FOR CONTRACT NO.: **06-0C1304**

INFORMATION HANDOUT

AGREEMENTS

CALIFORNIA DEPARTMENT OF FISH AND GAME
NOTIFICATION NO.1600-2012-0008-R4

MATERIALS INFORMATION

FOUNDATION REPORTS

AMENDMENT TO FOUNDATION REPORT

RESULTS OF CORROSION EVALUATION

FINAL SEISMIC DESIGN RECOMMENDATIONS

FOUNDATION REVIEWS

ROUTE: 06-Fre, Ker, Mad, Tul-99, 198, 63, 166-Var

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4593
www.dfg.ca.gov

EDMUND G. BROWN, Jr., Governor
Charlton H. Bonham, Director

May 1, 2012

Todd Barosso
California Department of Transporation
855 M Street, Suite 200
Fresno, California 93721

Subject: Final Lake or Streambed Alteration Agreement
Notification No. 1600-2012-0008-R4
Saint John's River – Tulare County

Dear Mr. Barosso:

Enclosed is the final Stream Alteration Agreement ("Agreement") for the SR63 Saint John R. Bridge Project ("Project"). Before the Department may issue an Agreement, it must comply with the California Environmental Quality Act ("CEQA"). In this case, the Department, acting as a Responsible Agency, determined your Project is exempt from CEQA and will file a Notice of Exemption ("NOE").

Under CEQA, filing a NOE starts a 35-day period within which a party may challenge the filing agency's approval of the Project. You may begin your Project before the 35-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 Laura Peterson-Diaz, Environmental Scientist, at (559) 243-4017, extension 225 or **lpdiaz@dfg.ca.gov**.

Sincerely,

Jeffrey R. Single, Ph.D.
Regional Manager

cc: Laura Peterson-Diaz, Environmental Scientist

NOTICE OF EXEMPTION

To: Office of Planning and Research
Post Office Box 3044
Sacramento, California 95812-3044

County Clerk
County of Tulare

From: California Department of Fish and Game
Central Region
1234 East Shaw Avenue
Fresno, California 93710

Project Title: Agreement 2012-0008-R4; SR 63 Seismic Bridge Retrofit.

Project Location (Specific): The work authorized by this Agreement will occur on State Route (SR) 63 where it crosses the Saint John's River, north of Visalia, in Tulare County, State of California; Township 36 South, Range 7 East, Section 18, United States Geological Survey (USGS) map Visalia/Monson, Mount Diablo meridian.

Project Location (City and County): Tulare County.

Description of Project: The proposed Project will retrofit the existing Bridge (Br No 46-0100). This will entail the installation of cable restrainers and seat extenders at four (4) hinges. Work would also be completed on piers 2, 4, 7 and 9. The build portion of the Project would consist of placement of an anchor plate at each of the above described locations. The cable restrainers are 14-inches by 14-inches by 1.5-inches steel plates which will be fastened in place by a 1-inch by 3-inche threaded rod and washer nuts at both ends that run through a 2-inch cored hole drilled at the four (4) hinge locations. Bore drills will be completed on racks that capture debris. To further minimize impacts to water quality, fiber tarpaulin or similar material will be placed at the footing of each drill location to catch off cast and drill spalling. Work will be limited to underneath the structure, with entrance and exit points clearly defined on previously utilized routes. Construction equipment will need to enter the channel, but water is not likely to be present when work is done in the Saint John's River channel so a water diversion is not anticipated. An Elderberry bush on the west side of the bridge will be avoided. The Project will not require the removal of any riparian vegetation.

Name of Public Agency Approving Project: California Department of Fish and Game (Central Region).

Name of Agency Carrying Out Project: California Department of Transportation

Exempt Status (Class and Guidelines Section): Categorically Exempt under Section 15301 Existing Facilities Class 1 - Maintenance, repair, and minor alterations of an existing structure.

Reasons Why Project is Exempt: The Project meets the Class 1 Exemption because it consists of restoring the existing facilities (the bridge) to meet current safety standards.

Lead Agency Contact Person: Laura Peterson-Diaz **Phone**: (559) 243-4017, ext. 225

Signature: _____ **Date**: 5/4/12

Jeffrey R. Single, Ph.D.
Title: **Regional Manager, Central Region**

Date received for filing at OPR: _____

CALIFORNIA DEPARTMENT OF FISH AND GAME
REGION 4 - CENTRAL REGION
1234 East Shaw Avenue
Fresno, California 93710

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2012-0008-R4
Saint John's River, Tulare County

CALIFORNIA DEPARTMENT OF TRANSPORTATION
CALTRANS DISTRICT 6
Kelly Hobbs
855 M Street, Suite 200
Fresno, California 93721

SR 63 SEISMIC BRIDGE RETROFIT PROJECT
06-TUL-63 PM 10.6-10.7 EA 06-0C130K

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and California Department of Transportation Caltrans District 6 (Permittee) as represented by Kelly Hobbs acting on behalf of Permittee.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) Section 1602, Permittee notified DFG on January 25, 2012, that Permittee intends to complete the Project described herein.

WHEREAS, pursuant to FGC section 1603, DFG 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 Project is located on State Route (SR) 63 where it crosses the Saint John's River, north of Visalia, in Tulare county, State of California; Township 36 South, Range 7 East, Section 18, United States Geological Survey (USGS) map Visalia/Monson, Mount Diablo meridian.

PROJECT DESCRIPTION

The Project is limited to:

- The existing Bridge (Br No 46-0100) will be retrofitted. This will entail the installation of cable restrainers and seat extenders at four hinges. Work would also be completed on piers 2, 4, 7 and 9. The build portion of the project would consist of placement of an anchor plate at each of the above described locations. The cable restrainers are 14"x14"x1.5" steel plates which will be fastened in place by a 1"x3" threaded rod and washer nuts at both ends that run through a 2" cored hole drilled at the four hinge locations.

- Bore drills will be completed on racks that capture debris. To further minimize impacts to water quality, fiber tarpaulin or similar material will be placed at the footing of each drill location to catch off cast and drill spalling.

- Equipment to be used includes a bobcat, concrete drill, small scaffolding and planking runners. Work will be limited to underneath the structure, with entrance and exit points clearly defined on previously utilized routes. Construction equipment will need to enter the channel, but water is not likely to be present when work is done in the Saint John's River channel so a water diversion is not anticipated.

- During site investigation an Elderberry bush was observed in the project area on the west side of the bridge near pier 9. Environmentally Sensitive Area (ESA) fencing would be installed to set up a buffer around the shrub. A vapor barrier would be attached to the west side of the bridge to prevent impacts to the bush from project generated dust. Work access would only be from the opposite side of the bridge.

- The Project will not require the removal of any riparian vegetation.

PROJECT IMPACTS

This Agreement is intended to avoid, minimize, and mitigate adverse impacts to the fish and wildlife resources that occupy the area of the Saint John's River, and the immediate adjacent riparian habitat. Absent implementation of the protective measures required by this Agreement, the following species and habitat types could potentially be impacted within the area covered by this Agreement: Federal Endangered Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), State Threatened Swainson's hawk (*Buteo swainsoni*), Species of Special Concern Western pond turtle (*Actinemys* marmorata), Species of Special Concern Western mastiff bat (*Eumops perotis californicus*), and Species of Special Concern Pallid bat (*Antrozous pallidus*), as well as birds, mammals, fish, reptiles, amphibians, invertebrates and plants that comprise the local riparian ecosystem.

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 DFG 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 DFG 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, DFG shall contact Permittee to resolve any conflict.

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

1.5. Legal Obligations: This Agreement does not exempt the Permittee from complying with all other applicable local, State and Federal law, or other legal obligations.

1.6. Unauthorized "Take": This Agreement does not authorize the "take" (defined in FGC Section 86 as to hunt, pursue, catch, capture, or kill; or attempt to hunt, pursue, catch, capture, or kill) of State- or Federal-listed threatened or endangered species. Any such "take" shall require separate permitting as may be required.

1.7. Water Diversion: To the extent that the Provisions of this Agreement provide for the diversion of water, they are agreed to with the understanding that the Permittee possesses the legal right to so divert such water.

1.8. Trespass: To the extent that the Provisions of this Agreement provide for activities that require the Permittee to trespass on another owner's property, they are agreed to with the understanding that the Permittee possesses the legal right to so trespass.

1.9. Construction/Work Schedule: The Permittee shall submit a **construction/work schedule** to DFG (lpdiaz@dfg.ca.gov with reference to

Agreement 1600-2012-0015-R4) prior to beginning any activities covered by this Agreement. The Permittee shall also notify DFG upon the completion of the activities covered by this Agreement.

1.10. Training: Prior to starting any construction activity, all employees, contractors, and visitors who will be present during Project activities shall have received training from a qualified individual on the contents of this Agreement, the resources at stake, and the legal consequences of non-compliance. A **training sign-in sheet** for the employees and contractors shall be provided to DFG and shall include the date of the training and who gave the training.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1. Flagging/Fencing: Prior to any activity within the stream, the Permittee shall identify the limits of the required access routes and encroachment into the stream. These "work area" limits shall be identified with brightly colored flagging/fencing. Work completed under this Agreement shall be limited to this defined area only. Flagging/fencing shall be maintained in good repair for the duration of the Project. All areas beyond the identified work area limits shall be considered Environmentally Sensitive Areas (ESA) and shall not be disturbed.

2.2. Listed Species: This Agreement does not allow for the "take," or "incidental take," of any State- or Federal-listed threatened or endangered species.

2.2.1. The Permittee affirms that no "take" of listed species will occur as a result of this Project and will take prudent measures to ensure that all "take" is avoided. The Permittee acknowledges that they fully understand that they do not have "incidental take" authority. If any State- or Federal-listed threatened or endangered species occur within the proposed work area or could be impacted by the work proposed, and thus "taken" as a result of Project activities, the Permittee is responsible for obtaining and complying with required State and Federal threatened and endangered species permits or other written authorization before proceeding with this Project.

2.2.2. Liability for any "take," or "incidental take," of such listed species remains the separate responsibility of the Permittee for the duration of the Project.

2.2.3. The Permittee shall immediately (the same day) notify DFG of the discovery of any such rare, threatened, or endangered species prior to and/or during construction.

2.3. Swainson's Hawk (SWHA): While there are no California Natural Diversity Database (CNDDB) records of SWHA within 10 miles of the Project, the area does have suitable habitat and there is the potential that a nesting pair could move into the area before the Project is completed. SWHA Specific Measures:

2.3.1. **Focused SWHA Surveys:** Surveys shall be conducted by a qualified biologist no more than 14 days before the onset of any ground-disturbing activities and no earlier then March 20. See attached SWHA Technical Advisory Committee May 31, 2000 protocol for appropriate survey details (Exhibit B).

2.3.2. No work shall occur which could result in either direct or indirect impacts to nesting SWHA. Between March 1 and September 1, Project activities shall not be conducted within a minimum 0.5 mile of any active SWHA nest. This minimum buffer may be reduced for any particular nest, but only if DFG concurs in writing that a reduced buffer will not result in a direct or indirect adverse impact to any nesting SWHA adults, chicks, or eggs.

2.3.3. A qualified biologist with appropriate raptor experience approved to act as monitor shall be on-site during all activities that could potentially impact nesting SWHA. In the event that the approved monitor determines Project activities are having or could cause an adverse impact to any nesting SWHA adults, chicks, or eggs based on bird behavior or other indicators regardless of the existing buffer, Permittee shall immediately cease the activities and contact DFG for further guidance.

2.4. Valley Elderberry Longhorn Beetle (VELB) Specific Measures: Elderberry bushes near the Project shall be completely avoided or mitigated according to USFWS regulations. Minimum buffer for avoidance is 20 feet from the dripline of the bush. Buffers of less then 100 feet require approval from USFWS.

2.5. Fish and Wildlife: If any fish or wildlife is encountered during the course of construction, said fish and wildlife shall be allowed to leave the construction area unharmed.

2.5.1. An approved biologist shall perform **general wildlife surveys** of the Project area (including access routes and storage areas) prior to Project construction start with particular attention to evidence of the presence of the species listed above and shall report any possible adverse affect to fish and wildlife resources not originally reported. If the survey shows presence of any wildlife species which could be impacted, Permittee shall contact DFG and mitigation, specific to each incident, shall be developed. If any

State- or Federal-listed threatened or endangered species are found within the proposed work area or could be impacted by the work proposed, a new Agreement and/or a 2081(b) State Incidental Take Permit may be necessary and a new CEQA analysis may need to be conducted, before work can begin.

2.5.2. Western Pond Turtle: Preconstruction surveys shall be conducted to determine the presence of the western pond turtle. Any of these species that are found in the area prior to construction shall be relocated to a suitable habitat area outside of the construction site by a qualified biologist with all required permits. The results of the survey shall be sent to the Department within one week of survey completion. The biologist hired by Permittee shall provide Permittee a list of exclusion measures that construction staff shall use to minimize risk of take or injury to any individual animals in the vicinity of the project site. Permittee shall ensure that these exclusion measures are in place prior to construction.

2.5.3. Bats: Prior to work commencing at any bridge, the bridge shall be surveyed for bats by a qualified bat biologist. Bats shall not be disturbed without specific notice to and consultation with the Department. Impact minimization measures shall be implemented prior to project activities. Exclusion devices, if required, would not be installed during the maternity season and would be removed once construction is completed. If the bridge is being replaced, new bat habitat shall be incorporated in the new bridge design.

2.6. Birds: Migratory nongame 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). Sections 3503, 3503.5 and 3513 of the California Fish and Game Code prohibits take of all birds and their active nests including raptors and other migratory nongame birds, and prohibits the needless destruction of nests.

2.6.1. To protect nesting birds, no construction shall be completed from February 15 through August 31 unless the following **avian surveys** are completed by a qualified biologist:

- Raptors: Survey for nesting activity of raptors within a 0.25-mile radius of the construction site. Surveys shall be conducted at appropriate nesting times and concentrate on trees with the potential to support raptor nests. If any active nests are observed, these nests and nest trees shall be designated an ESA and protected (until the young have fledged and are no longer dependent on the nest or parents for survival) with a minimum 500-foot buffer during Project-

construction unless otherwise agreed upon and approved in writing by DFG.

- Other Avian Species: Survey riparian areas for nesting activity within a 500-foot radius of the defined work area two (2) to three (3) weeks before construction begins. If any nesting activity is found, these nests and nest trees shall be designated an ESA and protected (until the young have fledged and are no longer dependent on the nest or parents for survival) with a minimum 250-foot buffer during Project construction unless otherwise agreed upon and approved in writing by DFG.

2.6.2. Swallows: If Permittee cannot avoid work on the bridges where there is the potential for disturbance of nesting swallows (February 15 through August 15), then prior to February 1, of each year, Permittee shall remove all existing inactive nest remnants which would be destroyed by the Project. Permittee shall continue to discourage new nest building in places where they would be disturbed, using methods developed in consultation between the Permittee Biologist and DFG. Prior to nesting season, a swallow exclusion device, with visual warnings for the birds to prevent entanglement must be installed. Where disturbance shall occur, nesting must be discouraged throughout the nesting season.

2.7. Vegetation: The disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations and shall only occur within the defined work area. Precautions shall be taken to avoid other damage to vegetation by people or equipment. Vegetation or material removed from the riparian area shall not be stockpiled in the streambed or on its banks without measures to ensure its stability, preventing accidental discharge into the stream.

2.7.1. No native riparian trees, shrubs or oak trees shall be removed or impacted as a result of planned construction activities for this Project.

2.8. Vehicles and Equipment: Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic and terrestrial life.

2.8.1. Construction vehicle access to the stream's banks and bed shall be limited to predetermined ingress and egress corridors on existing roads. All other areas adjacent to the work site shall be considered an ESA and shall remain off-limits to construction equipment.

Vehicle corridors and the ESA shall be identified by the Permittee's resident engineer in consultation with the Designated Biologist.

2.9. Staging and storage areas: Staging and storage areas for equipment, materials, fuels, lubricants, and solvents shall be located outside of the stream channel and banks, and to the extent possible, on previously disturbed ground. Stationary equipment such as motors, pumps, generators, compressors and welders, located within or adjacent to the stream, shall be positioned over drip-pans. Vehicles shall be moved away from the stream prior to refueling and lubrication.

2.10. Pollution: The Permittee and all contractors shall be subject to the water pollution regulations found in the Department of Fish and Game Code Sections 5650 and 12015.

2.10.1. Raw cement, concrete or washings thereof, asphalt, drilling fluids or lubricants, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to fish or wildlife resulting from or disturbed by Project-related activities, shall be prevented from contaminating the soil and/or entering the "Waters of the State."

2.10.2. All Project-generated debris, building materials, and rubbish shall be removed from the stream and from areas where such materials could be washed into the stream.

2.10.3. In the event that a spill occurs, all Project activities shall immediately cease until cleanup of the spilled materials is completed. DFG shall be notified immediately by the Permittee of any spills and shall be consulted regarding cleanup procedures.

2.11. Structures: The Permittee shall confirm that all structures are designed (i.e., size and alignment), constructed, and maintained such that they shall not cause long-term changes in water flows that adversely modify the existing upstream or downstream stream bed/bank contours or increase sediment deposition or cause significant new erosion.

2.12. Fill: Rock, gravel, and/or other materials shall not be imported into or moved within the stream, except as otherwise addressed in this Agreement. Only on-site materials and clean imported fill shall be used to complete the Project. Fill shall be limited to the minimal amount necessary to accomplish the agreed activities. Excess and temporary fill material shall be moved off-site at Project completion.

2.13. Spoil: Spoil storage sites shall not be located within the stream, where spoil will be washed into the stream, or where it will cover aquatic or riparian vegetation. Rock, gravel, and/or other materials shall not be imported into

or moved within the bed or banks of the stream, except as otherwise addressed in this Agreement.

2.14. Erosion: No work within the banks of the stream will be conducted during or immediately following large rainfall events, or when there is water flowing within the channel. All disturbed soils within the Project site shall be stabilized to reduce erosion potential, both during and following construction. Temporary erosion control devices may be used as appropriate to prevent siltation of the stream. Any installation of permanent non-erodible materials not described in the original Project description shall be coordinated with DFG. Coordination may include the negotiation of additional Agreement Provisions for this activity.

2.15. Turbidity: Turbid water shall not be discharged into the stream, or created within the stream. The Permittee's ability to minimize siltation shall be the subject of preconstruction planning and feature implementation. Precautions to minimize siltation may require that the work site be isolated so that silt or other deleterious materials are not allowed to pass to downstream reaches. The placement of any structure or materials in the stream for this purpose, not included in the original Project description, shall be coordinated with DFG. If it is determined that silt levels resulting from Project-related activities constitute a threat to aquatic life, activities associated with the siltation shall be halted until effective DFG-approved control devices are installed, or abatement procedures are initiated.

2.16. Restoration: Excess material must be removed from the Project site, pursuant to Department of Transportation Standard Specifications Section 7-1.13. All disturbed soils and new fill, including recontoured slopes and all other cleared areas, shall be revegetated with riparian vegetation or other plants, as appropriate to prevent erosion. If the Project causes any exposed slopes or exposed areas on the stream banks, these areas shall be seeded with a blend of a minimum of three (3) locally native grass species and covered with a protective layer of weed-free straw or mulch. One (1) or two (2) sterile non-native perennial grass species may be added to the seed mix provided that amount does not exceed 25 percent of the total seed mix by count. Locally native wildflower and/or shrub seeds may also be included in the seed mix. The seeding shall be completed as soon as possible, but no later than November 15 of the year construction ends. A **seed mixture** shall be submitted to DFG for approval prior to application. At the discretion of DFG, all exposed areas where seeding is considered unsuccessful after 90 days shall receive appropriate soil preparation and a second application of seeding, straw, or mulch as soon as is practical on a date mutually agreed upon.

3. Monitoring and Reporting Measures

Permittee shall meet each reporting and monitoring requirement described below.

3.1. Monitoring Obligations of the Permittee:

3.1.1. The Permittee shall have primary responsibility for monitoring compliance with all protective measures included as "Measures" in this Agreement. Protective measures must be implemented within the time periods indicated in the Agreement. DFG shall be notified immediately 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.

3.1.2. The Permittee (or the Permittee's designee) shall ensure the implementation of the Measures of the Agreement, and shall monitor the effectiveness of these Measures. DFG shall be notified immediately 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.

3.2. Reporting Obligations of the Permittee:

3.2.1. The Permittee shall submit the following Reports described in the Measures above to DFG:

- Construction/work schedule (Measure 1.9).
- Employees and contractors training sign-in sheet (Measure 1.10).
- Results of focused SWHA surveys (Measure 2.3.1).
- Results of general wildlife surveys (Measure 2.5.1).
- Results of avian surveys if construction is scheduled during the nesting season (Measure 2.6.1) or for tree removal Measure 2.7)
- The seed mixture to be used post Project for erosion control (Measure 2.16).

3.2.2. A Final Project Report shall be submitted to DFG within 30 days after the Project is completed. The final report shall summarize the Project construction, including any problems relating to the protective measures of this Agreement and how the problems were resolved. "Before and after" photo documentation of the Project site shall be included.

VERIFICATION OF COMPLIANCE:

DFG may verify compliance with protective measures to ensure the accuracy of Permittee's monitoring and reporting efforts at any point in time it is deemed necessary. DFG may, at its sole discretion, review relevant Project documents maintained by the Permittee, interview Permittee employees and agents, inspect the Project area, and take other actions to assess compliance with or effectiveness of protective measures for the Project.

CONTACT INFORMATION

Any communication that Permittee or DFG submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by United States mail, fax, or e-mail, or to such other address as Permittee or DFG specifies by written notice to the other.

To Permittee:

California Department of Transportation (Caltrans)
District 6
Todd Barosso
855 M Street, Suite 200
Fresno, California 93721
(559) 824-3599
Fax: (559) 445-6236
Todd_Barrosso@dot.ca.gov

To DFG:

Department of Fish and Game
Region 4 - Central Region
1234 East Shaw Avenue
Fresno, California 93710
Attn: Lake and Streambed Alteration Program – Laura Peterson-Diaz
Notification No. 1600-2012-0008-R4
Phone: (559) 243-4017, extension 225
Fax: (559) 243-4020
lpdiaz@dfg.ca.gov

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 DFG'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

DFG 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 DFG 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 DFG 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 DFG to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes DFG 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 DFG'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

DFG may amend the Agreement at any time during its term if DFG 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 DFG and Permittee. To request an amendment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in DFG'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 DFG 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 DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFG'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, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to DFG a completed DFG "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). DFG 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 DFG's signature, which shall be: 1) after Permittee's signature; 2) after DFG complies with all applicable requirements under 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.

TERM

This Agreement shall remain in effect for five (5) years beginning on the date signed by DFG, 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.

CEQA COMPLIANCE

In approving this Agreement, DFG is independently required to assess the applicability of CEQA. The features of this Agreement shall be considered as part of the overall Project description. The Permittee's concurrence signature on this Agreement serves as confirmation to DFG that the activities that shall be conducted under the terms of this Agreement are consistent with the Project described in Notification No. 2012-0008-R4. Permittee, as CEQA Lead Agency, signed a Class 1 Categorical Exemption on August 5, 2009. DFG, as a CEQA Responsible Agency, shall submit a Notice of Exemption to the State Clearinghouse upon signing this Agreement. DFG's concurrence with Permittee's CEQA Determination is based upon the Permittee's commitment to full implementation of the Measures of this Agreement.

EXHIBITS

The document(s) listed below is included as an exhibit to the Agreement and incorporated herein by reference.

A. Figure 1. Project Location USGS Quad Map.

B. SWHA Technical Advisory Committee May 31, 2000 protocol

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 DFG in accordance with FGC section 1602.

CONCURRENCE

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

FOR CALIFORNIA DEPARTMENT OF TRANSPORTATION

Kelly Hobbs
Senior Environmental Planner
Caltrans Districts 6

4/26/2012
Date

FOR DEPARTMENT OF FISH AND GAME

Jeffrey R. Single, Ph.D.
Regional Manager

5/4/12
Date

Prepared by: Laura Peterson-Diaz
Environmental Scientist

Figure 1

Exhibit A

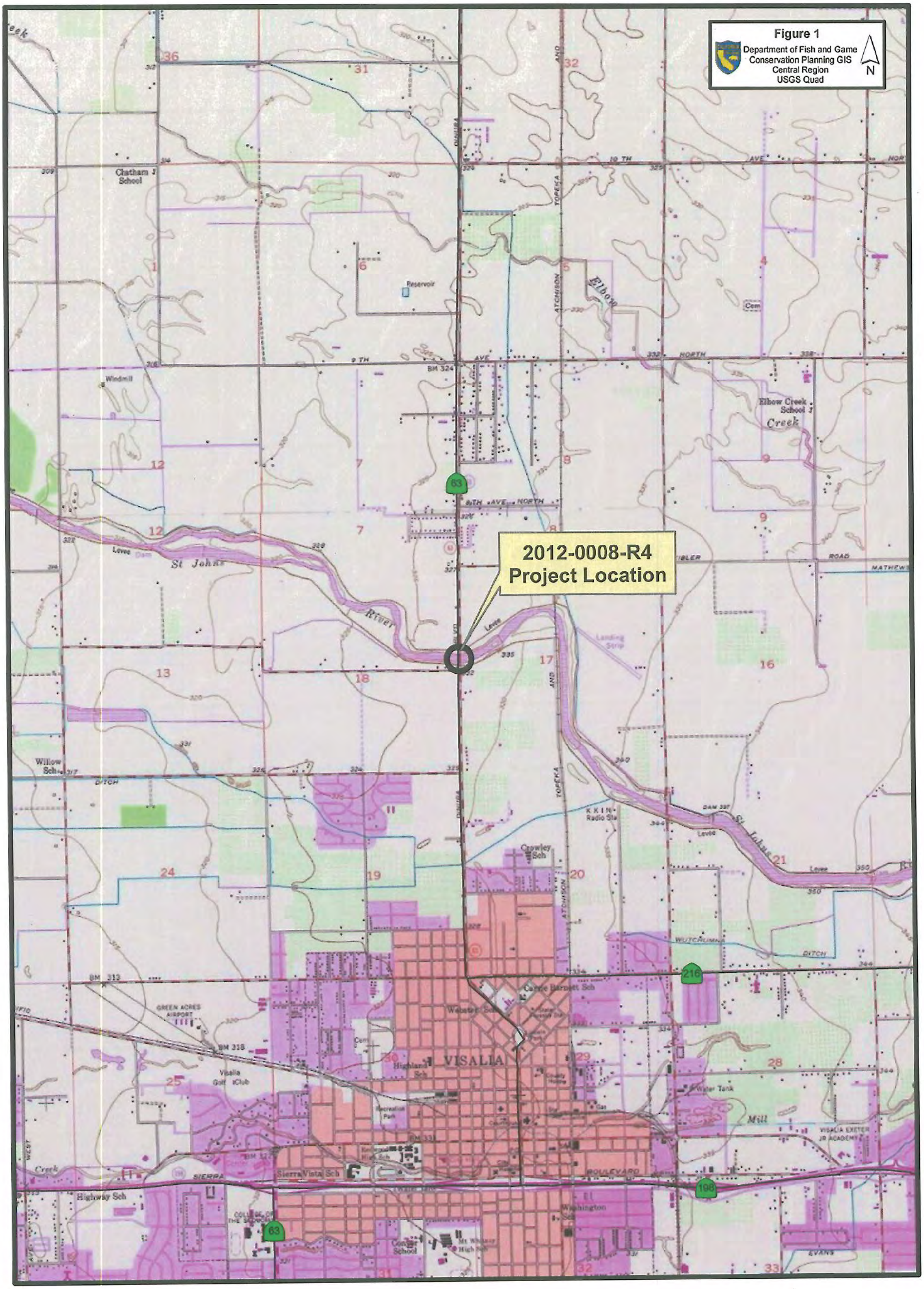


Figure 1
Department of Fish and Game
Conservation Planning GIS
Central Region
USGS Quad
N
2012-0008-R4
Project Location
St Johns
River
Elbow Creek School
Creek
Chatham School
Willow Sch.
Crowley Sch
KKIN Radio Sta
Landing Strip
VISALIA
Visalia Golf Club
GREEN ACRES AIRPORT
Highland Sch
Webster Sch
Carrie Barnett Sch
Sierra Vista Sch
Highway Sch
Washington Sch
Mt Whitney High Sch
Center School
VISALIA EXETER JR ACADEMY
Water Tank
Mill
Reservoir
Windmill
Levee
WUTCHUMNA
DITCH
BOULEVARD
SIERRA
EVANS
MATHEWS
ROAD
10 TH
AVE
9 TH
NORTH
TOPEKA
ATCHISON
DINUBA
63
216
198

SWHA Technical Advisory Committee May 31, 2000 protocol

Exhibit B

RECOMMENDED TIMING AND METHODOLOGY FOR SWAINSON'S HAWK NESTING SURVEYS IN CALIFORNIA'S CENTRAL VALLEY

Swainson's Hawk Technical Advisory Committee

May 31, 2000

This set of survey recommendations was developed by the Swainson's Hawk Technical Advisory Committee (TAC) to maximize the potential for locating nesting Swainson's hawks, and thus reducing the potential for nest failures as a result of project activities/disturbances. The combination of appropriate surveys, risk analysis, and monitoring has been determined to be very effective in reducing the potential for project-induced nest failures. As with most species, when the surveyor is in the right place at the right time, Swainson's hawks may be easy to observe; but some nest sites may be very difficult to locate, and even the most experienced surveyors have missed nests, nesting pairs, mis-identified a hawk in a nest, or believed incorrectly that a nest had failed. There is no substitute for specific Swainson's hawk survey experience and acquiring the correct search image.

METHODOLOGY

Surveys should be conducted in a manner that maximizes the potential to observe the adult Swainson's hawks, as well as the nest/chicks second. To meet the California Department of Fish and Game's (CDFG) recommendations for mitigation and protection of Swainson's hawks, surveys should be conducted for a ½ mile radius around all project activities, and if active nesting is identified within the ½ mile radius, consultation is required. In general, the TAC recommends this approach as well.

Minimum Equipment

Minimum survey equipment includes a high-quality pair of binoculars and a high quality spotting scope. Surveying even the smallest project area will take hours, and poor optics often result in eye-strain and difficulty distinguishing details in vegetation and subject birds. Other equipment includes good maps, GPS units, flagging, and notebooks.

Walking vs Driving

Driving (car or boat) or "windshield surveys" are usually preferred to walking if an adequate roadway is available through or around the project site. While driving, the observer can typically approach much closer to a hawk without causing it to fly. Although it might appear that a flying bird is more visible, they often fly away from the observer using trees as screens; and it is difficult to determine from where a flying bird came. Walking surveys are useful in locating a nest after a nest territory is identified, or when driving is not an option.

Angle and Distance to the Tree

Surveying subject trees from multiple angles will greatly increase the observer's chance of detecting a nest or hawk, especially after trees are fully leafed and when surveying multiple trees

in close proximity. When surveying from an access road, survey in both directions. Maintaining a distance of 50 meters to 200 meters from subject trees is optimal for observing perched and flying hawks without greatly reducing the chance of detecting a nest/young: Once a nesting territory is identified, a closer inspection may be required to locate the nest.

Speed
Travel at a speed that allows for a thorough inspection of a potential nest site. Survey speeds should not exceed 5 miles per hour to the greatest extent possible. If the surveyor must travel faster than 5 miles per hour, stop frequently to scan subject trees.

Visual and Aural Ques
Surveys will be focused on both observations and vocalizations. Observations of nests, perched adults, displaying adults, and chicks during the nesting season are all indicators of nesting Swainson's hawks. In addition, vocalizations are extremely helpful in locating nesting territories. Vocal communication between. hawks is frequent during territorial displays; during courtship and mating; through the nesting period as mates notify each other that food is available or that a threat exists; and as older chicks and fledglings beg for food.

Distractions
Minimize distractions while surveying. Although two pairs of eyes may be better than one pair at times, conversation may limit focus. Radios should be off, not only are they distracting, they may cover a hawk's call.

Notes and Species Observed
Take thorough field notes. Detailed notes and maps of the location of observed Swainson's hawk nests are essential for filling gaps in the Natural Diversity Data Base; please report all observed nest sites. Also document the occurrence of nesting great homed owls, red-tailed hawks, red-shouldered hawks and other potentially competitive species. These species will infrequently nest within 100 yards of each other, so the presence of one species will not necessarily exclude another.

TIMING

To meet **the minimum level** of protection for the species, surveys should be completed for **at least** the two survey periods immediately prior to a project's initiation. For example, if a project is scheduled to begin on June 20, you should complete 3 surveys in Period III and 3 surveys in Period V. However, it is always recommended that surveys be completed in Periods II, III and V. **Surveys should not be conducted in Period IV.**

The survey periods are defined by the timing of migration, courtship, and nesting in a "typical" year for the majority of Swainson's hawks from San Joaquin County to Northern Yolo County. Dates should be adjusted in consideration of early and late nesting seasons, and geographic differences (northern nesters tend to nest slightly later, etc). If you are not sure, contact a TAC member or CDFG biologist.

Survey dates **Justification and search image**	**Survey time**	**Number of Surveys**
I. *January-March 20 (recommended optional)*	*All day*	*1*

Prior to Swainson's hawks returning, it may be helpful to survey the project site to determine potential nest locations. Most nests are easily observed from relatively long distances, giving the surveyor the opportunity to identify potential nest sites, as well as becoming familiar with the project area. It also gives the surveyor the opportunity to locate and map competing species nest sites such as great homed owls from February on, and red-tailed hawks from March on. After March 1, surveyors are likely to observe Swainson's hawks staging in traditional nest territories.

II. *March 20 to April 5*	*Sunrise to 1000* *1600 to sunset*	*3*

Most Central Valley Swainson's hawks return by April 1, and immediately begin occupying their traditional nest territories. For those few that do not return by April 1, there are often hawks ("floaters") that act as place-holders in traditional nest sites; they are birds that do not have mates, but temporarily attach themselves to traditional territories and/or one of the site's "owners." Floaters are usually displaced by the territories' owner(s) if the owner returns.

Most trees are leafless and are relatively transparent; it is easy to observe old nests, staging birds, and competing species. The hawks are usually in their territories during the survey hours, but typically soaring and foraging in the mid-day hours. Swainson's hawks may often be observed involved in territorial and courtship displays, and circling the nest territory. Potential nest sites identified by the observation of staging Swainson's hawks will usually be active territories during that season, although the pair may not successfully nest/reproduce that year.

III. *April 5 to April 20*	*Sunrise to 1200* *1630 to Sunset*	*3*

Although trees are much less transparent at this time, 'activity at the nest site increases significantly. Both males and females are actively nest building, visiting their selected site frequently. Territorial and courtship displays are increased, as is copulation. The birds tend to vocalize often, and nest locations are most easily identified. This period may require a great deal of "sit and watch" surveying.

IV. *April 21 to June 10*	*Monitoring known nest sites only* ***Initiating Surveys is not recommended***	

Nests are extremely difficult to locate this time of year, and even the most experienced surveyor will miss them, especially if the previous surveys have not been done. During this phase of nesting, the female Swainson's hawk is in brood position, very low in the nest, laying eggs, incubating, or protecting the newly hatched and vulnerable chicks; her head may or may not be visible. Nests are often well-hidden, built into heavily vegetated sections of trees or in clumps of mistletoe, making them all but invisible. Trees are usually not viewable from all angles, which may make nest observation impossible.

Following the male to the nest may be the only method to locate it, and the male will spend hours away from the nest foraging, soaring, and will generally avoid drawing attention to the nest site. Even if the observer is fortunate enough to see a male returning with food for the female, if the female determines it is not safe she will not call the male in, and he will not approach the nest; this may happen if the observer, or others, are too close to the nest or if other threats, such as rival hawks, are apparent to the female or male.

V. ***June 10 to JuIy 30 (post-fledging)*** ***Sunrise to 1200*** ***3***
1600 to sunset

Young are active and visible, and relatively safe without parental protection. Both adults make numerous trips to the nest and are often soaring above, or perched near or on the nest tree. The location and construction of the nest may still limit visibility of the nest, young, 'and adults.

DETERMINING A PROJECT'S POTENTIAL
FOR IMPACTING SWAINSON'S HAWKS

LEVEL OF RISK	REPRODUCTIVE SUCCESS (Individuals)	LONGTERM SURVIVABILITY (Population)	NORMAL SITE CHARACTERISTICS (Daily Average)	NEST MONI-TORING
HIGH	Direct physical contact with the nest tree while the birds are on eggs or protecting young. (Helicopters in close proximity)	Loss of available foraging area.	Little human-created noise, little human use: nest is well away from dwellings, equipment yards, human access areas, etc. *Do not include general cultivation practices in evaluation.*	**MORE**
		Loss of nest trees.		
	Loss of nest tree after nest building is begun prior to laying eggs.	Loss of potential nest trees.		
	Personnel within 50 yards of nest tree (out of vehicles) for extended periods while birds are on eggs or protecting young that are < 10 days old.	Cumulative: Multi-year, multi-site projects with substantial noise/personnel disturbance.		
	Initiating construction activities (machinery and personnel) within 200 yards of the nest after eggs are laid and before young are > 10 days old.	Cumulative: Single-season projects with substantial noise/personnel disturbance that is greater than or significantly different from the daily norm.		
	Heavy machinery only working within 50 yards of nest.			
	Initiating construction activities within 200 yards of nest before nest building begins or after young > 10 days old.	Cumulative: Single-season projects with activities that "blend" well with site's "normal' activities.	Substantial human-created noise and occurrence: nest is near roadways, well-used waterways, active airstrips, areas that have high human use. *Do not include general cultivation practices in evaluation.*	
LOW	All project activities (personnel and machinery) greater than 200 yards from nest.			**LESS**

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: March 18, 2011

File: 06-TUL-99
PM R43.41
06-OC1301
Project No.0600000025
Avenue 328 OC
Bridge No. 46-0198

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) for the proposed seismic retrofit of Avenue 328 Overcrossing (OC), Bridge Number 46-0198 located in Tulare County. The purpose of this report is to document and discuss site subsurface geotechnical conditions, and to provide geotechnical recommendations for design and construction of the project. Subsurface conditions at the project site were interpreted from the As-Built Log of Test Borings (LOTBs) for the existing bridge. Field exploration was not performed for the purposes of this report.

To prepare this report, OGDN:

1. Review the following documents:

   - Project Scope Summary Report, Structure Rehabilitation, 06-Various Counties & Routes, 06225/06-0C1301, RAS – HA21 Program, August 2005
   - As-Built General Plan, Avenue 328 Overcrossing – Modification, Bridge No. 46-198, Contract No. 06-177624, November 30, 1982
   - As-Built Foundation Plan, Avenue 328 Overcrossing, Bridge No. 46-198, Contract No. 63-6V13C2, January 2, 1963

- As-Built Abutment Details No. 1, Avenue 328 Overcrossing, Bridge No. 46-198, Contract No. 63-6V13C2, January 2, 1963
- As-Built Abutment Details No. 2, Avenue 328 Overcrossing, Bridge No. 46-198, Contract No. 63-6V13C2, January 2, 1963
- As-Built Bent Details, Avenue 328 Overcrossing, Bridge No. 46-198, Contract No. 63-6V13C2, January 2, 1963
- As-Built Log Of Test Boring, Avenue 328 Overcrossing, Bridge No. 46-198, Contract No. 63-6V13C2, January 3, 1963
- Geologic Map of California – Fresno Sheet, Scale 1: 250,000, California Division of Mines and Geology, 1965
- Soil Survey of Tulare County California, United State Department of Agriculture, September, 1986
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 18S23E11B001M and 18S23E02Q001M, Department of Water Resources

OGDN also

2. Performed geotechnical engineering and seismic analyses, and
3. Prepared this report.

2.0 Project Description

Avenue 328 OC is a generally east-west aligning bridge overcrossing Highway 99 with a skew of about 28°. The proposed project will structurally retrofit the existing bridge to correct its seismic deficiency so that the bridge will conform to Caltrans guideline in terms of safety for public use. The retrofit work will include adding five in-fill walls to the bents, with one in-fill wall at each bent.

16-inch Cast-In-Drilled-Hole (CIDH) Pile foundation has been considered to support the in-fill walls. Foundation design loads have been provided to us and are shown in the tables below.

Table 1 Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Abut 1	--	--	--	--	--	--	--	--
Bent 2	LRFD	16" CIDH	275.0	270.0	3.0	22.0	0.5	6
Bent 3	LRFD	16" CIDH	277.0	271.0	3.0	22.0	0.5	6
Bent 4	LRFD	16" CIDH	278.0	271.0	3.0	22.0	0.5	6
Bent 5	LRFD	16" CIDH	277.0	268.5	3.0	22.0	0.5	6
Bent 6	LRFD	16" CIDH	275.0	268.5	3.0	22.0	0.5	6
Abut 7	--	--	--	--	--	--	--	--

Table 2 Foundation Design Loads

Support No.	**Service-I Limit State (kips)**			**Strength Limit State (kips)**				**Extreme Event Limit States (kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	--	--	--	--	--	--	--	--	--	--	--
Bent 2	212	80	212	255	45	--	--	212	40	--	--
Bent 3	216	80	216	260	45	--	--	216	40	--	--
Bent 4	234	80	234	280	50	--	--	234	40	--	--
Bent 5	260	70	260	310	50	--	--	260	40	--	--
Bent 6	260	70	260	310	50	--	--	260	40	--	--
Abut 7	--	--	--	--	--	--	--	--	--	--	--

3.0 Topography and Geology

3.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations in the immediate vicinity of the existing bridge are on the order of 279 feet above Mean Sea Level (MSL). The majority of the lands are used for agriculture purposes.

3.2 Geology

The site is situated in the Great Valley geomorphic province of California, an elongated lowland between the Sierra Nevada Mountains and the Coast Ranges. Unconsolidated Recent and Pleistocene sediments eroded from the Sierra Nevada Mountains and the Coast Range form the surface of the Great Valley. Below the surface of the Great Valley, a sequence of sedimentary rock deposited from the Mesozoic (Jurassic and Cretaceous) to the Cenozoic extends to as deep as 15,000 feet. Locally, Pleistocene fan deposit "Q_f" consisting of sediments from the surrounding high lands underlies the project site and its vicinity.

4.0 Subsurface Conditions

4.1 Soil Conditions

Based on the As-Built LOTBs of the existing bridge, the subsurface materials at the site consisted primarily of sands, silts, and their mixtures. The materials extended to the maximum depths explored by the borings of about 50 feet. The As-Built LOTBs show that the Standard Penetration Test (SPT) resistance values recorded in these materials ranged from approximately 9 to over 100 blows per foot (bpf), which indicates that the materials exhibited loose to very dense apparent densities. Based on the As-Built LOTBs, the loose materials were surfacial and localized. Rock was not encountered by the borings at the site.

The As-Built LOTBs are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded

when completed. Mrs. Irma Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on the LOTBs.

4.2 Groundwater Conditions

Groundwater was not encountered by the borings at the site at the time of exploration. Groundwater data recorded in the water wells of the Department of Water Resources (DWR) is used to obtain the groundwater conditions at the site. Two water wells located near the project site are selected. Data recorded in the wells are presented in the table below.

Table 3 Groundwater Data

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
18S23E11B001M	36.3850	119.4441	226.8 – 238.1	Feb. 1967 – Oct. 1969
18S23E02Q001M	36.3856	119.4443	172.0 – 250.1*	Feb. 1952 – Feb. 2007

* Groundwater elevations adjacent to 250 feet were recorded only in localized time period between 1950 and 1960. See discussion in the paragraph below.

The groundwater elevations higher than 240 feet in Well 18S23E02Q001M were recorded in a localized early time period between 1950 and 1960. All groundwater levels recorded in this well after 1960 were near or below the elevation of 240 feet. Further, all groundwater levels recorded in this well after 1990 were below the elevation of 220 feet. As such, based on the pile cut-off elevations of 268.5 to 271 feet and the pile lengths recommend below for the proposed in-fill walls, groundwater is not anticipated to affect the proposed CIDH pile constructions.

It should be noted that groundwater conditions may have changed significantly since the time of the above groundwater levels were recorded and groundwater conditions will vary in accordance to variations in rainfall, well pumping, and other activities in the area.

4.3 Corrosion Evaluation

Based on the available geologic information and the results of previous projects, the subsurface soils at the sites are considered non-corrosive.

5.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Parksfield section, Caltrans Fault ID No. of 312) with a maximum magnitude (Mmax) of 7.9, which is located west of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 64.6 miles. The fault is identified as a right lateral strike slip fault with a vertical dip of 90 degrees (Deg).

Based on the soil data, a shear wave velocity, Vs30, was estimated using the SPT blow counts shown on the As-Built LOTBs and the correlation formulas for the granular soil. The estimated Vs30 is about 1010 feet per second (f/s).

Using the above estimated Vs30, a spectral acceleration (SA) was generated from the fault. Another SA was obtained from the "USGS 2008 Interactive Deaggregation (Beta)" based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. These two SA were then compared with the statewide minimum deterministic spectrum. By comparison, the SA generated from the fault is less than the SA obtained from USGS probability model, which is in turn less than the statewide minimum spectrum at lower periods (less than 0.5 Sec.). At greater period (greater than 0.5 Sec.), the SA generated from the fault is less than the statewide minimum spectrum, which is again less than the SA obtained from the USGS probability model. Therefore, the recommended design Acceleration Response Spectrum (ARS) curve is a composite curve consisting the statewide minimum spectrum for lower periods (less than 0.5 Sec.) and the SA obtained from the USGS probability model for greater periods (greater than 0.5 Sec.). The design ARS curve with an estimated peak ground acceleration of 0.23g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate insignificant potential for liquefaction at the site during earthquake.

Furthermore, the potential for surface rupture at the site due to fault movement is considered insignificant since there is no known fault projecting towards or passing directly through the project site.

6.0 As-Built Foundation Data

The Avenue 328 OC bridge was built in 1962. In 1982, an upgrade was made to the girders at Spans 3, 4, and 5. Based on the As-Built plans and the bridge inspection reports, the bridge is a six-span, 413-foot-long, pre-cast, pre-stressed, concrete I-girder (at middle spans) and T-girder (at end spans) structure supported on reinforced concrete column bents and open end diaphragm abutments. The abutments and bents are all supported on 16-inch CIDH piles with a design load of 90 kips. The average pile length is about 34 feet.

7.0 Foundation Recommendations

The available subsurface data suggests that the site is suitable for CIDH pile foundations to support the in-fill walls. Recommendations for the 16-inch CIDH pile foundation are presented in the following tables.

Table 1 Foundation Recommendations For Bent In-Fill Walls

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
			Total	Permanent	Comp. Φ=0.7	Tens. Φ=0.7	Comp. Φ=1.0	Tens. Φ=1.0		
Bent 2 In-Fill Wall	16" CIDH	270.0	212	80	45	--	40	--	a-I (247) a-II (250)	247
Bent 3 In-Fill Wall	16" CIDH	271.0	216	80	45	--	40	--	a-I (248) a-II (251)	248
Bent 4 In-Fill Wall	16" CIDH	271.0	234	80	50	--	40	--	a-I (247) a-II (251)	247
Bent 5 In-Fill Wall	16" CIDH	268.5	260	70	50	--	40	--	a-I (244.5) a-II (248.5)	244.5
Bent 6 In-Fill Wall	16" CIDH	268.5	260	70	50	--	40	--	a-I (244.5) a-II (248.5)	244.5

Notes:

1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the load data provided by SD.
2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 2 Bent CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Bent 2	16" CIDH	65	--	a-I (247) a-II (250)	247
Bent 3	16" CIDH	65	--	a-I (248) a-II (251)	248
Bent 4	16" CIDH	71	--	a-I (247) a-II (251)	247
Bent 5	16" CIDH	71	--	a-I (244.5) a-II (248.5)	244.5
Bent 6	16" CIDH	71	--	a-I (244.5) a-II (248.5)	244.5

Notes:
1. The Design Tip Elevations are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.

8.0 Construction Consideration

CIDH Piles

Localized loose materials were documented by the As-Built LOTBs at the site. These materials often elevate potential of caving during drilling of CIDH piles. Depending on the actual condition, if caving occurs, temporary casing may become necessary. Temporary casings, if used, shall be retrieved from the drilled shafts.

The drilled shafts shall be inspected and approved by the Engineer prior to concrete placement.

9.0 Disclaimer and Contact Information

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design. If any change is made during final project design, OGDN should review the change to determine if these foundation recommendations are applicable.

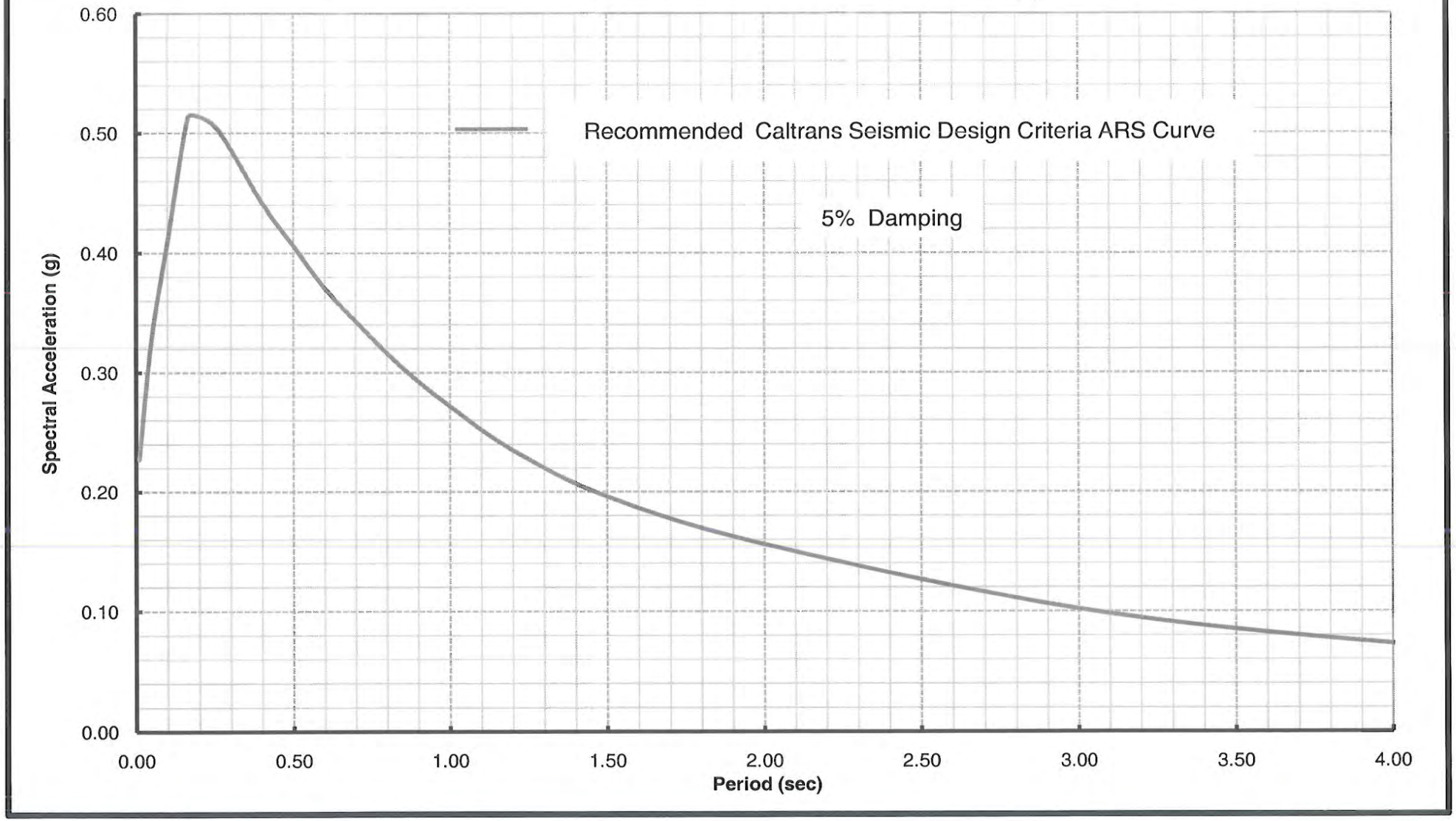
If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E
District Material Engineer, Doug Lambert

ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



Caltrans	DEPARTMENT OF TRANSPORTATION Division of Engineering Services Geotechnical Services Office of Geotechncial Design - North (OGDN)	Project No./EA:	0600000025 /06-0C1301
		DATE:	3/18/2011
		06-TUL-99 PM R43.41 Avenue 328 OC (Br. No. 46-0198)	
		Recommended Acceleration Response Spectrum	Figure 1

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: March 17, 2011

File: 06-KER-99
PM R36.52
06-OC1301
Project No.0600000025
Lerdo Highway OC
Bridge No. 50-0235

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) for the proposed seismic retrofit of Lerdo Highway Overcrossing (OC), Bridge Number 50-0235 located in Kern County. The purpose of this report is to document and discuss site subsurface geotechnical conditions, and to provide geotechnical recommendations for design and construction of the project. Subsurface conditions were interpreted from the As-Built Log of Test Boring (LOTB) for the existing bridge. Field exploration was not performed for the purposes of this report.

To prepare this report, OGDN:

1. Review the following documents:
   - Project Scope Summary Report, Structure Rehabilitation, 06-Various Counties & Routes, 06225/06-0C1301, RAS – HA21 Program, August 2005
   - As-Built General Plan, Lerdo Highway Overcrossing Alterations, Bridge No. 50-235, Contract No. 06-032924 (501), January 5, 1968
   - As-Built Foundation Plan, Lerdo Highway Overcrossing Alterations, Bridge No. 50-235, Contract No. 06-032924, October 3, 1968

- As-Built Abutment Wall Details, Lerdo Highway Overcrossing Alterations, Bridge No. 50-235, Contract No. 06-032924, January 5, 1968
- As-Built Retaining Wall Layout, Lerdo Highway Overcrossing Alterations, Bridge No. 50-235, Contract No. 06-032924, October 3, 1968
- As-Built Log Of Test Borings, Lerdo Highway Overcrossing Alterations, Bridge No. 50-235, Contract No. 06-032924, October 3, 1968
- As-Built General Plan, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- As-Built Foundation Plan, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- As-Built Abutment 1, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- As-Built Abutment 3, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- As-Built Type 1 Cantilever Retaining Wall, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- As-Built Log Of Test Boring, Lerdo Highway Overcrossing, Bridge No. 50-235, Contract No. 60—6VC13, July 12, 1961
- Geologic Map of California – Bakersfield Sheet, California Geologic Survey, Geologic Atlas of California Map No. 002, 1:250,000 scale, Compilation by Arthur R. Smith, 1964
- Soil Survey of Kern County California, United State Department of Agriculture, September, 1986
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 18S21E26P001M, 18S22E31E001M, 19S21E01B002M, and 19S21E02F001M, Department of Water Resources

Also, OGDN

2. Performed engineering and seismic analyses, and
3. Prepared this report.

2.0 Project Description

Lerdo Highway OC is a generally east-west aligning bridge overcrossing Highway 99 with a skew of about 47°. The proposed project will structurally retrofit the existing bridge to correct its seismic deficiency so that the bridge will conform to Caltrans guideline in terms of safety for public use. The retrofit will add three in-fill walls to Bent 2 at Bay 1(between Columns 1 and 2), Bay 3 (between Columns 3 and 4), and Bay 5 (between Columns 5 and 6).

16-inch Cast-In-Drilled-Hole (CIDH) Pile foundation has been considered to support the in-fill walls. Foundation design loads have been provided to us and are shown in the tables below.

Table 1 Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Abut 1	--	--	--	--	--	--	--	--
Bent 2	LRFD	16" CIDH	426.0	422.0	3.0	16.0	0.5	3
Abut 3	--	--	--	--	--	--	--	--

Table 2 Foundation Design Loads

Support No.	**Service-I Limit State (kips)**			**Strength Limit State (kips)**				**Extreme Event Limit States (kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	--	--	--	--	--	--	--	--	--	--	--
Bent 2	165	60	165	200	70	--	--	165	60	--	--
Abut 3	--	--	--	--	--	--	--	--	--	--	--

3.0 Topography and Geology

3.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations in the immediate vicinity of the existing bridge range approximately from 427 feet to 432 feet above Mean Sea Level (MSL). The majority of the lands are used for agriculture purposes. There are commercial and industrial developments to the west of the project site/Highway 99.

3.2 Geology

The site is situated in the Great Valley geomorphic province of California, an elongated lowland between the Sierra Nevada Mountains and the Coast Ranges. Unconsolidated Recent and Pleistocene sediments eroded from the Sierra Nevada Mountains and the Coast Range form the surface of the Great Valley. Below the surface of the Great Valley, a sequence of sedimentary rock deposited from the Mesozoic (Jurassic and Cretaceous) to the Cenozoic extends to as deep as 15,000 feet.

Locally, Pleistocene non-marine deposit "Q_c" consisting of sediments deposited from streams emerging from surrounding high lands underlies the project site and its vicinity.

4.0 Subsurface Conditions

4.1 Soil Conditions

Based on the As-Built LOTBs of the existing bridge, the subsurface materials at the site consist primarily of sands, silts, and their mixtures. The materials extend to the maximum depths explored by the borings of about 60 feet. The Standard Penetration Test (SPT) resistance values recorded in these materials ranged from approximately 3 to over 50 blows per foot (bpf), which indicate that these materials exhibited very loose to very dense apparent densities. Based on the As-Built LOTBs, the very loose and loose materials were predominantly surfacial and localized.

Rock was not encountered by the borings at the site.

The As-Built LOTB are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. Irma Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on the LOTBs.

4.2 Groundwater Conditions

Groundwater was not encountered by the borings at the site at the time of exploration.

Groundwater data recorded in the water wells of the Department of Water Resources is used to obtain the groundwater conditions at the site. Three water wells located near the project site are selected. Data recorded in the wells are presented in the table below.

Table 3 Groundwater Data

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
28S26E16A001M	35.4989	119.1709	136.8 – 185.0	Sept. 1971 – Oct. 2010
28S26E14D001M	35.5000	119.1502	99.0 – 187.0	Sept. 1979 – Oct. 2010
28S22E16A001M	35.4992	119.1659	237.0 – 241.8	Jan. 2006 – Sept. 2007

Based on the proposed pile cut-off elevation of 422 feet, the data shown in the above table indicate that groundwater is at about 200 to 343 feet below the bottom of the pile cap. As such, groundwater is not anticipated to affect the proposed CIDH pile construction.

It should be noted that groundwater conditions may have changed significantly since the time of the above groundwater levels were recorded and will vary according to variations in rainfall, well pumping, and other activities.

4.3 Corrosion Evaluation

Based on the available geologic information and the results of previous projects, the subsurface soils at the sites are considered non-corrosive.

5.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Cholame – Carrizo section – southern, Caltrans Fault ID No. of 313) with a maximum magnitude (Mmax) of 7.8, which is located west of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 37.9 miles. The fault is identified as a right lateral strike slip fault with a vertical dip of 90 degrees (Deg).

Based on the soil data, a shear wave velocity, Vs30, was estimated using the SPT blow counts shown in the As-Built LOTBs and the correlation formulas for the granular soil. The estimated Vs30 is about 920 feet per second (f/s).

Using the above estimated Vs30, the spectral acceleration (SA) generated from the fault is less than the statewide minimum, which is again less than the probabilistic spectral acceleration obtained from the "USGS 2008 Interactive Deaggregation (Beta)" web site. The probabilistic method is based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. Therefore, the recommended design Acceleration Response Spectrum (ARS) curve is based on the result of the probabilistic approach. The design ARS curve with an estimated peak ground acceleration of 0.34g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate insignificant potential for liquefaction during earthquake due to a deep groundwater condition at the site.

Furthermore, the potential for surface rupture at the site due to fault movement is considered insignificant since there is no known fault projecting towards or passing directly through the project site.

6.0 As-Built Foundation Data

The Lerdo Highway OC bridge was built in 1961. In 1968, a Type 1 retaining wall was added to the bridge near Abutment 1.

The Lerdo Highway OC bridge is a two-span, 247-foot-long, pre-cast, pre-stressed, concrete I-girder structure supported on reinforced concrete column bent and closed end cantilever abutments. Based on the As-Built plans and the bridge inspection reports, Abutment 1 of the bridge is supported on driven steel H-piles. Bent 2 and Abutment 3 are supported on 16-inch CIDH piles. The added Type-1 retaining wall is also supported on 16-inch CIDH piles.

7.0 Foundation Recommendations

The available subsurface data suggests that the site is suitable for CIDH pile foundations to support the in-fill walls. Recommendations for the 16-inch CIDH pile foundations are presented in the following tables.

Table 1 Foundation Recommendations For Bent 2 In-Fill Walls

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		Factored Nominal Resistance (kips)				Design Tip Elevations[8] (ft)	Specified Tip Elevation[8] (ft)
					Strength Limit		Extreme Limit			
			Total	Permanent	Comp. Φ=0.7	Tens. Φ=0.7	Comp. Φ=1.0	Tens. Φ=1.0		
Bent 2	16" CIDH	422.0	165	165	70	--	60	--	a-I (394) a-II (388)	394

Notes:

1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the load data provided by SD.
2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.
7. Unsuitable soil layers (scourable) that do not contribute to the design nominal resistance exist at Bents 2 and 3 extending to elevation of –10 feet.

Table 2 Bent 2 CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)[5]	Specified Tip Elevation (ft)[5]
		Compression	Tension		
Bent 2	16" CIDH	100	--	394 (a-II) 388 (a-I)	394

Notes:
1. The Design Tip Elevations are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.
5. Unsuitable soil layers (scourable) that do not contribute to the design nominal resistance exist at Bents 2 and 3 extending to elevation of –10 feet.

8.0 Construction Consideration

CIDH Piles

Loose and very loose materials were documented by the As-Built LOTBs at the site. These materials often elevate the potential of caving during drilling of CIDH piles. Depending on the actual condition, if caving occurs, temporary casing may become necessary. Temporary casings, if used, shall be retrieved from the drilled shafts.

The drilled shafts shall be inspected and approved by the Engineer prior to concrete placement.

9.0 Disclaimer and Contact Information

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design. If any changes are made during final project design, OGDN should review those changes to determine if these foundation recommendations are still applicable.

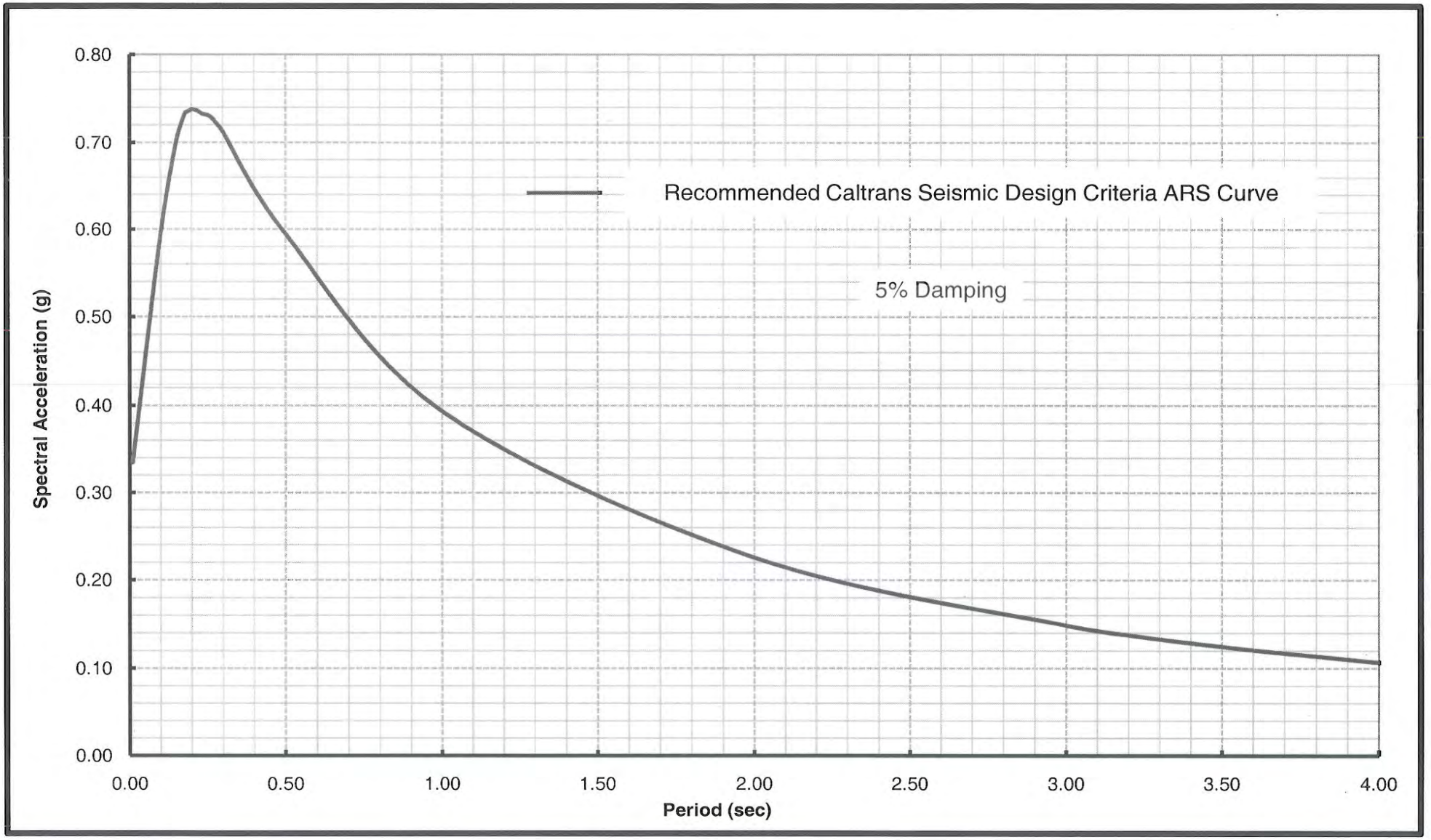
If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



Caltrans	DEPARTMENT OF TRANSPORTATION Division of Engineering Services Geotechnical Services Office of Geotechncial Design - North (OGDN)	Project No./EA:	0600000025 /06-0C1301
		DATE:	3/4/2011
		06-KER-99 PM R36.52 Lerdo Highway OC (Br. No. 50-0235)	
		Recommended Acceleration Response Spectrum	Figure 1

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: March 17, 2011

File: 06-KER-99
PM R50.14
06-OC1301
Project No.0600000025
Elmo Highway OC
Bridge No. 50-0233

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) for the proposed seismic retrofit of Elmo Highway Overcrossing (OC), Bridge Number 50-0233 located in Kern County. The purpose of this report is to document and discuss site subsurface geotechnical conditions, and to provide geotechnical recommendations for design and construction of the project. Subsurface conditions were interpreted from the As-Built Log of Test Borings (LOTBs) for the existing bridge. Field exploration was not performed for the purposes of this report.

To prepare this report, OGDN:

1. Review the following documents:
   - Project Scope Summary Report, Structure Rehabilitation, 06-Various Counties & Routes, 06225/06-0C1301, RAS – HA21 Program, August 2005
   - As-Built General Plan, Elmo Highway Overcrossing, Bridge No. 50-233, Contract No. 62-6V13C5, March 7, 1963
   - As-Built Foundation Plan, Elmo Highway Overcrossing, Bridge No. 50-233, Contract No. 62-6V13C5, March 1963

- As-Built Abutment Details, Elmo Highway Overcrossing, Bridge No. 50-233, Contract No. 62-6V13C5, March 1963
- As-Built Bent Details, Elmo Highway Overcrossing, Bridge No. 50-233, Contract No. 62-6V13C5, March 1963
- As-Built Log Of Test Borings, Elmo Highway Overcrossing, Bridge No. 50-233, Contract No. 62-6V13C5, March 1963
- Geologic Map of California – Bakersfield Sheet, Scale 1: 250,000, California Geological Survey, Geologic Atlas of California Map No. 002, 1:250,000 scale Compilation by: Arthur R. Smith, 1964
- Soil Survey of Kern County California, Northwestern Part, United State Department of Agriculture, September, 1988
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 26S25E01P002M and 26S25E12B001M, Department of Water Resources

Also, OGDN

2. Performed engineering and seismic analyses, and
3. Prepared this report.

2.0 Project Description

Elmo Highway OC is a generally east-west aligning bridge overcrossing Highway 99. The proposed project will structurally retrofit the existing bridge to correct its seismic deficiency so that the bridge will conform to Caltrans guideline in terms of safety for public use. The retrofit will add six in-fill walls to the bents, with one in-fill wall at each bent.

16-inch Cast-In-Drilled-Hole (CIDH) Pile foundation has been considered to support the in-fill walls. Foundation design loads have been provided to us and are shown in the tables below.

Table 1 Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Abut 1	--	--	--	--	--	--	--	--
Bent 2	LRFD	16" CIDH	343.0	337.0	3.0	14.5	0.5	3
Bent 3	LRFD	16" CIDH	343.0	335.0	3.0	14.5	0.5	3
Bent 4	LRFD	16" CIDH	343.0	335.0	3.0	14.5	0.5	3
Bent 5	LRFD	16" CIDH	343.0	338.0	3.0	14.5	0.5	3
Bent 6	LRFD	16" CIDH	343.0	338.0	3.0	14.5	0.5	3
Abut 7	--	--	--	--	--	--	--	--

Table 2 Foundation Design Loads

Support No.	**Service-I Limit State (kips)**			**Strength Limit State (kips)**				**Extreme Event Limit States (kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	--	--	--	--	--	--	--	--	--	--	--
Bent 2	160	60	160	190	70	--	--	160	60	--	--
Bent 3	190	70	190	230	80	--	--	190	70	--	--
Bent 4	200	70	200	240	80	--	--	200	70	--	--
Bent 5	190	70	190	230	80	--	--	190	70	--	--
Bent 6	185	70	185	220	80	--	--	185	70	--	--
Abut 7	--	--	--	--	--	--	--	--	--	--	--

3.0 Topography and Geology

3.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations in the immediate vicinity of the existing bridge are on the order of 346 feet above Mean Sea Level (MSL). The majority of the lands are used for agriculture purposes. There are residential and industrial developments to the south of the project site.

3.2 Geology

The site is situated in the Great Valley geomorphic province of California, an elongated lowland between the Sierra Nevada Mountains and the Coast Ranges. Unconsolidated Recent and Pleistocene sediments eroded from the Sierra Nevada Mountains and the Coast Range form the surface of the Great Valley. Below the surface of the Great Valley, a sequence of sedimentary rock deposited from the Mesozoic (Jurassic and Cretaceous) to the Cenozoic extends to as deep as 15,000 feet.

Locally, Pleistocene fan deposit "Q_f" consisting of sediments from the surrounding high lands underlies the project site and its vicinity.

4.0 Subsurface Conditions

4.1 Soil Conditions

Based on the As-Built LOTBs of the existing bridge, the subsurface materials at the site consist primarily of sands, silts, and their mixtures. The materials extend to the maximum depths explored by the borings of about 65 feet. The Standard Penetration Test (SPT) resistance values recorded in these materials ranged from approximately 11 to 44 blows per foot (bpf), which indicate that these materials exhibited medium dense to dense apparent densities.

Rock was not encountered by the borings at the site.

The As-Built LOTBs are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. Irma Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on the LOTBs.

4.2 Groundwater Conditions

Groundwater was not encountered by the borings at the site at the time of exploration.

Groundwater data recorded in the water wells of the Department of Water Resources is used to obtain the groundwater conditions at the site. Two water wells located near the project site are selected. Data recorded in the wells are presented in the table below.

Table 3 Groundwater Data

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
26S25E01P002M	35.6894	119.2340	88.0 – 266.5	Oct. 1959 – Sept. 2007
26S25E12B001M	35.6883	119.2284	75.8 – 184.5	Apr. 1970 – Jan. 1989

Based on the proposed pile cut-off elevations of 335 to 338 feet, the data shown in the above table indicate that groundwater is at about 70 to 260 feet below the bottoms of the pile caps. As such, groundwater is not anticipated to affect the proposed CIDH pile construction.

It should be noted that groundwater conditions may have changed significantly since the time of the above groundwater levels were recorded and will vary according to variations in rainfall, well pumping, and other activities.

4.3 Corrosion Evaluation

Based on the available geologic information and the results of previous projects, the subsurface soils at the sites are considered non-corrosive.

5.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Cholame – Carrizo section – central, Caltrans Fault ID No. of 258) with a maximum magnitude (Mmax) of 7.9, which is located west of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 43.1 miles. The fault is identified as a strike slip fault with a vertical dip of 90 degrees (Deg).

Based on the soil data, a shear wave velocity, Vs30, was estimated using the SPT blow counts shown in the As-Built LOTBs and the correlation formulas for the granular soil. The estimated Vs30 is about 900 feet per second (f/s).

Using the above estimated Vs30, the spectral acceleration (SA) generated from the fault is less than the statewide minimum, which is again less than the probabilistic spectral acceleration obtained from the "USGS 2008 Interactive Deaggregation (Beta)" web site. The probabilistic method is based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. Therefore, the recommended design Acceleration Response Spectrum (ARS) curve is based on the result of the probabilistic approach. The design ARS curve with an estimated peak ground acceleration of 0.30g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate insignificant potential for liquefaction during earthquake at the site.

Furthermore, the potential for surface rupture at the site due to fault movement is considered insignificant since there is no known fault projecting towards or passing directly through the project site.

6.0 As-Built Foundation Data

The Elmo Highway OC bridge was built in 1963. It is a six-span, 378-foot-long, pre-cast, pre-stressed, concrete I-girder (middle spans) and concrete T-girder (end spans) structure supported on reinforced concrete column bents and open end diaphragm abutments. All

abutments and bents are founded on 16-inch CIDH piles. Based on the As-Built plans, the average pile lengths are 27 and 30 feet.

7.0 Foundation Recommendations

The available subsurface data suggests that the site is suitable for CIDH pile foundations to support the in-fill walls. Recommendations for the 16-inch CIDH pile foundations are presented in the following tables.

Table 1 Foundation Recommendations For Bent In-Fill Walls

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
			Total	Permanent	Comp. Φ=0.7	Tens. Φ=0.7	Comp. Φ=1.0	Tens. Φ=1.0		
Bent 2	16" CIDH	337.0	160	160	70	--	60	--	a-I (309) a-II (314)	309
Bent 3	16" CIDH	335.0	190	190	80	--	70	--	a-I (305) a-II (311)	305
Bent 4	16" CIDH	335.0	200	200	80	--	70	--	a-I (305) a-II (311)	305
Bent 5	16" CIDH	338.0	190	190	80	--	70	--	a-I (308) a-II (314)	308
Bent 6	16" CIDH	338.0	185	185	80	--	60	--	a-I (308) a-II (315)	308

Notes:
1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the load data provided by SD.
2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.

3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 2 Bent CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Bent 2	16" CIDH	100	--	309 (a-I) 314 (a-II)	309
Bent 3	16" CIDH	115	--	305 (a-I) 311 (a-II)	305
Bent 4	16" CIDH	115	--	305 (a-I) 311 (a-II)	305
Bent 5	16" CIDH	115	--	308 (a-I) 314 (a-II)	308
Bent 6	16" CIDH	115	--	308 (a-I) 315 (a-II)	308

Notes:
1. The Design Tip Elevations are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.

8.0 Construction Consideration

CIDH Piles

Based on the As-Built LOTBs, a majority of the subsurface materials at the site are medium dense sands. However, loose surfacial materials were also documented. In addition, localized pockets of loose materials may present at the site. If encountered, these loose materials could elevate the potential of caving of drilled shafts. Depending on the actual condition, if caving occurs, temporary casing may become necessary. Temporary casings, if used, shall be retrieved from the drilled shafts.

The drilled shafts shall be inspected and approved by the Engineer prior to concrete placement.

9.0 Disclaimer and Contact Information

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design. If any changes are made during final project design, OGDN should review those changes to determine if these foundation recommendations are still applicable.

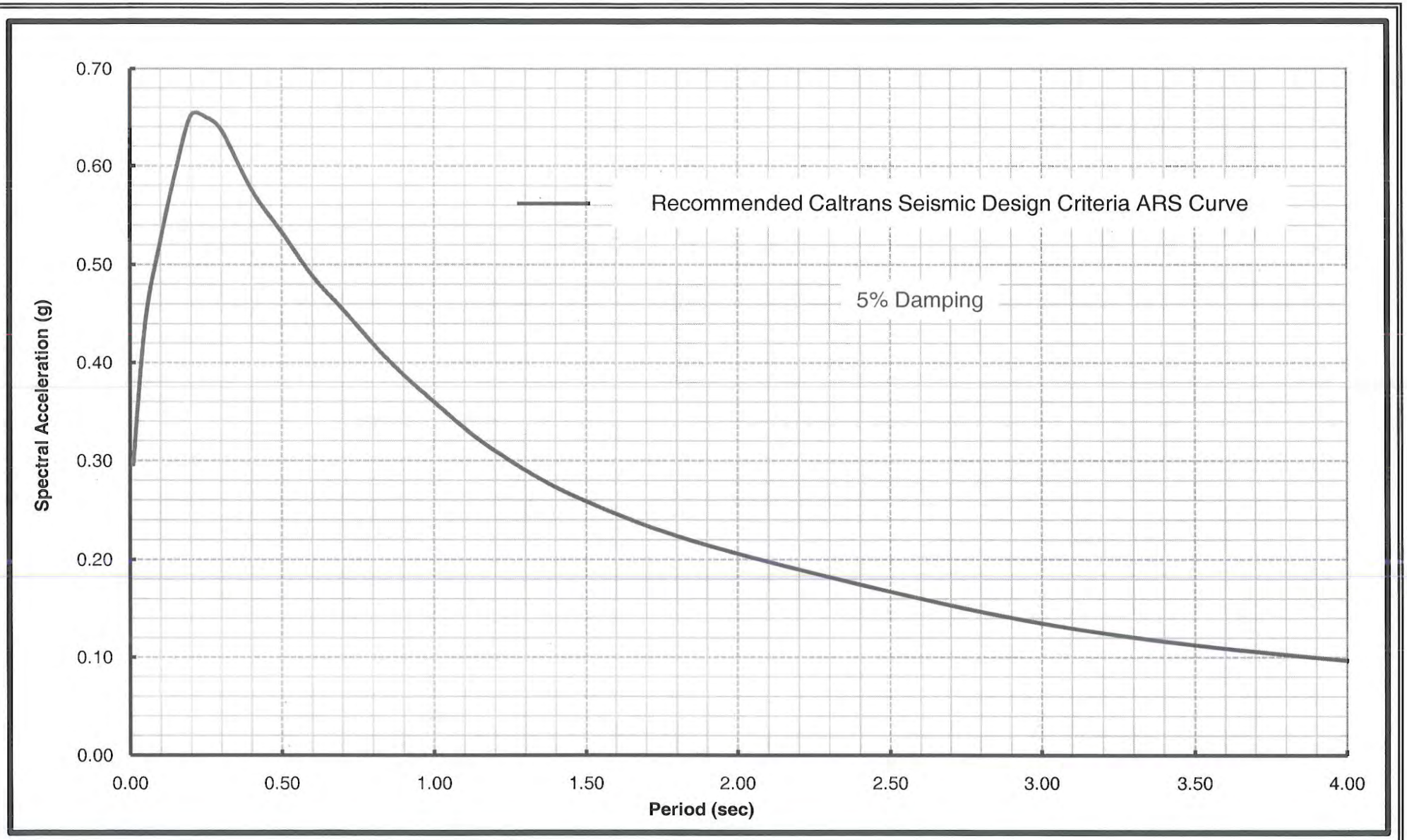
If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



Caltrans	DEPARTMENT OF TRANSPORTATION Division of Engineering Services Geotechnical Services Office of Geotechncial Design - North (OGDN)	Project No./EA:	0600000025 /06-0C1301
		DATE:	3/4/2011
		06-KER-99 PM R50.14 Elmo Highway OC (Br. No. 50-0233)	
		Recommended Acceleration Response Spectrum	Figure 1

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: March 17, 2011

File: 06-KER-99
PM R52.45
06-OC1301
Project No.0600000025
Pond Road OC
Bridge No. 50-0234

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) for the proposed seismic retrofit of Pond Road Overcrossing (OC), Bridge Number 50-0234 located in Kern County. The purpose of this report is to document and discuss site subsurface geotechnical conditions, and to provide geotechnical recommendations for design and construction of the project. Subsurface conditions at the project site were interpreted from the As-Built Log of Test Borings (LOTBs) for the existing bridge. Field exploration was not performed for the purposes of this report.

To prepare this report, OGDN:

1. Review the following documents:
   - Project Scope Summary Report, Structure Rehabilitation, 06-Various Counties & Routes, 06225/06-0C1301, RAS – HA21 Program, August 2005
   - As-Built General Plan, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 60-6VC8, February 9, 1961
   - As-Built Foundation Plan, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 60-6VC8, February 9, 1961

- As-Built Abutment Details, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 60-6VC8, February 9, 1961
- As-Built Bent Details, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 60-6VC8, February 9, 1961
- As-Built Pile Details, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 60-6VC8, February 9, 1961
- As-Built Log Of Test Borings, Pond Road Overcrossing, Bridge No. 50-234, Contract No. 63-6V13C2, February 9, 1961
- Geologic Map of California – Bakersfield Sheet, Scale 1: 250,000, California Geological Survey, Geologic Atlas of California Map No. 002, 1:250,000 scale Compilation by: Arthur R. Smith, 1964
- Soil Survey of Kern County California, Northwestern Part, United State Department of Agriculture, September, 1988
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 25S25E26R002M, 25S25E35A001M, 25S25E36C002M, and 25S25E25Q001M, Department of Water Resources

Also, OGDN

2. Performed geotechnical engineering and seismic analyses, and
3. Prepared this report.

2.0 Project Description

Pond Road OC is a generally east-west aligning bridge overcrossing Highway 99 with a skew of about 11°. The proposed project will structurally retrofit the existing bridge to correct its seismic deficiency so that the bridge will conform to Caltrans guideline in terms of safety for public use. The retrofit work will include adding two in-fill walls to each of the three bents, namely Bent 2, Bent 3, and Bent 4.

16-inch Cast-In-Drilled-Hole (CIDH) Pile foundation has been considered to support the in-fill walls. Foundation design loads have been provided to us and are shown in the tables below.

Table 1 Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Abut 1	--	--	--	--	--	--	--	--
Bent 2	LRFD	16" CIDH	319.0	314.0	3.0	9.5	0.5	2
Bent 3	LRFD	16" CIDH	320.0	314.0	3.0	9.5	0.5	2
Bent 4	LRFD	16" CIDH	319.0	314.0	3.0	9.5	0.5	2
Abut 5	--	--	--	--	--	--	--	--

Table 2 Foundation Design Loads

Support No.	**Service-I Limit State (kips)**			**Strength Limit State (kips)**				**Extreme Event Limit States (kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	--	--	--	--	--	--	--	--	--	--	--
Bent 2	85	50	85	100	50	--	--	85	50	--	--
Bent 3	95	50	95	115	60	--	--	95	50	--	--
Bent 4	100	50	100	120	60	--	--	100	50	--	--
Abut 5	--	--	--	--	--	--	--	--	--	--	--

3.0 Topography and Geology

3.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations in the immediate vicinity of the existing bridge are on the order of 321 feet above Mean Sea Level (MSL). The majority of the land is used for agriculture purposes.

3.2 Geology

The site is situated in the Great Valley geomorphic province of California, an elongated lowland between the Sierra Nevada Mountains and the Coast Ranges. Unconsolidated Recent and Pleistocene sediments eroded from the Sierra Nevada Mountains and the Coast Range form the surface of the Great Valley. Below the surface of the Great Valley, a sequence of sedimentary rock deposited from the Mesozoic (Jurassic and Cretaceous) to the Cenozoic extends to as deep as 15,000 feet.

Locally, Pleistocene fan deposit "Q_f" consisting of sediments from the surrounding high lands underlies the project site and its vicinity.

4.0 Subsurface Conditions

4.1 Soil Conditions

Based on the As-Built LOTB of the existing bridge, the subsurface materials at the site consist primarily of sands, silts, and their mixtures. The materials extend to the maximum depth explored by the boring of about 65 feet. The Standard Penetration Test (SPT) resistance values recorded in these materials ranged from approximately 9 to over 100 blows per foot (bpf), which indicate that these materials exhibited loose to very dense apparent densities. Based on the As-Built LOTBs, the loose materials appeared to be localized. Rock was not encountered by the boring at the site.

The As-Built LOTBs are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. Irma Gamarra-Remmen of the Contracts, graphics, & Records branch may be contacted directly for information on the LOTBs.

4.2 Groundwater Conditions

Groundwater was not encountered by the boring at the site at the time of exploration.

Groundwater data recorded in the water wells of the Department of Water Resources is used to obtain the groundwater conditions at the site. Four water wells located near the project site are selected. Data recorded in the wells are presented in the table below.

Table 3 Groundwater Data

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
25S25E26R002M	35.7205	119.2413	61.4 – 179.6	Jan. 1949 – Sept. 1960
25S25E35A001M	35.7150	119.2412	166.0 – 255.0	Sept. 1967 – Apr. 2006
25S25E36C002M	35.7172	119.2337	65.0 – 215.0	Oct. 1976 – Nov. 2004
25S25E25Q001M	35.7180	119.2310	72.7 – 191.5	Nov. 1945 – Feb. 1960

Based on the proposed pile cut-off elevations of 313 and 314 feet, the data shown in the above table indicate that groundwater is at about 58 to 252 feet below the bottoms of the pile caps. As such, groundwater is not anticipated to affect the proposed CIDH construction.

It should be noted that groundwater conditions may have changed significantly since the time of the above groundwater levels were recorded and will vary in accordance to variations in rainfall, well pumping, and other activities.

4.3 Corrosion Evaluation

Based on the available geologic information and the results of previous projects, the subsurface soils at the sites are considered non-corrosive.

5.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Cholame-Carrizo section-central, Caltrans Fault ID

No. of 258) with a maximum magnitude (Mmax) of 7.9, which is located west of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 43.8 miles. The fault is identified as a strike slip fault with a vertical dip of 90 degrees (Deg).

Based on the soil data, a shear wave velocity, Vs30, was estimated using the SPT blow counts and the correlation formulas for the granular soil. The estimated Vs30 is about 980 feet per second (f/s).

Using the above estimated Vs30, the spectral acceleration (SA) generated from the fault is less than the statewide minimum, which is again less than the probabilistic spectral acceleration obtained from the "USGS 2008 Interactive Deaggregation (Beta)" web site. The probabilistic method is based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. Therefore, the recommended design Acceleration Response Spectrum (ARS) curve is based on the result of the probabilistic approach. The design ARS curve with an estimated peak ground acceleration of 0.29g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate insignificant potential for liquefaction during earthquake at the site.

Furthermore, the potential for surface rupture at the site due to fault movement is considered insignificant since there is no known fault projecting towards or passing directly through the project site.

6.0 As-Built Foundation Data

The Pond Road OC bridge was built in 1960. It is a four-span, 193-foot-long, pre-cast, pre-stressed, concrete I-girder (at middle spans) and concrete T-girder (at end spans) structure supported on reinforced concrete column bents and open end diaphragm abutments. Based on the As-Built plans and the bridge inspection reports, the abutments and bents are all supported on 16 inches driven concrete piles. The average pile length is about 34 feet.

7.0 Foundation Recommendations

The available subsurface data suggests that the site is suitable for CIDH pile foundations to support the in-fill walls. Recommendations for the 16-inch CIDH pile foundations are presented in the following tables.

Table 1 Foundation Recommendations For In-Fill Walls at Bents 2, 3, and 4

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
			Total	Permanent	Comp. Φ=0.7	Tens. Φ=0.7	Comp. Φ=1.0	Tens. Φ=1.0		
Bent 2	16" CIDH	314.0	85	85	50	--	50	--	a-I (290) a-II (293)	290
Bent 3	16" CIDH	313.0	95	95	60	--	50	--	a-I (287) a-II (292)	287
Bent 4	16" CIDH	314.0	100	100	60	--	50	--	a-I (288) a-II (293)	288

Notes:

1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the load data provided by SD.
2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 2 Bents 2, 3, and 4 CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Bent 2	16" CIDH	72	--	290 (a-II) 293 (a-I)	290
Bent 3	16" CIDH	86	--	287 (a-II) 292 (a-I)	287
Bent 4	16" CIDH	86	--	288 (a-II) 293 (a-I)	288

Notes:
1. The Design Tip Elevations are controlled by: (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.

8.0 Construction Consideration

CIDH Piles

Loose materials were documented by the As-Built LOTBs at the site. These materials often elevate the potential of caving of drilled shafts during installations of CIDH piles. Depending on the actual condition, if caving occurs, temporary casing may become necessary. Temporary casing, if used, shall be retrieved from the drilled shafts.

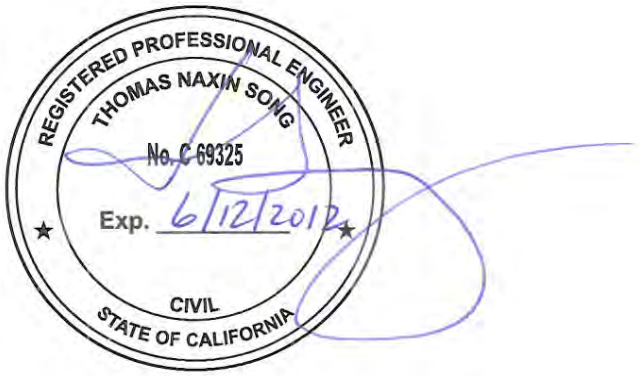
The drilled shafts shall be inspected and approved by the Engineer prior to concrete placement.

9.0 Disclaimer and Contact Information

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design. If any changes are made during final project design, OGDN should review those changes to determine if these foundation recommendations are still

applicable.

If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

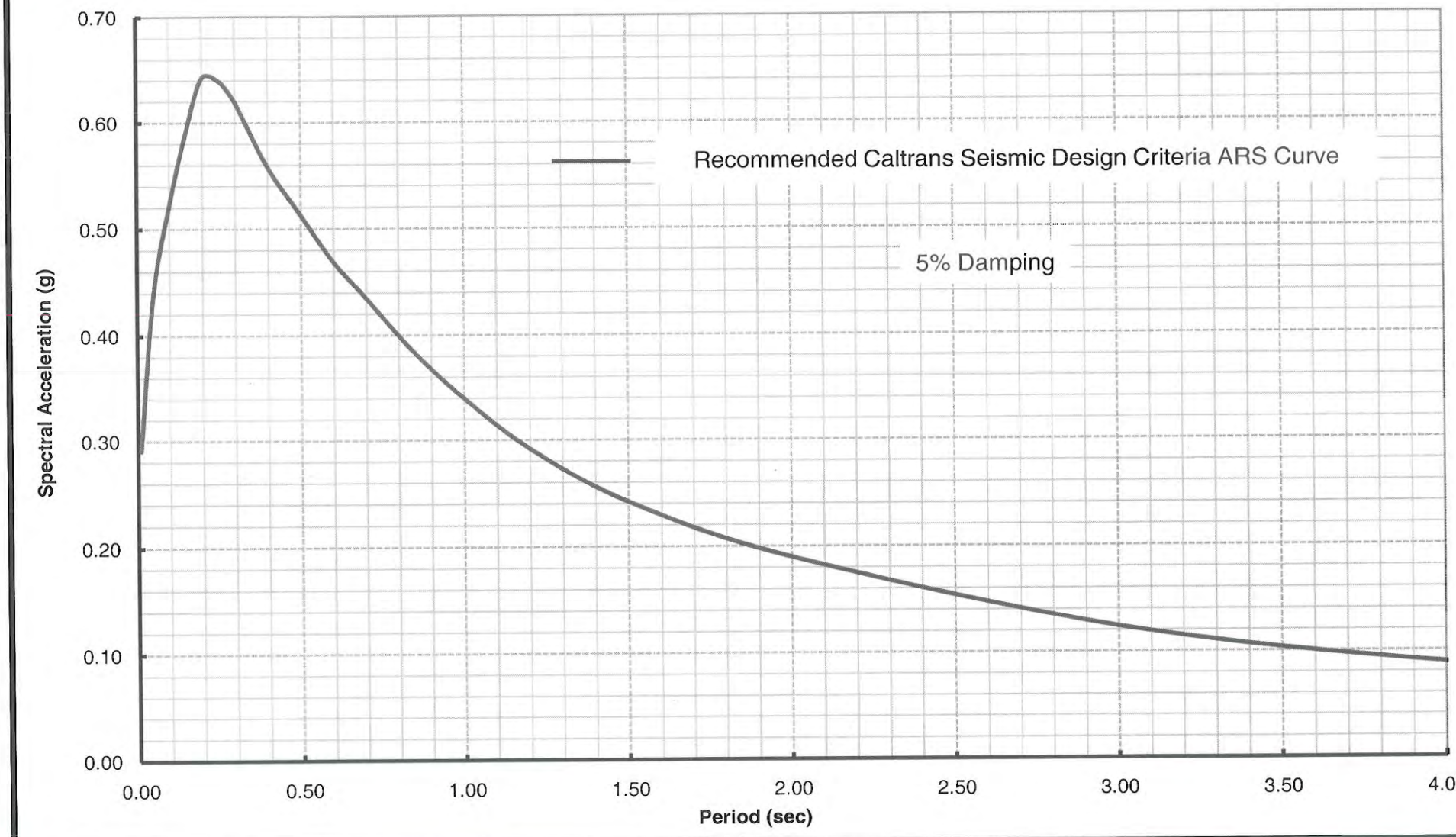


Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



Caltrans	DEPARTMENT OF TRANSPORTATION Division of Engineering Services Geotechnical Services Office of Geotechncial Design - North (OGDN)	Project No./EA:	0600000025 /06-0C1301
		DATE:	3/4/2011
		06-KER-99 PM R52.45 Pond Road OC (Br. No. 50-0234)	
		Recommended Acceleration Response Spectrum	Figure 1

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: March 28, 2011

File: 06-KER-166
PM 17.44
06-0C1301
Project No.0600000025
California Aqueduct Br.
Bridge No. 50-0323

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) to provide recommendations for 48-inch Cast-In-Drilled-Hole (CIDH) piles to be added to Abutments 1 and 4 for seismic retrofit of California Aqueduct Bridge, Bridge Number 50-0323 located in Kern County.

To prepare this report, OGDN:

1. Review the following documents:

   - Project Scope Summary Report, Structure Rehabilitation, 06-Various Counties & Routes, 06225/06-0C1301, RAS – HA21 Program, August 2005
   - As-Built General Plan, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967
   - As-Built Foundation Plan, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967
   - As-Built Abutment Details, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967
   - As-Built Retaining Wall Details, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967

- As-Built Pier Details, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967
- As-Built Log Of Test Borings, California Aqueduct Bridge, Bridge No. 50-323, Contract No. 06-053294, September 25, 1967
- Geologic Atlas of California – Bakersfield Sheet, Scale 1: 250,000, California Geological Survey, 1964
- Soil Survey of Kern County California, United State Department of Agriculture, September, 1986
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 11N21W11G001S and 11N21W11B002S, Department of Water Resources

OGDN also

2. Performed a subsurface exploration consisting of drilling two rotary wash soil test borings to a depth of 101½ feet below the existing ground surface at the project site on March 1 and 2, 2011,
3. Performed geotechnical engineering and seismic analyses, and
4. Prepared this report.

2.0 Project Description

California Aqueduct Bridge is a generally east-west aligning bridge overcrossing the California Aqueduct with a skew of about 67 degrees. The proposed project will add large diameter (48-inch) CIDH Piles to the existing bridge abutments. The piles will provide additional lateral resistances to the abutments to limit lateral displacement and prevent further degradation of the lined channel of the aqueduct and to prevent further development of misalignment of the bridge. 48-inch CIDH piles have been considered. Foundation design loads provided to us are shown in the tables below.

Table 1 Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Abut 1	WSD	48" CIDH	501.5	497.5	6	6	0.5	2
Bent 2	n/a	--	--	--	--	--	--	--
Bent 3	n/a	--	--	--	--	--	--	--
Abut 4	WSD	48" CIDH	501.5	497.5	6	6	0.5	2

Table 2 Foundation Design Loads

Support No.	**Service-I Limit State (kips)**			**Strength Limit State (kips)**				**Extreme Event Limit States (kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	490	250	490	--	--	--	--	490	250	--	--
Bent 2	n/a	--	--	--	--	--	--	--	--	--	--
Bent 3	n/a	--	--	--	--	--	--	--	--	--	--
Abut 4	490	250	490	--	--	--	--	490	250	--	--

3.0 Site Investigation

Two soil test borings were performed at the site on March 8 and 9, 2011. Boring R-11-001 was performed to the north of the bridge Abutment 1 and about 30 feet north/east of the Aqueduct. Boring R-11-002 was performed to the south of the bridge Abutment 4 and about 40 feet south/west of the Aqueduct. The borings were extended to a depth of 102½ feet below the existing ground surface. The borings were advanced using the rotary wash method coupled with the Standard Penetration Testing (SPT) and the standard split spoon sampling. A piezometer was installed in boring R-11-001 and the borehole was

backfilled with sands and bentonite chips. Borehole R-11-002 was backfilled with cement grout.

Sheets of Logs of Test Borings (LOTBs) for R-11-001 and R-11-002 as well as the previous As-Built LOTBs, which are to be incorporated in the project plans, are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. Irma Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on the LOTBs.

4.0 Topography and Geology

4.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations in the immediate vicinity of the existing bridge range from 501 to 511 feet above Mean Sea Level (MSL). The majority of the lands are used for agriculture purposes.

4.2 Geology

The site is situated in the Great Valley geomorphic province of California, an elongated lowland between the Sierra Nevada Mountains and the Coast Ranges. Unconsolidated Recent and Pleistocene sediments eroded from the Sierra Nevada Mountains and the Coast Range form the surface of the Great Valley. Below the surface of the Great Valley, a sequence of sedimentary rock deposited from the Mesozoic (Jurassic and Cretaceous) to the Cenozoic extends to as deep as 15,000 feet.

Locally, Pleistocene fan deposit "Q_f" consisting of sediments from the surrounding high lands underlies the project site and its vicinity.

5.0 Subsurface Conditions

5.1 Soil Conditions

Based on results of the soil test borings and the As-Built LOTBs, the subsurface materials at the site consisted primarily of sands, silts, and their mixtures. The materials extended to the maximum depths explored by the borings of about 102½ feet. The Standard Penetration Test (SPT) resistance values recorded in these materials ranged from 4 to 67 blows per foot (bpf), which indicates that the materials exhibited very loose to very dense apparent densities. Rock was not encountered by the borings at the site.

Sheets of Logs of Test Borings (LOTBs) for R-11-001 and R-11-002 as well as the previous As-Built LOTBs, which are to be incorporated in the project plans, are being prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records, and will be forwarded when completed. Mrs. Irma Gamarra-Remmen of the Contracts, Graphics, & Records branch may be contacted directly for information on the LOTBs.

5.2 Groundwater Conditions

Groundwater was not encountered in borings R-11-001 and R-11-002 at the time of exploration. Groundwater was measured at depths of 79 feet below the existing ground surface in R-11-001 after the completion of drilling. Groundwater was documented at depths of 76 to 87 feet below ground surface in the As-Built LOTBs. Data recorded in the water wells of the Department of Water Resources (DWR), as shown in the following table, suggest that deep natural aquifer exists in the project area.

Table 3 Groundwater Data

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
11N21W11G001S	35.0611	119.0924	69.0 – 207.0	Jan. 1988 – Jan. 2011
11N21W11B002S	35.0594	119.0892	88.1 – 111.1	Dec. 1981 – Jan. 1986

The groundwater information described above indicates that the natural aquifer is deep in the project area. However, indications observed onsite have suggested that

seepage/leakage through cracking of the channel liner and intrusion of surface runoff into the soils from behind the liner might have occurred near Abutment 1 and Bent 2. If such, localized groundwater conditions may have developed in the immediate vicinities surrounding the bridge foundations. Since a majority of the subsurface soils at the project site is granular in nature, thus free drained, water, after entering the soil matrix, would generally flow downwardly under gravity. Hydraulically, a downward flow of groundwater could potentially increase the effective stresses of the soils, and sub-consequently the capacities of the bridge foundations. However, water often produces paths/voids when flows in soils. These voids are mostly developed among the soil particles with weak connections, especially in areas adjacent to the faces of soil-structure interactions. Over time, voids may have been developed near the existing piles, and reduced the skin-frictions thus the capacities of the piles. Additionally, there may exist lenses of finer materials, such as clays, in the project area. These lenses could intercept the downward water flow and produce local ponding of water. If a pile is located in the soils with ponding water, the capacity of the pile would be reduced due to the loss of soil effective stresses through saturation. Therefore, in order to safeguard a satisfying performance of the bridge foundations, a saturate subsurface soil-groundwater condition is judged suitable for design of the CIDH piles at the site.

It should be noted that groundwater conditions may have changed significantly since the time of the above groundwater levels were recorded and groundwater conditions will vary in accordance to variations in rainfall, well pumping, and other activities in the area.

5.3 Corrosion Evaluation

Representative samples have been collected from the site during subsurface exploration. The samples are being tested for corrosion evaluation. Results of the tests and subsequent corrosion evaluation will be provided in the future.

6.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the White Wolf fault (Caltrans Fault ID No. of 103) with a maximum magnitude (Mmax) of 7.3, which is located north northeast of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 1.7 miles. The

fault is identified as a left lateral strike slip fault with a dip angle of 75 degrees (Deg) toward south.

Based on the soil data, a shear wave velocity, Vs30, was estimated using the SPT blow counts shown on the As-Built LOTBs and the correlation formulas for the granular soil. The estimated Vs30 is about 900 feet per second (f/s).

Using the above estimated Vs30, a spectral acceleration (SA) was generated from the fault. Another SA was obtained from the "USGS 2008 Interactive Deaggregation (Beta)" based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. The recommended design ARS curve is the envelope of the SRs mentioned above. The design ARS curve with an estimated peak ground acceleration of 0.56g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate minimum potential for liquefaction at the site during earthquake.

Furthermore, the potential for surface rupture at the site due to fault movement is considered insignificant since there is no known fault projecting towards or passing directly through the project site.

7.0 As-Built Foundation Data

The California Aqueduct bridge was built in 1968. The bridge is a three-span, 394-foot-long, continuous cast-in-place (CIP), prestressed box girder structure supported on reinforced concrete wall bents and open end diaphragm abutments. The abutments and bents are all supported on driven steel H-piles.

8.0 Foundation Recommendations

The available subsurface data suggests that the site is suitable for 48-inch CIDH pile foundations. Recommendations for the 48-inch CIDH pile foundation are presented in the following tables.

Table 1 Foundation Recommendations For Abutments 1 and 4

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		LRFD Service-1 Limit State Total Load (kips) per Pile (compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevations (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent					
Abut 1	48" CIDH	497.5	490	490	250	500	a-I (452.5) a-II (472.5)	a-I (452.5) a-II (472.5)	n/a
Abut 4	48" CIDH	497.5	490	490	250	500	a-I (452.5) a-II (472.5)	a-I (452.5) a-II (472.5)	n/a

Notes:

1. Recommendations are based on Working Stress Design (WSD) for abutment and the load data provided by SD.
2. A factor of safety of 2.0 is used to calculate the nominal resistance in Service-1 Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Service-1 Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 2 Abutment CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abut 1	48" CIDH	500	--	a-I (452.5) a-II (472.5)	452.5
Abut 4	48" CIDH	500	--	a-I (452.5) a-II (472.5)	452.5

Notes:

1. The Design Tip Elevations are controlled by: (a-I) Compression (Service-1 Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.

The above recommendations are based on a saturated soil-groundwater condition discussed in Section 5 Subsurface Conditions. In order to prevent the skin frictions of the CIDH piles from being changed/reduced by the development of flow paths/voids from the downward water flows, it is recommended that measures be taken to repair the cracked channel liner and to prevent the intrusion of surface runoff.

9.0 Construction Consideration

CIDH Piles

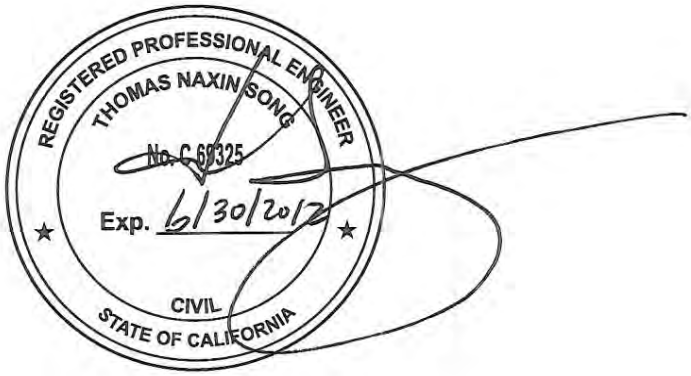
Loose materials and localized groundwater conditions present at the site, which often elevate potential of caving during drilling of CIDH piles. Depending on the actual condition, if caving occurs, temporary casing and/or drill fluid may become necessary. Temporary casings, if used, shall be retrieved from the drilled shafts. If groundwater is encountered, concrete shall be placed using the "wet" method in accordance with Caltrans Standard Specification.

The drilled shafts shall be inspected and approved by the Engineer prior to concrete placement.

10.0 Disclaimer and Contact Information

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Structure Design. If any change is made during final project design, OGDN should review the change to determine if these foundation recommendations are applicable.

If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

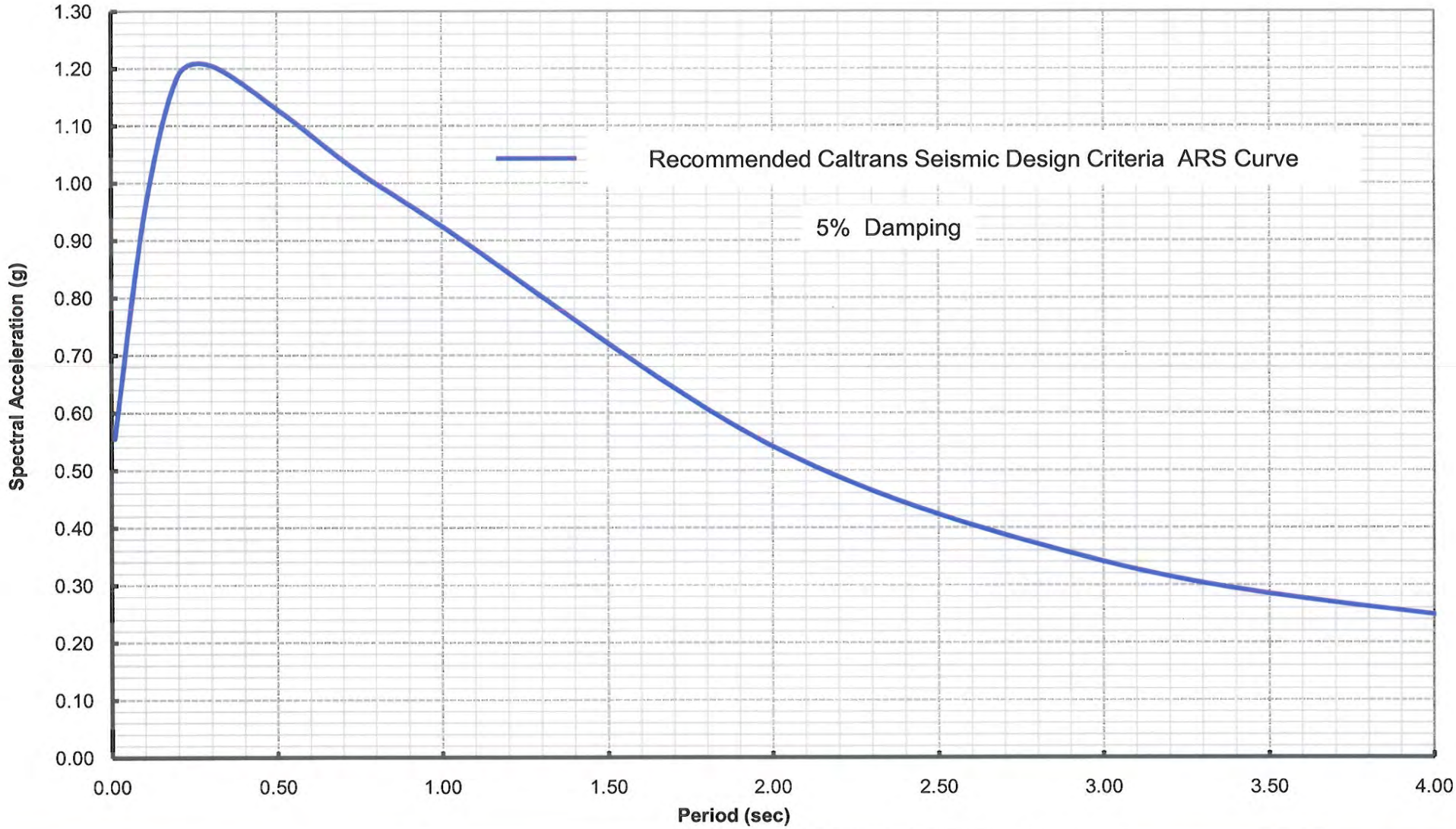


Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



DEPARTMENT OF TRANSPORTATION Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North (OGDN)	PROJECT NO. /EA:	0600000025 /06-0C1301	06-KER-166 PM 17.44 California Aqueduct Bridge Br. No. 50-0323
	DATE:	4/5/2011	
	Recommended Acceleration Response Spectrum		Figure 1

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: June 10, 2011

File: 06-KER-166
PM 17.44
06-0C1301
Project No.0600000025
California Aqueduct Br.
Bridge No. 50-0323

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Amendment to Foundation Report

The Office of Geotechnical Design North (OGDN) has prepared this Amendment to provide updated foundation recommendations for Abutment 1 for seismic retrofit of California Aqueduct Bridge, Bridge Number 50-0323 located in Kern County. Previously, a Foundation Report (FR) was issued by OGDN on March 28, 2011.

We understand that, the "cut-off" elevation of the 48" CIDH piles at Abutment 1 has been revised from 497.5' to 494.16'. Accordingly, the recommended "tip" elevation of these CIDH piles are revised. The revision is shown in the tables contained in this amendment. This amendment supersedes, where applicable, the previous FR. Other information, conditions, discussions, and recommendations contained in the previous FR still apply.

If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

Foundation Design Data

Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles Per Support
					B	L		
Abut 1	WSD	48" CIDH	501.5	494.16	6	6	0.5	2
Bent 2	n/a	--	--	--	--	--	--	--
Bent 3	n/a	--	--	--	--	--	--	--
Abut 4	WSD	48" CIDH	501.5	497.5	6	6	0.5	2

Foundation Recommendations For Abutments 1 and 4

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		LRFD Service-1 Limit State Total Load (kips) per Pile (compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevations (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent					
Abut 1	48" CIDH	494.16	490	490	250	500	a-I (449.16) a-II (469.16)	a-I (449.16) a-II (469.16)	n/a
Abut 4	48" CIDH	497.5	490	490	250	500	a-I (452.5) a-II (472.5)	a-I (452.5) a-II (472.5)	n/a

Notes:

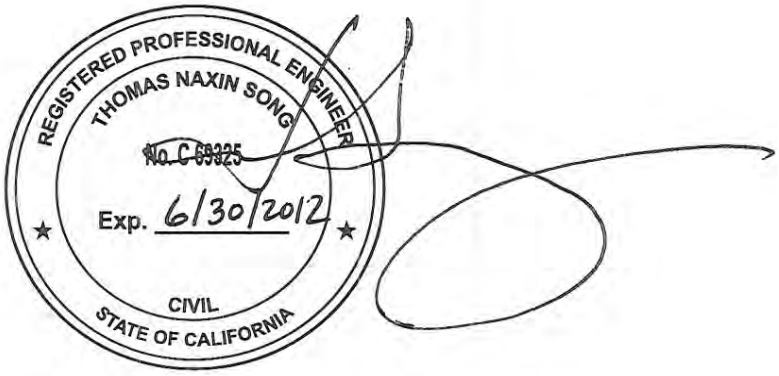
1. Recommendations are based on Working Stress Design (WSD) for abutment and the load data provided by SD.
2. A factor of safety of 2.0 is used to calculate the nominal resistance in Service-1 Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Service-1 Limit) and (a-II) Compression (Extreme Limit)
4. The Design Tip Elevation controlled by (c) Settlement is not applicable.
5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Abutment CIDH Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abut 1	48" CIDH	500	--	a-I (449.16) a-II (469.16)	449.16
Abut 4	48" CIDH	500	--	a-I (452.5) a-II (472.5)	452.5

Notes:

1. The Design Tip Elevations are controlled by: (a-I) Compression (Service-1 Limit) and (a-II) Compression (Extreme Limit).
2. The Design Tip Elevation controlled by (c) Settlement is not applicable.
3. The Design Tip Elevation controlled by lateral load is typically provided by SD.
4. The Specified Tip Elevation shall not be raised if controlled by lateral load.



Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction R.E. Pending File
DES Office Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

Memorandum

Flex your power!
Be energy efficient!

To: GORDON DANKE, CHIEF
Bridge Design Branch 9
Office of Bridge Design - West
Structure Design
Division of Engineering Services

Attention: Phil Lutz

Date: July 20, 2011

File: 06-KER-166
PM 17.44
06-0C1301
Project No.0600000025
California Aqueduct Br.
Bridge No. 50-0323

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Results of Corrosion Evaluation - Addendum to Foundation Report

The Office of Geotechnical Design North (OGDN) has prepared this Addendum to provide the result of a corrosion evaluation performed for the proposed seismic retrofit of California Aqueduct Bridge, Bridge Number 50-0323 located in the Kern County. Previously, OGDN issued a Foundation Report dated March 28, 2011 for the project.

The Department considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil 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, or the pH is 5.5 or less.

Two representative samples were collected from the site for corrosion testing. The results of the tests are shown in the following table.

SIC Number (TL101)	Sample Type	Sample Depth (ft)	Minimum Resistivity[1] (ohm-cm)	pH[2]	Chloride Content[3] (ppm)	Sulfate Content[4] (ppm)
C702932	Soil	0 - 5	1024	7.37	n/a	n/a
C702933	Soil	0 - 5	1930	7.49	n/a	n/a

Notes:
1, 2 – CTM 643; 3 – CTM 422; 4 – CTM 417

Based on the test results, the site is considered non-corrosive to foundation elements.

If you have any questions, please call me at (916) 227-1057, or my supervisor, Mr. John Huang at (916) 227-1037.

Thomas Song, PE
Transportation Engineer – Civil
Geotechnical Design – North
Geotechnical Services
Division of Engineering Services

C: District Project Manager, Jim Heinen,
GS Corporate, Mark Willian
Structure Construction, R.E. Pending File
DES Engineer, Office of PS&E, Craig Whitten
District Material Engineer, Doug Lambert

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Senior Bridge Engineer
Division of Structure Design MS 9
Office of Bridge Design - West
Bridge Design Branch 9

Attention: Mr. Phil Lutz

Date: September 28, 2011

File: 06-Mad-99-
PM 28.17
06-0C1301
Le Grand Ave OC
Br. No. 41-0057

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5
OFFICE OF GEOTECHNICAL DESIGN - NORTH

Subject: Final Seismic Design Recommendations

This report presents the final seismic design recommendations for the above referenced bridge and is in response to your e-mail request dated September 22, 2011, and it supersedes the previous recommendation dated October 14, 2009.

Soil Profile

Based on the As-Built Log of Test Borings (LOTB) dated August 1955, the foundation materials consist of very loose to dense granular materials. Based on the Standard Penetration Blow counts and the correlation formulas, a Vs30 (shear wave velocity for the top 100 feet of soil) is extrapolated to be 985 feet per second.

Seismicity

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Creeping section) (Fault ID No. 311) with a MMax of 7.9, and it is located about 63.4 miles southwest of the bridge. However, based on the SDP, the spectral acceleration (SA) must be the higher of the deterministic, statewide minimum requirement (Mmax of 6.5 of a vertical strike slip fault with a distance of 7.5 miles), and the probabilistic methods. In the case of the Le Grand Ave OC, the Acceleration Response Spectrum (ARS) curve is an envelope of only the last two methods. Note that (SA) for the probabilistic method is based on the USGS 5%

probability of exceedance in 50 years with a return period of 975 years and it was obtained at the USGS web site at https://geohazards.usgs.gov/deaggint/2008/. The final design Acceleration Response Spectrum curve is attached in Appendix A, and the peak ground acceleration is estimated to be 0.23g.

Liquefaction

The LOTB indicates that groundwater was not encountered during the foundation investigation, and therefore, the potential for soil liquefaction during strong ground shaking is considered to be negligible.

Surface Fault Rupture Hazard

The site is not located within Alquist-Priolo Fault Rupture Hazard Zones. The potential for surface fault rupture is considered negligible.

If you have any questions regarding the above recommendations, please call me at (916) 227-1033.

REZA MAHALLATI
Senior Materials and Research Engineer
Office of Geotechnical Design - North

Attachment
1-ARS Curve

c: GDN File

Appendix A

Recommended ARS Curve

Le Grand Ave OC

Bridge No. 41-0057

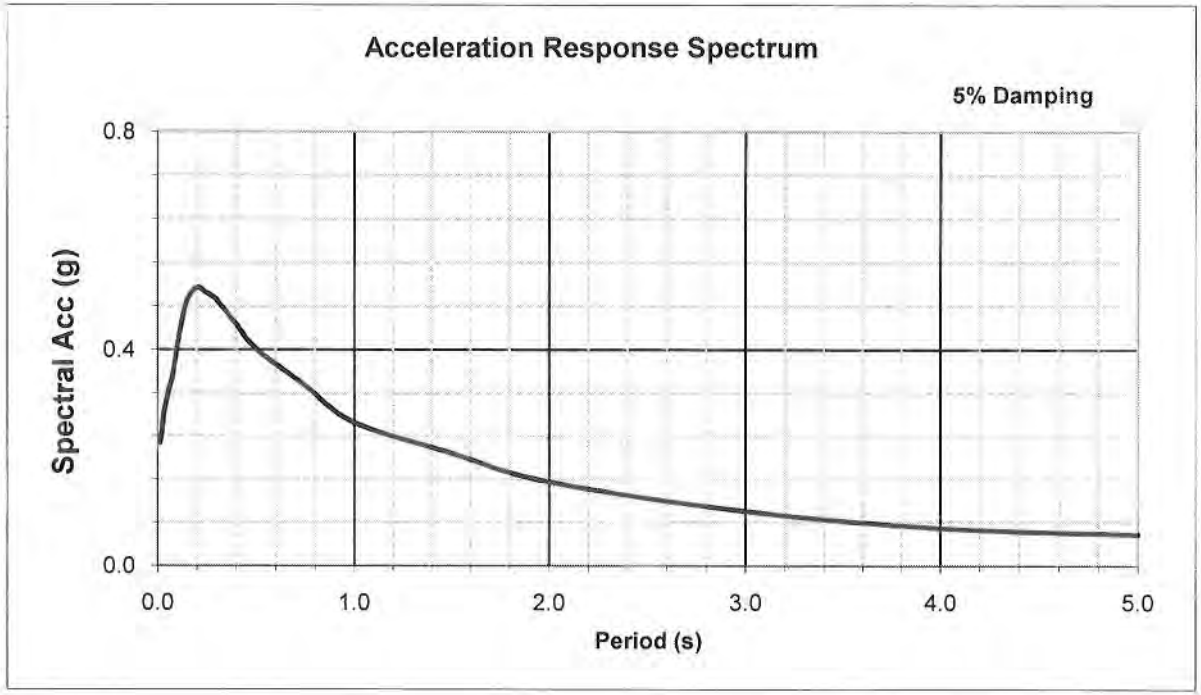
EA No. 06-0C1301

Latitude 37.1416

Longitude -120.2741

Control **Envelope**

Period (s)	Sa(g)
0.010	0.227
0.020	0.247
0.030	0.282
0.050	0.318
0.075	0.353
0.100	0.409
0.120	0.448
0.150	0.491
0.200	0.514
0.250	0.504
0.300	0.491
0.400	0.446
0.500	0.402
0.750	0.333
1.000	0.265
1.500	0.208
2.000	0.155
3.000	0.101
4.000	0.070
5.000	0.058



Deterministic Procedure Data

Fault	San Andreas fault zone (Creeping section)		R_{rup}	102	km
Fault ID	311		R_{jb}	102	km
Style	RLSS		R_x	102	km
Mmax	7.9		V_{S30}	300	m/s
Dip	90	deg	$Z_{1.0}$	N/A	m
Z_{TOR}	0	km	$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is an envelope of minimum and probabilitic spectrum.

Minimum Criteria is based on Mmax of 6.5 for a vertical strike and slip fault with a rupture distance of 7.5 miles.

Final

Design Response Spectrum

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Senior Bridge Engineer
Division of Structure Design MS 9
Office of Bridge Design - West
Bridge Design Branch 9

Attention: Mr. Phil Lutz

Date: September 28, 2011

File: 06-Fre-99-
PM 24.42
06-0C1301
Clinton Ave OC
Br. No. 42-0183

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5
OFFICE OF GEOTECHNICAL DESIGN - NORTH

Subject: Final Seismic Design Recommendations

This report presents the final seismic design recommendations for the above referenced bridge and is in response to your e-mail request dated September 22, 2011, and it supersedes the previous recommendation dated October 14, 2009.

Soil Profile

Based on the As-Built Log of Test Borings (LOTB) dated October 1953, and the foundation investigation for the widening of the bridge dated March 1990, the foundation materials consist of slightly compact to very dense granular materials. Based on the Standard Penetration Blow counts and the correlation formulas, a Vs30 (shear wave velocity for the top 100 feet of soil) is extrapolated to be 890 feet per second.

Seismicity

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Creeping section) (Fault ID No. 311) with a MMax of 7.9, and it is located about 64.2 miles southwest of the bridge. However, based on the SDP, the spectral acceleration (SA) must be the higher of the deterministic, statewide minimum requirement (with fault parameters of Mmax of 6.5 of a vertical strike slip fault with a distance of 7.5 miles), and the probabilistic methods. In the case of the Clinton Ave OC, the Acceleration Response Spectrum (ARS) curve is an envelope of only the

last two methods. Note that (SA) for the probabilistic method is based on the USGS 5% probability of exceedance in 50 years with a return period of 975 years and it was obtained at the USGS web site at https://geohazards.usgs.gov/deaggint/2008/. The final design Acceleration Response Spectrum curve is attached in Appendix A, and the peak ground acceleration is estimated to be 0.23g.

Liquefaction

The LOTBs indicates that groundwater was not encountered during the foundation investigation, and therefore, the potential for soil liquefaction during strong ground shaking is considered to be negligible.

Surface Fault Rupture Hazard

The site is not located within Alquist-Priolo Fault Rupture Hazard Zones. The potential for surface fault rupture is considered negligible.

If you have any questions regarding the above recommendations, please call me at (916) 227-1033.

REZA MAHALLATI
Senior Materials and Research Engineer
Office of Geotechnical Design - North

Attachment
1- Appendix A – ARS Curve

c: GDN File

Appendix A

Recommended ARS Curve

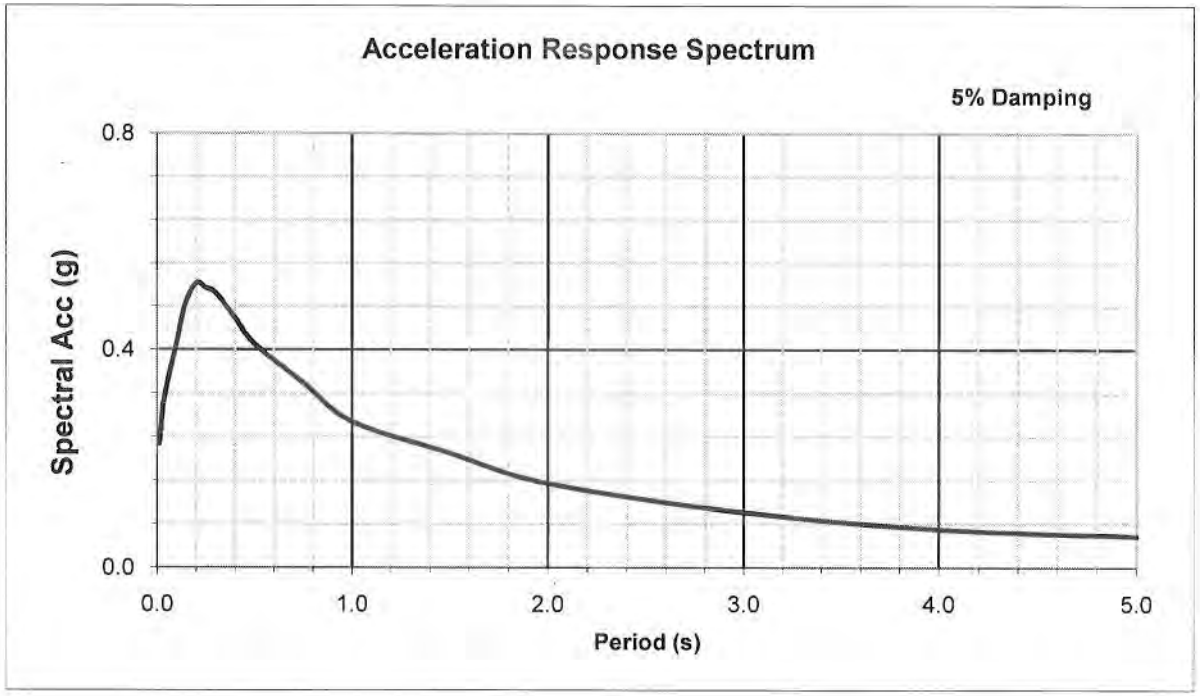
Clinton Ave OC

Bridge No. 42-0183
EA No. 06-0C1301

Latitude 36.7719
Longitude -119.8386

Control **Envelope**

Period (s)	Sa(g)
0.010	0.227
0.020	0.262
0.030	0.300
0.050	0.338
0.075	0.376
0.100	0.414
0.120	0.450
0.150	0.491
0.200	0.523
0.250	0.514
0.300	0.504
0.400	0.457
0.500	0.410
0.750	0.339
1.000	0.268
1.500	0.211
2.000	0.155
3.000	0.102
4.000	0.071
5.000	0.058



Deterministic Procedure Data

Fault	San Andreas fault zone (Creeping section)		R_{rup}	105	km
Fault ID	311		R_{jb}	105	km
Style	RLSS		R_x	105	km
Mmax	7.9		V_{S30}	300	m/s
Dip	90	deg	$Z_{1.0}$	N/A	m
Z_{TOR}	0	km	$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is an envelope of minimum and probabilitic spectrum.
Minimum Criteria is based on Mmax of 6.5 for a vertical strike and slip fault with a rupture distance of 7.5 miles.

Final

Design Response Spectrum

State of California
Department of Transportation

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Senior Bridge Engineer
Division of Structure Design MS 9
Office of Bridge Design - West
Bridge Design Branch 9

Attention: Mr. Phil Lutz

Date: September 29, 2011

File: 06-Tul-63-PM10.65
06-0C1301
St. John's River Br.
Br. No. 46-0100

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5
OFFICE OF GEOTECHNICAL DESIGN - NORTH

Subject: Final Seismic Design Recommendations

This report presents the final seismic design recommendations for the above referenced bridge and is in response to your e-mail request dated September 22, 2011, and supersedes the previous recommendation dated October 20, 2009.

Soil Profile

Based on the As-Built Log of Test Borings (LOTB) dated January and May 1968, the foundation materials generally consist of very loose to dense granular materials with an isolated cohesive layer encountered in only one of out the three borings. Based on the Standard Penetration Blow counts and the correlation formulas, a Vs30 (shear wave velocity for the top 100 feet of soil) is extrapolated to be 690 feet per second.

Seismicity

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Cholame-Carrizo section-southern) (Fault ID No. 313) with a MMax of 7.8, and it is located about 70.8 miles southwest of the bridge. However, based on the SDP, the spectral acceleration (SA) must be the higher of the deterministic, statewide minimum requirement (Mmax of 6.5 of a vertical strike slip fault with a distance of 7.5 miles), and the probabilistic methods. In the case of the above bridge, the Acceleration Response Spectrum (ARS) curve is an envelope of only the last two methods. Note that (SA) for the probabilistic method is based on the USGS 5%

obtained at the USGS web site at https://geohazards.usgs.gov/deaggint/2008/. The final design Acceleration Response Spectrum curve is attached in Appendix A, and the peak ground acceleration is estimated to be 0.22g.

Liquefaction

The As-Built LOTB indicates that groundwater was encountered at an elevation of 323 feet at the abutments and about 306 feet along the main channel. Liquefaction analyses for borings B-4 and B-6 which were drilled along the main channel showed insignificant susceptibility to liquefaction during a strong ground shaking. However the results for the other two borings (B-1 and B-3) which were installed at Abutments 10 and 1 respectively indicated significant potential for liquefaction. The estimated liquefiable layers are shown below.

Boring Number	Original Ground Elevation (ft)	Elevation of Liquefiable Layers (ft)	Seismic Settlement (in)
B-3 (Abut. 1)	336	302to 297	2.5
B-1 (Abut 10)	337	310 to 300	4.5

Surface Fault Rupture Hazard

The site is not located within Alquist-Priolo Fault Rupture Hazard Zones. The potential for surface fault rupture is considered negligible.

If you have any questions regarding the above recommendations, please call me at (916) 227-1033.

REZA MAHALLATI
Senior Materials and Research Engineer
Office of Geotechnical Design - North

REGISTERED PROFESSIONAL ENGINEER
REZA MAHALLATI
No. 49374
Exp. 9/30/12
CIVIL
STATE OF CALIFORNIA

Attachment
1- Appendix A – ARS Curve
C: GDN File

Appendix A

Recommended ARS Curve

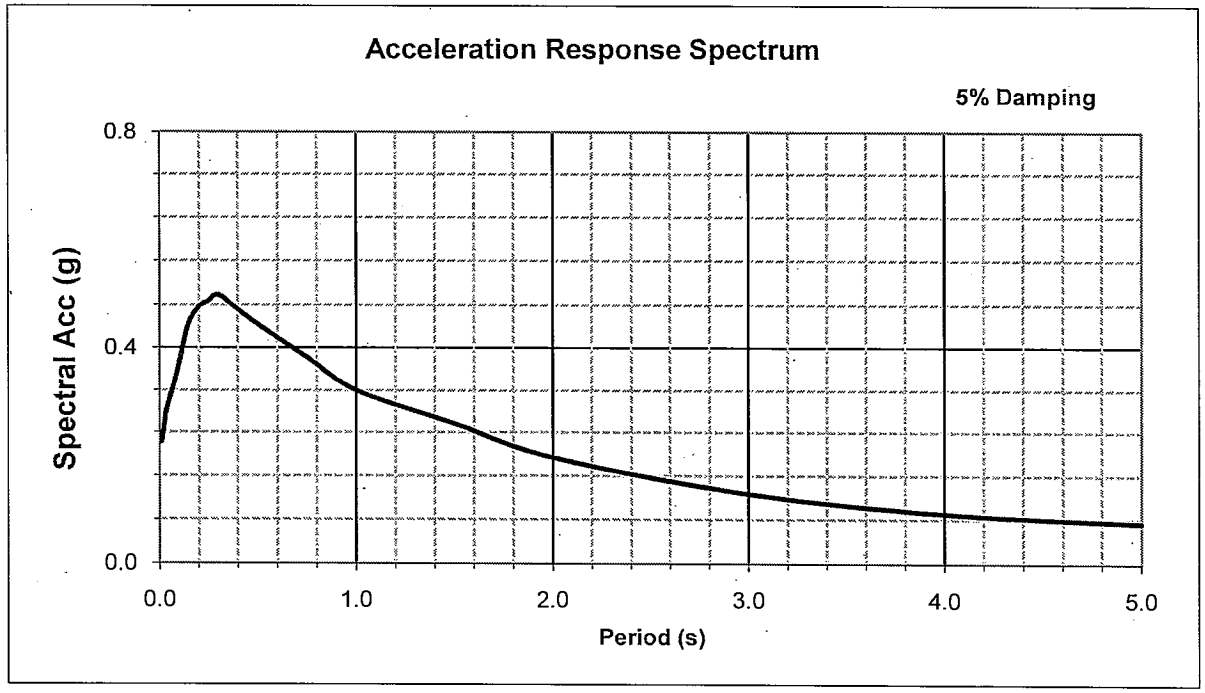
St John's River Br.

Bridge No. 46-0100
EA No. 06-0C1301

Latitude 36.3639
Longitude -119.2971

Control **Envelope**

Period (s)	Sa(g)
0.010	0.222
0.020	0.244
0.030	0.274
0.050	0.304
0.075	0.334
0.100	0.371
0.120	0.406
0.150	0.447
0.200	0.476
0.250	0.487
0.300	0.498
0.400	0.471
0.500	0.444
0.750	0.382
1.000	0.320
1.500	0.256
2.000	0.193
3.000	0.127
4.000	0.091
5.000	0.074



Deterministic Procedure Data

Fault	San Andreas fault zone (Cholame-Carrizo section-southern)	
Fault ID	313	
Style	RLSS	
Mmax	7.8	
Dip	90	deg
Z_{TOR}	0	km

R_{rup}	114	km
R_{jb}	114	km
R_x	114	km
V_{S30}	210	m/s
$Z_{1.0}$	N/A	m
$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is an envelope of minimum and probabilitic spectrum.
Minimum Criteria is based on Mmax of 6.5 for a vertical strike and slip fault with a rupture distance of 7.5 miles.

Final

Design Response Spectrum

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Senior Bridge Engineer
Division of Structure Design MS 9
Office of Bridge Design - West
Bridge Design Branch 9

Attention: Mr. Phil Lutz

Date: September 28, 2011

File: 06-Tul-198-PM43.41
PM R385
06-0C1301
W198-N99 Con.
(Plaza)
Br. No. 46-0242F

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5
OFFICE OF GEOTECHNICAL DESIGN - NORTH

Subject: Final Seismic Design Recommendations

This report presents the final seismic design recommendations for the above referenced bridge and is in response to your e-mail request dated September 22, 2011, and it supersedes the previous recommendation dated October 19, 2009.

Soil Profile

Based on the As-Built Log of Test Borings (LOTB) of various years in the region, the foundation materials consist of silty, sandy clay, and silty sand overlain sand and silty clay. Based on the Standard Penetration Blow counts and the correlation formulas, a Vs30 (shear wave velocity for the top 100 feet of soil) is extrapolated to be 985 feet per second.

Seismicity

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the San Andreas fault zone (Parkfield section) (Fault ID No. 312) with a MMax of 7.9, and it is located about 64.0 miles southwest of the bridge. However, based on the SDP, the spectral acceleration (SA) must be the higher of the deterministic, statewide minimum requirement (Mmax of 6.5 of a vertical strike slip fault with a distance of 7.5 miles), and the probabilistic methods. In the case of the above bridge, the Acceleration

Response Spectrum (ARS) curve is an envelope of only the last two methods. Note that (SA) for the probabilistic method is based on the USGS 5% probability of exceedance in 50 years with a return period of 975 years and it was obtained at the USGS web site at https://geohazards.usgs.gov/deaggint/2008/. The final design Acceleration Response Spectrum curve is attached in Appendix A, and the peak ground acceleration is estimated to be 0.23g.

Liquefaction

The LOTB indicates that groundwater was not encountered during the foundation investigation, and therefore, the potential for soil liquefaction during strong ground shaking is considered to be negligible.

Surface Fault Rupture Hazard

The site is not located within Alquist-Priolo Fault Rupture Hazard Zones. The potential for surface fault rupture is considered negligible.

If you have any questions regarding the above recommendations, please call me at (916) 227-1033.

REZA MAHALLATI
Senior Materials and Research Engineer
Office of Geotechnical Design - North

Attachment
1- Appendix A – ARS Curve

c: GDN File

Appendix A

Recommended ARS Curve

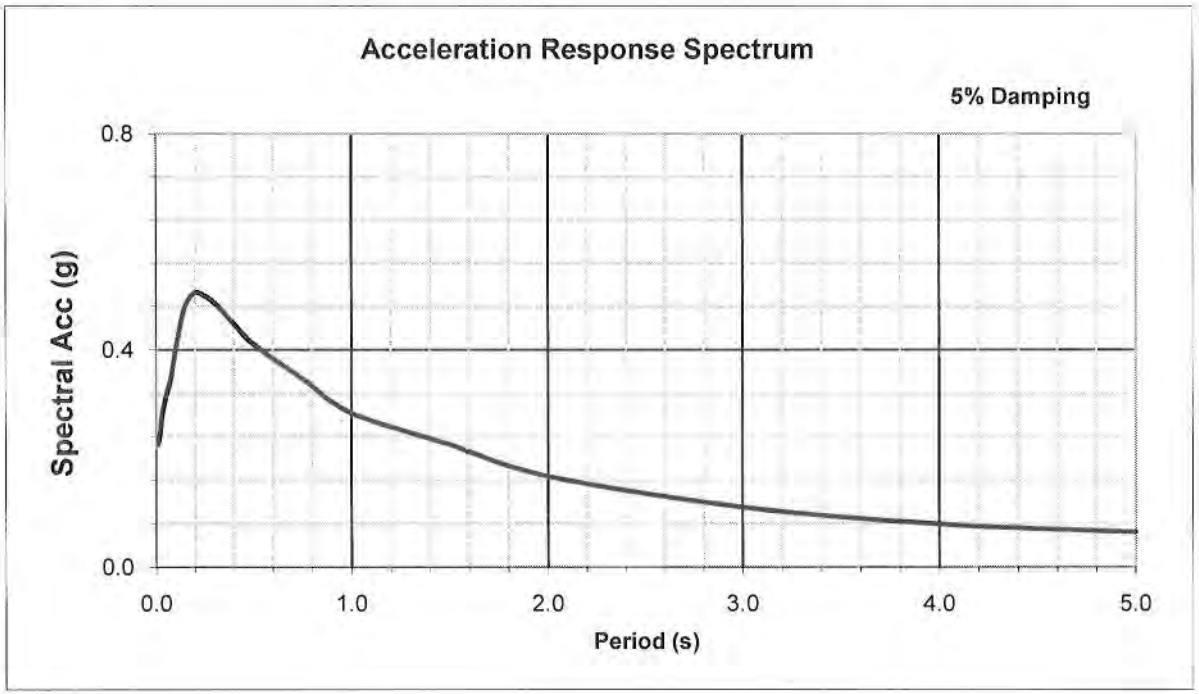
W198-N99 Connector (Plaza) OH

Bridge No. 46-0242F
EA No. 06-0C1301

Latitude 36.3276
Longitude -119.4063

Control **Envelope**

Period (s)	Sa(g)
0.010	0.226
0.020	0.247
0.030	0.281
0.050	0.314
0.075	0.348
0.100	0.400
0.120	0.437
0.150	0.481
0.200	0.505
0.250	0.499
0.300	0.486
0.400	0.448
0.500	0.411
0.750	0.348
1.000	0.285
1.500	0.226
2.000	0.168
3.000	0.111
4.000	0.079
5.000	0.065



Deterministic Procedure Data

Fault	San Andreas fault zone (Parkfield section)		R_{rup}	103	km
Fault ID	312		R_{jb}	103	km
Style	RLSS		R_x	103	km
Mmax	7.9		V_{S30}	270	m/s
Dip	90	deg	$Z_{1.0}$	N/A	m
Z_{TOR}	0	km	$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is an envelope of minimum and probabilitic spectrum.
Minimum Criteria is based on Mmax of 6.5 for a vertical strike and slip fault with a rupture distance of 7.5 miles.

Final

Design Response Spectrum

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Design
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GD - North ; South ; West
2 GS File Room

Date: 12/29/11

Calif. Aqueduct Br.
Structure Name

6 — Ker — 99 — 17.44
District County Route ~~km~~ Post

District Project Development
District Project Engineer

06-0C1301 50-323
E.A. Number Structure Number

Foundation Report By: T. Song Dated: 3/28/11 ; 6/10/11

Reviewed By: P. Lutz (SD) R. Price (GS)

General Plan Dated: 8/18/11 Foundation Plan Dated: 12/17/[redacted]09

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

Pile Types and Design Loads
- Pile Lengths
- Predrilling
- Pile Load Test
- Substitution of H Piles For Concrete Piles ☐ Yes ☒ No

- Footing Elevations, Design Loads, and Locations
- Seismic Data
- Location of Adjacent Structures and Utilities
- Stability of Cuts or Fills
- Fill Time Delay

Effect of Fills on Abutments and Bents
- Fill Surcharge
- Approach Paving Slabs
- Scour
- Ground Water
- Tremie Seals/Type D Excavation

Structure Design Bridge Design Branch No. 9

Geotechnical Services

Rev. 06/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Design
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GD - North ; South ; West
2 GS File Room

Date: 12/29/11

Lerdo Highway OC
Structure Name

6 - Ker - 99 - 36.52
District County Route ~~km~~ Post
M.

OC — 25

District Project Development — District Project Engineer
06-0C1301 — E.A. Number
50-235 — Structure Number

Foundation Report By: T. Song — Dated: 3/17/11

Reviewed By: P. Lutz (SD) R. Price (GS)

General Plan Dated: 12/20/11 — Foundation Plan Dated: 10/4/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- / Pile Types and Design Loads
- / Pile Lengths
- / Predrilling
- / Pile Load Test
- \ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- \ Footing Elevations, Design Loads, and Locations
- / Seismic Data
- / Location of Adjacent Structures and Utilities
- / Stability of Cuts or Fills
- / Fill Time Delay
- / Effect of Fills on Abutments and Bents
- / Fill Surcharge
- / Approach Paving Slabs
- / Scour
- / Ground Water
- / Tremie Seals/Type D Excavation

Richard P. Lutz — 9
Structure Design — Bridge Design Branch No.

Geotechnical Services

Rev. 06/02

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GEOTECHNICAL SERVICES

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3. Specifications & Estimates
4. File

Geotechnical Services
1. GD - North ; South ; West
2 GS File Room

Date: 12/29/11

Pond Rd. OC
Structure Name

6-Ker - 99 - 52.45
District County Route km Post

of one 25.

District Project Development — District Project Engineer
06-0C4301 — E.A. Number
50-234 — Structure Number

Foundation Report By: T. Song Dated: 3/17/11

Reviewed By: R. P. Lutz (SD) R. Price (GS)

General Plan Dated: 12/20/11 Foundation Plan Dated: 10/14/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ___ Pile Types and Design Loads
- ___ Pile Lengths
- ___ Predrilling
- ___ Pile Load Test
- ___ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ___ Footing Elevations, Design Loads, and Locations
- ___ Seismic Data
- ___ Location of Adjacent Structures and Utilities
- ___ Stability of Cuts or Fills
- ___ Fill Time Delay
- ___ Effect of Fills on Abutments and Berms
- ___ Fill Surcharge
- ___ Approach Paving Slabs
- ___ Scour
- ___ Ground Water
- ___ Tremie Seals/Type D Excavation

Structure Design — 9 Bridge Design Branch No. — Geotechnical Services

Rev. 06/02

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To: Structure Design
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3. Specifications & Estimates
4. File

Geotechnical Services
1. GD - North ; South ; West
2 GS File Room

Date: 12/29/11

ELMO Highway OC
Structure Name

6 - Ker - 99 - 50.41
District County Route ~~km~~ Post M

District Project Development
District Project Engineer

06-0C1301
E.A. Number

50-233
Structure Number

Foundation Report By: T. Song Dated: 3/17/11

Reviewed By: P. Lutz (SD) R. Price (GS)

General Plan Dated: 12/20/11 Foundation Plan Dated: 10/4/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- Pile Types and Design Loads
- Pile Lengths
- Predrilling
- Pile Load Test
- Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- Footing Elevations, Design Loads, and Locations
- Seismic Data
- Location of Adjacent Structures and Utilities
- Stability of Cuts or Fills
- Fill Time Delay
- Effect of Fills on Abutments and Bents
- Fill Surcharge
- Approach Paving Slabs
- Scour
- Ground Water
- Tremie Seals/Type D Excavation

Structure Design Bridge Design Branch No. 9

Geotechnical Services

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FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. Design
2. R.E. Pending File
3. Specifications & Estimates
4. File

Geotechnical Services
1. GD - North ; South ; West
2 GS File Room

Date: 12/29/11

Ave. 328 OC
Structure Name

6 - Tul - 99 - 43.41
District County Route ~~km~~ Post
M.

District Project Development — District Project Engineer
06-0C1301 — E.A. Number
46-0198 — Structure Number

Foundation Report By: T. Song — Dated: 3/18/11

Reviewed By: P. Lutz (SD) — R. Price (GS)

General Plan Dated: 12/8/11 — Foundation Plan Dated: 10/4/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

Pile Types and Design Loads
- ☐ Pile Lengths
- ☐ Predrilling
- ☐ Pile Load Test
- ☐ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ☒ Footing Elevations, Design Loads, and Locations
- ☐ Seismic Data
- ☒ Location of Adjacent Structures and Utilities
- ☒ Stability of Cuts or Fills
- ☒ Fill Time Delay
- ☐ Effect of Fills on Abutments and Bents
- ☒ Fill Surcharge
- ☒ Approach Paving Slabs
- ☒ Scour
- ☒ Ground Water
- ☒ Tremie Seals/Type D Excavation

Philip Lutz — 9
Structure Design — Bridge Design Branch No.

Geotechnical Services

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