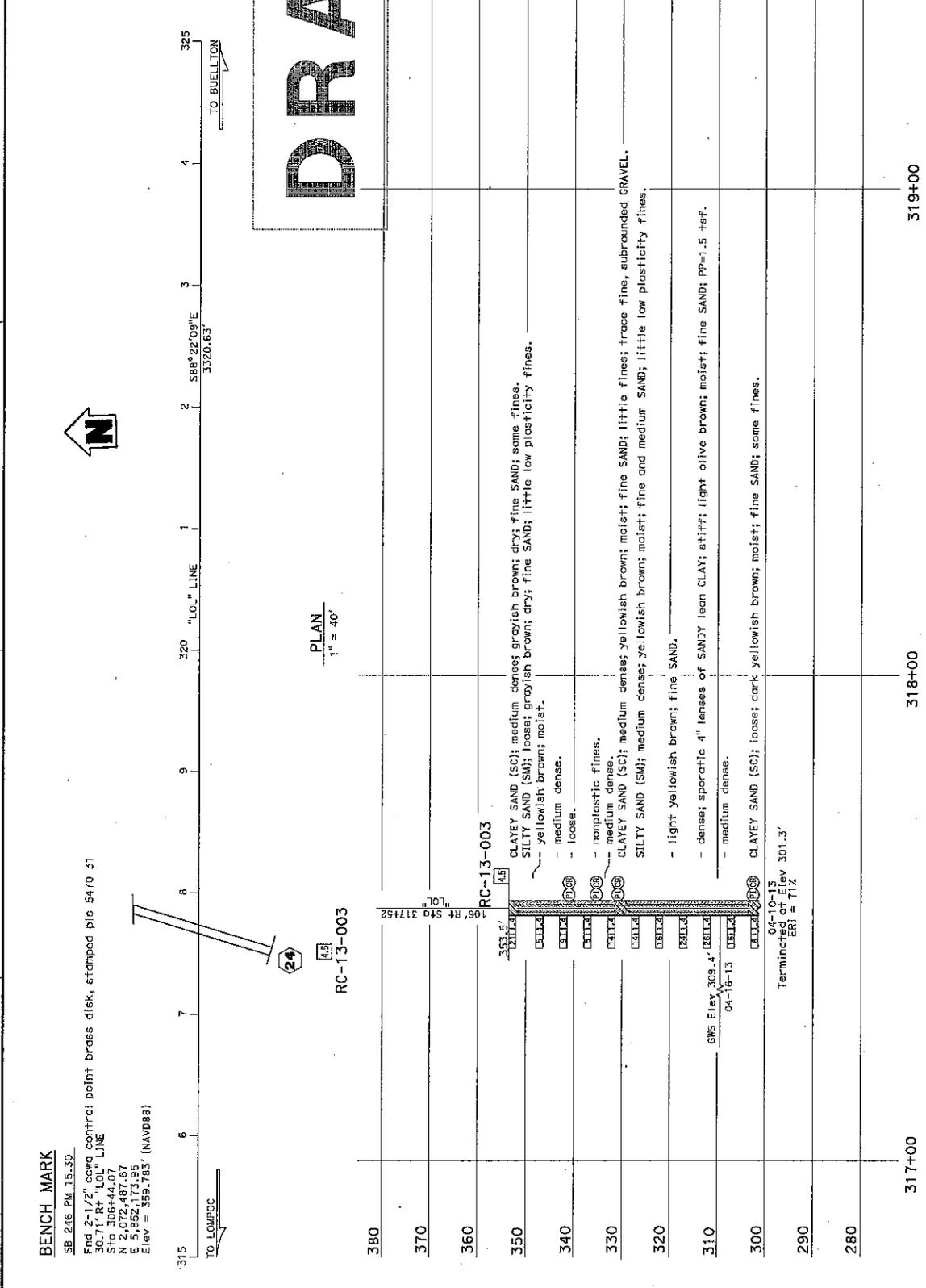
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL SHEETS
05	SB	246	12.3/R16.7	12.3/R16.7

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE \_\_\_\_\_

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This LOG sheet was prepared in accordance with the California Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition). See 2010 Standard Plans A10F and A10G for Soil Legend, and A10H for Rock Legend.



**BENCH MARK**

SB 246 PM 15.30  
 Fnd 2'-1/2" c/wg control point brass disk, stamped pls 5470 31  
 30.71' RT "LOL" LINE  
 SFG 306+44.07  
 N 2,072,487.87  
 E 5,852,173.95  
 Elev = 359.783' (NAVD88)

PLAN  
 1" = 40'

**DRAFT**

ENGINEERING SERVICES		STATE OF CALIFORNIA		DIVISION OF ENGINEERING SERVICES		SB 246 PASSING LANES	
FUNCTIONAL SUPERVISOR		DEPARTMENT OF TRANSPORTATION		STRUCTURE DESIGN		LOG OF TEST BORINGS 8 OF 8	
NAME: H. FINEGO		D. Appelbaum/J. Scott/ine		DESIGN BRANCH X		PROJECT NO. 05-056001	
CREATED BY:		ORIGINAL SCALE IN INCHES		PROJECT NUMBER & PHASE: 0500000211		CONTRACT NO. 05-056001	
DATE: 04-18-13		AS SHOWN		UNIT: 86.3		SHEET OF	
DRAWN BY: D. Appelbaum		FIELD INVESTIGATION BY:		DATE: 12.3/R16.7		X	
CHECKED BY:		D. Appelbaum/J. Scott/ine		DATE: 12.3/R16.7		X	
DATE: 04-18-13		DATE: 04-18-13		DATE: 12.3/R16.7		X	
DATE: 04-18-13		DATE: 04-18-13		DATE: 12.3/R16.7		X	

# **INFORMATION HANDOUT**

**For Contract No. 05-0C6404**

**At 05-SB-246-12.3/R16.7**

**Identified by**

**Project ID 0500000021**

## **MATERIALS INFORMATION**

[8. Supplemental Geotechnical Design Report dated 12/13/13](#)

**M e m o r a n d u m** *Flex your power!*

*Be energy efficient!*

**To:** FOAD AL-HAMDANI  
Senior Design Engineer  
Central Region Project Development  
Office of Design II, Branch H

**Date:** December 13, 2013

**File:** 05-0C6401 (0500000021)  
05-SB-246-12.3/R16.7  
Construct Passing Lanes

**Attn:** Apurva N. Gokal  
Project Engineer

**From:** DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES

**Subject:** Supplemental Geotechnical Design Report for SB 246 Passing Lanes

A Supplemental Geotechnical Design Report is provided for the above referenced project per your request dated February 21, 2013. A draft report was submitted to Central Region Project Development on July 26, 2013. Subsequent to issuance of the draft report, significant changes were made to the scope of work. The recommendations contained herein are based on design information provided in the 95% PS&E plan set.

The project proposes to construct passing lanes and operational improvements on Route 246 in Santa Barbara County between post mile 12.3 and post mile R16.7 to improve traffic safety, mobility, reliability and multi-modal functionality along that segment of highway.

The purpose of this report is to document geotechnical conditions and provide foundation recommendations for proposed wingwalls at Drainage System Nos. 7, 22, and 27. Review of published geologic data and previous geotechnical reports, field reconnaissance, a subsurface investigation, and geotechnical calculations were performed as part of the geotechnical investigation.

**Existing Facilities and Proposed Improvements**

The existing roadway consists of two 10-foot to 12-foot lanes, and shoulders varying in width between 1 foot and 8 feet. The proposed project will construct passing lanes, and will provide turn channelization and other operational improvements at intersections within the project limits. A vertical curve correction is proposed in the vicinity of the intersection of Route 246 with Tularosa Road to improve sight distance. The roadway will be realigned to the south of the existing lanes in that area so that the vertical curve correction can be constructed while maintaining two lanes for traffic.

Several existing drainage systems will be extended or replaced as part of the project. Reinforced concrete headwalls and wingwalls will be constructed at the ends of the Drainage System Nos. 7, 22, and 27 to reduce the length of pipe needed and to improve hydraulic efficiencies of the drainage systems.

### **Pertinent Reports and Investigations**

The following publications and references were used to assist in the evaluation of site conditions:

1. *Caltrans ARS Online (v2.1.06)*.
2. *Caltrans Seismic Design Criteria, Version 1.6*, November 2012.
3. *District Preliminary Geotechnical Report*; Daniel L. Appelbaum; EA 05-0C6400; July 28, 2008.
4. *Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California*; Thomas W. Dibblee, Jr.; 1988.
5. *Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California*; Thomas W. Dibblee, Jr.; 1993.
6. *Geotechnical Design Report*; Daniel L. Appelbaum; EA 05-0C6401; March 21, 2012.

Subsurface investigations were conducted at the locations of the proposed drainage structures to assess foundation conditions for the proposed wingwalls.

### **Physical Setting**

The project area is located near the northern margin of the Transverse Ranges Geomorphic Province, just outside of the southern margin of the Coast Ranges Geomorphic Province. The Transverse Ranges province is characterized by east-west trending mountain ranges and faults. It contains hills and dissected plains between the Santa Maria Valley to the north, the Santa Ynez River and Santa Ynez Fault to the south, and the San Rafael Mountains to the northeast.

### **Climate**

The climate in the project area is mild with a strong coastal influence. Daytime temperatures during the summer months are generally in the low to mid 70's (°F) with occasional extreme temperatures into the 100's. Nighttime summer temperatures are normally in the low to mid 50's. Winter temperatures generally have lows in the low 40's with highs in the mid to upper 60's. The area typically receives almost all of its rainfall between October and May with the heaviest rains occurring during the winter months. Average annual rainfall is approximately 15 inches.

Fog is a common feature of the weather in the project area during the summer months. The marine layer typically rolls in during the late night or early morning hours, and dissipates in the late morning or early afternoon. High winds are also common in the project area.

### **Topography and Drainage**

The project site is located in the Santa Rita Valley of Santa Barbara County. The terrain along the roadway alignment within the project limits is flat to moderately sloping. Roadway elevations in the project area range between approximately 180 feet and 470 feet. Adjacent land use is primarily agricultural.

The project traverses several watersheds including Purisima Canyon, Thompson Park, Cebada Canyon, and Santa Rita Valley. All of these watersheds ultimately drain to the Santa Ynez River, which lies to the south of the project area. The Santa Ynez River outlets to the Pacific Ocean north of Surf, within Vandenberg Air Force Base property.

### **Regional Geology**

Route 246 is located in the Santa Rita Valley at the western end of the Transverse Ranges geomorphic province. The province is characterized by east-west trending mountains and valleys. The western Transverse Ranges are primarily composed of thick (thousands of feet) marine and non-marine sedimentary rocks. Route 246 is bounded to the south by the Santa Ynez Range and to the north by the Purisma Hills. The region is rapidly uplifting and shortening along a system of east-west trending faults and folds (synclines and anticlines) due to dextral transverse movement on the San Andreas Fault system past the Big Bend. Regional compression has generated a system of steeply dipping reverse and transverse faults. The Santa Ynez River Fault Zone, which parallels the northern flanks of the Santa Ynez Range and Route 246, is the primary mechanism for rapid uplift of the Santa Ynez Range. The resulting structure, and rocks of marine origin are the source of numerous oil fields in the region, the closest to the site being the Lompoc Oil Field in the Purisma Hills.

The Santa Rita Valley is structurally controlled by the Santa Rita Syncline, which creates a topographic depression for locally derived Holocene valley and floodplain deposits. The valley is bounded on either side by the Orcutt and Paso Robles Formations. The Orcutt Formation is generally regarded as a terrace deposit of aeolian sand and interbedded coarse rounded gravels with minor amounts of silt and clay. The formation has a maximum thickness of about 200-feet. The Paso Robles Formation within the Santa Rita Valley is up to 700-feet thick, and is composed of fluvial lenticular deposits of sands and gravels, interbedded with silt and clay.

### **Seismicity**

The project is located within a seismically active region of California. There are several earthquake faults in close proximity to the project area. Table 1 lists the active and potentially active faults in the project vicinity as described in Caltrans's *2012 Fault Database*. Corresponding Moment

Magnitudes and distances to the project area are also given. A fault map is included in the attachments to this report.

**Table 1: Active and Potentially Active Faults**

Fault	Moment Magnitude of Maximum Credible Earthquake <sup>1</sup>	Type of Fault <sup>2</sup>	Distance to Fault from Project Area <sup>3</sup> (kilometers)	
			Westerly Project Limit	Easterly Project Limit
Santa Ynez River	6.4	R	2.4	2.0
Santa Ynez River fault zone (Honda Fault)	6.4	SS	5.0	10.6
Lions Head 2011 CFM	6.8	R	6.3	5.1
Los Alamos 2011 CFM	6.8	R	11.9	9.8

A design response spectrum for the project area was estimated using *Caltrans ARS Online (v2.1.06)*, a web-based tool that calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in Appendix B of *Caltrans Seismic Design Criteria*. The procedure used by ARS Online was developed to calculate the minimum seismic design requirements for bridges on State highways. The method calculates design response spectra over a range of periods. The design response spectrum is based on the envelope of a deterministic and a probabilistic spectrum. The deterministic spectrum is calculated as the arithmetic average of median response spectra computed using the Chiou & Youngs and Campbell & Bozorgnia ground motion prediction equations (CY-CB GMPE). These equations are applied to all faults in or near California considered to be active in the last 700,000 years (late Quaternary age) and capable of producing a moment magnitude earthquake of 6.0 or greater.

The probabilistic spectrum is obtained from the *2008 USGS Seismic Hazard Map* for the 5% in 50 years probability of exceedance (or 975 year return period). The spectral values are adjusted with a soil amplification factor based on an average of the Boore-Atkinson (2008), Campbell Bozorgnia (2008), and Chiou-Youngs (2008) ground motion prediction models. For sites underlain by soils having an average shear wave velocity for the upper 30 meters of soil ( $V_{S30}$ ) of less than 300 meters per second, the *2009 USGS Probabilistic Seismic Hazard Analysis Interactive Deaggregation Tool* is used to develop the probabilistic spectrum.

<sup>1</sup> According to *Caltrans 2012 Fault Database*

<sup>2</sup> SS=strike-slip fault; R=reverse fault; N=normal fault

<sup>3</sup> Perpendicular distance to fault or fictitious extension of fault

The controlling fault in the project area is the Santa Ynez River Fault, a reverse fault with a maximum magnitude of 6.4. The peak ground acceleration is estimated to be 0.53 g (gravity) at the westerly end of the project, and 0.54 g at the easterly project limit. The deterministic spectrum with a soil amplification factor for a  $V_{S30}$  of 270 meters per second governed the design response spectrum for both ends of the project area. 270 meters per second is an average shear wave velocity for Type D soil profiles. Type D soils are stiff soils having either a standard penetration resistance (SPT) of between 15 and 50 blows per foot, or undrained shear strength of between 1000 and 2000 pounds per square foot.

The project area is not located within an Alquist-Priolo Earthquake Fault Zone, nor is it within 1,000 feet of an un-zoned fault 15,000 years or younger in age so, based on Caltrans policy, a fault rupture evaluation is not warranted.

Soil liquefaction occurs when loose, water-saturated soils lose shear strength in response to the sudden shaking from an earthquake, and begin behaving like a liquid, reducing their ability to support embankments and structures. Loose sands and gravels with 35 percent fines or less that have the potential of being saturated are susceptible to liquefaction. Generally, the younger and looser the sediment, and the shallower the water table, the more susceptible the soil is to liquefaction. Sediments most susceptible to liquefaction include historical and late Holocene-age river channel and flood plain deposits, and poorly compacted fills. Bedrock and dense soils, including well-compacted fills, have a low susceptibility to liquefaction. Liquefaction is most prevalent in areas where groundwater lies within 30 feet of the ground surface; liquefaction rarely occurs in areas with groundwater deeper than 50 feet.

Based on inspection of the Log of Test Borings (LOTB), liquefaction potential may be moderate in areas of the project that are underlain by Quaternary valley and floodplain deposits (geologic unit Qa). There are zones of medium dense cohesionless soils present at elevations that may be saturated by groundwater. Surface expression of settlement of any liquefiable layers is unlikely, however. Similarly, perceptible settlement of shallow foundations is not expected.

### **Exploration**

Field investigations performed at the project site include geotechnical borings, cone penetrometer testing (CPT), and monitoring of groundwater elevations.

### **Drilling and Sampling**

Ten cone penetrometer soundings (CPT-11-001 through CPT-11-010) and four mud rotary borings (RC-11-001 through RC-11-004) were conducted in the project area during November and December 2011 to provide information for the Geotechnical Design Report. Six additional mud rotary borings (RC-13-001 through RC-13-006) were drilled in April 2013 to provide subsurface data for the drainage systems. The maximum depth of investigation was approximately 53 feet.

The locations of the geotechnical borings applicable to the drainage systems, and descriptions of the soils encountered in the borings are shown on the attached Log of Test Borings (LOTB).

**Table 2: 2011 and 2013 Drilling Summary**

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Location		Ground Surface Elevation (ft)	Boring Depth (ft)
					Station ("LOL" Line)	Offset		
RC-11-001	12/13/2011	Acker MP3	Automatic	77	248+02	38' Rt.	341.8	52.2
RC-11-002	12/13/2011	Acker MP3	Automatic	77	244+02	34' Rt.	328.5	51.8
RC-11-003	12/14/2011	Acker MP3	Automatic	77	276+50	22' Rt.	438.0	52.6
RC-11-004	12/14/2011	Acker MP3	Automatic	77	291+00	16' Rt.	371.1	52.2
RC-13-001	4/9/2013	Acker MP3	Automatic	71	218+33	129' Rt.	275.0	52.0
RC-13-002	4/9/2013	Acker MP3	Automatic	71	310+75	75' Rt.	354.5	52.5
RC-13-003	4/10/2013	Acker MP3	Automatic	71	317+52	106' Rt.	353.5	52.2
RC-13-004	4/10/2013	Acker MP3	Automatic	71	350+81	95' Rt.	410.9	52.7
RC-13-005	4/23/2013	Deidrich D-50	Automatic	64	310+51	49' Lt.	360.7	52.1
RC-13-006	4/24/2013	Deidrich D-50	Automatic	64	238+73	62' Lt.	318.0	52.5

The mud rotary borings were advanced using a self-cased wireline drilling apparatus that provided continuous soil samples. Soils were visually classified in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (June 2010). Soil samples were also collected and submitted to the Headquarters Geotechnical Laboratory and the District 5 Materials Laboratory for mechanical analyses, determination of Atterburg limits, and corrosion potential testing. Standard penetration tests (SPT), ASTM test method 1586, were performed at selected depth intervals to estimate in-place density of the native soil. Empirical correlations of soil strength parameters with SPT blow counts were used to estimate strength parameters of in-situ cohesionless soils. Pocket penetrometer measurements of unconfined compressive strength were used to estimate the undrained shear strength of clay samples.

**Corrosion**

Representative soil samples taken during the subsurface investigation were tested for corrosion potential. The Department considers a site corrosive to foundation elements if one or more of the following conditions exist:

- Chloride concentration is greater than or equal to 500 ppm
- Sulfate concentration is greater than or equal to 2000 ppm
- The pH is 5.5 or less

Since resistivity serves as an indicator parameter for the possible presence of soluble salts, tests for sulfate and chloride are usually not performed unless the resistivity of the soil is 1,000 ohm-cm or less.

**Table 3: Corrosion Test Summary**

Boring	Depth (ft.)	SIC Number	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RC-11-003	4-15	C246309	3828	7.27	N/A	N/A
RC-11-003	15-36	C246309	4563	6.90	N/A	N/A
RC-11-003	36-50	C246310	3518	6.34	N/A	N/A
RC-13-003	11.7-13.0	C246001	3787	8.44	N/A	N/A
RC-13-003	17.7-18.7	C246003	5549	6.89	N/A	N/A
RC-13-003	21.7-22.7	C246002	1774	7.47	N/A	N/A
RC-13-003	51.7-52.7	C246004	1262	8.34	N/A	N/A
RC-13-005	11.6-12.1	C512461	1301	6.70	N/A	N/A
RC-13-005	20-22	C512462	2115	7.73	N/A	N/A
RC-13-006	10.5-12.5	C512463	589	7.00	**	**
RC-13-006	46-47.5	C512464	364	6.38	**	**
RC-13-006	48-52.5	C512465	1155	7.95	N/A	N/A
<b>Corrosive if:</b>				<b>≤ 5.5</b>	<b>≥ 500</b>	<b>≥ 2000</b>

\*\*Insufficient sample quantity to test for chloride and sulfate content

Corrosion test results are inconclusive because of insufficient sample quantity to test for sulfate and chloride for SIC Numbers C512463 and C512464. The two soil samples were obtained from boring RC-13-006 which was drilled adjacent to Drainage System # 12. Resistivity numbers indicate that the samples may be corrosive. Inspections of the drainage system, however, indicated that the concrete headwalls and wingwalls at both the inlet and outlet ends of the existing 60" corrugated metal pipe (CMP) culvert show no signs of corrosion damage. The CMP itself is in fair condition; there is some corrosion of the invert, but it is relatively minor given that the culvert is over 40 years old (the drainage system was constructed in 1970). The damage is likely attributable to abrasion from the bed load of the water that has flowed through the pipe. Since all other test results indicate non-corrosive conditions, and because the project area is not within 1000 feet of salt or brackish water, the site should be considered non-corrosive.

### Drainage System #7

#### **Lithology**

The "Geologic Map of the Lompoc and Surf Quadrangles, Santa Barbara County, California" compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #7 is underlain by

Quaternary Orcutt Sand (geologic unit Q<sub>o</sub>), which Dibblee describes as tan to rusty brown, friable to locally indurated, wind-deposited sand.

**Subsurface Conditions**

Boring RC-13-001 was drilled near the inlet end of Drainage System #7. The boring encountered approximately 30 feet of dense to very dense poorly graded sand with clay overlying very dense poorly graded sand.

**Groundwater**

Groundwater was not measured in boring RC-13-001 because there was standing water below the invert of the existing culvert, and it was assumed that the water surface elevation measured in the hole would closely mirror the standing water surface. Groundwater was assumed to be at the bottom of footing elevation in the calculation of bearing capacity.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types at the inlet and outlet ends of the reinforced concrete box culverts of Drainage System #7. The drainage system cross section provided by Central Region Design indicates that the design height of the wingwalls will be 11 feet and the depth of the wingwall footings will be 4.0 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case I provided in 2010 Standard Plan D84 were used to evaluate bearing resistance of the foundation soil. Foundation soil types and density were assumed to be similar at both ends of the culvert.

**Table 4: Drainage System #7 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi q_N</math> (<math>\Phi=0.45</math>) (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #7 NE (Outlet)	11	258.05	4.77	7.08	3.77
DS #7 NW (Outlet)	11	258.05	4.77	7.19	3.77
DS #7 SE (Inlet)	11	262.82	4.77	6.89	3.77
DS #7 SW (Inlet)	11	262.82	4.77	6.89	3.77

## **Construction Considerations**

The sites of the proposed wingwalls for Drainage System #7 were inaccessible for the purposes of conducting a subsurface investigation. The geotechnical boring drilled for the analysis of foundation conditions was outside of the actual drainage channel, so soil type and consistency at the locations of the wingwalls may differ from soils encountered in the boring. This Office should be notified when footing excavation is complete to confirm that foundation soils are similar to what was assumed for the geotechnical analysis. If unsuitable material is encountered at bottom of footing elevation, it will likely be recommended that the material be removed and replaced with moisture conditioned Class 2 AB, compacted to 95% relative density. The depth and horizontal extent of the sub excavation will be determined at the time of the site inspection.

Localized areas of unconsolidated or saturated foundation materials may require stripping and recompaction, or removal of material deemed unsuitable. If standing water or unsuitable material is encountered to a depth where it cannot be economically removed, it is recommended that the unsuitable material be sub excavated 18 inches to a horizontal limit of one foot beyond the perimeter of the footing, and replaced with Class 1, Type B permeable material encapsulated in Class B3 subgrade enhancement geotextile. The permeable material will allow water to fill its pore spaces without a loss of strength. The subgrade enhancement geotextile will act as a separator, preventing the soils around the fabric from filling the voids in the permeable material, and preventing the permeable material from penetrating the soft soils beneath the geotextile. The subgrade enhancement geotextile will also serve to reinforce the subgrade soil. The permeable blanket will provide a dry and stable working platform for construction.

Groundwater is expected to be encountered in foundation excavations, particularly on the inlet side of the drainage system. Pumping may be required to prepare the excavation for concrete placement.

Temporary slopes or shoring may be required to support excavations to construct wingwalls. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

## **Drainage System #22**

### **Lithology**

The "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #22 is underlain by Quaternary valley and floodplain deposits (geologic unit Q<sub>a</sub>) consisting of silt, sand, and gravel.

### **Subsurface Conditions**

Boring RC-13-005, located near the left (inlet) end of Drainage System #22, encountered 10 feet of loose silty sand; overlying 12 feet of stiff sandy clay; overlying 24 feet of loose to medium dense silty sand; overlying medium dense clayey sand. Boring RC-13-002, located near the right (outlet)

end of the proposed culvert, encountered 5 feet of loose poorly graded sand; overlying 13 feet of loose to medium dense clayey sand and very stiff clay with sand; overlying medium dense to dense poorly graded sand.

**Groundwater**

Groundwater was measured at 30.9 feet below the ground surface in boring RC-13-002 on April 10, 2013, and at 34.8 feet below the ground surface in boring RC-13-005 on April 24, 2013. Those depths correspond to groundwater elevations of 323.6 feet and 325.9 feet respectively.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the design height of the wingwalls will be 12 feet and the depth of the footings will be 4.0 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D84 were used to evaluate bearing resistance of the foundation soil.

**Table 5: Drainage System #22 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi_{QN}</math> (<math>\Phi=0.45</math>) (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #22 NE (Inlet)	12	351.35	7.84	3.96	2.50
DS #22 NW (Inlet)	12	351.35	7.84	3.96	2.50
DS #22 SE (Outlet)	12	348.68	7.84	3.79	2.50
DS #22 SW (Outlet)	12	348.68	7.84	3.79	2.50

**Construction Considerations**

Bearing capacity calculations indicate that the foundation soils at the sites of the proposed wingwalls for Drainage System #22 are marginally acceptable. This Office should be notified when footing excavation is complete to confirm that foundation soils are suitable to support the proposed structures. If the foundation material is deemed unsuitable, it will likely be recommended that the material be removed and replaced with moisture conditioned Class 2 AB, compacted to 95% relative density. The depth and horizontal extent of the sub excavation will be determined at the time of the site inspection.

Temporary slopes or shoring may be required to support excavations to construct wingwalls. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

**Drainage System #27**

**Lithology**

The "Geologic Map of the Los Alamos Quadrangle, Santa Barbara County, California," compiled by Thomas W. Dibblee, Jr. indicates that the site of Drainage System #27 is underlain by Quaternary valley and floodplain deposits (geologic unit Q<sub>a</sub>) consisting of silt, sand, and gravel.

**Subsurface Conditions**

Boring RC-13-004, located near the right (outlet) end of Drainage System #27, primarily encountered medium dense to dense silty sand.

**Groundwater**

Groundwater was measured at 39.9 feet below the ground surface in boring RC-13-004 on April 16, 2013. That depth corresponds to a groundwater elevation of 371.0 feet.

**Foundation Recommendations**

Standard Plan reinforced concrete wingwalls on spread footings are the recommended structure and foundation types. The drainage system cross section provided by Central Region Design indicates that the design height of the wingwalls will be 11 feet and the depth of the footings will be 4.0 feet. The net bearing pressure and effective footing width for the Strength Limit State load under Design Loading Case III provided in 2010 Standard Plan D84 were used to evaluate bearing resistance of the foundation soil.

**Table 6: Drainage System #27 Wingwall Foundation Recommendations**

<i>Location</i>	<i>Design Height (ft)</i>	<i>Bottom of Footing Elevation (ft)</i>	<i>Effective Footing Width (ft)</i>	<i>Strength Limit Factored Bearing Resistance <math>\Phi q_N</math> (<math>\Phi=0.45</math>) (ksf)</i>	<i>Strength Limit Factored Gross Uniform Bearing Stress <math>q_u</math> (ksf)</i>
DS #27 SE (Outlet)	11	400.70	7.55	13.36	2.28
DS #27 SW (Outlet)	11	400.70	7.55	13.36	2.28

### **Construction Considerations**

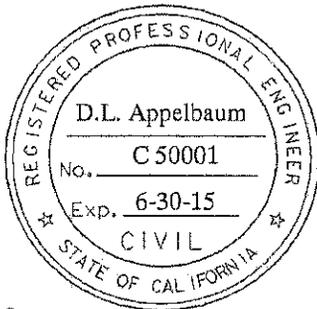
The site of the proposed wingwalls for Drainage System #27 was inaccessible for the purposes of conducting a subsurface investigation. The geotechnical boring drilled for the analysis of foundation conditions was outside of the actual drainage channel, so soil type and consistency at the locations of the wingwalls may differ from soils encountered in the boring. This Office should be notified when footing excavation is complete to confirm that foundation soils are similar to what was assumed for the geotechnical analysis. If unsuitable material is encountered at bottom of footing elevation, it will likely be recommended that the material be removed and replaced with moisture conditioned Class 2 AB, compacted to 95% relative density. The depth and horizontal extent of the sub excavation will be determined at the time of the site inspection.

Temporary slopes or shoring may be required to support excavations to construct wingwalls. Design and construction of temporary slopes and shoring are the responsibility of the contractor and must comply with Cal OSHA requirements.

### Closure

The recommendations contained in this report are based on specific project information that has been provided by Office of Design II, Branch H. If any conceptual changes are made during final project design, this Office should review those changes to determine if the recommendations contained in this report are still applicable. Any questions regarding the recommendations contained herein should be directed to the attention of Dan Appelbaum, (805) 549-3745, or Mike Finegan, (805) 549-3194, at the Office of Geotechnical Design – North, Branch D.

Supervised by,



*Daniel L. Appelbaum*  
DANIEL L. APPELBAUM, PE  
Transportation Engineer  
Geotechnical Design – North  
Branch D

*Michael S. Finegan*  
MICHAEL S. FINEGAN, PE, Chief  
Geotechnical Design - North  
Branch D

- c: Reza Mahallati / GDN Records (E-copy)
- Paul Martinez – Project Manager (E-copy)
- GeoDOG - Digital Archive of Geotechnical Data (E-copy)
- R.E. Pending File
- Eric Karlson – District Materials Engineer (E-copy)
- Job File / Branch D Records

## **LIST OF ATTACHMENTS**

<b>ATTACHMENT 1</b>	<b>VICINITY MAP</b>
<b>ATTACHMENT 2</b>	<b>GEOLOGIC MAP</b>
<b>ATTACHMENT 3</b>	<b>EARTHQUAKE FAULTS</b>
<b>ATTACHMENT 4</b>	<b>LOG OF TEST BORINGS</b>

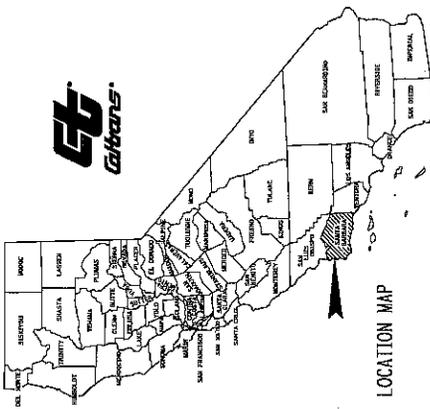
INDEX OF PLANS

STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
PROJECT PLANS FOR CONSTRUCTION ON  
STATE HIGHWAY

IN SANTA BARBARA COUNTY NEAR LOMPOC  
FROM 0.03 MILES EAST OF PURISIMA ROAD  
TO 0.37 MILES WEST OF SANTA RITA ROAD

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL SHEETS

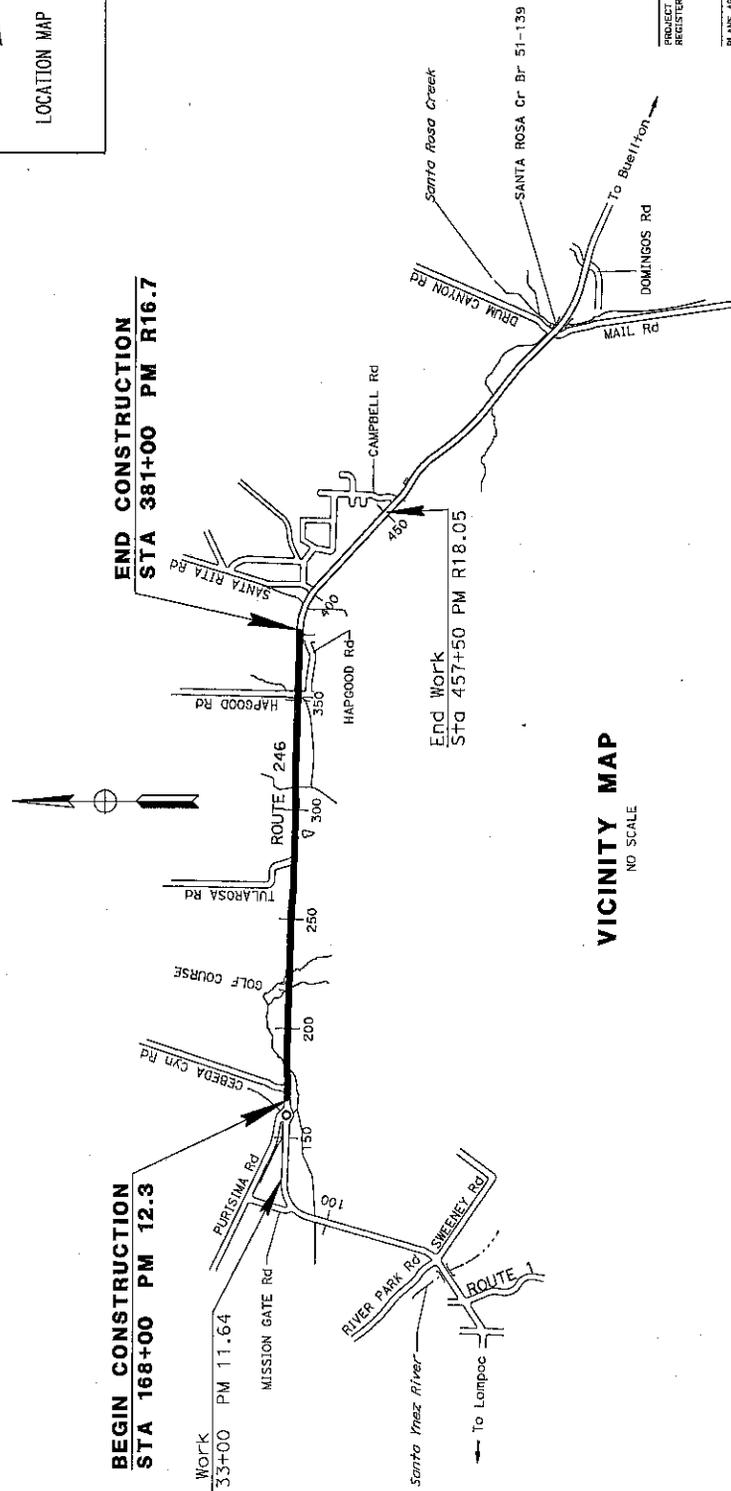



**BEGIN CONSTRUCTION**  
STA 168+00 PM 12.3

Begin Work  
Sta 133+00 PM 11.64

**END CONSTRUCTION**  
STA 381+00 PM R16.7

End Work  
Sta 457+50 PM R18.05




PROJECT ENGINEER  
REGISTERED CIVIL ENGINEER

DATE

PLANS APPROVAL DATE

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION CONTAINED IN THIS PLAN SHEET.

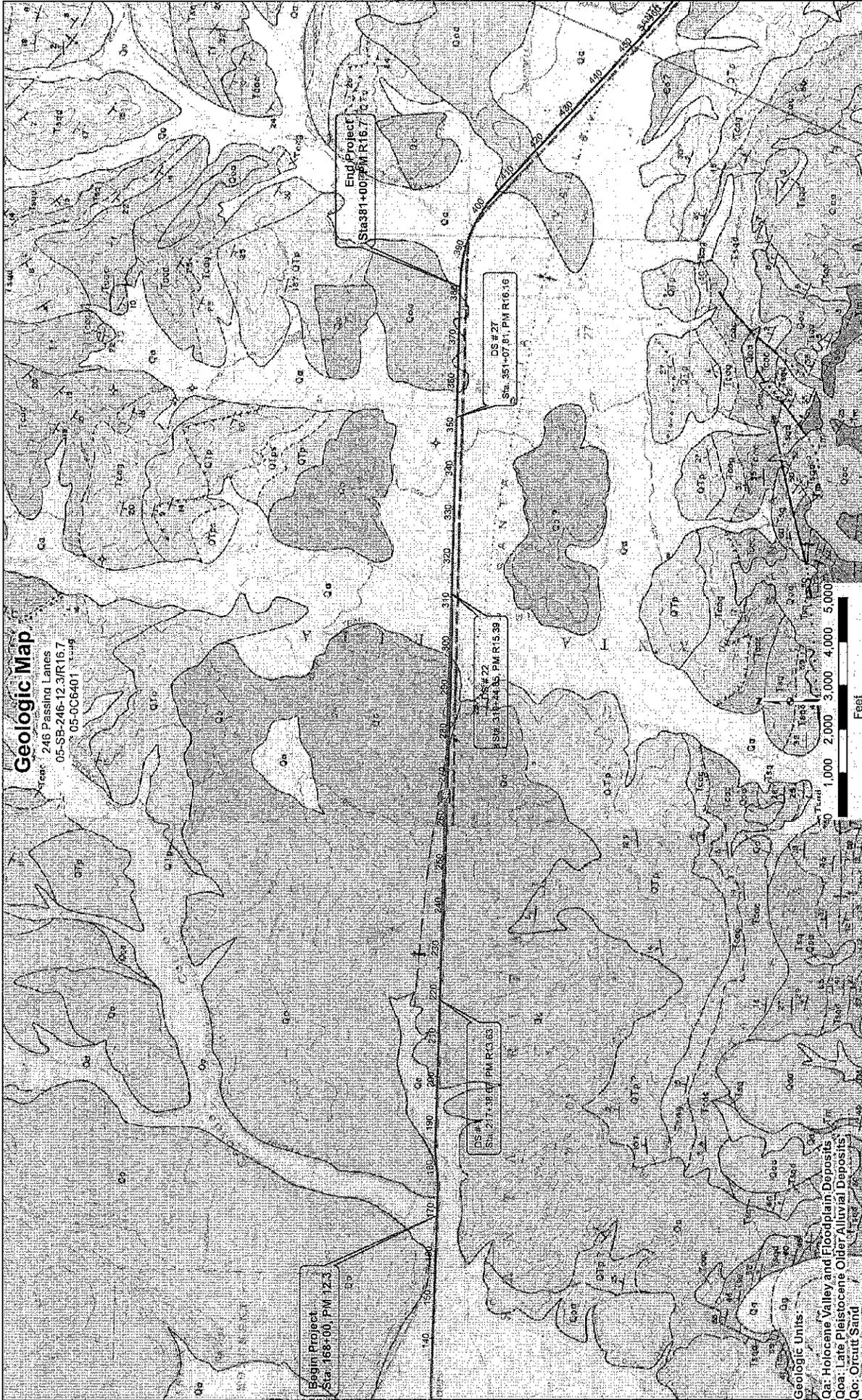
CONTRACT NO.	05-0C6404
PROJECT ID	0500000021

ATTACHMENT 1

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

PROJECT MANAGER

DESIGN ENGINEER



**Geologic Map**

246 Passing Lanes  
 05-SB-246-12.3/R16.7  
 05-OC6401

Begin Project  
 Sta. 166+00, PM 12.3

End Project  
 Sta. 381+00, PM R16.7

DS # 21  
 Sta. 177.38, PM R13.63

DS # 22  
 Sta. 317.44, PM R15.98

DS # 27  
 Sta. 351.07, PM R16.16

**Geologic Units**  
 Qa: Holocene Valley and Floodplain Deposits  
 Qoa: Late Pleistocene Older Alluvial Deposits  
 Qo: Orcutt Sand





# **ATTACHMENT 4**

Supplemental Geotechnical Design Report  
SB-246 Passing Lanes  
05-SB-246- R12.3/R16.7  
EA 05-0C6401, Project ID 0500000021

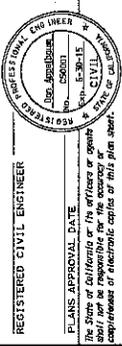
## **Log of Test Borings** (3 Pages)

DIST	COUNTY	ROUTE	POST MILES	TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
05	SB	246	12.3/116.7			

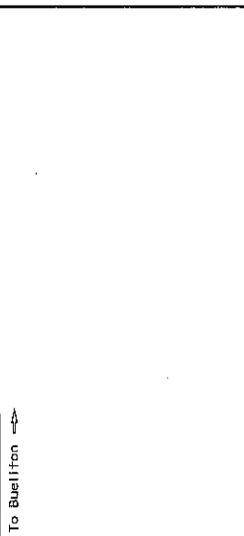
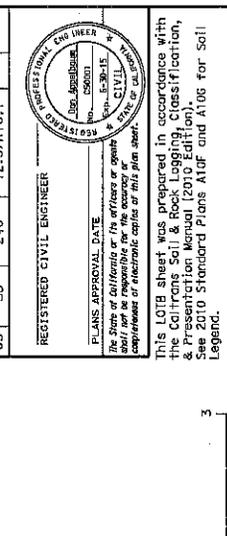
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE: 12-30-15

THE STATE OF CALIFORNIA OR THE OFFICE OF ENGINEERING OR ELECTRONIC COPYES OF THIS PLAN SHEET



This LOTB sheet was prepared in accordance with the California Soil & Rock Logging Classification, as shown on the legend. The soil was logged on 04-08-13. See 2010 Standard Plans A106 and A106 for Soil Legend.



280	275.0'	RC-13-001	Poorly graded SAND with CLAY (SP-SC); dense; light brownish gray; dry; fine SAND.	280
270				270
260			CLAYEY SAND (SC); dense; very dark grayish brown; moist; fine SAND; little fines. - dark brown. - very dense. - yellowish brown.	260
250				250
240			Poorly graded SAND (SP); very dense; yellowish brown; moist; fine and medium SAND. - trace fines.	240
230			- trace fine, subrounded GRAVEL. - dense; pale yellow. - very dense; reddish yellow.	230
220				220

04-08-13  
Terminated at Elev 223.0'  
Elev 217.0'  
Groundwater encountered, but not measured

**BENCH MARK**  
SB 246 PM 13.50  
Find cowa control point brass disk, stamped pls 5470 27  
S+G 212+82.19  
N 2,072,730.10  
E 5,842,815.04  
Elev = 279.691 (NAVDS88)

← To Lompoc  
3 4 215 SB89°16'49"E 900.00  
6 7 8 "CL.1" LINE 9  
SB89°28'41"E 602.31  
220  
To Buellton →

PLAN  
1" = 40'

RC-13-001  
RC-13-002

PI 219+00.00

218+00 219+00 220+00

ENGINEERING SERVICES  
DESIGNED BY: D. Appelbaum  
CHECKED BY: J. Scardine

GEO TECHNICAL SERVICES  
FIELD INVESTIGATION BY:  
D. Appelbaum/J. Scardine

STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION

DESIGN BRANCH X

SB 246 PASSING LANES

LOG OF TEST BORINGS 1 OF 3

CONTRACT NO. 05-025401

DATE: 04-08-13

PROJECT NUMBER & PHASE: 0509000221

SCALE: 1" = 10'

VERTICAL SCALE: 1" = 10'

FUNCTIONAL SUPERVISOR  
NAME: M. F. Fiegion

DATE CIVIL LOG OF TEST BORINGS SHEET

DATE: 04-08-13

PROJECT NUMBER & PHASE: 0509000221

SCALE: 1" = 10'

VERTICAL SCALE: 1" = 10'

FUNCTIONAL SUPERVISOR  
NAME: M. F. Fiegion

DATE CIVIL LOG OF TEST BORINGS SHEET





# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## MATERIALS INFORMATION

### [9. Alternative Temporary Crash Cushion](#)

**TECHNICAL  
BRIEF**

180 River Road • Rio Vista, CA 94571 • Tel 707-374-6800 • Fax 707-374-6801  
Email: info@barriersystemsinc.com • Website: barriersystemsinc.com

## Product Specification

# ABSORB 350<sup>TM</sup> TL-3 Non-Redirective, Gating, Crash Cushion Applied to Permanent and Portable Concrete Barrier

### I. General

The ABSORB 350<sup>TM</sup> TL-3 System is a Non-Redirective, Gating, Crash Cushion in accordance with the definitions in the National Cooperative Highway Research Program Report 350 (NCHRP 350). The system shall be tested and perform in an acceptable manner in accordance with the guidelines of NCHRP 350 at Test Level 3 (100 km/h).

### II. Performance

The ABSORB 350 is designed to absorb the impact energy of an errant vehicle in accordance with NCHRP 350 guidelines for Non-Redirective, Gating, Crash Cushions. The system is designed to be attached to Permanent Concrete Barrier and Portable Concrete Barrier with section lengths of at least 3.1 meters (10 feet). When attached in accordance with the manufacturers instructions, the ABSORB 350 system is capable of safely stopping a 2000 kg (4400 pound) pickup truck impacting the system at 100 km/h (62.3 mph) and 0 degrees and an 820 kg (1800 pound) compact vehicle impacting the system at 100 km/h (62.3 mph), 0 degrees and with an offset of the vehicle and system centerlines of one-fourth the vehicle width.

A. When properly installed according to the manufacturer's recommendations the ABSORB 350 system shall be fully tested to and meet the recommended structural adequacy, occupant risk, and vehicle trajectory criteria set forth in NCHRP 350 for Test Level 3 Non-Redirective, Gating Crash Cushions (NCHRP 350 TL-3):

1. Impact at 0 degrees at w/4 offset (centerline of vehicle offset 1/4 width of vehicle from centerline of system) at 100 km/h with an 820C vehicle. This is Test 3-40 of NCHRP 35.

2. Impact at 0 degrees into center nose of device (0 offset from centerline of vehicle) at 100 km/h with a 2000P vehicle. This is Test 3-41 of NCHRP 350.
3. Impact at 15 degrees into center nose of device (0 offset from centerline of vehicle) at 100 km/h with an 820C vehicle unless the Federal Highway Administration, due to acceptable performance in test 3-40, waives this test. This is Test 3-42 of NCHRP 350.
4. Impact at 15 degrees into center nose of device (0 offset from centerline of vehicle) at 100 km/h with a 2000P vehicle. This is Test 3-43 of NCHRP 350.
5. Impact at 20 degrees along the side of the unit (with the centerline of the vehicle aligned with the centerline of the attachment of the barrier and the ABSORB 350™) at 100 km/h with a 2000P vehicle. This is Test 3-44 of NCHRP 350 as modified by the Federal Highway Administration.

B. The impact velocity of a hypothetical front seat passenger against the vehicle interior as calculated from the longitudinal vehicle acceleration and 600 mm [23 5/8 in] forward displacement, and the lateral vehicle acceleration and 300 mm [1 ft] lateral displacement shall be less than 12 m/s (39.3 ft/s) and the highest 10 ms average vehicle acceleration in the longitudinal and lateral directions subsequent to the instant of hypothetical occupant impact shall be less than 20 g's in NCHRP 350 tests 3-40, 41, 42 and 43.

For TL-3 impacts detached debris shall not show potential for penetrating the vehicle occupant compartment or presenting a hazard to other traffic, pedestrians, or workers in a work zone. The vehicle shall remain upright during and after the collision although moderate roll, pitch and yaw may occur.

### **III. Description of System**

A. The ABSORB 350 system shall be made up of the following components and the system shall be fabricated from materials conforming to the following specifications:

1. ABSORB 350 Energy Absorbing Element – Each element of the system shall be composed of a plastic container, steel side bars, end plate/ hinge assemblies, an evaporation prevention cap with tether and appropriate fasteners. The overall dimensions of the assembled element are 610 mm (24 inches) wide, 812 mm (32 inches) tall and 1000 mm (39 1/2 inches) long, as shown in the attached drawing (B000524). Each element of the system shall weigh approximately 50 kg (110 pounds) when empty and 325 kg (717 pounds) when filled. The first element of the assembled system should always be empty of fluid with the evaporation prevention cap installed. All other elements of the system should be filled with fluid in accordance with the installation instructions and the evaporation prevention cap shall be securely installed. All elements shall be attached in accordance with the installation instructions and drawings supplied by the manufacturer.

- a. The plastic elements shall be molded from Linear Low Density Polyethylene.
  - b. All steel sidebars, end plate/hinge assemblies shall be fabricated from mild steel in conformance with ASTM A-36 specifications.
  - c. The evaporation prevention cap shall be molded from low density polyethylene
2. ABSORB 350 Nose Piece – Each ABSORB 350 system shall contain one Nose Piece at the front of the system. The Nose Piece is approximately 620 mm (24 3/8inches) wide, 825mm (32 1/2inches) tall and 610mm (24 inches) long, as shown in the attached drawing (B000526). The Nose Piece shall weigh approximately 60 kg (132 pounds) and shall be attached to the first Energy Absorbing Element in accordance with the installation instructions and drawings supplied by the manufacturer.
- a. The Nose Piece shall be fabricated from mild steel in conformance with ASTM A-36.
  - b. The Nose Piece shall also have an aluminum skin on the front portion to provide an aesthetic cover and a place for attaching traffic control signage, if needed. This skin shall be fabricated from 5052 H32 in conformance with ASTM B209 and shall be attached to the steel portion of the Nose Piece with adhesives and pop rivets.
3. ABSORB 350 Transition Hardware for PCB – The transition configuration is as shown in the attached drawing B000608.
- a. PCB Transition Hardware is fabricated from mild steel in conformance with ASTM A-36 as shown in the attached drawing (B000531). The steel components shall weigh approximately 80 kg (176 pounds).

B. Attachment of the ABSORB 350™ system to PCB systems shall require nine (9) Energy Absorbing Elements. Assembly should be in compliance with the manufactures drawings and written instructions.

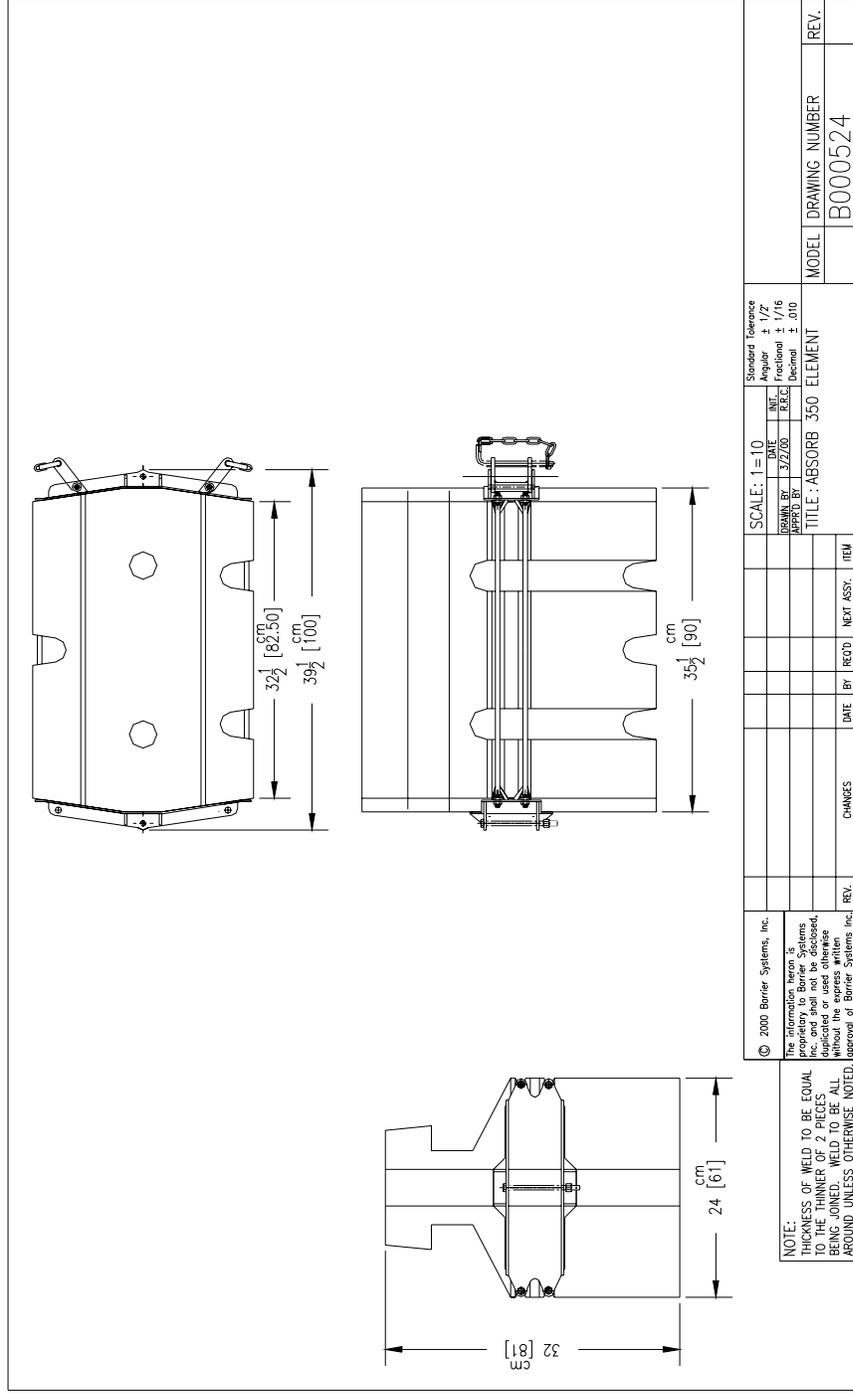
C. The ABSORB 350™ system shall be able to be refurbished after a NCHRP 350 type impact in less than 1 hour with two people, an adequate fluid supply and refurbishment materials.

D. The ABSORB 350™ system shall not require attachment to a foundation. Attachment to the PCB system will require attachment in accordance with the manufacturer's drawings and instructions.

E. The ABSORB 350™ system shall be assembled and filled with fluid in accordance with the manufacturers instructions. If there is a possibility that the fluid in the system could freeze due to low temperatures, proper antifreeze agents should be used in accordance with local standards and environmental regulations.

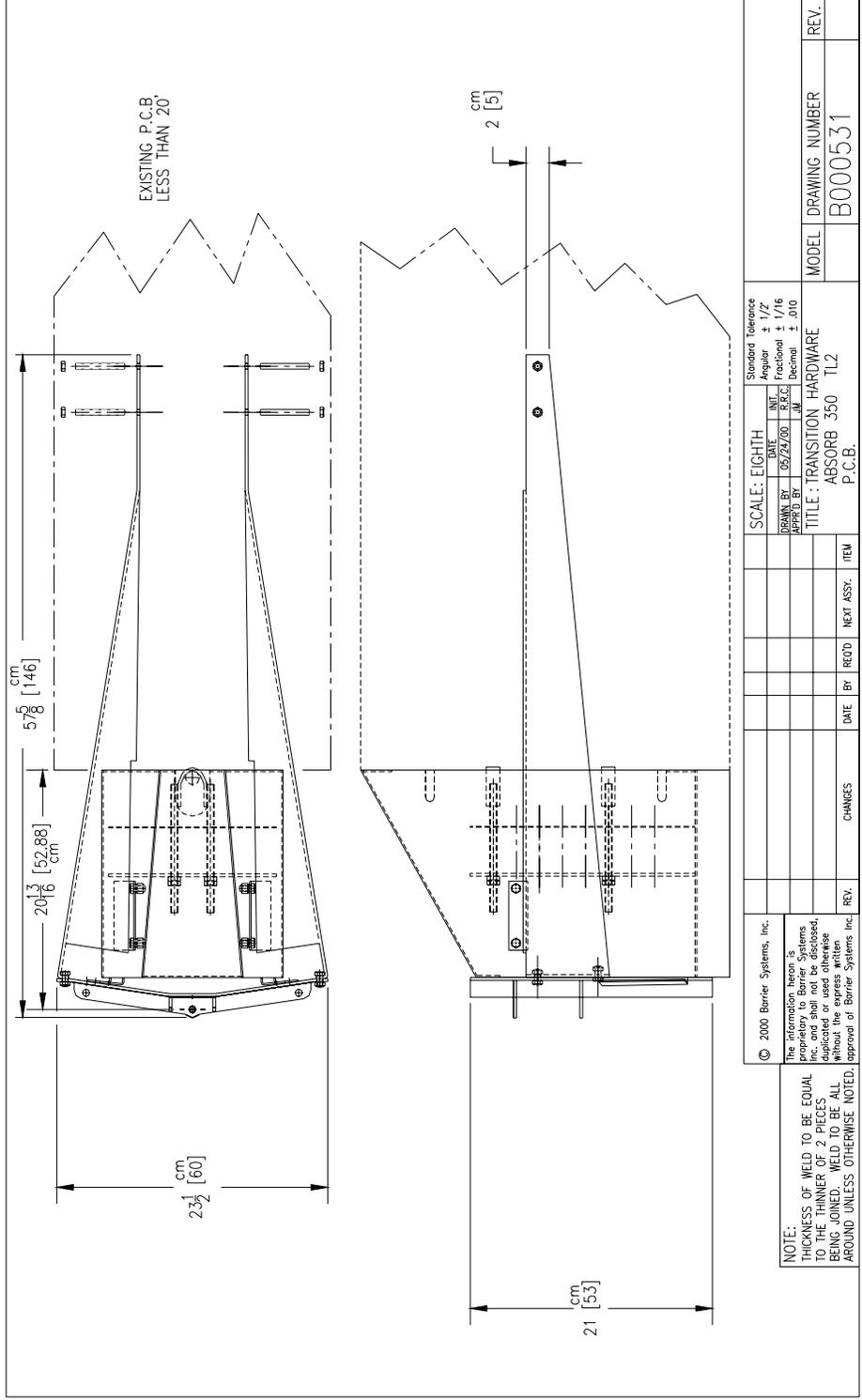
#### **IV. Application of Safety Appurtenances**

Highway safety appurtenances should be applied to hazardous sites in accordance with the guidelines and recommendations in the American Association of State Highway Transportation Officials (AASHTO), "Roadside Design Guide," 1989, and other Federal Highway Administration and State Department of Transportation requirements. Placement and use of the ABSORB 350 system should comply with these specifications and guidelines.











U.S. Department  
of Transportation  
**Federal Highway  
Administration**

1200 New Jersey Avenue, SE.  
Washington, DC 20590

February 13, 2009

In Reply Refer To: HSSD/CC-47D

Mr. Barry D. Stephens, P.E.  
Senior Vice President of Engineering  
Energy Absorption Systems, Inc.  
3617 Cincinnati Avenue  
Rocklin, CA 95765

Dear Mr. Stephens:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system: Mod. TRITON Concrete End Treatment ACZ-350™ System  
Type of system: Non-redirecting barrier terminal  
Test Level: NCHRP Report 350 TL-3  
Testing conducted by: E-TECH Testing Services  
Date of request: December 17, 2008

You requested that we find this system acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety systems should meet the guidelines contained in the NCHRP Report 350. The FHWA Memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

### **Description**

The ACZ-350™ System is designed to perform as a narrow, non-redirecting crash cushion to shield the blunt ends of both permanent and variable length portable concrete median barrier (P/CMB), as well as crashworthy steel median barrier systems such as the Vulcan Barrier.

The ACZ-350™ System consists of a sheet metal nose, four water-filled plastic shell segments, and a steel transition pinned together to act as an end treatment. The nose is constructed of light gauge steel and connects directly to the front-most water filled segment. Each of the four water filled segments is equipped with an external, top-mounted steel stiffener which is rigidly fixed to each respective segment. The front two water filled segments do not contain an internal steel frame or external, side-mounted laminated steel straps. In contrast, the next (or last) two water

**MOVING THE**  
**AMERICAN**  
**ECONOMY**



filled Triton segments are equipped with an internal steel frame as well as external side-mounted steel laminated straps. A heavy duty non-crushable steel transition completes the system by connecting the last water filled segment to the blunt end of the downstream barrier, be it P/CMB or Vulcan barrier. The total length of the ACZ-350<sup>TM</sup> System is 9.6 meters (31'-7"). In bi-directional traffic applications, there are no rigid exposed vehicle snag points for traffic traveling from the reverse direction.

### **Crash Testing**

You requested acceptance of the ACZ-350<sup>TM</sup> System based on the successful results of three NCHRP Report 350 crash tests. The first was Test 3-40 in which an 820C compact car impacted the unit head-on, and with the vehicle offset at w/4. The second test was Test 3-41 in which a 2000P pickup truck impacted the unit head-on. The third test was a modification of Test 3-44 in which a 2000P vehicle impacts the side of the system at 20 degrees with the centerline of the vehicle aligned with the centerline of the rigid hazard. The NCHRP Report 350 states that the intent of Test 3-44 is "...to evaluate the ability of the cushion to safely stop a large passenger car prior to a life-threatening impact with the corner of the hazard object being shielded." Aligning the centerline of the impacting vehicle at the center of the shielded concrete barrier is clearly the critical impact point for the ACZ-350 design and the impact conditions are essentially the same as Test 3-38 for redirecting crash cushions. Report 350 acknowledges that test 3-38 "would be difficult to pass for a nonredirective crash cushion", and thus does not require that the nominal limiting occupant impact velocities and ridedown accelerations be achieved. However, we recognize your newly designed ACZ-350<sup>TM</sup> System is a nonredirective crash cushion that meets the occupant impact velocities and ridedown accelerations with reported values of 10.5 m/s and 18.4 g's while the impacting vehicle showed no evidence of penetration, climbing or vaulting.

We agree with your conclusions that Tests 3-42 and 3-43 do not require retesting. There has been no significant change in system shape, system height or component weights between the original TRITON CET and the ACZ-350. Individual system sections near the front of the system are designed to articulate in the same fashion as the TRITON Concrete End Treatment. This articulation will allow the errant vehicle to pass through the system as expected for a gating system. Based on these design principals we believe the new ACZ-350<sup>TM</sup> system will behave with similar results as the TRITON Concrete End Treatment when tested to 3-42 and 3-43 criteria.

### **Findings**

Based upon the results of the reported Tests 3-40, 3-41, and 3-44, and the discussions above, the FHWA concludes the ACZ-350<sup>TM</sup> System is acceptable for use on the NHS to act as a narrow, non-redirecting gating crash cushion for permanent and portable concrete median barrier of varying individual lengths as well as steel barrier such as Vulcan. It is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency. The cushion should be used in locations where side impacts are unlikely, penetration behind the barrier is acceptable for angled nose impacts, and where the use of a redirective crash cushion is not feasible for reasons other than cost or convenience.

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-47D and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The ACZ-350<sup>TM</sup> System is a patented product and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

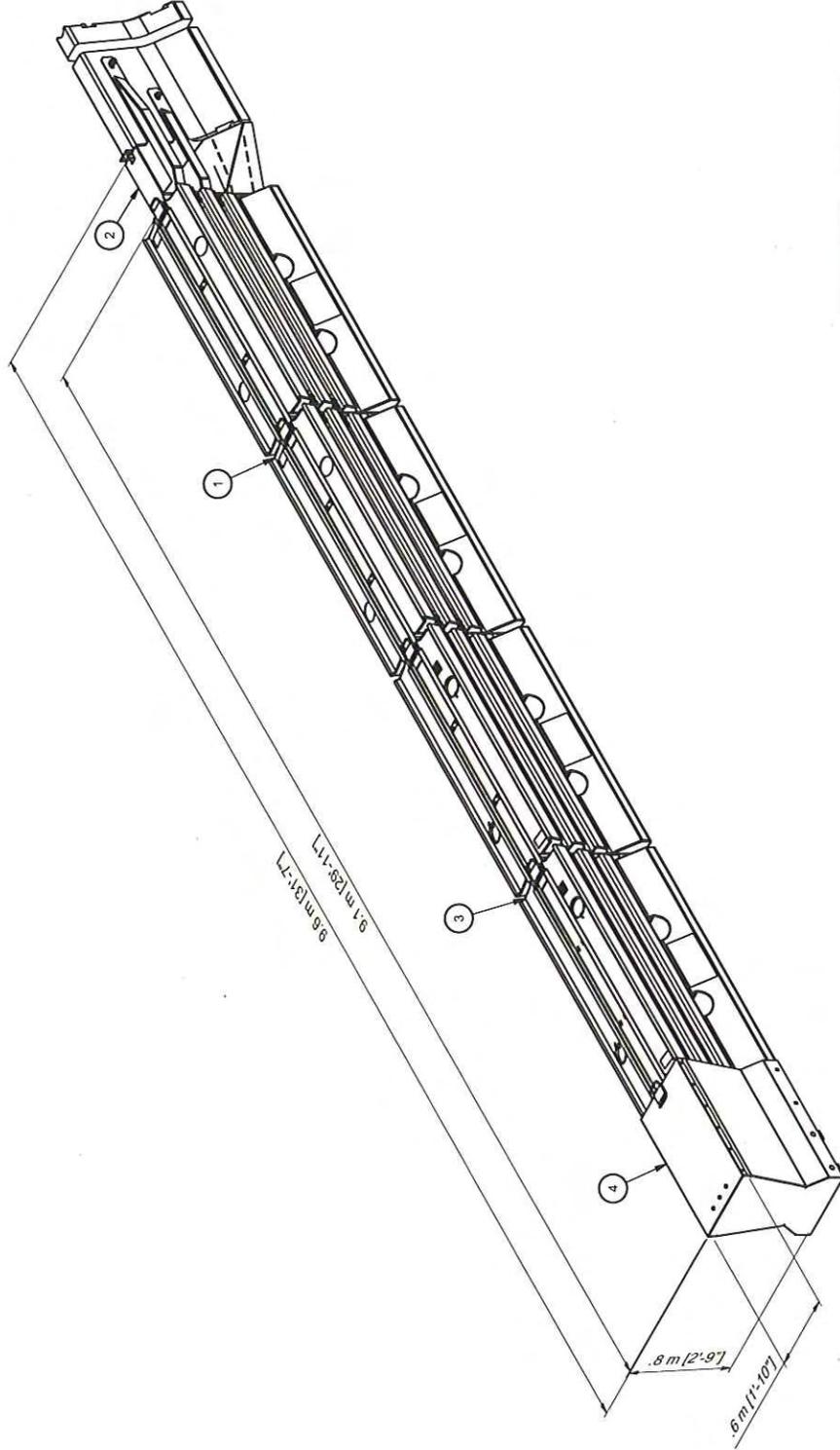
Sincerely yours,



David A. Nicol  
Director, Office of Safety Design  
Office of Safety

Enclosures

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1		ACZ-350 SECTION 2	1
2		ACZ-350 TRANSITION ASSY	1
3		ACZ-350 SECTION 1	1
4		ACZ-350 NOSE ASSY	1



DESIGNED BY	BAIRON, COX	DATE	11/12/2008
DRAWN BY	BAIRON, COX	DATE	
CHECKED BY		DATE	
APPROVED BY		DATE	
SCALE		DATE	

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES  
DIMENSIONS ARE SHOWN AS DECIMAL UNLESS  
OTHERWISE SPECIFIED

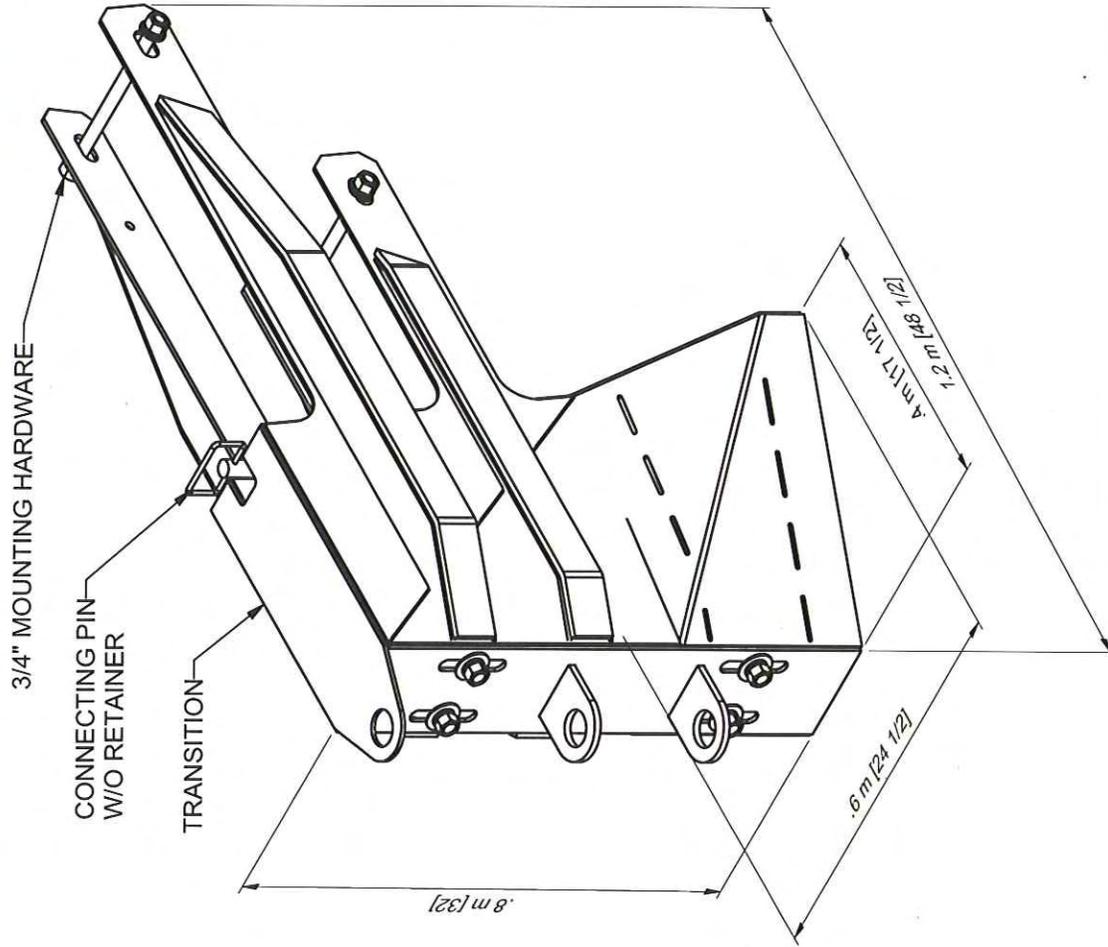
ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

ACZ-350 TL-3 CRASH CUSHION

1 of 1

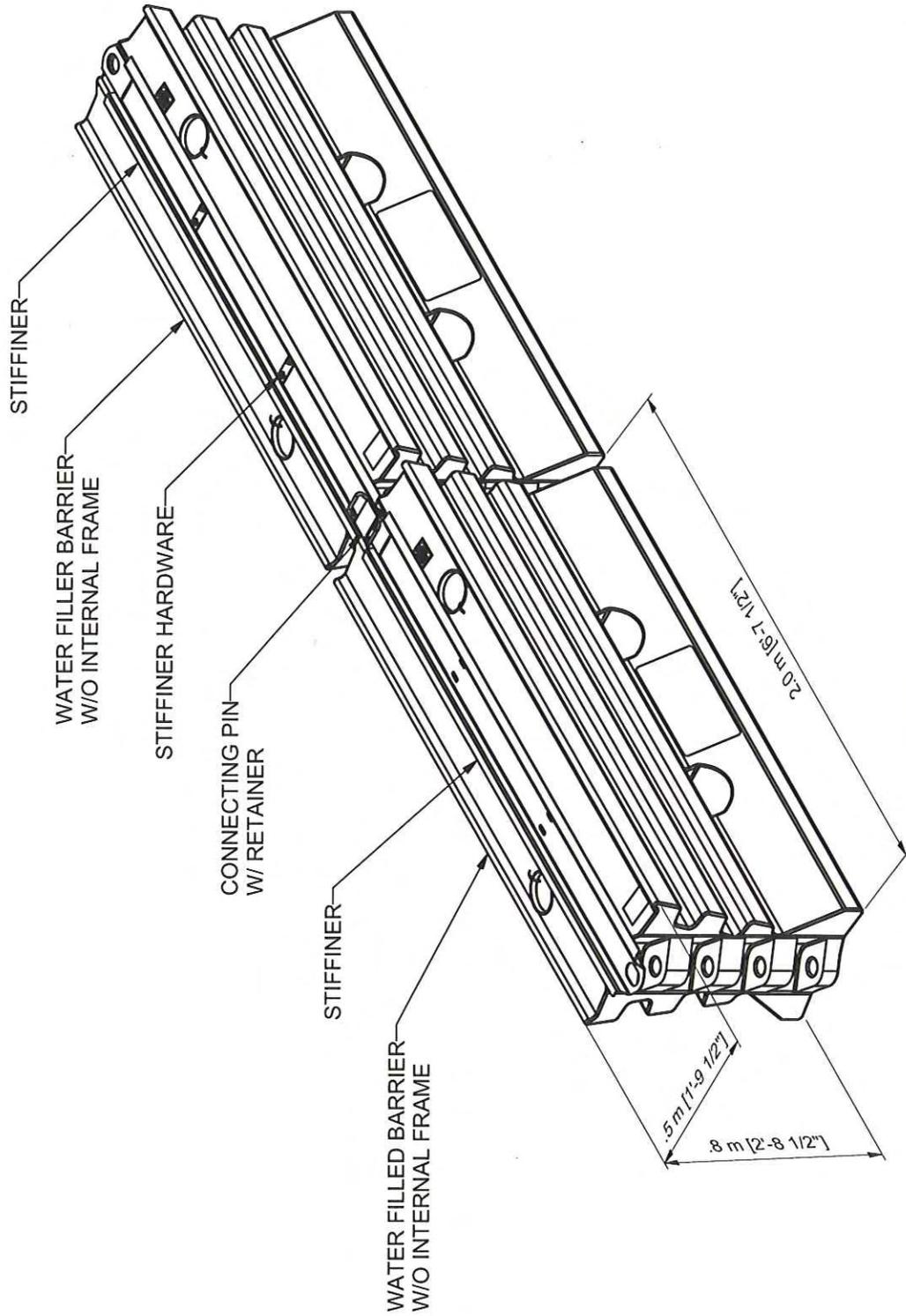
Figure 1





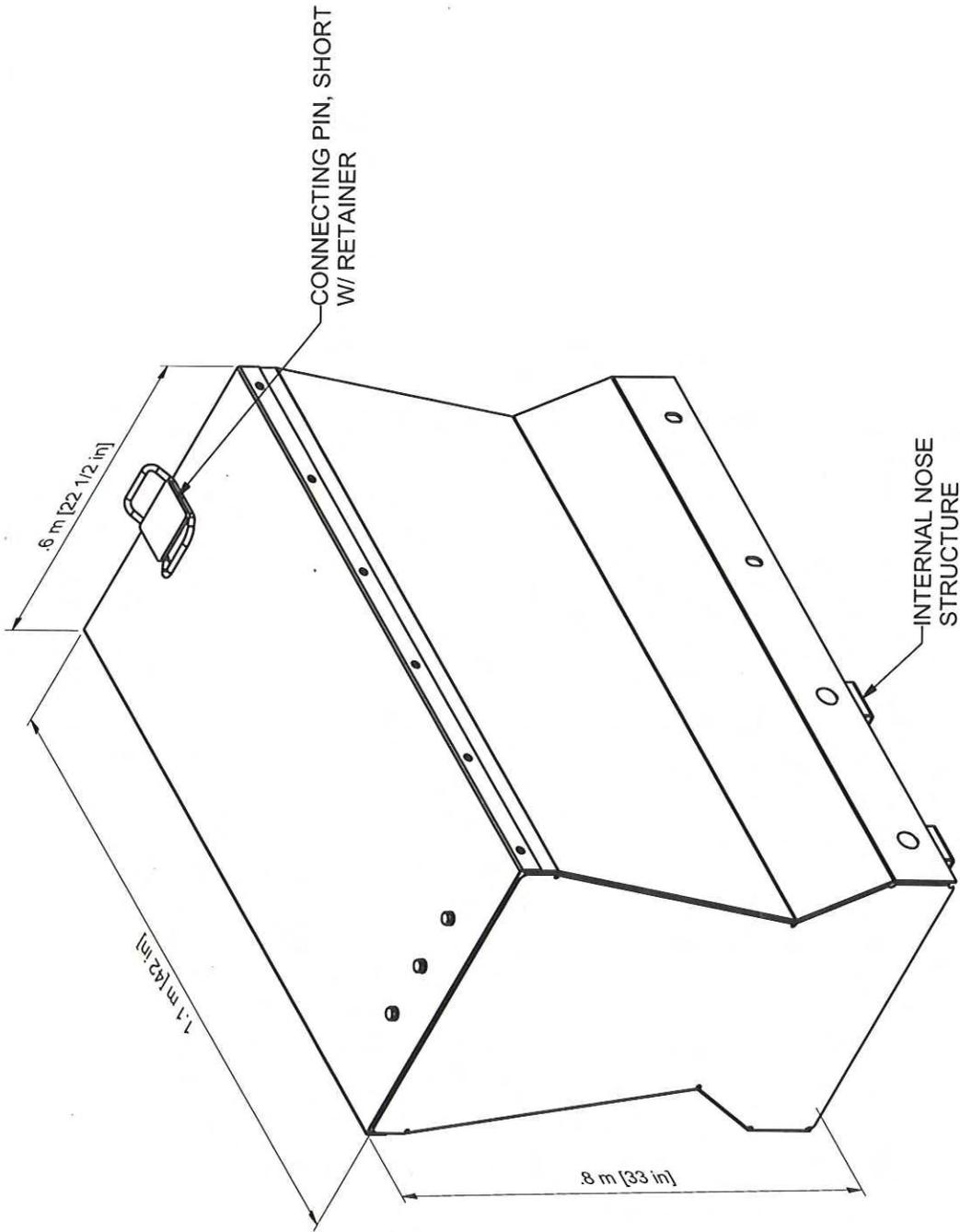
DRAWN: aaron.cox	DATE: 11/13/2008	ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT	
DESIGNED: aaron.cox	DATE:	ACZ-350 TRANSITION ASSY	
CHECKED:	DATE:		
APPROVED:	DATE:		
D.L.:	DATE:		
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.			

Figure 3



DATE	11/12/2008	DATE	
DESIGNED	aaron.cox	DATE	
CHECKED	aaron.cox	DATE	
APPROVED		DATE	
D.C.		DATE	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED			
DRAWING		DRAWING	
ENERGY ABSORPTION SYSTEMS, INC. ENGINEERING AND RESEARCH DEPARTMENT		ACZ-350 SECTION 1	
DRAWING		1 of 1	
REV		REV	

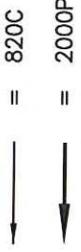
Figure 2



DRAWN: aaron.cox	DATE: 11/12/2008	 <b>ENERGY ABSORPTION SYSTEMS, INC.</b> ENGINEERING AND RESEARCH DEPARTMENT	<b>ACZ-350 NOSE ASSY</b>	DRAWING: 	SHEET: 1 of 1	REV:
DESIGNED: aaron.cox	DATE:					
CHECKED:	DATE:					
APPROVED:	DATE:					
DATE:	DATE:					
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.						

Figure 5

NCHRP 350  
TEST MATRIX



\* F FOR TL-2 & TL-3; G FOR TL-1

TL-3 (100 km/h = 62.1 mph)

ACZ-350 SYSTEM

TERMINALS & CRASH CUSHIONS  
NONREDIRECTIVE GATING

PASSED

TEST 3-40  
820C/100 km/h/0°  
C,D,F\*,H,I,(J),K,N



PASSED

TEST 3-41  
2000P/100km/h/0°  
C,D,F\*,H,I,(J),K,N



PASSED

TEST 3-44  
2000P/100km/h/20°  
C,D,F\*,K,N

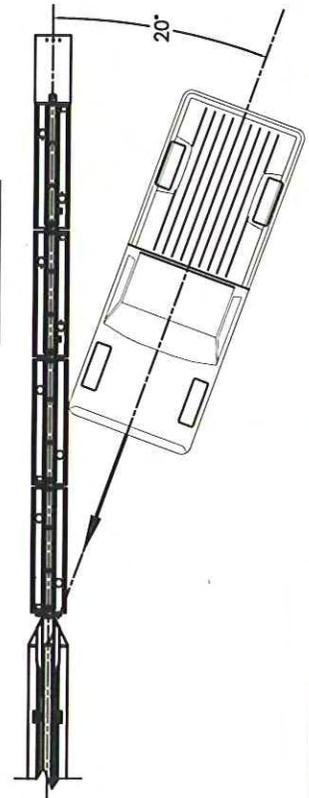
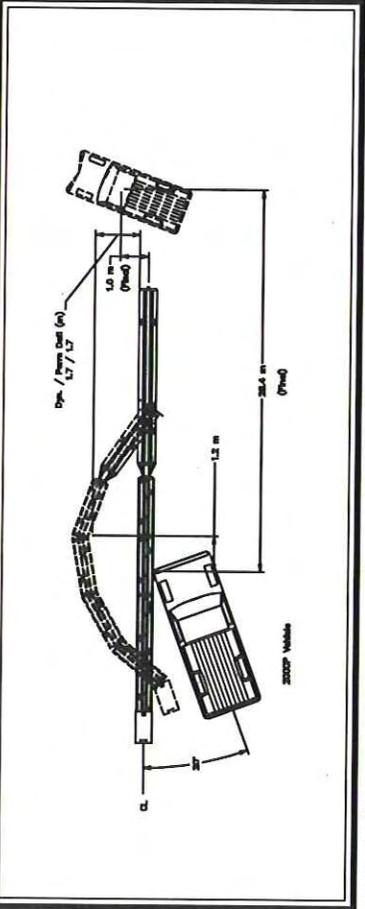
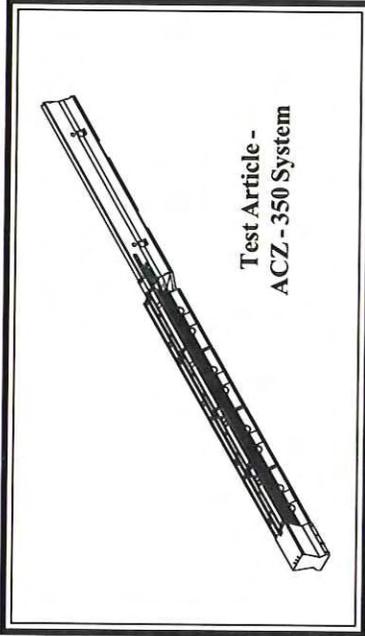


Figure 6



t = 0.000 sec      t = 0.160 sec      t = 0.320 sec      t = 0.480 sec      t = 0.640 sec      t = 0.800 sec

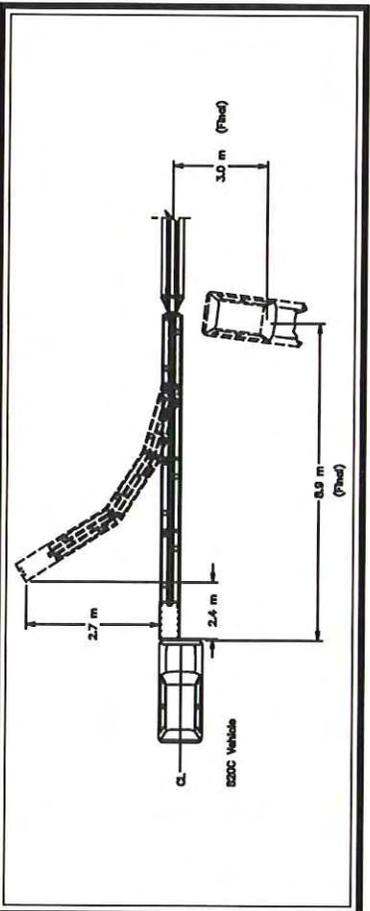
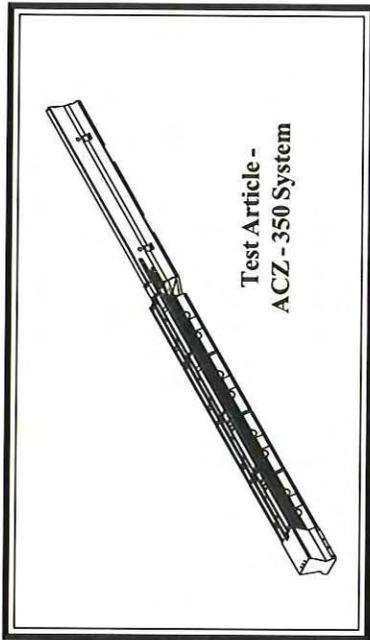


<b>General Information</b>		
Test Agency .....	E-TECH Testing Services, Inc.	
Test Designation .....	NCHRP 350 Test 3-44 modified	
Test No. ....	01-4317-003	
Date .....	12/4/08	
Test Article Type .....	Energy Absorption System	
Installation Length, .....	ACZ - 350 System	Impact Conditions
Material and key elements .....	9.0 m - (4) segment total, pinned and freestanding w/ steel nose	Speed (km/h) .....
Foundation Type and Condition .....	Polyethylene plastic segments (4 water filled), first two w/o frame and steel side straps, last two with, 14 ga hollow steel nose, transition to (3) 3 m freestanding PCMB with last section anchored	Angle (deg) .....
Test Vehicle Type .....	Segment Length x Width x Height: (2021 mm x 533 mm x 813 mm)	Impact Severity (kJ) .....
Designation .....	Portland Cement Concrete, clean and dry, unanchored	Speed (km/h) .....
Model .....	Production Model	Angle (deg - veh. c.g.) .....
Mass (kg) .....	2000P	Occupant Risk Values
Curb .....	1988 Chevrolet C2500 Pickup	Impact Velocity (m/s)
Test inertial .....		x-direction .....
Dummy .....		y-direction .....
Gross Static .....		Ridedown Acceleration (g's)
		x-direction .....
		y-direction .....
		European Committee for Normalization (CEN) Values
		THIV (km/h) .....
		PHD (g's) .....
		ASI .....
		Post-Impact Vehicular Behavior (deg - rate gyro)
		Maximum Roll Angle .....
		Maximum Pitch Angle .....
		Maximum Yaw Angle .....
		Test Article Deflections (m)
		Dynamic .....
		Permanent .....
		Vehicle Damage (Primary Impact)
		Exterior
		VDS .....
		CDC .....
		Interior
		VCDI .....
		Maximum Deformation (mm) .....

Figure 11. Summary of Results - ACZ - 350 System Test 01-4317-003



t = 0.00 sec      t = 0.129 sec      t = 0.258 sec      t = 0.387 sec      t = 0.516 sec      t = 0.968 sec



**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-40  
 Test No. .... 01-4317-002

Date ..... 11/6/08

Test Article Type ..... Energy Absorption System  
 ACZ - 350 System

Installation Length, ..... 9.0 m - (4) segment total,  
 pinned and freestanding  
 Material and key elements ..... Polyethylene plastic segments  
 w/ steel nose  
 (4 water filled), first two w/o frame and  
 steel side straps, last two with, 14 ga  
 hollow steel nose, transition to (3) 3 m  
 freestanding PCMB with last section  
 anchored

Foundation Type and Condition ..... Segment Length x Width x Height:  
 (2021 mm x 533 mm x 813 mm)  
 Portland Cement Concrete,  
 clean and dry, unanchored

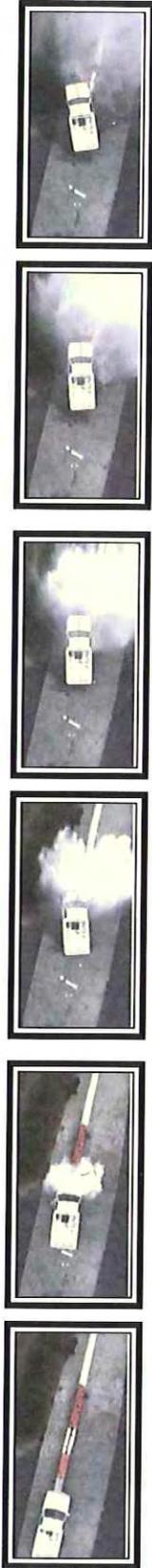
**Test Vehicle**

Type .....  
 Designation ..... 820C  
 Model ..... 1993 Ford Festiva

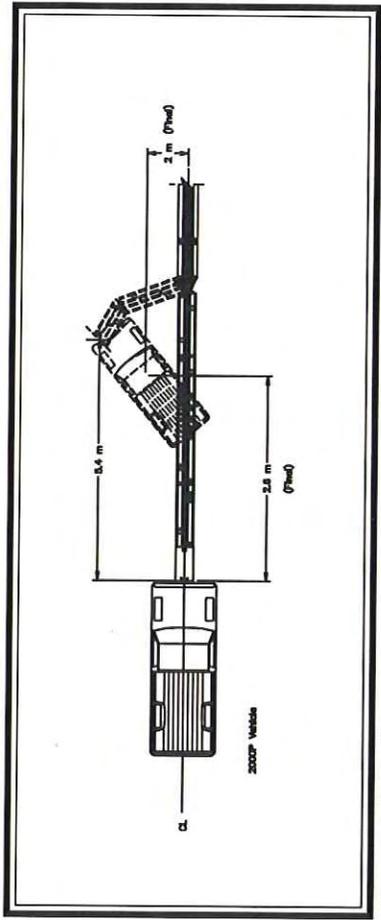
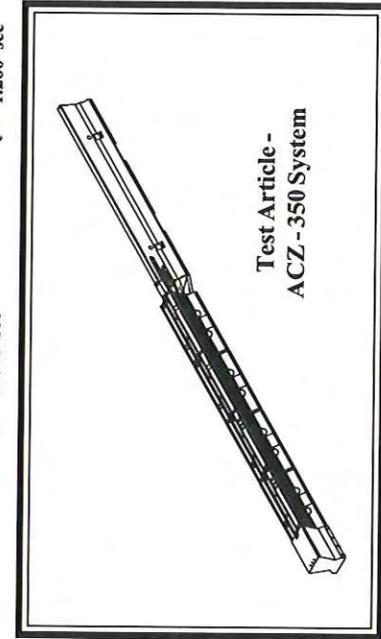
Mass (kg) .....  
 Curb ..... 821  
 Test inertial ..... 816  
 Dummy ..... 75  
 Gross Static ..... 891

Impact Conditions	99.0
Speed (km/h) .....	0
Angle (deg) .....	308.5
Impact Severity (kJ) .....	N/A
Exit conditions	N/A
Speed (km/h) .....	N/A
Angle (deg - veh. c.g.) .....	N/A
Occupant Risk Values	
Impact Velocity (m/s)	11.9
x-direction .....	-0.6
y-direction .....	-12.5
Ridedown Acceleration (g/s)	-3.6
x-direction .....	
y-direction .....	
European Committee for Normalization (CEN) Values	
THIV (km/h) .....	44.2
PHD (g's) .....	12.5
ASI .....	1.1
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle .....	20.1
Maximum Pitch Angle .....	-43.5
Maximum Yaw Angle .....	-244.9
Test Article Deflections (m)	
Dynamic .....	2.7
Permanent .....	2.7
Vehicle Damage (Primary Impact)	
Exterior	
VDS .....	FD-4
CDC .....	12FDEW4
Interior	
VCDI .....	AS0001000
Maximum Deformation (mm) .....	21 mm

Figure 1. Summary of Results - ACZ - 350 System Test 01-4317-002



t = 0.000 sec      t = 0.210 sec      t = 0.420 sec      t = 0.630 sec      t = 0.840 sec      t = 1.260 sec



**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-41  
 Test No. .... 01-4317-001  
 Date ..... 10/30/08  
 Test Article Type ..... Energy Absorption System  
 Installation Length, ..... ACZ - 350 System  
 ..... 9.0 m - (4) segment total,  
 ..... pinned and freestanding  
 ..... w/ steel nose  
 Material and key elements ..... Polyethylene plastic segments  
 ..... (4 water filled), first two w/o frame and  
 ..... steel side straps, last two with, 14 ga  
 ..... hollow steel nose, transition to (3) 5 m  
 ..... freestanding PCMB with last section  
 ..... anchored  
 Foundation Type and Condition ..... Segment Length x Width x Height:  
 ..... (2021 mm x 533 mm x 813 mm)  
 ..... Portland Cement Concrete,  
 ..... clean and dry, unanchored

**Test Vehicle**

Type ..... 2000P  
 Designation ..... 1988 Chevrolet C2500 Pickup  
 Model .....  
 Mass (kg) .....  
 Curb ..... 1853  
 Test inertial ..... 1995  
 Dummy ..... N/A  
 Gross Static ..... 1995

**Impact Conditions**

Speed (km/h) ..... 98.3  
 Angle (deg) ..... 0  
 Impact Severity (kJ) ..... 744.0

**Exit conditions**

Speed (km/h) ..... N/A  
 Angle (deg - veh. c.g.) ..... N/A

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 9.9  
 y-direction ..... -0.3  
 Ridedown Acceleration (g's)  
 x-direction ..... -11.1  
 y-direction ..... -5.7

**European Committee for Normalization (CEN) Values**

THIV (km/h) ..... 35.6  
 PHD (g's) ..... 11.2  
 ASI ..... 0.9

**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle ..... -7.6  
 Maximum Pitch Angle ..... 20.0  
 Maximum Yaw Angle ..... -39.2

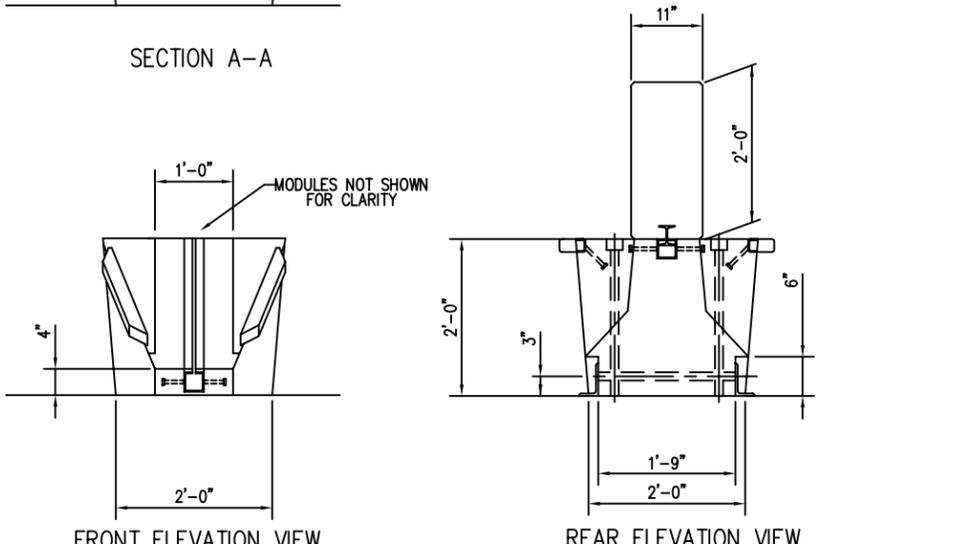
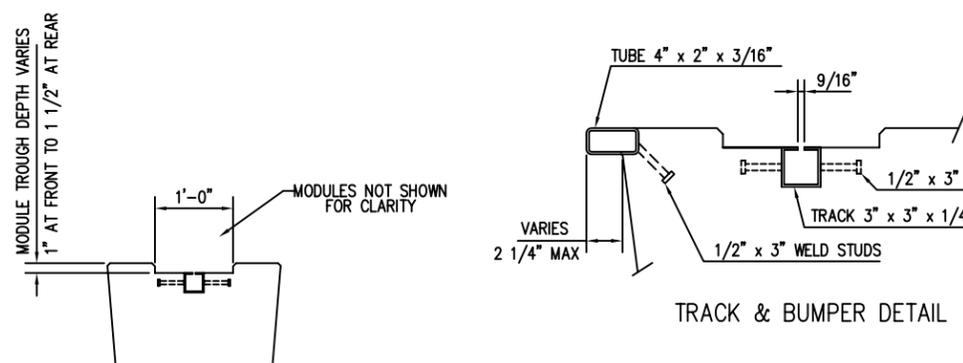
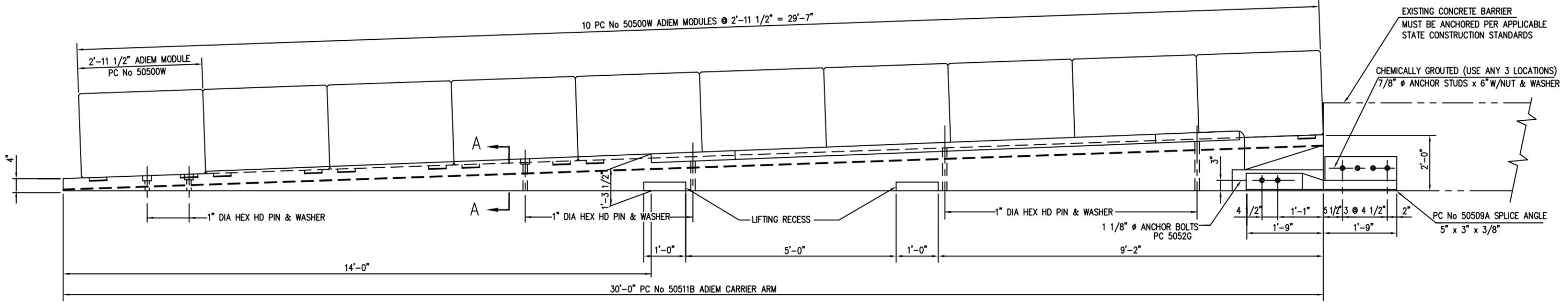
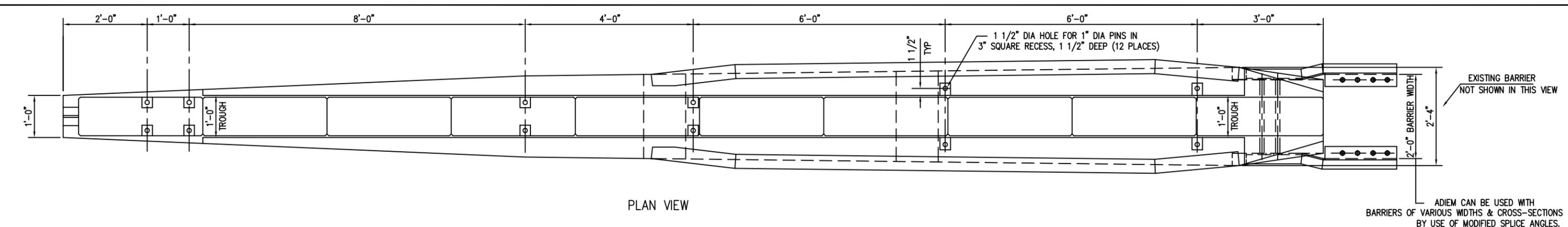
**Test Article Deflections (m)**

Dynamic ..... 5.4  
 Permanent ..... 5.4

**Vehicle Damage (Primary Impact)**

Exterior  
 VDS ..... FD-4  
 CDC ..... 12FDEW4  
 Interior  
 VCDI ..... AS0000000  
 Maximum Deformation (mm) ..... 14

Figure 6. Summary of Results - ACZ - 350 System Test 01-4317-001



BILL OF MATERIAL			
PRODUCT CODE	QTY	DESCRIPTION	REMARKS
50500W	10	MODULES x 2'-11 1/2"	
50511B	1	BASE x 30'-0"	
50508A	1	SPLICE ANGLE x 3'-6" RT	
50509A	1	SPLICE ANGLE x 3'-6" LT	
6549W	1	GARNA-THANE COATING (1 GAL)	
5052G	2	1 1/8" Ø x 25" HEX HD BOLT	
4963G	4	1 1/8" WASHER	
3976G	2	1 1/8" HEX NUT	
4616G	6	7/8" Ø STUD x 6" (FULL THD)	
3725G	6	7/8" WASHER	
3735G	6	7/8" HEX NUT	
★ 5206B	1	ADHESIVE HY150 CARTRIDGE	
3900G	12	1" WASHER	

- ADIEM INSTALLATION INSTRUCTIONS**
- The ADIEM base is to be placed on a smooth surface (the same horizontal plane as the concrete barrier) and parallel to the mainline or ramp traveled lane(s).
  - Install anchor rods for ADIEM base by driving in soil or soft asphalt or driving in pre-drilled holes for hard asphalt or concrete (no epoxy required). The base should not be moved after the holes are drilled. The holes should be drilled using, at a minimum, a 35# hammer and minimum 36 inch long drill bit. (A 50# hammer is recommended.)
  - Attach connection brackets to base with two (2) 1 1/8" X 25" hex head bolts provided. Then field drill holes in the existing barrier and attach connection brackets to it with chemically grouted hardware provided.
  - Oil the ADIEM base track. Slide the modules onto the base. Be careful not to damage edges of the modules while sliding onto the base.
  - If the modules are scuffed or nicked, apply GARNA-THANE coating to the affected area.

Recommended tools and equipment:

- 35/50# air hammer/drill
- 1 3/8" Ø x 36" rock drill
- 1 1/4" Ø x 12" rock drill
- Sledge hammer
- Oil
- Wrenches

OPTIONAL ANCHOR ITEMS	
PRODUCT CODE	DESCRIPTION
5205B	ADHESIVE DISPENSER
5207B	MIXER HIT HY150 (NOZZLE)
5208B	FILLER HIT HY150 (FILLER TUBE)
5209B	BIT TE-C+ 11/16-18 (11/16" Ø BIT)

- ★ EACH CARTRIDGE INCLUDES 1 EACH : MIXER HY 150 CARTDIDGE(NOZZLE) : FILLER HIT HY 150 (FILLER TUBE)
- ANCHOR PIN SCHEDULE PER SURFACE (SEE NOTES 1-5)**
- |       | PCC     | ACP | BASE |
|-------|---------|-----|------|
| 5665G | SEE SCH |     | 4    |
| 5642G |         |     | 4    |
| 5650G |         | 4   | 4    |
| 5641G |         |     | 4    |
| 5646G |         | 4   | 4    |
| 5643G |         | 4   |      |
- NOTES:**
- ANCHOR PINS ARE 1" DIA HEX HD, POINTED, GALV RODS (A307)
  - PORTLAND CEMENT CONCRETE (PCC)
  - ASPHALTIC CONCRETE (ACP)
  - BASE AND/OR COMPACTED SOIL (BASE)
  - ADIEM INSTALLATION NOT RECOMMENDED ON LOOSE SOIL.

- ALTERNATE ADIEM INSTALLATION INSTRUCTIONS**
- At a holding site, the modules are slid into the ADIEM base after oiling the base track. Be careful not to damage the edges of the modules while sliding them onto the base.
  - If the modules are scuffed or nicked, apply GARNA-THANE coating to the affected area.
  - The unit is then delivered to the job site. The unit is to be placed on a smooth surface (the same horizontal slope as the concrete barrier) and parallel to the mainline or ramp traveled lane (s).
  - The front module should be removed so the remaining modules can be shifted for easy access for drilling the anchor rod holes.
  - Install anchor rods for ADIEM base by driving in soil or soft asphalt or driving in predrilled holes for hard asphalt or concrete (no epoxy required). The base should not be moved after the holes are drilled. The holes should be drilled using, at a minimum, a 35# hammer and a minimum 36 inch long drilling bit. (A 50# hammer is recommended.)
  - Attach connection brackets to base with two (2) 1 1/8" X 25" hex head bolts provided. Then field drill holes in the existing barrier and attach connection brackets to it with chemically grouted hardware provided.

REV.	CHK'D	BY	DATE	REMARKS
6	B.T.	L.H.	12/10/03	REPLACED GROUT WITH HILTI, UPDATED DWG
5		L.H.	03/12/03	DELETED NOTE #7, REVISED NOTE #3
4	D.D.	L.H.	12/17/99	REVISED COATING, CHANGED TITLE BLOCK
3		BT	3-14-97	DELETED PC 5484, ADDED PC 5052, CHG QTY PC 3976
2		BT	2-14-97	GENERAL UPDATES

**ADIEM 30'**

**ERECTION DETAILS**

TRINITY INDUSTRIES, INC.  
HIGHWAY SAFETY PRODUCTS  
2525 STEMMONS FREEWAY, DALLAS, TX 75207

DRAWN	B.TAKACH
CHECKED	D.D.
APPROVED	
DATE	3/19/96
ENG. FILE #	SS349-01E
SHT.No.	E1 OF 1
DRAWING NO.	SS 349
REV.	6

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March 20, 2009

In Reply Refer To: HSSD/CC-35I

Mr. Barry D. Stephens, P.E.  
Sr. Vice President Engineering  
Energy Absorption Systems, Inc.  
3617 Cincinnati Avenue  
Rocklin, CA 95678

Dear Mr. Stephens:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety device for use on the National Highway System (NHS).

Name of device:	5-bay QuadGuard II 5-bay QuadGuard II Wide 2-bay QuadGuard II
Type of device:	Impact Attenuators
Test Level:	NCHRP Report 350 Test Levels 2 and 3
Testing conducted by:	E-Tech Testing Services, Inc.
Date of request:	December 8, 2008

You requested that we find this device acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350." The FHWA Memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

### **Description**

The QuadGuard<sup>®</sup> II is a redirective, non-gating crash cushion with a reduced length of 5 bays that is otherwise identical to the previously accepted Test Level 3 (TL-3) 6-bay unit (see FHWA Acceptance Letter CC-35, dated June 21, 1996). The difference is that one bay is removed from the rear of the system and a new sheet metal front nose is used. Likewise, the QuadGuard<sup>®</sup> II with a reduced length of 2 bays is identical to the previously accepted TL-2 3-bay unit (ref. CC-35C, dated June 17, 1999) with the exception of one of the rear bays being removed plus a new sheet metal front nose.

Features of the 5-bay QuadGuard<sup>®</sup> II systems (narrow and wide) as well as the 2-bay QuadGuard<sup>®</sup> II narrow system are depicted in the enclosed drawings for reference. The QuadGuard<sup>®</sup> II 5-bay narrow system has an overall length of 5830 mm (19' 1") and can be configured with backup widths of 610 mm (24 inches), 762 mm (30 inches), 914 mm (36 inches), 1753 mm (69 inches), and 2286 mm (90 inches). The 2-bay QuadGuard<sup>®</sup> II system has an overall length of 3080 mm (10' 1") and can be configured with a backup width of 610 mm (24 inches). The system consists of energy absorbing cartridges surrounded by a framework of steel Quad-Beam<sup>®</sup> guardrail that can telescope rearward during head-on impacts. The system has a center monorail that will resist lateral movement during side angle impacts and a back up structure that will resist movement during head-on impacts. Simply removing a rear Bay from an existing 6-Bay or 3-Bay system will not be adequate to meet TL-3 and TL-2 impact speeds, respectively. As noted in your report, the QuadGuard II system requires an upgraded nose assembly.

### **Crash Testing**

The original 6-bay test data of NCHRP 350 Test 3-31 and 3-32 demonstrated that the 2000P vehicle impacting at 0 degree and a nominal speed of 100km/h (63 mph) resulted in a ridedown g's of -14.52 and Occupant Impact Velocity ( $\Delta V$ ) of 10.55 m/s. An engineering review of this previous data indicated excess capacity in the device and prompted a crash test to be done after removing bay 6. The NCHRP 350 Tests 3-31 and 3-32 were conducted and the results are as follows:

#### Narrow System 610mm (24 inches) width:

Test 3-31: Impact speed: 101.1 km/h, ridedown of -17.3 g's, and  $\Delta V$  9.6 m/s.

Test 3-32: Impact speed: 98.3 km/h, ridedown of -17.4 g's, and  $\Delta V$  12.4 m/s.

#### Wide System 2286mm (90 inches) width:

Test 3-31: Impact speed: 99.7 km/h, ridedown of -17.0 g's, and  $\Delta V$  10.0 m/s.

Test 3-32: Impact speed: 97.7 km/h, ridedown of -17.4 g's, and  $\Delta V$  11.7 m/s.

Similarly the 3-bay narrow system test data demonstrated that the 2000P vehicle impacting at 0 degree and a nominal speed of 70km/h (43.5 mph) resulted in a ridedown g's of -19.57 and Occupant Impact Velocity ( $\Delta V$ ) of 8.89. Again an engineering review indicated excess capacity in the device and prompted the following crash tests with results as follows:

Test 2-31: Impact speed: 68.3 km/h, ridedown of -19.4 g's, and  $\Delta V$  10.7 m/s.

Test 2-32: Impact speed: 67.7 km/h, ridedown of -17.8 g's, and  $\Delta V$  10.8 m/s.

Due to the elimination of one bay at the rear of each system we concur that the tests performed provide adequate capacity of head-on impacts for all widths of TL-3 5-bay QuadGuard<sup>®</sup> II systems. In addition we also concur that the tests performed on the TL-2 2-bay QuadGuard<sup>®</sup> II system provide adequate capacity for head-on impacts for the 610mm (24 inches) width system. We agree that the front of the system was adequately tested for the 820C vehicle crash

characteristics. Based upon the multiple redirective test impacts into the QuadGuard<sup>®</sup> and the basic structure of the reduced 5-bay and 2-bay QuadGuard<sup>®</sup> II being unchanged, redirective tests are not required.

### **Findings**

The QuadGuard<sup>®</sup> II 5-bay and 2-bay systems meet the evaluation criteria for NCHRP Report 350 redirective, non-gating crash cushion at TL-3 and TL-2 impact conditions respectively and are acceptable for use on the NHS when such use is acceptable to the contracting authority. It's further acknowledged that the QuadGuard<sup>®</sup> II can be installed with existing QuadGuard<sup>®</sup> Transition hardware (Reference CC-35B, dated October 17, 1996.)

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-35I and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The QuadGuard and QuadGuard II families of crash cushions are patented products and considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and

the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,

A handwritten signature in blue ink, appearing to read "David A. Nicol". The signature is fluid and cursive, with a large initial "D" and "N".

David A. Nicol, P.E.  
Director, Office of Safety Design  
Office of Safety

Enclosures

**Table1: Table of TL- 3 Tests (5-Bay System).**

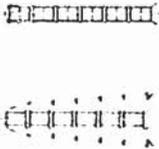
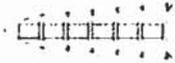
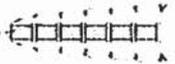
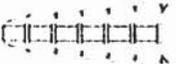
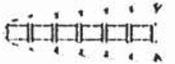
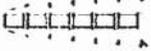
Illustration	Test #	Completed	Notes
	3-31	YES	Passed all ORV's. 5-Bay 24" Wide System was tested and passed all Occupant Risk Values. 5-Bay 90" Wide system was tested and passed all Occupant Risk Values.
	3-32	YES	Passed all ORV's. 5-Bay 24" Wide System was tested. 5-Bay 90" Wide System was tested.
	3-30	NO	Test 3-32 was completed as "Worst Case" for 820c.
	3-33	NO	Test 3-31 tested system capacity for 2000P and is considered worst case.
	3-36	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware therefore performance would remain unchanged.
	3-37	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.

Illustration	Test #	Completed	Notes
	3-38	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.
	3-39	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware / performance remains unchanged.

**Table2: Table of TL-2 Tests (2-Bay System)**

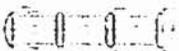
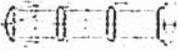
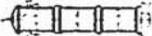
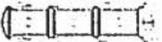
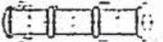
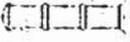
Illustration	Test#	Completed	Notes
	2-30	NO	Test 2-32 was completed as is considered “worst case” scenario for 820c.
	2-31	YES	Passed all ORV’s on 2-Bay System.
	2-32	YES	Passed all ORV’s on 2-Bay System.
	2-33	NO	Test 2-31 tested system capacity for 2000P and is considered worst case.

Illustration	Test#	Completed	Notes
	2-36	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.
	2-37	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.
	2-38	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.
	2-39	NO	Qualified under the Original QuadGuard Test Matrix. No changes in Structural Hardware – performance remains unchanged.



t = 0.000 sec

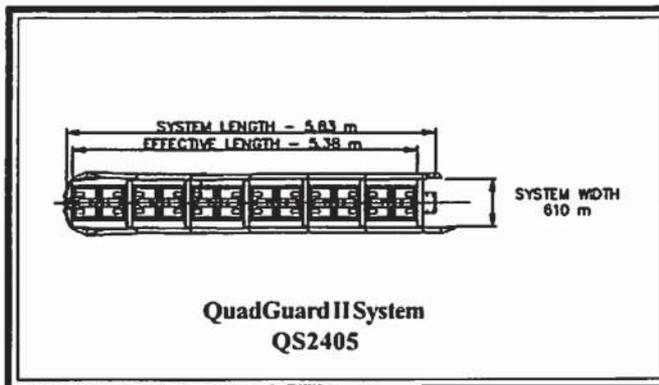
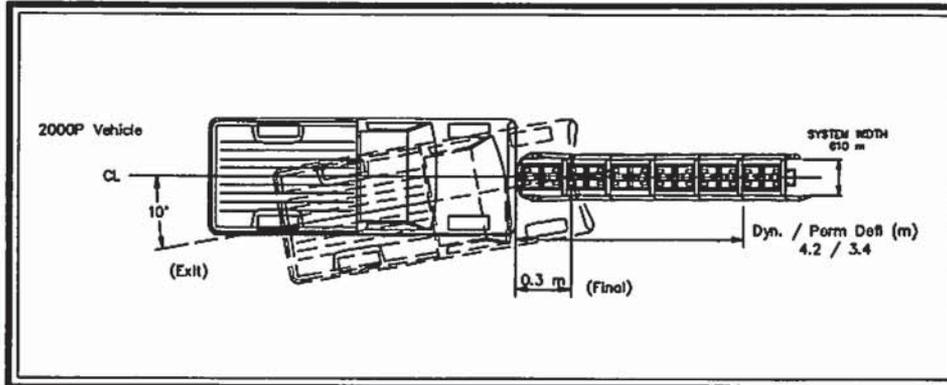
t = 0.120 sec

t = 0.240 sec

t = 0.360 sec

t = 0.480 sec

t = 0.600 sec



QuadGuard II System  
QS2405



E-TECH Testing Services, Inc.

QuadGuard II System Crash Test Results - 10 of 69

**General Information**

Test Agency .....	E-TECH Testing Services, Inc.
Test Designation .....	NCHRP 350 Test 3-31
Test No. ....	01-4309-001
Date .....	1/5/06
Test Article	
Type .....	Energy Absorption System
.....	QuadGuard II System QS2405
.....	
Installation Length, (mm) .....	5 bay 5830 mm long 610 mm wide
Material and key elements .....	5 bay system, 6 energy
.....	absorbing cartridges (3) Type II
.....	and (3) Type I.
.....	P.C. Concrete, clean
Foundation Type and Condition .....	Unreinforced 27.6 Mpa concrete,
.....	clean and dry, with (46) 19 mm x
.....	178 mm ASTM A193 Grade B-7
.....	threaded studs and
.....	MP-3 Anchoring System
Test Vehicle	
Type .....	Production Model
Designation .....	2000P
Model .....	1988 Chevrolet Pickup
.....	
Mass (kg)	
Curb .....	1861
Test inertial .....	1984
Dummy .....	N/A
Gross Static .....	1984

**Impact Conditions**

Speed (km/h) .....	101.1
Angle (deg) .....	0
Impact Severity (kJ) .....	781.6
Exit conditions	
Speed (km/h) .....	N/A
Angle (deg - veh. c.g.) .....	N/A
Occupant Risk Values	
Impact Velocity (m/s)	
x-direction .....	9.6
y-direction .....	0.5
Ridedown Acceleration (g's)	
x-direction .....	-17.3
y-direction .....	3.5
European Committee for Normalization (CEN) Values	
THIV (km/h) .....	34.7
PHID (g's) .....	17.4
ASI .....	1.3
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle .....	3.2
Maximum Pitch Angle .....	-8.6
Maximum Yaw Angle .....	-10.2
Test Article Deflections (m)	
Dynamic .....	4.2
Permanent .....	3.4
Vehicle Damage (Primary Impact)	
Exterior	
VDS .....	FC-3
CDC .....	12FCEW3
Interior	
VCDI .....	AS0000000
Maximum Deformation (mm) .....	Negligible

Figure I. Summary of Results - QuadGuard II System Test 01-4309-001



t = 0.000 sec

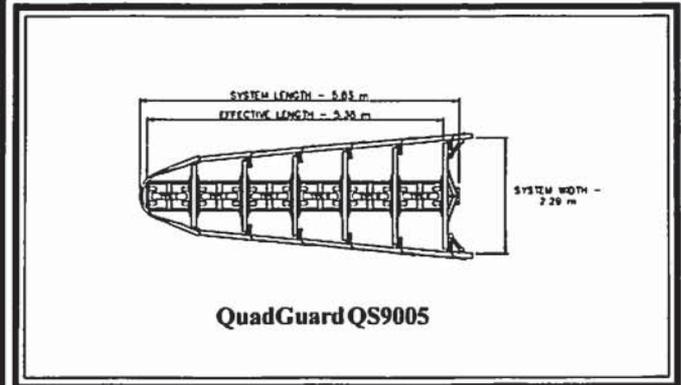
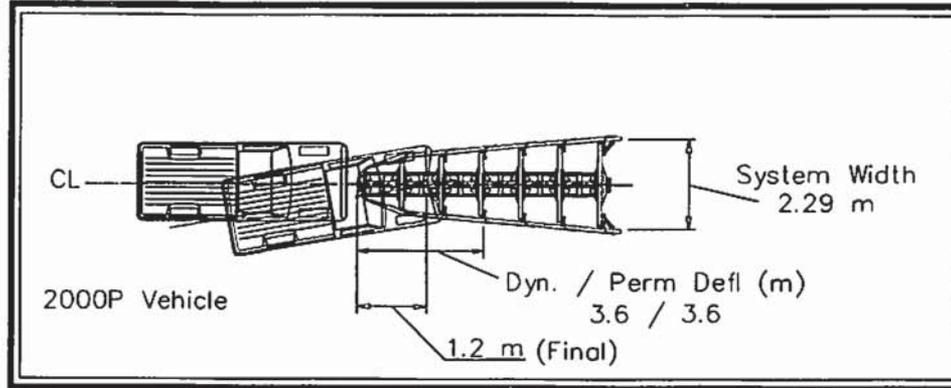
t = 0.138 sec

t = 0.276 sec

t = 0.414 sec

t = 0.552 sec

t = 0.965 sec



QuadGuard II System Crash Test Results - 16 of 69

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-31  
 Test No. .... 01-4309-006  
 Date ..... 11/04/08

**Test Article**

Type ..... Energy Absorption System  
 QuadGuard II System QS2405

**Installation Length, (mm)**

5 bay 5.83 m long 2.29 m wide

**Material and key elements**

5 bay system, 6 energy absorbing cartridges (3) Type II and (3) Type I.

**Foundation Type and Condition**

Unreinforced 27.6 Mpa concrete, clean and dry, with (46) 19 mm x 178 mm ASTM A193 Grade B-7 threaded studs and MP-3 Anchoring System

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 2000P  
 Model ..... 1991 GMC C2500

**Mass (kg)**

Curb ..... 1840  
 Test inertial ..... 2000  
 Dummy ..... N/A  
 Gross Static ..... 2000

**Impact Conditions**

Speed (km/h) ..... 99.7  
 Angle (deg) ..... 0  
 Impact Severity (kJ) ..... 766.5

**Exit conditions**

Speed (km/h) ..... N/A  
 Angle (deg - veh. c.g.) ..... N/A

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 10.0  
 y-direction ..... 0.0  
 Ridedown Acceleration (g's)  
 x-direction ..... -17.0  
 y-direction ..... -3.3

**European Committee for Normalization (CEN) Values**

THIV (km/h) ..... 36.1  
 PHD (g's) ..... 17.1  
 ASI ..... 1.3

**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle ..... -2.6  
 Maximum Pitch Angle ..... 30.6  
 Maximum Yaw Angle ..... -2.3

**Test Article Deflections (m)**

Dynamic ..... 3.6  
 Permanent ..... 3.6

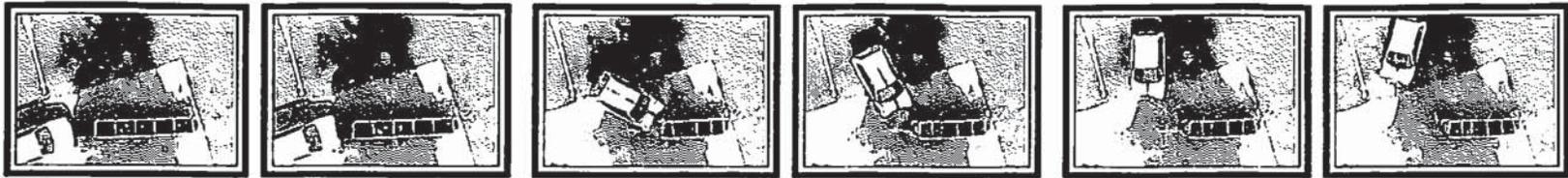
**Vehicle Damage (Primary Impact)**

Exterior  
 VDS ..... FC-4  
 CDC ..... 12FCEW4  
 Interior  
 VCDI ..... AS0000000  
 Maximum Deformation (mm) ..... Negligible

**Figure 6. Summary of Results - QuadGuard II System Test 01-4309-006**



E-TECH Testing Services, Inc.



t = 0.000 sec

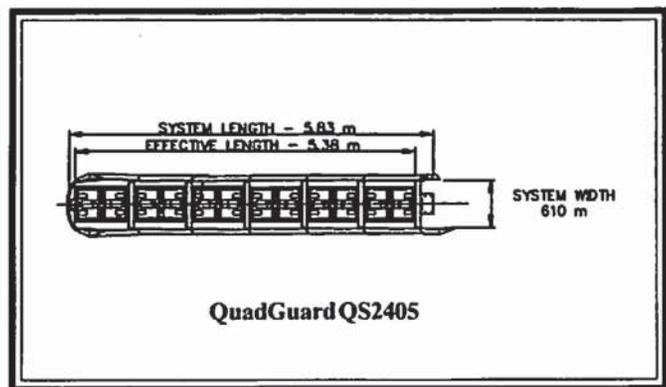
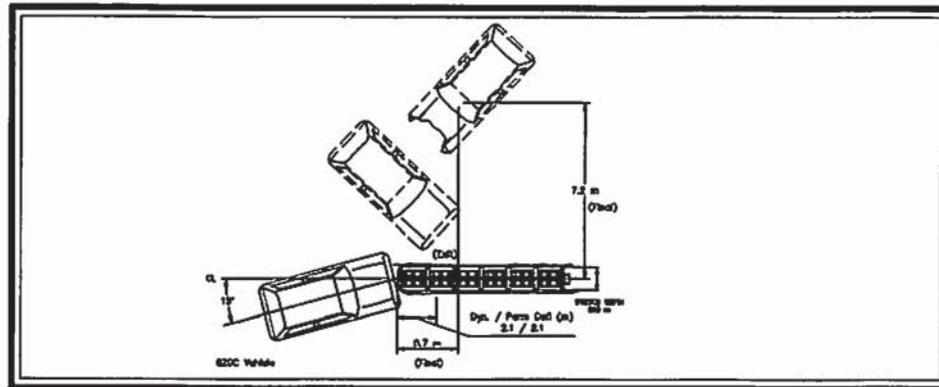
t = 0.173 sec

t = 0.341 sec

t = 0.511 sec

t = 0.680 sec

t = 0.851 sec



E-TECH Testing Services, Inc.

QuadGuard II System Crash Test Results - 22 of 69

**General Information**

Test Agency .....	E-TECH Testing Services, Inc.
Test Designation .....	NCHRP 350 Test 3-32
Test No. ....	01-4309-002
Date .....	6/04/08
Test Article	
Type .....	Energy Absorption System
.....	QuadGuard System QS2405
.....	
Installation Length, (mm) .....	5 bay 5830 mm long 610 mm wide
Material and key elements .....	5 bay system, 6 energy
.....	absorbing cartridges (3) Type II
.....	and (3) Type I.
.....	P.C. Concrete, clean
Foundation Type and Condition .....	Unreinforced 27.6 Mpa concrete,
.....	clean and dry, with (46) 19 mm x
.....	178 mm ASTM A193 Grade B-7
.....	threaded studs and
.....	MP-3 Anchoring System
Test Vehicle	
Type .....	Production Model
Designation .....	820C
Model .....	1988 Ford Festiva
.....	
Mass (kg)	
Curb .....	818
Test inertial .....	845
Dummy .....	75
Gross Static .....	920

**Impact Conditions**

Speed (km/h) .....	98.3
Angle (deg) .....	15
Impact Severity (kJ) .....	316.6

**Exit conditions**

Speed (km/h) .....	N/A
Angle (deg - veh. c.g.) .....	N/A

**Occupant Risk Values**

Impact Velocity (m/s)	
x-direction .....	12.4
y-direction .....	0.1
Ridedown Acceleration (g's)	
x-direction .....	-17.4
y-direction .....	-5.1

**European Committee for Normalization (CEN) Values**

THIV (km/h) .....	45.4
PHD (g's) .....	17.4
ASI .....	1.3

**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle .....	25.7
Maximum Pitch Angle .....	-12.1
Maximum Yaw Angle .....	191.8

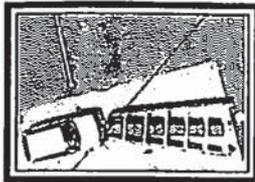
**Test Article Deflections (m)**

Dynamic .....	2.1
Permanent .....	2.1

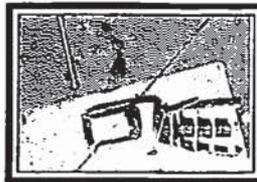
**Vehicle Damage (Primary Impact)**

Exterior	
VDS .....	FC-3
CDC .....	12FCEW3
Interior	
VCDI .....	AS000000
Maximum Deformation (mm) .....	Negligible

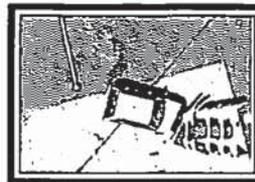
**Figure 11. Summary of Results - QuadGuard II System Test 01-4309-002**



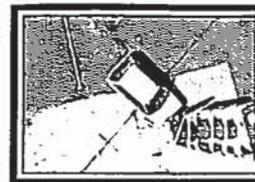
t = 0.000 sec



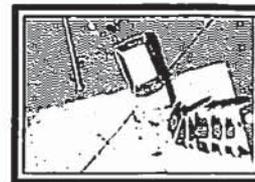
t = 0.118 sec



t = 0.236 sec



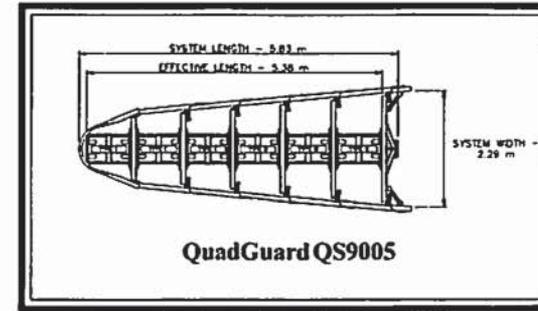
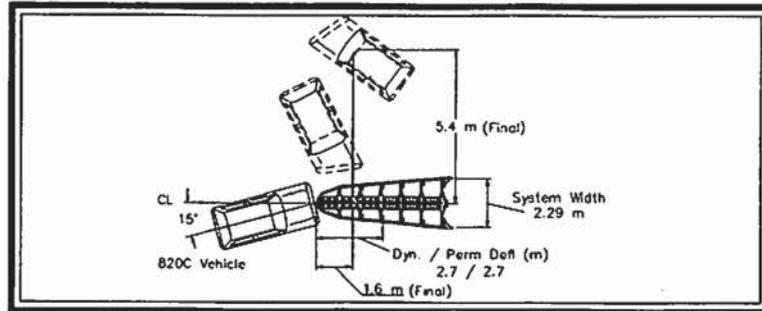
t = 0.354 sec



t = 0.472 sec



t = 1.295 sec



QuadGuard QS9005

**General Information**

Test Agency .....	E-TECH Testing Services, Inc.
Test Designation .....	NCHRP 350 Test 3-32
Test No. ....	01-4309-005
Date .....	8/13/08
<b>Test Article</b>	
Type .....	Energy Absorption System
.....	QuadGuard II System QS9005
.....	
Installation Length, (mm) .....	5 bay 5.83 m long 2.29 m wide
Material and key elements .....	5 bay system, 6 energy
.....	absorbing cartridges (3) Type II
.....	and (3) Type I.
Foundation Type and Condition .....	Unreinforced 27.6 Mpa concrete,
.....	clean and dry, with (46) 19 mm x
.....	178 mm ASTM A193 Grade B-7
.....	threaded studs and
.....	MP-3 Anchoring System
<b>Test Vehicle</b>	
Type .....	Production Model
Designation .....	820C
Model .....	1990 Ford Festiva
.....	
Mass (kg)	
Curb .....	852
Test inertial .....	827
Dummy .....	75
Gross Static .....	902

**Impact Conditions**

Speed (km/h) .....	97.7
Angle (deg) .....	15
Impact Severity (kJ) .....	304.3

**Exit conditions**

Speed (km/h) .....	N/A
Angle (deg - veh. c.g.) .....	N/A

**Occupant Risk Values**

Impact Velocity (m/s)	
x-direction .....	11.7
y-direction .....	-0.1
Ridedown Acceleration (g's)	
x-direction .....	-17.4
y-direction .....	-3.1

**European Committee for Normalization (CEN) Values**

THIV (km/h) .....	42.6
PHD (g's) .....	17.7
ASI .....	1.3

**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle .....	30.9
Maximum Pitch Angle .....	13.7
Maximum Yaw Angle .....	221.1

**Test Article Deflections (m)**

Dynamic .....	2.7
Permanent .....	2.7

**Vehicle Damage (Primary Impact)**

Exterior	
VDS .....	FC-3
CDC .....	01FCEW3
Interior	
VCDI .....	AS0000000
Maximum Deformation (mm) .....	Negligible

QuadGuard II System Crash Test Results - 28 of 69

E-TECH Testing Services, Inc.

Figure 16. Summary of Results - QuadGuard II System Test 01-4309-005



t = 0.000 sec

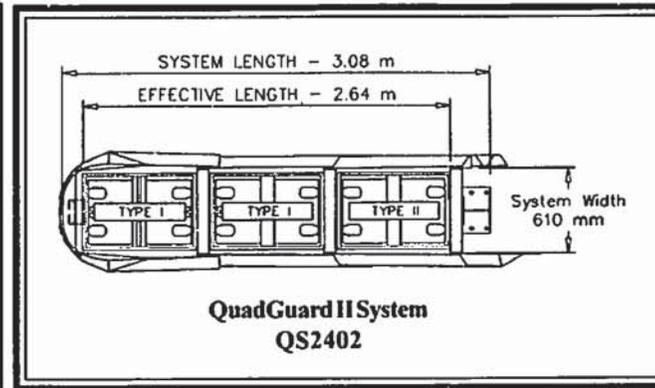
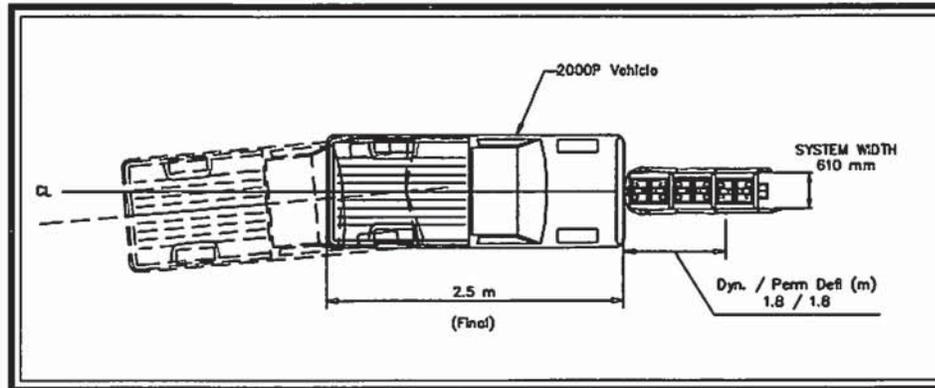
t = 0.133 sec

t = 0.266 sec

t = 0.399 sec

t = 0.532 sec

t = 1.920 sec



E-TECH Testing Services, Inc.

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 2-31  
 Test No. .... 01-4309-003

Date ..... 7/16/08

Test Article  
 Type ..... Energy Absorption System  
 QuadGuard II System QS2402

Installation Length, (mm) ..... 2 bay 3080 mm long 610 mm wide

Material and key elements ..... 2 bay system, 3 energy  
 absorbing cartridges (1) Type II  
 and (2) Type I.

Foundation Type and Condition ..... Unreinforced 27.6 Mpa concrete,  
 clean and dry, with (26) 19 mm x  
 178 mm ASTM A193 Grade B-7  
 threaded studs and  
 MP-3 Anchoring System

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 2000P  
 Model ..... 1989 Chevrolet Pickup  
 Mass (kg)  
 Curb ..... 1961  
 Test inertial ..... 2005  
 Dummy ..... N/A  
 Gross Static ..... 2005

**Impact Conditions**

Speed (km/h) ..... 68.3  
 Angle (deg) ..... 0  
 Impact Severity (kJ) ..... 361.0

**Exit conditions**

Speed (km/h) ..... N/A  
 Angle (deg - veh. c.g.) ..... N/A

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 10.7  
 y-direction ..... -0.7  
 Ridedown Acceleration (g's)  
 x-direction ..... -19.4  
 y-direction ..... 5.9

**European Committee for Normalization (CEN) Values**

THIV (km/h) ..... 38.7  
 PHD (g's) ..... 19.9  
 ASI ..... 1.3

**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle ..... 1.5  
 Maximum Pitch Angle ..... 5.4  
 Maximum Yaw Angle ..... -4.7

**Test Article Deflections (m)**

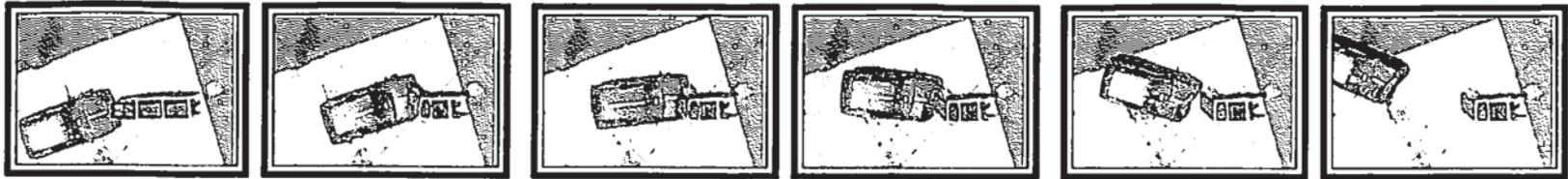
Dynamic ..... 1.8  
 Permanent ..... 1.8

**Vehicle Damage (Primary Impact)**

Exterior  
 VDS ..... FC-3  
 CDC ..... 12FCEW3  
 Interior  
 VCDI ..... AS0000000  
 Maximum Deformation (mm) ..... Negligible

QuadGuard II Crash Test Results - 9 of 43

**Figure 1. Summary of Results - QuadGuard II System Test 01-4309-003**



t = 0.000 sec

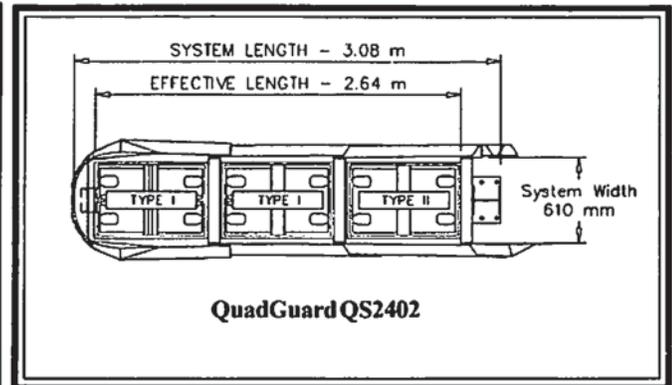
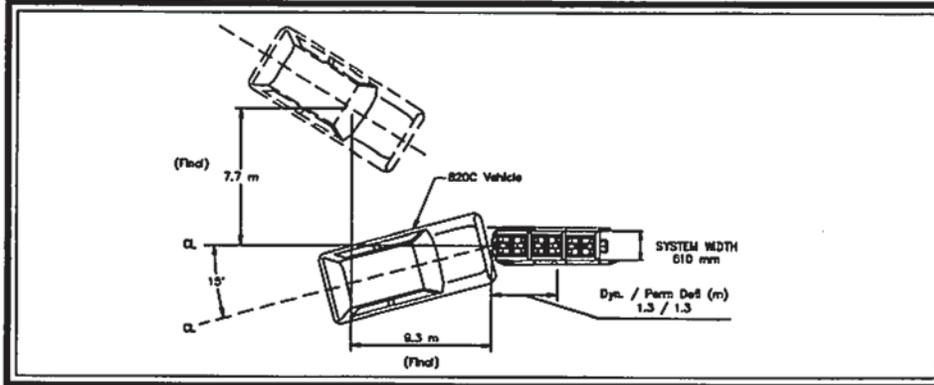
t = 0.125 sec

t = 0.250 sec

t = 0.375 sec

t = 0.500 sec

t = 1.285 sec



QuadGuard QS2402

E-TECH Testing Services, Inc.

QuadGuard II Crash Test Results - 15 of 43

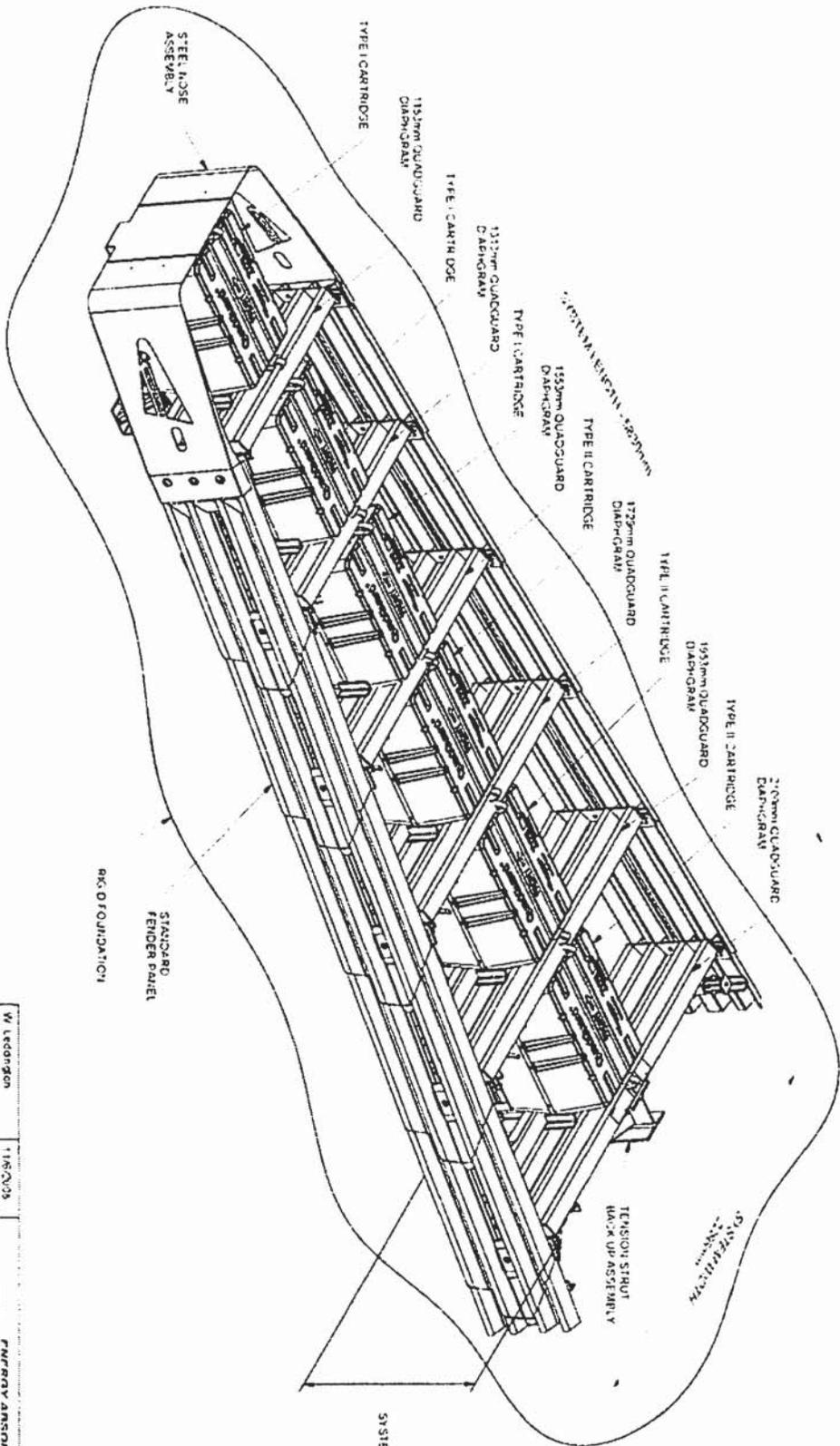
**General Information**

Test Agency .....	E-TECH Testing Services, Inc.
Test Designation .....	NCHRP 350 Test 2-32
Test No. ....	01-4309-004
Date .....	7/22/08
<b>Test Article</b>	
Type .....	Energy Absorption System
.....	QuadGuard System QS2402
.....	
Installation Length, (mm) .....	2 bay 3080 mm long 610 mm wide
<b>Material and key elements</b> .....	2 bay system, 3 energy
.....	absorbing cartridges (1) Type II
.....	and (2) Type I.
.....	
<b>Foundation Type and Condition</b> .....	Unreinforced 27.6 Mpa concrete,
.....	clean and dry, with (26) 19 mm x
.....	178 mm ASTM A193 Grade B-7
.....	threaded studs and
.....	MP-3 Anchoring System
.....	
<b>Test Vehicle</b>	
Type .....	Production Model
Designation .....	820C
Model .....	1990 Ford Festiva
.....	
<b>Mass (kg)</b>	
Curb .....	838
Test inertial .....	818
Dummy .....	75
Gross Static .....	993

**Impact Conditions**

Speed (km/h) .....	67.7
Angle (deg) .....	15
Impact Severity (kJ) .....	144.6
<b>Exit conditions</b>	
Speed (km/h) .....	N/A
Angle (deg - veh. c.g.) .....	N/A
<b>Occupant Risk Values</b>	
Impact Velocity (m/s)	
x-direction .....	10.8
y-direction .....	-0.5
Ridedown Acceleration (g's)	
x-direction .....	-17.8
y-direction .....	-6.2
<b>European Committee for Normalization (CEN) Values</b>	
THIV (km/h) .....	39.0
PHD (g's) .....	18.0
ASI .....	1.5
<b>Post-Impact Vehicular Behavior (deg - rate gyro)</b>	
Maximum Roll Angle .....	7.3
Maximum Pitch Angle .....	11.3
Maximum Yaw Angle .....	47.0
<b>Test Article Deflections (m)</b>	
Dynamic .....	1.3
Permanent .....	1.3
<b>Vehicle Damage (Primary Impact)</b>	
<b>Exterior</b>	
VDS .....	FC-3
CDC .....	12FCEW3
<b>Interior</b>	
VCDI .....	AS0000000
Maximum Deformation (mm) .....	Negligible

**Figure 6. Summary of Results - QuadGuard II System Test 01-4309-004**

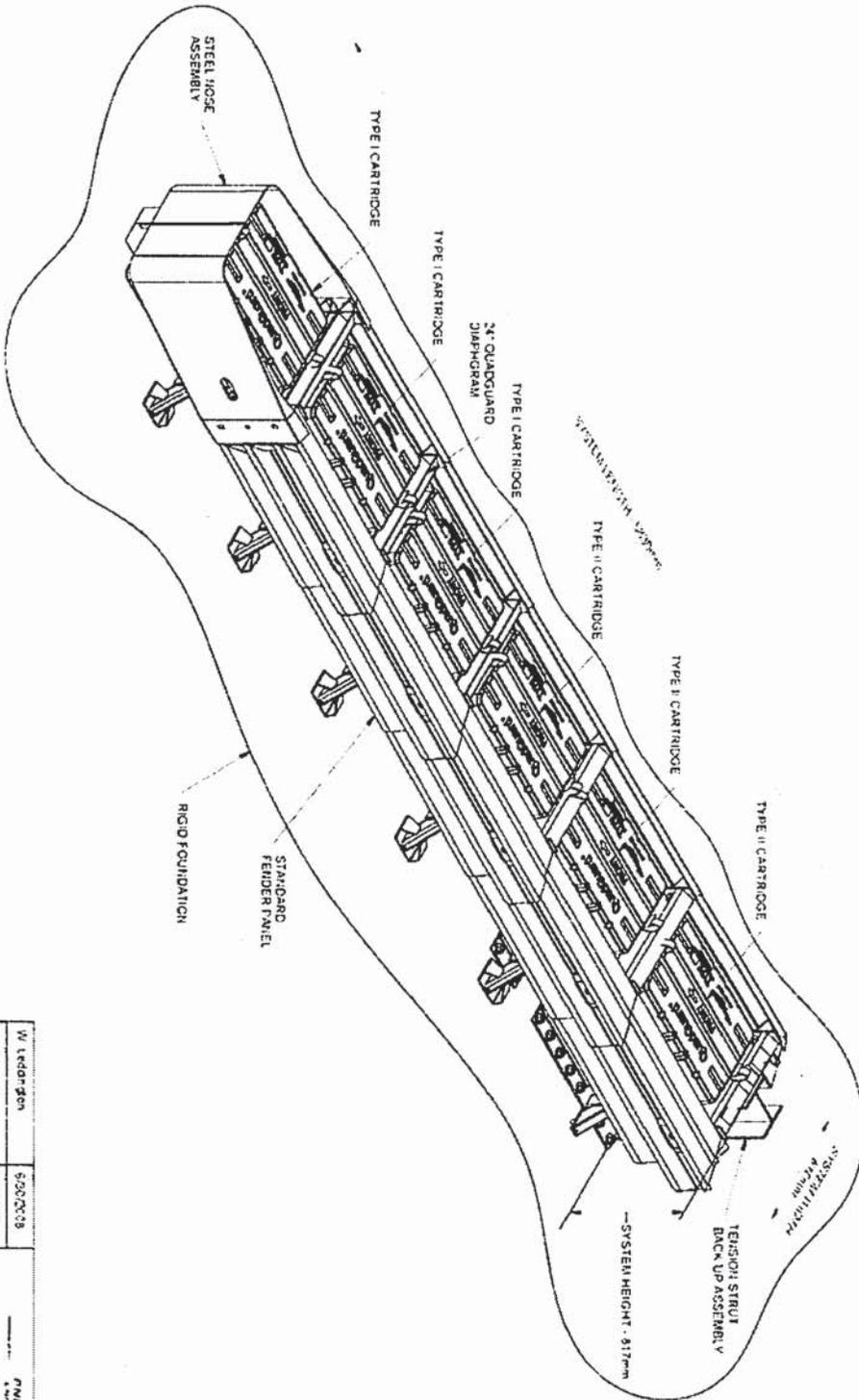


W. Ledderson	11/6/2003
M. Blunier	11/6/2003

**5 BAY 90 WIDE QUADGUARD II SYSTEM**

PNRROY ASSOCIATION, INC. 11/11/03  
 8000 N. 116TH AVE. SUITE 100, CLAYTON, OH 44027

05229X0011 1 of 1



W. Ledorson	5/20/00
M. Buchner	6/27/00

<p>5 BAY QUADGUARD II SYSTEM</p>	
<p>1 of 1</p>	



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

1200 New Jersey Ave., SE  
Washington, D.C. 20590

February 9, 2011

In Reply Refer To:  
HSST/CC-114

Mr. Geoff Maus  
Chief Design Engineer  
TraFFix Devices, Inc.  
160 Avenida La Pata  
San Clemente, California 92673

Dear Mr. Maus:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system:	SLED – Sentry Longitudinal Energy Dissipater
Type of system:	Gating Crash Cushion/Impact Attenuator
Test Level:	NCHRP Report 350 Test Level 3 (TL-3)
Testing conducted by:	KARCO Engineering
Date of request:	August 31, 2010
Date initially acknowledged:	August 31, 2010

You requested that we find this system acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350.

### Requirements

Roadside safety devices should meet the guidelines contained in the Report 350. The FHWA memorandum “ACTION: Identifying Acceptable Highway Safety Features” of July 24, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

### Decision

The following device was found acceptable, with details provided below:

- TL-3 SLED – Sentry Longitudinal Energy Dissipater

### Description

The SLED End Treatment is a high-density polyethylene (HDPE) water filled crash cushion designed to shield the end of permanent and portable barrier shapes including concrete, steel, and plastic. The SLED End Treatment modules are designed for uni- and bi-directional traffic applications where a gating device is acceptable to the road authority.



FHWA:HSST:NArtimovich:ms:x61331:2/9/11

File: s://directory folder/HSST/Artimovich CC114\_Sled\_TL3.dotx  
cc: HSST (NArtimovich; JDewar)

The SLED End Treatment modules are designated by their yellow color, each module has overall dimensions of approximately 6.3 ft (1.93 m) x 1.875 ft (.57 m) x 3.8 ft (1.16 m) and weighs approximately 160 lbs empty and 2000 lbs filled. Each module has eleven connecting lugs, five on one end and six on the opposite end. The four upper lugs on every module contain an independent corrosion resistant wire rope. A 1.125 inch (28.6 mm) diameter steel t-pin drops through the 1.5 inch (38 mm) diameter holes in the lugs linking the sections together.

At the front of the end treatment, pinned directly to module #1 is the Containment Impact Sled (CIS). The CIS is made of all steel construction with a flat bottom, a curved sheet metal nose, and support frames made of structural rectangular steel tubes. The CIS is designed to attach to either the five or six knuckle ends of module #1. The CIS has a curved impact face to fit over the curved knuckle contour of module #1. The vertical t-pin connects the CIS to module #1 through the series of vertical knuckles and the internal molded-in cables. Module #1 is designed to be an empty module. To prevent module #1 from being filled, six holes are designed into the lower edge of the side walls. Modules 2, 3, and 4 are filled entirely and weigh approximately 2000lbs (907 kg) each when filled.

When the Sentry SLED End Treatment is used to shield an end of an array of Sentry Water Cable Barriers, one CIS, and one module #1 is attached. For TL-3 applications, the SLED End Treatment is attached to a minimum of ten (unlimited maximum number) Sentry Water Cable Barriers.

For shielding all permanent and portable barriers, an adjustable steel transition has been designed. This transition securely attaches the rear of the Sentry SLED End Treatment to the shielded object. The transition is designed to accommodate assorted safety barrier shapes and sizes by using hinged outboard transition panels. The transition panels are made of 0.188 inch (4.8 mm) thick steel, which when attached to the barrier, conforms to the contour of the barrier. The combination of hinging, and contouring, allow the panels allows the SLED End Treatment to be attached to narrow and wide and profile shapes with either converging, or diverging angles, up to 10 degrees. For testing, the contoured hinged panels were anchored to the barriers using a minimum of eight 1 inch diameter anchor bolts with expansion sleeves, minimum four per side.

### **Crash Testing**

A non-redirective gating crash cushion requires the following tests be conducted: 3-40, 3-41, 3-42, 3-43, and 3-44. The following full-scale tests were conducted on the SLED:

#### **Tests for Shielding Sentry Water Cable Barrier**

NCHRP-350 Test Number	Test Vehicle Weight (kg)	Impact Speed (kph)	Impact Condition	Occ. Imp Velocity (m/s)	Ridedown Acceleration (G)
3-40	820	99.6	¼ offset	10.6	15.7
3-41	2000	102	0°	11.1	11.0
3-43	2000	102.4	15°	8.0	4.8

### Tests for Shielding F-Shape CMB Unpinned and Permanently Anchored

NCHRP-350 Test Number	Test Vehicle Weight (kg)	Impact Speed (kph)	Impact Angle Degree	Occ. Imp Velocity (m/s)	Ridedown Acceleration (G)
3-41 Free Standing	2000	101.5	0°	9.2	9.6
3-41 Anchored	2000	99.1	0°	9.7	12.3
3-44 Anchored	2000	103.1	20°	9.8	10.6
3-44M Anchored	2000	96.2	15°	8.4	15.6

You requested waivers of the following tests:

Test 3-40 -Shielding permanent and portable concrete barriers.

Test 3-42 -Shielding Sentry Water Cable Barrier and permanent and portable concrete barriers.

Test 3-43- Shielding permanent and portable concrete barriers.

Test 3-44 -Shielding Sentry Water Cable Barrier.

You detailed your reasoning behind the waiver requests as follows:

#### **Test 3-40** Shielding Permanent and Portable Concrete Barriers

The Sentry SLED End Treatment shielding Sentry Water Cable Barrier recorded an OIV of 10.6 m/s and a ridedown acceleration of 15.7 g's. These values are below accepted levels, and were recorded prior to movement of the fourth Sentry module. You expect little or no change in performance with the SLED End Treatment attached to a fixed object.

#### **Tests 3-42** Shielding Sentry Water Cable Barrier and Permanent and Portable Concrete Barriers

You expect the impacting car to push the sled and first empty module aside, allowing the end treatment to act as a gating device, similar to the 3-43 test performed. Just as the 3-43 test had lower measured values than the 3-41 test, we would expect the 3-42 test would have lower values than the 3-40 test.

#### **Test 3-43** Shielding Permanent and Portable Concrete Barriers

As tested, shielding the Sentry Water Cable Barrier, the trajectory of the impacting vehicle carried past the angled barrier and remained upright during and after the collision with only moderate, roll pitch, and yaw. It would be expected that the impacting vehicle would have similar test results regardless of the type of barrier that is being shielded.

#### **Test 3-44** Shielding Sentry Water Cable Barriers

The SLED End Treatment was tested twice in the most severe condition, attached to rigid anchored F-shape safety concrete barrier, in test 3-44 and 3-44M parameters. In these tests, all specified evaluation criteria (C,D,F,K, and N) were met. In addition, evaluation criteria H and I (OIV and Ridedown) were well below the maximum accepted values. Based on the 3-11 performance of Sentry Water Cable Barriers, and the products ability to deflect, you expect equal or better performance for evaluation criteria C,D,F,K and N with the SLED End Treatment attached to Sentry Water Cable Barriers.

All physical crash test summaries are included as enclosures to this correspondence.

## Findings

Because the SLED is a non-redirecting, gating cash cushion, it should be applied to hazards that are not likely to be impacted at an angle on the side at any significant velocity. We note also that proper antifreezing agents must be used as filler when the SLED and Sentry products are used in areas where low temperatures can be anticipated. All users of this device should be made aware of the factors that contribute to its proper performance.

Therefore, the system described in the requests above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-114 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Sentry and SLED are patented products and considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.

The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely,

Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

Enclosures



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

1200 New Jersey Ave., SE  
Washington, D.C. 20590

February 9, 2011

In Reply Refer To:  
HSST/CC-114

Mr. Geoff Maus  
Chief Design Engineer  
TraFFix Devices, Inc.  
160 Avenida La Pata  
San Clemente, California 92673

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### **Requirements**

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### **Decision**

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### **Description**

The SLED End Treatment is a high-density polyethylene (HDPE) water filled crash cushion designed to shield the end of permanent and portable barrier shapes including concrete, steel, and plastic. The SLED End Treatment modules are designed for uni- and bi-directional traffic applications where a gating device is acceptable to the road authority.



The SLED End Treatment modules are designated by their yellow color, each module has overall dimensions of approximately 6.3 ft (1.93 m) x 1.875 ft (.57 m) x 3.8 ft (1.16 m) and weighs approximately 160 lbs empty and 2000 lbs filled. Each module has eleven connecting lugs, five on one end and six on the opposite end. The four upper lugs on every module contain an independent corrosion resistant wire rope. A 1.125 inch (28.6 mm) diameter steel t-pin drops through the 1.5 inch (38 mm) diameter holes in the lugs linking the sections together.

At the front of the end treatment, pinned directly to module #1 is the Containment Impact Sled (CIS). The CIS is made of all steel construction with a flat bottom, a curved sheet metal nose, and support frames made of structural rectangular steel tubes. The CIS is designed to attach to either the five or six knuckle ends of module #1. The CIS has a curved impact face to fit over the curved knuckle contour of module #1. The vertical t-pin connects the CIS to module #1 through the series of vertical knuckles and the internal molded-in cables. Module #1 is designed to be an empty module. To prevent module #1 from being filled, six holes are designed into the lower edge of the side walls. Modules 2, 3, and 4 are filled entirely and weigh approximately 2000lbs (907 kg) each when filled.

When the Sentry SLED End Treatment is used to shield an end of an array of Sentry Water Cable Barriers, one CIS, and one module #1 is attached. For TL-3 applications, the SLED End Treatment is attached to a minimum of ten (unlimited maximum number) Sentry Water Cable Barriers.

For shielding all permanent and portable barriers, an adjustable steel transition has been designed. This transition securely attaches the rear of the Sentry SLED End Treatment to the shielded object. The transition is designed to accommodate assorted safety barrier shapes and sizes by using hinged outboard transition panels. The transition panels are made of 0.188 inch (4.8 mm) thick steel, which when attached to the barrier, conforms to the contour of the barrier. The combination of hinging, and contouring, allow the panels allows the SLED End Treatment to be attached to narrow and wide and profile shapes with either converging, or diverging angles, up to 10 degrees. For testing, the contoured hinged panels were anchored to the barriers using a minimum of eight 1 inch diameter anchor bolts with expansion sleeves, minimum four per side.

### **Crash Testing**

A non-redirective gating crash cushion requires the following tests be conducted: 3-40, 3-41, 3-42, 3-43, and 3-44. The following full-scale tests were conducted on the SLED:

#### **Tests for Shielding Sentry Water Cable Barrier**

NCHRP-350 Test Number	Test Vehicle Weight (kg)	Impact Speed (kph)	Impact Condition	Occ. Imp Velocity (m/s)	Ridedown Acceleration (G)
3-40	820	99.6	¼ offset	10.6	15.7
3-41	2000	102	0°	11.1	11.0
3-43	2000	102.4	15°	8.0	4.8

### Tests for Shielding F-Shape CMB Unpinned and Permanently Anchored

NCHRP-350 Test Number	Test Vehicle Weight (kg)	Impact Speed (kph)	Impact Angle Degree	Occ. Imp Velocity (m/s)	Ridedown Acceleration (G)
3-41 Free Standing	2000	101.5	0°	9.2	9.6
3-41 Anchored	2000	99.1	0°	9.7	12.3
3-44 Anchored	2000	103.1	20°	9.8	10.6
3-44M Anchored	2000	96.2	15°	8.4	15.6

You requested waivers of the following tests:

Test 3-40 -Shielding permanent and portable concrete barriers.

Test 3-42 -Shielding Sentry Water Cable Barrier and permanent and portable concrete barriers.

Test 3-43- Shielding permanent and portable concrete barriers.

Test 3-44 -Shielding Sentry Water Cable Barrier.

You detailed your reasoning behind the waiver requests as follows:

#### **Test 3-40** Shielding Permanent and Portable Concrete Barriers

The Sentry SLED End Treatment shielding Sentry Water Cable Barrier recorded an OIV of 10.6 m/s and a ridedown acceleration of 15.7 g's. These values are below accepted levels, and were recorded prior to movement of the fourth Sentry module. You expect little or no change in performance with the SLED End Treatment attached to a fixed object.

#### **Tests 3-42** Shielding Sentry Water Cable Barrier and Permanent and Portable Concrete Barriers

You expect the impacting car to push the sled and first empty module aside, allowing the end treatment to act as a gating device, similar to the 3-43 test performed. Just as the 3-43 test had lower measured values than the 3-41 test, we would expect the 3-42 test would have lower values than the 3-40 test.

#### **Test 3-43** Shielding Permanent and Portable Concrete Barriers

As tested, shielding the Sentry Water Cable Barrier, the trajectory of the impacting vehicle carried past the angled barrier and remained upright during and after the collision with only moderate, roll pitch, and yaw. It would be expected that the impacting vehicle would have similar test results regardless of the type of barrier that is being shielded.

#### **Test 3-44** Shielding Sentry Water Cable Barriers

The SLED End Treatment was tested twice in the most severe condition, attached to rigid anchored F-shape safety concrete barrier, in test 3-44 and 3-44M parameters. In these tests, all specified evaluation criteria (C,D,F,K, and N) were met. In addition, evaluation criteria H and I (OIV and Ridedown) were well below the maximum accepted values. Based on the 3-11 performance of Sentry Water Cable Barriers, and the products ability to deflect, you expect equal or better performance for evaluation criteria C,D,F,K and N with the SLED End Treatment attached to Sentry Water Cable Barriers.

All physical crash test summaries are included as enclosures to this correspondence.

## Findings

Because the SLED is a non-redirecting, gating cash cushion, it should be applied to hazards that are not likely to be impacted at an angle on the side at any significant velocity. We note also that proper antifreezing agents must be used as filler when the SLED and Sentry products are used in areas where low temperatures can be anticipated. All users of this device should be made aware of the factors that contribute to its proper performance.

Therefore, the system described in the requests above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-114 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Sentry and SLED are patented products and considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.

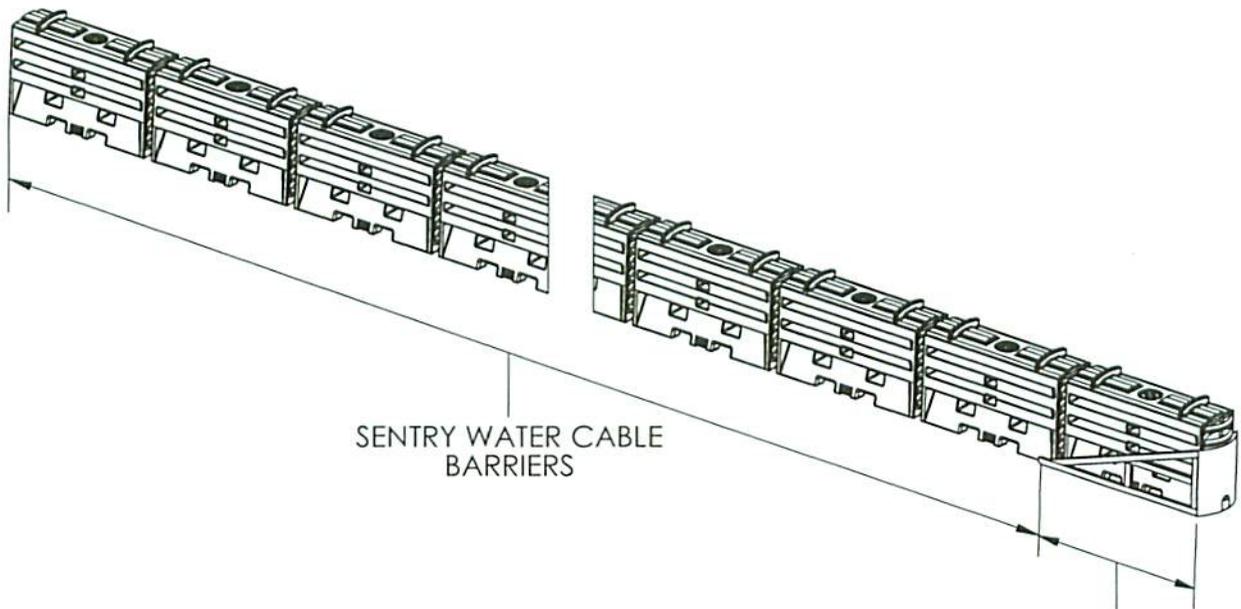
The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely,



Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

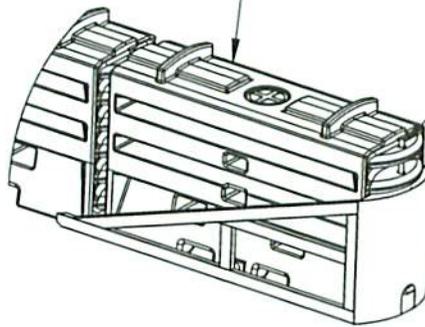
Enclosures



SENTRY WATER CABLE  
BARRIERS

6'-4"  
[1.93]  
SLED END TREATMENT

EMPTY YELLOW MODULE



T-PIN WITH KEEPER PIN

CONTAINMENT IMPACT SLED

SLED END TREATMENT



SER##

SHEET NO.

DATE:

1 OF 2

08/27/2010

## INTENDED USE

The Sentry Longitudinal Energy Dissipater (SLED) End Treatment is a narrow water filled non-redirective, gating crash cushion designed to shield the Sentry Water Cable Barrier. Like the Sentry Water Cable Barrier the SLED End Treatment does not require foundation anchor bolts to be attached to road surface. The complete end treatment can be installed on firm soil, asphalt, and concrete.

The SLED End Treatment meets NCHRP-350 TL-3, TL-2, and TL-1 crashworthy test criteria as a non-redirective crash cushion. The complete end treatment consists of one yellow empty module and a Containment Impact Sled (CIS).

### SLED End Treatment

Length: 75-3 4 in (1.93 m)

Height: 42-11 16 in (1.09 m)

Width: 22-1 2 in (0.57 m)

The SLED End Treatment has been fully tested to the recommended procedures of Report NCHRP-350.

## ACCEPTANCE

FHWA Acceptance Letters:

## CONTACT INFORMATION

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## SLED END TREATMENT

SER##

SHEET NO.

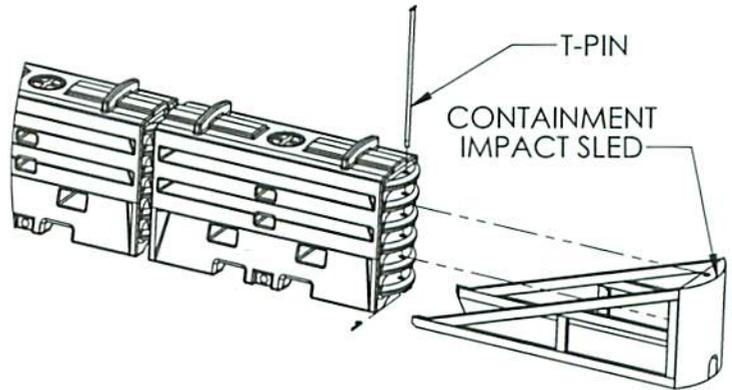
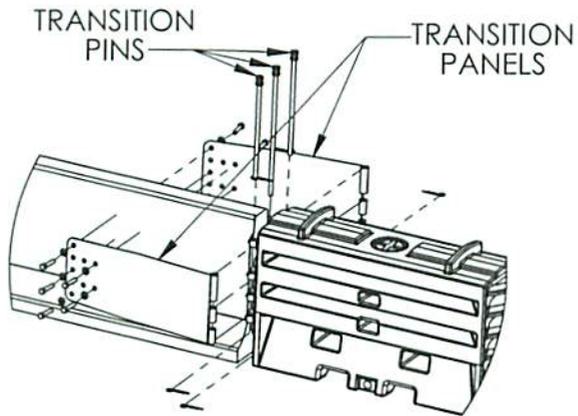
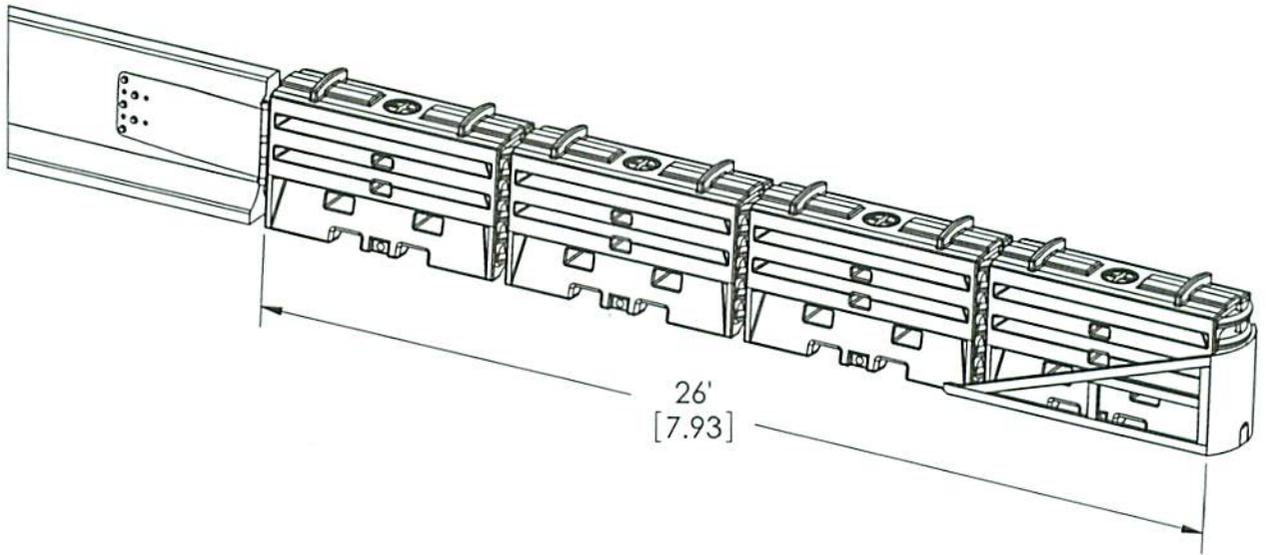
DATE:

2 OF 2

08/27/2010

**TraFFix**  
**Devices Inc.**





SLED END TREATMENT



SER##

SHEET NO.

DATE:

1 OF 2

08/27/2010

## INTENDED USE

The Sentry Longitudinal Energy Dissipater (SLED) End Treatment is a narrow water-filled non-redirective, gating crash cushion designed to shield the end of all permanent and portable barrier shapes including concrete, steel, and plastic. The SLED End Treatment does not require foundation anchor bolts to be attached to the road surface. The complete crash cushion can be installed on firm soil, asphalt, and concrete.

The SLED End Treatment meets NCHRP-350 TL-3, TL-2, and TL-1 crashworthy test requirements as a non-redirective crash cushion. Four yellow modules make up the complete crash cushion assembly. Front module 1 is left empty and weighs 160 lbs. [75.6 kg]. Modules 2, 3, and 4 are filled and weigh approximately 2000 lbs [907.2 kg]. The Containment Impact Sled is attached to the front of Module 1 and the Transition is attached to the rear of Module 4.

### SLED End Treatment

Length: 26 ft (7.93 m) Four (4) Modules

Height: 42-11 16 in (1.09 m)

Width: 22-1/2 in (0.57 m)

The SLED End Treatment has been fully tested to the recommended procedures of NCHRP-350.

## ACCEPTANCE

FHWA Acceptance Letters:

## CONTACT INFORMATION

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## SLED END TREATMENT

SER##

SHEET NO.

DATE:

2 OF 2

08/27/2010

**TraFFix**  
**Devices Inc.**



**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TraFFix Devices Sentry End Treatment  
 Test Program: NCHRP 350 3-40  
 Test Vehicle: 1995 Geo Metro

Project No.: P30061-01  
 Test Date: 05/14/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-40	X DIRECTION	10.6
DATE	5/14/2010	Y DIRECTION	0.4
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	25.0 m (82.1 ft.)	X DIRECTION	-15.7
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 79.4 kg (175 lbs)	Y DIRECTION	2.2
SOIL TYPE AND CONDITION	Concrete	PHD (Optional)	
TEST VEHICLE		ASI (Optional)	
TYPE	Production Model	TEST ARTICLE DEFLECTIONS (m)	
DESIGNATION	820C	DYNAMIC	
MODEL	1995 Geo Metro	PERMANENT	
MASS (CURB)	807.0 kg (1779 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	806.5 kg (1778 lbs)	EXTERIOR	
DUMMY MASS	75.0 kg (165 lbs)	VDS	12-FR-5
MASS (GROSS STATIC)	885.5 kg (1952 lbs)	CDC	12FREW2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	99.6 km/h (61.9 mi/h)	OCDI	FS0000000
ANGLE (°)	0.1	POST-IMPACT VEHICULAR BEHAVIOR	
IMPACT SEVERITY (kJ)	337.9	MAXIMUM ROLL ANGLE (°)	-7.0
EXIT CONDITIONS		MAXIMUM PITCH ANGLE (°)	-7.4
VELOCITY (km/h)		MAXIMUM YAW ANGLE (°)	-165.3
ANGLE (°)			

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TraFFix Devices Sentry End Treatment  
 Test Program: NCHRP 350 3-41  
 Test Vehicle: 1998 Chevrolet 2500 Cheyenne

Project No.: P30040-01  
 Test Date: 04/15/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-41	X DIRECTION	11.1
DATE	4/15/2010	Y DIRECTION	0.1
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	25.0 m (82.1 ft.)	X DIRECTION	-11.0
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 79.4 kg (175 lbs)	Y DIRECTION	-2.7
SOIL TYPE AND CONDITION	Concrete	PHD (Optional)	
TEST VEHICLE		ASI (Optional)	
TYPE	Production Model	TEST ARTICLE DEFLECTIONS (m)	
DESIGNATION	2000P	DYNAMIC	
MODEL	1998 Chevrolet 2500 Cheyenne	PERMANENT	
MASS (CURB)	2155 kg (4752 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	2034 kg (4484 lbs)	EXTERIOR	
DUMMY MASS	N/A	VDS	12-FC-5
MASS (GROSS STATIC)	2034 kg (4484 lbs)	CDC	12FCEN2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	102.0 km/h (63.3 mi/h)	OCDI	FS0000000
ANGLE (°)	0.1		
IMPACT SEVERITY (kJ)	815.9	POST-IMPACT VEHICULAR BEHAVIOR	
EXIT CONDITIONS		MAXIMUM ROLL ANGLE (°)	-6.0
VELOCITY (km/h)		MAXIMUM PITCH ANGLE (°)	3.4
ANGLE (°)		MAXIMUM YAW ANGLE (°)	-6.6

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TrafFix Devices Sentry End Treatment  
 Test Program: NCHRP 350 3-43  
 Test Vehicle: 1998 Chevrolet Silverado 2500

Project No.: P30075-01  
 Test Date: 06/17/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-43	X DIRECTION	8.0
DATE	6/17/2010	Y DIRECTION	1.9
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	25.1 m (82.4 ft.)	X DIRECTION	-4.8
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 79.4 kg (175 lbs)	Y DIRECTION	3.7
SOIL TYPE AND CONDITION	Concrete	PHD (Optional)	
TEST VEHICLE		ASI (Optional)	
TYPE	Production Model	TEST ARTICLE DEFLECTIONS (m)	
DESIGNATION	2000P	DYNAMIC	
MODEL	1998 Chevrolet Silverado 2500	PERMANENT	
MASS (CURB)	2122.5 kg (4679 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	2044.0 kg (4506 lbs)	EXTERIOR	
DUMMY MASS	N/A	VDS	11-FL-4
MASS (GROSS STATIC)	2044.0 kg (4506 lbs)	CDC	11FLEN2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	102.4 km/h (63.6 mi/h)	OCDI	FS0000000
ANGLE (°)	15.5	POST-IMPACT VEHICULAR BEHAVIOR	
IMPACT SEVERITY (kJ)	826.8	MAXIMUM ROLL ANGLE (°)	6.3
EXIT CONDITIONS		MAXIMUM PITCH ANGLE (°)	-2.7
VELOCITY (km/h)		MAXIMUM YAW ANGLE (°)	-14.3
ANGLE (°)	23.0		

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TrafFix Devices Sentry End Treatment  
 Test Program: NCHRP 350 3-41  
 Test Vehicle: 1994 GMC Sierra 2500

Project No.: P30043-01  
 Test Date: 05/27/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-41	X DIRECTION	9.2
DATE	5/27/2010	Y DIRECTION	0.1
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	20.1 m (65.9 ft.)	X DIRECTION	-9.6
END TREATMENT LENGTH	7.9 m (25.9 ft.)	Y DIRECTION	-3.4
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 79.4 kg (175 lbs)	PHD (Optional)	
SOIL TYPE AND CONDITION	Concrete	ASI (Optional)	
TEST VEHICLE		TEST ARTICLE DEFLECTIONS (m)	
TYPE	Production Model	DYNAMIC	
DESIGNATION	2000P	PERMANENT	
MODEL	1994 GMC Sierra 2500		
MASS (CURB)	2092.5 kg (4614 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	2016 kg (4445 lbs)	EXTERIOR	
DUMMY MASS	N/A	VDS	12-FC-5
MASS (GROSS STATIC)	2016 kg (4445 lbs)	CDC	12FCEN2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	101.5 km/h (63.1 mi/h)	OCDI	FS0000000
ANGLE (°)	0.2		
IMPACT SEVERITY (kJ)	801.9	POST-IMPACT VEHICULAR BEHAVIOR	
EXIT CONDITIONS		MAXIMUM ROLL ANGLE (°)	-2.8
VELOCITY (km/h)		MAXIMUM PITCH ANGLE (°)	3.6
ANGLE (°)		MAXIMUM YAW ANGLE (°)	3.6

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TraFFix Devices Sentry End Treatment  
 Test Program: NCHRP 350 3-41  
 Test Vehicle: 1992 Chevrolet Silverado 2500

Project No.: P30072-01  
 Test Date: 06/15/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-41	X DIRECTION	9.7
DATE	6/15/2010	Y DIRECTION	0.3
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	20.3 m (66.6 ft.)	X DIRECTION	-12.3
END TREATMENT LENGTH	8.0 m (26.2 ft.)	Y DIRECTION	3.5
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 79.4 kg (175 lbs)	PHD (Optional)	
SOIL TYPE AND CONDITION	Concrete	ASI (Optional)	
TEST VEHICLE		TEST ARTICLE DEFLECTIONS (m)	
TYPE	Production Model	DYNAMIC	
DESIGNATION	2000P	PERMANENT	
MODEL	1992 Chevrolet Silverado 2500		
MASS (CURB)	2130 kg (4696 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	2013.5 kg (4439 lbs)	EXTERIOR	
DUMMY MASS	N/A	VDS	12-FC-5
MASS (GROSS STATIC)	2013.5 kg (4439 lbs)	CDC	12FCEN2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	99.1 km/h (61.5 mi/h)	OCDI	FS0000000
ANGLE (°)	0.1		
IMPACT SEVERITY (kJ)	762.6	POST-IMPACT VEHICULAR BEHAVIOR	
EXIT CONDITIONS		MAXIMUM ROLL ANGLE (°)	-5.6
VELOCITY (km/h)		MAXIMUM PITCH ANGLE (°)	-2.6
ANGLE (°)		MAXIMUM YAW ANGLE (°)	-4.1

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TrafFix Devices Sentry End Treatment CMB  
 Test Program: NCHRP 350 3-44  
 Test Vehicle: 1996 Chevrolet Cheyenne 2500

Project No.: P30077-01  
 Test Date: 06/28/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-44	X DIRECTION	9.8
DATE	6/28/2010	Y DIRECTION	2.2
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	20.3 m (66.6 ft)	X DIRECTION	-10.6
END TREATMENT LENGTH	8.0 m (26.2 ft)	Y DIRECTION	4.3
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 66.5 kg (146 lbs)	PHD (Optional)	
SOIL TYPE AND CONDITION	Concrete	ASI (Optional)	
TEST VEHICLE		TEST ARTICLE DEFLECTIONS (m)	
TYPE	Production Model	DYNAMIC	
DESIGNATION	2000P	PERMANENT	
MODEL	1996 Chevrolet Cheyenne 2500	VEHICLE DAMAGE	
MASS (CURB)	2087.0 kg (4601 lbs)	EXTERIOR	
MASS (TEST INERTIAL)	2044.5 kg (4507 lbs)	VDS	1-FR-5
DUMMY MASS	N/A	CDC	01FREW2
MASS (GROSS STATIC)	2044.5 kg (4507 lbs)	INTERIOR	
IMPACT CONDITIONS		OCDI	FS0000000
VELOCITY (km/h)	103.1 km/h (64.1 mi/h)	POST-IMPACT VEHICULAR BEHAVIOR	
ANGLE (°)	20.1	MAXIMUM ROLL ANGLE (°)	-35.7
IMPACT SEVERITY (kJ)	99.0	MAXIMUM PITCH ANGLE (°)	-5.2
EXIT CONDITIONS		MAXIMUM YAW ANGLE (°)	-15.2
VELOCITY (km/h)			
ANGLE (°)			

**DATA SHEET 4**  
**SUMMARY OF RESULTS**

Test Article: TraFFix Devices Sentry End Treatment CMB  
 Test Program: NCHRP 350 3-44 (Modified)  
 Test Vehicle: 1990 Chevrolet Silverado

Project No.: P30074-01  
 Test Date: 06/16/10



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	NCHRP 350 3-44 (Modified)	X DIRECTION	8.4
DATE	6/16/2010	Y DIRECTION	2.0
TEST ARTICLE		THIV (Optional)	
TYPE	Crash Cushion	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	20.3 m (66.5 ft)	X DIRECTION	-15.6
END TREATMENT LENGTH	8.0 m (26.2 ft)	Y DIRECTION	7.4
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Nominal Mass 71.7 kg (158 lbs)	PHD (Optional)	
SOIL TYPE AND CONDITION	Concrete	ASI (Optional)	
TEST VEHICLE		TEST ARTICLE DEFLECTIONS (m)	
TYPE	Production Model	DYNAMIC	
DESIGNATION	2000P	PERMANENT	
MODEL	1990 Chevrolet Silverado	VEHICLE DAMAGE	
MASS (CURB)	2020.5 kg (4454 lbs)	EXTERIOR	
MASS (TEST INERTIAL)	1983.0 kg (4372 lbs)	VDS	1-FR-5
DUMMY MASS	N/A	CDC	01FREW2
MASS (GROSS STATIC)	1983.0 kg (4372 lbs)	INTERIOR	
IMPACT CONDITIONS		OCDI	FS0000000
VELOCITY (km/h)	96.2 km/h (59.8 mi/h)	POST-IMPACT VEHICULAR BEHAVIOR	
ANGLE (°)	15.0	MAXIMUM ROLL ANGLE (°)	-19.3
IMPACT SEVERITY (kJ)	47.4	MAXIMUM PITCH ANGLE (°)	10.7
EXIT CONDITIONS		MAXIMUM YAW ANGLE (°)	4.0
VELOCITY (km/h)			
ANGLE (°)			

# INFORMATION HANDOUT

For Contract No. 05-0C6404

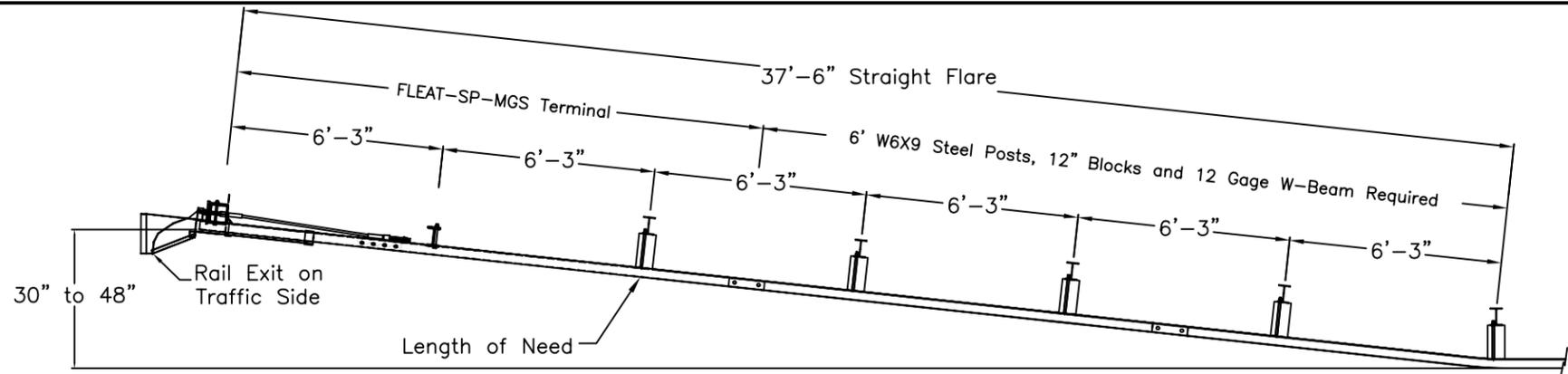
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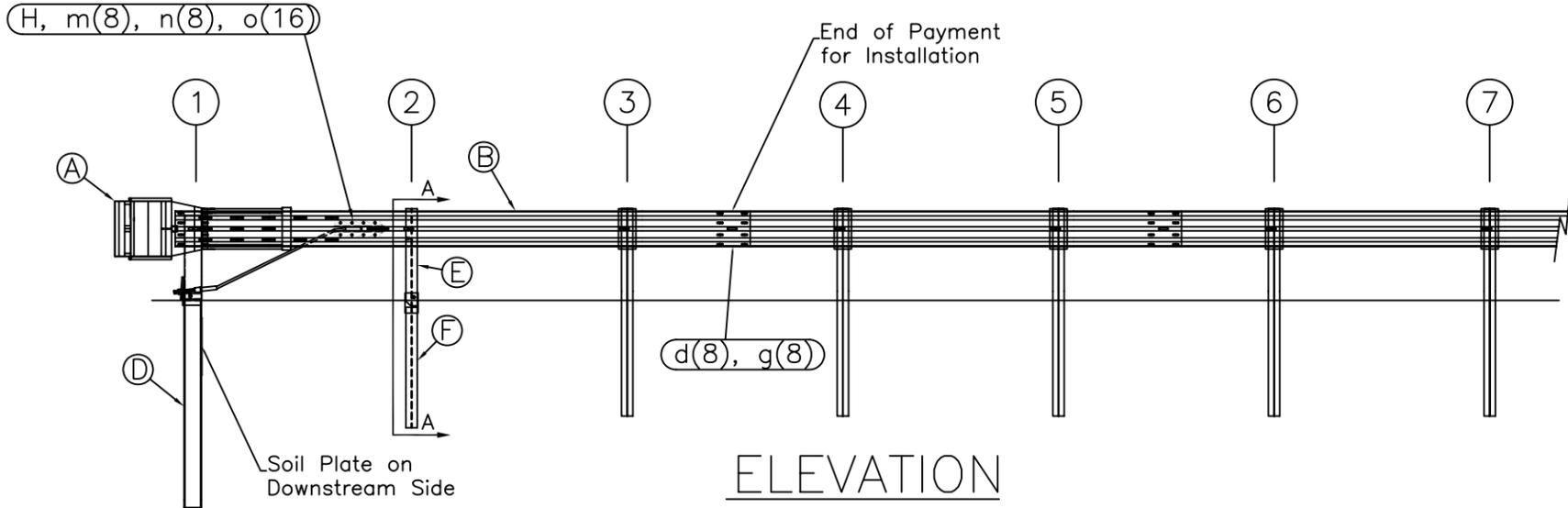
Project ID 0500000021

## MATERIALS INFORMATION

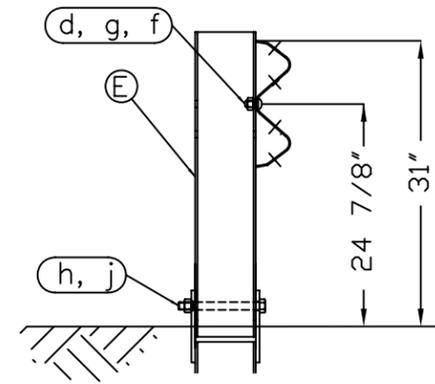
### [10. Alternative Flared Terminal Systems](#)



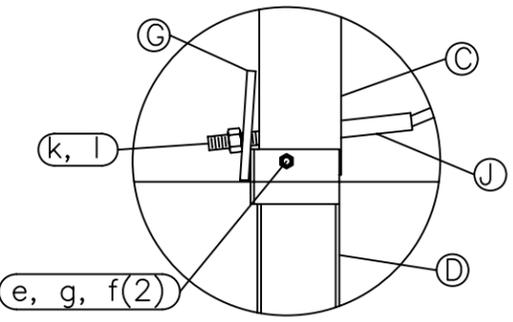
PLAN



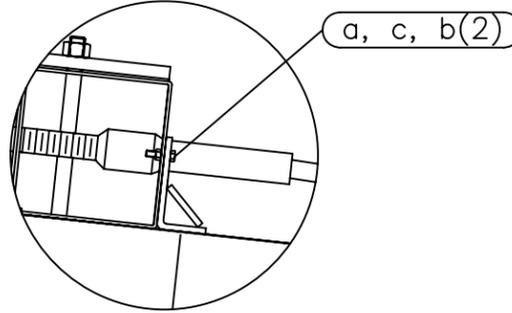
ELEVATION



SECTION A-A  
Post #2



Post #1 Connection Detail



Impact Head Connection Detail

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	F3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{8}$ " Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.

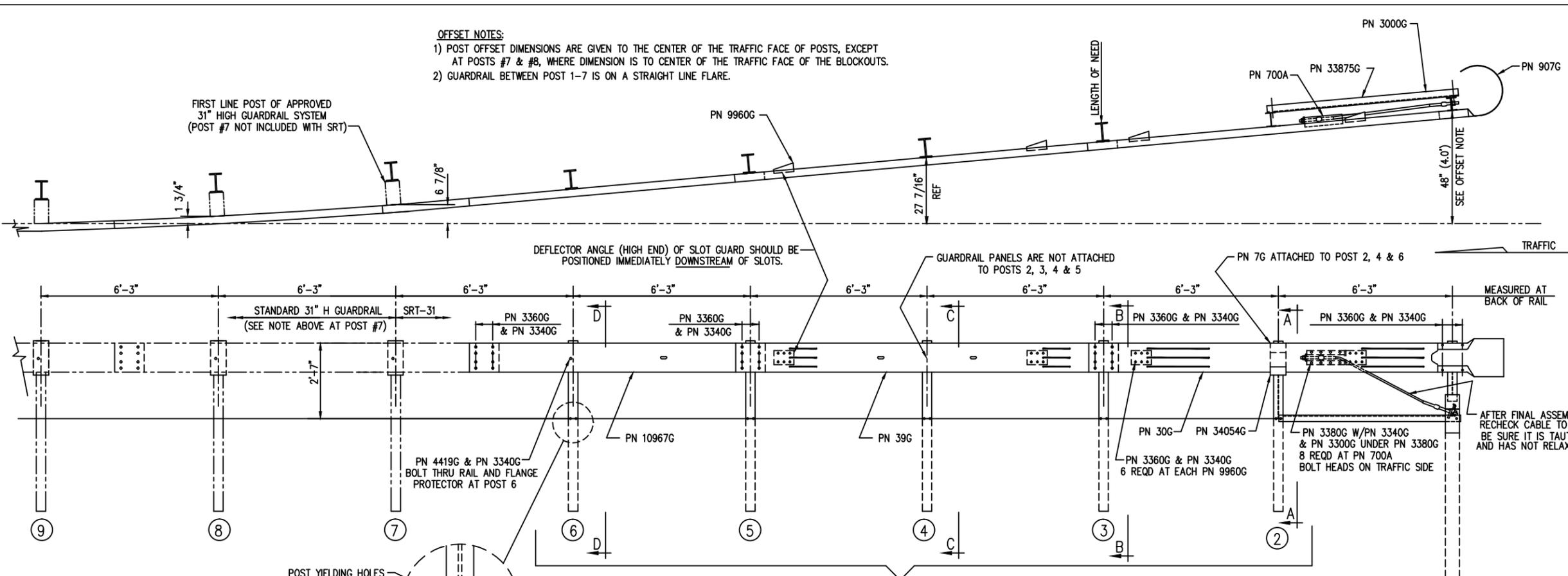
**Road Systems, Inc.**  
Big Spring, TX  
Phone: 432-263-2435  
or Phone: 330-346-0721

<b>FLEAT-SP-MGS Terminal Midwest Guardrail System 31" Top of Rail</b>		Sheet:	1
		Date:	02/24/10
Drawing Name: <b>FLT-SP-S-MGS</b>		By:	JRR
		Scale:	None
		Rev:	0

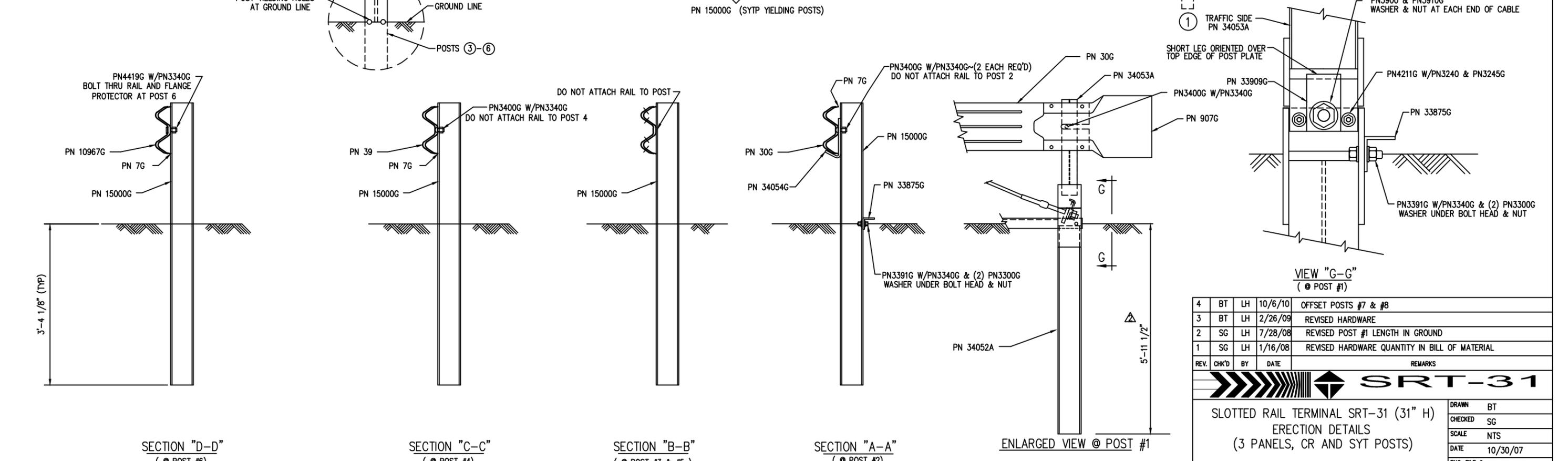
**OFFSET NOTES:**

- 1) POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF POSTS, EXCEPT AT POSTS #7 & #8, WHERE DIMENSION IS TO CENTER OF THE TRAFFIC FACE OF THE BLOCKOUTS.
- 2) GUARDRAIL BETWEEN POST 1-7 IS ON A STRAIGHT LINE FLARE.

FIRST LINE POST OF APPROVED 31" HIGH GUARDRAIL SYSTEM (POST #7 NOT INCLUDED WITH SRT)



BILL OF MATERIAL		
PN	QTY	DESCRIPTION
7G	3	12/6"/FLG PROTECTOR (AT POST 2, 4 & 6)
30G	1	12/12/6"/S SRT-1 (GUARDRAIL)
39G	1	12/12/6"/S SRT-2 (GUARDRAIL)
700A	1	CABLE ANCHOR BRACKET
907G	1	12/BUFFER/ROLLED (TERMINAL)
3000G	1	3/4 x 6'-6" CABLE
<b>HARDWARE</b>		
3240G	2	5/16" WASHER (AT POST 1)
3245G	2	5/16" HEX NUT (AT POST 1)
3300G	12	5/8" WASHER
3340G	67	5/8" HEX HGR NUT
3360G	52	5/8" x 1 1/4" HGR SPLICE BOLT
3380G	8	5/8" x 1 1/2" HEX HD BOLT
3400G	4	5/8" x 2" HGR POST BOLT (AT POSTS 1, 2 & 4)
3391G	2	5/8" x 1 3/4" HEX BOLT (A325) (AT STRUT)
3900G	2	1" WASHER (AT CABLE)
3910G	2	1" HEX NUT (AT CABLE)
4211G	2	5/16" x 1 3/4" HEX BOLT (AT POST 1)
4419G	1	5/8" x 1 3/4" COUNTERSUNK HD BOLT (AT POST 6)
9960G	4	SLOT GUARD BRACKET
10967G	1	12/9/4.5/31.5/S SRT-3 (GUARDRAIL)
15000G	5	6'-0" SYT POST (W6 X 8.5)
33909G	1	CABLE ANCHOR BRACKET (AT POST 1)
33875G	1	ANGLE STRUT 3 x 3 x 1/4
34052A	1	CR POST 1 BOT (W6 X 15)
34053A	1	CR POST 1 TOP (W6 X 8.5)
34054G	1	POST SHELF ANGLE (AT POST 2)



REV.	CHK'D	BY	DATE	REMARKS
4	BT	LH	10/6/10	OFFSET POSTS #7 & #8
3	BT	LH	2/26/09	REVISED HARDWARE
2	SG	LH	7/28/08	REVISED POST #1 LENGTH IN GROUND
1	SG	LH	1/16/08	REVISED HARDWARE QUANTITY IN BILL OF MATERIAL

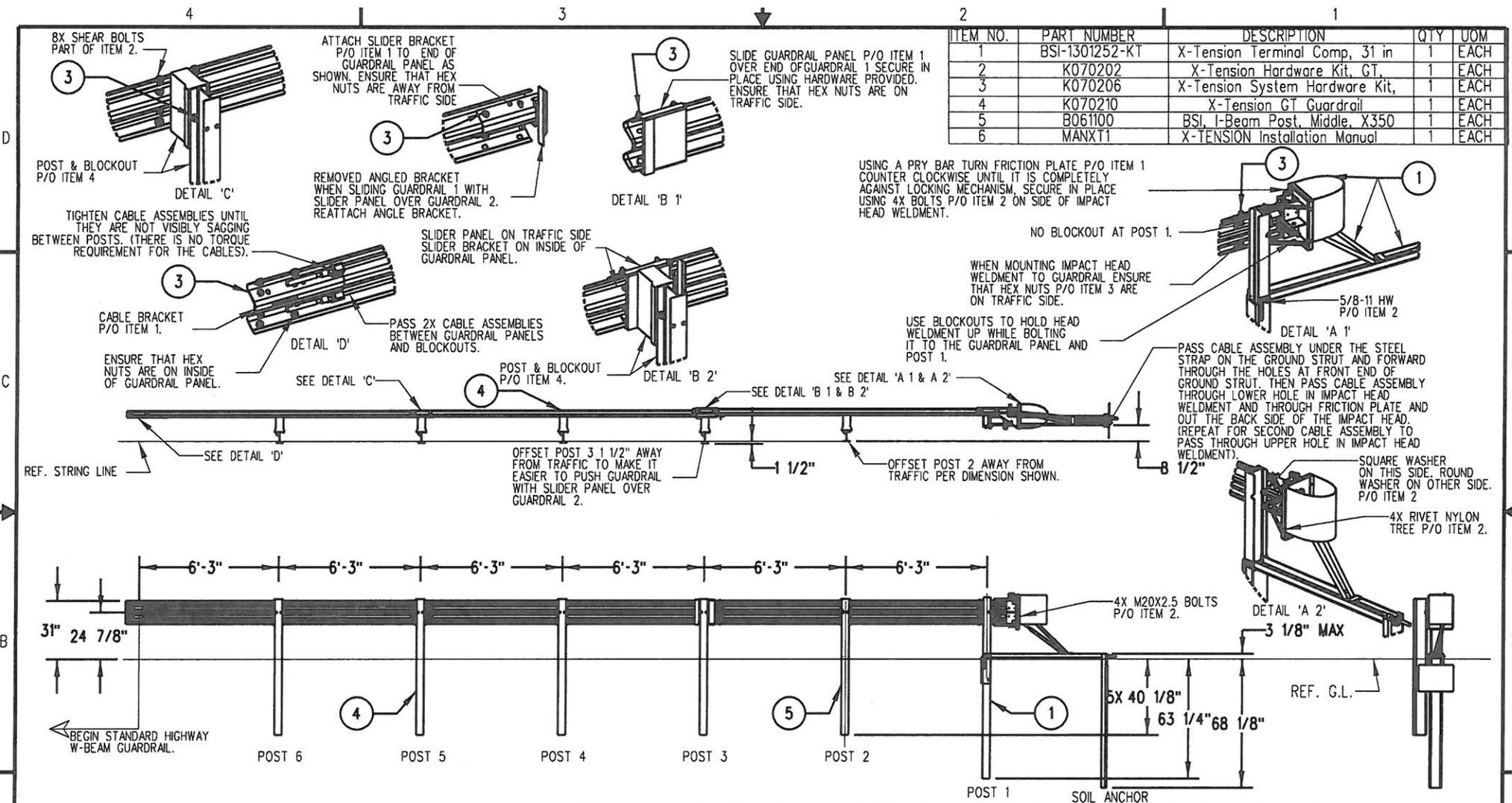
**SRT-31**

SLOTTED RAIL TERMINAL SRT-31 (31" H)  
ERECTION DETAILS  
(3 PANELS, CR AND SYT POSTS)

DRAWN	BT
CHECKED	SG
SCALE	NTS
DATE	10/30/07
ENG. FILE #	SS436-01E
SHT.No.	E1 OF 1
DRAWING NO.	SS 436
REV.	4

TRINITY HIGHWAY PRODUCTS, LLC.  
2525 STEMMONS FREEWAY  
DALLAS, TX 75207

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY	UOM
1	BSI-1301252-KT	X-Tension Terminal Comp, 31 in	1	EACH
2	K070202	X-Tension Hardware Kit, GT,	1	EACH
3	K070206	X-Tension System Hardware Kit,	1	EACH
4	K070210	X-Tension GT Guardrail	1	EACH
5	B061100	BSL I-Beam Post, Middle, X350	1	EACH
6	MANXT1	X-TENSION Installation Manual	1	EACH

- NOTES: UNLESS OTHERWISE SPECIFIED.
- SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
  - ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.
  - WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.

1/2012 BARRIER SYSTEMS INC. THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BARRIER SYSTEMS INC. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF BARRIER SYSTEMS INC. IS PROHIBITED.		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS DECIMAL ANGLES $\pm 1/16$ $\pm .015$ $\pm 1/2^\circ$ $\pm .003$ $\pm .010$	
<b>APPROVALS</b> DRAWN BY: NMV DRAWN DATE: 2/08/13 APPR'D BY: JMT APPR'D DATE: 2/08/13		INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994 THIRD ANGLE PROJECTION 	
REV	ECN*	DATE	SCALE
B	2067	03/02/13	B
A	2022	2/08/13	B
1			1:50

**LINDSAY**  
TRANSPORTATION SOLUTIONS

BARRIER SYSTEMS INC.  
3333 Voco Valley Parkway, Ste 800  
Vacoala, CA 95688  
Tel: 800-800-5691  
www.barriersystemsinc.com

TITLE: X-TENSION GUARDRAIL TERMINAL SYSTEM  
STEEL POST WITH COMPOSITE BLOCKOUT  
31" RAIL HEIGHT

SIZE: B  
DWC NO.: B  
SCALE: 1:50  
SHEET: 1 OF 1

# INFORMATION HANDOUT

For Contract No. 05-0C6404

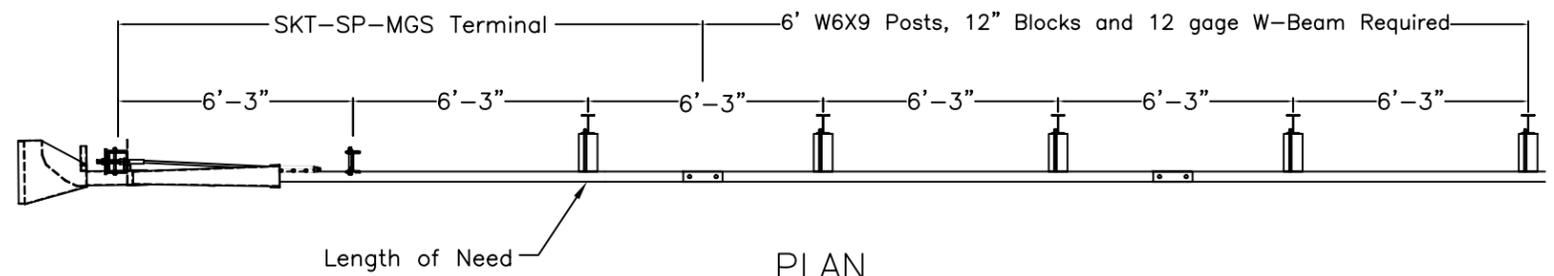
At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

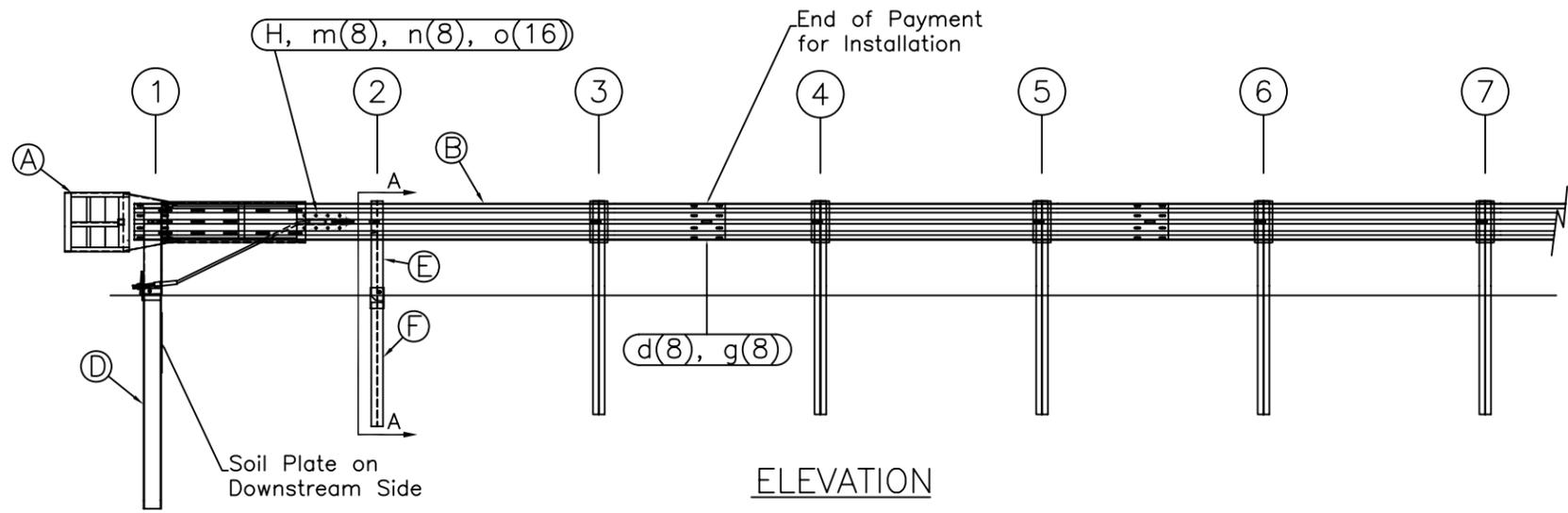
## MATERIALS INFORMATION

### [11. Alternative In-line Terminal Systems](#)

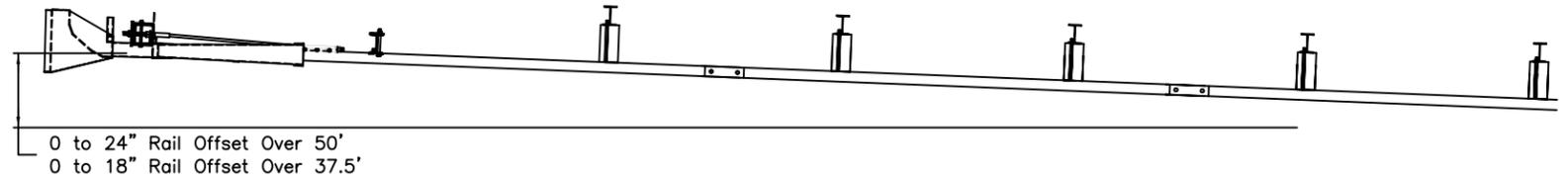


PLAN

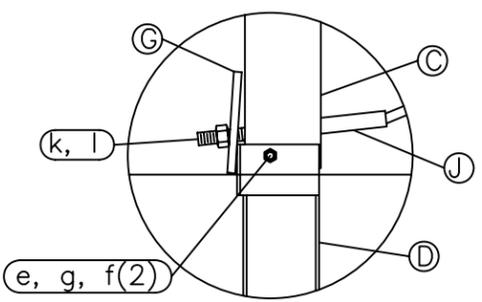
TRAFFIC →



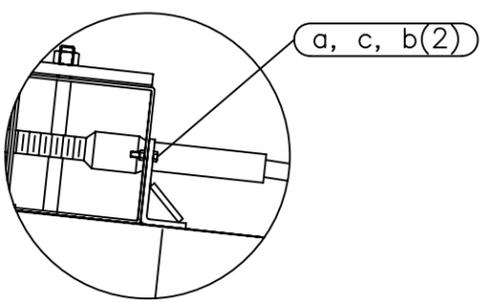
ELEVATION



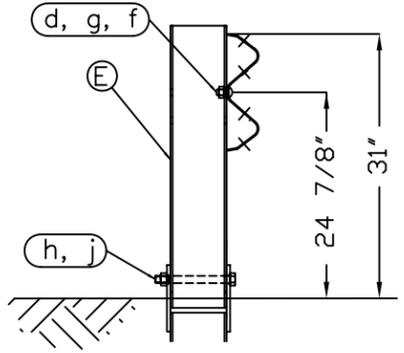
OPTIONAL FLARED INSTALLATION  
25:1 maximum flare rate



Post #1 Connection Detail



Impact Head Connection Detail



SECTION A-A  
Post #2

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{2}$ " Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12"  $\varnothing$  post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- A site evaluation should be considered if there is less than 25' between the outlet side of the terminal and any adjacent driving lane.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.



<b>SKT-SP-MGS Terminal Midwest Guardrail System 31" Top of Rail</b>		Sheet:	1
		Date:	02/24/10
Drawing Name: SKT-SP-S-MGS		By:	JRR
		Scale:	None
		Rev:	0

# ET-31™ Guardrail End Treatment

## Product Description Assembly Manual

Part No. 620182B

Created January 2013



**TRINITY**  
HIGHWAY PRODUCTS  
ENERGY ABSORPTION SYSTEMS

# ET-31™ Guardrail End Treatment

## Product Description Assembly Manual



2525 Stemmons Freeway  
Dallas, Texas 75207



**Important:** These instructions are to be used only in conjunction with the assembly, maintenance, and repair of the ET-31™ Guardrail End Treatment. These instructions are for standard assembly specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact the appropriate highway authority engineer. This system has been determined to meet the criteria for eligibility for reimbursement by the Federal Highway Administration for use on the national highway system under strict criteria utilized by that agency. A Trinity Highway Products, LLC representative is available for consultation if required.

**This Manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Trinity Highway Products at (888) 323-6374 or download from the website listed below.**

The instructions contained in this Manual supersede all previous information and Manuals. All information, illustrations, and specifications in this Manual are based on the latest ET-31™ Guardrail End Treatment information available to Trinity Highway Products at the time of printing. We reserve the right to make changes at any time. Please contact Trinity Highway Products to confirm that you are referring to the most current instructions.

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## **Customer Service Contacts**

Trinity Highway Products, LLC is committed to the highest level of customer service. Feedback regarding the ET-31™ Guardrail End Treatment, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below.

### **Trinity Highway Products:**

Telephone:	(888) 323-6374 (U.S. Calls) (214) 589-8140 (International Calls)
Fax:	(214) 589-8423
E-mail:	product.info@trin.net
Internet: Trinity Highway Products, LLC	<a href="http://www.highwayguardrail.com">http://www.highwayguardrail.com</a>

### **Regional Telephone Contacts:**

Dallas, Texas	(800) 527-6050
Centerville, Utah	(800) 772-7976
Elizabethtown, Kentucky	(800) 282-7668
Girard, Ohio	(800) 321-2755
Orangeburg, South Carolina	(800) 835-9307
International	+1 214-589-8140

## **Important Introductory Notes**

Proper assembly of the ET-31™ Guardrail End Treatment is essential to achieve performance of the system under appropriate federal and state criteria. These instructions should be read in their entirety and understood before assembling the ET-31™ Guardrail End Treatment. These instructions are to be used only in conjunction with the assembly of the ET-31™ Guardrail End Treatment and are for standard assemblies only as specified by the applicable highway authority. In the event your system assembly requires or involves deviation from standard parameters or, during the assembly process a question arises, please contact the appropriate highway authority that specified this system at this particular location for guidance. Trinity Highway Products is available for consultation with that agency. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. They are intended for the individual who is experienced and skilled in the assembly of highway products which are specified and selected by the highway authority.



**Important:** Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the ET-31™ Guardrail End Treatment. Failure to follow this warning can result in serious injury or death to workers and/or bystanders. It further compromises the acceptance of this system by the FHWA. Please have these instructions available for use and reference by anyone involved in the assembly of the product.



**Warning:** Ensure that all of the ET-31™ Guardrail End Treatment Warnings, Cautions, and Important Statements within the ET-31™ Guardrail End Treatment Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

## **Recommended Safety Rules ET-31™ Guardrail End Treatment**

### **\* Important Safety Instructions \***

This Manual must be kept in a location where it is readily available to persons who are skilled and experienced in the assembly, maintenance, or repair of the ET-31™ Guardrail End Treatment system. Additional copies of this Manual are immediately available from Trinity Highway Products by calling (888) 323-6374 or by email at [product.info@trin.net](mailto:product.info@trin.net). This Manual may also be downloaded directly from the websites indicated below. Please contact Trinity Highway Products if you have any questions concerning the information in this Manual or about the ET-31™ Guardrail End Treatment.

Always use appropriate safety precautions when operating power equipment and when moving heavy equipment or the ET-31™ Guardrail End Treatment components. Gloves, safety goggles, steel toe boots, and back protection should be used.

Safety measures incorporating traffic control devices specified by the highway authority must be used to provide safety for personnel while at the assembly, maintenance, or repair site.

## Safety Symbols

This section describes the safety symbols that appear in this ET-31™ Guardrail End Treatment Manual. Read the Manual for complete safety, assembly, operating, maintenance, repair, and service information.

<u>Symbol</u>	<u>Meaning</u>
---------------	----------------



**Safety Alert Symbol:** Indicates Danger, Warning, Important, or Caution. Failure to read and follow Danger, Warning, Safety, or Important Statement indicators could result in serious injury or death to workers and/or bystanders.

## Warnings and Cautions

Read all instructions before assembling, maintaining, or repairing the ET-31™ Guardrail End Treatment.



**Warning:** Do not assemble, maintain, or repair the ET-31™ Guardrail End Treatment until you have read this Manual thoroughly and completely understand it. Ensure that all Warnings, Cautions, and Important Statements within the Manual are completely followed. Please call Trinity Highway Products at (888) 323-6374 if you do not understand these instructions. Failure to follow this warning could result in serious injury or death.



**Warning:** Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site. Failure to follow this warning could result in serious injury or death.



**Warning:** Use only Trinity Highway Products parts that are specified herein for the ET-31™ Guardrail End Treatment for assembling, maintaining, or repairing the ET-31™ Guardrail End Treatment. **Do not utilize or otherwise comingle parts from other systems** even if those systems are other Trinity Highway Products systems. Such configurations have not been tested, nor have they been accepted for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.



**Warning:** Do NOT modify the ET-31™ Guardrail End Treatment in any way. Failure to follow this warning could result in serious injury or death.



**Warning:** Ensure that the ET-31™ Guardrail End Treatment and delineation used meet all federal, state, specifying agency, and local specifications. Failure to follow this warning could result in serious injury or death.



**Warning:** Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (MUTCD) and local standards. Failure to follow this warning could result in serious injury or death.



**Warning:** Be aware of hazards of using compressed air (small objects may become projectiles). Failure to follow this warning can result in serious injury or death to the workers and/or bystanders.



**Warning:** DO NOT perform assembly, maintenance, or repair, if the ET-31™ Guardrail End Treatment site, shoulder, or traveled area is covered or encroached by road debris. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Ensure that the entire work zone site is well lighted at all times. Failure to follow this warning could result in serious injury or death to the workers and/or bystanders.



**Warning:** Use caution when working near public roads. Be mindful of vehicles in motion nearby. Failure to follow this warning could result in serious injury or death to the workers and/or bystanders.



**Warning:** Safety measures, incorporating traffic control devices, must be used to protect all personnel, while at the assembly, maintenance, or repair site. Failure to follow this warning could result in serious injury or death to the workers and/or bystanders. Trinity Highway Products offers an economical and effective truck mounted attenuator, the MPS-350, for the protection of workers in work zones. For more information on the MPS-350, call (888) 323-6374 or visit the Trinity Highway Products website at [www.highwayguardrail.com](http://www.highwayguardrail.com).



**Warning:** Ensure that all guardrail products and delineation meet all federal, state or specifying agency, and local specifications. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** DO NOT place a Steel Yielding Treatment Post (SYTP™) at location No. 1. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** DO NOT place a Wood 6' 0" long Controlled Release Terminal (CRT) post at location No. 1. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** DO NOT bolt the Rail Panel in any fashion to the Post at location No. 1 in any of the ET-31™ Guardrail End Treatments. Doing so may impede the extrusion of the rail through the Head.

**Note:** The Head is attached to the No. 1 Post with an upper and lower 3/8" diameter fastener that has been shown to shear during impact within NCHRP 350 criteria.

Failure to follow this warning could result in serious injury or death in the event of a collision



**Warning:** Ensure that there is proper site grading for tube and post placement, as dictated by the state or specifying agency, pursuant to FHWA acceptance. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement for any posts. Surrounding posts with rigid pavement such as any thickness of concrete or asphalt will prevent post movement in the soil and is NOT allowed. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Ensure that all of the ET-31™ Guardrail End Treatment Warnings, Cautions, and Important Statements within the ET-31™ Guardrail End Treatment Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Always use safety precautions when performing assembly, maintenance or repair, mixing chemicals, and/or moving heavy equipment. Wear steel toe shoes, gloves, safety goggles, and back protection. Failure to follow this warning could result in serious injury or death to the workers and/or bystanders.



**Warning:** Ensure all Wood Blocks or Composite Blocks used with Steel Posts are routed to establish a fixed vertical orientation relative to the Posts. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Ensure that this assembly conforms with the guidance provided by the *AASHTO Roadside Design Guide*, including, but not limited to, those regarding placement on curbs or islands. Failure to follow this warning could result in serious injury or death in the event of a collision.



**Warning:** Any grout, backfill, or other materials (such as concrete, asphalt, or soil) must be low enough so as not to obstruct, constrain, or otherwise engage the Bearing Plate. Failure to eliminate the interaction of soil or materials with the Bearing Plate will hinder the performance of the ET-31™ Guardrail End Treatment and could result in serious injury or death in the event of a collision.



**Caution:** Ensure before assembling, maintaining, or repairing the ET-31™ Guardrail End Treatment that no parts are frayed, damaged, or broken. Failure to follow this warning could result in serious injury to the workers and/or bystanders.

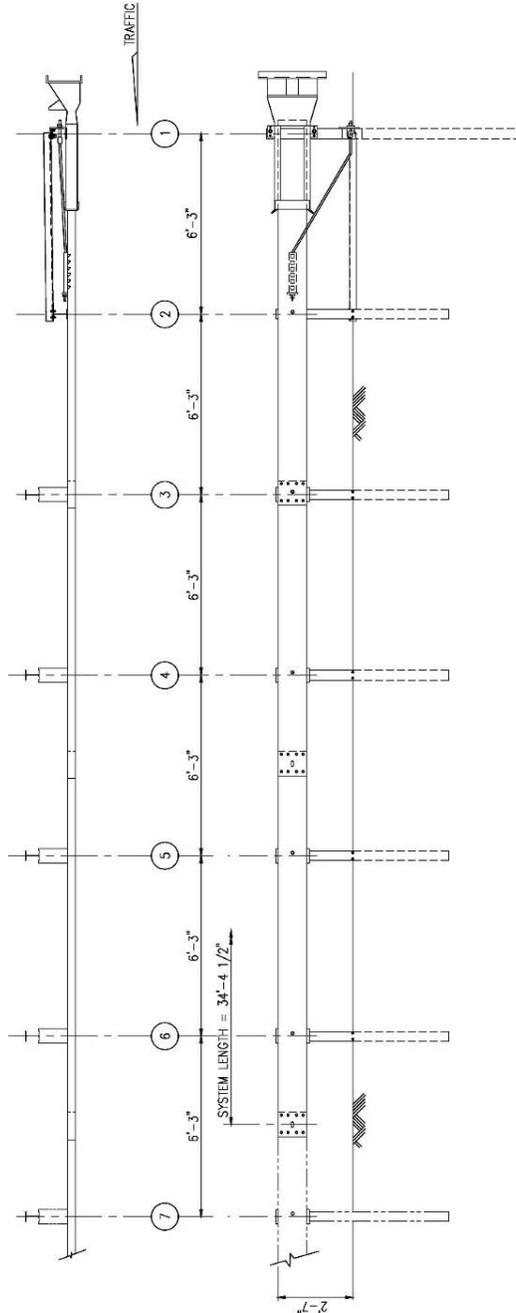


**Warning:** Do not place anything under the rail to post bolt head that would prevent the bolt from pulling through the Rail Panel. Failure to follow this warning could result in serious injury or death in the event of a collision.

# Know Your ET-31™ Guardrail End Treatment

## ET-31™ Guardrail End Treatment NCHRP Report 350 Test Level 3 System Length 34'-4 1/2" (10.48 m)

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity Highway Products standard layout drawings.



**Figure 1 (TL-3)**

[This drawing represents one version of the 34'-4 1/2" (10.48 m) system]

**Alternative Post Combinations**

**At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:**

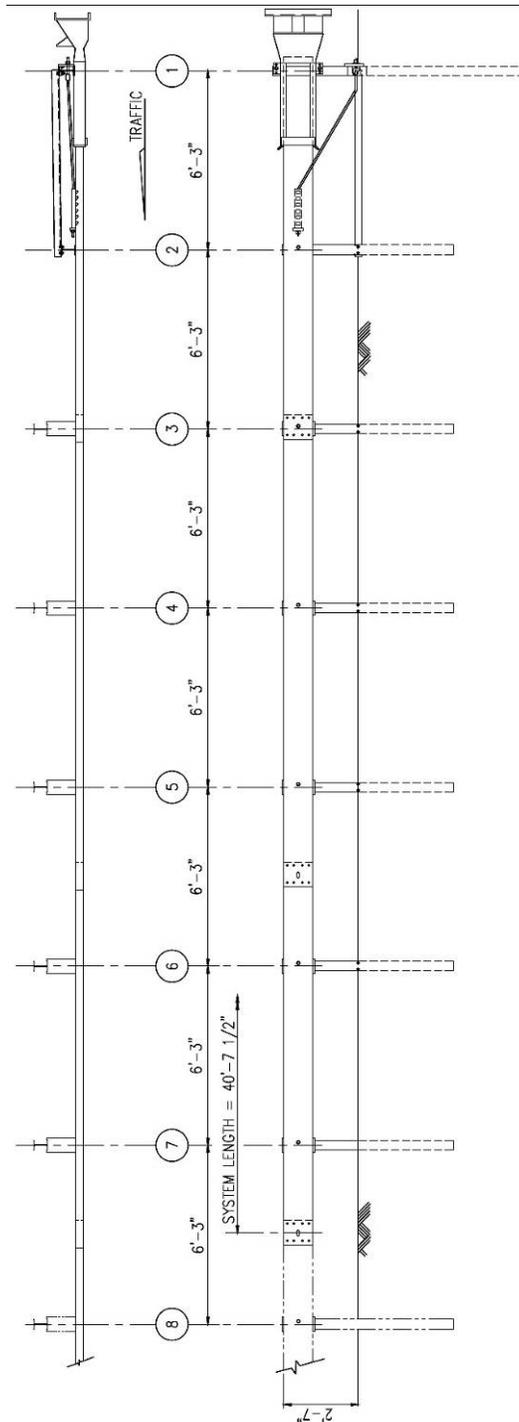
	<b>Post Location 1</b>	<b>Post Location 2</b>
<b>Option 1</b>	HBA Post	Short Foundation Tube with SYT Post Insert
<b>Option 2</b>	Long Foundation Tube with Wood Post insert	6' SYTP or short Foundation Tube with SYT Post Insert
<b>Option 3</b>	Long foundation Tube with Wood Post Inserts	Long foundation Tube with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tube with Soil Plate and Wood Post Inserts	Short Foundation Tube with Soil Plate and Wood Inserts
<b>Option 5</b>	Long Foundation Tube with Wood Post Inserts or Short Foundation Tube with Soil Plate and Wood Post Inserts	6' SYTP or Short Foundation Tube with SYT Post Insert

**For post locations 3 through 6, alternates to 6' SYT posts are:**

- All Short Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post Insert
- Any combination of above options, as accepted by the FHWA and dictated by the state or specifying agency

**ET-31™ Guardrail End Treatment  
NCHRP Report 350 Test Level 3  
System Length 40'-7 1/2" (12.35 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity Highway Products standard layout drawings.



**Figure 2 (TL-3)**

[This drawing represents one version of the 40'-7 1/2" (12.38 m) system]

**Alternative Post and Rail Panel Combinations**

**At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:**

	<b>Post Location 1</b>	<b>Post Location 2</b>
<b>Option 1</b>	HBA Post	Short Foundation Tube with SYT Post insert
<b>Option 2</b>	Long Foundation Tube with Wood Post insert	6' SYTP or short foundation Tube with SYT Post insert
<b>Option 3</b>	Long Foundation Tube with Wood Post Inserts	Long foundation Tube with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tube with soil plates and Wood Post Inserts	Short Foundation Tube with soil plates and Wood Inserts
<b>Option 5</b>	Long foundation Tube with soil Post insert or Short Foundation Tube with soil plate and Wood Post Inserts	6' SYTP or Short Foundation Tube with SYT Post insert

**For Post locations 3 through 6, alternates to 6' SYT Posts are:**

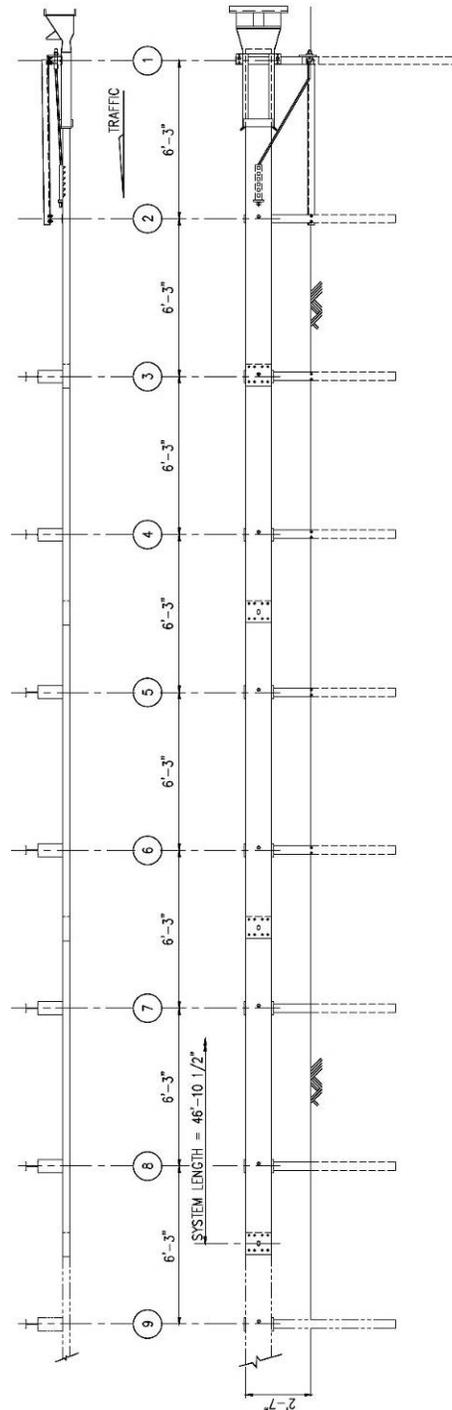
- All Short Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post insert
- Any combination of above options as accepted by the FHWA and dictated by the state or specifying agency

**For Post location 7:**

- Steel or Wood line Post dictated by the state or specifying agency

**ET-31™ Guardrail End Treatment**  
**NCHRP Report 350 Test Level 3**  
**System Length 46'-10 1/2" (14.29 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity standard layout drawings.



**Figure 3 (TL-3)**

[This drawing represents one version of the 46'-10 1/2" (14.29 m) system]

**Alternative Post and Rail Panel Combinations**

**At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:**

	<b>Post Location 1</b>	<b>Post Location 2</b>
<b>Option 1</b>	HBA Post	Short Foundation Tube with SYT Post insert
<b>Option 2</b>	Long Foundation Tube with Wood Post Insert	6' SYTP or Short Foundation Tube with SYT Post Insert
<b>Option 3</b>	Long Foundation Tube with Wood Post Inserts	Long foundation Tube with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tube with soil plates and Wood Post Inserts	Short Foundation Tube with Soil Plates and Wood Post Inserts
<b>Option 5</b>	Long Foundation Tube with Wood Post Inserts or Short Foundation Tube with Soil Plates and Wood Post Inserts	6' SYTP or Short Foundation Tube with SYT Post Insert

The alternate to two 12' 6" (3.81 m) long rail elements is one 25' 0" (7.62 m) long rail element.

**For Post locations 3 through 6, alternates to 6' SYT Posts are:**

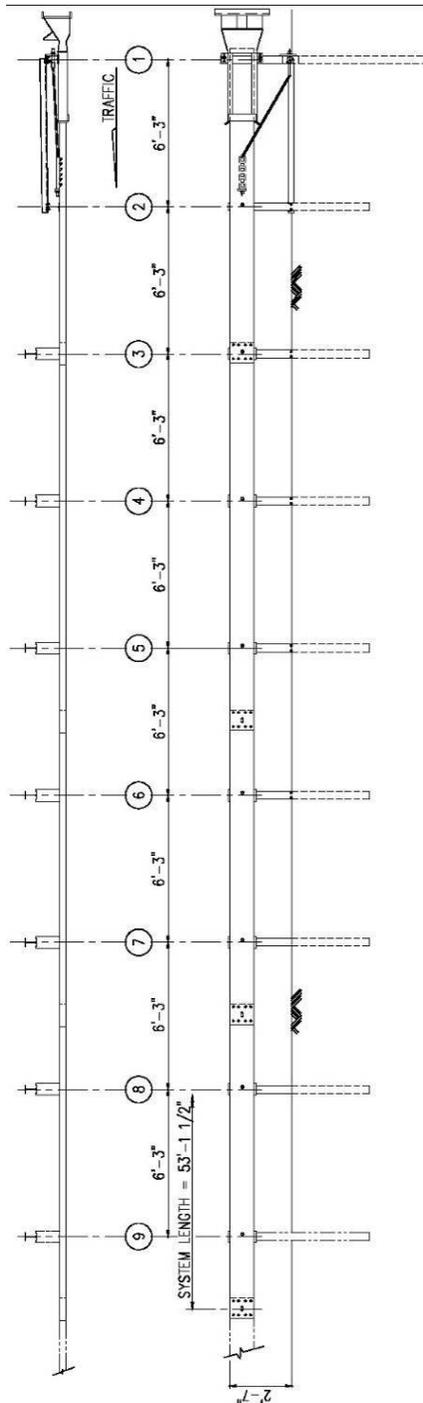
- All Short Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post insert
- Any combination of above options, as accepted by the FHWA and dictated by the state or specifying agency

**For Post location 7 and 8:**

- Steel or Wood line Post dictated by the state or specifying agency

**ET-31™ Guardrail End Treatment  
NCHRP Report 350 Test Level 3  
System Length 53'-1 1/2" (16.19 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity standard layout drawings.



**Figure 4 (TL-3)**

[This drawing represents one version of the 53'-1 1/2" (16.19 m) system]

## Alternative Post and Rail Panel Combinations

At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:

	Post Location 1	Post Location 2
<b>Option 1</b>	HBA Post	Short Foundation Tube with SYT Post insert
<b>Option 2</b>	Long Foundation Tube with Wood Post insert	6' SYTP or Short Foundation Tube with SYT Post Insert
<b>Option 3</b>	Long Foundation Tubes with Wood Post Inserts	Long foundation Tubes with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tubes with Soil Plates and Wood Post Inserts	Short Foundation Tubes with Soil Plates and Wood Post Inserts
<b>Option 5</b>	Long Foundation Tube with Wood Post Inserts or Short Foundation Tube with Soil Plates and Wood Post Inserts	6' SYTP or Short Foundation Tube with SYT Post Insert

The alternate to two 12' 6" (3.81 m) long Rail Panel elements is one 25' 0" (7.62 m) long Rail Panel element.

### For Post locations 3 through 6, alternates to 6' SYT Posts are:

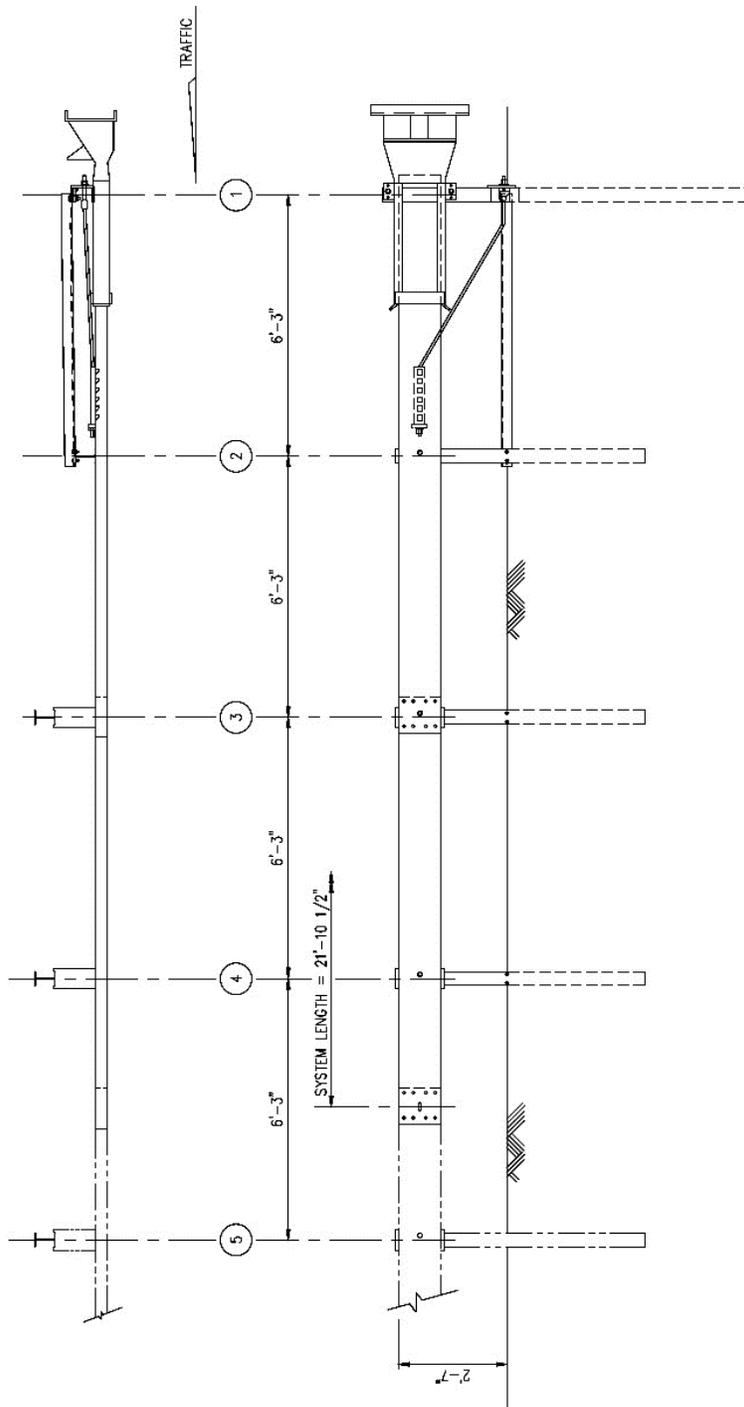
- All Short Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post Insert
- Any combination of above options, as accepted by the FHWA and dictated by the state or specifying agency

### For Post location 7 through 9:

- Steel or Wood line Post dictated by the state or specifying agency

**ET-31™ Guardrail End Treatment  
NCHRP Report 350 Test Level 2  
System Length 21'-10 1/2" (6.68 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity Highway Products standard layout drawings.



**Figure 5 (TL-2)**

[This drawing represents one version of the 21'-10 1/2" (6.68 m) system]

**Alternative Post Combinations**

**At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:**

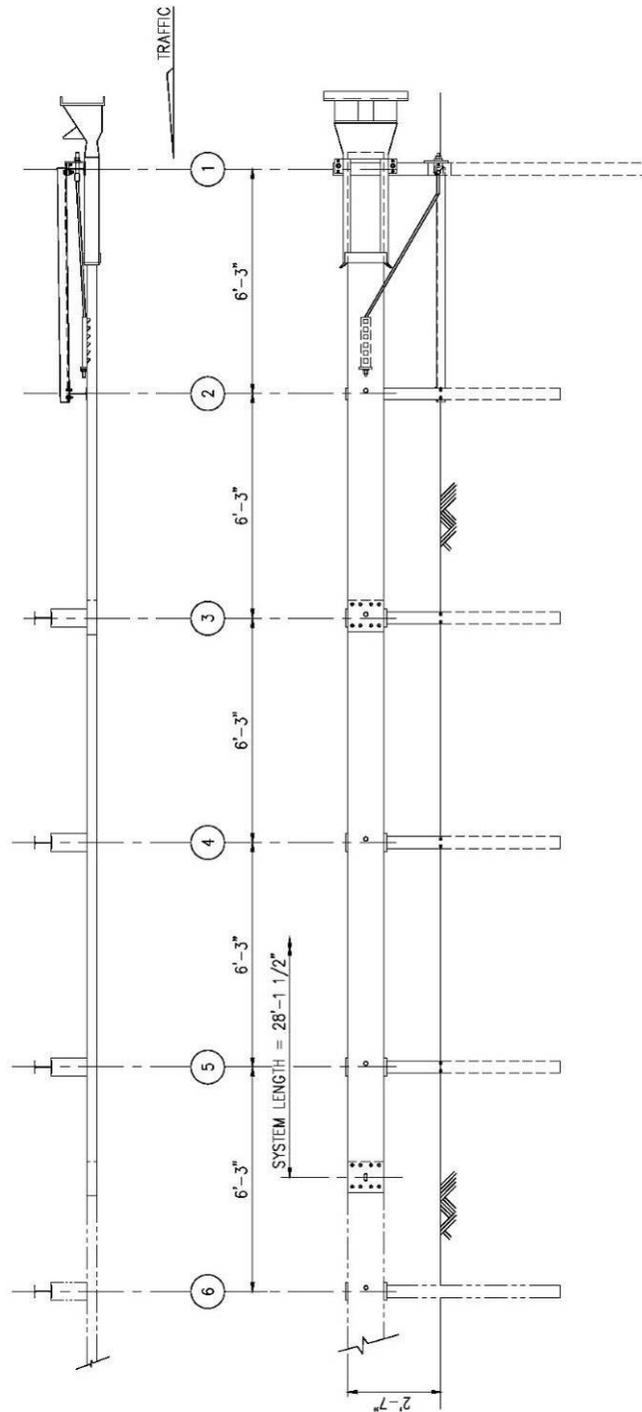
	<b>Post Location 1</b>	<b>Post Location 2</b>
<b>Option 1</b>	HBA Post	Short Foundation tube with SYT Post Insert
<b>Option 2</b>	Long Foundation Tube with Wood Post Insert	6' SYTP or Short Foundation Tube with SYT Post Insert
<b>Option 3</b>	Long Foundation Tubes with Wood Post Inserts	Long Foundation Tubes with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tubes with Soil Plates and Wood Post Inserts	Short Foundation Tubes with Soil Plates and Wood Post Inserts
<b>Option 5</b>	Long Foundation Tube with Wood Post Inserts or Short Foundation Tube with Soil Plates and Wood Post Inserts	6' SYTP or Short Foundation Tube with SYT Post Insert

**For Post locations 3 and 4, alternates to 6' SYT Posts are:**

- All Short Foundation Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post Insert
- Any combination of above options, as accepted by the FHWA and dictated by the state or specifying agency

**ET-31™ Guardrail End Treatment  
NCHRP Report 350 Test Level 2  
System Length 28'-1 1/2" (8.57 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity Highway Products standard layout drawings.



**Figure 6 (TL-2)**

[This drawing represents one version of the 28'-1 1/2" (8.57 m) system]

**Alternative Post Combinations**

**At Post locations 1 and 2, the alternates to HBA Post at location 1 and 6' Steel Yielding Treatment Post (SYTP) at location 2 are:**

	<b>Post Location 1</b>	<b>Post Location 2</b>
<b>Option 1</b>	HBA Post	Short Foundation Tube with SYT Post Insert
<b>Option 2</b>	Long Foundation Tube with Wood Post Insert	6' SYTP or short Foundation Tube with SYT Post Insert
<b>Option 3</b>	Long Foundation Tubes with Wood Post Inserts	Long Foundation Tubes with Wood Post Inserts
<b>Option 4</b>	Short Foundation Tubes with soil plates and Wood Post Inserts	Short Foundation Tubes with Soil Plates and Wood Post Inserts
<b>Option 5</b>	Long Foundation Tube with Wood Post Inserts or Short Foundation Tube with Soil Plates and Wood Post Inserts	6' SYTP or short Foundation Tube with SYT Post Insert

**For Post locations 3 and 4, alternates to 6' SYT Posts are:**

- All Short Foundation Tubes with Wood Post Inserts
- All 6' Wood CRT Posts
- All Short Foundation Tubes with SYT Post Insert
- Any combination of above options, as accepted by the FHWA and dictated by the state or specifying agency

**For Post locations 5:**

- Steel or Wood line Post dictated by the state or specifying agency

## Bill of Materials English (Metric)



**Warning:** Use only Trinity Highway Products parts that are specified herein for the ET-31™ Guardrail End Treatment for assembling, maintaining, or repairing the ET-31™ Guardrail End Treatment. Do not utilize or otherwise comingle parts from other systems even if those systems are other Trinity Highway Products systems. Such configurations have not been tested, nor have they been accepted for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNACCEPTED system.

### **ET-31™ Guardrail End Treatment**

(For specific materials and quantities, see state or specifying agency's options and Trinity standard layout drawings)

PN	Description
11G	12/12.5'3'-1.5"/S (2.67/3.81/0.952/S) (Guardrail)
32G	12/12.5"/6' 3"/S (2.67/3.81/1.905/S) ANC (Guardrail)
60G	12/25'6' 3"/S (2.67/7.62/1.905/S) (Guardrail)
704A	Cable Anchor Bracket (unique to ET systems), with welded ears
705G	Pipe Sleeve - 2" STD Pipe x 51/2" (50 STD Pipe x 150 Pipe)
740G	6" x 8" x 4' 6" x 3/16 (152 x 203 x 1375 x 4.8) Tube Sleeve
749G	6" x 8" x 6' 0" x 3/16 (152 x 203 x 1830 x 4.8) Tube Sleeve (Alternate to using 740G and 766G)
758G	6" x 8" x 3'10"x 3/16" (252 x 203 x 1168 x 4.8) Tube Sleeve
766G	18" x 24" x 1/4" (460 x 610 x 16) Soil Plate
782G	8" x 8" x 5/8" (200 x 200 x 16) Bearing Plate ( <b>For Wood Post</b> )
995A	ET-PLUS™ Extruder (Head)
3000G	Cable (Assembly) 3/4" x 6' 6" (19 x 1981)
3300G	5/8" (16) Round Washer
3340G	5/8" (16) HGR Nut
3391G	5/8" DIA. x 1 3/4" (16 DIA. x 45) Hex Head Bolt (High Strength)
3360G	5/8" DIA. X 1 1/4" (16 DIA. x 35) Splice Bolt (HGR)
3478G	5/8" DIA. x 7 1/2" (16 DIA. x 190) Hex Head Bolt
3497G	5/8" DIA. x 9 1/2" (16 DIA. x 240) Hex Head Bolt
3500G	5/8" DIA. x 10" (16 DIA. x 255) HGR Post Bolt
3580G	5/8" DIA. x 18" (16 DIA. x 460) HGR Post Bolt
3620G	5/8" DIA. x 22" (16 DIA. x 560) HGR Post Bolt
3700G	3/4" (19) Washer (F844)
3701G	3/4" (19) Washer (F436)
3704G	3/4" (19) Hex Nut
3717G	3/4" x 2 1/2" (19 x 75) Hex Head Bolt (High Strength)
3718G	3/4" x 3" (19 x 75) Hex Head Bolt (High Strength)
3900G	1" (25) Round Washer
3910G	1" (25) Hex Nut
4071B	Wood Post 6" x 8" x 6' 0" (150 x 200 x 1830) CRT

4075B	Wood Block 6" x 8" x 14" (150 x 200 x 355) DR
4076B	Wood Block 6" x 8" x 14" (150 x 200 x 355) DR Routed
4140B	Wood Post 5 1/2" x 7 1/2" x 4'-0 1/4" (140 x 190 x 1225)
4161B	HDPE spacer (SYTP™)
4228B	3/8" x 4" (10 x 100) Lag Screw
4254G	3/8" (10) Round Washer
4255G	3/8" (10) Fender Washer 1 1/2" OD (38)
4258G	3/8" (10) Lock Washer
4261G	3/8" DIA. X 1 1/2" (10 x 38) Hex Head Bolt (Grade 5)
4389G	7/16" (11) Round Washer
4390G	7/16" DIA. x 1 1/2" (11 x 38) GR. 5 Hex Head Bolt
4393G	7/16" (11) Lock Washer
4396G	7/16" (11) Hex Nut
4660B	Wood Block 6" x 12 3/8" x 14" (150 x 315 x 350) Routed
4699G	3/4" (19) Lock Washer
5148G	3/4" DIA. X 9 1/2" (19 DIA. x 240) Hex Head Bolt (High Strength)
5978B	Polymer Block 4 x 12 x 14 (100 x 305 x 350)
6120G	Wood Block 6" x 12" x 14" (150 x 305 x 350)
6321G	3/8" x 2' (10 x 50) Hex Head Bolt (Grade 5)
6405G	3/8" (10) Hex Nut
6907B	Polymer Block 4" x 7 1/2" x 14" (100 x 187 x 350) [King Block]
10967G	12/9'4.5/3'1.5/S (2.67/2.85/0.952/S) (Guardrail)
14328G	3' 9 7/8" Steel Yielding Treatment Post (SYTP™)
15000G	6' Steel Yielding Treatment Post™ (SYTP™)
19258A	8" x 8" x 5/8" (200 x 200 x 16) Bearing Plate With Two Ears/Tabs <b>(For HBA Post)</b>
19948G	1 3/4" x 10 GA x 1 3/4" (44 x 3 x 44) Plate Washer
20442G	12/15'7.5/3'1.5:2@6'3/S (2.67/4.76/.952:2@1.905/S) (Guardrail)
49398A	ET HBA™ Post #1 Top
33873A	ET HBA™ Post #1 Bottom
9852A	Strut (and Yoke Assembly)
32922G	6' 6" (1980) Angle Strut HBA™ / SYTP™ / Wood
33875G	6' 6" (1980) Angle Strut ET HBA™ (6'-3 C/C Slots)
33795G	6' 6" (1980) Angle Strut HBA™ / SYTP™
33730G	6' 7 1/2" (2020) Angle Strut SYTP™ / Wood
33847G	6' 9 1/8" (2060) Angle Strut SYTP™ / CRP

### Delineation Options

PN	Description
6206B	Right Side 13" x 27 1/2" (325 x 700) Reflective Sheeting Amber
6207B	Left Side 13" x 27 1/2" (325 x 700) Reflective Sheeting Amber
6668B	Either Side 12" x 12" (305 x 305) Reflective Sheeting (Typically 2 required) Amber
3534B	Either Side 12" x 12" (305 x 305) Reflective Sheeting (Typically 2 required) Silver

# **Assembling the ET-31™ Guardrail End Treatment**

## **Materials**

As packaged, the NCHRP Report 350 ET-31™ Guardrail End Treatment includes all materials needed for a complete assembly. The pay limit will include a 34' 4.5" (10.48 m) system, 40' 7.5" (12.38 m) system, 46' 10.5" (14.29 m) system, or 53' 1.5" (16.19 m) system for TL-3 or 21' 10.5" (6.68 m) or 28' 1.5" (8.57 m) system for TL-2, unless otherwise specified in the contract plans.

**Note:** Concrete footings or foundations are not required.

## **Recommended Tools**

- 9/16" (14 mm) Socket or wrench
- 15/16" (24 mm) Socket or wrench
- 1 1/4" (32 mm) Socket or wrench
- 1 1/2" (38 mm) Socket or wrench
- Augers
- Post pounders (commonly used in driving Posts)
- Locking pliers
- Tape measure

## **Recommend Tools for Repair**

- Acetylene torch to cut off extruded rail
- Heavy-duty chain to remove the ET-PLUS™ Extruder (Head)
- Locking pliers or Channel Lock pliers
- Sledge hammer
- Post removal tool and other normal guardrail tools
- Eye bolts connected to heavy duty chain (to remove the Posts from Tubes)
- Vehicle to pull the Extruder (Head) from the damaged rail

**Note:** The above list(s) of tools is a general recommendation. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority, additional or fewer tools may be required. Decisions as to what tools are needed to perform the job are entirely within the discretion of the specifying highway authority, and the authority's selected contractor performing the assembly of the system at the authority's specified site. It is the province of the engineer working under the authority of the local highway authority that owns and has specified this product as to whether or not they wish to use the Extruder (Head) again after impact. Trinity makes no recommendation in this regard.

## **Site Preparation**

When the Guardrail is placed in-line with edge of the shoulder (without any offset), a 25:1 or flatter straight flare over the length of the systems can be used to position the ET-PLUS™ Extruder (Head) further away from the edge of the shoulder. Site grading may be necessary for assemblies beyond the edge of the shoulder for the proper placement of the steel tubes and the CRT Posts. Use the state or specifying agency's standard specifications and drawings for the site grading. Trinity does not direct grading. Complete all grading before the start of the assembly of the ET-31™ Guardrail End Treatment. See *Assembly of the ET-31™ Guardrail End Treatment on a Curve* section for the layout of the ET-31™ Guardrail End Treatment on a curve on Page 24.

If the system is deployed on a curve, see *Assembly of the ET-31™ Guardrail End Treatment on a Curve* section on Page 24. When placing the ET-31™ Guardrail End Treatment outside or inside the curve, the ET-31™ Guardrail End Treatment must be straight over the length of the system. If there are special field conditions encountered when assembling the ET-31™ Guardrail End Treatment, contact the state or specifying agency's engineer. Trinity Highway Products LLC, at (888) 323-6374, is available for consultation with that agency.

## Post Placed in Rigid Material

Provide the proper leaveout (the specified area of open space in the pavement) around a Post when assembling the Post in any thickness of concrete or asphalt. The top surfaces of any grout or other backfill placed in the rigid material leaveout **MUST be low enough** so that it does not restrict smooth release of the Anchor Cable Bearing Plate at Post 1 or otherwise obstruct or constrain the 3/8" shear bolts or the 3/4" hinge bolts of the HBA Post. The assembly shall not impede in any fashion the hinging-action or release mechanism of the No. 1 HBA post by burying it in rigid material (asphalt, concrete, rigid soil, etc.)

For leaveout information, please consult the applicable state or specifying agency. Additional source of leaveout information or details can be found in the U.S. Department of Transportation, Federal Highway Administration, Memorandum B 64-B, dated 3/10/04. Trinity can provide this FHWA memo upon request.

## Assembling the ET-31™ Guardrail End Treatment on a Curve

When the ET-31™ Guardrail End Treatment is placed on a curve, use the following layouts. All offsets are measured to the face of the rail. Under no circumstances shall the guardrail within the ET-31™ Guardrail End Treatment pay limit be curved.

- Outside the curve: With the line guardrail placed parallel to the curve, the Treatment end is offset from the curve a distance equal to the line guardrail offset plus the value in Table 1. Consult state or specifying agency drawings for details.
- Inside the curve (radius greater than 1000 feet): With the line guardrail placed parallel to the curve, the Treatment end is offset from the curve a distance equal to the line guardrail offset plus the value in Table 1. Consult state or specifying agency drawings for details.
- Inside the curve (radius 1000 feet or less): With the line guardrail placed parallel to the curve, the Treatment end is offset from the curve a distance equal to the line guardrail offset plus one foot maximum in Table 1. Consult state or specifying agency drawings for details.

**Table 1**

ET-31™ Length	Outside the Curve Max Offset	Inside the Curve With a Radius Greater Than 1000 Feet Max Offset	Inside the Curve With a Radius 1000 Feet or Less Max Offset
53' 1.5"	24 Inches	24 Inches	12 Inches
46' 10.5"	18 Inches	18 Inches	12 Inches
40' 7.5"	18 Inches	18 Inches	12 Inches
34' 4.5"	12 Inches	12 Inches	12 Inches
28'-1 1/2"	12 Inches	12 Inches	12 Inches
21'-10 1/2"	12 Inches	12 Inches	9 Inches

## Assembling the Posts

Complete the following steps when assembling HBA™ Posts, Steel Yielding Treatment Posts™ (SYTP™), foundation tube with wood Posts and wood CRT Posts. For non-breakaway posts, follow the agency's assembly instructions. For placing posts in rigid pavement, also see the Post Assembled in Rigid Material section.

### **Assembling HBA™ Post**

#### **Assembling HBA™ Bottom Post – Post Location 1**

Complete the following steps to assemble the HBA™ Bottom Post:

Step	Actions
1.	Arrange the HBA™ bottom (PN-33873A) posts so that the large hole (13/16" [21 mm]) is placed downstream (away from the impact end of the system).
2.	Select Option A or Option B for this assembly.
Option A	Drive the HBA™ Bottom Post with an approved driving head to a depth of approximately 72" (1830 mm).
Option B	<ol style="list-style-type: none"><li>1. Drill a 12" (300 mm) maximum diameter pilot hole approximately 72" (1830 mm) deep.</li><li>2. Insert the bottom HBA™ Post in the hole.</li><li>3. Backfill the holes with compactable materials in 6" (150 mm) lifts and compact with pneumatic equipment to optimum compaction.</li></ol> <p><b>Note:</b> In either option, the optimum depth will have the 13/16" (21 mm) hole in the post plates (ears/tabs) even with the finished grade.</p>

## Assembling HBA™ Top Post

Complete the following steps to assemble the HBA™ Top Post, after the Bottom Post has been assembled:

Step	Actions
1.	Place the Top Post (PN-49398A) at Post 1, by aligning the holes of the post plates (ears) on the top and bottom posts. <b>Note:</b> The Top Post's post plates (ears) can be attached on either side of the Bottom Post's post plates (ears).
2.	Insert a 3/8" (10 mm) diameter x 2" (50 mm) hex head high strength bolt (PN-6321G) through the 7/16" (11 mm) holes of the post plates (ears) on the Top and Bottom Posts.
3.	Place a 3/8" (10 mm) washer (PN-4252G) and a 3/8" (10 mm) lock washer (PN-4258G) under a 3/8" (10 mm) hex nut (PN-6405G) on the inserted bolts to secure. <b>Note:</b> The bolts can be assembled so the nuts are on the inside or outside of the post plates (ears).
4.	Tighten the nuts to a snug position. The designer does not recommend a torque requirement for the HBA field assembly.
5.	Insert a 3/4" (19 mm) diameter x 2 1/2" (63 mm) hex head high strength bolt (PN-5148G) in the 13/16" (21 mm) hole of the HBA™ Post 1 post plates on the side opposite the strut. Do not assemble the 3/4" (19 mm) bolt on the strut side of Post 1, until the strut is ready to be assembled. <b>Note:</b> The bolts can be assembled so the nuts are on the inside or outside of the post plates (ears).
6.	Place a 3/4" (19 mm) washer (PN-3701G) and a 3/4" (19 mm) lock washer (PN-4699G) under a 3/4" (19 mm) hex nut on the inserted bolt to secure.
7.	Tighten the nuts to a snug position. The designer does not recommend a torque requirement for the HBA field assembly.

## Assembling the Steel Yielding Treatment Post™ (SYTP™)

The SYTP™ can be driven or assembled in a tube. For SYTP™ assembly in a tube, see the *Assembling the SYTP™ in Tubes* section. The SYTP™ can be assembled at all locations EXCEPT at location 1. Complete the following step to assemble the SYTP™:



**Warning:** Do NOT assemble SYTP™ at location 1. Failure to follow this warning could result in serious injury or death in the event of a collision.

### Placing the 6' (1.83 m) SYTP™

Step	Actions
1.	Drive all the 6' 0" SYTP™ (PN-15000G) to the optimum depth where the centers of the four yielding holes through the flange are at the ground line.
	<b>Warning:</b> DO NOT assemble SYTP™ at location 1. Failure to follow this warning could result in serious injury or death in the event of a collision.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Assembling Foundation Tubes

Complete the following steps to assemble foundation tubes.

### **6' 0" Foundation Tube (Post locations 1 and/or 2)**

Step	Actions
1.	Assemble a 5/8" x 7 1/2" (16 mm x 190 mm) hex head bolt (PN-3478G) and 5/8" (16 mm) HGR nut (PN-3340G) in the Foundation Tube (PN-749G) as a post stop. Use 2 bolts when the SYTP is assembled. Use 1 bolt when a Wood Post is assembled. <b>Note:</b> Do not over tighten the nuts and deform the tubes as this will complicate post replacement.
2.	The foundation tube can be assembled by driving or with a pilot hole. See <i>For Driven Foundation Tube Assembling</i> or <i>For Pilot Hole Foundation Tube Assembly</i> sections for assembly instructions.
3.	Assemble the foundation tubes at locations 1 and 2. Use the strut as a guide for the spacing of the tubes. <b>Note:</b> Do not drive Tubes with the Wood Post inserted; this will complicate post replacement.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

### **4' 6" Foundation Tube with Soil Plate (Post locations 1 and/or 2)**

Step	Actions
1.	Bolt the Soil Plate (PN-766G) to the Foundation Tube (PN-740G) with two 5/8" x 7 1/2" (16 mm x 190 mm) hex head bolts (PN-3478G) and 5/8" (16 mm) HGR nuts (PN-3340G) (no washers). <b>Note:</b> Do not over tighten the nuts and deform the tubes; this will complicate post replacement.
2.	The foundation tube can be placed by driving or with a pilot hole. See <i>For Driven Foundation Tube Assembly</i> or <i>For Pilot Hole Foundation Tube Assembly</i> sections for assembly instructions.
3.	Assemble the foundation tubes at locations 1 and 2. Use the strut as a guide for the spacing of the tubes. If the Soil Plate is utilized, position it on the downstream side of the post (away from the Impact Head). <b>Note:</b> Do not drive Tubes with the Wood Post inserted; this will complicate post replacement.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

### 4' 6" Foundation Tube (Post locations 2 - 6, per state specifications):

Step	Actions
1.	Assemble a 5/8" x 7 1/2" (16 mm x 190 mm) hex head bolt (PN-3478G) and 5/8" (16 mm) HGR nut (PN-3340G) in the Foundation Tube (PN-749G) as a post stop. Use 2 bolts where the SYTP is placed. Use 1 bolt when a wood post is attached. <b>Note:</b> Do not over tighten the nuts and deform the tubes as this will complicate post replacement.
2.	The foundation tube can be assembled by driving or with a pilot hole. See <i>For Driven Foundation Tube Assembly</i> or <i>For Pilot Hole Foundation Tube Assembly</i> sections for Assembly instructions.
3.	Assemble the foundation tubes. Use the strut as a guide for the spacing of the tube at location 2. <b>Note:</b> Do not drive tubes with the wood post inserted; this will complicate post replacement.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts placed in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

### 3' 10" Foundation Tube (Post locations 2 - 6, per state specifications):

Step	Actions
1.	Assemble a 5/8" x 7 1/2" (16 mm x 190 mm) hex head bolt (PN-3478G) and 5/8" (16 mm) HGR nut (PN-3340G) in the Foundation Tube (PN-758G) as a post stop. Use 2 bolts where the SYTP is deployed. Use 1 bolt when a wood post is deployed. <b>Note:</b> Do not over tighten the nuts and deform the tubes as this will complicate post replacement.
2.	The foundation tube can be assembled by driving or with a pilot hole. See <i>For Driven Foundation Tube Assembly</i> or <i>For Pilot Hole Foundation Tube Assembly</i> sections for Assembly instructions.
3.	Assemble the foundation tubes. Use the strut as a guide for the spacing of the tube at location 2. <b>Note:</b> Do not drive Tubes with the Wood Post inserted; this will complicate post replacement.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the Posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts placed in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Assembly Options for Foundation Tubes

Complete the following steps to place foundation tubes.

### For Driven Foundation Tube Assembly

Step	Actions
1.	Drive the foundation tubes (with an appropriate driving head) to the optimum depth, where the top of the tube is 2 5/8" (67 mm) above the finished grade. <b>Note:</b> Take extra care to prevent settlement or lateral displacement of the tubes, to ensure the posts attach to the guardrail, correctly.
2.	Ensure that the finished guardrail height will be approximately 31" (787 mm) above the finished grade, or as the state or specifying agency plans indicate.
3.	Ensure that the tubes do not project more than 4" (100 mm) above the finished grade.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts placed in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

### For Pilot Hole Foundation Tube Assembly

Step	Actions
1.	Drill a 12" (300 mm) maximum diameter pilot hole approximately 49" (1245 mm) deep for the 3' 10" (1168 mm) long foundation tube, 57" (1450 mm) deep for the 4' 6" (1370 mm) long foundation tube or 75" (1905 mm) for the 6' 0" (1830 mm) long foundation tube. If the foundation tube has a soil plate, use Option A or B with this step.
Option A	Cut slots for the soil plates out by hand or by using a rock bar and then follow all of the steps of Option A for 4' 6" tube with soil plate, above.
Option B	Drill three adjacent 12" (300 mm) maximum diameter holes or one 24" (610 mm) maximum diameter hole to accommodate the soil plate / tube assembly and then follow all of the steps of Option A for 4' 6" tube with soil plate, above. <b>Note:</b> Take extra care to prevent settlement or lateral displacement of the tubes, to ensure the posts attach to the guardrail correctly.
	<b>Warning:</b> Ensure that the proper leaveout (specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts placed in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.
2.	Backfill the hole with compactable materials in 6" (150 mm) lifts and compact with pneumatic equipment to optimum compaction.
3.	Ensure that the finished guardrail height will be approximately 31" (787 mm) above the finished grade, or as the state or specifying agency plans indicate.
4.	Ensure that the tubes do not project more than 4" (100 mm) above the finished grade.

## Assembling the SYTP™ in Tubes (Post Locations 2 through 6)

Step	Actions
1.	Attach the 3' 9 7/8" (1.16 m) SYTP™ (PN-14328G) in tubes.
	<b>Warning:</b> DO NOT assemble SYTP™ at location 1. Failure to follow this warning could result in serious injury or death in the event of a collision.
	<b>Warning:</b> Ensure that the proper leave out (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.
2.	Follow the instructions in the <i>Assembling the Strut</i> section, Step 5.
3.	Except at Post 1, assemble the SYTP™ in a tube at locations required for the system with the four yielding holes (through the flange) at the top of the tube.
4.	From the embankment side of the tube, insert a 5/8" x 9 1/2" (16 mm x 240 mm) hex head bolt (PN-3497G) through the tube, the spacer (PN-4161), and the SYTP™
5.	Place a 5/8" (16 mm) HGR nut (PN-3340G) on the inserted bolt, to secure the SYTP™ to the tube. <b>Note:</b> Do not over tighten the nut and deform the tubes; this will complicate post replacement.

## Assembling Wood Posts in Tubes

Complete the following steps to assemble wood posts in tubes:

Step	Actions
1.	Insert Pipe Sleeve (PN-705G) in post (PN-4140B) and assemble the wood post in the steel tube at location 1.
2.	Assemble Wood Post(s) (PN-4140B) in tubes at locations required for the system, as dictated by the state or specifying agency.
3.	Insert a 5/8" x 9 1/2" (16 mm x 240 mm) hex head bolt (PN-3497G) through the Foundation Tube and the Wood Post at all locations EXCEPT locations 1 and 2. <b>Note:</b> The bolt must be assembled from the embankment side, to aid in possible post replacement.
4.	Place a 5/8" (16 mm) HGR nut (PN-3340G) on the end of the inserted bolt.
5.	Tighten the nuts to a snug position. <b>Note:</b> Do not over tighten the bolts and deform the tubes; this will complicate post replacement.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Assembling Wood CRT Posts

Complete the following steps to assemble the wood CRT posts:

Step	Actions
1.	Assemble the Wood Posts (PN-4071B) at locations required for the system, spaced at 6' 3" (1270 mm) apart. Select Option A or Option B to place the CRT posts.
Option A	Drive posts into the ground.
Option B	<ol style="list-style-type: none"> <li>1. Drill 12" (300 mm) maximum diameter pilot holes approximately 44" (1120 mm) deep.</li> <li>2. Insert the 6' 0" (1830 mm) Wood Posts into these holes.</li> <li>3. Backfill the holes with compactable materials in 6" (150 mm) lifts and compact with pneumatic equipment to optimum compaction.</li> </ol>
	<b>Note:</b> In either option within Step 1, the bottom of the upper 3 1/2" (90 mm) hole in the post is approximately at the finished grade.
	<b>Warning:</b> DO NOT assemble 6' 0" CRT post at location 1 and 2. Failure to follow this warning could result in serious injury or death in the event of a collision.
	<b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Assembling Foundation Tubes, HBA™ Posts, or SYTP™ when Encountering Rock

Complete the following steps to assemble foundation tubes, HBA™ posts or SYTP™ when encountering rock:

Step	Actions
1	Select Option A or Option B below when encountering rock, unless there is a more restrictive state or specifying agency specification.
Option A	If rock is encountered and 20 inches (510 mm) or less of the full length post or foundation tube remains to be embedded:
	<ol style="list-style-type: none"> <li>1. Drill a 12" to 16" (300 mm to 400 mm) diameter hole into the rock.</li> <li>2. Drill holes 2" (50 mm) deeper than the required embedment depth.</li> <li>3. Place granular material or small pieces of the drilled rock in the bottom 2" (50 mm) of the hole for drainage.</li> <li>4. Assemble the tube or post into the hole. Backfill the hole with compactable materials in 6" (150 mm) lifts and compact with pneumatic equipment to optimum compaction.</li> </ol>
	<b>Note:</b> If compactable, the material removed from the hole may be used for backfill.

Option B	<p>If rock is encountered and more than 20 inches (510) of the full length post or foundation tube remains to be embedded:</p> <ol style="list-style-type: none"> <li>1. Drill a 12" to 16" (300 mm to 400 mm) diameter hole 22" (560 mm) deep into the rock.</li> <li>2. Cut off the embedded portion of the tube or post so the Guardrail will be at the proper mounting height. Cutting off the bottom of the embedded portion of full length post or foundation tube is permitted only when a minimum of 20" (510 mm) embedment into rock can be achieved.</li> <li>3. Place granular material or small pieces of the drilled rock in the bottom 2" (50 mm) of the hole for drainage.</li> <li>4. Assemble the tube or post in the hole. Backfill the hole with compactable materials in 6" (150 mm) lifts and compact with pneumatic equipment to optimum compaction.</li> </ol> <p><b>Note:</b> If compactable, the material removed from the hole may be used for backfill.</p>
	<p><b>Warning:</b> Ensure that the proper leaveout (the specified area of open space in the pavement) around the posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement, for any posts assembled in rigid pavement such as any thickness of concrete or asphalt. Failure to follow this warning could result in serious injury or death in the event of a collision.</p>

## **Assembling the Strut**

Complete the following steps when assembling the strut:

**Note:** For all strut assemblies, the assembler must provide a shallow valley or trough for assembly of the strut, since a portion of the angle strut will be below grade.

### **Assembling the Strut with HBA™ Post at Post 1 and SYTP™ at Post 2**

Complete the following steps to assemble the strut.

#### **At Post 1**

Step	Actions
1.	<p>Place the angle strut on the outside flanges of the HBA™ post.</p> <p><b>Note:</b> The strut can be placed with one of the legs flat on the ground or with the leg edge on the ground. The strut may be attached either on the traffic side or the field side of the posts.</p>
2.	<p>Assemble a 3/4" (19 mm) diameter x 2 1/2" (63 mm) hex head high strength bolt (PN-3717G) in the 13/16" (21 mm) hole of the HBA™ Post 1 post plates. Place the bolt through the top and bottom post's post plates and through the strut.</p>
3.	<p>Place a 3/4" (19 mm) washer (PN-3700G) and a 3/4" (19 mm) lock washer under a 3/4" (19 mm) hex nut on the end of the bolt to secure.</p>
4.	<p>Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.)</p>

### For Angle Strut with 6' SYTP™ at Post 2

Step	Actions
1.	Place the Angle Strut (PN-33795G) on the embankment side of the SYTP™. (The strut can be placed with one of the legs flat on the ground or with the leg edge on the ground.)
2.	Place a 7/16" (11 mm) round washer (PN-4389G) on the two 7/16" (11 mm) diameter x 1 1/2" (38 mm) hex head high strength bolts (PN-4390G).
3.	Insert the two bolts through the two slotted holes of the strut and the yielding diameter holes of the SYTP™, at Post 2.
4.	Place a 7/16" (11 mm) lock washer (PN-4393G) and a plate washer (PN-19948G) under a 7/16" (11 mm) hex nut (PN-4388G) on the ends of inserted bolts. When in the correct position, plate washer is placed against yielding holes of the post and under the lock washer and nut.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.)

### For Angle Strut with SYTP™ in Tube at Post 2

Step	Actions
1.	Place the Angle Strut (PN-33875G) on the embankment side of the tube. (The strut can be placed with one of the legs flat on the ground or with the leg edge on the ground.)
2.	Place a 3/4" (19 mm) washer (PN-3701G) on a 3/4" (19 mm) diameter x 9 1/2" (240 mm) hex head high strength bolt (PN-5148G).
3.	From the embankment side, insert the bolt through the Strut, Foundation Tube, spacer (PN-4161), and the SYTP™ at Post 2.
4.	Place a 3/4" (19 mm) washer (PN-3701G) under a 3/4" (19 mm) hex nut on the end of the inserted bolt.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.) <b>Note:</b> Do not over tighten the bolts and deform the tubes; this will complicate possible post replacement.

## Assembling the Strut with Wood CRT Post in Tube at Post 1 and SYTP™ at Post 2

Complete the following steps to assemble the strut:

### At Post 1

Step	Actions
1.	Place the Angle Strut on the embankment side of the Foundation Tube.
2.	Place a 3/4" (19 mm) washer (PN-3701G) on a 3/4" (19 mm) diameter x 9 1/2" (240 mm) hex head high strength bolt (PN-5148G).
3.	From the embankment side, insert the bolt through the Strut, the Foundation Tube, and the Wood Post.
4.	Place a second washer under a 3/4" (19 mm) hex nut (PN-3704G) on the end of the inserted bolt.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.)

### For Angle Strut with 6' SYTP™ at Post 2

Step	Actions
1.	Place the Angle Strut (PN-33730G) on the embankment side of the SYTP™. (The Strut can be placed with one of the legs flat on the ground or with the leg edge on the ground.)
2.	Place a 7/16" (11 mm) round washer (PN-4389G) on the two 7/16" (11 mm) diameter x 1 1/2" (38 mm) hex head high strength bolts (PN-4390G).
3.	Insert the two bolts through the two slotted holes of the strut and the yielding diameter holes of the SYTP™, at Post 2.
4.	Place a 7/16" (11 mm) lock washer (PN-4393G) and a plate washer (PN-19948G) under a 7/16" (11 mm) hex nut (PN-4388G) on the ends of inserted bolts. When in the correct position, the plate washer is assembled against the yielding holes of the post and under the lock washer and nut.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement)

### For Angle Strut with SYTP™ in Tube at Post 2

Step	Actions
1.	Place the Angle Strut (PN-33875G) on the embankment side of the tube. (The Strut can be placed with one of the legs flat on the ground or with the leg edge on the ground.)
2.	Place a 3/4" (19 mm) washer (PN-3701G) on a 3/4" (19 mm) diameter x 9 1/2" (240 mm) hex head high strength bolt (PN-5148G).
3.	From the embankment side, insert the bolt through the Strut, Foundation Tube, spacer (PN-4161), and the SYTP™ at Post 2.
4.	Place a 3/4" (19 mm) washer (PN-3701G) under a 3/4" (19 mm) hex nut on the end of the inserted bolt
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.) <b>Note:</b> Do not over tighten the bolts and deform the tubes; this will complicate possible post replacement

## Assembling the Strut with Wood Posts in Soil Tubes (Post Locations 1 and 2)

Complete the following steps to assemble the strut:

### For Angle Strut

Step	Actions
1.	Place the Angle Strut (PN-33875G) on the embankment side of the Foundation Tubes.
2.	Place a 3/4" (19 mm) washer (PN-3701G) on a 3/4" (19 mm) diameter x 9 1/2" (240 mm) hex head high strength bolt (PN-5148G).
3.	From the embankment side, insert the bolt through the Strut, the Foundation Tube, and the Wood Post.
4.	Place a second washer under a 3/4" (19 mm) hex nut (PN-3704G) on the end of the inserted bolt.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.)

### For Channel Ground Strut

Step	Actions
1.	Place the slotted yokes of the Ground Strut (PN-9852A) over the Foundation Tubes.
2.	Place a 5/8" (16 mm) round washer (PN-3300G) on a 5/8" (16 mm) diameter x 9 1/2" (240 mm) hex head bolt (PN-3497G).
3.	From the embankment side, insert the bolt through the Strut, Foundation Tube, and the Wood Post.
4.	Place a second washer under a 5/8" (16 mm) HGR hex nut on the end of the inserted bolt.
5.	Tighten the nuts to a snug position. (The designer does not recommend a torque requirement.) <b>Note:</b> Do not over tighten the bolts and deform the tubes; this will complicate possible post replacement.

## Assembling Offset Blocks and Rail Panels

The ET-31™ Guardrail End Treatment uses a 12' 6" (3.81 m) Rail Panel (PN-32G). Depending on the state or specifying agency standards, a combination of the following Rail Panels will be used for their system: 9' 4 1/2" (2.86 m) Rail Panel (PN-10967G), 15' 7 1/2" (4.76 m) Rail Panel (PN-20442G), 12' 6" (3.81 m) Rail Panel (PN-11G), or 25' (7.62 m) Rail Panel (PN-60G).



**Warning:** DO NOT bolt the Rail Panel to the post at location 1 in any of the ET-31™ Guardrail End Treatment. Failure to follow this warning could result in serious injury or death in the event of a collision.

## Splicing the Rail Panels

Complete the following steps to splice the rail panels:

Step	Actions
1.	Lap the Treatment rail in the direction of traffic, unless the state or specifying agency's policy dictates otherwise. EACH RAIL PANEL MUST BE STRAIGHT WITH NO VISIBLE DISTORTIONS OR BLEMISHES SUCH AS CURVES, DENTS, CUTS, TEARS, EXTRA HOLES, CUT-OUTS, CORROSION OR SIGNS OF PAST REPAIRS. Rails with distortions that could compromise its ability to resist compressive load induced by the Head during head-on impacts shall not be used.
2.	Splice the Rail Panels together with eight 5/8" x 1 1/4" (16 mm x 32 mm), HGR splice bolts (PN-3360G), and 5/8" (16 mm) HGR hex nuts.
	<b>Warning: USE ONLY PROPER LENGTH SPLICE BOLTS</b> (1-1/4" LONG) which have Trinity's "TRN" identifying mark stamped into the top of the bolt head. Failure to follow this warning could result in serious injury or death in the event of a collision.
3.	Tighten the bolts. (There is no torque requirement.)

## Assembling the Offset Block and Rail Panel to Wood Posts (Posts 3 through 6)

Complete the following steps to attach the Offset Blocks and Rail Panels to the Wood Posts:

Step	Actions
1.	1. At locations with Wood Posts and Wood Blocks, insert a 5/8" (16 mm) diameter 22" (560 mm) HGR post bolt (PN-3620G) through the Rail Panel, Offset Block (PN-4660B), and the Post. <b>Note:</b> Offset Blocks are NOT used at post locations 1 and 2, but are used at all other locations.
	<b>Warning:</b> Do NOT bolt the Rail Panel to the post at location 1 in any of the ET-31™ Guardrail End Treatment. Failure to follow this warning could result in serious injury or death in the event of a collision.
2.	Place a 5/8" (16 mm) round washer (PN-3300G) under a 5/8" (16 mm) HGR nut (PN-3340G).
3.	Tighten the bolts. (There is no torque requirement for these bolts.)
4.	Secure the Offset Block by toe nailing the Block to the Post or the Post to the Block, with two 16d hot-dipped galvanized nails approximately 3" (75 mm) from the top of the Post or Block, one on each side, to prevent it from rotating.

## Assembling the Offset Block and Rail Panel to SYTP™ (Posts 3 through 6)

Complete the following steps to attach the Offset Blocks and Rail Panels to the SYTP™:

Step	Actions
1.	At locations with Steel Yielding Treatment Post™ (SYTP™) with Offset Blocks, insert a 5/8" (16 mm) diameter x 14" (355 mm) HGR post bolt (PN-3540G) through the Rail Panel, routed Wood (PN-4076B) or Composite (PN-6707B) Blockout, and the SYTP™. <b>Note:</b> Offset Blocks are NOT used at post locations 1 and 2. For SYTP™ Inserts, there are two sets of holes in the SYTP™ for attaching the rail. Use the holes in the SYTP™ that will place the rail at the correct height.
	<b>Warning:</b> DO NOT bolt the Rail Panel to the post at location 1 in any of the ET-PLUS™ systems. Failure to follow this warning could result in serious injury or death in the event of a collision.

	<b>Warning:</b> Ensure all Wood Blocks or Composite Blocks used with steel posts are routed. Failure to follow this warning could result in serious injury or death in the event of a collision.
2.	Place a 5/8" (16 mm) round washer (PN-3300G) under a 5/8" (16 mm) HGR nut (PN-3340G) on the inserted bolt.
3.	Tighten the bolts. (There is no torque requirement for these bolts.)

### Assembling the Rail Panel to the Post without Offset Block at Post 2

Complete the following steps to attach the Rail Panel to the Post without Offset Block at Post 2:

Step	Actions
1.	Select Option A or Option B to attach the Rail Panel without Offset Block at Post 2:
Option A	<p><b>For Wood Post:</b></p> <ol style="list-style-type: none"> <li>1. Insert a 5/8" (16 mm) diameter x 10" (255 mm) HGR post bolt (PN-3500G) through the Rail Panel and the Wood Post at location 2.</li> <li>2. Place a 5/8" (16 mm) round washer (PN-3300G) under a 5/8" (16 mm) HGR nut (PN-3340G) on the inserted bolt. Tighten the bolts. (There is no torque requirement for these bolts.)</li> </ol>
Option B	<p><b>For SYTP™:</b></p> <ol style="list-style-type: none"> <li>1. Insert a 5/8" (16 mm) diameter x 1 1/4" (31 mm) HGR bolt (PN-3360G) through the Rail Panel and the hole in the SYTP™.</li> </ol> <p><b>Note:</b> For SYTP™ Inserts use the hole in the SYTP™ that will place the Rail Panel at the correct height. (If there are two sets of holes in the SYTP™ for attaching the Rail Panel.)</p> <ol style="list-style-type: none"> <li>2. Place a 5/8" (16 mm) round washer (PN-3300G) under a 5/8" (16 mm) HGR nut (PN- 3340G) on the inserted bolt.</li> </ol>

## Assembling the Cable Anchor Assembly

The Cable Anchor Bracket (PN-704A) is secured to the Rail Panel, by inserting the square protruding hooks / lugs on the bracket into the square slots in the rail panel. The Cable Anchor Bracket is locked into place, by pulling the bracket towards the impact end of the unit, making sure the hooks / lugs are well seated into the square holes.

Complete the following steps to assemble the Cable Anchor Bracket assembly:

Step	Actions
1.	Slide one end of the Cable (PN-3000G) into the Cable Anchor Bracket and the other end through Post 1.
2.	Place a 1" (25 mm) washer (PN-3900G) and 1" (25 mm) hex nut (PN-3910G) on the end of the cable that extends through the Cable Anchor Bracket. Turn the nut, until at least 2 threads are completely through the nut.
3.	Place the Bearing Plate (PN-19258A with two side ears/tabs on the steel post, PN-782G with no side ears/tabs on Wood Post) on the impact side of Post 1 where the Cable extends through the Post. The Cable Bearing Plate MUST BE oriented with the "long" dimension turned up. The hole in the Bearing Plate is off center (in the vertical direction), 5" (125 mm) from one edge and 3" (75 mm) from the opposite edge. The two ears/tabs on the Bearing Plate (PN-19258A) must straddle the left and right side of the HBA hinge assembly.
4.	If applying the Bearing Plate with no side ears/tabs (PN-782G) to a wood post at Post 1, drive two 16d hot-dipped <b>galvanized</b> nails along the top edge of the bearing plate and bend over to prevent the bearing plate from rotating.
	<b>Warning:</b> Any grout, backfill, or other materials (such as concrete, asphalt, or soil) must be low enough so as not to obstruct, constrain, or otherwise engage the Bearing Plate. Failure to eliminate the interaction of soil or materials with the Bearing Plate will hinder the performance of the ET-31™ Guardrail End Treatment and could result in serious injury or death in the event of a collision.
5.	Place a 1" (25 mm) washer under a nut on the end of the Cable extending through Post 1.
6.	Restrain the Cable with locking pliers at the end being tightened, to avoid twisting the Cable.
7.	Tighten the hex nuts on the Cable ends, until the Cable is taut. The Cable is considered taut when it does not deflect more than 1" (25 mm) when pressure is applied by hand in an up or down direction.
8.	The shank portion of the Anchor Cable MUST BE positioned so it bears on the bottom edge of the web of the HBA post. The shank portion of the Anchor Cable must also be centered so that the Bearing Plate bears uniformly on both flanges of Post 1.

## Assembling the ET-PLUS™ Extruder (Head)

Complete the following steps to assemble the ET-PLUS™ Extruder (Head):

Step	Actions
1.	Place the ET-PLUS™ Extruder (Head) (PN-995A) over the end of the Rail Panel as the final piece to attach to the assembly. <b>Note:</b> The ET-PLUS™ Extruder (Head) can be used on the left or right hand shoulder.
2.	Push the ET-PLUS™ Extruder (Head) as far as it will go onto the front-most Rail Panel, making sure the Rail Panel is fully engaged into the full length of the channel guide attached to the Head until it stops.
3.	Assemble the ET-PLUS™ Extruder (Head) with channel guide attached to it approximately parallel to the ground. The upper and lower attachment tabs welded to the guide chute have three holes in each to provide a means to level the Head (See following steps).
4.	Select Option A or Option B for the ET-PLUS™ Extruder (Head) assembly.
Option A	<b>For Wood post:</b> <ol style="list-style-type: none"> <li>Place the ET-PLUS™ Extruder (Head) against the Wood Post, at location 1.</li> <li>Choose the hole in the tab welded to the guide chute that is closest to the center of the Post.</li> <li>Drill a 1/4" (6 mm) pilot hole to avoid breaking the lag screw during assembly.</li> <li>Screw one 3/8" (10 mm) diameter x 4" (100 mm) lag screw (PN-4228B) through the top and bottom tab. The lag screw must be screwed into the Wood Post to prevent it from pulling out or cracking the post. <b>DO NOT OVER TIGHTEN</b>, causing the threads in the Wood Post to strip.</li> </ol>
Option B	<b>For HBA™ post:</b> <ol style="list-style-type: none"> <li>Place the ET-PLUS™ Extruder (Head) against the HBA™ post, at location 1.</li> <li>Place a 3/8" (10 mm) round washer (PN-4254G) onto a 3/8" (10 mm) diameter x 1 1/2" (38 mm) hex head bolt (PN-4261G).</li> <li>Insert this bolt through the tab welded to the side of the guide channel attached to the ET-PLUS™ Extruder (Head) and then through the hole in the flange of HBA™ Post.</li> <li>Place a 3/8" (10 mm) fender washer (PN-4255G) under a 3/8" (10 mm) nut (PN-6405G) onto the inserted bolt. A larger fender washer is used to cover the relatively large hole in the flange of the HBA Post.</li> <li>Repeat this assembly step for the top and bottom tabs. When completed, the Head will be attached to the HBA post via an upper and lower 3/8" diameter hex head bolt (PN-4261G).</li> <li>Tighten the nuts to a snug position. The designer does not recommend a torque requirement for the HBA field assembly.</li> </ol>

## Delineation Option for the ET-31™ Guardrail End Treatment

Apply High Intensity Reflective Sheeting (PN-6206B [Right Side] or PN-6207B [Left Side]) on the front face of the ET-PLUS™ Extruder (Head), per the state or specifying agency's *Manual on Uniform Traffic Control Devices* (MUTCD) for options or proper delineation. Alternate Reflective Sheeting is PN-6668B. The Alternate Reflective Sheeting requires two pieces and may be rotated for proper right or left delineation.

**Note:** The Reflective Sheeting is an option to the ET-31™ Guardrail End Treatment and needs to be ordered separate from the ET-31™ Guardrail End Treatment package.

## Assembly Checklist

State: \_\_\_\_\_ Project: \_\_\_\_\_

Date: \_\_\_\_\_ Location: \_\_\_\_\_

- The leaveout (the specified area of open space in the pavement) around the Posts is reserved and filled with state or specifying agency approved backfill material that will not prevent movement for any posts placed in rigid pavement such as any thickness of concrete or asphalt.
- The finished guardrail height is approximately 31" (787 mm) above the finished grade, or as the state or specifying agency plans indicate.
- Any site grading needed was completed, before the start of the assembly of the ET-31™ Guardrail End Treatment.
- The Steel Tubes or Post Plates (ears) to the HBA™ bottom post do not protrude more than 4" (100 mm) above the finished grade measured by the American Association of State Highway and Transportation Officials (AASHTO) 5' (1.5 m) cord method. Site grading may be necessary to meet this requirement.
- The 3/4" (19 mm) bolts connecting the tops of the HBA™ Bottom Post to the bottom of the HBA™ Top Post are tightened to a snug position. The designer does not recommend a torque requirement for the HBA field assembly.
- The 3/8" (10 mm) bolts connecting the tops of the HBA™ Bottom Post to the bottom of the HBA™ Top Post are tightened to a snug position. The designer does not recommend a torque requirement for the HBA field assembly.
- The bolts at the top of the Steel Tubes are not over tightened. The walls of the Steel Tubes are not collapsed.
- If an Angle Strut was utilized, the bolts connecting the Angle Strut are 3/4" (19 mm) DIA. high strength.
- The ET-PLUS™ Extruder (Head) is pushed as far as it will go on the Rail Panel, ensuring the Rail Panel is fully engage into the channel guide that is welded to the Extruder (Head).
- The two 3/8" diameter bolts holding the ET-PLUS™ Extruder (Head) to Post 1 are snug and the channel guide welded to the Head is approximately parallel to the finished grade.
- The Cable Anchor Bracket is locked into place, by pulling the Bracket towards the impact end of the unit, making sure the hooks / lugs are well seated into the square holes.
- The shank portion of the Anchor Cable MUST BE positioned vertically flush against the bottom web of the top section of the HBA Post. The shank portion of the Cable MUST also be centered so that the Bearing Plate bears uniformly on both flanges of Post 1.
- Any grout, backfill, or other materials (such as concrete, asphalt, or soil) must be low enough so as not to obstruct, constrain, or otherwise engage the Bearing Plate.

- The hex nuts on the Cable ends are tightened, until the Cable is taut. The Cable is considered taut, when it does not deflect more than 1" (25 mm) when pressure is applied by hand in an up or down direction.
- Do not place anything under the rail to post bolt head that would prevent the bolt from pulling through the Rail Panel.
- The Bearing Plate is placed on the front of Post 1 where the Cable extends through the Post. The Cable Bearing Plate MUST BE oriented with the "long" dimension turned up. The hole in the Bearing Plate is off center (in the vertical direction), 5" (125 mm) from one edge and 3" (75 mm) from the opposite edge. If the Bearing Plate has two "ears/tabs", these need to straddle the left and right side of the No. 1 Post and be on the upper side of the plate.
- The top surfaces of any grout or other backfill placed in the mow strip "leave out" must be low enough so that it does not engage the Bearing Plate or otherwise obstruct or constrain the 3/8" (10 mm) shear bolts or the 3/4" (19 mm) hinge bolts of the HBA Post
- Any Wood Offset Blocks used have been toe nailed to the Wood Posts.
- If backfilled, make sure the backfill material around the Posts is properly compacted.
- Each HBA™ Post has two bolts on either side of the Post with the larger bolt downstream of the smaller bolt (away from the Impact Head).
- The SYTP™ holes are at the finished grade.
- The Wood CRT Post has two 3 1/2" (90 mm) breakaway holes (checked prior to assembly). They are located parallel to the roadway with the top hole located approximately at the finished grade.
- The tube bolts are attached with the nuts on the pavement side of the Tube for ease of future removal.
- The Rail Panels are lapped correctly and not attached to the Posts at locations identified for the system.
- Each Rail Panel used in the ET-31™ pay length is straight, with no visible distortions or blemishes such as curves, dents, cuts, tears, extra holes, cut-outs, corrosion, or signs of past repairs.
- The Reflective Sheeting is correctly positioned on the Extruder face.
- Ensure that this assembly conforms with the guidance provided by the *AASHTO Roadside Design Guide*, including, but not limited to, those regarding placement on curbs.

## Maintenance and Repair

Always keep the Manual in a location where it is easily accessed by persons who assemble, maintain, or repair the ET-31™ Guardrail End Treatment. If you have any questions concerning the information in this Manual or about the ET-31™ Guardrail End Treatment, contact Trinity Highway Products at 888-323-6374.

### Maintenance

Complete the following steps, periodically, to check the safety of the system:

Step	Actions
1.	Ensure the nuts have not been removed from the Cable. Replace nuts, if needed.
2.	Ensure the end fitting on the Anchor Cable <b>MUST BE</b> positioned vertically, up flush against the bottom web of the top section of the Post. The end fitting of the Cable <b>MUST</b> be centered horizontally so that the Bearing Plate bears uniformly on both flanges of Post 1.
3.	Ensure the Cable is taut. The Cable is considered taut when it does not deflect more than 1 inch when pressure is applied by hand in an up or down direction. Tighten Cable if needed.
4.	Ensure the Bearing Plate has not rotated. <b>Note:</b> The Cable Bearing Plate <b>MUST BE</b> oriented with the “long” dimension turned up. The hole in the Bearing Plate is off center (in the vertical direction), 5” (125 mm) from one edge and 3” (75 mm) from the opposite edge.
5.	Ensure Wood Blocks are in place and in good condition, as defined by the state or specifying agency.
6.	Ensure the Block Outs have not rotated. Correct the Block Out position and reattach the 16d hot-dipped galvanized nails, if needed.

### Repair

Complete the following steps to repair the ET-31™ Guardrail End Treatment:

Step	Actions
1.	Set up necessary traffic control at the accident site and then remove any debris that has encroached onto the traveled way or shoulder.
2.	Take inventory of the damaged system and determine what parts are reusable, as defined by the state or specifying agency and what parts need to be replaced.
3.	Check the ET-PLUS™ Extruder (Head) for damage. The determination as to whether or not the Head is reusable rests <b>entirely</b> within the discretion of the DOT or other appropriate highway authority. Before reusing a Head, please make sure that an experienced, trained engineer for the highway authority inspects the Head to his or her satisfaction and authorizes its reuse. For consideration of reuse of the Extruder Head, the rail guide chute must be fully intact and not distorted in any way; the slot that flattens the rail shall not be excessively distorted in any way; the slot that flattens the rail shall not be excessively distorted; the front impact face must not be excessively distorted, and all the original welds must be intact. Again before reusing a Head, a trained DOT or applicable highway authority engineer shall inspect it and authorize its reuse.
4.	Check the Anchor Cable and Cable Anchor Bracket for damage. (The Bearing Plate, nuts, washers, and Cable Anchor Bracket are rarely damaged.)
5.	Obtain the Trinity Highway Products parts that need to be replaced from Trinity Highway Products. (See <i>Tools Required</i> section for a list of recommended tools for the repair of the ET-31™ Guardrail End Treatment.)

6.	Return to the repair site with the replacement parts and tools needed.
7.	Cut off the extruded rail near the ET-PLUS™ Extruder (Head). Do not cut the ET-PLUS™ Extruder (Head) from the non-extruded rail.
8.	Secure a chain to the ET-PLUS™ Extruder (Head).
9.	Attach the chain to a truck frame while the other end of the Rail Panel is still connected to the downstream Posts (away from the Impact Head) to provide anchorage.
10.	Pull the ET-PLUS™ Extruder (Head) off the Rail Panel.
11.	Remove any damaged Rail Panel(s).
12.	Remove the broken Posts from the Steel Tubes.
13.	Remove all damaged CRT, SYTP™, or HBA™ Posts. Undamaged HBA™ Posts can be reset.
14.	Remove and discard any rubber bumpers or construction legs.
15.	Reconstruct the system following the assembly instructions after the site has been cleared of damaged debris.
16.	Attach proper delineation for the repaired system in accordance with the state or specifying agency's <i>Manual on Uniform Traffic Control Devices</i> (MUTCD).



2525 Stemmons Freeway

Dallas, Texas 75207

888-323-6374 (USA only)

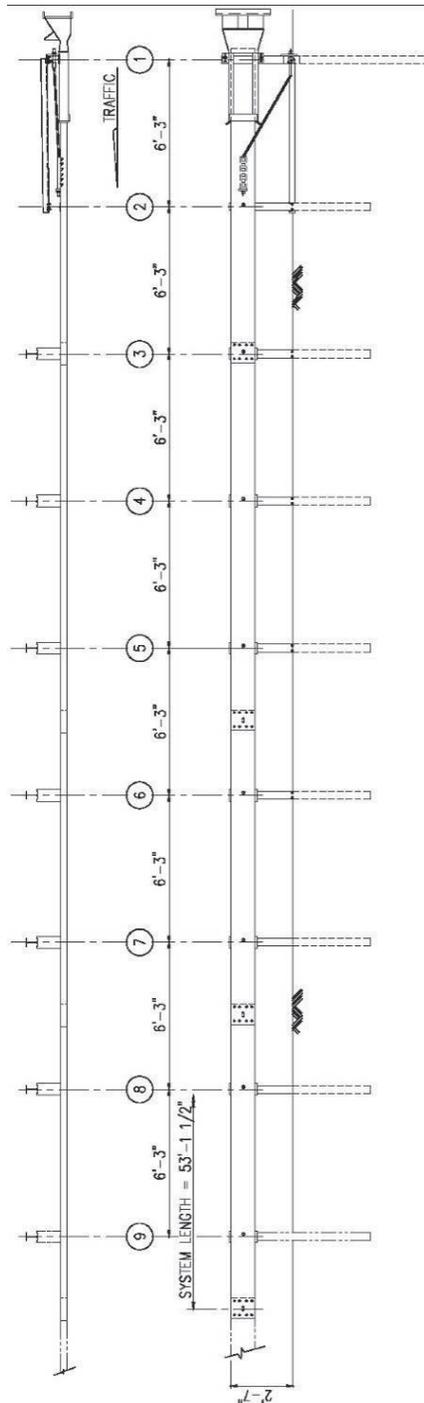
214-589-8140 (Outside USA)

[www.energyabsorption.com](http://www.energyabsorption.com)

[www.highwayguardrail.com](http://www.highwayguardrail.com)

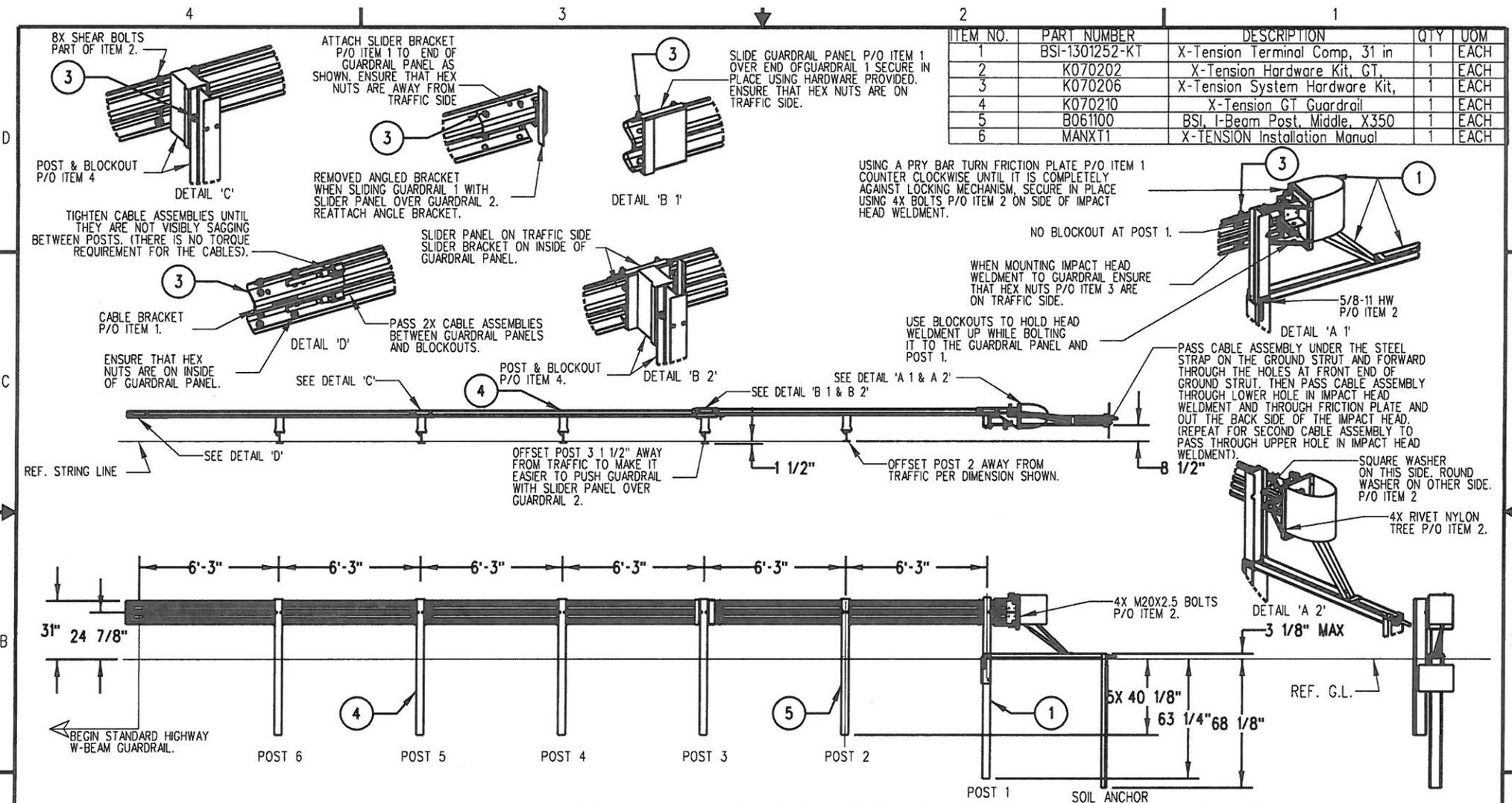
**ET-31™ Guardrail End Treatment  
NCHRP Report 350 Test Level 3  
System Length 53'-1 1/2" (16.19 m)**

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawings and/or Trinity standard layout drawings.



**Figure 4 (TL-3)**

[This drawing represents one version of the 53'-1 1/2" (16.19 m) system]



- NOTES: UNLESS OTHERWISE SPECIFIED.
1. SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
  2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.
  3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.

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<b>APPROVALS</b>				<b>TITLE</b> X-TENSION GUARDRAIL TERMINAL SYSTEM STEEL POST WITH COMPOSITE BLOCKOUT 31" RAIL HEIGHT			
<small>DRAWN BY:</small> NMV <small>DRAWN DATE:</small> 2/08/13 <small>APPR'D BY:</small> JMT <small>APPR'D DATE:</small> 2/08/13	<small>THIRD ANGLE PROJECTION</small> 	<small>REV</small> 2067 <small>DATE</small> 03/02/13 <small>REV</small> 2022 <small>DATE</small> 2/08/13	<small>SCALE</small> 1:50	<small>SIZE</small> B <small>DWG NO.</small> XTGTSS5	<small>REV.</small> B	<small>SHEET</small> 1 OF 1	

# INFORMATION HANDOUT

For Contract No. 05-0C6404

At 05-SB-246-12.3/R16.7

Identified by

Project ID 0500000021

## MATERIALS INFORMATION

[12.Water Source Information](#)

9/17/14

05-0C6401 Water Source:

La Purisima Golf Course, Owner, Chris Bellamy.

Ph # 805-735-8395

Contacted by Telephone & E-Mail on 09-17-2014 by  
Apurva Gokal and Jason Castillo

## Lee, Veronica N@DOT

---

**From:** Gokal, Apurva@DOT  
**Sent:** Monday, September 29, 2014 8:55 AM  
**To:** Lee, Veronica N@DOT  
**Cc:** Simms, Rochelle R@DOT; Tan, SooHee@DOT; Al-Hamdani, Foad N@DOT; Castillo, Jason D@DOT  
**Subject:** FW: Request for information regarding available water for purchase for use for Highway Project 05-0C6401

Hi Veronica,

The e-mail chain is below. Jason and I had a phone conversation with Chris Bellamy, the property owner, a few minutes before he sent the e-mail confirming that he had adequate water and was willing to sell it to the contractor for the passing lanes project.

### Apurva N. Gokal, P.E.

Transportation Engineer, Civil  
Caltrans - Central Region Project Development  
District 6 – Design II - Branch Y

Phone: 559. 243. 3547  
Fax: 559. 244. 2852

2015 E. Shields Avenue, Suite 100  
Fresno, CA 93726

---

**From:** Castillo, Jason D@DOT  
**Sent:** Wednesday, September 17, 2014 2:18 PM  
**To:** Chris Bellamy  
**Cc:** Al-Hamdani, Foad N@DOT; Gokal, Apurva@DOT  
**Subject:** RE: Request for information regarding available water for purchase for use for Highway Project 05-0C6401

Hi Chris,

Thank you for your assistance with our water source needs. Just to clarify (for our records), I had put the incorrect contract number (it was for another job I have ongoing). For the project which we are referring to, Rte 246 project near Lompoc, the contract number is 05-0C6401.

We will proceed to add you as a potential water source in our contract documents.

Thank you again for your assistance.

Jason Castillo

---

**From:** Chris Bellamy [<mailto:chrisbellamy@me.com>]  
**Sent:** Wednesday, September 17, 2014 2:01 PM  
**To:** Castillo, Jason D@DOT  
**Subject:** Re: Request for information regarding available water for purchase for use for Highway Project 05-~~1G1900~~  
**0C6401**

Jason,

It is OK to list us as a water source for the construction project for HWY 246. We have 2 wells that produce 300-400 gallons per minute. Contractor would need to draw from one of our fire hydrants in the parking lot.

Thanks

Chris

On Sep 17, 2014, at 11:31 AM, La Purisima Golf Course <[info@lapurisimagolf.com](mailto:info@lapurisimagolf.com)> wrote:

---

**From:** Castillo, Jason D@DOT [<mailto:jason.castillo@dot.ca.gov>]

**Sent:** Wednesday, September 17, 2014 10:47 AM

**To:** [info@lapurisimagolf.com](mailto:info@lapurisimagolf.com)

**Cc:** Gokal, Apurva@DOT; Al-Hamdani, Foad N@DOT

**Subject:** Request for information regarding available water for purchase for use for Highway Project 05-~~1G1900~~  
**0C6401**

Hello,

My name is Jason Castillo and I work for the California Department of Transportation (Caltrans). Some time ago (last year) we met with the owners of the La Purisma Golf Course to discuss drainage easement needs and improvements the project was making on Route 246 in the vicinity of the La Purisma Golf Course.

We would like to contact the owners of the La Purisma Golf Course to discuss the upcoming project's water needs and if any (and how much) water may be available for the contractor to purchase for the upcoming project.

Please contact me at 559-243-3542 or Apurva Gokal at 559-243-3547, at your earliest convenience, to discuss the matter.

Thank you,

Jason Castillo  
State of California  
Department of Transportation  
Project Development, Office of Design II – Branch Y  
2015 E. Shields Ave, Ste 100  
Fresno, CA 93726  
559-243-3542