FOR CONTRACT NO.: 03-3A0424

INFORMATION HANDOUT

PERMITS / AGREEMENTS / CERTIFICATIONS

CALIFORNIA
DEPARTMENT OF FISH AND GAME
STREAMBED ALTERATION AGREEMENT
NOTIFICATION NUMBER
1600-2010-0002-R2

UNITED STATES ARMY CORPS OF ENGINEERS
NATIONWIDE PERMIT
FILE NUMBER
SPK-2003-00803

CALIFORNIA REGIONAL WATER QUALITY
CONTROL BOARD, CENTRAL VALLEY REGION
CERTIFICATION
APPLICATION NUMBER
WDID #5A04CR00186

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
(CONSENT LETTER & GUIDELINES FOR SALMONID PASSAGE AT STEAM CROSSINGS)
CONSENT LETTER
DATED, MARCH 11, 2010

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE
BIOLOGICAL OPINION
81420-2008-F-1714-R001-2

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH MINING & TUNNEL UNIT (UNDERGROUND CLASSIFICATION)
No.: C076-007-10T to C079-007-10T

FOR CONTRACT NO.: 03-3A0424

REQUIREMENTS OF CITY OF CHICO FROM CONTRACTOR IN ORDER TO ISSUE PERMITS

MATERIALS INFORMATION

AERIALLY DEPOSITED LEAD (JULY 2009) AND VARIANCE

REVISED INITIAL SITE ASSESSMENT FOR HAZARDOUS MATERIAL IMPACT (JANUARY 2002)

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FOUNDATION INVESTIGATION REPORT, PALMETTO AVENUE
UNDERCROSSING (WIDEN)
BRIDGE No. 12-0152 R/L
ADDENDUM #1, FEBRUARY 2010

GEOTECHNICAL DESIGN & MATERIALS REPORT (FEBRUARY 2009)
ADDENDUM #1, DECMEMBER 2009
ADDENDUM #2, JANUARY 2010
ADDENDUM #3, FEBRUARY 2010

ROUTE: 03-BUT-99-PM R32.4/R33.3

CALIFORNIA DEPARTMENT OF FISH AND GAME
NORTH CENTRAL REGION
1701 NIMBUS ROAD, SUITE A
RANCHO CORDOVA, CA 95670

Streambed Alteration Agreement
Notification No. 1600-2010-0002 -R2
Big Chico Creek
Butte County Association of Governments
State Route 99 Auxiliary Lane Project

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and Butte County Association of Governments (Permittee) as represented by Andy Newsum.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified DFG on January 12, 2010 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 at Big Chico Creek, in the County of Butte, State of California; Latitude N39 44.323, Longitude W121 49.384.

PROJECT DESCRIPTION

The proposed project would improve the operational characteristics of SR 99 between SR 32 and East 1st Avenue by providing an auxiliary lane in each direction. The project would involve the following components: widening the two Bidwell Park Viaduct bridges; widening SR 99, including the southbound SR32 off - ramp and northbound SR 32 on - ramp; widening East 1st Avenue; widening East 1st Avenue on - ramp; widening Palmetto Avenue undercrossing; realignment of the existing bike path; constructing 33 new bridge piers, including the footings and columns; in Bidwell Park; constructing 6 new bridge piers, including the footings and columns; within the ordinary high water mark of Big Chico Creek; and installing rock slope protection (RSP) for each of the 6 new piers within the ordinary high water mark of Big Chico Creek.

A detailed project description is provided in the notification materials submitted to DFG. The notification, together with all supporting documents submitted with the notification, Draft Environmental Impact Report for the State Route 99 Auxiliary Lane Project Between State Route 32 and East 1st Avenue (SCH# 2002112002) the 65% submittal construction plan set for the Bidwell Park Viaduct designed by Quincy Engineering, the Final Natural Environmental Study Report - State Route 99 Auxiliary Lane Project between State Route 32 and East 1st Avenue, dated April 2003, Biological Assessment and Essential Fish Habitat Assessment for the Central Valley Steelhead and Central Valley Spring-run and Fun-run Chinook Salmon State Route 99 Auxiliary Lane Project between State Route 32 and East 1st Avenue, dated March 2003 and the Riparian Mitigation And Monitoring Plan for the State Route 99 Auxiliary Lane Project, date March 2010 are hereby incorporated into this agreement to describe the location, features, avoidance measures and mitigation measures of the proposed project.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: Central Valley steelhead, Central Valley Spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Yuma myotis bat, pallid bat, northwestern pond turtle, and other fish species, amphibians, and other aquatic and terrestrial plant and wildlife species.

The adverse effects the project could have on the fish or wildlife resources identified above include: loss of natural bed or bank; change in contour of bed, channel or bank; increase of bank erosion during construction; change in composition of channel materials: soil compaction or other disturbance; change in turbidity; increased sedimentation from adjacent construction; contaminants: short-term release (e.g. incidental from construction); loss or decline of riparian and/or emergent marsh habitat; decline of vegetative diversity; loss or decline of instream channel habitat; loss of or decline instream woody material; hydroacoustic impacts on fish by pile driving; construction pits and trenches that can capture terrestrial organisms; disruption to nesting birds and other wildlife: loss or impediment of terrestrial animal species travel routes due to temporary structures such as survey tape, sandbags, erosion protection materials etc.; change in shading or insolation leading to vegetative change; diversion of flow water from stream activity site or around activity site; and dewatering and rewatering of stream.

STREAM ZONE DEFINED

All components of a stream, including the channel, bed, banks, and floodplains. For the purpose of this agreement, the Stream Zone is defined as that area within 50 feet of the top of bank.

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 Authorized Work. The notification, together with all supporting documents submitted with the notification, is hereby incorporated into this agreement to describe the location and features of the proposed project. The Permittee agrees that all work shall be done as described in the notification and supporting documents, incorporating all project modifications, wildlife resource protection features, mitigation measures, and provisions as described in this agreement. Where apparent conflicts exist between the notification and the provisions listed in this agreement, the Permittee shall comply with the provisions listed in this agreement. The Permittee further agrees to notify DFG of any modifications made to the project plans submitted to DFG. At the discretion of DFG, this agreement will be amended to accommodate modifications to the project plans submitted to DFG and/or new project activities.

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 Work Period. The time period for completing the work within active channel (flowing water) shall be restricted to periods of low stream flow and dry weather and shall be confined to the period of July 1 to October 1. The time period for completing the work within stream zone (area within 50 feet of the top of bank) shall be restricted to periods of dry weather and shall be confined to the period of April 15 to November 15. Construction activities shall be timed with awareness of precipitation forecasts and likely increases in stream flow. Construction activities within the stream zone shall cease until all reasonable erosion control measures, inside and outside of the stream zone, have been implemented prior to all storm events. Revegetation, restoration and erosion control work is not confined to this time period. This provision does not apply to work above the stream zone (bridge deck and road surface).

2.2 Work Period Extensions. At DFG's discretion, the work period may be extended based on the extent of the work remaining, on site conditions and reasonably anticipated future conditions. If the Permittee finds more time is needed to complete the authorized activity, the Permittee shall submit a written request for a work period time extension to DFG. The work period extension request shall provide the following information: 1) Describe the extent of work already completed; 2) Provide specific detail of the activities that remain to be completed within the stream zone; and 3) Detail the actual time required to complete each of the remaining activities within the stream zone. The work period extension request should consider the effects of increased stream conditions, rain delays, increased erosion control measures, limited access due to saturated soil conditions, and limited growth of erosion control grasses due to cool weather. Photographs of the work completed and the proposed work areas are helpful in assisting DFG in its evaluation. Time extensions are issued at the discretion of DFG. DFG will have ten calendar days to approve the proposed work period extension. DFG reserves the right to require additional measures designed to protect natural resources.

2.3 Stream Diversions / Dewatering. Except for site preparation for the placement of dewatering structures (coffer dams), no excavation or other use of heavy equipment in the active stream channel is allowed. The Permittee must submit detailed water diversion plan to DFG. Dewatering and stream crossing structures must use clean removable materials, such as, sand bags, Port-a-dams, water bladder dams, K-rails, driven sheet metal coffer dams and trestles. Temporary culvert(s) and/or bridges must be sized to handle reasonably anticipated flows from unanticipated storm events. DFG will review the proposed water diversion plan. DFG will have 10 calendar days to approve the plan(s) or provide the requirements for that approval. If DFG does not respond within 10 days, the plan shall be automatically approved. All water dewatering structures shall be removed from the stream zone by November 15 unless otherwise authorized by DFG.

2.4 Temporary Stream Crossings: If a temporary stream crossing is necessary to complete operations, the Permittee must submit stream crossing plan to DFG. Temporary stream crossings (temporary bridge or temporary culvert(s) must be sized to handle reasonably anticipated flows from unanticipated storm events. DFG will review the proposed stream crossing plan. DFG will have 10 calendar days to approve the plan(s) or provide the requirements for that approval. If DFG does not respond within 10 days, the plan shall be automatically approved. All stream crossing structures shall be removed from the stream zone by November 15 unless otherwise authorized by DFG.

2.5 Surveys: The Permittee should provide copies on all surveys required in the Final Natural Environmental Study Report - State Route 99 Auxiliary Lane Project between State Route 32 and East 1st Avenue, dated April 2003. As appropriate, DFG will work with the Permittee to develop avoidance and mitigation measures based on the survey results.

2.6 Vegetation Removal. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. The Permittee shall use a licensed arborist to direct the removal of trees. To the extent practical for the health of the tree and safety of the workers and public, trees shall be trimmed instead of removed. Except for the trees specifically identified for removal in the notification, no native trees with a trunk diameter at breast height (DBH) in excess of four (4) inches shall be removed or damaged without prior consultation and approval of a Department representative. Using hand tools (clippers, chain saw, etc.), trees may be trimmed to the extent necessary to gain access to the work sites.

2.7 Sediment Control. Precautions to minimize turbidity/siltation shall be taken into account during project planning and implementation. This may require the placement of silt fencing, coir logs, coir rolls, straw bale dikes, or other siltation barriers so that silt and/or other deleterious materials are not allowed to pass to downstream reaches. Passage of sediment beyond the sediment barrier(s) is prohibited. If any sediment barrier fails to retain sediment, corrective measures shall be taken. The sediment barrier(s) shall be maintained in good operating condition throughout the construction period and the following rainy season. Maintenance includes, but is not limited to, removal of accumulated silt and/or replacement of damaged silt fencing, coir logs, coir rolls, and/or straw bale dikes. The Permittee is responsible for the removal of non-biodegradable silt barriers (such as plastic silt fencing) after the disturbed areas have been stabilized with erosion control vegetation (usually after the first growing season). Upon Department determination that turbidity/siltation levels resulting from project related activities constitute a threat to aquatic life, activities associated with the turbidity/siltation shall be halted until effective Department approved control devices are installed or abatement procedures are initiated.

2.8 Pollution Control. Utilize Best Management Practices (BMPs) to prevent spills and leaks into water bodies. If maintenance or refueling of vehicles or equipment must occur on-site, use a designated area and/or a secondary containment, located away from drainage courses to prevent the runoff of storm water and the runoff of spills. Ensure that all vehicles and equipment are in good working order (no leaks). Place drip pans or absorbent materials under vehicles and equipment when not in use. Ensure that all construction areas have proper spill clean up materials (absorbent pads, sealed containers, booms, etc.) to contain the movement of any spilled substances. Any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. Any of these materials, placed within or where they may enter a stream or lake by the Applicant or any party working under contract or with the permission of the Permittee, shall be removed immediately. DFG shall be notified immediately by the Permittee of any spills and shall be consulted regarding clean-up procedures.

2.9 Tree Removal - Bird Nests. It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird except as otherwise provided by the Fish and Game Code. No trees that contain active nests of birds shall be disturbed until all eggs have hatched and young birds have fledged without prior consultation and approval of a Department representative. It is recommended that the trees that are identified for removal, be removed during the non-nesting period of August 15 to March 15. If tree removal must occur during the period of March 16 and August 14, a qualified biologist shall conduct a pre-construction survey for bird nests or nesting activity in the project area. If any active nests or nesting behaviors are found, the Department must be notified prior to further action. The Permittee may be required to create exclusion zones of 75 feet to 0.25 miles depending on the species observed. The exclusion zone must be maintained until birds have fledged or nest is abandoned. The survey results shall be provided to the Department prior to removing any trees.

3. Compensatory Measures

To compensate for adverse impacts to fish and wildlife resources identified above that cannot be avoided or minimized, Permittee shall implement each measure listed below.

3.1 Site Restoration. All exposed/disturbed areas and access points within the stream zone left barren of vegetation as a result of the construction activities shall be restored using locally native grass seeds, locally native grass plugs and/or a mix of quick growing sterile non-native grass with locally native grass seeds. Seeded areas shall be covered with broadcast straw and/or jut netted (monofilament erosion blankets are not authorized).

3.2 Mitigation and Monitoring Plan. The Permittee shall implement the mitigation proposed in the Riparian Mitigation And Monitoring Plan for the State Route 99 Auxiliary Lane Project, date March 2010. Annual reporting shall be provided DFG as directed in the Riparian Mitigation And Monitoring Plan.

4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 The Permittee shall notify DFG within two working days of beginning work within the stream zone of Big Chico Creek. Notification shall be submitted as instructed in Contact Information section below. Email notification is preferred.

4.2 Upon completion of the project activities described in this agreement, the work area within the stream zone shall be digitally photographed. Photographs shall be submitted to DFG within two days of completion. Photographs and project commencement notification shall be submitted as instructed in Contact Information section below. Email submittal is preferred.

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 U.S. mail, fax, or email, or to such other address as Permittee or DFG specifies by written notice to the other. Refer to the project's Notification Number when submitting documents to DFG.

To Permittee:

Butte County Association of Governments
Contact: Andy Newsum
2580 Sierra Sunrise Terrace, Suite 100
Chico, CA 95928
Phone: (530) 879-2468
Email: ANewsum@bcag.org

Cc: Peggy Lee
ICFI
630 K Street, Suite 400
Sacramento, CA 95814
(916) 231-7690
Plee2@icfi.com

To DFG:

Department of Fish and Game
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
Attn: Lake and Streambed Alteration Program – Gary L. Hobgood
Notification #1600-2010-0002 R2
Fax: 916-358-2912
ghobgood@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).

The Permittee shall notify DFG where conflicts exist between the provisions of this agreement and those imposed by other regulatory agencies. Unless otherwise notified, the Permittee shall comply with the provision that offers the greatest protection to water quality, species of special concern and/or critical habitat.

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 the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31, 2014, 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.

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 BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

Andy Newsum

Andy Newsum
Project Manager

5/4/10
Date

FOR DEPARTMENT OF FISH AND GAME

Kent Smith

Kent Smith
Acting Regional Manager

5/27/10
Date

Prepared by: Gary L. Hobgood
Staff Environmental Scientist

DEPARTMENT OF THE ARMY

U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO ATTENTION OF

April 7, 2010

Regulatory Division (SPK-2003-00803)

Andy Newsum
Butte County Association of Governments
2580 Sierra Sunrise Terrace, Suite 100
Chico, California 95928

Dear Mr. Newsum:

We are responding to your January 7, 2010, request for a Department of the Army permit for the State Route 99 Auxiliary Lane project. This approximately 20.1-acre project involves activities, including discharges of dredged or fill material, in waters of the United States to construct new bridge piers to support the Bidwell Park Viaduct widening and installing rock slope protection along the banks of Big Chico Creek adjacent to the piers for scour protection. The project is located on Big Chico Creek, Section 25, Township 22 North, Range 1 East, MDB&M Survey, Latitude 39.7414064892636°, Longitude -121.826018547089°, Chico, Butte County, California.

Based on the information you provided, the proposed activity, resulting in the permanent loss of approximately 0.049 acres of water of the United States and temporary impacts to approximately 0.12 acres of waters of the United States, is authorized by Nationwide Permit Number 14. However, until Section 401 Water Quality Certification for the activity has been issued or waived, our authorization is denied without prejudice. Once you have provided us evidence of water quality certification, the activity is authorized and the work may proceed subject to the conditions of certification and the Nationwide Permit. Your work must comply with the general terms and conditions listed on the enclosed Nationwide Permit information sheets and the following special conditions:

Special Conditions

1. To insure project compliance, the document entitled Pre-Construction Notification, dated January 7, 2010, is incorporated by reference as a condition of this authorization except as modified by the following special conditions:

2. You must allow representatives from the Corps of Engineers to inspect the authorized activity and any mitigation, preservation, or avoidance areas at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

3. To document pre- and post-project construction conditions, you shall submit pre-construction photos of the project site prior to project implementation and post-construction photos of the project site within 30 days after project completion.

4. You shall plant and maintain regionally appropriate native riparian trees at a 1:1 replacement ratio along the affected reach of Big Chico Creek, to mitigate project impacts to the aquatic resource and associated habitat. Willows, oaks, alders, cottonwoods, and/or sycamores shall be planted to shade the entire stream reach.

5. To mitigate for the loss of 0.049 acres of riverine aquatic bed, you shall submit a check to this office in the amount of $7,350.00 payable to the National Fish and Wildlife Foundation (NFWF). Prior to proceeding with any activity otherwise authorized by this permit, you must receive written notification from the Corps that the check has been deposited in NFWF's Sacramento District Wetlands Conservation Fund.

You must sign the enclosed Compliance Certification and return it to this office within 30 days after completion of the authorized work.

This verification is valid for two years from the date of this letter or until the Nationwide Permit is modified, reissued, or revoked, whichever comes first. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2012. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. Failure to comply with the General Conditions of this Nationwide Permit, or the project-specific Special Conditions of this authorization, may result in the suspension or revocation of your authorization.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the customer survey on our website under *Customer Service Survey.*

Please refer to identification number SPK-2003-00803 in any correspondence concerning this project. If you have any questions, please contact Brian Vierria at our California North Branch, 1325 J Street, Room 1480, Sacramento, California 95814, email *Brian.E.Vierria@usace.army.mil,* or telephone 916-557-7728. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/regulatory.html.*

Sincerely,

Nancy A. Haley

Nancy A. Haley
Chief, California North Branch

Enclosures

Copy furnished without enclosures

Peggy Lee, ICFI, 630 K Street, Suite 400, Sacramento, California 95814
Jennifer Olah, CALTRANS District 3, Post Office Box 911, Marysville, California 95901

COMPLIANCE CERTIFICATION

Permit File Number: SPK-2003-00803 - SR 99 Auxy lane II

Nationwide Permit Number: 14

Permittee: Andy Newsum
Butte County Association of Governments
2580 Sierra Sunrise Terrace, Suite 100
Chico, California 95928

County: Butte

Date of Verification: April 7, 2010

Within 30 days after completion of the activity authorized by this permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Sacramento District

Brian.E.Vierria@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of the permit your authorization may be suspended, modified, or revoked. If you have any questions about this certification, please contact the Corps of Engineers.

* * * * * * * * *

I hereby certify that the work authorized by the above-referenced permit, including all the required mitigation, was completed in accordance with the terms and conditions of the permit verification.

Signature of Permittee ____________ Date ____________

Nationwide Permit Summary

U S Army Corps of Engineers
Sacramento District

33 CFR Part 330; Issuance of Nationwide Permits – March 19, 2007 includes corrections of May 8, 2007 and addition of regional conditions December 2007

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4)

A. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

☐ **1. Navigation.**

☐ (a) No activity may cause more than a minimal adverse effect on navigation.

☐ (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

☐ (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

☐ **2. Aquatic Life Movements.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

☐ **3 Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

☐ **4. Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

☐ **5. Shellfish Beds.** No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

☐ **6. Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

☐ **7. Water Supply Intakes.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

☐ **8. Adverse Effects From Impoundments.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

☐ **9. Management of Water Flows.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

☐ **10. Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

☐ **11. Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

☐ **12. Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

☐ **13. Removal of Temporary Fills**. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

☐ **14. Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

☐ **15. Wild and Scenic Rivers**. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

☐ **16. Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

☐ **17. Endangered Species**.

☐ (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

☐ (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

☐ (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

☐ (e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

☐ **18. Historic Properties**.

☐ (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

☐ (b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

☐ (d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

☐ (e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

☐ **19. Designated Critical Resource Waters.** Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

☐ (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

☐ (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

☐ **20 Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

☐ (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

☐ (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

☐ (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

☐ (d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

☐ (e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

☐ (f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

☐ (g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

☐ (h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

☐ **21. Water Quality.** Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

☐ **22. Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

☐ **23. Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

☐ **24. Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

☐ **25. Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

> "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."
>
> ---
>
> (Transferee)
>
> ---
>
> (Date)

☐ **26. Compliance Certification**. Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

☐ (a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

☐ (b) A statement that any required mitigation was completed in accordance with the permit conditions; and

☐ (c) The signature of the permittee certifying the completion of the work and mitigation.

☐ **27. Pre-Construction Notification.**

☐ (a) **Timing**.. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

☐ (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

☐ (2) Forty-five calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

☐ (b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

☐ (1) Name, address and telephone numbers of the prospective permittee;

☐ (2) Location of the proposed project;

☐ (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

☐ (4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

☐ (5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

☐ (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

☐ (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

☐ (c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

☐ (d) Agency Coordination:

☐ (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

☐ (2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

☐ (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

☐ (4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

☐ (5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

☐ (e) In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

☐ (a) **28. Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

B. Regional Conditions:

I. Sacramento District (All States, except Colorado)

1. When pre-construction notification (PCN) is required, the prospective permittee shall notify the Sacramento District in accordance with General Condition 27 using either the South Pacific Division Preconstruction Notification (PCN) Checklist or a completed application form (ENG Form 4345). In addition, the PCN shall include:

a. A written statement explaining how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;

b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and size (in acreage) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the high tide line should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation; and

c. Pre-project color photographs of the project site taken from designatedlocations documented on the plan drawing.

2. The permittee shall complete compensatory mitigation required by special conditions of the NWP verification before or concurrent with construction of the authorized activity, except when specifically determined to be impracticable by the Sacramento District. When project mitigation involves use of a mitigation bank or in-lieu fee program, payment shall be made before commencing construction.

3. The permittee shall record the NWP verification with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property against areas (1) designated to be preserved as part of mitigation for authorized impacts, including any associated covenants or restrictions, or (2) where structures such as boat ramps or docks, marinas, piers, and permanently moored vessels will be constructed in or adjacent to navigable waters (Section 10 and Section 404). The recordation shall also include a map showing the surveyed location of the authorized structure and any associated areas preserved to minimize or compensate for project impacts.

4. The permittee shall place wetlands, other aquatic areas, and any vegetative buffers preserved as part of mitigation for impacts into a separate "preserve" parcel prior to discharging dredged or fill material into waters of the United States, except where specifically determined to be impracticable by the Sacramento District. Permanent legal protection shall be established for all preserve parcels, following Sacramento District approval of the legal instrument.

5. The permittee shall allow Corps representatives to inspect the authorized activity and any mitigation areas at any time deemed necessary to determine compliance with the terms and conditions of the NWP verification. The permittee will be notified in advance of an inspection.

6. For NWPs 29, 39, 40, 42, 43, 44, and 46, requests to waive the 300 linear foot limitation for intermittent or ephemeral waters of the U.S. shall include an evaluation of functions and services provided by the waterbody taking into account the watershed, measures to be implemented to avoid and minimize impacts, other measures to avoid and minimize that were found to be impracticable, and a mitigation plan for offsetting impacts.

7. Road crossings shall be designed to ensure fish passage, especially for anadromous fisheries. Permittees shall employ bridge designs that span the stream or river, utilize pier or pile supported structures, or involve large bottomless culverts with a natural streambed, where the substrate and streamflow conditions approximate existing channel conditions. Approach fills in waters of the United States below the ordinary high water mark are not authorized under the NWPs, except where avoidance has specifically been determined to be impracticable by the Sacramento District.

8. For NWP 12, clay blocks, bentonite, or other suitable material shall be used to seal the trench to prevent the utility line from draining waters of the United States, including wetlands.

9. For NWP 13, bank stabilization shall include the use of vegetation or other biotechnical design to the maximum extent practicable. Activities involving hard-armoring of the bank toe or slope requires submission of a PCN per General Condition 27.

10. For NWP 23, the PCN shall include a copy of the signed Categorical Exclusion document and final agency determinations regarding compliance with Section 7 of the Endangered Species Act, Essential Fish Habitat under the Magnussen-Stevens Act, and Section 106 of the National Historic Preservation Act.

11. For NWP 44, the discharge shall not cause the loss of more than 300 linear feet of streambed. For intermittent and ephemeral streams, the 300 linear foot limit may be waived in writing by the Sacramento District. This NWP does not authorize discharges in waters of the United States supporting anadromous fisheries.

12. For NWPs 29 and 39, channelization or relocation of intermittent or perennial drainage, is not authorized, except when, as determined by the Sacramento District, the relocation would result in a net increase in functions of the aquatic ecosystem within the watershed.

13. For NWP 33, temporary fills for construction access in waters of the United States supporting fisheries shall be accomplished with clean, washed spawning quality gravels where practicable as determined by the Sacramento District, in consultation with appropriate federal and state wildlife agencies.

14. For NWP 46, the discharge shall not cause the loss of greater than 0.5 acres of waters of the United States or the loss of more than 300 linear feet of ditch, unless this 300 foot linear foot limit is waived in writing by the Sacramento District.

15. For NWPs 29, 39, 40, 42, and 43, upland vegetated buffers shall be established and maintained in perpetuity, to the maximum extent practicable, next to all preserved open waters, streams and wetlands including created, restored, enhanced or preserved waters of the U.S., consistent with General Condition 20. Except in unusual circumstances, vegetated buffers shall be at least 50 feet in width.

16. All NWPs except 3, 6, 20, 27, 32, 38, and 47, are revoked for activities in histosols and fens and in wetlands contiguous with fens. Fens are defined as slope wetlands with a histic epipedon that are hydrologically supported by groundwater. Fens are normally saturated throughout the growing season, although they may not be during drought conditions. For NWPs 3, 6, 20, 27, 32, and 38, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27.

17. For all NWPs, when activities are proposed within 100 feet of the point of groundwater discharge of a natural spring, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27. A spring source is defined as any location where ground water emanates from a point in the ground. For purposes of this condition, springs do not include seeps or other discharges which lack a defined channel.

II. California Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

2. In the Primary and Secondary Zones of the Legal Delta, NWPs 29 and 39 are revoked. New development activities in the Legal Delta will be reviewed through the Corps' standard permit process.

III. Nevada Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

IV. Utah Only

1. For all NWPs, except NWP 47, prospective permittees shall submit a PCN in accordance with General Condition 27 for any activity, in waters of the United States, below 4217 feet mean sea level (msl) adjacent to the Great Salt Lake and below 4500 feet msl adjacent to Utah Lake.

2. A PCN is required for all bank stabilization activities in a perennial stream that would affect more than 100 linear feet of stream

3. For NWP 27, facilities for controlling stormwater runoff, construction of water parks such as kayak courses, and use of grout or concrete to construct in-stream structures are not authorized. A PCN is required for all projects exceeding 1500 linear feet as measured on the stream thalweg, using in stream structures exceeding 50 cubic yards per structure and/or incorporating grade control structures exceeding 1 foot vertical drop. For any stream restoration project, the post project stream sinuosity shall be appropriate to the geomorphology of the surrounding area and shall be equal to, or greater than, pre project sinuosity. Sinuosity is defined as the ratio of stream length to project reach length. Structures shall allow the passage of aquatic organisms, recreational water craft or other navigational activities unless specifically waived in writing by the District Engineer.

V. Colorado Only

1. Final Regional Conditions Applicable to Specific Nationwide Permits within Colorado.

a. Nationwide Permit Nos. 12 and 14, Utility Line Activities and Linear Transportation Projects. In the Colorado River Basin, utility line and road activities crossing perennial water or special aquatic sites require notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification).

b. Nationwide Permit No. 13 Bank Stabilization. In Colorado, bank stabilization activities necessary for erosion prevention in streams that average less than 20 feet in width (measured between the ordinary high water marks) are limited to the placement of no more than 1/4 cubic yard of suitable fill* material per running foot below the plane of the ordinary high water mark. Activities greater than 1/4 cubic yard may be authorized if the permittee notifies the District Engineer in accordance with General Condition 27 (Pre-Construction Notification) and the Corps determines the adverse environmental effects are minimal. [* See (g) for definition of Suitable Fill]

c. Nationwide Permit No. 27 Aquatic Habitat Restoration, Establishment, and Enhancement Activities.

(1) For activities that include a fishery enhancement component, the Corps will send the Pre-Construction Notification to the Colorado Division of Wildlife (CDOW) for review. In accordance with General Condition 27 (Pre-Construction Notification), CDOW will have 10 days from the receipt of Corps notification to indicate that they will be commenting on the proposed project. CDOW will then have an additional 15 days after the initial 10-day period to provide those comments. If CDOW raises concerns, the applicant may either modify their plan, in coordination with CDOW, or apply for a standard individual permit.

(2) For activities involving the length of a stream, the post-project stream sinuosity will not be significantly reduced, unless it is demonstrated that the reduction in sinuosity is consistent with the natural morphological evolution of the stream (sinuosity is the ratio of stream length to project reach length).

(3) Structures will allow the upstream and downstream passage of aquatic organisms, including fish native to the reach, as well as recreational water craft or other navigational activities, unless specifically waived in writing by the District Engineer. The use of grout and/or concrete in

building structures is not authorized by this nationwide permit.

(4) The construction of water parks (i.e., kayak courses) and flood control projects are not authorized by this nationwide permit.

d. Nationwide Permits Nos. 29 and 39; Residential Developments and Commercial and Institutional Developments. A copy of the existing FEMA/locally-approved floodplain map must be submitted with the Pre-Construction Notification. When reviewing proposed developments, the Corps will utilize the most accurate and reliable FEMA/locally-approved pre-project floodplain mapping, not post-project floodplain mapping based on a CLOMR or LOMR. However, the Corps will accept revisions to existing floodplain mapping if the revisions resolve inaccuracies in the original floodplain mapping and if the revisions accurately reflect pre-project conditions.

2. Final Regional Conditions Applicable to All Nationwide Permits within Colorado

e. Removal of Temporary Fills. General Condition 13 (Removal of Temporary Fills) is amended by adding the following: When temporary fills are placed in wetlands in Colorado, a horizontal marker (i.e. fabric, certified weed-free straw, etc.) must be used to delineate the existing ground elevation of wetlands that will be temporarily filled during construction.

f. Spawning Areas. General Condition 3 (Spawning Areas) is amended by adding the following: In Colorado, all Designated Critical Resource Waters (see enclosure 1) are considered important spawning areas. Therefore, In accordance with General Condition 19 (Designated Critical Resource Waters), the discharge of dredged or fill material in not authorized by the following nationwide permits in these waters: NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50. In addition, in accordance with General Condition 27 (Pre-Construction Notification), notification to the District Engineer is required for use of the following nationwide permits in these waters: NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37 and 38".

g. Suitable Fill. In Colorado, use of broken concrete as fill material requires notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification). Permittees must demonstrate that soft engineering methods utilizing native or non-manmade materials are not practicable (with respect to cost, existing technology, and logistics), before broken concrete is allowed as suitable fill. Use of broken concrete with exposed rebar is prohibited in perennial waters and special aquatic sites.

h. Invasive Aquatic Species. General Condition 11 is amended by adding the following condition for work in perennial or intermittent waters of the United States: If heavy equipment is used for the subject project that was previously working in another stream, river, lake, pond, or wetland within 10 days of initiating work, one the following procedures is necessary to prevent the spread of New Zealand Mud Snails and other aquatic hitchhikers:

(1) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and keep the equipment dry for 10 days. OR

(2) Remove all mud and debris from Equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with either a 1:1 solution of Formula 409 Household Cleaner and water, or a solution of Sparquat 256 (5 ounces Sparquat per gallon of water). Treated equipment must be kept moist for at least 10 minutes. OR

(3) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with water greater than 120 degrees F for at least 10 minutes.

3. Final Regional Conditions for Revocation/Special Notification Specific to Certain Geographic Areas

i. Fens: All Nationwide permits, except permit Nos. 3, 6, 20, 27, 32, 38 and 47, are revoked in fens and wetlands adjacent to fens. Use of nationwide permit Nos. 3, 20, 27 and 38, requires notification to the District Engineer, in accordance with General Condition 27 (Pre-Construction Notification), and the permittee may not begin the activity until the Corps determines the adverse environmental effects are minimal. The following defines a fen:

Fen soils (histosols) are normally saturated throughout the growing season, although they may not be during drought conditions. The primary source of hydrology for fens is groundwater. Histosols are defined in accordance with the U.S. Department of Agriculture, Natural Resources Conservation Service publications on Keys to Soil Taxonomy and Field Indicators of Hydric Soils in the United States (http://soils.usda.gov/technical/classification/taxonomy).

j. Springs: Within the state of Colorado, all NWPs, except permit 47 (original 'C'), require preconstruction notification pursuant to General Condition 27 for discharges of dredged or fill material within 100 feet of the point of groundwater discharge of natural springs. A spring source is defined as any location where groundwater emanates from a point in the ground. For purposes of this regional condition, springs do not include seeps or other discharges which do not have a defined channel.

4. Additional Information

The following provides additional information regarding minimization of impacts and compliance with existing general Conditions:

a. Permittees are reminded of the existing General Condition No. 6 which prohibits the use of unsuitable material. Organic debris, building waste, asphalt, car bodies, and trash are not suitable material. Also, General Condition 12 requires appropriate erosion and sediment controls (i.e. all fills must be permanently stabilized to prevent erosion and siltation into waters and wetlands at the earliest practicable date). Streambed material or other small aggregate material placed along a bank as stabilization will not meet General Condition 12. Also, use of erosion control mates that contain plastic netting may not meet General Condition 12 if deemed harmful to wildlife.

b. Designated Critical Resource Waters in Colorado. In Colorado, a list of designated Critical Resource Waters has been published in accordance with General Condition 19 (Designated Critical Resource Waters). This list will be published on the Albuquerque District Regulatory home page (http://www.spa.usace.army.mil/reg/)

c. Federally-Listed Threatened and Endangered Species. General condition 17 requires that nod-federal permittees notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project. Information on such species, to include occurrence by county in Colorado, may be found at the following U.S. Fish and Wildlife Service website: http://www.fws.gov/mountain%2Dprairie/endspp/name_county_search.htm

C. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

D. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration, establishment (creation), enhancement, or preservation of aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects waterbodies with their adjacent uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 20.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete project: The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete project must have independent utility (see definition). For linear projects, a "single and complete project" is all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States that, during a year with normal patterns of precipitation, has water flowing or standing above ground to the extent that an ordinary high water mark (OHWM) or other indicators of jurisdiction can be determined, as well as any wetland area (see 33 CFR 328.3(b)). If a jurisdictional wetland is adjacent--meaning bordering, contiguous, or neighboring--to a jurisdictional waterbody displaying an OHWM or other indicators of jurisdiction, that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

California Regional Water Quality Control Board
Central Valley Region

Katherine Hart, Chair.

Linda S. Adams
Secretary for Environmental Protection

Redding Office
415 Knollcrest Drive, Suite 100, Redding, California 96002
(530) 224-4845 • Fax (530) 224-4857
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

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California Regional Water Quality Control Board
Central Valley Region
Katherine Hart, Chair

Linda S. Adams
Secretary for Environmental Protection

415 Knollcrest Drive, Suite 100, Redding, California 96002
(530) 224-4845 • Fax (530) 224-4857

Arnold Schwarzenegger
Governor

12 May 2010

Mr. Andy Newsum
Butte County Association of Governments
2580 Sierra Sunrise Terrace, Suite 100
Chico, CA 95928

CLEAN WATER ACT §401 TECHNICALLY CONDITIONED WATER QUALITY CERTIFICATION FOR DISCHARGE OF DREDGED AND/OR FILL MATERIALS FOR THE STATE ROUTE 99 AUXILIARY LANE PROJECT (WDID#5A04CR00186), CHICO, BUTTE COUNTY

ACTION:

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

WATER QUALITY CERTIFICATION STANDARD CONDITIONS:

1. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to §13330 of the California Water Code and §3867 of Title 23 of the California Code of Regulations (23 CCR).
2. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.
3. The validity of any non-denial certification action shall be conditioned upon total payment of the full fee required under 23 CCR §3833, unless otherwise stated in writing by the certifying agency.
4. Certification is valid for the duration of the described project. Butte County Association of Governments shall notify the Central Valley Water Board in writing within 7 days of project completion.

ADDITIONAL TECHNICALLY CONDITIONED CERTIFICATION CONDITIONS:

In addition to the four standard conditions, Butte County Association of Governments shall satisfy the following:

1. Butte County Association of Governments shall notify the Central Valley Water Board in writing 7 days in advance of the start of any in-water activities.

2. Except for activities permitted by the U.S. Army Corps under §404 of the Clean Water Act, soil, silt, or other organic materials shall not be placed where such materials could pass into surface water or surface water drainage courses.

3. All areas disturbed by project activities shall be protected from washout or erosion.

4. Butte County Association of Governments shall maintain a copy of this Certification and supporting documentation (Project Information Sheet) at the Project site during construction for review by site personnel and agencies. All personnel (employees, contractors, and subcontractors) performing work on the proposed project shall be adequately informed and trained regarding the conditions of this Certification.

5. An effective combination of erosion and sediment control Best Management Practices (BMPs) must be implemented and adequately working during all phases of construction.

6. All temporarily affected areas will be restored to pre-construction contours and conditions upon completion of construction activities.

7. Butte County Association of Governments shall perform surface water sampling: 1) When performing any in-water work; 2) In the event that project activities result in any materials reaching surface waters or; 3) When any activities result in the creation of a visible plume in surface waters. The following monitoring shall be conducted immediately upstream out of the influence of the project and 300 feet downstream of the active work area. Sampling results shall be submitted to this office within two weeks of initiation of sampling and every two weeks thereafter. The sampling frequency may be modified for certain projects with written permission from the Central Valley Water Board.

Parameter	Unit	Type of Sample	Frequency of Sample
Turbidity	NTU	Grab	Every 4 hours during in water work
Settleable Material	ml/l	Grab	Same as above.
Visible construction related pollutants	Observations	Visible Inspections	Continuous throughout the construction period

8. Activities shall not cause turbidity increases in surface water to exceed:

(a) where natural turbidity is less than 1 Nephelometric Turbidity Units (NTUs), controllable factors shall not cause downstream turbidity to exceed 2 NTU;
(b) where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU;
(c) where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
(d) where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
(e) where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Except that these limits will be eased during in-water working periods to allow a turbidity increase of 15 NTU over background turbidity as measured in surface waters 300 feet downstream from the working area. In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected. Averaging periods may only be assessed by prior permission of the Central Valley Water Board.

9. Activities shall not cause settleable matter to exceed 0.1 ml/l in surface waters as measured in surface waters 300 feet downstream from the project.

10. The discharge of petroleum products or other excavated materials to surface water is prohibited. Activities shall not cause visible oil, grease, or foam in the work area or downstream. Butte County Association of Governments shall notify the Central Valley Water Board immediately of any spill of petroleum products or other organic or earthen materials.

11. Butte County Association of Governments shall notify the Central Valley Water Board immediately if the above criteria for turbidity, settleable matter, oil/grease, or foam are exceeded.

12. Butte County Association of Governments shall comply with all Department of Fish and Game 1600 requirements for the project.

13. Butte County Association of Governments must obtain coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities issued by the State Water Resources Control Board for any project disturbing an area of 1 acre or greater.

14. The Conditions in this water quality certification are based on the information in the attached "Project Information." If the information in the attached Project Information is modified or the project changes, this water quality certification is no longer valid until amended by the Central Valley Water Board.

15. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under State law and section 401 (d) of the federal Clean Water

Act. The applicability of any State law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to ensure compliance into this Order.

a. If Butte County Association of Governments or a duly authorized representative of the project fails or refuses to furnish technical or monitoring reports, as required under this Order, or falsifies any information provided in the monitoring reports, the applicant is subject to civil, for each day of violation, or criminal liability.

b. In response to a suspected violation of any condition of this Order, the Central Valley Water Board may require Butte County Association of Governments to furnish, under penalty of perjury, any technical or monitoring reports the Central Valley Water Board deems appropriate, provided that the burden, including cost of the reports, shall be in reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

c. Butte County Association of Governments shall allow the staff(s) of the Central Valley Water Board, or an authorized representative(s), upon the presentation of credentials and other documents, as may be required by law, to enter the project premises for inspection, including taking photographs and securing copies of project-related records, for the purpose of assuring compliance with this certification and determining the ecological success of the project.

ADDITIONAL STORM WATER QUALITY CONDITIONS:

Butte County Association of Governments shall also satisfy the following additional storm water quality conditions:

1. During the construction phase, Butte County Association of Governments must employ strategies to minimize erosion and the introduction of pollutants into storm water runoff. These strategies must include the following:

   (a) the Storm Water Pollution Prevention Plan (SWPPP) must be prepared during the project planning and design phases and before construction;
   (b) an effective combination of erosion and sediment control Best Management Practices (BMPs) must be implemented and adequately working prior to the rainy season and during all phases of construction.

2. Butte County Association of Governments must minimize the short and long-term impacts on receiving water quality from the State Route 99 Auxiliary Lane Project by implementing the following post-construction storm water management practices:

   (a) minimize the amount of impervious surface;
   (b) reduce peak runoff flows;
   (c) provide treatment BMPs to reduce pollutants in runoff;
   (d) ensure existing waters of the State (e.g., wetlands, vernal pools, or creeks) are not used as pollutant source controls and/or treatment controls;
   (e) preserve and, where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones;

(f) limit disturbances of natural water bodies and natural drainage systems caused by development (including development of roads, highways, and bridges);
(g) use existing drainage master plans or studies to estimate increases in pollutant loads and flows resulting form projected future development and require incorporation of structural and non-structural BMPs to mitigate the projected pollutant load increases in surface water runoff;
(h) identify and avoid development in areas that are particularly susceptible to erosion and sediment loss, or establish development guidance that protects areas from erosion/ sediment loss;
(i) control post-development peak storm water run-off discharge rates and velocities to prevent or reduce downstream erosion, and to protect stream habitat.

3. Butte County Association of Governments must ensure that all development within the project provides verification of maintenance provisions for post-construction structural and treatment control BMPs. Verification shall include one or more of the following, as applicable:

(a) the developer's signed statement accepting responsibility for maintenance until the maintenance responsibility is legally transferred to another party; or
(b) written conditions in the sales or lease agreement that require the recipient to assume responsibility for maintenance; or
(c) written text in project conditions, covenants and restrictions for residential properties assigning maintenance responsibilities to a home owner's association, or other appropriate group, for maintenance of structural and treatment control BMPs; or
(d) any other legally enforceable agreement that assigns responsibility for storm water BMP maintenance.

REGIONAL WATER QUALITY CONTROL BOARD CONTACT PERSON:

Scott A. Zaitz, R.E.H.S., Redding Branch Office, 415 Knollcrest Drive, Suite 100, Redding, California 96002, szaitz@waterboards.ca.gov, (530) 224-4784

WATER QUALITY CERTIFICATION:

I hereby issue an order certifying that any discharge from the Butte County Association of Governments, the State Route 99 Auxiliary Lane Project (WDID# 5A04CR00186) will comply with the applicable provisions of §301 ("Effluent Limitations"), §302 ("Water Quality Related Effluent Limitations"), §303 ("Water Quality Standards and Implementation Plans"), §306 ("National Standards of Performance"), and §307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Resources Control Board Water Quality Order No. 2008-0182 DWQ "Statewide General Waste Discharge Requirements For Dredged Or Fill Discharges That Have Received State Water Quality Certification (General WDRs)".

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with the Butte County Association of Governments' project description and the attached Project Information Sheet, and (b) compliance with all applicable requirements of the Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan).

Robert A. Crandall

(for) PAMELA C. CREEDON
Executive Officer

SAZ: lm

Enclosure: Project Information

cc: Mr. Brian Vierria, U.S. Army Corp of Engineers, Sacramento
U.S. Fish and Wildlife Service, Sacramento
Department of Fish and Game, Region 2, Rancho Cordova
Mr. Bill Jennings, CALSPA, Stockton
City of Chico Planning Department, Chico
Mr. Peter Buckman, ICF International

cc by email: Mr. Dave Smith, U.S. EPA, Region 9, San Francisco
Mr. Bill Orme, SWRCB, Certification Unit, Sacramento

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PROJECT INFORMATION

Application Date: 11 January 2010

Applicant: Butte County Association of Governments, Attn: Andy Newsum

Applicant Representatives: ICF International, Attn: Peter Buchman

Project Name: State Route 99 Auxiliary Lane Project

Application Number: WDID No. 5A04CR00186

U.S. Army Corps File Number: SPK-2003-00803 Nationwide Permit No. 14 (Linear Transportation Project)

Type of Project: Widening of the two Bidwell Park Viaduct Bridges on SR 99 from East 1st Avenue to SR 32 in Chico.

Project Location: On State Route 99 between the State Route 32 and East 1st Avenue interchanges as well as on East 1st Avenue in the vicinity of the SR99/East 1st Avenue interchange, in the City of Chico, Butte County, Section 26, Township 22 North, Range 01 East, MDB&M. Latitude: 39°44'26.5" & Longitude: -121°49'31.1"

County: Butte County

Receiving Water(s) (hydrologic unit): Big Chico Creek, which is a tributary to the Sacramento River. Tehama Hydrologic Unit-Red Bluff Hydrologic Area No. 504.20

Water Body Type: Streambed

Designated Beneficial Uses: The Basin Plan for the Central Valley Regional Board has designated beneficial uses for surface and ground waters within the region. Beneficial uses that could be impacted by the project include: Municipal and Domestic Water Supply (MUN); Agricultural Supply (AGR); Industrial Service Supply (IND); Hydropower Generation (POW); Water Contact Recreation (REC-1); Non-contact Water Recreation (REC-2); Warm Freshwater Habitat (WARM); Cold Freshwater Habitat (COLD); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and /or Early Development (SPWN); Wildlife Habitat (WILD); and Navigation (NAV).

Project Description (purpose/goal): The State Route 99 Auxiliary Lane Project consists of widening the two Bidwell Park Viaduct Bridges, widening SR99, including the southbound SR32 off-ramp and northbound on-ramp, constructing six new bridge piers, including the footings and columns, and installing rock slope protection for each of the new piers.

Preliminary Water Quality Concerns: Construction activities may impact surface waters with increased turbidity and settleable matter.

Proposed Mitigation to Address Concerns: Butte County Association of Governments will implement Best Management Practices (BMPs) to control sedimentation and erosion. All temporary affected areas will be restored to pre-construction contours and conditions upon completion of construction activities. Butte County Association of Governments will conduct turbidity and settleable matter testing during in-water work, stopping work if Basin Plan criteria are exceeded or are observed.

Fill/Excavation Area: Project implementation will permanently impact 0.049 acres and 90 linear feet of streambed and temporarily impact 0.12 acres and 213 linear feet of streambed.

Dredge Volume: N/A

U.S. Army Corps of Engineers Permit Number: SPK-2003-00803 Nationwide Permit 14 (Linear Transportation Project)

Department of Fish and Game Streambed Alteration Agreement: Butte County Association of Governments will comply with Lake and Streambed Alteration Agreement number 1600-2010-0002-R2.

Possible Listed Species: Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, and valley elderberry longhorn beetle (VELB).

Status of CEQA Compliance: The Butte County Association of Governments approved the Final Environmental Impact Report for this project on 26 June 2009.

Compensatory Mitigation: Butte County Association of Governments will pay fees required by the National Marine Fisheries Service and dedicate 0.51 acres of mitigating property to the Wildlands, Inc. An unspecified amount of acreage will be restored to riparian floodplain forest. To satisfy the remaining 0.73-acre of mitigation for permanent impacts to riparian habitat, the applicant is proposing to mitigate for the permanent loss of riparian habitat through the purchase of riparian credits at the Fremont Landing Conservation Bank.

Application Fee Provided: Total fees of $1216.00 have been submitted as required by 23 CCR §3833b(3)(A) and by 23 CCR §2200(e). A remaining certification fee of $787 was paid on 10 March 2010 as required by 23 CCR §3833b(2)(A) and by 23 CCR § 2200(e)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Sacramento Area Office
650 Capitol Mall, Suite 8-300
Sacramento, California 95814-4706

MAR 1 1 2010

Sandra E. Rosas
Branch Chief
California Department of Transportation
P.O. Box 911
Marysville, California 95901-0911

Dear Ms. Rosas:

This letter is in response to your February 8, 2010, request for an extension to the in-water work window concerning the State Route 99 Auxiliary Lane project in Butte County, California. The proposed project involves realigning and expanding the existing freeway between the north and south-bound lanes. Enclosed with your letter was an updated work schedule detailing the activities for the proposed project to continue through October 1. According to the information submitted with your extension request, instream work will be limited to July 1 through October 1, when federally listed anadromous fish species are least likely to occur in the action area, and thus would not be exposed to the effects of the proposed construction activities in the channel of Big Chico Creek. In addition, standard Best Management Practices and a Storm Water Pollution Prevention Plan will continue to be implemented as initially proposed in the project description in order to avoid degrading water quality.

After reviewing your letter, NOAA's National Marine Fisheries Service has determined that the proposed extension of in-water work activities until October 1, will not result in adverse effects to listed species or designated critical habitats beyond those that were previously considered in the September 3, 2003, and January 12, 2009, concurrence letters; therefore re-initiation of consultation is not warranted.

Please contact Monica Gutierrez at (916) 930-3657, or via e-mail at Monica.Gutierrez@noaa.gov if you have any questions or require additional information concerning this project.

Sincerely,

for
Maria Rea
Sacramento Area Office Supervisor

cc: Copy to File ARN # 151422SWR2008SA00320
NMFS-PRD, Long Beach, CA

National Marine Fisheries Service
Southwest Region

GUIDELINES FOR SALMONID PASSAGE AT STREAM CROSSINGS

1.0 INTRODUCTION

This document provides guidelines for design of stream crossings to aid upstream and downstream passage of migrating salmonids. It is intended to facilitate the design of a new generation of stream crossings, and assist the recovery of threatened and endangered salmon species. These guidelines are offered by the National Marine Fisheries Service, Southwest Region (NMFS-SWR), as a result of its responsibility to prescribe fishways under the Endangered Species Act, the Magnuson-Stevens Act, the Federal Power Act, and the Fish and Wildlife Coordination Act. The guidelines apply to all public and private roads, trails, and railroads within the range of anadromous salmonids in California.

Stream crossing design specifications are based on the previous works of other resource agencies along the U.S. West Coast. They embody the best information on this subject at the time of distribution. Meanwhile, there is mounting evidence that impassable road crossings are taking a more significant toll on endangered and threatened fish than previously thought. New studies are revealing evidence of the pervasive nature of the problem, as well as potential solutions. Therefore, this document is appropriate for use until revised, based on additional scientific information, as it becomes available.

The guidelines are general in nature. There may be cases where site constraints or unusual circumstances dictate a modification or waiver of one or more of these design elements. Conversely, where there is an opportunity to protect salmonids, additional site-specific criteria may be appropriate. Variances will be considered by the NMFS on a project-by-project basis. When variances from the technical guidelines are proposed, the applicant must state the specific nature of the proposed variance, along with sufficient biological and/or hydrologic rationale to support appropriate alternatives. Understanding the spatial significance of a stream crossing in relation to salmonid habitat within a watershed will be an important consideration in variance decisions.

Protocols for fish-barrier assessment and site prioritization are under development by the California Department of Fish and Game (CDFG). These will be available in updated versions of the *California Salmonid Stream Habitat Restoration Manual*. Most streams in California also support important populations of non-salmonid fishes, amphibians, reptiles, macroinvertebrates, insects, and other organisms important to the aquatic food web. Some of these may also be threatened or endangered species and require "ecological connectivity" that dictate other design criteria not covered in this document. Therefore, the project applicant should check with the local Fish and Game office, the U.S. Fish and Wildlife Service (USFWS), and/or tribal biologists to ensure other species are fully considered.

The California Department of Transportation Highway Design Manual defines a culvert as “A closed conduit which allows water to pass under a highway,” and in general, has a single span of less than 20 feet or multiple spans totaling less than 20 feet. For the purpose of fish passage, the distinction between bridge, culvert or low water crossing is not as important as the effect the structure has on the form and function of the stream. To this end, these criteria conceptually apply to bridges and low water crossings, as well as culverts.

2.0 PREFERRED ALTERNATIVES AND CROSSINGS

The following alternatives and structure types should be considered in order of preference:

1. *Nothing* - Road realignment to avoid crossing the stream
2. *Bridge* - spanning the stream to allow for long term dynamic channel stabilty
3. *Streambed simulation strategies* - bottomless arch, embedded culvert design, or ford
4. *Non-embedded culvert* - this is often referred to as a hydraulic design, associated with more traditional culvert design approaches limited to low slopes for fish passage
5. *Baffled culvert, or structure designed with a fishway* - for steeper slopes

If a segment of stream channel where a crossing is proposed is in an active salmonid spawning area then only full span bridges or streambed simulations are acceptable.

3.0 DESIGNING NEW AND REPLACEMENT CULVERTS

The guidelines below are adapted from culvert design criteria published by many federal and state organizations including the California Department of Fish and Game (CDFG, 2001). It is intended to apply to new and replacement culverts where fish passage is legally mandated or important.

3.1 Active Channel Design Method

The Active Channel Design method is a simplified design that is intended to size a culvert sufficiently large and embedded deep enough into the channel to allow the natural movement of bedload and formation of a stable bed inside the culvert. Determination of the high and low fish passage design flows, water velocity, and water depth is not required for this method since the stream hydraulic characteristics within the culvert are intended to mimic the stream conditions upstream and downstream of the crossing. This design method is usually not suitable for stream channels that are greater than 3% in natural slope or for culvert lengths greater than 100 feet. Structures for this design method are typical round, oval, or squashed pipes made of metal or reinforced concrete.

- Culvert Width - The minimum culvert width shall be equal to, or greater than, 1.5 times the active channel width.
- Culvert Slope - The culvert shall be placed level (0% slope).
- Embedment - The bottom of the culvert shall be buried into the streambed not less than 20% of the culvert height at the outlet and not more than 40% of the culvert height at the inlet.

3.2 Stream Simulation Design Method

The Stream Simulation Design method is a design process that is intended to mimic the natural stream processes within a culvert. Fish passage, sediment transport, flood and debris conveyance within the culvert are intended to function as they would in a natural channel. Determination of the high and low fish passage design flows, water velocity, and water depth is not required for this option since the stream hydraulic characteristics within the culvert are designed to mimic the stream conditions upstream and downstream of the crossing. The structures for this design method are typically open bottomed arches or boxes but could have buried floors in some cases. These culverts contain a streambed mixture that is similar to the adjacent stream channel. Stream simulation culverts require a greater level of information on hydrology and geomorphology (topography of the stream channel) and a higher level of engineering expertise than the Active Channel Design method.

- Culvert Width - The minimum culvert width shall be equal to, or greater than, the bankfull channel width. The minimum culvert width shall not be less than 6 feet.
- Culvert Slope - The culvert slope shall approximate the slope of the stream through the reach in which it is being placed. The maximum slope shall not exceed 6%.
- Embedment - The bottom of the culvert shall be buried into the streambed not less than 30% and not more than 50% of the culvert height. For bottomless culverts the footings or foundation should be designed for the largest anticipated scour depth.

3.3 Hydraulic Design Method

The Hydraulic Design method is a design process that matches the hydraulic performance of a culvert with the swimming abilities of a target species and age class of fish. This method targets distinct species of fish and therefore does not account for ecosystem requirements of non-target species. There are significant errors associated with estimation of hydrology and fish swimming speeds that are resolved by making conservative assumptions in the design process. Determination of the high and low fish passage design flows, water velocity, and water depth are required for this option.

The Hydraulic Design method requires hydrologic data analysis, open channel flow hydraulic calculations and information on the swimming ability and behavior of the target group of fish. This design method can be applied to the design of new and replacement culverts and can be used to evaluate the effectiveness of retrofits of existing culverts.

$ Culvert Width - The minimum culvert width shall be 3 feet.

$ Culvert Slope - The culvert slope shall not exceed the slope of the stream through the reach in which it is being placed. If embedment of the culvert is not possible, the maximum slope shall not exceed 0.5%.

$ Embedment - Where physically possible, the bottom of the culvert shall be buried into the streambed a minimum of 20% of the height of the culvert below the elevation of the tailwater control point downstream of the culvert. The minimum embedment should be at least 1 foot. Where physical conditions preclude embedment, the hydraulic drop at the outlet of a culvert shall not exceed the limits specified above.

Hydrology for Fish Passage under the Hydraulic Design Method

$ **High Fish Passage Design Flow** - The high design flow for adult fish passage is used to determine the maximum water velocity within the culvert. Where flow duration data is available or can be synthesized the high fish passage design flow for adult salmonids should be the 1% annual exceedance. If flow duration data or methods necessary to compute them are not available then 50% of the 2 year flood recurrence interval flow may be used as an alternative. Another alternative is to use the discharge occupied by the cross-sectional area of the active stream channel. This requires detailed cross section information for the stream reach and hydraulic modeling. For upstream juvenile salmonid passage the high design flow should be the 10% annual exceedance flow.

$ **Low Fish Passage Design Flow** - The low design flow for fish passage is used to determine the minimum depth of water within a culvert. Where flow duration data is available or can be synthesized the 50% annual exceedance flow or 3 cfs, whichever is greater, should be used for adults and the 95% annual exceedance flow or 1 cfs, whichever is greater, should be used for juveniles.

Maximum Average Water Velocities in the Culvert at the High Fish Passage Design Flow - Average velocity refers to the calculated average of velocity within the barrel of the culvert. Juveniles require 1 fps or less for upstream passage for any length culvert at their High Fish Passage Design Flow. For adult salmonids use the following table to determine the maximum velocity allowed.

Culvert Length (ft)	Velocity (fps) - Adult Salmonids
<60	6
60-100	5
100-200	4
200-300	3
>300	2

Minimum Water Depth at the Low Fish Passage Design Flow - For non-embedded culverts, minimum water depth shall be twelve 12 inches for adult steelhead and salmon, and six 6 inches for juvenile salmon.

Juvenile Upstream Passage - Hydraulic design for juvenile upstream passage should based on representative flows in which juveniles typically migrate. Recent research (NMFS, 2001, in progress) indicates that providing for juvenile salmon up to the 10% annual exceedance flow will cover the majority of flows in which juveniles have been observed moving upstream. The maximum average water velocity at this flow should not exceed 1 fps. In some cases over short distances 2 fps may be allowed.

Maximum Hydraulic Drop - Hydraulic drops between the water surface in the culvert and the water surface in the adjacent channel should be avoided for all cases. This includes the culvert inlet and outlet. Where a hydraulic drop is unavoidable, its magnitude should be evaluated for both high design flow and low design flow and shall not exceed 1 foot for adults or 6 inches for juveniles. If a hydraulic drop occurs at the culvert outlet, a jump pool of at least 2 feet in depth should be provided.

3.4 Structural Design and Flood Capacity

All culvert stream crossings, regardless of the design option used, shall be designed to withstand the 100-year peak flood flow without structural damage to the crossing. The analysis of the structural integrity of the crossing shall take into consideration the debris loading likely to be encountered during flooding. Stream crossings or culverts located in areas where there is significant risk of inlet plugging by flood borne debris should be designed to pass the 100-year peak flood without exceeding the top of the culvert inlet (Headwater-to-Diameter Ratio less than one). This is to ensure a low risk of channel degradation, stream diversion, and failure over the life span of the crossing. Hydraulic capacity must be compensated for expected deposition in the culvert bottom.

3.5 Other Hydraulic Considerations

Besides the upper and lower flow limit, other hydraulic effects need to be considered, particularly when installing a culvert:

- Water surface elevations in the stream reach must exhibit gradual flow transitions, both upstream and downstream. Abrupt changes in water surface and velocities must be avoided, with no hydraulic jumps, turbulence, or drawdown at the entrance. A continuous low flow channel must be maintained throughout the entire stream reach.
- In addition, especially in retrofits, hydraulic controls may be necessary to provide resting pools, concentrate low flows, prevent erosion of stream bed or banks, and allow passage of bedload material.

- Culverts and other structures should be aligned with the stream, with no abrupt changes in flow direction upstream or downstream of the crossing. This can often be accommodated by changes in road alignment or slight elongation of the culvert. Where elongation would be excessive, this must be weighed against better crossing alignment and/or modified transition sections upstream and downstream of the crossing. In crossings that are unusually long compared to streambed width, natural sinuosity of the stream will be lost and sediment transport problems may occur even if the slopes remain constant. Such problems should be anticipated and mitigated in the project design.

4.0 RETROFITTING CULVERTS

For future planning and budgeting at the state and local government levels, redesign and replacement of substandard stream crossings will contribute substantially to the recovery of salmon stocks throughout the state. Unfortunately, current practices do little to address the problem: road crossing corrections are usually made by some modest level of incremental, low cost “improvement” rather than re-design and replacement. These usually involve bank or structure stabilization work, but frequently fail to address fish passage. Furthermore, bank stabilization using hard point techniques frequently denigrates the habitat quality and natural features of a stream. Nevertheless, many existing stream crossings can be made better for fish passage by cost-effective means. The extent of the needed fish passage improvement work depends on the severity of fisheries impacts, the remaining life of the structure, and the status of salmonid stocks in a particular stream or watershed.

For work at any stream crossing, site constraints need to be taken into consideration when selecting options. Some typical site constraints are ease of structure maintenance, construction windows, site access, equipment, and material needs and availability. The decision to replace or improve a crossing should fully consider actions that will result in the greatest net benefit for fish passage. If a particular stream crossing causes substantial fish passage problems which hinder the conservation and recovery of salmon in a watershed, complete redesign and replacement is warranted. *Consolidation and/or decommissioning of roads can sometimes be the most cost-effective option*. Consultations with NMFS or CDFG biologists can help in selecting priorities and alternatives.

Where existing culverts are being modified or retrofitted to improve fish passage, the Hydraulic Design method criteria should be the design objective for the improvements. However, it is acknowledged that the conditions that cause an existing culvert to impair fish passage may also limit the remedies for fish passage improvement. Therefore, short of culvert replacement, the Hydraulic Design method criteria should be the goal for improvement but not necessarily the required design threshold.

Fish passage through existing non-embedded culverts may be improved through the use of gradient control weirs upstream or downstream of the culvert, interior baffles or weirs, or in some cases, fish ladders. However, these measures are not a substituted for good fish passage design for new or replacement culverts. The following guidelines should be used:

- **Hydraulic Controls -** Hydraulic controls in the channel upstream and/or downstream of a culvert can be used to provide a continuous low flow path through culvert and stream reach. They can be used to facilitate fish passage by establishing the following desirable conditions: Control depth and water velocity within culvert, concentrate low flows, provide resting pools upstream and downstream of culvert and prevent erosion of bed and banks. A change in water surface elevation of up to one foot is acceptable for adult passage conditions, provided water depth and velocity in the culvert meet other hydraulic guidelines. A jump pool must be provided that is *at least* 1.5 times the jump height, or a minimum of two feet deep, whichever is deeper.

- **Baffles** - Baffles may provide incremental fish passage improvement in culverts with excess hydraulic capacity that can not be made passable by other means. Baffles may increase clogging and debris accumulation within the culvert and require special design considerations specific to the baffle type. Culverts that are too long or too high in gradient require resting pools, or other forms of velocity refuge spaced at increments along the culvert length.

- **Fishways** - Fishways are generally not recommended, but may be useful for some situations where excessive drops occur at the culvert outlet. Fishways require specialized site-specific design for each installation. A NMFS or CDFG fish passage specialist should be consulted.

- **Multiple Culverts** - Retrofitting multiple barrel culverts with baffles in one of the barrels may be sufficient as long as low flow channel continuity is maintained and the culvert is reachable by fish at low stream flow.

5.0 OTHER GENERAL RECOMMENDATIONS

Trash racks and livestock fences should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage, and potential injuries to fish. Where fencing cannot be avoided, it should be removed during adult salmon upstream migration periods. Otherwise, a minimum of 9 inches clear spacing should be provided between pickets, up to the high flow water surface. Timely clearing of debris is also important, even if flow is getting around the fencing. Cattle fences that rise with increasing flow are highly recommended.

Natural or artificial supplemental lighting should be provided in new and replacement culverts that are over 150 feet in length. Where supplemental lighting is required the spacing between light sources shall not exceed 75 feet.

The NMFS and the CDFG set in-stream work windows in each watershed. Work in the active stream channel should be avoided during the times of year salmonids are present. Temporary crossings, placed in salmonid streams for water diversion during construction activities, should meet all of the guidelines in this document. However, if it can be shown that the location of a temporary crossing in the stream network is not a fish passage concern at the time of the project, then the construction activity only needs to minimize erosion, sediment delivery, and impact to surrounding riparian vegetation.

Culverts shall only be installed in a de-watered site, with a sediment control and flow routing plan acceptable to NMFS or CDFG. The work area shall be fully restored upon completion of construction with a mix of native, locally adapted, riparian vegetation. Use of species that grow extensive root networks quickly should be emphasized. Sterile, non-native hybrids may be used for erosion control in the short term if planted in conjunction with native species.

Construction disturbance to the area should be minimized and the activity should not adversely impact fish migration or spawning. If salmon are likely to be present, fish clearing or salvage operations should be conducted by qualified personnel prior to construction. If these fish are listed as threatened or endangered under the federal or state Endangered Species Act, consult directly with NMFS and CDFG biologists to gain authorization for these activities. Care should be taken to ensure fish are not chased up under banks or logs that will be removed or dislocated by construction. Return any stranded fish to a suitable location in a nearby live stream by a method that does not require handling of the fish.

If pumps are used to temporarily divert a stream to facilitate construction, an acceptable fish screen must be used to prevent entrainment or impingement of small fish. Contact NMFS or CDFG hydraulic engineering staff for appropriate fish screen specifications. Unacceptable wastewater associated with project activities shall be disposed of off-site in a location that will not drain directly into any stream channel.

6.0 POST-CONSTRUCTION EVALUATION AND LONG TERM MAINTENANCE AND ASSESSMENT

Post-construction evaluation is important to assure the intended results are accomplished, and that mistakes are not repeated elsewhere. There are three parts to this evaluation:

1) Verify the culvert is installed in accordance with proper design and construction procedures.
2) Measure hydraulic conditions to assure that the stream meets these guidelines.
3) Perform biological assessment to confirm the hydraulic conditions are resulting in successful passage.

NMFS and/or CDFG technical staff may assist in developing an evaluation plan to fit site-specific conditions and species. The goal is to generate feedback about which techniques are working well, and which require modification in the future. These evaluations are not intended to cause extensive retrofits of any given project unless the as-built installation does not reasonably conform to the design guidelines, or an obvious fish passage problem continues to exist. Over time, the

NMFS anticipates that the second and third elements of these evaluations will be abbreviated as clear trends in the data emerge.

Any physical structure will continue to serve its intended use only if it is properly maintained. During the storm season, timely inspection and removal of debris is necessary for culverts to continue to move water, fish, sediment, and debris. In addition, all culverts should be inspected at least once annually to assure proper functioning. Summary reports should be completed annually for each crossing evaluated. An annual report should be compiled for all stream crossings and submitted to the resource agencies. A less frequent reporting schedule may be agreed upon for proven stream crossings. Any stream crossing failures or deficiencies discovered should be reported in the annual cycle and corrected promptly.

8.0 DEFINITIONS

These definitions apply to terms used in this document. Meanings may differ when used in another context and are not legal unless otherwise noted. Definitions were shortened, paraphrased or adapted to fit regional conditions and for ease of understanding.

Active Channel: A waterway of perceptible extent that periodically or continuously contains moving water. It has definite bed and banks which serve to confine the water and includes stream channels, secondary channels, and braided channels. It is often determined by the "ordinary high water mark" which means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Bankfull: The point on a streambank at which overflow into the floodplain begins. The floodplain is a relatively flat area adjacent to the channel constructed by the stream and overflowed by the stream at a recurrence interval of about one to two years. If the floodplain is absent or poorly defined, other indicators may identify bankfull. These include the height of depositional features, a change in vegetation, slope or topographic breaks along the bank, a change in the particle size of bank material, undercuts in the bank, and stain lines or the lower extent of lichens and moss on boulders. Field determination of bankfull should be calibrated to known stream flows or to regional relationships between bankfull flow and watershed drainage area.

Bedload: Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water. The particles of this material have a density or grain size which prevents movement far above or for a long distance out of contact with the streambed under natural flow conditions.

Fish Passage: The ability of both adult and juvenile fish to move both up and down stream.

Flood Frequency: The frequency with which a flood of a given discharge has the probability of recurring. For example, a "100-year" frequency flood refers to a flood discharge of a magnitude likely to occur on the average of once every 100 years or, more properly, has a one-percent chance of being exceeded in any year. Although calculation of possible recurrence is often based on historical records, there is no guarantee that a "100-year" flood will occur at all within the 100-year period or that it will not recur several times.

Flood Prone Zone: Spatially, this area generally corresponds to the modern floodplain, but can also include river terraces subject to significant bank erosion. For delineation, see definition for floodplain.

Floodplain: The area adjacent to the stream constructed by the river in the present climate and inundated during periods of high flow.

Flow Duration Curve: A cumulative frequency curve that shows the percentage of time that specified discharges are equaled or exceeded. Flow duration curves are usually based on daily streamflow and describe the flow characteristics of a stream throughout a range of discharges without regard to the sequence of occurrence. If years of data are plotted the annual exceedance flows can be determined.

Ordinary High Water Mark: The mark along the bank or shore up to which the presence and action of the water are common and usual, and so long continued in all ordinary years, as to leave a natural line impressed on the bank or shore and indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics.

Roads: For purposes of these guidelines, roads include all sites of intentional surface disturbance for the purpose of vehicular or rail traffic and equipment use, including all surfaced and unsurfaced roads, temporary roads, closed and inoperable roads, legacy roads, skid trails, tractor roads, layouts, landings, turnouts, seasonal roads, fire lines, and staging areas.

Section 10 and 404 Regulatory Programs: The principal federal regulatory programs, carried out by the U.S. Army Corps of Engineers, affecting structures and other work below mean high water. The Corps, under Section 10 of the River and Harbor Act of 1899, regulates structures in, or affecting, navigable waters of the U.S. as well as excavation or deposition of materials (e.g., dredging or filling) in navigable waters. Under Section 404 of the Federal Water Pollution Control Act Amendments (Clean Water Act of 1977), the Corps is also responsible for evaluating application for Department of the Army permits for any activities that involve the placement of dredged or fill material into waters of the United States, including adjacent wetlands.

Waters of the United States: Currently defined by regulation to include all navigable and interstate waters, their tributaries and adjacent wetlands, as well as isolated wetlands and lakes and intermittent streams.

9.0 REFERENCES

Baker, C.O. and F.E. Votapka. 1990. *Fish Passage Through Culverts*. Federal Highways Administration & USDA Forest Service. FHWA-FL-90-006. 67 pages. (Available from USDA Forest Service publications, San Dimas Laboratory, CA)

Bates, K. 1992. *Fishway Design Guidelines for Pacific Salmon*. Working paper 1.6. (Available from Ken Bates, Lands and Restoration Program Chief Engineer, Washington Dept. of Fish and Wildlife. 600 Capitol Way North, Olympia, WA, 98501-1091.)

Beechie, T., E. Beamer, and L. Wasserman. 1994. *Estimating Coho Salmon Rearing Habitat and Smolt Production Losses in a Large River Basin, and Implications for Habitat Restoration*. North Am. J. Fish. Mgt. 14:797 - 811.

Behlke, C.E., D.L. Kane, R.F. McLean, and M.D. Travis. 1991. *Fundamentals of Culvert Design for Passage of Weak-Swimming Fish, Final Report*. Alaska DOT&PF and USDT, Federal Highway Administration, FHWA-AK-RD-90-10. 177 pages.

California Department of Fish and Game. 1998. *California Salmonid Stream Habitat Restoration Manual, 3rd Edition, Part X Fish Passage Evaluation At Road Crossings* (Part X is in preparation, expected fall 2001).

California Department of Fish and Game. 2001. *Culvert Criteria for Fish Passage*.

Clay, C.H. 1995. *Design of Fishways and Other Fish Facilities, 2nd Edition*. Lewis Publishers, CRC Press (imprint), Boca Raton, FL. 248 pages.

Evans, W.A. and B. Johnston. 1980. *Fish Migration and Fish Passage: a Practical Guide to Solving Fish Passage Problems*. U.S. Forest Service, EM - 7100 - 2, Washington, D.C.

Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. *Road Construction and Maintenance*. American Fisheries Society Special Publication 19:297-323.

Gebhards, S., and J. Fisher. 1972. *Fish Passage and Culvert Installations*. Idaho Fish and Game Rep. 12 pages.

Groot, C., and L. Margolis, editors. 1991. *Pacific Salmon Life Histories*. Univ. British Columbia Press, Vancouver. 564 pages.

Hassler, T.J. 1987. *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Southwest) Coho Salmon*. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.70). U.S. Army Corps of Engineers, TR EL-82-4. 19 pages.

Johnson, A. and J.F. Orsborn. Undated, circa 1990. *Welcome to Culvert College*. Washington Trout, Duvall, WA. 67 pages.

Kay, AR., and R.B. Lewis. 1970. *Passage of Anadromous Fish Through Highway Drainage Structures*. California Division of Highways, Dist. 01 Res. Rep. 629110. 28 pages.

Katopodis, C. 1992. *Introduction to Fishway Design*. Working Document from Fish Passageways and Diversion Structures Course presented by National Education and Training Center, USFWS.

Lauman, J.E. 1976. *Salmonid Passage at Stream-Road Crossings*. Oregon Dept. of Fish and Wildlife.

McClellan, T.J. 1970. *Fish Passage Through Highway Culverts*. U.S. Dept. Trans., Federal Highway Administration and Oregon State Game Comm., Portland OR. 16 pages.

Meehan, W.R., editor. 1991. *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat*s. American Fisheries Society Special Publication 19.

ODFW, 1997. Oregon Department of Fish and Wildlife *Guidelines and Criteria for Stream-Road Crossings*. 7 pages.

Pearsons, T.N., G.A. McMichael, S.W. Martin, E.L. Bartrand, A. Long, and S.A. Leider. 1996. *Yakima Species Interactions Studies Annual Report 1994*. U.S. Department of Energy, Bonneville Power Administration Annual Report 1994. No. DOE/BPB99852-3.

Poulin, V.A., and H.W. Argent. 1997. *Stream Ccrossing Guidebook for Fish Streams, a Working Draft*. Prepared for British Columbia Ministry of Forests. 80 pages.

Sandercock, F.K. 1991. *Life History of Coho Salmon*. Pages 397-445 *in* C. Groot and L. Margolis (ed.s.), Pacific salmon life histories. Univ. British Columbia Press, Vancouver. 564 pages.

Shirvell, C.S. 1994. Effect of changes in streamflow on the microhabitat use and movement of sympatric juvenile coho salmon (*Oncorhynchus kisutch*) and chinook salmon (*O. tshawytscha*) in a natural stream. Can. J. Fish. Aquat. Sci. 51:1644-1652.

Salmonid Restoration Federation Conference. 1996. *Culvert Fish Passage Design and Retrofitting Workshop*. Fortuna, CA. 30 pages.

U.S.D.A., Forest Service, 1999. *Water Road Interaction Series*.

U.S. Fish and Wildlife Service. *1983-19__. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates*. U.S. Fish Wildlife Service, Biol. Rep. 82(11). U.S. Army Corps of Engineers, TR EL-82-4.

Waples, R.S. 1991. *Definition of "Species@ under the ESA: Application to Pacific Salmon*. U.S. Dep. Commer., NOAA Tech. Memo., NMFS, F/NWC-194, 29 pages.

Washington State Department of Fish and Wildlife, 1999. Design Guidelines for Fish Passage Design at Road Culverts.

Washington State Department of Transportation. 1998. *Juvenile and Resident Salmonid Movement and Passage Through Culverts. Final Report. Rept. No. WA-RD 457.1*. (Available through the National Technical Information Service, Springfield, VA 22616).

Washington State Department of Transportation. 1997. *Fish Passage Program Department of Transportation Inventory Final Report.* G. Johnson (Project Leader) and nine others. 58 pages.

Washington State Department of Transportation. 1996. *Investigation o f Culvert Hydraulics Related to Juvenile Fish Passage. Final Report. Rept. No. WA-RD 388.1*. (Available through the National Technical Information Service, Springfield, VA 22616)

Weaver, W.E., and D.K. Hagans. 1994. *Handbook for Forest and Ranch Roads*. Mendocino County Resource Conservation District. 161 pages.

Wietkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. *Status Review of Coho Salmon from Washington, Oregon, and California*. U.S. Dep. Commer., NOAA Tech. Memo., NMFS-NWFSC-24, Northwest Fisheries Science Center, Seattle, Washington. 258 pages.

Ziemer, G.L. 1961. *Fish Transport in Waterways*. Alaska Dept. of Fish and Game. 2 pages.

Internet Resources:

California Department of Fish and Game
http://www.dfg.ca.gov

National Marine Fisheries Service Southwest Region
http://swr.nmfs.noaa.gov

Washington Department of Fish and Wildlife Fish Passage Technical Assistance
http://www.wa.gov/wdfw/hab/engineer/habeng.htm

Oregon Road/Stream Crossing Restoration Guide, Spring 1999 (with ODFW criteria)
http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/orfishps.htm

FishXing software and learning systems for the analysis of fish migration through culverts
http://www.stream.fs.fed.us/fishxing/

USDA Forest Service Water-Road Interaction Technology Series Documents
http://www.stream.fs.fed.us/water-road/index.html

British Columbia Forest Practices Code Stream Crossing Guidebook for Fish Streams
http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/stream/str-toc.htm

Please direct questions regarding this material to:

National Marine Fisheries Service
Hydraulic Engineering Staff
777 Sonoma Avenue, Suite 325
Santa Rosa, CA 95404

Phone: (707) 575-6050
Fax: (707) 578-3425

Email: nmfs.swr.fishpassage@noaa.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2008-F-1714-R001-2

JAN 22 2009

Ms. Sandra Rosas
Chief, Environmental Management, M2 Branch
California Department of Transportation
P.O. Box 911
Marysville, California 95901-0911

Subject: 2nd Amendment to the State Route 99 Auxiliary Lane Project, Butte County, California (Service File Number 1-1-03-F-0201) project under the Programmatic Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office, California

Dear Ms. Rosas:

This letter responds to the California Department of Transportation's (Caltrans) November 17, 2008, request for an amendment of the programmatic consultation for the proposed State Route 99 Auxiliary Lane Project (proposed project). The U.S. Fish and Wildlife Service (Service) analyzed the proposed project's effects on the federally-threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle) and issued a biological opinion on July 8, 2004 (Service file number 1-1-03-F-0201). Caltrans is requesting re-initiation for the proposed project because since the previous amendment was issued, Caltrans has determined that several of the elderberries (*Sambucus* sp.) shrubs originally identified as needing to be removed can be protected by minimization and avoidance measures. Aditionally, the previous reinitiation request contained an error for elderberry shrub #5: the one stem for this shrub should have been >5 inches rather than in the >1 and <3 inch category. This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

Therefore, please replace the following paragraphs of the August 7, 2004 amendment:

Replace:

Implementation of the Inside Lane Widening Alternative would result in the removal of 17 elderberry shrubs (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, and 21) that have a combined total of 51 stems measuring 1.0 inch in diameter or greater at ground level. All of

TAKE PRIDE IN AMERICA

these shrubs are located within the Caltrans right-of-way and will be directly affected by the proposed project. Two elderberry shrubs/clumps in the project area (#19 and 20) and seven elderberry shrubs/clumps within approximately 100 feet of the Caltrans right-of-way could be indirectly affected by the proposed action.

With:

Implementation of the Inside Lane Widening Alternative would result in directly affecting six elderberry shrubs and indirectly affecting eleven elderberry shrubs which have a combined total of 51 stems measuring 1.0 inch in diameter or greater at ground level. The six shrubs directly impacted will be transplanted to the River Ranch Conservation Bank in Yolo County, California. Eleven shrubs (4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17) will be protected. However these shrubs are within 20 feet of the proposed activity and Caltrans has proposed compensation for the impacts related to those eleven shrubs. Two elderberry shrubs/clumps in the project area (#19 and 20) and seven elderberry shrubs/clumps within approximately 100 feet of the Caltrans right-of-way could be indirectly affected by the proposed action.

Replace:

Before construction begins, BCAG would compensate for direct effects to elderberry shrubs by transplanting the shrubs to a Service-approved conservation area. Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. BCAG has proposed to buy credits (2.3 acres) at the River Ranch Conservation Bank.

The relocation of the elderberry shrubs would be conducted according to Service-approved procedures outlined in the Guidelines (U. S. Fish and Wildlife Service 1999). Elderberry shrubs within the project area that cannot be avoided would be transplanted during the plant's dormant phase (November through the first two weeks of February). A qualified biological monitor would remain onsite while the shrubs are being transplanted.

With:

Before construction begins, BCAG would compensate for the effects to all elderberry shrubs by purchasing credits (2.3 acres) at the River Ranch Conservation Bank. Caltrans also proposes to transplant the six elderberry shrubs which were directly affected by the proposed project to the River Ranch Conservation Bank. Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area.

The relocation of the elderberry shrubs would be conducted according to Service-approved procedures outlined in the Guidelines (U. S. Fish and Wildlife Service 1999). Elderberry shrubs within the project area that cannot be avoided would be transplanted during the plant's dormant phase (November through the first two weeks of February). A qualified biological monitor would remain onsite while the shrubs are being transplanted.

Replace:

Habitat	Stem Diameter	Number of Stems	Exit Holes (Y/N)	Seedling Ratio	Native Plant Ratio	Total Seedling	Total Native Plants
Riparian	Stems ≥1" to ≤3"	6	N	2:1	1:1	12	12
	Stems ≥1" to ≤3"	10	Y	4:1	2:1	40	80
	Stems >3" to <5"	5	N	3:1	1:1	15	15
	Stems >3" to <5"	2	Y	6:1	2:1	12	24
	Stems ≥5"	4	N	4:1	1:1	16	16
	Stems ≥5"	9	Y	8:1	2:1	72	144
Non-riparian	Stems >1" to <3"	3	N	1:1	1:1	3	3
	Stems >1" to <3"	9	Y	2:1	2:1	18	36
	Stems >3" to <5"	1	N	2:1	1:1	2	2
	Stems >3" to <5"	1	Y	4:1	2:1	4	8
	Stems >5"	0	N	3:1	1:1	0	0
	Stems ≥5"	1	Y	6:1	2:1	6	12
Total		51	N			200	352

With:

Habitat	Stem Diameter	Number of Stems	Exit Holes (Y/N)	Seedling Ratio	Native Plant Ratio	Total Seedling	Total Native Plants
Riparian	Stems ≥1" to ≤3"	**5**	N	2:1	1:1	**10**	**10**
	Stems ≥1" to ≤3"	10	Y	4:1	2:1	40	80
	Stems >3" to <5"	5	N	3:1	1:1	15	15
	Stems >3" to <5"	2	Y	6:1	2:1	12	24
	Stems ≥5"	**5**	N	4:1	1:1	**20**	**20**
	Stems ≥5"	9	Y	8:1	2:1	72	144

Non-riparian	Stems >1" to <3"	3	N	1:1	1:1	3	3
	Stems >1" to <3"	9	Y	2:1	2:1	18	36
	Stems >3" to <5"	1	N	2:1	1:1	2	2
	Stems >3" to <5"	1	Y	4:1	2:1	4	8
	Stems >5"	0	N	3:1	1:1	0	0
	Stems ≥5"	1	Y	6:1	2:1	6	12
Total		51	N			**202**	**354**

This concludes formal consultation for the proposed State Route 99 Auxiliary Lane project outlined in your request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this amendment to the biological opinion on the proposed State Route 99 Auxiliary Lane Project, please contact Jason Hanni, staff biologist, or Jana Milliken, the Sacramento Valley Branch Chief, at (916) 414-6645.

Sincerely,

Peter A. Cross

Peter A. Cross
Deputy Assistant Field Supervisor

STATE OF CALIFORNIA ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2211 Park Towne Circle, Suite 2
Sacramento, California 95825

Telephone (916) 574-2540
FAX (916) 574-2542

January 21, 2010

Quincy Engineering Inc
3247 Ramos Circle
Sacramento, California 95827-2501

Attention: Lindsay J. Juarez

Subject: Underground Classification Nos. C076-007-10T thru C079-007-10T
Route 99 Improvements - Chico

Owner: Department of Transportation
PO Box 911
Marysville, California 95901

Ms. Juarez:

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, Underground Classifications of "Potentially Gassy with Special Conditions" have been assigned to the tunnels identified on your submittal. Please forward the original Classifications to the Owner and retain true and correct copies of these Classifications for your records.

When the contractor who will be performing the work is selected, please deliver to them a true and correct copy of the Classification for posting at the job site and advise them to notify this office to schedule the mandated Prejob Conferences with the Division prior to commencing any activity associated with construction of the tunnels.

Please be informed that whenever an employee enters any bore or shaft being constructed under 30 inches in diameter, the Mining and Tunneling Unit then has immediate jurisdiction over that job. Please contact the Mining and Tunneling Unit prior to entering such spaces.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

John R. Leahy

John R. Leahy
Senior Engineer

cc: Richard Brockman
File

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C076-007-10T

DEPARTMENT OF TRANSPORTATION
(NAME OF TUNNEL OR MINE AND COMPANY NAME)

of PO Box 911, Marysville, California 95901
(MAILING ADDRESS)

at ROUTE 99 IMPROVEMENTS – CHICO
(LOCATION)

has been classified as *** POTENTIALLY GASSY with Special Conditions***
(CLASSIFICATION)

as required by the California Labor Code Section 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch diameter by 25 feet deep drilled shaft located on the north side of Route 99 approximately 0.3 miles north of the intersection of Route 99 and Route 32, Chico, Butte County.

This classification shall be conspicuously posted at the place of employment.

Date January 19, 2010

John R Leahy
(SENIOR ENGINEER)

John R. Leahy

03 77089

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C077-007-10T

DEPARTMENT OF TRANSPORTATION
(NAME OF TUNNEL OR MINE AND COMPANY NAME)

of PO Box 911, Marysville, California 95901
(MAILING ADDRESS)

at ROUTE 99 IMPROVEMENTS – CHICO
(LOCATION)

has been classified as *** POTENTIALLY GASSY with Special Conditions***
(CLASSIFICATION)

as required by the California Labor Code Section 7955.

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3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 54-inch diameter by 21 feet deep drilled shaft located in the median of Route 99 approximately 0.4 miles north of the intersection of Route 99 and Route 32, Chico, Butte County.

This classification shall be conspicuously posted at the place of employment.

Date January 19, 2010

John R Leahy
(SENIOR ENGINEER)

John R. Leahy

03 77089

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C078-007-10T

DEPARTMENT OF TRANSPORTATION
(NAME OF TUNNEL OR MINE AND COMPANY NAME)

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(MAILING ADDRESS)

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(LOCATION)

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(CLASSIFICATION)

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2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch diameter by 25 feet deep drilled shaft located on the north side of Route 99 approximately 0.6 miles north of the intersection of Route 99 and Route 32, Chico, Butte County.

This classification shall be conspicuously posted at the place of employment.

Date January 19, 2010

John R Leahy
(SENIOR ENGINEER)

John R. Leahy

03 77089

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C079-007-10T

DEPARTMENT OF TRANSPORTATION
(NAME OF TUNNEL OR MINE AND COMPANY NAME)

of PO Box 911, Marysville, California 95901
(MAILING ADDRESS)

at ROUTE 99 IMPROVEMENTS – CHICO
(LOCATION)

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3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch diameter by 25 feet deep drilled shaft located on the south side of Route 99 approximately 0.55 miles north of the intersection of Route 99 and Route 32, Chico, Butte County.

This classification shall be conspicuously posted at the place of employment.

Date January 19, 2010

John R Leahy
(SENIOR ENGINEER)

John R. Leahy

03 77089

REQUIREMENTS OF CITY OF CHICO FROM CONTRACTOR IN ORDER TO ISSUE PERMITS:

24 Hour Inspection Request Line: (530) 879-6799
NOTE: Calls must be received before 7 AM on the day you want inspection.

General Information: (530) 879-6700

1. City Business License - Contact the Finance Department (530 879-7320
2. State contractor's pocket license which shows the following information:
   A. License number, B. Classification(s), and C. Expiration date.
3. Contractor shall provide Workers' Compensation carrier, and, policy number at time of permit issuance.
4. Letter from corporation/company/partnership/sole proprietorship authorizing specific employees/agents to sign permits on behalf of said entity at time of permit issuance.
5. **Correct and current owner/lessee/agent/business name, with mailing address(es).**

REQUIREMENTS OF THE CITY OF CHICO FROM CONTRACTOR IN ORDER TO ISSUE **ENCROACHMENT PERMITS (Off-site)**:

General Information: (530) 879-6900

1. Pre-approved Excavation Bond form *(provided by the City of Chico)* in the amount of $10,000 *or,* an Excavation Bond form provided by the insurance company which has been approved by the City Attorney.
2. Certificate of General Liability in the amount of $1,000,000, approved by the City of Chico Risk Manager. (530-879-7900)
3. State contractor's pocket license which shows the following information:
   A. License number, B. Classification(s), and C. Expiration date
4. Letter from corporation/company/partnership/sole proprietorship authorizing specific employees/agents to sign Encroachment Permits on behalf of said entity.
5. City Business License - Contact the Finance Department (530) 879-7320.
6. **Correct and current owner/lessee/agent/business name, with mailing address(es).**

City of Chico - Capital Services Department

Encroachment Permit
Insurance Requirements - Information Sheet

Following is a summary of the insurance requirements for the issuance of an Encroachment Permit pursuant to Section 14.08.120 Chico Municipal Code and City Risk Management Office procedures:

An applicant for an Encroachment Permit shall obtain and provide to the City evidence that the applicant has a commercial general liability insurance policy from a U.S. domiciled insurance company licensed to do business in the State of California with an A.M. Best Company rating of "B" or better, or an unlicensed U.S. domiciled company with a rating of "A"; which provides coverage against all liabilities for bodily injury, personal injury or property damage.

The liability insurance obtained shall be in an amount of at least $1,000,000 per occurrence, and $2,000,000 in the aggregate, with a maximum policy deductible of $1,000, except when the City's Risk Management determines that work performed pursuant to such permit involves unusual risks which expose the City to liabilities in excess of $1,000,000, then the insurance shall be in an amount which the City's Risk Management determines is necessary to fully cover the City's exposure to all such risks. An Occurrence policy is required.

Applicants for an Encroachment Permit must submit evidence of coverage in the form of an original **certificate of insurance with policy endorsements** executed by an authorized official of the insurer. The policy endorsements to be <u>attached to the certificate</u> shall provide that:

1. The City of Chico, its officers, boards and commission, and members thereof, its employees and agents are covered as **additional insureds** as respects to **any** liability arising out of the activities of the named insured. **A CG 2012 endorsement form or equivalent is required.**

2. The insurance coverages afforded by this policy shall be **primary** insurance as respects the additional insured. Any insurance or self-insurance available to the additional insureds shall be excess and non-contributing to any loss.

   The above language can be included on the additional insured endorsement form or on a separate endorsement form. A photocopy of the language from the policy (typically found in the section which discusses "Other Insurance" and "Methods of Sharing") is also acceptable as evidence of primary coverage **provided that it is transmitted to the City <u>with a note or letter</u> on insurance agency or company letterhead certifying it is from the policy of the insured.**

In addition, the certificate of insurance or endorsement must provide to the City at least **thirty (30) days prior notice of cancellation** or material change in coverage.

Please provide this information sheet to your insurance agent or broker and request that he or she issue the certificate, <u>with endorsements</u>, to the City of Chico, Attention: Risk Management, P.O. Box 3420, Chico, CA 95927. The City will not issue the Permit until the evidence of insurance is approved. If your agent or broker has questions regarding these insurance requirements, he or she should call the Risk Management office at (530) 879-7903.

Revised 12/10/06

REQUIREMENTS FOR AN EXCAVATION PERMIT BOND

The City of Chico requires all persons or companies working in the public right-of-way to have these items:

1. State Contractor's License;

2. City Business License;

3. Excavation Permit Bond in the amount of $10,000.00; and

4. Liability Insurance.

WHAT IS AN EXCAVATION PERMIT BOND?

When you come to the City and request an Encroachment Permit to work in the public right-of-way, there is no written contract between you and the City of Chico. The City needs assurance that the work started will be completed, and the requirement of an Excavation Permit Bond fulfills that guarantee. You must complete the work started according to all laws, ordinances, rules and regulations pertaining to the permit and hold the City harmless from all loss and damage that the City may suffer by reason of your failure to comply with the laws, ordinances, rules and regulations.

WHAT DO WE LOOK FOR WHEN A BOND IS SUBMITTED?

1. The Surety Company shall be licensed to transact business in the State of California..

2. If a representative of the Surety Company signs the bond as an "Attorney-in-Fact," that signature must be acknowledged by a Notary Public, ensuring that the person signing the document is the person named as the Attorney-in-Fact.

3. All signatures on the bond should be identified as Principal, Attorney-in-Fact, etc.

4. The bond will be held in place until its termination date or until the City receives notification of cancellation.

THE EXCAVATION PERMIT BOND MUST BE APPROVED BY THE CITY ATTORNEY'S OFFICE.

Premium: $____________

SURETY: ________________________________
BOND NO.: ________________________________
COMMENCEMENT DATE: ________________________________
TERMINATION DATE: ________________________________

EXCAVATION PERMIT BOND
(City of Chico Approved Form)

________________________ [Name of Principal], a(n) ________________________________ [Capacity of Principal] ("Principal") and ______________________________ [Name of Surety], a corporation duly authorized to transact business as a corporate surety in the State of California, ("Surety") are held and firmly bound to the City of Chico, a municipal corporation of the State of California ("City"), in the sum of Ten Thousand Dollars ($10,000.00), for which payment will be made, we and each of us bind ourselves and our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by the provisions of this Excavation Permit Bond ("Bond").

WHEREAS, Principal has applied to the City for a permit to make excavations within the public streets and other public places within the City, all as provided for by Chapter 14.08 of the Chico Municipal Code;

NOW, THEREFORE, the condition of this Bond is such that if an excavation permit is issued to Principal and Principal shall comply with all requirements of Chapter 14.08 of the Chico Municipal Code relating to excavations made within the public streets or other public places within the City pursuant to said permit, as well as with all instructions and directions of City's Building & Development Services Director/Capital Project Services Director/General Services Director pertaining thereto, then the above obligation shall be void; otherwise, it shall be and remain in full force and effect until ______________________, unless renewed by a continuation certificate.

IN WITNESS WHEREOF, the Principal and Surety have executed this Bond on the dates first set forth above.

____
Date

____
Principal

By: ______________________________

____
Title

____
Name of Surety

By: ____________________________
Attorney-in-Fact

____
Address of Surety

____

____
Telephone Number

APPROVED AS TO FORM:

____
Lori J. Barker, City Attorney
By: Alicia M. Rock
Assistant City Attorney

AERIALLY DEPOSITED LEAD STUDY

State Route 99 Auxiliary Lane Project Phase 2 and 3
Between State Route 32 and East 1st Avenue
Chico, California

Prepared For:

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, California 95827

1P2/305/192

Prepared by:

Taber Consultants
3911 W Capitol Ave
West Sacramento, CA 95691

July 9, 2009

Taber
Since 1954

Aerially Deposited Lead Study

State Route 99 Auxiliary Lane Project Phase 2 and 3
Between State Route 32 and East 1st Avenue
Chico, California

1P2/305/192

1.0 INTRODUCTION

Taber Consultants has completed a program of soil sampling and analyses to study the possible presence and extent of aerially deposited lead in accordance with the agreement between Taber Consultants and Quincy Engineering. The purpose of this study is to evaluate if aerially deposited lead (ADL) has impacted near surface soil within unpaved areas of the project where soil excavation is proposed and to estimate classification of the soil with respect to State and Federal hazardous waste criteria. The scope of work also included a subsurface investigation to investigate the potential presence of tetrachloroethylene (PCE) within groundwater within the project area.

2.0 SITE BACKGROUND

2.1 Project Location / General Description

The overall project requiring ADL assessment consists of adding an auxiliary lane on the outside edge in the northbound and southbound directions of SR 99 in Chico, California (Figure 1). The auxiliary lanes will be constructed on new embankment fill supported by retaining walls located on the existing embankment slope. Most of the retaining wall will be constructed with sound wall on top.

Phase 2 of the project will consist of constructing the northbound auxiliary lane, and reconstructing the northbound on ramp at SR 32 (East 8th Avenue). This will involve widening the Bidwell Viaduct, Palmetto Avenue undercrossing, constructing sound walls and retaining walls along the east edge of SR 99.

Phase 3 will consist of constructing the southbound auxiliary lane, reconstructing the southbound ramp at east First Avenue, reconstructing the southbound off ramp at SR 32 (East 8th Street), widening the south side of East First Avenue, widening the Bidwell Viaduct and Palmetto Avenue undercrossing, and constructing sound walls and retaining walls along the west edge of SR 99.
Earthwork beyond the limits of existing pavement and below existing grade, is expected to include:

- Excavation to new pavement sub-grade (estimated 3-foot maximum depth).
- Stripping, scarification and compaction of surface soil in preparation of placing new fill (estimated 0.5-foot maximum depth).
- Excavations for sign poles, electric lines, etc. are generally expected to be within the new fill sections.

It is anticipated that widening the Bidwell Viaduct will require new foundation elements. However, ADL testing of soil under the Viaduct is not expected to be required by Caltrans unless hazardous concentrations of lead are encountered in the nearby embankment. Similarly, testing of soil for new foundation elements of the Palmetto Avenue undercrossing is not expected to be required unless hazardous concentration are encountered in the embankment fill. ADL testing of soil below the Viaduct and more than 3 feet deep for other bridge structures is therefore not included in this work plan.

Existing SR 99 is raised about 15-25 feet above surrounding grades on roadway embankment. The roadway shoulders are paved to at or near the top of the embankment slope that descends at an overall gradient typically about 1v:2h to 1v:2½h. The existing embankment slopes are typically heavily vegetated.

2.2 Rights-of-Entry

All work is expected to be performed on Caltrans and County right of way. A Caltrans encroachment permit has been granted to Taber Consultants for access to State Highway Property for our geotechnical and geoenvironmental studies for the project. A copy of the permit will be in the possession of Taber personnel while on the project site. An encroachment permit is not expected to be required for work on County property.

2.3 Prior Work

- A Preliminary Geotechnical Report dated November 26, 2003 prepared by Parikh Consultants, Inc.
- Portions of the report "Revised Initial Site Assessment for Hazardous Materials Impact" dated January 6, 2003 prepared by Espana Geotechnical Consulting including: Cover letter (1 page); report pages 11, 12 and 13; and Figure 1.
- Outside Widening Plans from the Project Report including Typical Cross Section Drawings X-1 and X-2, L-1 through L-6 (Median widening alternative) and Layout Drawings L-1 through L-6
- A hazardous materials study for Phase 1 of the project, widening of the northbound off ramp from SR-99 to East 1st Avenue. Results were presented in reports titled "Aerially Deposited Lead Study – Draft" dated April 5, 2005 and "Groundwater Monitoring Data" dated June 24, 2005.

2.4 Geology

The site is located at the northeast edge of the Sacramento Valley, with the Sacramento River to the West and the Sierra Nevada range to the East. The published Geologic Map of the Chico Monocline and northeastern part of the Sacramento Valley, California (Harwood, Helley, and Doukas, 1981) shows surface materials within the project limits as the Pleistocene-aged Modesto Formation, primarily composed of gravel, sand, silt and clay.

Site geology descriptions from soil borings drilled by Caltrans (1962 to 1966) were reviewed in preparation of the November 26, 2003 *Preliminary Geotechnical Report* indicates. Surface soils consist of approximately 6 to 8 m (20 to 25 feet) of roadway embankment fill, which consists of sandy clay to clayey gravel with sand. The native soil consists of a surface layer of 1 to 3 m (3 to 10 feet) of recent alluvial deposits of loose silty sand to sandy silt. Underlying the alluvial deposits is alternating layers of dense to very dense sand and gravel with cobbles and medium dense silty sand. Bedrock was not encountered during boring activities to a maximum depth of approximately 25 m (80 feet).

According to the USDA *Soil Conservation Service Current Soil Survey of Butte County*, the soil at the site is the Vina fine sandy loam. This soil is found in alluvial fan deposits of the Great Basin and Central Valley area at elevations of 140 to 240 feet above mean sea level. The typical soil profile is foamy sandy loam to 11 inches, sandy loam to 50 inches, and loamy coarse sand to 54 inches, and coarse sand to 80 inches.

2.5 Groundwater

The groundwater table encountered in the 1962-1966 Caltrans investigations ranged from 4 to 20 feet below grade. The groundwater level is anticipated to have varied within the subsequent 42 years due to seasonal groundwater fluctuation, surface and subsurface flows into the local creeks, ground surface runoff, and other factors not present during the time of investigation.

According to the USDA *Soil Conservation Service Current Soil Survey of Butte County*, the Vina fine sandy loam is well drained and the most limiting soil layer against water transmission is moderately high to high (1.13 to 3.68 in/hr). The depth to water table is more than 80 inches.

A nearby open-status site (a 7-11 approximately 0.1 mile southeast of the intersection between US 32 and 1st Street, at 308 Walnut Street) has three monitoring wells that were monitored in 2006-2007. The minimum depths to groundwater recorded for the three wells were 9.02, 9.03, and 8.98 feet below ground surface, while the maximum depths to groundwater recorded for the three wells were 15.78, 15.84, and 15.33 feet below ground surface, respectively. The groundwater gradient measured was approximately 0.006-foot/foot to the southwest.

3.0 SITE STUDY

A “Soil Sampling Plan-DRAFT” (Sampling Plan) prepared by Taber Consultants and dated September 22, 2005 was provided to Caltrans for review. A Health and Safety Plan for the study was also prepared and appended as part of the sampling plan. The final sampling plan incorporated Caltrans’ comments and was issued on June 24, 2007. All field work was performed under the supervision of Thomas E. Ballard, a California-registered Professional Geologist (#7299).

3.1 Sample Locations

The purpose of the proposed work was to evaluate lead concentrations within soil expected to be excavated during project construction and to estimate classification of the soil with respect to State and Federal hazardous waste criteria. The evaluation included testing for total lead, soluble lead using waste extraction testing (WET/STLC testing), soluble lead using Toxicity Characteristic Leaching Procedure (TCLP testing), and pH.

3.2 Sample Location Rationale

The discussion below uses the following terminology: 1) a “station” is a line perpendicular to the project road alignments and identifiable by station numbers as shown on project plans; 2) a “sample location” is a specific point, locatable by station number and offset from station centerline, at which one or more samples were collected.

Based on typical Caltrans practice, samples were collected from stations spaced at about 200-foot intervals along project alignments (US 99, on/off ramps) where excavation (cut or fill) is proposed (Figure 2).

At each station, sample locations were selected at approximately 1/5, and 4/5 the distance between the edge of pavement (EOP) and outside edge of earthwork. At a selected station where earthwork will occur on both sides of the highway pavement or on/off ramps, sample locations were selected on both sides of the pavement. Some sample stations were adjusted to avoid sampling at locations where construction width will be less than 12 feet.

At each sample location, samples were collected if possible from the 0.0-0.5, 1.0-1.5, and 2.0-2.5-foot depth intervals. In fill areas, samples were collected only from the 0.0-0.5 foot depth interval. A total 35 sample locations netted 114 samples, which was less than the proposed number due to sampling refusal (inability to deepen the hole or collect the sample using hand tools) was encountered. Where refusal occurred, additional attempts to collect the sample were made at stations ±5-foot from the initial sample station or location.

3.3 Soil Sampling Procedures

All soil samples were collected using hand tools. Sampling with hand tools entailed shoveling or hand augering to the target depth, then excavating the sample with a steel tube driven into the soil by slide- hammer. Care was taken to avoid “fall in” during sampling that could result in cross-contamination between samples taken at different depths.

Immediately following collection, the samples containers labeled with a unique identification number, transferred to a cooler and stored at ambient temperatures pending delivery to the analytical laboratory. Sample information (identification number, date and time of sampling, etc.) was entered on a chain-of-custody form which accompanied the samples at all times.

The excavations were backfilled after sampling at each location with excess excavated soil and adjacent soil as necessary to return the excavation to approximately original grade.

3.4 Decontamination

The sampling and excavation equipment was thoroughly cleaned before arrival on the site. All sampling equipment (trowels, split-spoon sampler, etc.) were disassembled between each sample location, washed with a weak detergent bath (Liquinox) and double rinsed with distilled water immediately before moving to a new sample location to prevent incidental and cross contamination. Wash and rinse water (rinsate) from the cleaning process was disposed of on the ground. Lead or other contaminants, if any, which might be present in the rinse water, would therefore return to the soil where they originated and no change in site conditions would occur. Rinsate water was not disposed of near any drainage inlets or known environmentally sensitive areas.

The potential for excavation equipment creating significant cross-contamination between sampling locations is considered very low. In addition, considering the shallow depth of the samples, effects of any cross-contamination would be insignificant. As such, rather than decontamination, excavation equipment was cleaned by brushing after completing operations at each sample location.

4.0 GROUNDWATER SAMPLING

The previous ISA prepared by Espana Geotechnical Consulting in 2003 identified a tetrachloroethylene (PCE) plume associated with a dry cleaning operation at the East First Street northbound freeway onramp (Figure 3). Low levels of PCE were present in groundwater monitoring wells at the time of Espana's investigation. Due to the potential to encounter groundwater during the construction phase of this project, Taber recommended the completion of borings SB-1 and SB-2 using a hollow stem auger (HSA) drill rig to groundwater and collection of grab groundwater samples to determine the presence of PCE and related volatile organic compounds in groundwater beneath the proposed right-of-way acquisition.

Dense gravel was encountered at approximately 15 feet below ground surface (bgs) preventing further advancement of SB-1 and the collection of a grab groundwater sample. SB-2 was advanced to 45-feet bgs without encountering or sampling groundwater. Soil samples were collected only for lithologic logging purposes (Appendix A).

Drilling, sampling and boring abandonment was overseen by a California-registered Professional Geologist and conducted in accordance with State of California and Butte County regulations. Permits were obtained from Butte County Environmental Health Department prior to the drilling.

5.0 LABORATORY ANALYSES

ADL samples were collected on November 17 and 18, 2008 and samples were submitted to Sparger Technology, Inc. of Sacramento, California, a California Department of Health Services certified laboratory, for analytical testing using standard EPA methods on November 19, 2008. The following analyses were performed:

- All samples were analyzed for total threshold leachate concentration (TTLC) lead by EPA method 6010, using metals extraction by EPA method 3050A. These analyses were performed on December 4, 2008.
- Ten percent of all samples, randomly selected, were analyzed for pH using EPA method 9045. These analyses were performed on December 5, 2008.
- Based on the results of the TTLC analyses, all samples exceeding 50 mg/kg total lead were analyzed for Soluble Threshold Limit Concentration (STLC) lead by method 6010 using the waste extraction test (WET) extraction method with citrate buffer. These analyses were performed on January 14, 2009.

- Based on the results of the TTLC analyses, all samples exceeding 100 mg/kg total lead were analyzed for soluble lead by EPA method 6010 using the toxicity characteristic leaching procedure (TCLP) extraction method. These analyses were performed on January 14, 2009.
- Consistent with the California Department of Toxic Substances Control (DTSC) Variance for handling of lead-contaminated soils for Caltrans projects, WET testing using de-ionized water (diWET) was performed for all samples exceeding 50 mg/kg total lead on May 13, 2009.

Copies of the laboratory reports, including results for standard laboratory QA/QC procedures and chain-of-custody documentation, are attached in Appendix B.

6.0 FINDINGS

Results of the analytical testing are summarized on Table 1 (attached). 114 samples were analyzed for TTLC lead, with reported concentrations ranging from 4.70 to 2,100 mg/kg. 82 samples were analyzed for STLC lead, with reported results ranging from 0.0900 mg/l to 99 mg/l. 82 samples were analyzed for diWET with reported results ranging from 0.005 mg/l to 0.760 mg/l. 16 samples were analyzed for TCLP lead, with results ranging from 0.0580 mg/l to 9.09 mg/l. 11 samples were analyzed for pH, with reported results ranging from 5.3 to 7.63 standard units.

7.0 DATA EVALUATION

As a practical matter, lead concentrations in soil are never homogeneous either vertically in the soil profile or horizontally across a site. As such, classifying the soil in accordance with hazardous waste criteria can be based on an anticipated mean concentration of lead in the soil after it is excavated, rationalized based on the analytical results and reasonable scenarios of site excavation. The analytical data was therefore statistically analyzed for north and southbound lanes as described below, and for each vertical interval within each potential excavation area.

Laboratory data for the north and southbound lanes are summarized in Table 1, with laboratory analytical reports included as Appendix B (attached hereto).

The true mean value of any parameter can only be determined with certainty when the value of that parameter is known for the entire "population" being evaluated. Determining a mean based on sampling from a population (e.g. soil samples collected from soil to be excavated) therefore necessarily entails some uncertainty. As the portion of the total population represented by the sampled set increases (i.e. the greater the number of samples), the uncertainty decreases.

In order to quantify the uncertainty, the analytical data for total lead concentration (TTLC) were statistically analyzed to determine the 90% and 95% upper confidence limits (UCL) of the true mean. These are defined as values that, when calculated repeatedly for randomly drawn subsets of site data, equal or exceed the true mean 90% and 95% of the time, respectively.

The mean (average) value of each data set was hand-calculated. The UCL analyses were performed using the Microsoft Excel spreadsheet tool "Bootstrap3 04-4874G1-VT" (provided to us by Caltrans District 4) with 1000 iterations for each data set. For both mean and UCL calculations, laboratory results of "non-detect" were assumed to have an actual TTLC of one-half the laboratory reporting limit in order to reduce skewing of the data toward low values.

Typical practice for evaluation of ADL contaminated soil is to use the 90% UCL to determine applicability of the DTSC variance, if applicable, and to use the 95% UCL to evaluate off site disposal. The following tables summarize the results of these analyses:

Northbound Lanes				
Data Set	Number of Samples	Total Lead Concentration (mg/kg)		
		Average	90% UCL	95% UCL
All Samples	45	333.4	405.6	426.5
(A) 0.0 to 0.5 ft	30	469.1	565.7	593.6
(B) 1.0 to 1.5 ft	9	53.4	74.5	80.7
(C) 2.0 to 2.5 ft	6	30.1	45.9	50.5

Southbound Lanes				
Data Set	Number of Samples	Total Lead Concentration (mg/kg)		
		Average	90% UCL	95% UCL

All Samples	69	391.0	472.1	495.5
(A) 0.0 to 0.5 ft	40	567.0	689.5	724.9
(B) 1.0 to 1.5 ft	17	175.6	276.6	305.8
(C) 2.0 to 2.5 ft	12	67.7	96.8	105.2

Presuming a single source and/or chemical state of lead in the soil, and presuming other factors (soil chemistry and other soil properties, sampling and analytical methodologies, etc.) are uniform, total lead concentration and soluble lead concentration would be expected to have a linear relationship; i.e. the soluble lead concentration will be in direct proportion to the total lead concentration. This relationship, if found to exist, provides a means of predicting soluble lead concentrations based on the UCLs reported above.

In order to estimate the actual relationship between total and soluble (WET) lead concentrations, a correlation coefficient was calculated. A correlation coefficient ("r") of +1 indicates a perfect direct relationship between two variables, r = –1 indicates a perfect inverse relationship, and r = 0 indicates no linear relationship between the variables. The correlation coefficient calculated using the laboratory results for all soil samples analyzed for both total and soluble (diWET) lead concentrations indicates r = 0.5870 for these data.

Since the correlation coefficient for these data indicates that a linear relationship exists between total and soluble (diWET) concentrations, the method of least squares was used to determine a regression "line of best fit" between the data. This calculation indicates a "line of best fit" defined by the equation Y = 0.0157 + 0.000046X, where X represents the total lead concentration and Y represents a predicted soluble lead concentration. For some Caltrans projects, it has been assumed that a "Y intercept" other than zero is due solely to less than perfect correlation, and therefore the regression line can be forced through a Y intercept equal to zero. For the data herein, that would resulting in a simplified equation Y = 0.000046X for the regression line. For this project we recommend and have used the calculated, more conservative regression equation.

8.0 SOIL CLASSIFICATION

In accordance with the California Department of Toxic Substances Control

(DTSC) Variance No. V09HQSCD006 for handling of lead-contaminated soils for Caltrans projects, soil containing 1.5 mg/l extractable lead or less (based on a modified waste extraction test using deionized water as the extractant) and 1411 mg/kg or less total lead may be used as fill provided that the lead-contaminated soil is placed a minimum of five (5) feet above the maximum historic water table elevation and covered with at least one (1) foot of nonhazardous soil that will be maintained by Caltrans to prevent future erosion (Type Y1). Most of the soil sampled as part of this project qualifies as Type Y1 soil.

Soil containing 150 mg/L extractable lead or less (based on a modified waste extraction test using deionized water as the extractant) and 3397 mg/kg or less total lead may be used as fill provided that the lead-contaminated soils are placed a minimum of five (5) feet above the maximum historic water table elevation and protected from infiltration by a pavement structure which will be maintained by Caltrans (Type Y2). A limited area of Type Y2 material was identified during the sampling program in the southbound lanes of State Route 99 on the northern end of the project area from approximately Station 29+50 to 39+40, extending approximately 6 feet from the edge of pavement and to a depth of 0.5 feet.

Soil classified as RCRA Hazardous based on a TCLP concentration of 5.0 mg/l or greater must be disposed as hazardous waste and is not eligible for re-use on site under the DTSC variance (Type Z3). The sampling program did not identify any type Z3 soil within the project area.

Based on these classifications under the DTSC variance, all soil sampled is eligible for re-use on site. As a sample population as a whole, the excavated soil from both north and southbound lanes would qualify as Type Z1 material however, as noted above, a limited area of material from the northern portion of the project will likely need to be treated as Type Y2 material in accordance with the DTSC Variance.

*   *   *   *   *   *

TABER CONSULTANTS

PROFESSIONAL GEOLOGIST
THOMAS E. BALLARD
No. 7299
STATE OF CALIFORNIA

Thomas E. Ballard
Senior Geologist
P.G. #7299

TEB/tf

Attachments:
Figure 1 - Project Location Map
Figure 2 - Soil Sampling Location Map
Figure 3 - Soil Boring Location Map
Table 1 – ADL Sampling Results
Appendix A - Boring Logs
Appendix B - Analytical Data Reports
Appendix C – DTSC Variance

GENERAL CONDITIONS

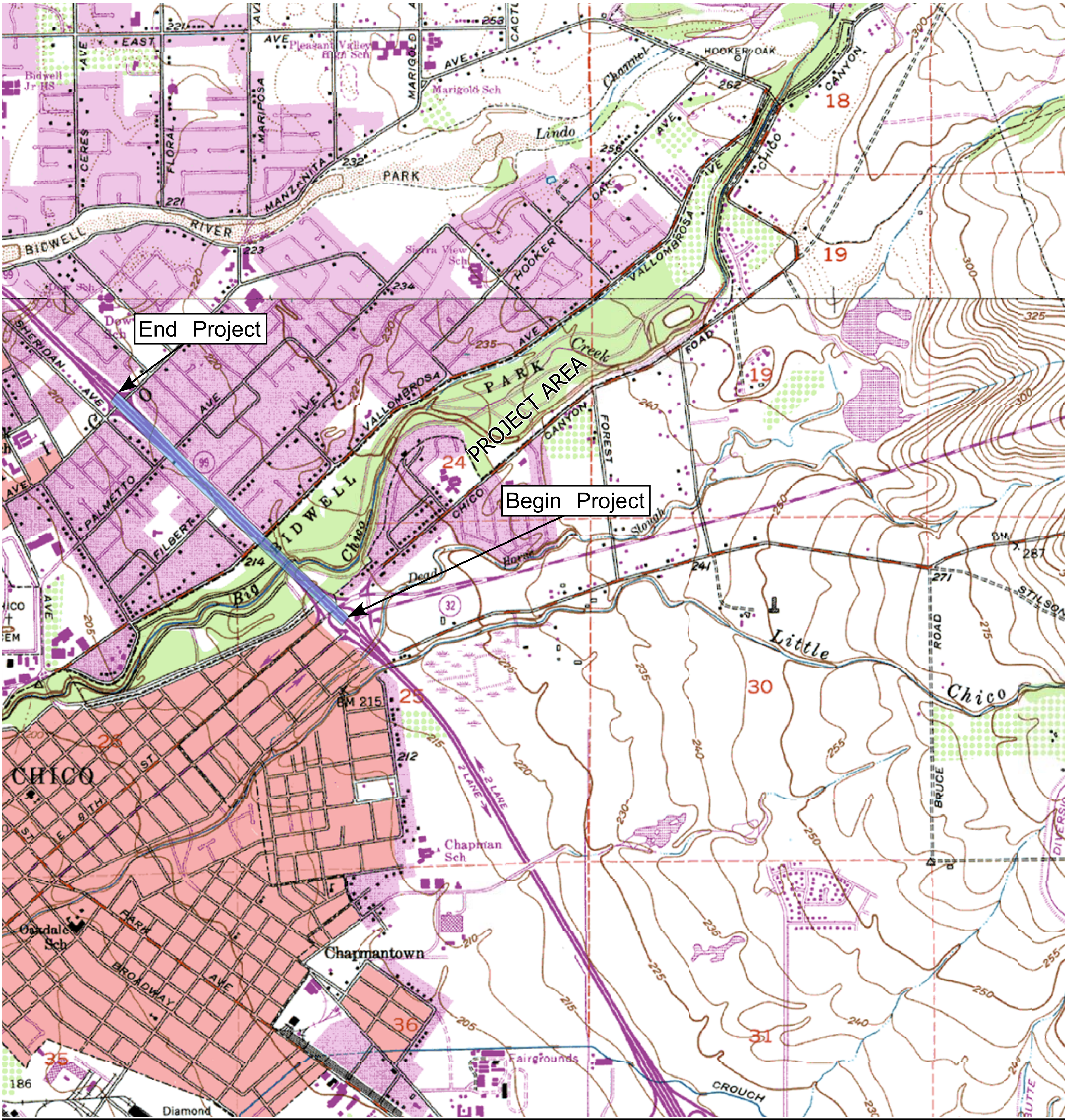
The conclusions of this study are professional opinion based upon the indicated project criteria and the limited data described herein. Sampling and testing programs recommended in this report and construction activities may reveal conditions not identified by this limited study. Geotechnical study, possibly including sub-surface exploration, is anticipated as part of project design that could provide information that would warrant modifying the conclusions herein.

This report is intended only for the purpose, Site limits and project description indicated and assumes planning, design and construction in accordance with the latest applicable codes. Changes in Site conditions could occur at any time that might substantially alter the conclusions of this report. The conclusions therefore should only be considered valid as of the dates of the data (Site reconnaissance, data base records, interviews, etc.) on which they are based.

A review by this office of any plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental evaluations as indicated there-from is considered an integral part and a condition of this study. Should there be significant change in the project, this office should be notified for supplemental evaluation as necessary or appropriate.

Opinions herein apply to current Site conditions and those reasonably foreseeable for the described development -- which includes appropriate operation and maintenance thereof. They cannot necessarily apply to Site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

FIGURES



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Sources: USGS Chico Quadrangle, 7.5 Minute Series (topographic), dated 1948, revised 1978 and
USGS Richardson Springs Quadrangle, 7.5 Minute Series (topographic), dated 1951, revised 1969

Taber
Since 1954
Taber Consultants
Engineers and Geologists
3911 West Capitol Avenue
West Sacramento, CA 95691-2116
916.371.1690 Fax 916.371.7265
www.taberconsultants.com

Quincy Engineering, Inc.

State Route 99 Auxiliary Lane Project
Chico, California

Vicinity Map

1P2/305/192	September 2008	Figure - 1

AGENCY NAME	PROJECT ENGINEER	CALCULATED/ DESIGNED BY	XX	DATE XX/OX	REVISED BY
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS	CAROLYN DAVIS	CHECKED BY	XX	XX/OX	DATE REVISED

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

GAD

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

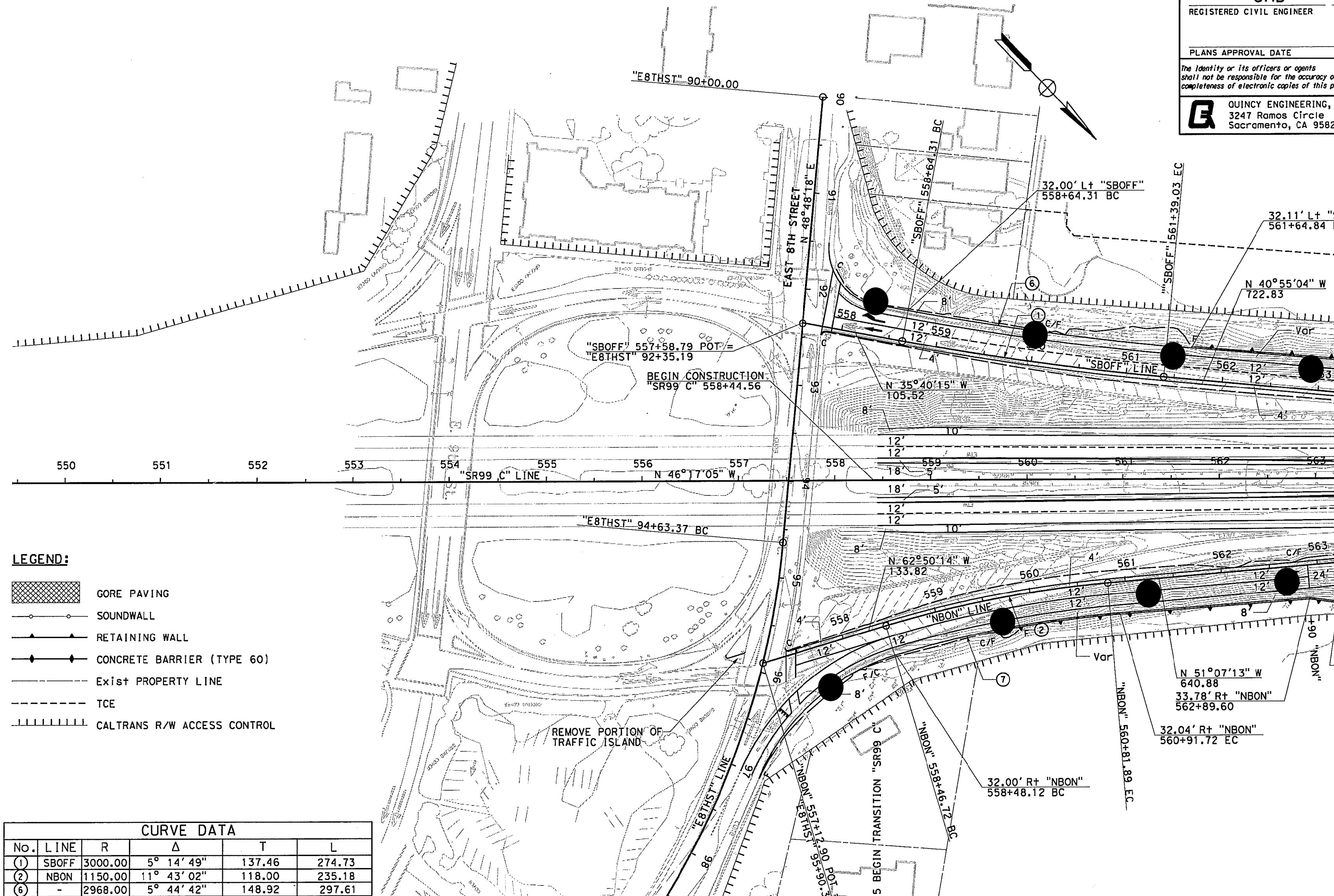
The identity or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER
Carolyn Davis
No.
Exp.
CIVIL
STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

NOTES:

1. FOR COMPLETE R/W DATA, SEE R/W MAPS AT DISTRICT OFFICE.



LEGEND:

- GORE PAVING
- SOUNDWALL
- RETAINING WALL
- CONCRETE BARRIER (TYPE 60)
- Exist PROPERTY LINE
- TCE
- CALTRANS R/W ACCESS CONTROL

CURVE DATA

No.	LINE	R	Δ	T	L
1	SBOFF	3000.00	5° 14' 49"	137.46	274.73
2	NBON	1150.00	11° 43' 02"	118.00	235.18
6	-	2968.00	5° 44' 42"	148.92	297.61
7	-	1118.00	12° 09' 02"	118.99	237.09

LAYOUT
1" = 50'

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

GAD

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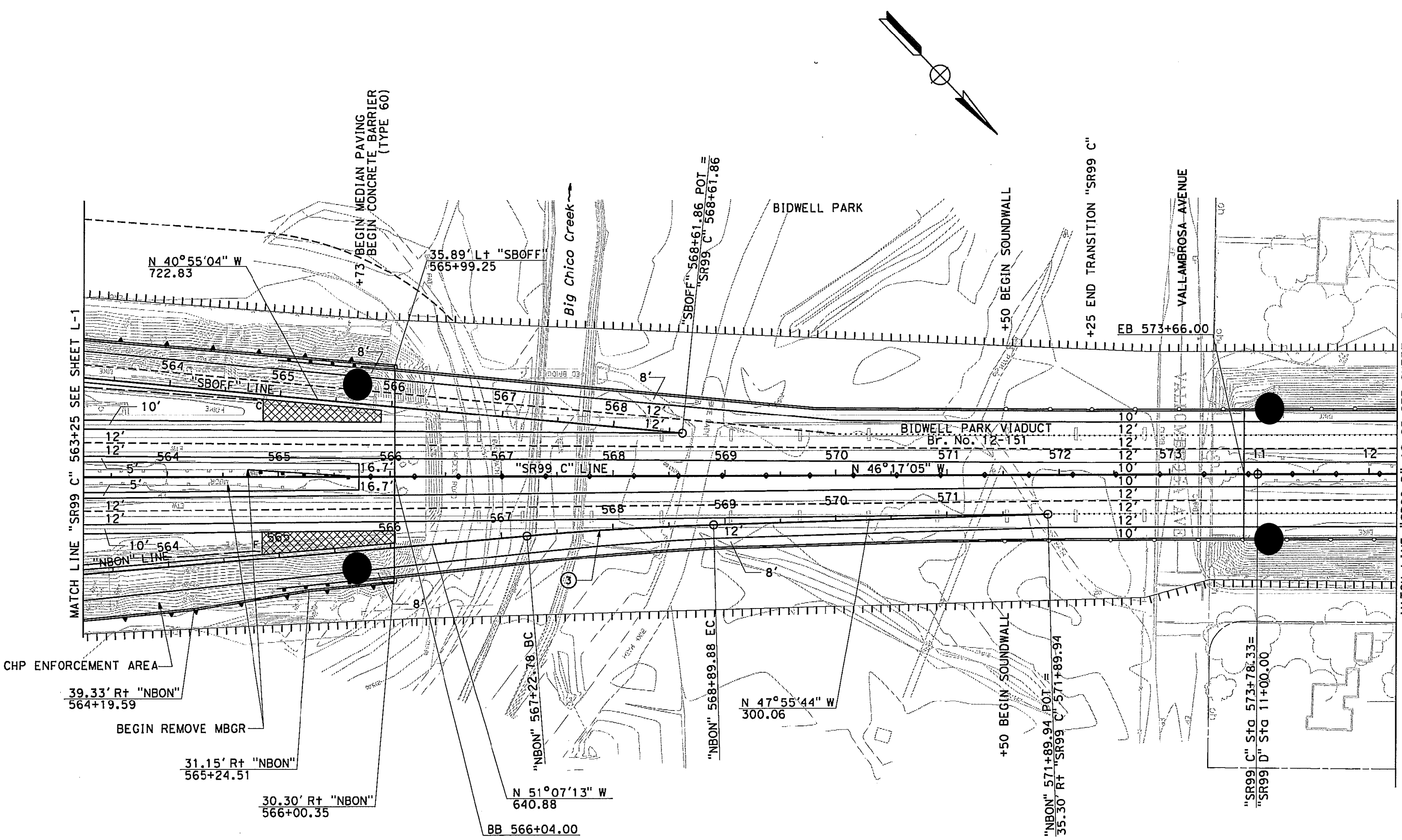

CURVE DATA					
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(3)	NBON	3000.00	3° 11' 29"	83.57	167.10

LAYOUT

1" = 50'

L-2

CALCULATED/ DESIGNED BY	XX	DATE XX/OX	REVISED BY
CHECKED BY	XX	XX/OX	DATE REVISED

PROJECT ENGINEER
CAROLYN DAVIS

AGENCY NAME
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

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03	But	99			

GAD

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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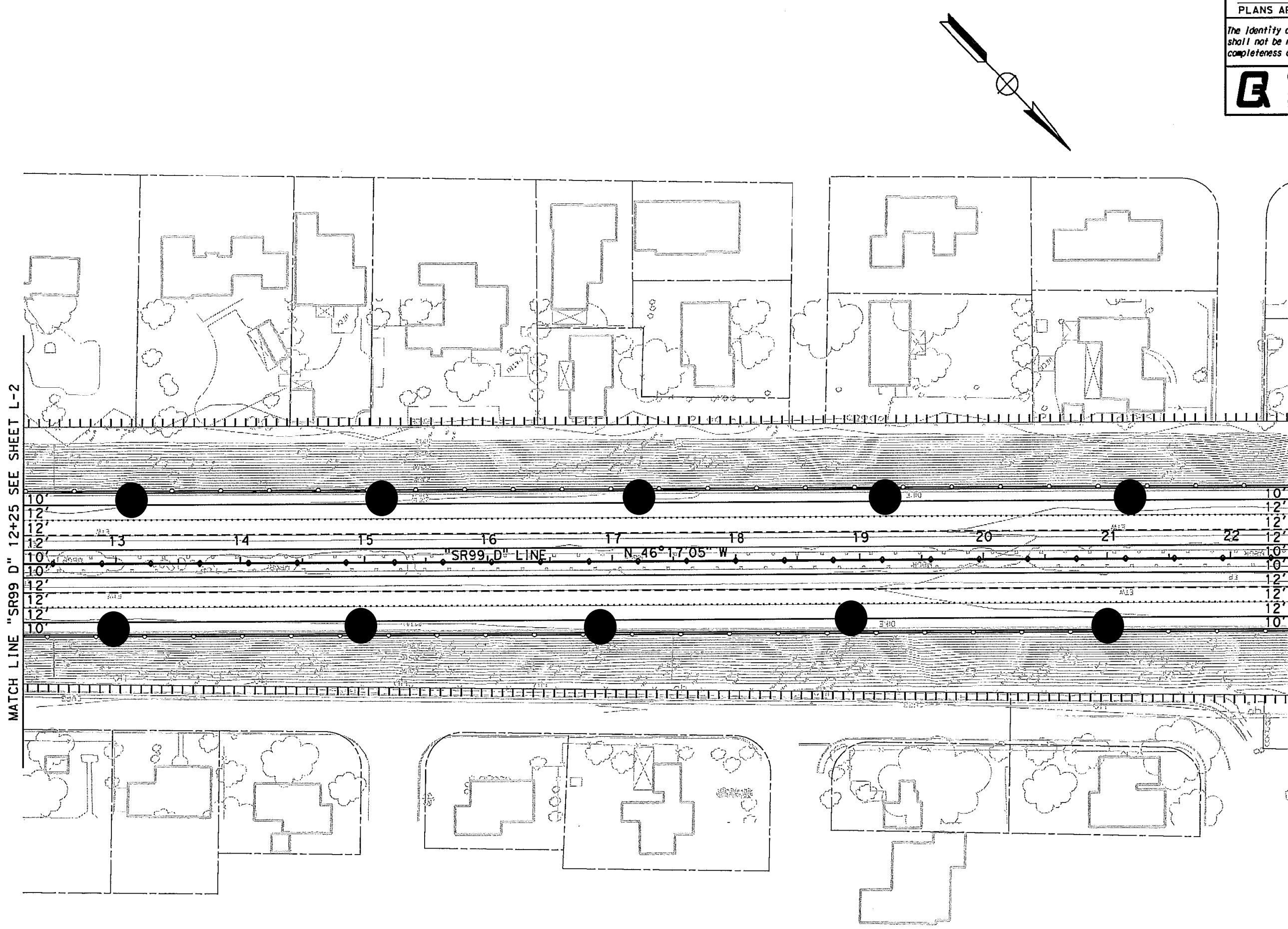
NOTES:

1. FOR COMPLETE R/W DATA, SEE R/W MAPS AT DISTRICT OFFICE.



AGENCY NAME	PROJECT ENGINEER				
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS	CAROLYN DAVIS	CALCULATED/ DESIGNED BY	XX	DATE XX/OX	REVISED BY
		CHECKED BY	XX	XX/OX	DATE REVISED

LAYOUT

1" = 50'

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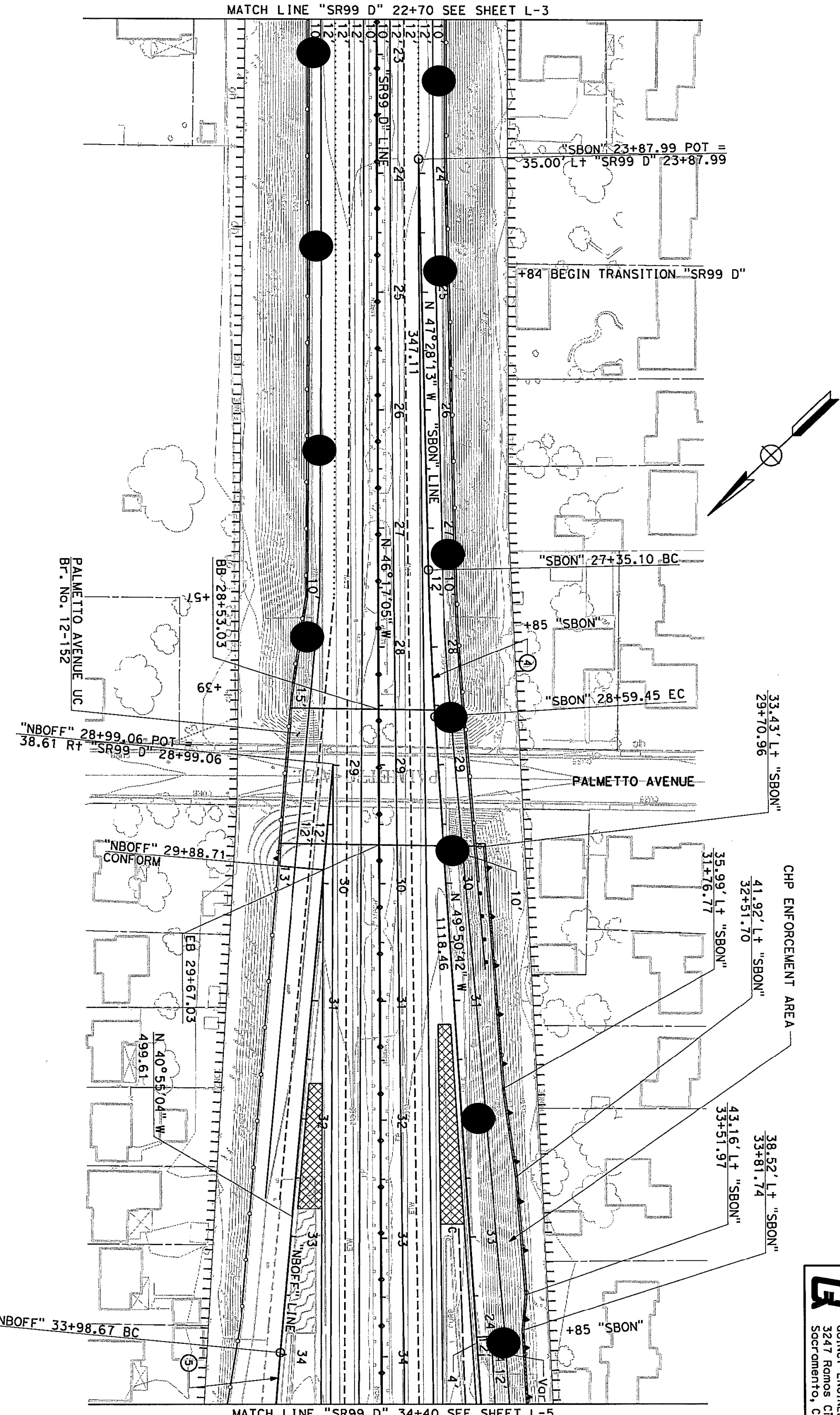
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS	CAROLYN DAVIS	CHECKED BY	XX	XX/OX	DATE REVISED

NOTES:
1. FOR COMPLETE R/W DATA, SEE R/W MAPS AT DISTRICT OFFICE.

CURVE DATA

No.	LINE	R	Δ	T	L
4	SBON	3000.00	2° 22' 30"	62.18	124.35
5	NBOFF	3280.84	4° 35' 15"	131.42	262.69



FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES

0 1 2 3

FILE => D:\dgn\b218r_Joeb\b218rlc4.dgn

CU 00000

EA 000000

LAYOUT
1" = 50'

L-4

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

GAD

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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

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

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

LAST REVISION 00-00-00 | DATE PLOTTED => 5/16/2008 | TIME PLOTTED => 1:31:39 PM

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

GAD
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

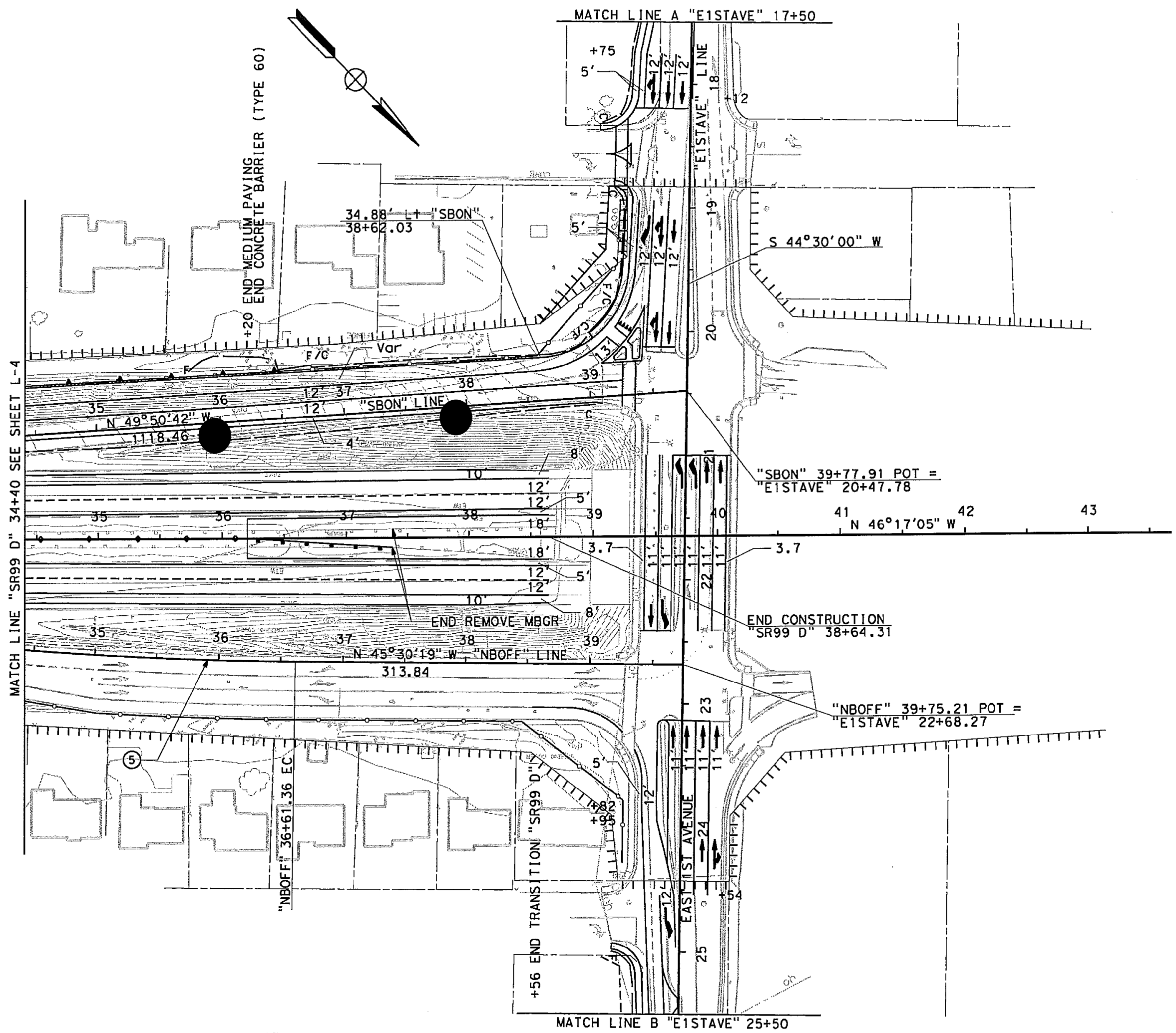
The identity or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER Carolyn Davis No. Exp. CIVIL STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

NOTES:

1. FOR COMPLETE R/W DATA, SEE R/W MAPS AT DISTRICT OFFICE.



CURVE DATA					
No.	LINE	R	Δ	T	L
5	NBOFF	3280.84	4° 35' 15"	131.42	262.69

LAYOUT
1" = 50'

L-5

CALCULATED/ DESIGNED BY	XX	xx/ox	REVISED BY
CHECKED BY	XX	xx/ox	DATE REVISED

PROJECT ENGINEER: CAROLYN DAVIS

AGENCY NAME: BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

FILE => D:\dgn\b218r joeb\b218rlo5.dgn

CU 00000

EA 000000

LAST REVISION 00-00-00

DATE PLOTTED => 5/6/2008
TIME PLOTTED => 6:49:02 PM

TABLES

TABLE 1
ADL Sampling Results
SR 99, Chico, California

Sample ID	Date	Latitude	Longitude	North/South Bound (NB/SB)	pH	TTLC LEAD mg/kg	STLC	diWET mg/l	TCLP LEAD
1-1A	11/17/2008	39.73730897	-121.8195598	NB	---	1,200	56.0	0.489	0.630
1-1B	11/17/2008	39.73730897	-121.8195598	NB	---	51.0	1.50	0.0638	---
1-1C	11/17/2008	39.73730897	-121.8195598	NB	---	97.0	0.300	0.0409	---
1-2A	11/17/2008	39.73730897	-121.8195598	NB	6.8	1,120	51.0	0.176	0.400
1-2B	11/17/2008	39.73730897	-121.8195598	NB	---	43.0	---	---	---
1-2C	11/17/2008	39.73730897	-121.8195598	NB	---	18.0	---	---	---
2-1A	11/17/2008	39.73738228	-121.8198849	NB	---	490	16.0	0.154	---
2-1B	11/17/2008	39.73738228	-121.8198849	NB	---	60.0	0.570	0.0264	---
2-1C	11/17/2008	39.73738228	-121.8198849	NB		19.0	---	---	---
2-2A	11/17/2008	39.73738228	-121.8198849	NB	---	130	2.60	0.036	---
2-2B	11/17/2008	39.73738228	-121.8198849	NB	---	15.0	---	---	---
2-2C	11/17/2008	39.73738228	-121.8198849	NB	---	12.0	---	---	---
3-1A	11/17/2008	39.7374014	-121.8198942	NB	---	422	18.0	0.0581	---
3-1B	11/17/2008	39.7374014	-121.8198942	NB	---	37.0	---	---	---
3-2A	11/17/2008	39.7374014	-121.8198942	NB	---	134	3.70	0.0107	---
3-2B	11/17/2008	39.7374014	-121.8198942	NB	---	36.0	---	---	---
4-1A	11/17/2008	39.73742358	-121.8200636	NB	---	1,170	49.0	0.019	0.430
4-1B	11/17/2008	39.73742358	-121.8200636	NB	---	190	10.0	0.0373	---
4-2A	11/17/2008	39.73742358	-121.8200636	NB	---	150	3.30	0.0112	---
4-2B	11/17/2008	39.73742358	-121.8200636	NB	---	10.0	---	---	---
4-2C	11/17/2008	39.73742358	-121.8200636	NB	---	13.0	---	---	---
5-1A	11/17/2008	39.7374594	-121.8202142	NB	5.91	**2,040**	99.0	0.0659	---
5-2A	11/17/2008	39.7374594	-121.8202142	NB	---	240	6.50	<0.010	---
5-2B	11/17/2008	39.7374594	-121.8202142	NB	---	40.0	---	---	---
5-2C	11/17/2008	39.7374594	-121.8202142	NB	---	20.0	---	---	---
6-1A	11/17/2008	39.74011575	-121.8242228	NB	---	610	34.0	0.052	---
6-2A	11/17/2008	39.74011575	-121.8242228	NB	---	360	13.0	0.0282	---
7-1A	11/17/2008	39.74049222	-121.8247440	NB	5.3	980	47.0	0.0639	---
7-2A	11/17/2008	39.74049222	-121.8247440	NB	---	390	19.0	0.0161	---
8-1A	11/17/2008	39.74084771	-121.8252331	NB	---	614	35.0	0.0128	---
8-2A	11/17/2008	39.74084771	-121.8252331	NB	---	460	18.0	<0.010	---
9-1A	11/17/2008	39.74049967	-121.8247355	NB	---	240	23.0	0.0338	---
9-2A	11/17/2008	39.74049967	-121.8247355	NB	---	220	7.10	0.015	---
10-1A	11/17/2008	39.7412363	-121.8257311	NB	---	200	18.0	0.0183	---
10-2A	11/17/2008	39.7412363	-121.8257311	NB	6.31	180	7.30	0.0214	---
11-1A	11/17/2008	39.74159809	-121.8262249	NB	---	600	32.0	0.0318	---
11-2A	11/17/2008	39.74159809	-121.8262249	NB	---	140	5.20	<0.010	---
12-1A	11/17/2008	39.74208052	-121.8268756	NB	---	220	11.0	0.0474	---
12-2A	11/17/2008	39.74208052	-121.8268756	NB	---	220	6.50	0.0257	---
13-1A	11/17/2008	39.74257865	-121.8275580	NB	---	760	35.0	0.0275	---
13-2A	11/17/2008	39.74257865	-121.8275580	NB	---	100	3.80	<0.010	---
14-1A	11/17/2008	39.74297217	-121.8280560	NB	---	350	13.0	0.0101	---
14-2A	11/17/2008	39.74297217	-121.8280560	NB	---	190	5.80	0.0159	---
15-1A	11/17/2008	39.74328513	-121.8285137	NB	---	174	5.00	<0.010	---
15-2A	11/17/2008	39.74328513	-121.8285137	NB	---	130	2.80	0.0131	---
16-1A	11/17/2008	39.73655292	-121.8206609	SB	---	500	18.0	0.0341	---
16-1B	11/17/2008	39.73655292	-121.8206609	SB	---	210	4.30	0.101	---
16-1C	11/17/2008	39.73655292	-121.8206609	SB	---	130	2.90	0.0567	---
16-2A	11/17/2008	39.73655292	-121.8206609	SB	---	**1,760**	6.60	<0.010	0.0580
16-2B	11/17/2008	39.73655292	-121.8206609	SB	---	270	8.60	<0.010	---
16-2C	11/17/2008	39.73655292	-121.8206609	SB	7.49	70.0	0.390	0.0169	---
17-1A	11/17/2008	39.74483355	-121.8313737	SB	---	**2,040**	100	0.137	1.90

TABLE 1
ADL Sampling Results
SR 99, Chico, California

Sample ID	Date	Latitude	Longitude	North/South Bound (NB/SB)	pH	TTLC LEAD mg/kg	STLC ←	diWET mg/l	TCLP LEAD →
17-1B	11/17/2008	39.74483355	-121.8313737	SB	---	80.0	1.20	0.0473	---
17-1C	11/17/2008	39.74483355	-121.8313737	SB	---	80.0	2.50	0.0579	---
17-2A	11/17/2008	39.74483355	-121.8313737	SB	---	380	15.0	0.0462	---
17-2B	11/17/2008	39.74483355	-121.8313737	SB	---	60.0	0.820	0.0199	---
17-2C	11/17/2008	39.74483355	-121.8313737	SB	---	60.0	0.800	0.0184	---
18-1A	11/17/2008	39.74467062	-121.8312957	SB	---	**1,940**	111	0.251	4.30
18-2A	11/17/2008	39.74467062	-121.8312957	SB	6.69	300	14.0	0.0293	---
18-2B	11/17/2008	39.74467062	-121.8312957	SB	---	50.0	0.610	<0.010	---
18-2C	11/17/2008	39.74467062	-121.8312957	SB	---	24.0	---	---	---
19-1A	11/18/2008	39.74459299	-121.8311569	SB	---	**1,910**	111	0.162	4.60
19-1B	11/18/2008	39.74459299	-121.8311569	SB	---	1,240	80.0	0.76	3.80
19-1C	11/18/2008	39.74459299	-121.8311569	SB	---	80.0	3.10	0.275	---
19-2A	11/18/2008	39.74459299	-121.8311569	SB	---	330	10.0	0.0292	---
19-2B	11/18/2008	39.74459299	-121.8311569	SB	---	40.0	---	---	---
19-2C	11/18/2008	39.74459299	-121.8311569	SB	---	20.0	---	---	---
20-1A	11/18/2008	39.74450819	-121.8310114	SB	---	**2,100**	137	0.14	2.50
20-1B	11/18/2008	39.74450819	-121.8310114	SB	---	850	49.0	0.462	---
20-1C	11/18/2008	39.74450819	-121.8310114	SB	7.47	290	9.90	0.256	---
20-2A	11/18/2008	39.74450819	-121.8310114	SB	---	550	32.0	0.0189	2.83
20-2B	11/18/2008	39.74450819	-121.8310114	SB	---	80.0	16.0	0.0113	---
20-2C	11/18/2008	39.74450819	-121.8310114	SB	7.59	30.0	---	---	---
21-1A	11/18/2008	39.74344817	-121.8284941	SB	---	320	8.30	<0.010	---
21-2A	11/18/2008	39.74344817	-121.8284941	SB	---	1,230	71.0	0.306	1.70
22-1A	11/18/2008	39.74294916	-121.8286354	SB	---	590	42.0	0.0472	---
22-2A	11/18/2008	39.74294916	-121.8286354	SB	---	440	24.0	0.0404	---
23-1A	11/18/2008	39.74294916	-121.8286354	SB	---	710	3.50	0.0572	---
23-2A	11/18/2008	39.74283026	-121.8284636	SB	---	380	6.10	0.0266	---
24-1A	11/18/2008	39.74212087	-121.8274949	SB	---	1,000	66.0	0.0338	1.10
24-2A	11/18/2008	39.74212087	-121.8274949	SB	---	220	8.20	0.0166	---
25-1A	11/18/2008	39.74206824	-121.8274247	SB	---	740	0.0900	0.061	---
25-2A	11/18/2008	39.74206824	-121.8274247	SB	---	270	8.10	0.0145	---
26-1A	11/18/2008	39.74130636	-121.8264110	SB	---	760	40.0	0.0875	---
26-2A	11/18/2008	39.74130636	-121.8264110	SB	6.87	290	9.20	<0.010	---
27-1A	11/18/2008	39.7412292	-121.8262934	SB	---	570	25.0	0.0273	---
27-2A	11/18/2008	39.7412292	-121.8262934	SB	---	430	20.0	0.0148	---
28-1A	11/18/2008	39.74055601	-121.8253997	SB	---	650	32.0	0.0102	---
28-2A	11/18/2008	39.74055601	-121.8253997	SB	---	240	9.10	0.015	---
29-1A	11/18/2008	39.74051596	-121.8253431	SB	---	580	35.0	0.0593	---
29-2A	11/18/2008	39.74051596	-121.8253431	SB	---	160	3.9	0.0139	---
30-1A	11/18/2008	39.74016086	-121.8248677	SB	---	640	26.0	0.0576	---
30-2A	11/18/2008	39.74016086	-121.8248677	SB	---	100	3.80	<0.010	---
31-1A	11/18/2008	39.741272	-121.82629	SB	---	180	7.10	<0.010	---
31-1B	11/18/2008	39.741272	-121.82629	SB	---	20.0	---	---	---
31-2A	11/18/2008	39.741272	-121.82629	SB	---	30.0	---	---	---
31-2B	11/18/2008	39.741272	-121.82629	SB	---	10.0	---	---	---
32-1A	11/18/2008	39.73711509	-121.8211277	SB	---	90.0	3.70	<0.010	---
32-1B	11/18/2008	39.73711509	-121.8211277	SB	7.63	50.0	2.20	0.0274	---
32-2A	11/18/2008	39.73711509	-121.8211277	SB	---	40.0	0.0950	---	---
32-2B	11/18/2008	39.73711509	-121.8211277	SB	---	70.0	---	<0.010	---
32-2C	11/18/2008	39.73711509	-121.8211277	SB	---	8.30	---	---	---
33-1A	11/18/2008	39.73677728	-121.8208446	SB	---	24.0	---	---	---
33-2A	11/18/2008	39.73677728	-121.8208446	SB	---	30.0	---	---	---
33-2B	11/18/2008	39.73677728	-121.8208446	SB	---	15.0	---	---	---

TABLE 1
ADL Sampling Results
SR 99, Chico, California

Sample ID	Date	Latitude	Longitude	North/South Bound (NB/SB)	pH	TTLC LEAD mg/kg	STLC ←	diWET mg/l	TCLP LEAD →
34-1A	11/18/2008	39.73665506	-121.8207471	SB	---	40.0	---	---	---
34-1B	11/18/2008	39.73665506	-121.8207471	SB	---	4.70	---	---	---
34-2A	11/18/2008	39.73665506	-121.8207471	SB	---	40.0	---	---	---
35-1A	11/18/2008	39.73653833	-121.8206645	SB	7.39	40.0	---	---	---
35-1B	11/18/2008	39.73653833	-121.8206645	SB	---	13.0	---	---	---
35-1C	11/18/2008	39.73653833	-121.8206645	SB	---	9.60	---	---	---
35-2A	11/18/2008	39.73653833	-121.8206645	SB	---	40.0	---	---	---
35-2B	11/18/2008	39.73653833	-121.8206645	SB	---	11.0	---	---	---
35-2C	11/18/2008	39.73653833	-121.8206645	SB	---	9.20	---	---	---

Notes:
TTCL = Total or total threshold concentration limit
STLC = Soluable threshold limit concentration
TCLP = Toxicity Characteristic Leaching Procedure
mg/kg = Milligrams per kilogram
mg/l = Milligrams per liter
--- = Not analyzed
< = Less than laboratory reporting limits

APPENDIX A

BORING LOGS

WESTERN
Resource Management

State Route 99 Auxiliary Lane Project
Phase 2 and 3
East 1st Avenue

Chico, California

Date Started	: December 18, 2008
Date Completed	: December 18, 2008
Hole Diameter	: 6-inch
Drilling Method	: Hollow-Stem Auger
Sampling Method	: No Sampling
Drilling Company	: Taber Consultants
Northing Coord.	:
Easting Coord.	:
Total Depth	: 15 feet
Logged By	: MAW

BORING LOG SB-1

(Page 1 of 1)

Casing Type	:
Screen Size	:
Seal Type	:
Sand Pack Type	:

Sample Legend
- Vapor Sample
- Soil Sample

Water Levels
- ▼ During Drilling
- ▽ After Completion

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Sample	Lab No.	Blow Count	PID		Depth in Feet
0				CLAY SILT, brown, moist, loose, no odor, no stain.						0
5				No samples collected. Lithology determined from drill cuttings.						5
		ML								
									Grout	
10										10
				SILT, orange-brown, dry, loose, some gravel, no odor, no stain. Very hard drilling.						
15		ML								15

BORING LOG SB-2

(Page 1 of 1)

State Route 99 Auxiliary Lane Project
Phase 2 and 3
East 1st Avenue

Chico, California

Date Started	: December 18, 2008
Date Completed	: December 18, 2008
Hole Diameter	: 6-inch
Drilling Method	: Hollow-Stem Auger
Sampling Method	: No Sampling
Drilling Company	: Taber Consultants
Northing Coord.	:
Easting Coord.	:
Total Depth	: 45 feet
Logged By	: MAW

Casing Type	:
Screen Size	:
Seal Type	:
Sand Pack Type	:

Sample Legend: Vapor Sample; Soil Sample

Water Levels: During Drilling; After Completion

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Sample	Lab No.	Blow Count	PID	Depth in Feet
0–9		ML		SILT, dark brown, moist, loose, no odor, no stain. No samples collected. Lithology determined from drill cuttings.					
9–12		ML		SILT, light brown, moist, loose, some gravel, no odor, no stain.					
12–18		ML		SILT, orange-brown, dry, loose, some gravel, no odor, no stain. Very hard drilling.					
18–45		ML		GRAVELLY SILT, dry, loose, much less gravel.					

Grout

APPENDIX B

LABOPRATORY ANALYTICAL REPORTS

Sparger Technology, Inc.
Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Client	Taber Consultants	
Workorder	18700	Chico, SR99 ADL Sampling
Received	11/19/08	

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

- DUP - Matrix Duplicate
- MS - Matrix Spike
- MSD - Matrix Spike Duplicate
- LCS - Lab Control Sample
- LCSD - Lab Control Sample Duplicate
- RPD - Relative Percent Difference
- QC - Additional Quality Control
- DIL - Results from a diluted sample
- ND - None Detected
- RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

3738 Bradview Drive • Sacramento, California 95827 • (916) 369-7688 • FAX (916) 369-7689

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Workorder 18700

Enclosed are the results from samples received on November 19, 2008.

The requested analyses are listed below.

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18700001	1-1A, Soil	11/17/08	6010B
18700002	1-1B, Soil	11/17/08	6010B
18700003	1-1C, Soil	11/17/08	6010B
18700004	1-2A, Soil	11/17/08	9045 PH 6010B
18700005	1-2B, Soil	11/17/08	6010B
18700006	1-2C, Soil	11/17/08	6010B
18700007	2-1A, Soil	11/17/08	6010B
18700008	2-1B, Soil	11/17/08	6010B
18700009	2-1C, Soil	11/17/08	6010B
18700010	2-2A, Soil	11/17/08	6010B
18700011	2-2B, Soil	11/17/08	6010B
18700012	2-2C, Soil	11/17/08	6010B
18700013	3-1A, Soil	11/17/08	6010B
18700014	3-1B, Soil	11/17/08	6010B
18700015	3-2A, Soil	11/17/08	6010B
18700016	3-2B, Soil	11/17/08	6010B
18700017	4-1A, Soil	11/17/08	6010B
18700018	4-1B, Soil	11/17/08	6010B
18700019	4-2A, Soil	11/17/08	6010B
18700020	4-2B, Soil	11/17/08	6010B
18700021	4-2C, Soil	11/17/08	6010B
18700022	5-1A, Soil	11/17/08	9045 PH 6010B

Workorder 18700

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18700023	5-2A, Soil	11/17/08	6010B
18700024	5-2B, Soil	11/17/08	6010B
18700025	5-2C, Soil	11/17/08	6010B
18700026	6-1A, Soil	11/17/08	6010B
18700027	6-2A, Soil	11/17/08	6010B
18700028	7-1A, Soil	11/17/08	9045 PH 6010B
18700029	7-2A, Soil	11/17/08	6010B
18700030	8-1A, Soil	11/17/08	6010B
18700031	8-2A, Soil	11/17/08	6010B
18700032	9-1A, Soil	11/17/08	6010B
18700033	9-2A, Soil	11/17/08	6010B
18700034	10-1A, Soil	11/17/08	6010B
18700035	10-2A, Soil	11/17/08	9045 PH 6010B
18700036	11-1A, Soil	11/17/08	6010B
18700037	11-2A, Soil	11/17/08	6010B
18700038	12-1A, Soil	11/17/08	6010B
18700039	12-2A, Soil	11/17/08	6010B
18700040	13-1A, Soil	11/17/08	6010B
18700041	13-2A, Soil	11/17/08	6010B
18700042	14-1A, Soil	11/17/08	6010B
18700043	14-2A, Soil	11/17/08	6010B
18700044	15-1A, Soil	11/17/08	6010B
18700045	15-2A, Soil	11/17/08	6010B
18700046	16-1A, Soil	11/17/08	6010B
18700047	16-1B, Soil	11/17/08	6010B
18700048	16-1C, Soil	11/17/08	6010B
18700049	16-2A, Soil	11/17/08	9045 PH 6010B
18700050	16-2B, Soil	11/17/08	6010B
18700051	16-2C, Soil	11/17/08	9045 PH 6010B

Workorder 18700

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18700052	17-1A, Soil	11/17/08	6010B
18700053	17-1B, Soil	11/17/08	6010B
18700054	17-1C, Soil	11/17/08	6010B
18700055	17-2A, Soil	11/17/08	6010B
18700056	17-2B, Soil	11/17/08	6010B
18700057	17-2C, Soil	11/17/08	6010B
18700058	18-1A, Soil	11/17/08	6010B
18700059	18-2A, Soil	11/17/08	9045 PH 6010B
18700060	18-2B, Soil	11/17/08	6010B
18700061	18-2C, Soil	11/17/08	6010B
18700062	19-1A, Soil	11/18/08	6010B
18700063	19-1B, Soil	11/18/08	6010B
18700064	19-1C, Soil	11/18/08	6010B
18700065	19-2A, Soil	11/18/08	6010B
18700066	19-2B, Soil	11/18/08	6010B
18700067	19-2C, Soil	11/18/08	6010B
18700068	20-1A, Soil	11/18/08	6010B
18700069	20-1B, Soil	11/18/08	6010B
18700070	20-1C, Soil	11/18/08	9045 PH 6010B
18700071	20-2A, Soil	11/18/08	6010B
18700072	20-2B, Soil	11/18/08	6010B
18700073	20-2C, Soil	11/18/08	9045 PH 6010B
18700074	21-1A, Soil	11/18/08	6010B
18700075	21-2A, Soil	11/18/08	6010B
18700076	22-1A, Soil	11/18/08	6010B
18700077	22-2A, Soil	11/18/08	6010B
18700078	23-1A, Soil	11/18/08	6010B
18700079	23-2A, Soil	11/18/08	6010B
18700080	24-1A, Soil	11/18/08	6010B
18700081	24-2A, Soil	11/18/08	6010B

Workorder 18700

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18700082	25-1A, Soil	11/18/08	6010B
18700083	25-2A, Soil	11/18/08	6010B
18700084	26-1A, Soil	11/18/08	6010B
18700085	26-2A, Soil	11/18/08	9045 PH 6010B
18700086	27-1A, Soil	11/18/08	6010B
18700087	27-2A, Soil	11/18/08	6010B
18700088	28-1A, Soil	11/18/08	6010B
18700089	28-2A, Soil	11/18/08	6010B
18700090	29-1A, Soil	11/18/08	6010B
18700091	29-2A, Soil	11/18/08	6010B
18700092	30-1A, Soil	11/18/08	6010B
18700093	30-2A, Soil	11/18/08	6010B
18700094	31-1A, Soil	11/18/08	6010B
18700095	31-1B, Soil	11/18/08	6010B
18700096	31-2A, Soil	11/18/08	6010B
18700097	31-2B, Soil	11/18/08	6010B
18700098	32-1A, Soil	11/18/08	6010B
18700099	32-1B, Soil	11/18/08	9045 PH 6010B
18700100	32-2A, Soil	11/18/08	6010B
18700101	32-2B, Soil	11/18/08	6010B
18700102	32-2C, Soil	11/18/08	6010B
18700103	33-1A, Soil	11/18/08	6010B
18700104	33-2A, Soil	11/18/08	6010B
18700105	33-2B, Soil	11/18/08	6010B
18700106	34-1A, Soil	11/18/08	6010B
18700107	34-1B, Soil	11/18/08	6010B
18700108	34-2A, Soil	11/18/08	6010B
18700109	35-1A, Soil	11/18/08	9045 PH 6010B
18700110	35-1B, Soil	11/18/08	6010B
18700111	35-1C, Soil	11/18/08	6010B

Workorder 18700

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18700112	35-2A, Soil	11/18/08	6010B
18700113	35-2B, Soil	11/18/08	6010B
18700114	35-2C, Soil	11/18/08	6010B

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18700 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead
Method 6010B

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18700001	1-1A	1200	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700002	1-1B	51.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700003	1-1C	97.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700004	1-2A	1120	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700005	1-2B	43.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700006	1-2C	18.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700007	2-1A	490	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700008	2-1B	60.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700009	2-1C	19.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700010	2-2A	130	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700011	2-2B	15.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700012	2-2C	12.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700013	3-1A	422	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700014	3-1B	37.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700015	3-2A	134	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700016	3-2B	36.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700017	4-1A	1170	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700018	4-1B	190	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700019	4-2A	150	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700020	4-2B	10.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700021	4-2C	13.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700022	5-1A	2040	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700023	5-2A	240	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700024	5-2B	40.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700025	5-2C	20.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700026	6-1A	610	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700027	6-2A	360	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700028	7-1A	980	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700029	7-2A	390	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700030	8-1A	614	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700031	8-2A	460	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700032	9-1A	240	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700033	9-2A	220	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700034	10-1A	200	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700035	10-2A	180	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700036	11-1A	600	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700037	11-2A	140	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700038	12-1A	220	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18700 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18700039	12-2A	220	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700040	13-1A	760	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700041	13-2A	100	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700042	14-1A	350	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700043	14-2A	190	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700044	15-1A	174	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700045	15-2A	130	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700046	16-1A	500	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700047	16-1B	210	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700048	16-1C	130	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700049	16-2A	1760	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700050	16-2B	270	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700051	16-2C	70.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700052	17-1A	2040	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700053	17-1B	80.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700054	17-1C	80.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700055	17-2A	380	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700056	17-2B	60.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700057	17-2C	60.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700058	18-1A	1940	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700059	18-2A	300	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700060	18-2B	50.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700061	18-2C	24.0	1.0	mg/Kg	11/17/08	12/04/08	Soil	1:1
18700062	19-1A	1910	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700063	19-1B	1240	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700064	19-1C	80.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700065	19-2A	330	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700066	19-2B	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700067	19-2C	20.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700068	20-1A	2100	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700069	20-1B	850	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700070	20-1C	290	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700071	20-2A	550	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700072	20-2B	80.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700073	20-2C	30.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700074	21-1A	320	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700075	21-2A	1230	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700076	22-1A	590	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18700 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18700077	22-2A	440	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700078	23-1A	710	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700079	23-2A	380	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700080	24-1A	1000	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700081	24-2A	220	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700082	25-1A	740	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700083	25-2A	270	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700084	26-1A	760	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700085	26-2A	290	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700086	27-1A	570	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700087	27-2A	430	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700088	28-1A	650	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700089	28-2A	240	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700090	29-1A	580	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700091	29-2A	160	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700092	30-1A	640	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700093	30-2A	100	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700094	31-1A	180	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700095	31-1B	20.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700096	31-2A	30.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700097	31-2B	10.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700098	32-1A	90.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700099	32-1B	50.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700100	32-2A	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700101	32-2B	70.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700102	32-2C	8.30	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700103	33-1A	24.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700104	33-2A	30.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700105	33-2B	15.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700106	34-1A	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700107	34-1B	4.70	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700108	34-2A	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700109	35-1A	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700110	35-1B	13.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700111	35-1C	9.60	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700112	35-2A	40.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700113	35-2B	11.0	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1
18700114	35-2C	9.20	1.0	mg/Kg	11/18/08	12/04/08	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18700 **Workorder ID** Chico, SR99 ADL Sampling

Parameter pH
Method 9045 PH

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18700004	1-2A	6.8	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700022	5-1A	5.91	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700028	7-1A	5.3	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700035	10-2A	6.31	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700049	16-2A	6.79	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700051	16-2C	7.49	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700059	18-2A	6.69	0.1	SU	11/17/08	12/05/08	Soil	1:1
18700070	20-1C	7.47	0.1	SU	11/18/08	12/05/08	Soil	1:1
18700073	20-2C	7.59	0.1	SU	11/18/08	12/05/08	Soil	1:1
18700085	26-2A	6.87	0.1	SU	11/18/08	12/05/08	Soil	1:1
18700099	32-1B	7.63	0.1	SU	11/18/08	12/05/08	Soil	1:1
18700109	35-1A	7.39	0.1	SU	11/18/08	12/05/08	Soil	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 357450 [ICPV/6292]
Laboratory ID	88774	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0 mg/Kg	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 357450 [ICPV/6292]
Laboratory ID	88775	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	49.0	1.0 mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 357450 [ICPV/6292
Laboratory ID	88776	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	50.0	1.0 mg/Kg	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 357450 [ICPV/6292]
Laboratory ID	88777	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	1250	1.0 mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 357450 [ICPV/6292]
Laboratory ID	88778	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	1200	1.0 mg/Kg	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357450 [ICPV/6292]
Laboratory ID	88779	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	2900	1.0 mg/Kg	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 357454 [ICPV/6294]
Laboratory ID	88786	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0	mg/Kg	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 357454 [ICPV/6294]
Laboratory ID	88787	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	48.0	1.0	mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 357454 [ICPV/6294
Laboratory ID	88788	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	48.0	1.0	mg/Kg	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 357454 [ICPV/6294]
Laboratory ID	88789	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	57.0	1.0	mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 357454 [ICPV/6294]
Laboratory ID	88790	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	54.0	1.0	mg/Kg	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357454 [ICPV/6294]
Laboratory ID	88791	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	12.0	1.0	mg/Kg	1:1

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Method Blank Report

Client ID Taber Consultants **Sample ID** MB for HBN 357457 [ICPV/6295]
Laboratory ID 88792 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0 mg/Kg	1:1

Lab Control Sample Report

Client ID Taber Consultants **Sample ID** LCS for HBN 357457 [ICPV/6295]
Laboratory ID 88793 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	49.0	1.0 mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID Taber Consultants **Sample ID** LCSD for HBN 357457 [ICPV/6295
Laboratory ID 88794 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	51.0	1.0 mg/Kg	1:1

Matrix Spike Report

Client ID Taber Consultants **Sample ID** MS for HBN 357457 [ICPV/6295]
Laboratory ID 88795 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	206	1.0 mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID Taber Consultants **Sample ID** MSD for HBN 357457 [ICPV/6295]
Laboratory ID 88796 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	200	1.0 mg/Kg	1:1

Duplicate Report

Client ID Taber Consultants **Sample ID** DUP for HBN 357457 [ICPV/6295]
Laboratory ID 88797 **Matrix** Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	139	1.0 mg/Kg	1:1

Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 357460 [ICPV/6296]
Laboratory ID	88798	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0 mg/Kg	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 357460 [ICPV/6296]
Laboratory ID	88799	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	46.0	1.0 mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 357460 [ICPV/6296
Laboratory ID	88800	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	47.0	1.0 mg/Kg	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 357460 [ICPV/6296]
Laboratory ID	88801	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	79.0	1.0 mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 357460 [ICPV/6296]
Laboratory ID	88802	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	67.0	1.0 mg/Kg	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357460 [ICPV/6296]
Laboratory ID	88803	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	23.0	1.0 mg/Kg	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 357463 [ICPV/6297]
Laboratory ID	88804	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0 mg/Kg	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 357463 [ICPV/6297]
Laboratory ID	88805	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	46.0	1.0 mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 357463 [ICPV/6297
Laboratory ID	88806	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	48.0	1.0 mg/Kg	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 357463 [ICPV/6297]
Laboratory ID	88807	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	272	1.0 mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 357463 [ICPV/6297]
Laboratory ID	88808	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	285	1.0 mg/Kg	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357463 [ICPV/6297]
Laboratory ID	88809	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B	12/01/08	12/04/08	248	1.0 mg/Kg	1:1

Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 357466 [ICPV/6298]
Laboratory ID	88810	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	ND	1.0	mg/Kg	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 357466 [ICPV/6298]
Laboratory ID	88811	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	46.0	1.0	mg/Kg	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 357466 [ICPV/6298
Laboratory ID	88812	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	47.0	1.0	mg/Kg	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 357466 [ICPV/6298]
Laboratory ID	88813	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	61.0	1.0	mg/Kg	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 357466 [ICPV/6298]
Laboratory ID	88814	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	61.0	1.0	mg/Kg	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357466 [ICPV/6298]
Laboratory ID	88815	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B	12/01/08	12/04/08	20.0	1.0	mg/Kg	1:1

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Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 357469 [PHV/1661]
Laboratory ID	88816	**Matrix**	Soil

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
pH	9045 PH	12/04/08	12/05/08	6.8	0.1	SU	1:1

QC SUMMARY

Client ID	Taber Consultants	**Original**	18700001		
QC Batch	ICPP 6318	**Sample**	**Duplicate [88779]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				82.9*	(35)

*High RPD due to sample effect.

Client ID	Taber Consultants	**Original**	18700021		
QC Batch	ICPP 6319	**Sample**	**Duplicate [88791]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				8.00	(35)

Client ID	Taber Consultants	**Original**	18700041		
QC Batch	ICPP 6320	**Sample**	**Duplicate [88797]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				32.6	(35)

Client ID	Taber Consultants	**Original**	18700061		
QC Batch	ICPP 6321	**Sample**	**Duplicate [88803]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				4.26	(35)

Client ID	Taber Consultants	**Original**	18700081		
QC Batch	ICPP 6322	**Sample**	**Duplicate [88809]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				12.0	(35)

Client ID	Taber Consultants	**Original**	18700101		
QC Batch	ICPP 6323	**Sample**	**Duplicate [88815]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
Lead				111*	(35)

*High RPD due to sample effect.

Client ID	Taber Consultants	**Original**	18700004		
QC Batch	PHX 1612	**Sample**	**Duplicate [88816]**		
Matrix	Soil				**RPD**
Parameter				**RPD**	**Limits**
pH				0	(20)

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QC SUMMARY

Client ID	Taber Consultants	**Original**	18700001
QC Batch	ICPP 6318	**Samples**	Matrix Spike [88777]
Matrix	Soil		Matrix Spike Duplicate [88778]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	106	4.00*	(75-125)	185**	(35 MAX)

*Loss of MSD recovery due to sample matrix effect **High RPD due to sample effect.

Client ID	Taber Consultants	**Original**	18700021
QC Batch	ICPP 6319	**Samples**	Matrix Spike [88789]
Matrix	Soil		Matrix Spike Duplicate [88790]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	88.0	82.0	(75-125)	7.06	(35 MAX)

Client ID	Taber Consultants	**Original**	18700041
QC Batch	ICPP 6320	**Samples**	Matrix Spike [88795]
Matrix	Soil		Matrix Spike Duplicate [88796]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	212*	200*	(75-125)	5.83	(35 MAX)

*High MS/MSD recoveries due to sample matrix effect.

Client ID	Taber Consultants	**Original**	18700061
QC Batch	ICPP 6321	**Samples**	Matrix Spike [88801]
Matrix	Soil		Matrix Spike Duplicate [88802]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	110	86.0	(75-125)	24.5	(35 MAX)

Client ID	Taber Consultants	**Original**	18700081
QC Batch	ICPP 6322	**Samples**	Matrix Spike [88807]
Matrix	Soil		Matrix Spike Duplicate [88808]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	104	130*	(75-125)	22.2	(35 MAX)

*High MSD recoveries due to sample matrix effect.

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QC SUMMARY

Client ID Taber Consultants | **Original** 18700101
QC Batch ICPP 6323 | **Samples** Matrix Spike [88813]
Matrix Soil | Matrix Spike Duplicate [88814]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	-18*	-18*	(75-125)	0000	(35 MAX)

*Loss of MS/MSD recoveries due to sample matrix effect.

Client ID Taber Consultants | **Samples** Lab Control Sample [88775]
QC Batch ICPP 6318 | Lab Control Sample Duplicate [88776]
Matrix Soil

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	98.0	100	(80-120)	2.02	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [88787]
QC Batch ICPP 6319 | Lab Control Sample Duplicate [88788]
Matrix Soil

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	96.0	96.0	(80-120)	0000	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [88793]
QC Batch ICPP 6320 | Lab Control Sample Duplicate [88794]
Matrix Soil

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	98.0	102	(80-120)	4.00	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [88799]
QC Batch ICPP 6321 | Lab Control Sample Duplicate [88800]
Matrix Soil

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	92.0	94.0	(80-120)	2.15	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [88805]
QC Batch ICPP 6322 | Lab Control Sample Duplicate [88806]
Matrix Soil

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	92.0	96.0	(80-120)	4.26	(20 MAX)

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QC SUMMARY

Client ID	Taber Consultants	**Samples**	Lab Control Sample [88811]
QC Batch	ICPP 6323		Lab Control Sample Duplicate [88812]
Matrix	Soil		

Parameter	**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	92.0	94.0	(80-120)	2.15	(20 MAX)

18700

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SRG # / Lab No. ____________

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Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To):
Tom Ballard

California EDF Report? ☐ Yes ☐ No

Company / Address: TABER
3911 West Capitol Avenue
West Sacramento, Ca. 95691

Sampling Company Log Code:

Phone #: 916-371-1690
Fax #:

Global ID:

Project #: Chico, SR99 ADL Smpling
P.O. #:

EDF Deliverable To (Email Address):
tballard@taberconsultants.com

Project Name:
Chico, SR99 ADL Sampling

Sampler Signature: [signature]

Project Address:
State Route 99 between
East 8th Street (State Route 32)
and East 1st Avenue.

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None	Matrix: Water	Soil	Air	Analysis Request: Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 1-1A	11/17/08	10:00						x			x		x		x		
2) 1-1B		10:04						x			x		x		x		
3) 1-1C		10:06						x			x		x		x		
4) 1-2A		10:14						x			x		x		x		X
5) 1-2B		10:18						x			x		x		x		
6) 1-2C		10:22						x			x		x		x		
7) 2-1A		10:36						x			x		x		x		
8) 2-1B		10:39						x			x		x		x		
9) 2-1C		10:44						x			x		x		x		
10) 2-2A	11/17/08	10:49						x			x		x		x		

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	1410	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

SEE ATTACHED: LAB ANALYSIS AND PROCEEDURE

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

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Lab: 916.369.7688
Fax: 916.369.7689

SRG # / Lab No. ____________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard	California EDF Report? ☐ Yes ☐ No
Company / Address: TABER 3911 West Capitol Avenue West Sacramento, Ca. 95691	Sampling Company Log Code:
Phone #: 916-371-1690 / Fax #:	Global ID:
Project #: Chico, SR99 ADL Smpling / P.O. #:	EDF Deliverable To (Email Address): tballard@taberconsultants.com
Project Name: Chico, SR99 ADL Sampling	Sampler Signature: [signature]
Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.	

Analysis Request: Total Lead (EPA 6010B) (3050A); W.E.T. Lead (STLC); Ph (EPA 9045)

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

Sample Designation	Date	Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None			Water	Soil	Air		Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 2-2B	11/19/08	10:59						x			x				x			x		
2) 2-2C		11:02						x			x				x			x		
3) 3-1A		11:13						x			x				x			x		
4) 3-1B		11:16						x			x				x			x		
5) 3-2A		11:23						x			x				x			x		
6) 3-2B		11:35						x			x				x			x		
7) 4-1A		11:42						x			x				x			x		
8) 4-1B		11:47						x			x				x			x		
9) 4-2A		11:50						x			x				x			x		
10) 4-2B	11/19/08	11:53						x			x				x			x		

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	14:10	Nguyen 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

SEE ATTACHED: LAB ANALYSIS AND PROCEEDURE

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

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Sacramento, CA 95827
Lab: 916.369.7688
Fax: 916.369.7689

SRG # / Lab No. ____________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard	California EDF Report? ☐ Yes ☐ No
Company / Address: TABER, 3911 West Capitol Avenue, West Sacramento, Ca. 95691	Sampling Company Log Code:
Phone #: 916-371-1690 / Fax #:	Global ID:
Project #: Chico, SR99 ADL Smpling / P.O. #:	EDF Deliverable To (Email Address): tballard@taberconsultants.com
Project Name: Chico, SR99 ADL Sampling	Sampler Signature: [signature]
Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.	

Sample Designation	Date	Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None			Water	Soil	Air		Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 4-2C	11/17/08	11:56						x			x				x			x		
2) 5-1A		12:06						x			x				x			x		X
3) 5-2A		12:08						x			x				x			x		
4) 5-2B		12:10						x			x				x			x		
5) 5-2C		12:12						x			x				x			x		
6) 6-1A		12:47						x			x				x			x		
7) 6-2A		12:49						x			x				x			x		
8) 7-1A		12:51						x			x				x			x		X
9) 7-2A		12:53						x			x				x			x		
10) 8-1A	11/17/08	12:57						x			x				x			x		

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

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Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:

- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

SEE ATTACHED: LAB ANALYSIS AND PROCEEDURE

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

Sparger Technology, Inc.
Environmental Laboratories

3738 Bradview Drive
Sacramento, CA 95827
Lab: 916.369.7688
Fax: 916.369.7689

SRG # / Lab No. ____________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard

California EDF Report? ☐ Yes ☐ No

Company / Address: TABER
3911 West Capitol Avenue
West Sacramento, Ca. 95691

Sampling Company Log Code:

Phone #: 916-371-1690

Fax #:

Global ID:

Project #: Chico, SR99 ADL Smpling

P.O. #:

EDF Deliverable To (Email Address): tballard@taberconsultants.com

Project Name: Chico, SR99 ADL Sampling

Sampler Signature:

Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.

Sample Designation	Sampling Date	Sampling Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None	Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 8-2A	11/17/08	12:58						x			x		x		x		
2) 9-1A		13:03						x			x		x		x		
3) 9-2A		13:05						x			x		x		x		
4) 10-1A		13:09						x			x		x		x		
5) 10-2A		13:10						x			x		x		x		X
6) 11-1A		13:14						x			x		x		x		
7) 11-2A		13:15						x			x		x		x		
8) 12-1A		13:19						x			x		x		x		
9) 12-~~#~~2A		13:20						x			x		x		x		
10) 13-1A	11/17/08	13:26						x			x		x		x		

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

SEE ATTACHED: LAB ANALYSIS AND PROCEEDURE

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

Sparger Technology, Inc. Environmental Laboratories

3738 Bradview Drive
Sacramento, CA 95827
Lab: 916.369.7688
Fax: 916.369.7689

SRG # / Lab No. ____________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard

Company / Address: TABER
3911 West Capitol Avenue
West Sacramento, Ca. 95691

Phone #: 916-371-1690
Fax #:

Project #: Chico, SR99 ADL Smpling
P.O. #:

Project Name: Chico, SR99 ADL Sampling

Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.

California EDF Report? ☐ Yes ☐ No

Sampling Company Log Code:

Global ID:

EDF Deliverable To (Email Address): tballard@taberconsultants.com

Sampler Signature: [signature]

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

Sample Designation	Date	Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None		Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 13-2A	11/17/08	13:27						x			x			x		x		
2) 14-1A		13:32						x			x			x		x		
3) 14-2A		13:33						x			x			x		x		
4) 15-1A		13:36						x			x			x		x		
5) 15-2A		13:37						x			x			x		x		
6) 16-1A		14:33						x			x			x		x		
7) 16-1B		14:37						x			x			x		x		
8) 16-1C		14:40						x			x			x		x		
9) 16-2A		14:44						x			x			x		x		X
10) 16-2B		14:53						x			x			x		x		

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[signature]	11/19/08	14:00	[signature]	11/19/08 14:05
			Received by Laboratory:	

Remarks:
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Environmental Laboratories

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California EDF Report? ☐ Yes ☐ No

Sampling Company Log Code:

Global ID:

EDF Deliverable To (Email Address): tballard@taberconsultants.com

Sampler Signature: [signature]

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

Sample Designation	Date	Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None		Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 16-2C	11/17/08	14:56						x			x			x		x		X
2) 17-1A		15:04						x			x			x		x		
3) 17-1B		15:07						x			x			x		x		
4) 17-1C		15:10						x			x			x		x		
5) 17-2A		15:16						x			x			x		x		
6) 17-2B		15:20						x			x			x		x		
7) 17-2C		15:24						x			x			x		x		
8) 18-1A		15:33						x			x			x		x		
9) 18-2A		16:05						x			x			x		x		X
10) 18-2B	11/17/08	16:09						x			x			x		x		

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[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
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- pH analyses (9045) for 10% of samples selected randomly

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For Lab Use Only: Sample Receipt

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Environmental Laboratories

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Sacramento, CA 95827
Lab: 916.369.7688
Fax: 916.369.7689

SRG # / Lab No. ____________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard	California EDF Report? ☐ Yes ☐ No
Company / Address: TABER, 3911 West Capitol Avenue, West Sacramento, Ca. 95691	Sampling Company Log Code:
Phone #: 916-371-1690 / Fax #:	Global ID:
Project #: Chico, SR99 ADL Smpling / P.O. #:	EDF Deliverable To (Email Address): tballard@taberconsultants.com
Project Name: Chico, SR99 ADL Sampling	Sampler Signature: [signature]
Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.	

Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None	Matrix: Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 18-2C	11/17/08	16:13						x			x		x		x		
2) 19-1A	11/18/08	13:09						x			x		x		x		
3) 19-1B		13:11						x			x		x		x		
4) 19-1C		13:14						x			x		x		x		
5) 19-2A		13:17						x			x		x		x		
6) 19-2B		13:21						x			x		x		x		
7) 19-2C		13:24						x			x		x		x		
8) 20-1A		13:28						x			x		x		x		
9) 20-1B		13:32						x			x		x		x		
10) 20-1C	11/18/08	13:34						x			x		x		x		X

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

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[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
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- pH analyses (9045) for 10% of samples selected randomly

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					Yes / No

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SRG # / Lab No. ____________

Page 8 of 12

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Company / Address: TABER
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Phone #:
916-371-1690

Fax #:

Project #:
Chico, SR99 ADL Smpling

P.O. #:

Project Name:
Chico, SR99 ADL Sampling

Project Address:
State Route 99 between
East 8th Street (State Route 32)
and East 1st Avenue.

California EDF Report? ☐ Yes ☐ No

Sampling Company Log Code:

Global ID:

EDF Deliverable To (Email Address):
tballard@taberconsultants.com

Sampler Signature:

Sample Designation	Sampling Date	Sampling Time	40 ml VOA	Sleeve	Poly	Glass	Tedlar		HCl	HNO_3	None		Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 20-2A	11/18/08	13:46						x			x			x		x		
2) 20-2B		13:49						x			x			x		x		
3) 20-2C		13:53						x			x			x		x		X
4) 21-1A		11:37						x			x			x		x		
5) 21-2A		11:38						x			x			x		x		
6) 22-1A		11:41						x			x			x		x		
7) 22-2A		11:42						x			x			x		x		
8) 23-1A		11:45						x			x			x		x		
9) 23-2A		11:46						x			x			x		x		
10) 24-1A		11:48						x			x			x		x		

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

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[signature]	11/19/08	14:00	Nguyen 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

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For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

Sparger Technology, Inc.
Environmental Laboratories

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Fax: 916.369.7689

SRG # / Lab No. ________

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Tom Ballard

California EDF Report? ☐ Yes ☐ No

Company / Address: TABER
3911 West Capitol Avenue
West Sacramento, Ca. 95691

Sampling Company Log Code:

Phone #: 916-371-1690

Fax #:

Global ID:

Project #: Chico, SR99 ADL Smpling

P.O. #:

EDF Deliverable To (Email Address): tballard@taberconsultants.com

Project Name: Chico, SR99 ADL Sampling

Sampler Signature: [signature]

Project Address: State Route 99 between East 8th Street (State Route 32) and East 1st Avenue.

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO$_3$	None	Matrix: Water	Soil	Air	Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 24-2A	11/18/08	11:49						x			x		x		x		
2) 25-1A		11:52						x			x		x		x		
3) 25-2A		11:53						x			x		x		x		
4) 26-1A		11:56						x			x		x		x		
5) 26-2A		11:57						x			x		x		x		X
6) 27-1A		11:59						x			x		x		x		
7) 27-2A		12:00						x			x		x		x		
8) 28-1A		12:03						x			x		x		x		
9) 28-2A		12:04						x			x		x		x		
10) 29-1A	11/18/08	12:07						x			x		x		x		

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

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					Yes / No

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Tom Ballard

California EDF Report? ☐ Yes ☐ No

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3911 West Capitol Avenue
West Sacramento, Ca. 95691

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916-371-1690

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Chico, SR99 ADL Smpling

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tballard@taberconsultants.com

Project Name:
Chico, SR99 ADL Sampling

Sampler Signature:

Project Address:
State Route 99 between
East 8th Street (State Route 32)
and East 1st Avenue.

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

	Sample Designation	Date	Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None	Matrix: Water	Soil	Air	Analysis Request: Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1)	29-2A	11/18/08	12:08						x			x		x		x		
2)	30-1A		12:14						x			x		x		x		
3)	30-2A		12:15						x			x		x		x		
4)	31-1A		09:26						x			x		x		x		
5)	31-1B		09:34						x			x		x		x		
6)	31-2A		09:42						x			x		x		x		
7)	31-2B		09:44						x			x		x		x		
8)	32-1A		09:51						x			x		x		x		
9)	32-1B		09:56						x			x		x		x		X
10)	32-2A	11/18/08	09:58						x			x		x		x		

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	1400	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
- All samples tested for total lead by EPA method (6010-B)(3050A).
- pH analyses (9045) for 10% of samples selected randomly

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Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
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Project Address:
State Route 99 between
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TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

	Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None			Matrix: Water	Soil	Air	Analysis Request: Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1)	32-2B	11/18/08	10:01						x			x				x		x		
2)	32-2C		10:03						x			x				x		x		
3)	33-1A		10:08						x			x				x		x		
4)	33-2A		10:12						x			x				x		x		
5)	33-2B		10:24						x			x				x		x		
6)	34-1A		10:29						x			x				x		x		
7)	34-1B		10:34						x			x				x		x		
8)	34-2A		10:40						x			x				x		x		
9)	35-1A		10:48						x			x				x		x	X	
10)	35-1B	11/18/08	10:52						x			x				x		x		

Relinquished by:	Date	Time	Received by:
[signature]	11/19/08	14:00	[signature] 11/19/08 14:05
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:

Remarks:
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- pH analyses (9045) for 10% of samples selected randomly

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Temp °C	initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

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SRG # / Lab No. ____________

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California EDF Report? ☐ Yes ☐ No

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tballard@taberconsultants.com

Project Name: Chico, SR99 ADL Sampling

Sampler Signature: [signature]

Project Address:
State Route 99 between
East 8th Street (State Route 32)
and East 1st Avenue.

Sample Designation	Sampling Date	Sampling Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None			Matrix: Water	Soil	Air		Analysis Request: Total Lead (EPA 6010B) (3050A)	W.E.T. Lead (STLC)	Ph (EPA 9045)
1) 35-1C	11/18/08	10:54						x			x				x			x		
2) 35-2A		10:56						x			x				x			x		
3) 35-2B		11:00						x			x				x			x		
4) 35-2C	11/18/08	11:06						x			x				x			x		
5)								x			x				x			x		
6)								x			x				x			x		
7)								x			x				x			x		
8)								x			x				x			x		
9)								x			x				x			x		
10)								x			x				x			x		

TAT: ☐ 12 hr ☐ 24 hr ☐ 48 hr ☐ 72 hr ☑ 1 wk

For Lab Use Only

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Relinquished by:	Date	Time	Received by:
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Remarks:
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- pH analyses (9045) for 10% of samples selected randomly

SEE ATTACHED: LAB ANALYSIS AND PROCEEDURE

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

ADL Soil Sampling Plan

State Route 99 Auxiliary Lane Project Phase 2 and 3
Between State Route 32 and East 1st Avenue
Chico, California

LABORATORY ANALYSES AND PROCEDURES FOR ADL

All samples will be submitted to a California DHS certified laboratory for analytical testing using standard EPA methods. Caltrans District 3 does not have a DTSC variance for on-site disposal of lead-contaminated soil and analytical testing will be limited to evaluating if offsite disposal is necessary. The testing will include testing for total lead, soluble lead using WET extraction (WET testing), soluble lead using TCLP extraction (TCLP testing), and pH. Proposed analytical testing will include:

□ All samples will be tested for total lead by EPA method 6010-B, using metals extraction by EPA method 3050A.

□ All samples with 50 mg/kg or more total lead will be tested for soluble lead by EPA method 6010 or 7420 using the WET test extraction method with citrate buffer.

□ Presuming a single source and/or chemical state of lead in the soil, and presuming other factors (soil chemistry and other soil properties, sampling and analytical methodologies, etc.) are uniform, total lead concentration and soluble lead concentration would be expected to have a linear relationship (i.e. directly proportional concentrations). If the correlation coefficient ("r") calculated to quantify the variation between the total and soluble lead results does not indicate a suitable correlation (i.e. "r" greater than about 0.7 to 0.8) the initial analyses will be supplemented by analyzing all samples for soluble lead using WET extraction.

□ All samples exceeding 1000 mg/kg total lead, but not less than the four samples with highest total lead concentration, will be tested for soluble lead by EPA method 6010 or 7420 using the TCLP extraction method (EPA method 1311 and 3010 digest).

□ pH analyses will be performed using EPA method 9045 for 10% of samples selected randomly.

Laboratory reports will present the analytical results and will include, at a minimum, the following information for each sample: sample identification number, laboratory identification number, analytical method, reporting limit, results for each analyte, units of measurement, and report date.

ADL Soil Sampling Plan

State Route 99 Auxiliary Lane Project Phase 2 and 3
Between State Route 32 and East 1st Avenue
Chico, California

LABORATORY ANALYSES AND PROCEDURES FOR ADL

All samples will be submitted to a California DHS certified laboratory for analytical testing using standard EPA methods. Caltrans District 3 does not have a DTSC variance for on-site disposal of lead-contaminated soil and analytical testing will be limited to evaluating if offsite disposal is necessary. The testing will include testing for total lead, soluble lead using WET extraction (WET testing), soluble lead using TCLP extraction (TCLP testing), and pH. Proposed analytical testing will include:

□ All samples will be tested for total lead by EPA method 6010-B, using metals extraction by EPA method 3050A.

□ All samples with 50 mg/kg or more total lead will be tested for soluble lead by EPA method 6010 or 7420 using the WET test extraction method with citrate buffer.

□ Presuming a single source and/or chemical state of lead in the soil, and presuming other factors (soil chemistry and other soil properties, sampling and analytical methodologies, etc.) are uniform, total lead concentration and soluble lead concentration would be expected to have a linear relationship (i.e. directly proportional concentrations). If the correlation coefficient ("r") calculated to quantify the variation between the total and soluble lead results does not indicate a suitable correlation (i.e. "r" greater than about 0.7 to 0.8) the initial analyses will be supplemented by analyzing all samples for soluble lead using WET extraction.

□ All samples exceeding 1000 mg/kg total lead, but not less than the four samples with highest total lead concentration, will be tested for soluble lead by EPA method 6010 or 7420 using the TCLP extraction method (EPA method 1311 and 3010 digest).

□ pH analyses will be performed using EPA method 9045 for 10% of samples selected randomly.

Laboratory reports will present the analytical results and will include, at a minimum, the following information for each sample: sample identification number, laboratory identification number, analytical method, reporting limit, results for each analyte, units of measurement, and report date.

Sparger Technology, Inc.
Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Client	Taber Consultants	
Workorder	18743	Chico, SR99 ADL Sampling
Received	12/08/08	

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

- DUP - Matrix Duplicate
- MS - Matrix Spike
- MSD - Matrix Spike Duplicate
- LCS - Lab Control Sample
- LCSD - Lab Control Sample Duplicate
- RPD - Relative Percent Difference
- QC - Additional Quality Control
- DIL - Results from a diluted sample
- ND - None Detected
- RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

3738 Bradview Drive • Sacramento, California 95827 • (916) 369-7688 • FAX (916) 369-7689

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Workorder 18743

Enclosed are the results from samples received on December 08, 2008.

The requested analyses are listed below.

SAMPLE	**SAMPLE DESCRIPTION**	**DATE COLLECTED**	**TEST METHOD**
18743001	1-1A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743002	1-1B, Soil	11/17/08	6010B STLC Pb
18743003	1-1C, Soil	11/17/08	6010B STLC Pb
18743004	1-2A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743005	2-1A, Soil	11/17/08	6010B STLC Pb
18743006	2-1B, Soil	11/17/08	6010B STLC Pb
18743007	2-2A, Soil	11/17/08	6010B STLC Pb
18743008	3-1A, Soil	11/17/08	6010B STLC Pb
18743009	3-2A, Soil	11/17/08	6010B STLC Pb
18743010	4-1A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743011	4-1B, Soil	11/17/08	6010B STLC Pb
18743012	4-2A, Soil	11/17/08	6010B STLC Pb
18743013	5-1A, Soil	11/17/08	6010B STLC Pb
18743014	5-2A, Soil	11/17/08	6010B STLC Pb
18743015	6-1A, Soil	11/17/08	6010B STLC Pb
18743016	6-2A, Soil	11/17/08	6010B STLC Pb
18743017	7-1A, Soil	11/17/08	6010B STLC Pb
18743018	7-2A, Soil	11/17/08	6010B STLC Pb
18743019	8-1A, Soil	11/17/08	6010B STLC Pb
18743020	8-2A, Soil	11/17/08	6010B STLC Pb
18743021	9-1A, Soil	11/17/08	6010B STLC Pb

Workorder 18743

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18743022	9-2A, Soil	11/17/08	6010B STLC Pb
18743023	10-1A, Soil	11/17/08	6010B STLC Pb
18743024	10-2A, Soil	11/17/08	6010B STLC Pb
18743025	11-1A, Soil	11/17/08	6010B STLC Pb
18743026	11-2A, Soil	11/17/08	6010B STLC Pb
18743027	12-1A, Soil	11/17/08	6010B STLC Pb
18743028	12-2A, Soil	11/17/08	6010B STLC Pb
18743029	13-1A, Soil	11/17/08	6010B STLC Pb
18743030	13-2A, Soil	11/17/08	6010B STLC Pb
18743031	14-1A, Soil	11/17/08	6010B STLC Pb
18743032	14-2A, Soil	11/17/08	6010B STLC Pb
18743033	15-1A, Soil	11/17/08	6010B STLC Pb
18743034	15-2A, Soil	11/17/08	6010B STLC Pb
18743035	16-1A, Soil	11/17/08	6010B STLC Pb
18743036	16-1B, Soil	11/17/08	6010B STLC Pb
18743037	16-1C, Soil	11/17/08	6010B STLC Pb
18743038	16-2A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743039	16-2B, Soil	11/17/08	6010B STLC Pb
18743040	16-2C, Soil	11/17/08	6010B STLC Pb
18743041	17-1A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743042	17-1B, Soil	11/17/08	6010B STLC Pb
18743043	17-1C, Soil	11/17/08	6010B STLC Pb
18743044	17-2A, Soil	11/17/08	6010B STLC Pb
18743045	17-2B, Soil	11/17/08	6010B STLC Pb
18743046	17-2C, Soil	11/17/08	6010B STLC Pb
18743047	18-1A, Soil	11/17/08	6010B STLC Pb 6010B TCLP Pb
18743048	18-2A, Soil	11/17/08	6010B STLC Pb
18743049	18-2B, Soil	11/17/08	6010B STLC Pb
18743050	19-1A, Soil	11/18/08	6010B STLC Pb 6010B TCLP Pb

Workorder 18743

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18743051	19-1B, Soil	11/18/08	6010B STLC Pb 6010B TCLP Pb
18743052	19-1C, Soil	11/18/08	6010B STLC Pb
18743053	19-2A, Soil	11/18/08	6010B STLC Pb
18743054	20-1A, Soil	11/18/08	6010B STLC Pb 6010B TCLP Pb
18743055	20-1B, Soil	11/18/08	6010B STLC Pb
18743056	20-1C, Soil	11/18/08	6010B STLC Pb
18743057	20-2A, Soil	11/18/08	6010B STLC Pb
18743058	20-2B, Soil	11/18/08	6010B STLC Pb
18743059	21-1A, Soil	11/18/08	6010B STLC Pb
18743060	21-2A, Soil	11/18/08	6010B STLC Pb 6010B TCLP Pb
18743061	22-1A, Soil	11/18/08	6010B STLC Pb
18743062	22-2A, Soil	11/18/08	6010B STLC Pb
18743063	23-1A, Soil	11/18/08	6010B STLC Pb
18743064	23-2A, Soil	11/18/08	6010B STLC Pb
18743065	24-1A, Soil	11/18/08	6010B STLC Pb 6010B TCLP Pb
18743066	24-2A, Soil	11/18/08	6010B STLC Pb
18743067	25-1A, Soil	11/18/08	6010B STLC Pb
18743068	25-2A, Soil	11/18/08	6010B STLC Pb
18743069	26-1A, Soil	11/18/08	6010B STLC Pb
18743070	26-2A, Soil	11/18/08	6010B STLC Pb
18743071	27-1A, Soil	11/18/08	6010B STLC Pb
18743072	27-2A, Soil	11/18/08	6010B STLC Pb
18743073	28-1A, Soil	11/18/08	6010B STLC Pb
18743074	28-2A, Soil	11/18/08	6010B STLC Pb
18743075	29-1A, Soil	11/18/08	6010B STLC Pb
18743076	29-2A, Soil	11/18/08	6010B STLC Pb
18743077	30-1A, Soil	11/18/08	6010B STLC Pb
18743078	30-2A, Soil	11/18/08	6010B STLC Pb
18743079	31-1A, Soil	11/18/08	6010B STLC Pb

Workorder 18743

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18743080	32-1A, Soil	11/18/08	6010B STLC Pb
18743081	32-1B, Soil	11/18/08	6010B STLC Pb
18743082	32-2B, Soil	11/18/08	6010B STLC Pb

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18743 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead
Method 6010B STLC Pb

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18743001	1-1A	56.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743002	1-1B	1.50	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743003	1-1C	0.300	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743004	1-2A	51.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743005	2-1A	16.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743006	2-1B	0.570	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743007	2-2A	2.60	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743008	3-1A	18.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743009	3-2A	3.70	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743010	4-1A	49.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743011	4-1B	10.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743012	4-2A	3.30	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743013	5-1A	99.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743014	5-2A	6.50	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743015	6-1A	34.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743016	6-2A	13.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743017	7-1A	47.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743018	7-2A	19.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743019	8-1A	35.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743020	8-2A	18.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743021	9-1A	23.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743022	9-2A	7.10	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743023	10-1A	18.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743024	10-2A	7.30	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743025	11-1A	32.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743026	11-2A	5.20	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743027	12-1A	11.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743028	12-2A	6.50	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743029	13-1A	35.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743030	13-2A	3.80	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743031	14-1A	13.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743032	14-2A	5.80	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743033	15-1A	5.00	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743034	15-2A	2.80	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743035	16-1A	18.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743036	16-1B	4.30	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743037	16-1C	2.90	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743038	16-2A	6.60	0.050	mg/L	11/17/08	01/14/09	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18743 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B STLC Pb

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18743039	16-2B	8.60	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743040	16-2C	0.390	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743041	17-1A	100	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743042	17-1B	1.20	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743043	17-1C	2.50	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743044	17-2A	15.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743045	17-2B	0.820	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743046	17-2C	0.800	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743047	18-1A	111	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743048	18-2A	14.0	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743049	18-2B	0.610	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743050	19-1A	111	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743051	19-1B	80.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743052	19-1C	3.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743053	19-2A	10.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743054	20-1A	137	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743055	20-1B	49.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743056	20-1C	9.90	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743057	20-2A	32.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743058	20-2B	16.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743059	21-1A	8.30	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743060	21-2A	71.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743061	22-1A	42.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743062	22-2A	24.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743063	23-1A	3.50	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743064	23-2A	6.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743065	24-1A	66.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743066	24-2A	8.20	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743067	25-1A	0.0900	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743068	25-2A	8.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743069	26-1A	40.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743070	26-2A	9.20	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743071	27-1A	25.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743072	27-2A	20.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743073	28-1A	32.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743074	28-2A	9.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743075	29-1A	35.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743076	29-2A	3.90	0.050	mg/L	11/18/08	01/14/09	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18743 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B STLC Pb

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18743077	30-1A	26.0	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743078	30-2A	3.80	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743079	31-1A	7.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743080	32-1A	3.70	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743081	32-1B	2.20	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743082	32-2B	0.0950	0.050	mg/L	11/18/08	01/14/09	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18743 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead
Method 6010B TCLP Pb

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18743001	1-1A	0.630	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743004	1-2A	0.400	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743010	4-1A	0.430	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743038	16-2A	0.0580	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743041	17-1A	1.90	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743047	18-1A	4.30	0.050	mg/L	11/17/08	01/14/09	Soil	1:1
18743050	19-1A	4.60	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743051	19-1B	3.80	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743054	20-1A	2.50	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743060	21-2A	1.70	0.050	mg/L	11/18/08	01/14/09	Soil	1:1
18743065	24-1A	1.10	0.050	mg/L	11/18/08	01/14/09	Soil	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361350 [ICPV/6327]
Laboratory ID	89627	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	ND	0.050 mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361350 [ICPV/6327]
Laboratory ID	89628	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.52	0.050 mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361350 [ICPV/6327
Laboratory ID	89629	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.56	0.050 mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361350 [ICPV/6327]
Laboratory ID	89630	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	55.0	0.050 mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361350 [ICPV/6327]
Laboratory ID	89631	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	62.0	0.050 mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361350 [ICPV/6327]
Laboratory ID	89632	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	63.0	0.050 mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361353 [ICPV/6328]
Laboratory ID	89633	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	ND	0.050	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361353 [ICPV/6328]
Laboratory ID	89634	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	2.70	0.050	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361353 [ICPV/6328
Laboratory ID	89635	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	2.60	0.050	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361353 [ICPV/6328]
Laboratory ID	89636	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	23.0	0.050	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361353 [ICPV/6328]
Laboratory ID	89637	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	25.0	0.050	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361353 [ICPV/6328]
Laboratory ID	89638	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/14/09	01/14/09	28.0	0.050	mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361356 [ICPV/6329]
Laboratory ID	89639	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	ND	0.050	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361356 [ICPV/6329]
Laboratory ID	89640	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.60	0.050	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361356 [ICPV/6329
Laboratory ID	89641	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.50	0.050	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361356 [ICPV/6329]
Laboratory ID	89642	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	101	0.050	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361356 [ICPV/6329]
Laboratory ID	89643	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	101	0.050	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361356 [ICPV/6329]
Laboratory ID	89644	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	101	0.050	mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361369 [ICPV/6331]
Laboratory ID	89663	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	ND	0.050	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361369 [ICPV/6331]
Laboratory ID	89664	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.80	0.050	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361369 [ICPV/6331
Laboratory ID	89665	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.80	0.050	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361369 [ICPV/6331]
Laboratory ID	89666	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	41.0	0.050	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361369 [ICPV/6331]
Laboratory ID	89667	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	46.0	0.050	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361369 [ICPV/6331]
Laboratory ID	89668	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	47.0	0.050	mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361375 [ICPV/6333]
Laboratory ID	89675	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	ND	0.050	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361375 [ICPV/6333]
Laboratory ID	89676	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.80	0.050	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361375 [ICPV/6333
Laboratory ID	89677	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.90	0.050	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361375 [ICPV/6333]
Laboratory ID	89678	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	2.20	0.050	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361375 [ICPV/6333]
Laboratory ID	89679	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	4.60	0.050	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361375 [ICPV/6333]
Laboratory ID	89680	**Matrix**	STLC

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC Pb	01/12/09	01/14/09	4.90	0.050	mg/L	1:1

Certification No. 1614

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 361450 [ICPV/6334]
Laboratory ID	89681	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	ND	0.050	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 361450 [ICPV/6334]
Laboratory ID	89682	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	2.90	0.050	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 361450 [ICPV/6334
Laboratory ID	89683	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	2.90	0.050	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 361450 [ICPV/6334]
Laboratory ID	89684	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	0.610	0.050	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 361450 [ICPV/6334]
Laboratory ID	89685	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	3.50	0.050	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 361450 [ICPV/6334]
Laboratory ID	89686	**Matrix**	TCLP

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B TCLP Pb	01/12/09	01/14/09	3.50	0.050	mg/L	1:1

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QC SUMMARY

Client ID	Taber Consultants	**Original**	18743001
QC Batch	ICPP 6351	**Sample**	**Duplicate [89630]**
Matrix	STLC		

Parameter	**RPD**	**RPD Limits**
Lead	1.8	(35)

Client ID	Taber Consultants	**Original**	18743021
QC Batch	ICPP 6352	**Sample**	**Duplicate [89636]**
Matrix	STLC		

Parameter	**RPD**	**RPD Limits**
Lead	00	(35)

Client ID	Taber Consultants	**Original**	18743041
QC Batch	ICPP 6353	**Sample**	**Duplicate [89642]**
Matrix	STLC		

Parameter	**RPD**	**RPD Limits**
Lead	1.0	(35)

Client ID	Taber Consultants	**Original**	18743061
QC Batch	ICPP 6355	**Sample**	**Duplicate [89666]**
Matrix	STLC		

Parameter	**RPD**	**RPD Limits**
Lead	2.4	(35)

Client ID	Taber Consultants	**Original**	18743081
QC Batch	ICPP 6357	**Sample**	**Duplicate [89678]**
Matrix	STLC		

Parameter	**RPD**	**RPD Limits**
Lead	00	(35)

Client ID	Taber Consultants	**Original**	18743001
QC Batch	ICPP 6358	**Sample**	**Duplicate [89684]**
Matrix	TCLP		

Parameter	**RPD**	**RPD Limits**
Lead	3.23	(35)

Client ID	Taber Consultants	**Original**	18743001
QC Batch	ICPP 6351	**Samples**	Matrix Spike [89631]
Matrix	STLC		Matrix Spike Duplicate [89632]

Parameter	**Spike %Recovery**	**Spike Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead*	240	280	(60-125)	15	(35 MAX)

*High RPD due to sample effect.

*Loss of MSD recovery due to sample matrix effect

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QC SUMMARY

Client ID	Taber Consultants	**Original**	18743021
QC Batch	ICPP 6352	**Samples**	Matrix Spike [89637]
Matrix	STLC		Matrix Spike Duplicate [89638]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead*	80	200	(60-125)	86**	(35 MAX)

**High RPD due to sample effect.

*High MS/MSD recoveries due to sample matrix effe

Client ID	Taber Consultants	**Original**	18743041
QC Batch	ICPP 6353	**Samples**	Matrix Spike [89643]
Matrix	STLC		Matrix Spike Duplicate [89644]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead*	40	40	(60-125)	00	(35 MAX)

*High MSD recoveries due to sample matrix effect.

Client ID	Taber Consultants	**Original**	18743061
QC Batch	ICPP 6355	**Samples**	Matrix Spike [89667]
Matrix	STLC		Matrix Spike Duplicate [89668]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead*	160	200	(60-125)	22	(35 MAX)

*Loss of MS/MSD recoveries due to sample matrix effect.

Client ID	Taber Consultants	**Original**	18743081
QC Batch	ICPP 6357	**Samples**	Matrix Spike [89679]
Matrix	STLC		Matrix Spike Duplicate [89680]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	96	108	(60-125)	12	(35 MAX)

Client ID	Taber Consultants	**Original**	18743001
QC Batch	ICPP 6358	**Samples**	Matrix Spike [89685]
Matrix	TCLP		Matrix Spike Duplicate [89686]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	115	115	(75-125)	0000	(35 MAX)

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QC SUMMARY

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89628]		
QC Batch	ICPP 6351			Lab Control Sample Duplicate [89629]		
Matrix	STLC					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		101	102	(80-120)	1.0	(20 MAX)

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89634]		
QC Batch	ICPP 6352			Lab Control Sample Duplicate [89635]		
Matrix	STLC					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		108	104	(80-120)	3.8	(20 MAX)

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89640]		
QC Batch	ICPP 6353			Lab Control Sample Duplicate [89641]		
Matrix	STLC					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		104	100	(80-120)	3.9	(20 MAX)

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89664]		
QC Batch	ICPP 6355			Lab Control Sample Duplicate [89665]		
Matrix	STLC					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		112	112	(80-120)	00	(20 MAX)

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89676]		
QC Batch	ICPP 6357			Lab Control Sample Duplicate [89677]		
Matrix	STLC					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		112	116	(80-120)	3.5	(20 MAX)

Client ID	Taber Consultants		**Samples**	Lab Control Sample [89682]		
QC Batch	ICPP 6358			Lab Control Sample Duplicate [89683]		
Matrix	TCLP					
Parameter		**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead		116	116	(80-120)	0000	(20 MAX)

18743

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Workorder

Enclosed are the results from samples received on November 19, 2008.

The requested analyses are listed below

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
1.18700001	1-1A, Soil	11/17/08	6010B STLC, TCLP
2.18700002	1-1B, Soil	11/17/08	6010B STLC
3 18700003	1-1C, Soil	11/17/08	6010B STLC
4 18700004	1-2A, Soil	11/17/08	6010B STLC, TCLP
5 18700007	2-1A, Soil	11/17/08	6010B STLC
6 18700008	2-1B, Soil	11/17/08	6010B STLC
7.18700010	2-2A, Soil	11/17/08	6010B STLC
8 18700013	3-1A, Soil	11/17/08	6010B STLC
9.18700015	3-2A, Soil	11/17/08	6010B STLC
10.18700017	4-1A, Soil	11/17/08	6010B STLC, TCLP
11 18700018	4-1B, Soil	11/17/08	6010B STLC
12 18700019	4-2A, Soil	11/17/08	6010B STLC
13 18700022	5-1A, Soil	11/17/08	6010B STLC

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Workorder

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
14 18700023	5-2A, Soil	11/17/08	6010B STLC
15 18700026	6-1A, Soil	11/17/08	6010B STLC
16 18700027	6-2A, Soil	11/17/08	6010B STLC
17 18700028	7-1A, Soil	11/17/08	6010B STLC
18 18700029	7-2A, Soil	11/17/08	6010B STLC
19 18700030	8-1A, Soil	11/17/08	6010B STLC
20 18700031	8-2A, Soil	11/17/08	6010B STLC
21 18700032	9-1A, Soil	11/17/08	6010B STLC
22 18700033	9-2A, Soil	11/17/08	6010B STLC
23 18700034	10-1A, Soil	11/17/08	6010B STLC
24 18700035	10-2A, Soil	11/17/08	6010B STLC
25 18700036	11-1A, Soil	11/17/08	6010B STLC
26 18700037	11-2A, Soil	11/17/08	6010B STLC
27 18700038	12-1A, Soil	11/17/08	6010B STLC
28 18700039	12-2A, Soil	11/17/08	6010B STLC
29 18700040	13-1A, Soil	11/17/08	6010B STLC
30 18700041	13-2A, Soil	11/17/08	6010B STLC
31 18700042	14-1A, Soil	11/17/08	6010B STLC
32 18700043	14-2A, Soil	11/17/08	6010B STLC
33 18700044	15-1A, Soil	11/17/08	6010B STLC
34 18700045	15-2A, Soil	11/17/08	6010B STLC
35 18700046	16-1A, Soil	11/17/08	6010B STLC
36 18700047	16-1B, Soil	11/17/08	6010B STLC
37 18700048	16-1C, Soil	11/17/08	6010B STLC
38 18700049	16-2A, Soil	11/17/08	6010B STLC, TCLP
39 18700050	16-2B, Soil	11/17/08	6010B STLC
40 18700051	16-2C, Soil	11/17/08	6010B STLC

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Workorder

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
41 18700052	17-1A, Soil	11/17/08	6010B STLC, TCLP
42 18700053	17-1B, Soil	11/17/08	6010B STLC
43 18700054	17-1C, Soil	11/17/08	6010B STLC
44 18700055	17-2A, Soil	11/17/08	6010B STLC
45 18700056	17-2B, Soil	11/17/08	6010B STLC
46 18700057	17-2C, Soil	11/17/08	6010B STLC
47 18700058	18-1A, Soil	11/17/08	6010B STLC, TCLP
48 18700059	18-2A, Soil	11/17/08	6010B STLC
49 18700060	18-2B, Soil	11/17/08	6010B STLC
50 18700062	19-1A, Soil	11/18/08	6010B STLC, TCLP
51 18700063	19-1B, Soil	11/18/08	6010B STLC, TCLP
52 18700064	19-1C, Soil	11/18/08	6010B STLC
53 18700065	19-2A, Soil	11/18/08	6010B STLC
54 18700068	20-1A, Soil	11/18/08	6010B STLC, TCLP
55 18700069	20-1B, Soil	11/18/08	6010B STLC
56 18700070	20-1C, Soil	11/18/08	6010B STLC
57 18700071	20-2A, Soil	11/18/08	6010B STLC
58 18700072	20-2B, Soil	11/18/08	6010B STLC
59 18700074	21-1A, Soil	11/18/08	6010B STLC
60 18700075	21-2A, Soil	11/18/08	6010B STLC, TCLP
61 18700076	22-1A, Soil	11/18/08	6010B STLC
62 18700077	22-2A, Soil	11/18/08	6010B STLC
63 18700078	23-1A, Soil	11/18/08	6010B STLC
64 18700079	23-2A, Soil	11/18/08	6010B STLC
65 18700080	24-1A, Soil	11/18/08	6010B STLC, TCLP
66 18700081	24-2A, Soil	11/18/08	6010B STLC

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Workorder

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
67 18700082	25-1A, Soil	11/18/08	6010B STLC
68 18700083	25-2A, Soil	11/18/08	6010B STLC
69 18700084	26-1A, Soil	11/18/08	6010B STLC
70 18700085	26-2A, Soil	11/18/08	6010B STLC
71 18700086	27-1A, Soil	11/18/08	6010B STLC
72 18700087	27-2A, Soil	11/18/08	6010B STLC
73 18700088	28-1A, Soil	11/18/08	6010B STLC
74 18700089	28-2A, Soil	11/18/08	6010B STLC
75 18700090	29-1A, Soil	11/18/08	6010B STLC
76 18700091	29-2A, Soil	11/18/08	6010B STLC
77 18700092	30-1A, Soil	11/18/08	6010B STLC
78 18700093	30-2A, Soil	11/18/08	6010B STLC
79 18700094	31-1A, Soil	11/18/08	6010B STLC
80 18700098	32-1A, Soil	11/18/08	6010B STLC
81 18700099	32-1B, Soil	11/18/08	6010B STLC
82 18700101	32-2B, Soil	11/18/08	6010B STLC

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Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Client	Taber Consultants	
Workorder	18909	Chico, SR99 ADL Sampling
Received	05/08/09	

The samples were received in EPA specified containers. The samples were transported and received under documented chain of custody and stored at four (4) degrees C until analysis was performed.

Sparger Technology, Inc. ID Suffix Keys - These descriptors will follow the Sparger Technology, Inc. ID numbers and help identify the specific sample and clarify the report.

- DUP - Matrix Duplicate
- MS - Matrix Spike
- MSD - Matrix Spike Duplicate
- LCS - Lab Control Sample
- LCSD - Lab Control Sample Duplicate
- RPD - Relative Percent Difference
- QC - Additional Quality Control
- DIL - Results from a diluted sample
- ND - None Detected
- RL - Reporting Limit

Note: In an effort to conserve paper, the results are printed on both sides of the paper.

Ray James
Laboratory Director

3050 Fite Circle, Suite 112 • Sacramento, California 95827 • (916) 362-8947 • FAX (916) 362-0947

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA   95691

Workorder 18909

Enclosed are the results from samples received on May 08, 2009.

The requested analyses are listed below.

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18909001	1-1A, Soil	11/17/08	6010B STLC-DI
18909002	1-1B, Soil	11/17/08	6010B STLC-DI
18909003	1-1C, Soil	11/17/08	6010B STLC-DI
18909004	1-2A, Soil	11/17/08	6010B STLC-DI
18909005	2-1A, Soil	11/17/08	6010B STLC-DI
18909006	2-1B, Soil	11/17/08	6010B STLC-DI
18909007	2-2A, Soil	11/17/08	6010B STLC-DI
18909008	3-1A, Soil	11/17/08	6010B STLC-DI
18909009	3-2A, Soil	11/17/08	6010B STLC-DI
18909010	4-1A, Soil	11/17/08	6010B STLC-DI
18909011	4-1B, Soil	11/17/08	6010B STLC-DI
18909012	4-2A, Soil	11/17/08	6010B STLC-DI
18909013	5-1A, Soil	11/17/08	6010B STLC-DI
18909014	5-2A, Soil	11/17/08	6010B STLC-DI
18909015	6-1A, Soil	11/17/08	6010B STLC-DI
18909016	6-2A, Soil	11/17/08	6010B STLC-DI
18909017	7-1A, Soil	11/17/08	6010B STLC-DI
18909018	7-2A, Soil	11/17/08	6010B STLC-DI
18909019	8-1A, Soil	11/17/08	6010B STLC-DI
18909020	8-2A, Soil	11/17/08	6010B STLC-DI
18909021	9-1A, Soil	11/17/08	6010B STLC-DI
18909022	9-2A, Soil	11/17/08	6010B STLC-DI
18909023	10-1A, Soil	11/17/08	6010B STLC-DI

Workorder 18909

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18909024	10-2A, Soil	11/17/08	6010B STLC-DI
18909025	11-1A, Soil	11/17/08	6010B STLC-DI
18909026	11-2A, Soil	11/17/08	6010B STLC-DI
18909027	12-1A, Soil	11/17/08	6010B STLC-DI
18909028	12-2A, Soil	11/17/08	6010B STLC-DI
18909029	13-1A, Soil	11/17/08	6010B STLC-DI
18909030	13-2A, Soil	11/17/08	6010B STLC-DI
18909031	14-1A, Soil	11/17/08	6010B STLC-DI
18909032	14-2A, Soil	11/17/08	6010B STLC-DI
18909033	15-1A, Soil	11/17/08	6010B STLC-DI
18909034	15-2A, Soil	11/17/08	6010B STLC-DI
18909035	16-1A, Soil	11/17/08	6010B STLC-DI
18909036	16-1B, Soil	11/17/08	6010B STLC-DI
18909037	16-1C, Soil	11/17/08	6010B STLC-DI
18909038	16-2A, Soil	11/17/08	6010B STLC-DI
18909039	16-2B, Soil	11/17/08	6010B STLC-DI
18909040	16-2C, Soil	11/17/08	6010B STLC-DI
18909041	17-1A, Soil	11/17/08	6010B STLC-DI
18909042	17-1B, Soil	11/17/08	6010B STLC-DI
18909043	17-1C, Soil	11/17/08	6010B STLC-DI
18909044	17-2A, Soil	11/17/08	6010B STLC-DI
18909045	17-2B, Soil	11/17/08	6010B STLC-DI
18909046	17-2C, Soil	11/17/08	6010B STLC-DI
18909047	18-1A, Soil	11/17/08	6010B STLC-DI
18909048	18-2A, Soil	11/17/08	6010B STLC-DI
18909049	18-2B, Soil	11/17/08	6010B STLC-DI
18909050	19-1A, Soil	11/18/08	6010B STLC-DI
18909051	19-1B, Soil	11/18/08	6010B STLC-DI
18909052	19-1C, Soil	11/18/08	6010B STLC-DI
18909053	19-2A, Soil	11/18/08	6010B STLC-DI
18909054	20-1A, Soil	11/18/08	6010B STLC-DI
18909055	20-1B, Soil	11/18/08	6010B STLC-DI

Workorder 18909

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
18909056	20-1C, Soil	11/18/08	6010B STLC-DI
18909057	20-2A, Soil	11/18/08	6010B STLC-DI
18909058	20-2B, Soil	11/18/08	6010B STLC-DI
18909059	21-1A, Soil	11/18/08	6010B STLC-DI
18909060	21-2A, Soil	11/18/08	6010B STLC-DI
18909061	22-1A, Soil	11/18/08	6010B STLC-DI
18909062	22-2A, Soil	11/18/08	6010B STLC-DI
18909063	23-1A, Soil	11/18/08	6010B STLC-DI
18909064	23-2A, Soil	11/18/08	6010B STLC-DI
18909065	24-1A, Soil	11/18/08	6010B STLC-DI
18909066	24-2A, Soil	11/18/08	6010B STLC-DI
18909067	25-1A, Soil	11/18/08	6010B STLC-DI
18909068	25-2A, Soil	11/18/08	6010B STLC-DI
18909069	26-1A, Soil	11/18/08	6010B STLC-DI
18909070	26-2A, Soil	11/18/08	6010B STLC-DI
18909071	27-1A, Soil	11/18/08	6010B STLC-DI
18909072	27-2A, Soil	11/18/08	6010B STLC-DI
18909073	28-1A, Soil	11/18/08	6010B STLC-DI
18909074	28-2A, Soil	11/18/08	6010B STLC-DI
18909075	29-1A, Soil	11/18/08	6010B STLC-DI
18909076	29-2A, Soil	11/18/08	6010B STLC-DI
18909077	30-1A, Soil	11/18/08	6010B STLC-DI
18909078	30-2A, Soil	11/18/08	6010B STLC-DI
18909079	31-1A, Soil	11/18/08	6010B STLC-DI
18909080	32-1A, Soil	11/18/08	6010B STLC-DI
18909081	32-1B, Soil	11/18/08	6010B STLC-DI
18909082	32-2B, Soil	11/18/08	6010B STLC-DI

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Analytical Laboratory Division
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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18909 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead
Method 6010B STLC-DI

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18909001	1-1A	0.489	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909002	1-1B	0.0638	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909003	1-1C	0.0409	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909004	1-2A	0.176	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909005	2-1A	0.154	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909006	2-1B	0.0264	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909007	2-2A	0.0360	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909008	3-1A	0.0581	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909009	3-2A	0.0107	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909010	4-1A	0.0190	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909011	4-1B	0.0373	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909012	4-2A	0.0112	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909013	5-1A	0.0659	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909014	5-2A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909015	6-1A	0.0520	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909016	6-2A	0.0282	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909017	7-1A	0.0639	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909018	7-2A	0.0161	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909019	8-1A	0.0128	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909020	8-2A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909021	9-1A	0.0338	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909022	9-2A	0.0150	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909023	10-1A	0.0183	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909024	10-2A	0.0214	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909025	11-1A	0.0318	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909026	11-2A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909027	12-1A	0.0474	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909028	12-2A	0.0257	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909029	13-1A	0.0275	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909030	13-2A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909031	14-1A	0.0101	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909032	14-2A	0.0159	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909033	15-1A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909034	15-2A	0.0131	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909035	16-1A	0.0341	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909036	16-1B	0.101	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909037	16-1C	0.0567	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909038	16-2A	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18909 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B STLC-DI

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18909039	16-2B	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909040	16-2C	0.0169	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909041	17-1A	0.137	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909042	17-1B	0.0473	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909043	17-1C	0.0579	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909044	17-2A	0.0462	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909045	17-2B	0.0199	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909046	17-2C	0.0184	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909047	18-1A	0.251	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909048	18-2A	0.0293	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909049	18-2B	ND	0.010	mg/L	11/17/08	05/13/09	Soil	1:1
18909050	19-1A	0.162	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909051	19-1B	0.760	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909052	19-1C	0.275	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909053	19-2A	0.0292	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909054	20-1A	0.140	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909055	20-1B	0.462	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909056	20-1C	0.256	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909057	20-2A	0.0189	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909058	20-2B	0.0113	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909059	21-1A	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909060	21-2A	0.306	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909061	22-1A	0.0472	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909062	22-2A	0.0404	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909063	23-1A	0.0572	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909064	23-2A	0.0266	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909065	24-1A	0.0338	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909066	24-2A	0.0166	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909067	25-1A	0.0610	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909068	25-2A	0.0145	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909069	26-1A	0.0875	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909070	26-2A	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909071	27-1A	0.0273	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909072	27-2A	0.0148	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909073	28-1A	0.0102	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909074	28-2A	0.0150	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909075	29-1A	0.0593	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909076	29-2A	0.0139	0.010	mg/L	11/18/08	05/13/09	Soil	1:1

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Test Certificate of Analysis

Client ID Taber Consultants
Workorder # 18909 **Workorder ID** Chico, SR99 ADL Sampling

Parameter Lead (continued)
Method 6010B STLC-DI

Lab ID	Sample ID	Result	RL	Units	Collected	Analyzed	Matrix	Dilution
18909077	30-1A	0.0576	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909078	30-2A	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909079	31-1A	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909080	32-1A	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909081	32-1B	0.0274	0.010	mg/L	11/18/08	05/13/09	Soil	1:1
18909082	32-2B	ND	0.010	mg/L	11/18/08	05/13/09	Soil	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 368567 [ICPV/6373]
Laboratory ID	90927	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	ND	0.010	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 368567 [ICPV/6373]
Laboratory ID	90928	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.498	0.010	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 368567 [ICPV/6373
Laboratory ID	90929	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.489	0.010	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 368567 [ICPV/6373]
Laboratory ID	90930	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.528	0.010	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 368567 [ICPV/6373]
Laboratory ID	90931	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	1.05	0.010	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 368567 [ICPV/6373]
Laboratory ID	90932	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	1.06	0.010	mg/L	1:1

Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 368570 [ICPV/6374]
Laboratory ID	90933	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	ND	0.010	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 368570 [ICPV/6374]
Laboratory ID	90934	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.495	0.010	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 368570 [ICPV/6374
Laboratory ID	90935	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.496	0.010	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 368570 [ICPV/6374]
Laboratory ID	90936	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.0424	0.010	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 368570 [ICPV/6374]
Laboratory ID	90937	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.570	0.010	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 368570 [ICPV/6374]
Laboratory ID	90938	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.568	0.010	mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 368573 [ICPV/6375]
Laboratory ID	90939	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	ND	0.010	mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 368573 [ICPV/6375]
Laboratory ID	90940	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	0.481	0.010	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 368573 [ICPV/6375
Laboratory ID	90941	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	0.492	0.010	mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 368573 [ICPV/6375]
Laboratory ID	90942	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	0.138	0.010	mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 368573 [ICPV/6375]
Laboratory ID	90943	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	0.633	0.010	mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 368573 [ICPV/6375]
Laboratory ID	90944	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/12/09	0.639	0.010	mg/L	1:1

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Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

Method Blank Report

Client ID Taber Consultants **Sample ID** MB for HBN 368576 [ICPV/6376]
Laboratory ID 90945 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	ND	0.010	mg/L	1:1

Lab Control Sample Report

Client ID Taber Consultants **Sample ID** LCS for HBN 368576 [ICPV/6376]
Laboratory ID 90946 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.493	0.010	mg/L	1:1

Lab Control Sample Duplicate Report

Client ID Taber Consultants **Sample ID** LCSD for HBN 368576 [ICPV/6376
Laboratory ID 90947 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.483	0.010	mg/L	1:1

Duplicate Report

Client ID Taber Consultants **Sample ID** DUP for HBN 368576 [ICPV/6376]
Laboratory ID 90948 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.0475	0.010	mg/L	1:1

Matrix Spike Report

Client ID Taber Consultants **Sample ID** MS for HBN 368576 [ICPV/6376]
Laboratory ID 90949 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.566	0.010	mg/L	1:1

Matrix Spike Duplicate Report

Client ID Taber Consultants **Sample ID** MSD for HBN 368576 [ICPV/6376]
Laboratory ID 90950 **Matrix** STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL	Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.571	0.010	mg/L	1:1

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Method Blank Report

Client ID	Taber Consultants	**Sample ID**	MB for HBN 368579 [ICPV/6377]
Laboratory ID	90951	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	ND	0.010 mg/L	1:1

Lab Control Sample Report

Client ID	Taber Consultants	**Sample ID**	LCS for HBN 368579 [ICPV/6377]
Laboratory ID	90952	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.487	0.010 mg/L	1:1

Lab Control Sample Duplicate Report

Client ID	Taber Consultants	**Sample ID**	LCSD for HBN 368579 [ICPV/6377
Laboratory ID	90953	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.489	0.010 mg/L	1:1

Duplicate Report

Client ID	Taber Consultants	**Sample ID**	DUP for HBN 368579 [ICPV/6377]
Laboratory ID	90954	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.0285	0.010 mg/L	1:1

Matrix Spike Report

Client ID	Taber Consultants	**Sample ID**	MS for HBN 368579 [ICPV/6377]
Laboratory ID	90955	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.560	0.010 mg/L	1:1

Matrix Spike Duplicate Report

Client ID	Taber Consultants	**Sample ID**	MSD for HBN 368579 [ICPV/6377]
Laboratory ID	90956	**Matrix**	STLC-DI

Parameter	Method	Prep Date	Analyzed	Result	RL Units	Dilution
Lead	6010B STLC-DI	05/12/09	05/13/09	0.565	0.010 mg/L	1:1

Sparger Technology, Inc.
Environmental Laboratories

Analytical Laboratory Division
Mobile Laboratory Division
Scientific Division

QC SUMMARY

Client ID	Taber Consultants	Original	18909001
QC Batch	ICPP 6397	Sample	**Duplicate [90930]**
Matrix	STLC-DI		

Parameter	RPD	RPD Limits
Lead	7.7	(35)

Client ID	Taber Consultants	Original	18909021
QC Batch	ICPP 6398	Sample	**Duplicate [90936]**
Matrix	STLC-DI		

Parameter	RPD	RPD Limits
Lead	23	(35)

Client ID	Taber Consultants	Original	18909041
QC Batch	ICPP 6399	Sample	**Duplicate [90942]**
Matrix	STLC-DI		

Parameter	RPD	RPD Limits
Lead	0.70	(35)

Client ID	Taber Consultants	Original	18909061
QC Batch	ICPP 6400	Sample	**Duplicate [90948]**
Matrix	STLC-DI		

Parameter	RPD	RPD Limits
Lead	0.60	(35)

Client ID	Taber Consultants	Original	18909081
QC Batch	ICPP 6401	Sample	**Duplicate [90954]**
Matrix	STLC-DI		

Parameter	RPD	RPD Limits
Lead	3.9	(35)

Client ID	Taber Consultants	Original	18909001
QC Batch	ICPP 6397	Samples	Matrix Spike [90931]
Matrix	STLC-DI		Matrix Spike Duplicate [90932]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	112	114	(75-125)	1.8	(35 MAX)

Client ID	Taber Consultants	Original	18909021
QC Batch	ICPP 6398	Samples	Matrix Spike [90937]
Matrix	STLC-DI		Matrix Spike Duplicate [90938]

Parameter	Spike %Recovery	Spike Dup %Recovery	Recovery Limits	RPD	RPD Limits

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QC SUMMARY

Client ID	Taber Consultants	**Original**	18909021
QC Batch	ICPP 6398	**Samples**	Matrix Spike [90937]
Matrix	STLC-DI		Matrix Spike Duplicate [90938]
			(continued)

Parameter	**Spike %Recovery**	**Spike Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	107	107	(75-125)	00	(35 MAX)

Client ID	Taber Consultants	**Original**	18909041
QC Batch	ICPP 6399	**Samples**	Matrix Spike [90943]
Matrix	STLC-DI		Matrix Spike Duplicate [90944]

Parameter	**Spike %Recovery**	**Spike Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	99	100	(75-125)	1.0	(35 MAX)

Client ID	Taber Consultants	**Original**	18909061
QC Batch	ICPP 6400	**Samples**	Matrix Spike [90949]
Matrix	STLC-DI		Matrix Spike Duplicate [90950]

Parameter	**Spike %Recovery**	**Spike Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	104	105	(75-125)	1.0	(35 MAX)

Client ID	Taber Consultants	**Original**	18909081
QC Batch	ICPP 6401	**Samples**	Matrix Spike [90955]
Matrix	STLC-DI		Matrix Spike Duplicate [90956]

Parameter	**Spike %Recovery**	**Spike Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	107	108	(75-125)	0.90	(35 MAX)

Client ID	Taber Consultants	**Samples**	Lab Control Sample [90928]
QC Batch	ICPP 6397		Lab Control Sample Duplicate [90929]
Matrix	STLC-DI		

Parameter	**Check %Recovery**	**Check Dup %Recovery**	**Recovery Limits**	**RPD**	**RPD Limits**
Lead	100	98	(80-120)	2.0	(20 MAX)

QC SUMMARY

Client ID Taber Consultants | **Samples** Lab Control Sample [90934]
QC Batch ICPP 6398 | Lab Control Sample Duplicate [90935]
Matrix STLC-DI

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	99	99	(80-120)	00	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [90940]
QC Batch ICPP 6399 | Lab Control Sample Duplicate [90941]
Matrix STLC-DI

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	96	98	(80-120)	2.1	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [90946]
QC Batch ICPP 6400 | Lab Control Sample Duplicate [90947]
Matrix STLC-DI

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	99	97	(80-120)	2.0	(20 MAX)

Client ID Taber Consultants | **Samples** Lab Control Sample [90952]
QC Batch ICPP 6401 | Lab Control Sample Duplicate [90953]
Matrix STLC-DI

Parameter	Check %Recovery	Check Dup %Recovery	Recovery Limits	RPD	RPD Limits
Lead	97	98	(80-120)	1.0	(20 MAX)

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18909

Tom Ballard
Taber Consultants
3911 West Capitol Ave.
West Sacramento, CA 95691

Workorder 18909

Received on December 08, 2008.

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
1> 18743001	1-1A, Soil	11/17/08 10:00	6010B STLD Pb
2> 18743002	1-1B, Soil	11/17/08 10:04	6010B STLD Pb
3> 18743003	1-1C, Soil	11/17/08 10:06	6010B STLD Pb
4> 18743004	1-2A, Soil	11/17/08 10:14	6010B STLD Pb
5> 18743005	2-1A, Soil	11/17/08 10:36	6010B STLD Pb
6> 18743006	2-1B, Soil	11/17/08 10:38	6010B STLD Pb
7> 18743007	2-2A, Soil	11/17/08 10:49	6010B STLD Pb
8> 18743008	3-1A, Soil	11/17/08 11:13	6010B STLD Pb
9> 18743009	3-2A, Soil	11/17/08 11:22	6010B STLDPb
10>18743010	4-1A, Soil	11/17/08 11:42	6010B STLD Pb
11>18743011	4-1B, Soil	11/17/08 11:47	6010B STLD Pb
12>18743012	4-2A, Soil	11/17/08 11:50	6010B STLD Pb
13>18743013	5-1A, Soil	11/17/08 12:06	6010B STLD Pb
14>18743014	5-2A, Soil	11/17/08 12:08	6010B STLD Pb
15>18743015	6-1A, Soil	11/17/08 12:47	6010B STLD Pb
16>18743016	6-2A, Soil	11/17/08 12:49	6010B STLD Pb
17>18743017	7-1A, Soil	11/17/08 12:51	6010B STLD Pb
18>18743018	7-2A, Soil	11/17/08 12:53	6010B STLD Pb
19>18743019	8-1A, Soil	11/17/08 12:57	6010B STLD Pb
20>18743020	8-2A, Soil	11/17/08 12:58	6010B STLD Pb
21>18743021	9-1A, Soil	11/17/08 13:03	6010B STLD Pb

18909

Workorder 18909

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
22>18743022	9-2A, Soil	11/17/08 13:05	6010B SILD Pb
23>18743023	10-1A, Soil	11/17/08 13:09	6010B SILD Pb
24>18743024	10-2A, Soil	11/17/08 13:10	6010B SILD Pb
25>18743025	11-1A, Soil	11/17/08 13:14	6010B SILD Pb
26>18743026	11-2A, Soil	11/17/08 13:15	6010B SILD Pb
27>18743027	12-1A, Soil	11/17/08 13:19	6010B SILD Pb
28>18743028	12-2A, Soil	11/17/08 13:20	6010B SILD Pb
29>18743029	13-1A, Soil	11/17/08 13:26	6010B SILD Pb
30>18743030	13-2A, Soil	11/17/08 13:27	6010B SILD Pb
31>18743031	14-1A, Soil	11/17/08 13:32	6010B SILD Pb
32>18743032	14-2A, Soil	11/17/08 13:33	6010B SILD Pb
33>18743033	15-1A, Soil	11/17/08 13:36	6010B SILD Pb
34>18743034	15-2A, Soil	11/17/08 13:37	6010B SILD Pb
35>18743035	16-1A, Soil	11/17/08 14:33	6010B SILD Pb
36>18743036	16-1B, Soil	11/17/08 14:37	6010B SILD Pb
37>18743037	16-1C, Soil	11/17/08 14:40	6010B SILD Pb
38>18743038	16-2A, Soil	11/17/08 14:44	6010B SILD Pb
39>18743039	16-2B, Soil	11/17/08 14:53	6010B SILD Pb
40>18743040	16-2C, Soil	11/17/08 14:56	6010B SILD Pb
41>18743041	17-1A, Soil	11/17/08 15:04	6010B SILD Pb
42>18743042	17-1B, Soil	11/17/08 15:07	6010B SILD Pb
43>18743043	17-1C, Soil	11/17/08 15:10	6010B SILD Pb
44>18743044	17-2A, Soil	11/17/08 15:16	6010B SILD Pb
45>18743045	17-2B, Soil	11/17/08 15:20	6010B SILD Pb
46>18743046	17-2C, Soil	11/17/08 15:24	6010B SILD Pb
47>18743047	18-1A, Soil	11/17/08 15:33	6010B SILD Pb
48>18743048	18-2A, Soil	11/17/08 15:33	6010B SILD Pb
49>18743049	18-2B, Soil	11/17/08 16:09	6010B SILD Pb
50>18743050	19-1A, Soil	11/18/08 13:09	6010B SILD Pb

18909

Workorder 18909

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
51>18743051	19-1B, Soil	11/18/08 13:11	6010B STLD Pb
52>18743052	19-1C, Soil	11/18/08 13:14	6010B STLD Pb
53>18743053	19-2A, Soil	11/18/08 13:17	6010B STLD Pb
54>18743054	20-1A, Soil	11/18/08 13:28	6010B STLD Pb
55>18743055	20-1B, Soil	11/18/08 13:32	6010B STLD Pb
56>18743056	20-1C, Soil	11/18/08 13:39	6010B STLD Pb
57>18743057	20-2A, Soil	11/18/08 13:46	6010B STLD Pb
58>18743058	20-2B, Soil	11/18/08 13:49	6010B STLD Pb
59>18743059	21-1A, Soil	11/18/08 11:37	6010B STLD Pb
60>18743060	21-2A, Soil	11/18/08 11:38	6010B STLD Pb
61>18743061	22-1A, Soil	11/18/08 11:41	6010B STLD Pb
62>18743062	22-2A, Soil	11/18/08 11:42	6010B STLD Pb
63>18743063	23-1A, Soil	11/18/08 11:45	6010B STLD Pb
64>18743064	23-2A, Soil	11/18/08 11:46	6010B STLD Pb
65>18743065	24-1A, Soil	11/18/08 11:48	6010B STLD Pb
66>18743066	24-2A, Soil	11/18/08 11:49	6010B STLD Pb
67>18743067	25-1A, Soil	11/18/08 11:52	6010B STLD Pb
68>18743068	25-2A, Soil	11/18/08 11:53	6010B STLD Pb
69>18743069	26-1A, Soil	11/18/08 11:56	6010B STLD Pb
70>18743070	26-2A, Soil	11/18/08 11:57	6010B STLD Pb
71>18743071	27-1A, Soil	11/18/08 11:59	6010B STLD Pb
72>18743072	27-2A, Soil	11/18/08 12:00	6010B STLD Pb
73>18743073	28-1A, Soil	11/18/08 12:03	6010B STLD Pb
74>18743074	28-2A, Soil	11/18/08 12:04	6010B STLD Pb
75>18743075	29-1A, Soil	11/18/08 12:07	6010B STLD Pb
76>18743076	29-2A, Soil	11/18/08 12:08	6010B STLD Pb
77>18743077	30-1A, Soil	11/18/08 12:14	6010B STLD Pb
78>18743078	30-2A, Soil	11/18/08 12:15	6010B STLD Pb
79>18743079	31-1A, Soil	11/18/08 09:26	6010B STLD Pb

18909

Workorder 18909

SAMPLE	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
80>18743080	32-1A, Soil	11/18/08 09:51	6010B SILD Pb
81>18743081	32-1B, Soil	11/18/08 09:56	6010B SILD Pb
82>18743082	32-2B, Soil	11/18/08 10:01	6010B SILD Pb

DEPARTMENT OF TRANSPORTATION
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MARYSVILLE, CA 95901
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Flex your power!
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February 18, 2010

Mr. Steve E. Rosenbaum
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670

Subject: Reuse of Lead-Contaminated Soil on Caltrans Project Number 03-3A0421

Dear Mr. Rosenbaum:

The California Department of Transportation (Caltrans) proposes to allow the reuse of soil containing aerially deposited lead (ADL) within the limits of project 03-3A0421 in accordance with Variance V09HQSCD006 issued to Caltrans by the California Department of Toxic Substances Control (DTSC) on June 30, 2009. This project proposes to add auxiliary lanes to State Route (SR) 99 between East 8th Street and East 1st Ave in Chico, CA.

As required, testing of the existing shoulder material along SR 99 for aerially deposited lead (ADL) has resulted in the identification of some contaminated soils designated as Y-1 and Y-2 material according to the DTSC ADL Variance. Testing and the associated report (attached) was completed in July 2009. It is planned to reuse the ADL material under the northbound on ramp at East 8th Street. Attached are plan sheets and cross sections showing the intended location where the material will be removed from and placed.

This project required geotechnical drilling in March 2008 to depths of 45 feet, in which groundwater was not encountered. Geotechnical drilling consisted of advancing two separate borings at stations "NBON" 562+00 and 565+00.

This project is anticipated to start construction in the Fall/Winter 2010 and will be complete in 2012. If you have any questions, please contact me at 530-741-4539.

Sincerely,

Doug Coleman, PE
Caltrans North Region
Branch Chief, Office of Environmental Engineering - South

Enclosures

cc (w/o enclosures): Alicia Beyer, Caltrans District 3 Hazardous Waste Coordinator
Martin Villanueva, Caltrans Project Manager
Carolyn Davis, Quincy Engineering

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99,32	32.4/33.3, 10.1	1	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Lindsay J Juarez
No. C68432
Exp. 9/30/11
CIVIL
STATE OF CALIFORNIA

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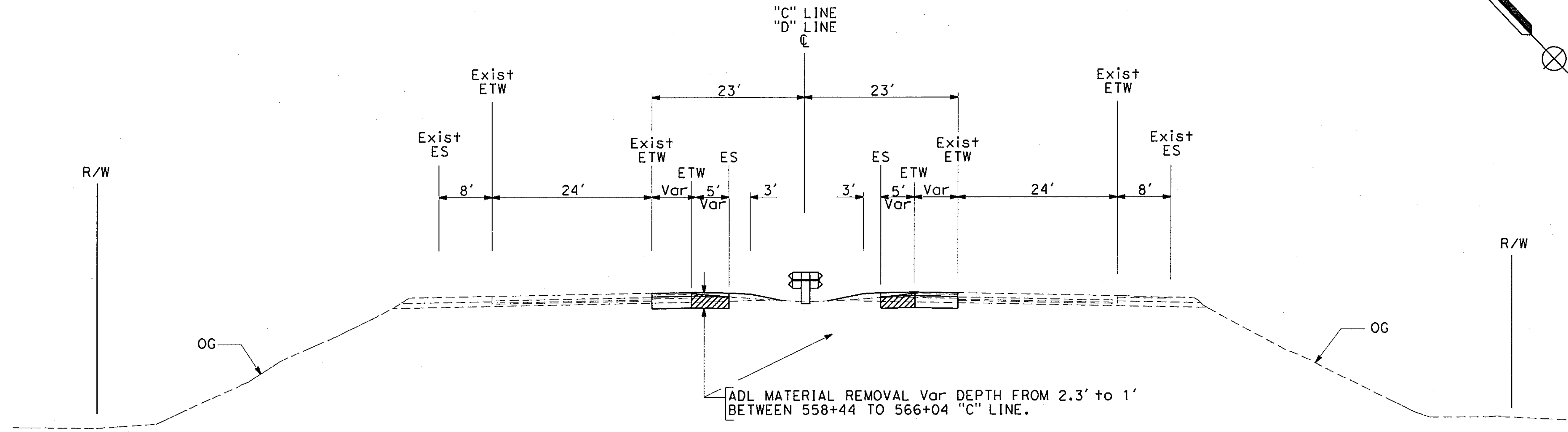
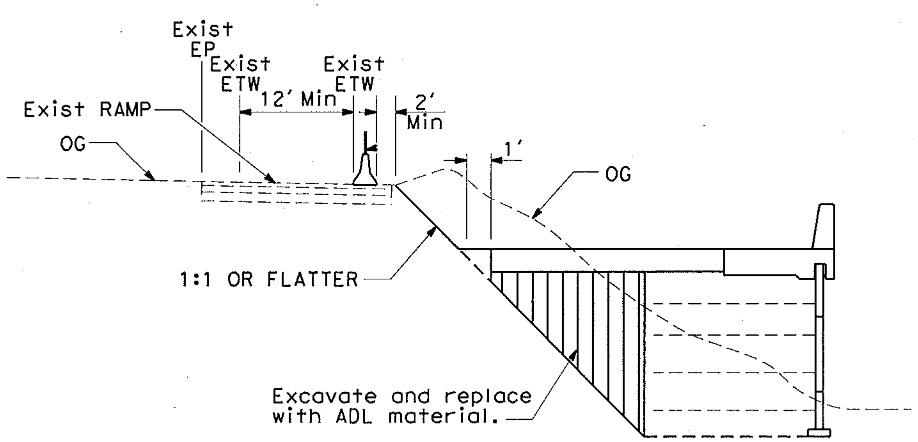
QUINCY ENGINEERING INC
3247 RAMOS CIRCLE
SACRAMENTO, CA 95827-2501

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
2580 SIERRA SUNRISE TERRACE, SUITE 100
CHICO, CA 95928



SECTION A-A

STA "C" 558+44.00 TO 566+04.00

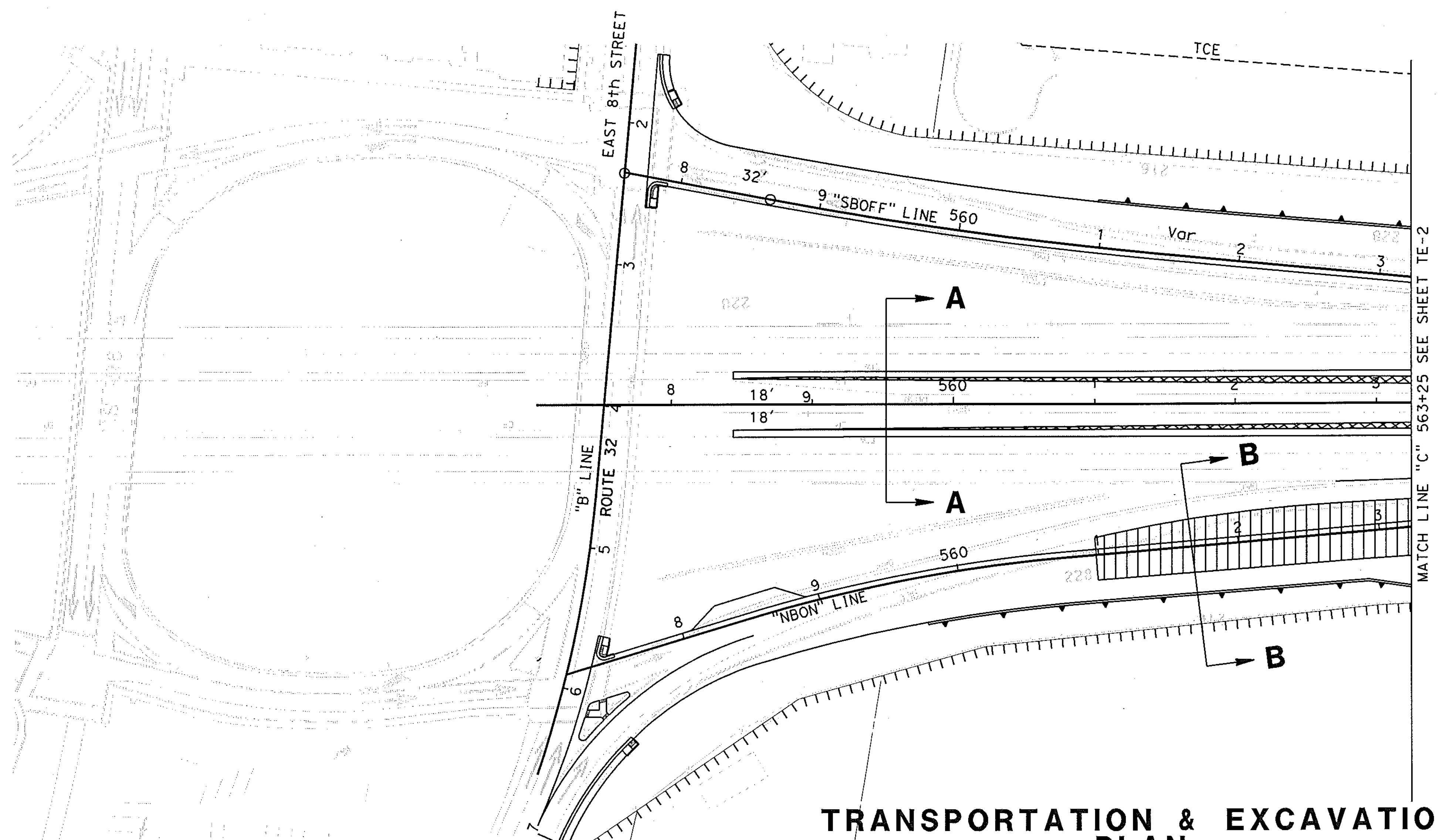


SECTION B-B

STA "NBON" 560+78 TO 565+73.87

Y1 & Y2 ADL BACKFILL

Y1 & Y2 ADL EXCAVATION



TRANSPORTATION & EXCAVATION PLAN

SCALE: 1" = 50'

TE-1

REVISED BY
DATE REVISED
L. JUAREZ
C. GIBSON
CALCULATED-DESIGNED BY
CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR
CAROLYN DAVIS
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

RELATIVE BORDER SCALE 0 1 2 3

USERNAME => $USER

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99,32	32.4/33.3, 10.1	2	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Lindsay J Juarez
No. C68432
Exp. 9/30/11
CIVIL
STATE OF CALIFORNIA

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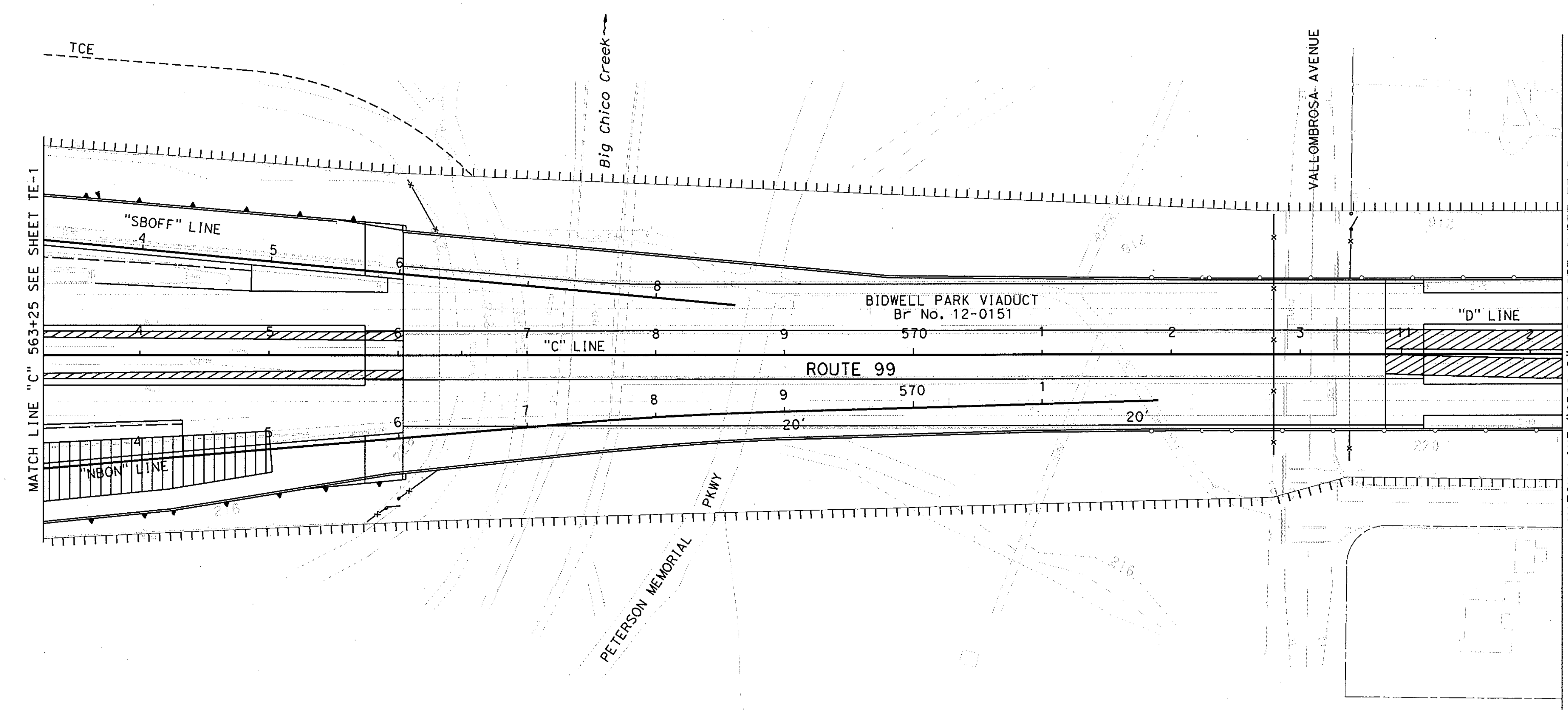
SACRAMENTO, CA 95827-2501

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
2580 SIERRA SUNRISE TERRACE, SUITE 100
CHICO, CA 95928



Y1 & Y2 ADL BACKFILL

Y1 & Y2 ADL EXCAVATION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
CAROLYN DAVIS	L. JUAREZ	
	CHECKED BY	DATE REVISED
	C. GIBSON	

TRANSPORTATION & EXCAVATION

SCALE: 1" = 50'

TE-2

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99,32	32.4/33.3, 10.1	3	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

Lindsay J Juarez No. C68432 Exp. 9/30/11 CIVIL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

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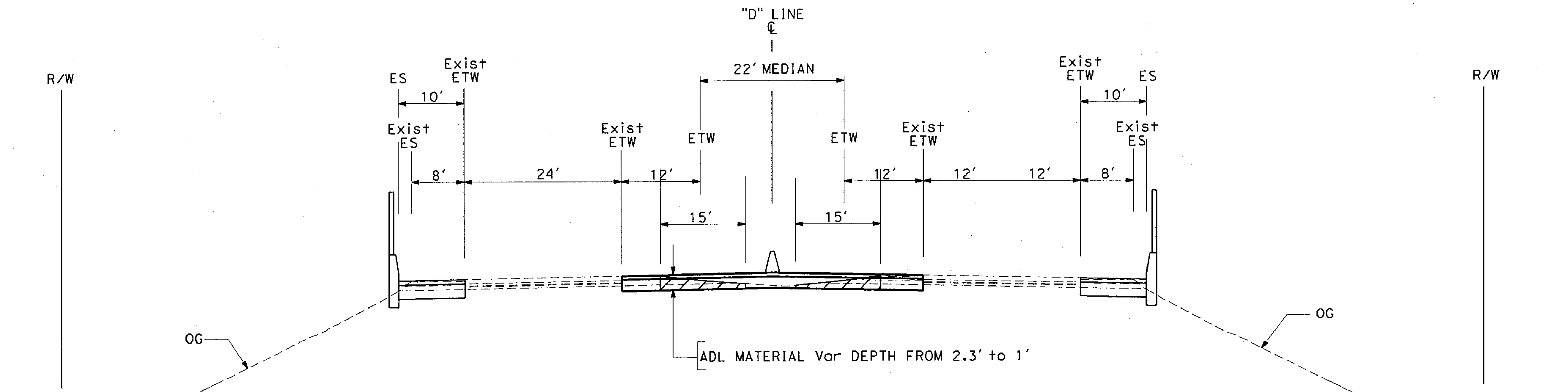
3247 RAMOS CIRCLE
SACRAMENTO, CA 95827-2501

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
2580 SIERRA SUNRISE TERRACE, SUITE 100
CHICO, CA 95928

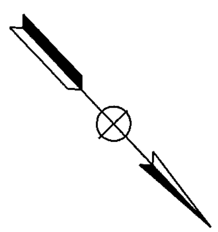
NOTES:

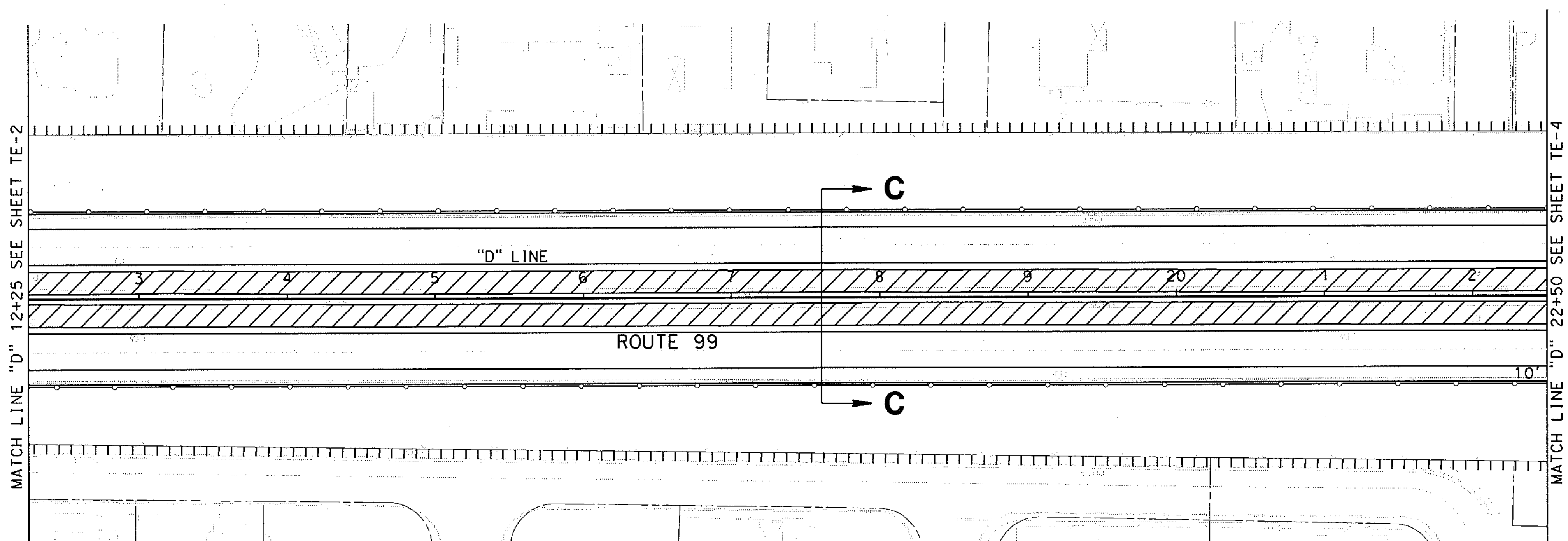
1. FOR COMPLETE R/W AND ACCURATE ACCESS DATA, SEE R/W MAPS AT DISTRICT OFFICE.



SECTION C-C

STA "C" 573+66 TO "D" 28+53.03





Y1 & Y2 ADL BACKFILL

Y1 & Y2 ADL EXCAVATION

TRANSPORTATION & EXCAVATION PLAN

SCALE: 1" = 50'

TE-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: CAROLYN DAVIS

CALCULATED-DESIGNED BY: L. JUAREZ

CHECKED BY: C. GIBSON

REVISED BY

DATE REVISED

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99,32	32.4/33.3, 10.1	4	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Lindsay J Juarez No. C68432 Exp. 9/30/11 CIVIL STATE OF CALIFORNIA

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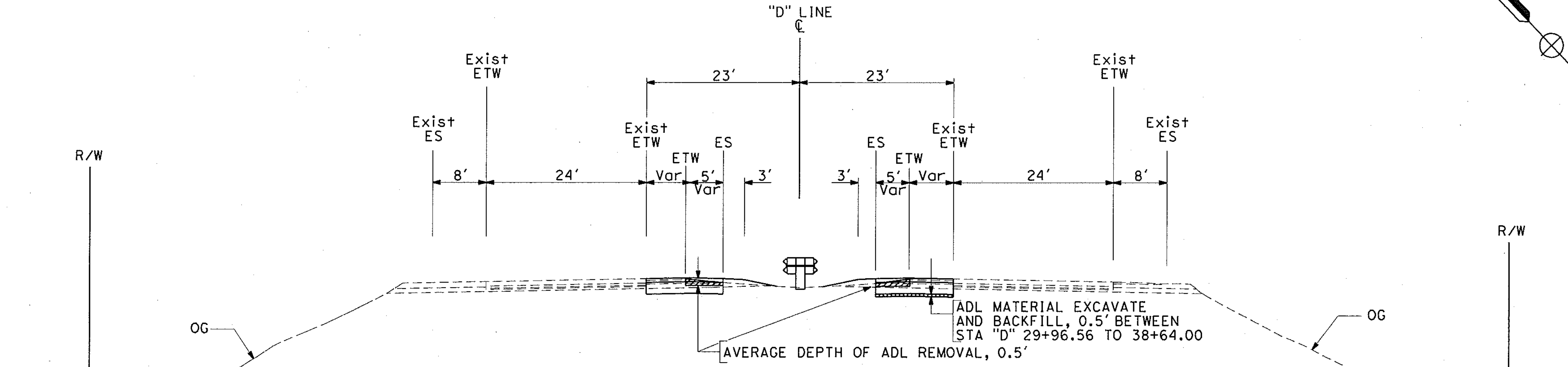
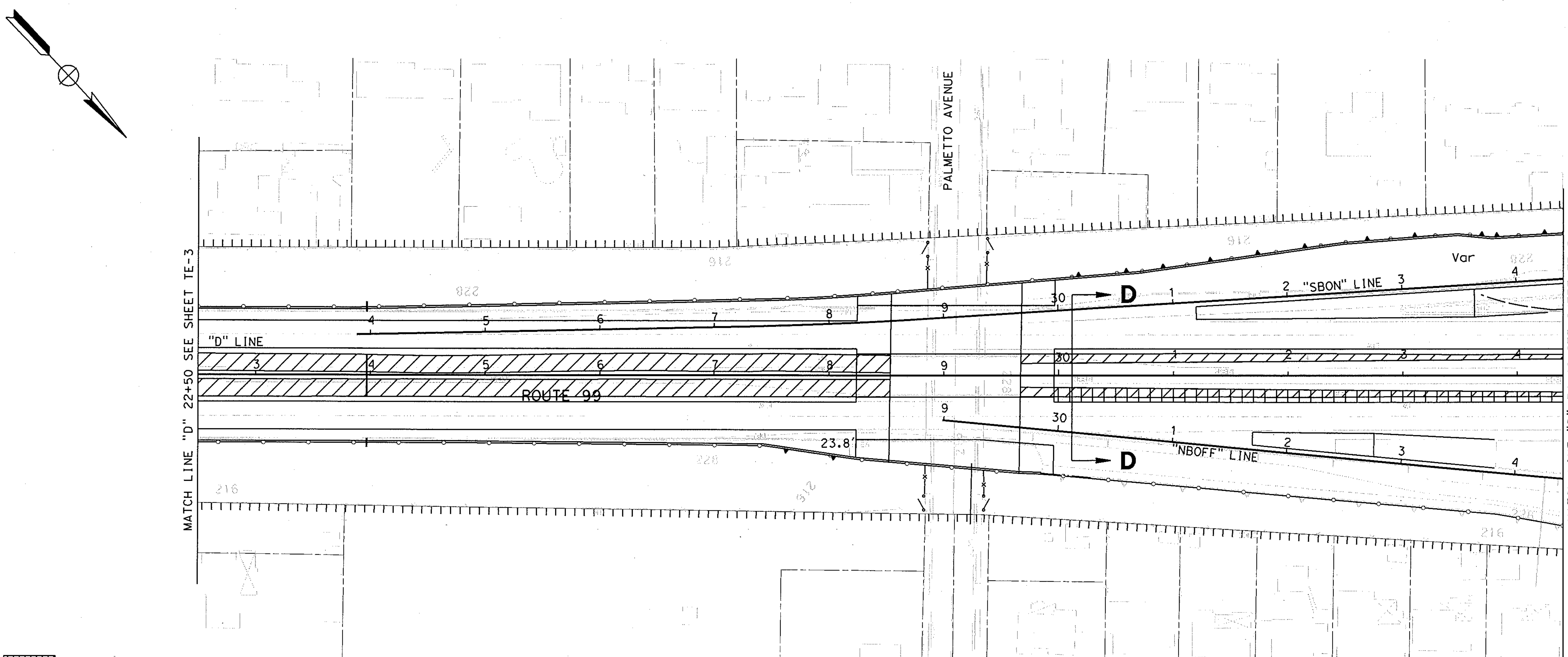


SECTION D-D

STA "D" 29+67.03 TO 38+64.00



Y1 & Y2 ADL BACKFILL

Y1 & Y2 ADL EXCAVATION

TRANSPORTATION & EXCAVATION PLAN

SCALE: 1" = 50'

TE-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: CAROLYN DAVIS

CALCULATED-DESIGNED BY: L. JUAREZ

CHECKED BY: C. GIBSON

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RELATIVE BORDER SCALE 0 1 2 3

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
03	But	99,32	32.4/33.3, 10.1	5	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Lindsay J Juarez
No. C68432
Exp. 9/30/11
CIVIL
STATE OF CALIFORNIA

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SACRAMENTO, CA 95827-2501

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
2580 SIERRA SUNRISE TERRACE, SUITE 100
CHICO, CA 95928

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CONSULTANT FUNCTIONAL SUPERVISOR: CAROLYN DAVIS

CALCULATED-DESIGNED BY: L. JUAREZ

CHECKED BY: C. GIBSON

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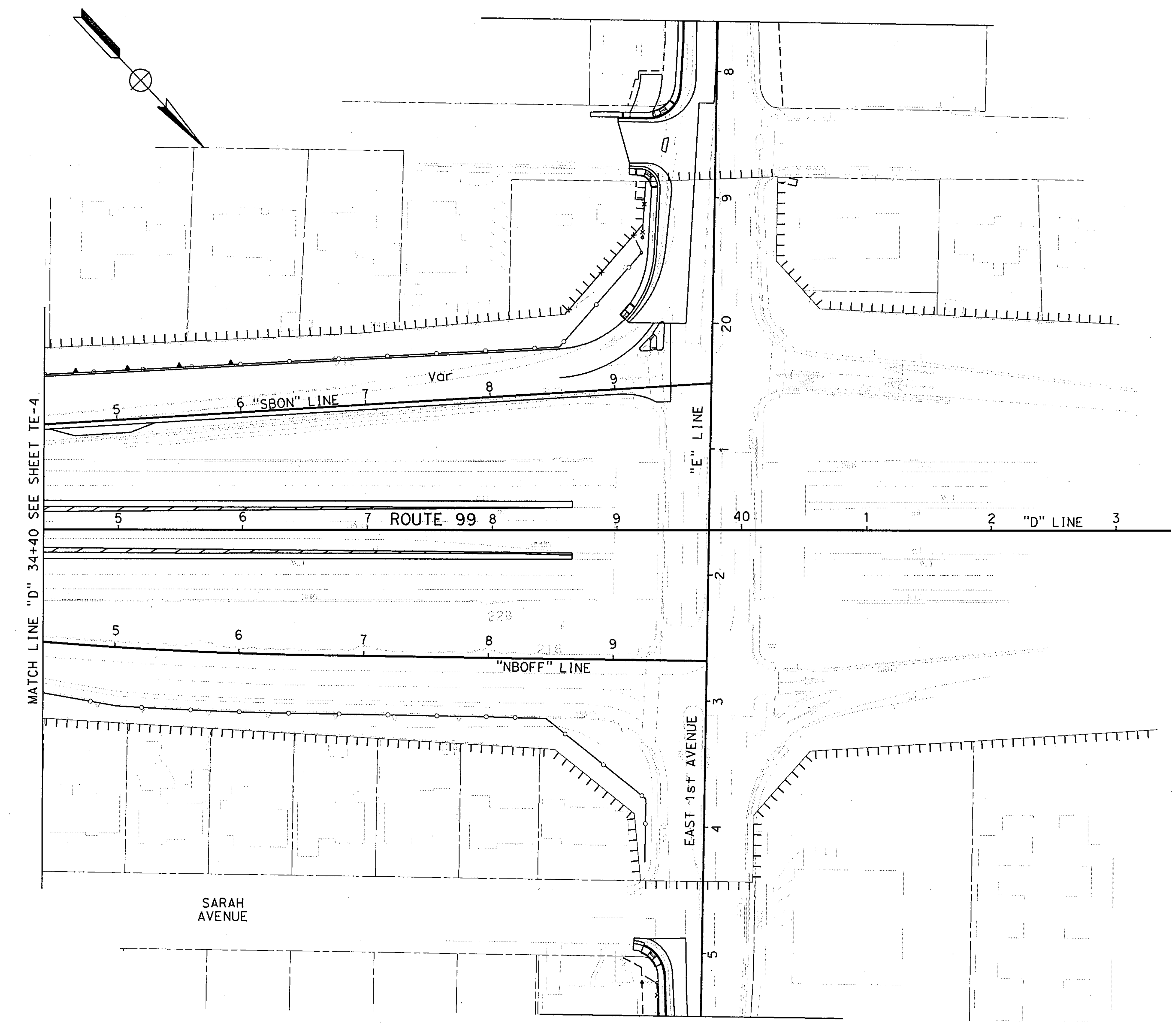
DATE REVISED



Y1 & Y2 ADL BACKFILL

Y1 & Y2 ADL EXCAVATION

TRANSPORTATION & EXCAVATION PLAN

SCALE: 1" = 50'

TE-5

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

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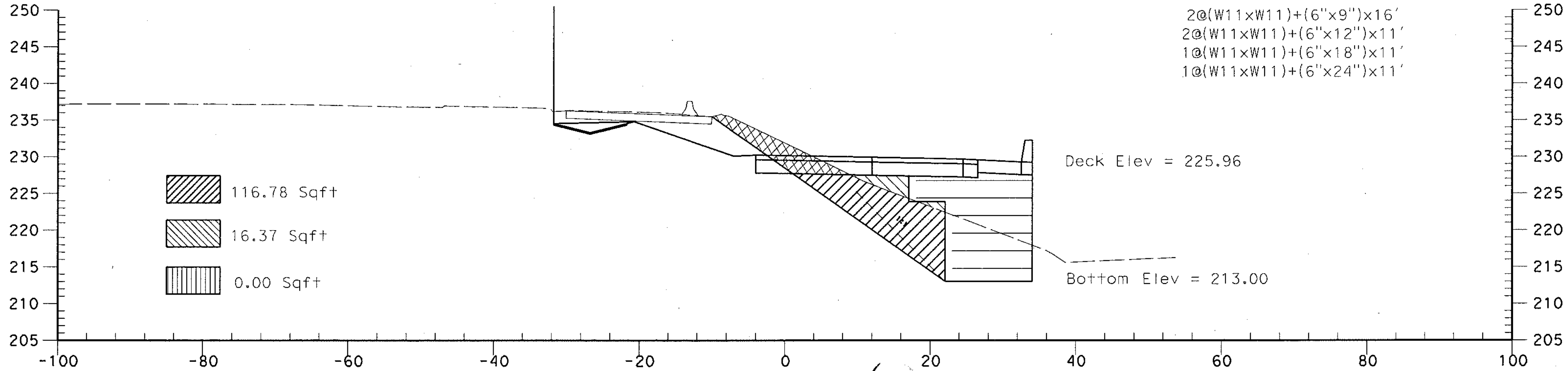
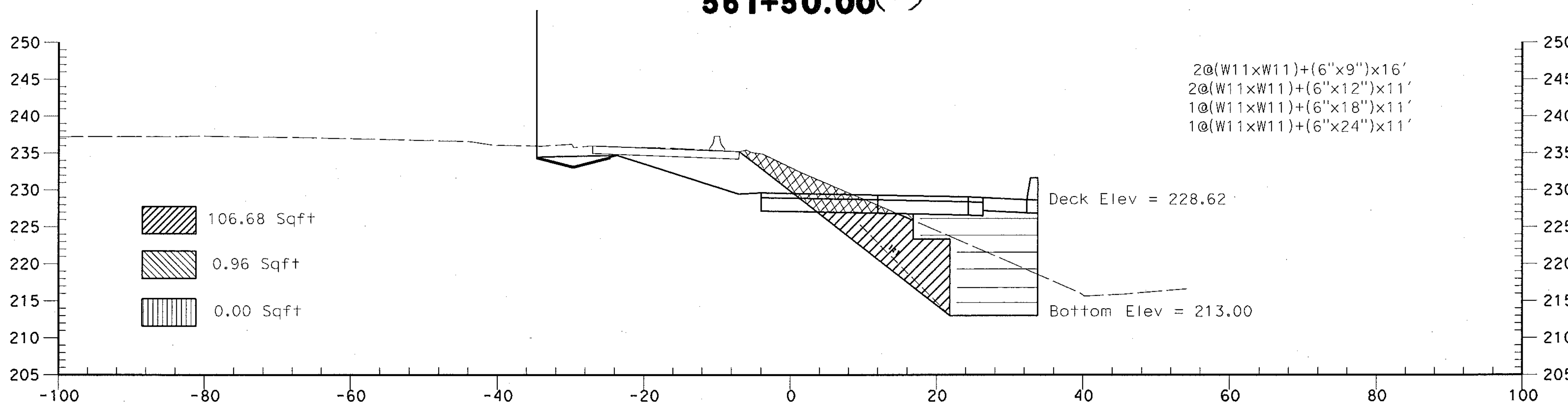
Sacramento, CA 95827 - 2501



561+50.00



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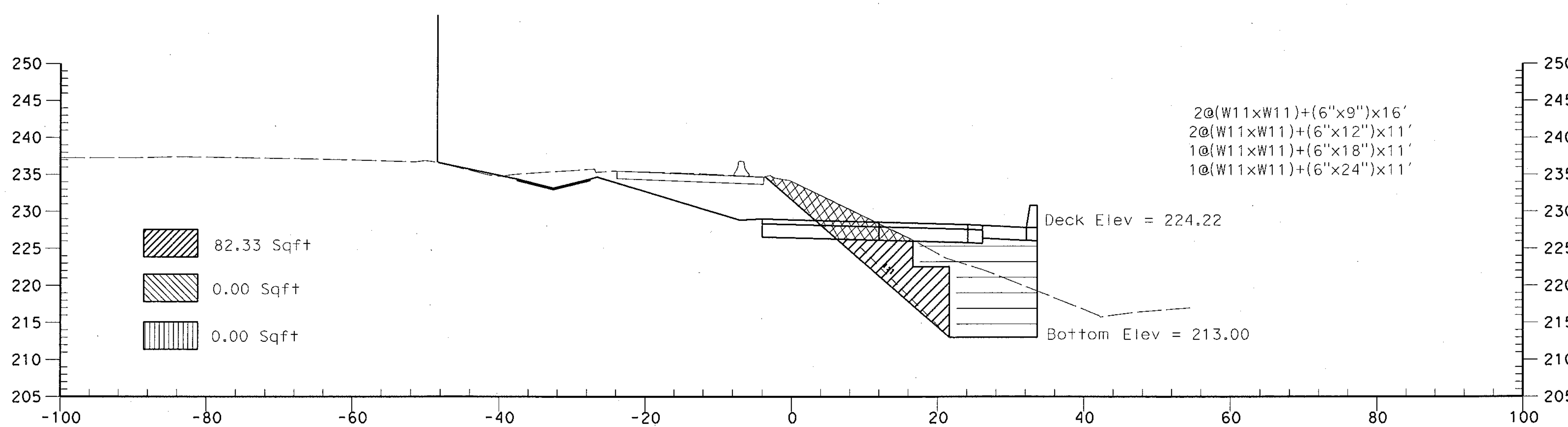

560+78.00

Roadway Excavation

Excavate and Replace with ADL Material

Backfill With ADL Material

Additional Roadway Excavation

NBON

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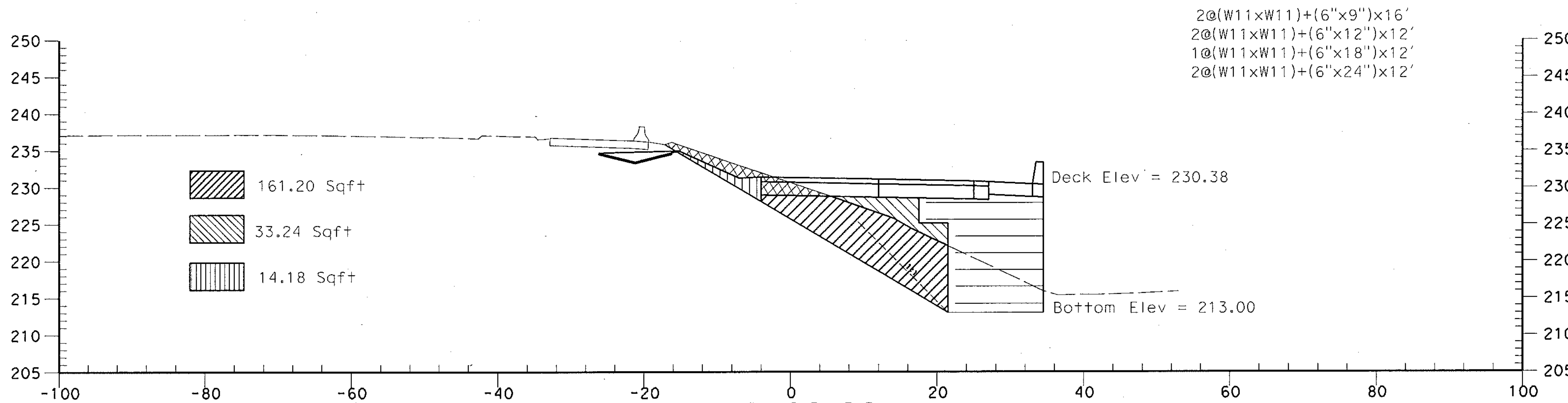
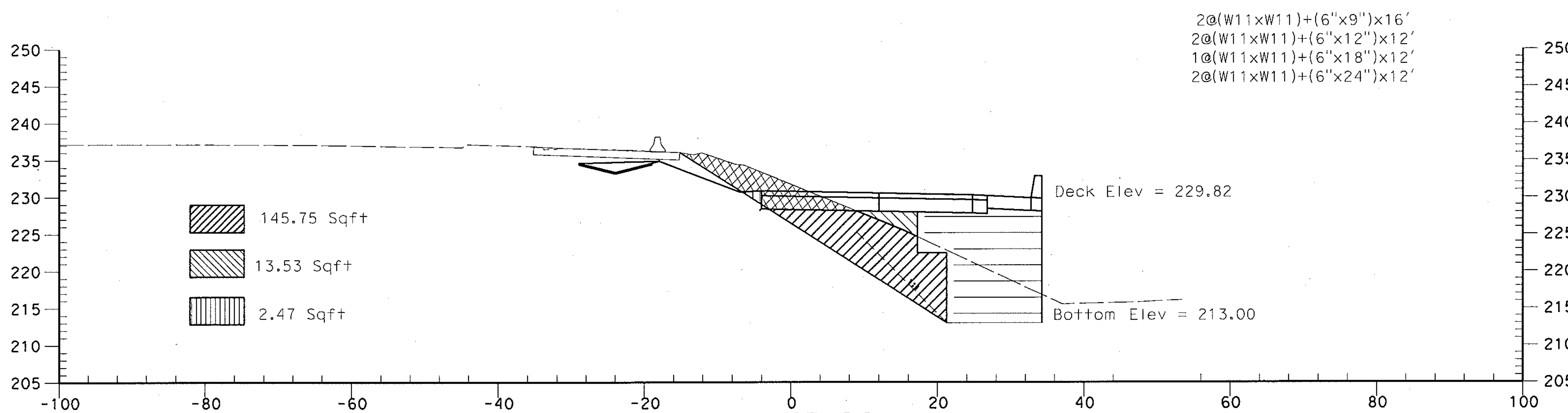


562+00.00



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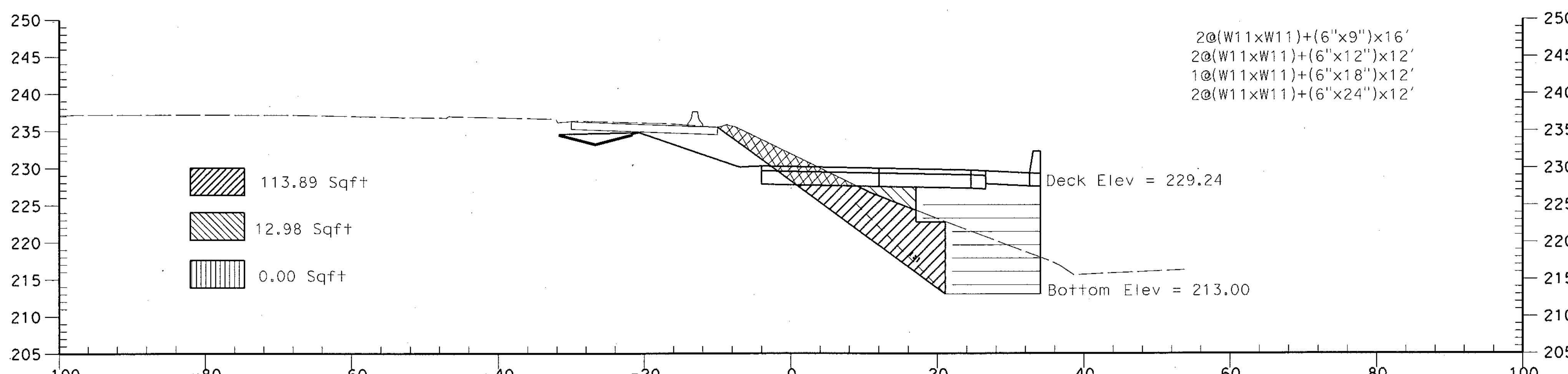

561+50.00 (+)

Roadway Excavation

Excavate and Replace with ADL Material

Backfill With ADL Material

Additional Roadway Excavation

NBON

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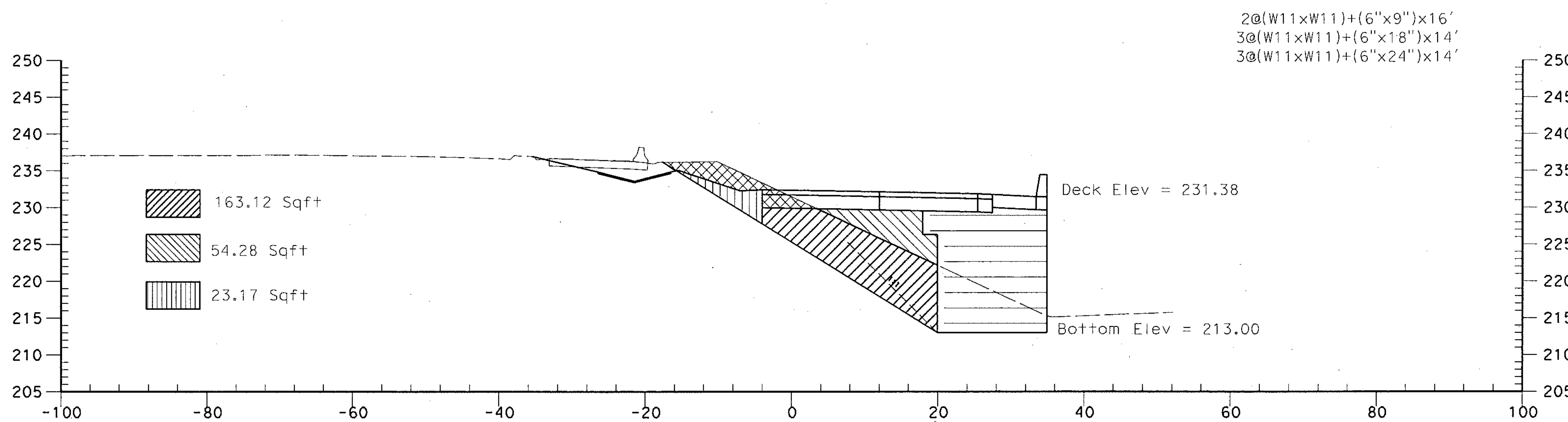

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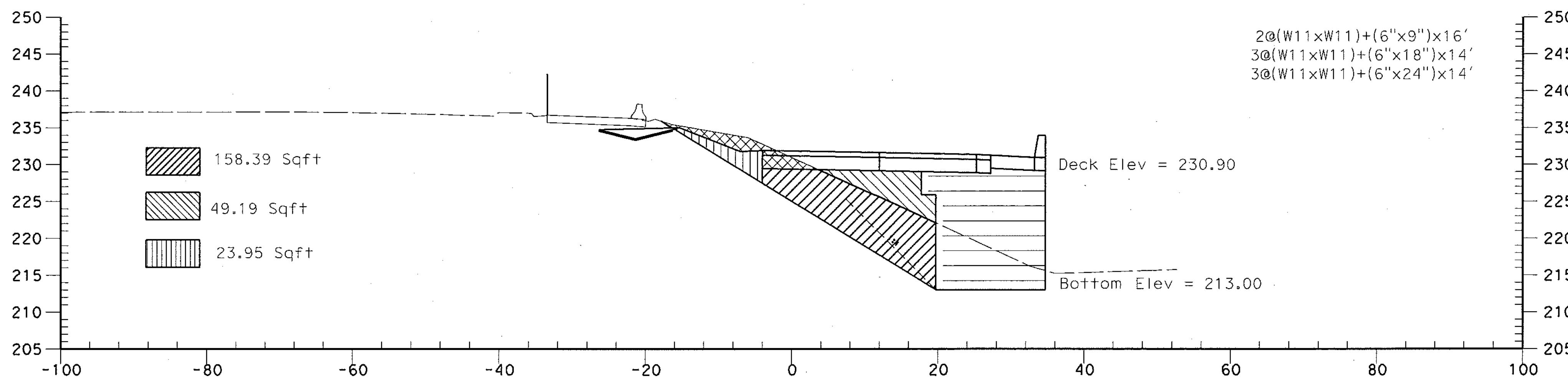

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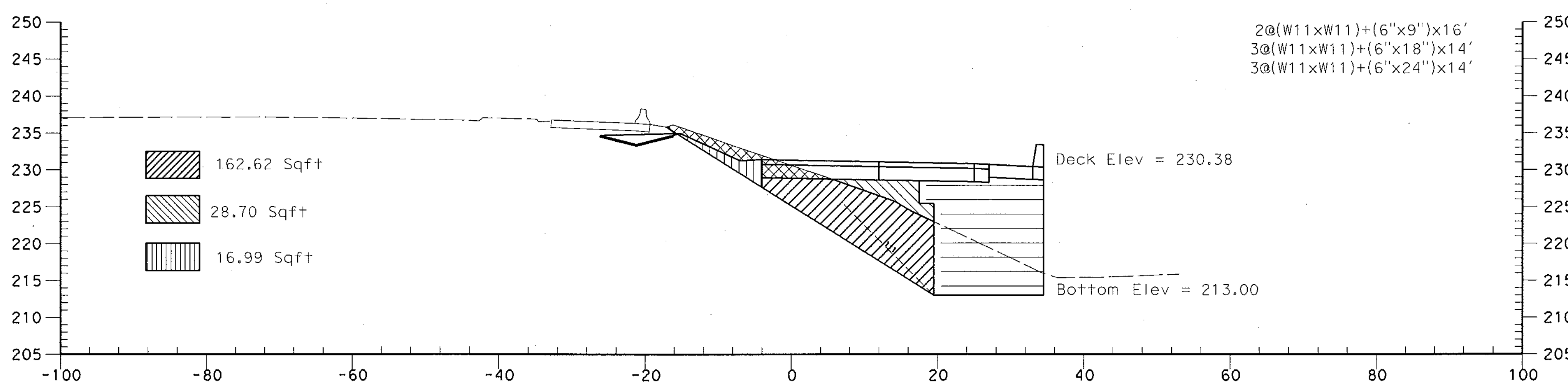

562+00.00

Roadway Excavation

Excavate and Replace with ADL Material

Backfill With ADL Material

Additional Roadway Excavation

NBON

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LAST REVISION

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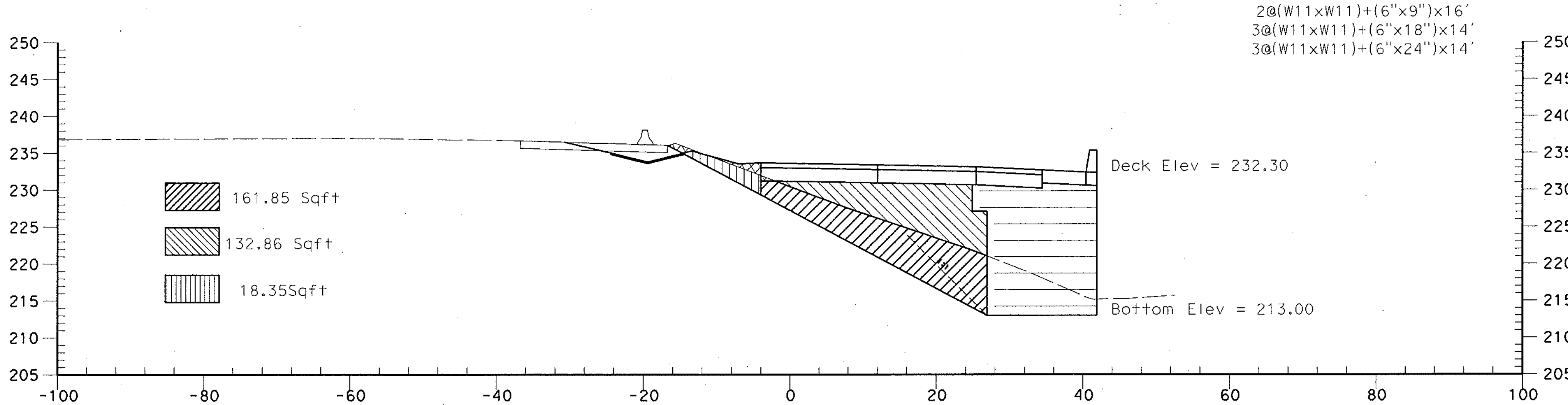

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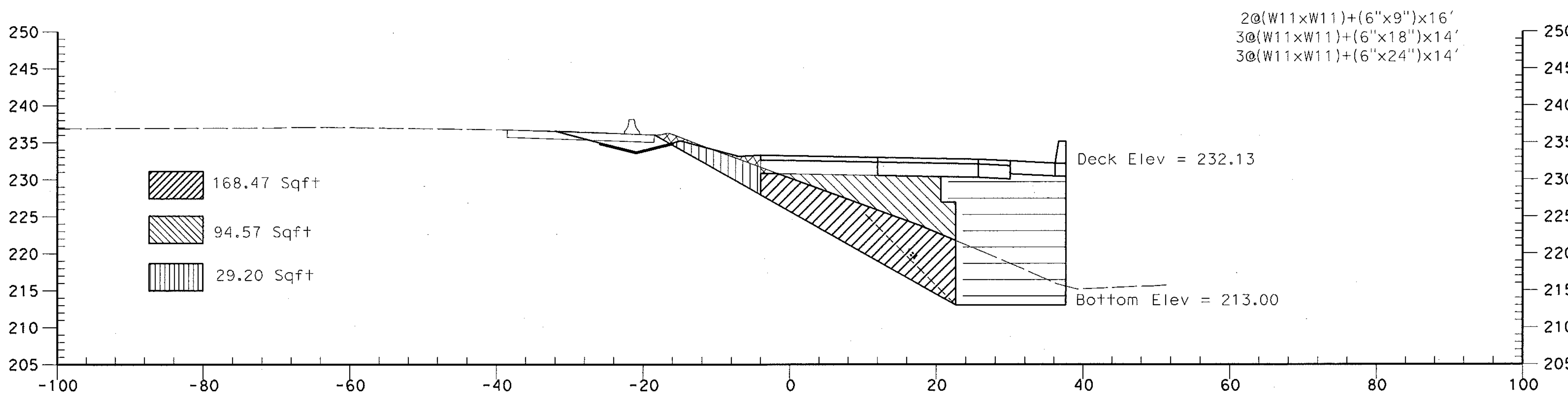

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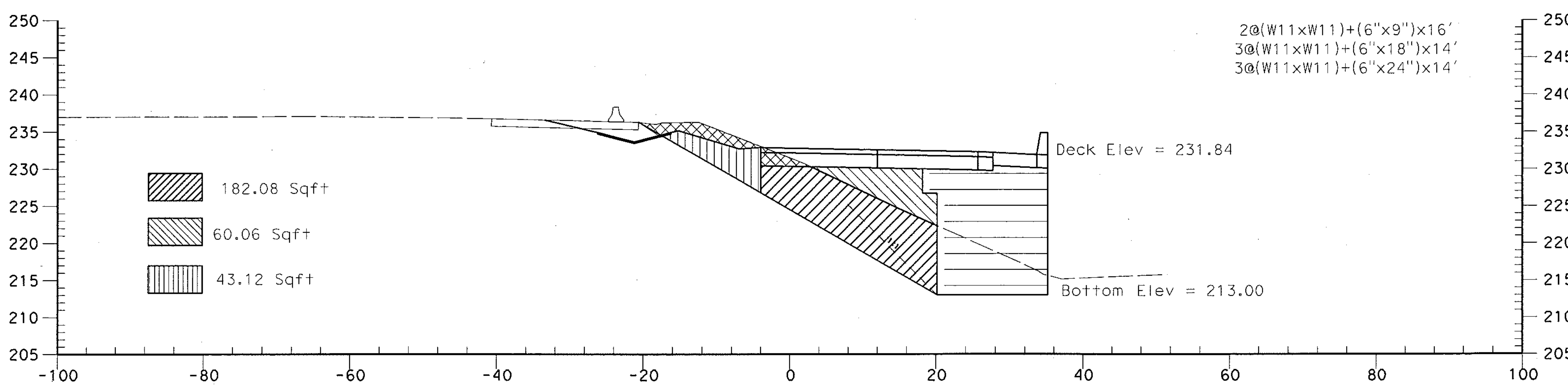

562+75.00

Roadway Excavation

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Backfill With ADL Material

Additional Roadway Excavation

NBON

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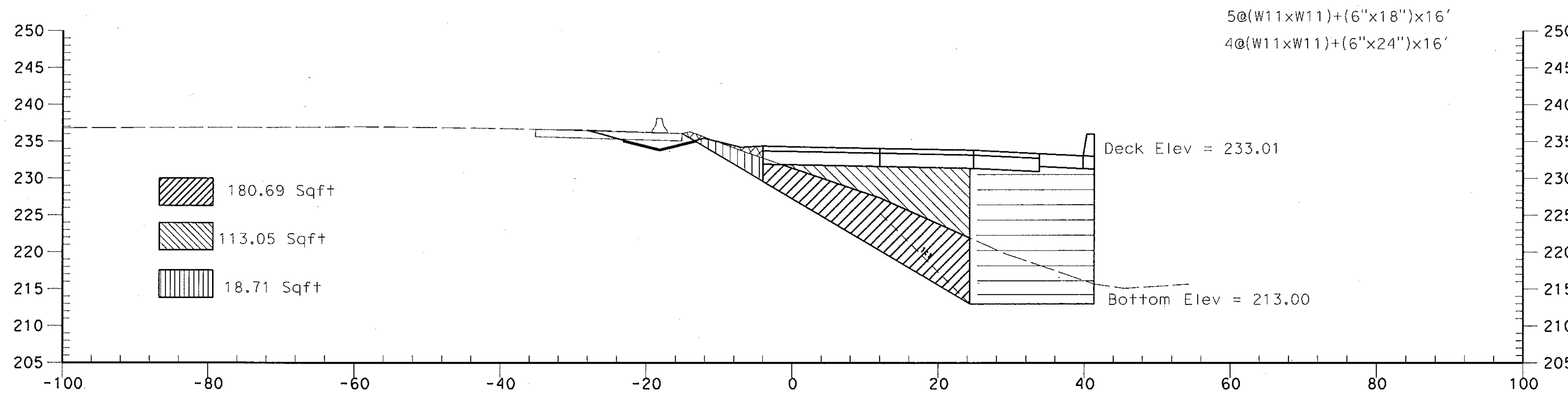

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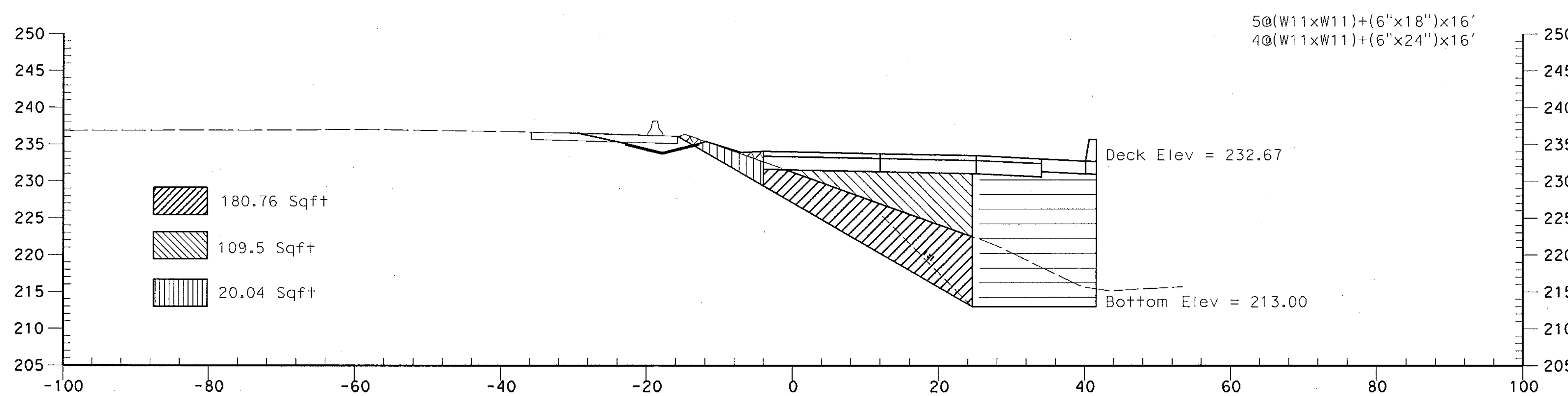

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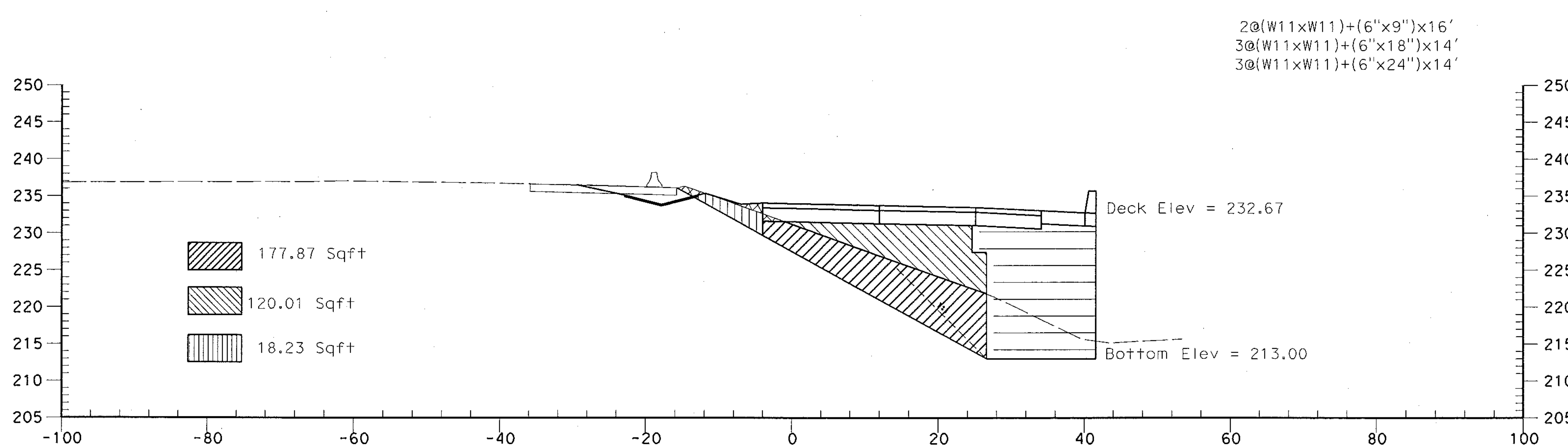

563+50.00

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Backfill With ADL Material

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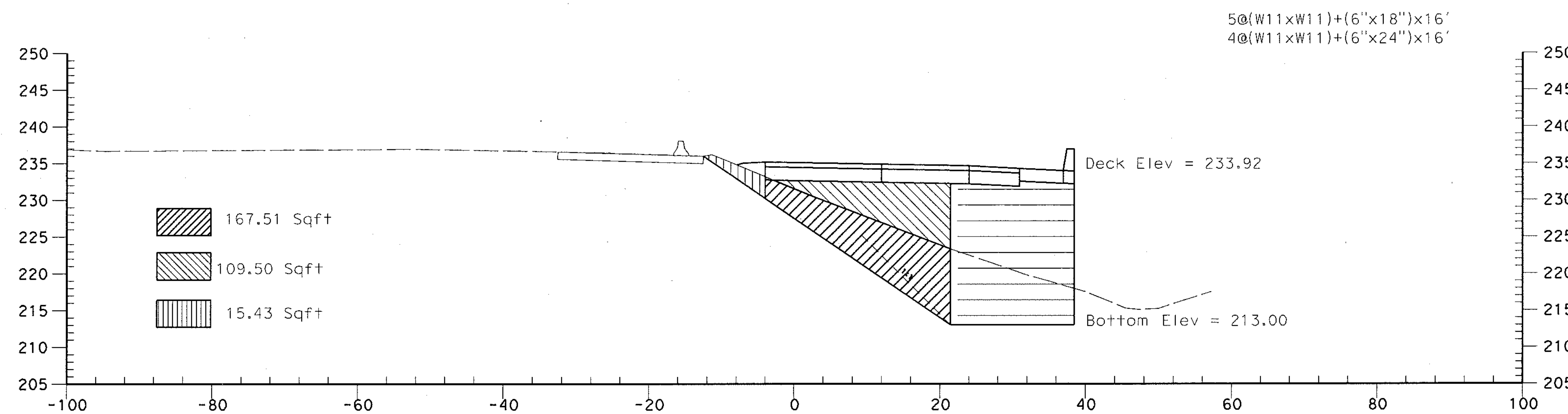

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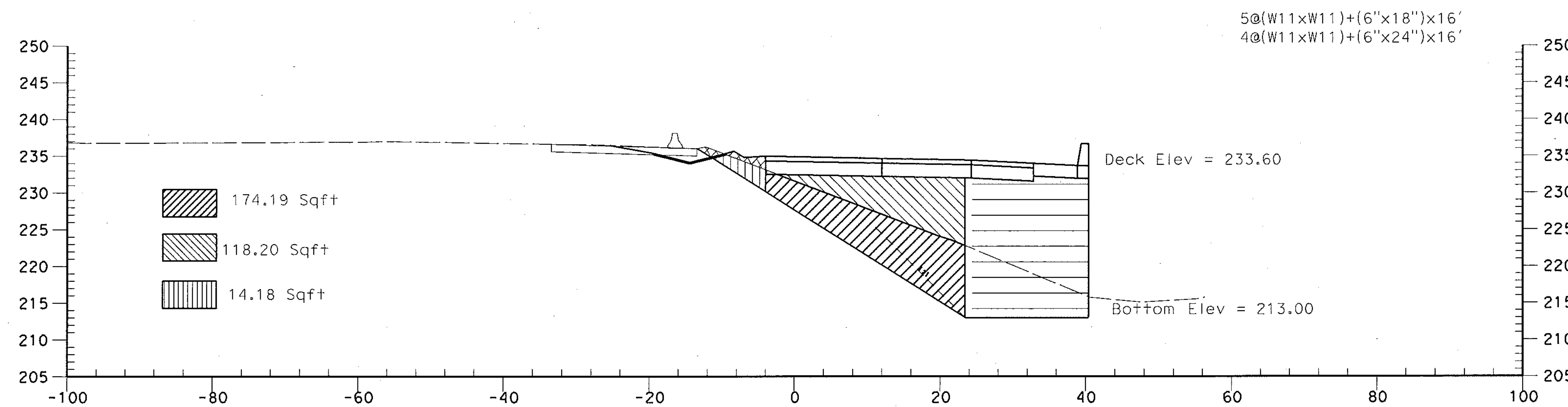

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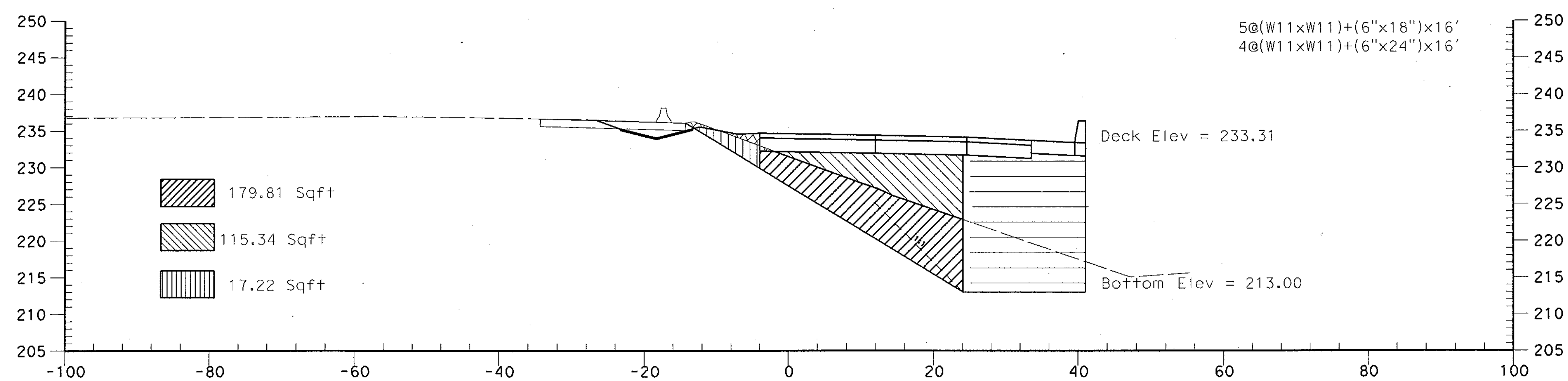

564+00.00

Roadway Excavation

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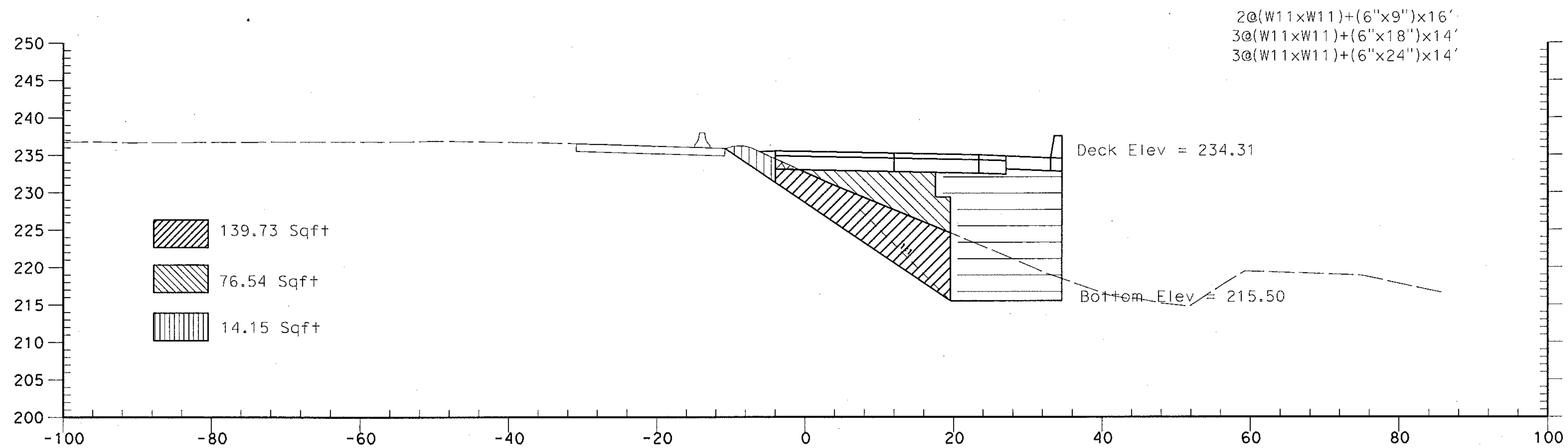

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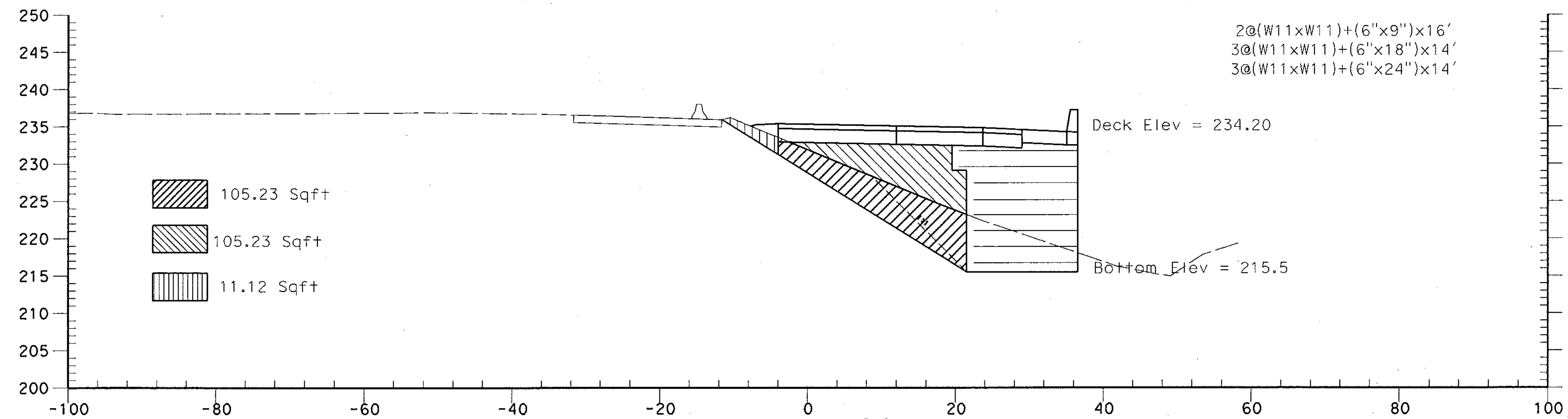

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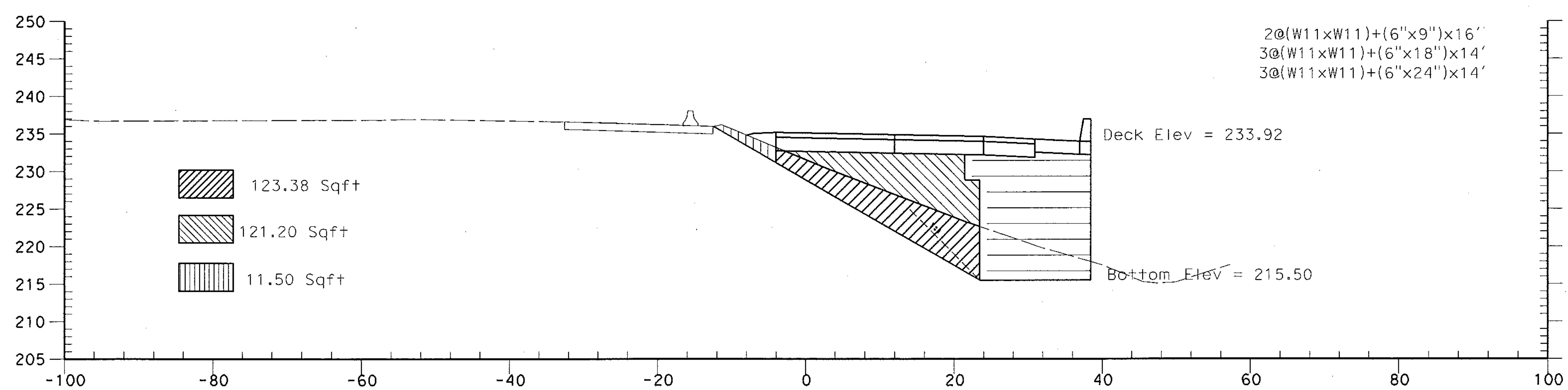

564+50.00

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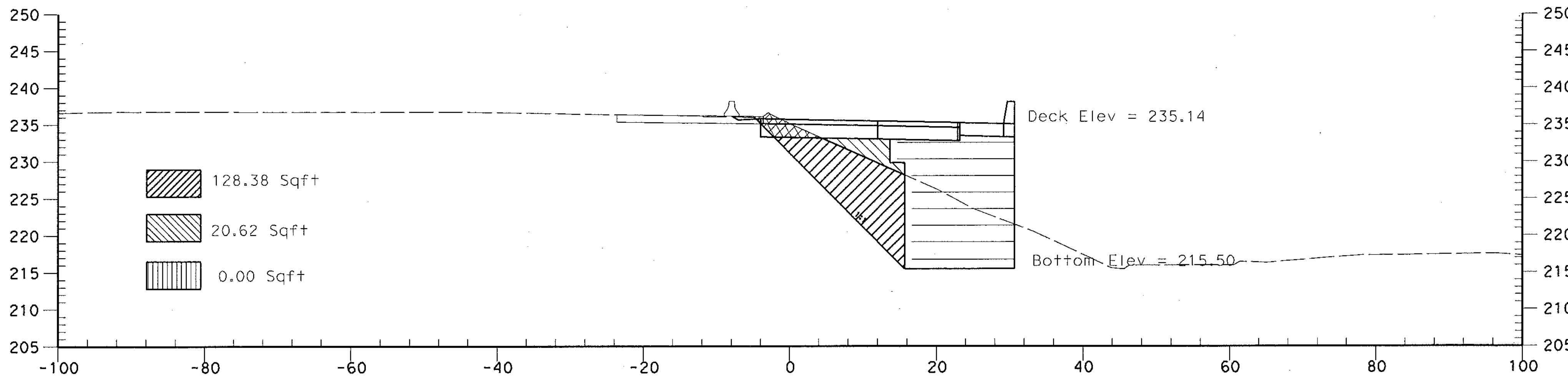

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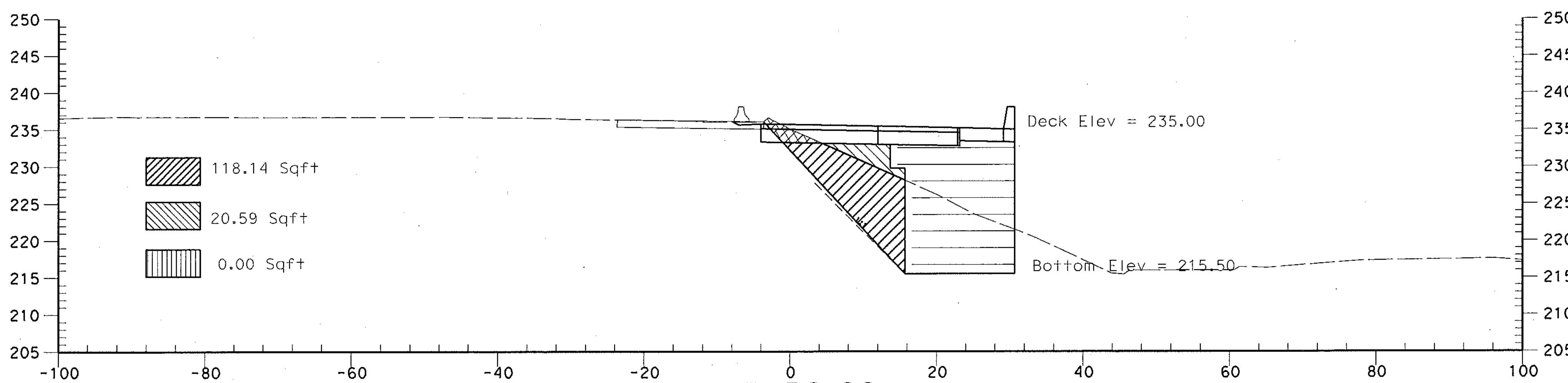

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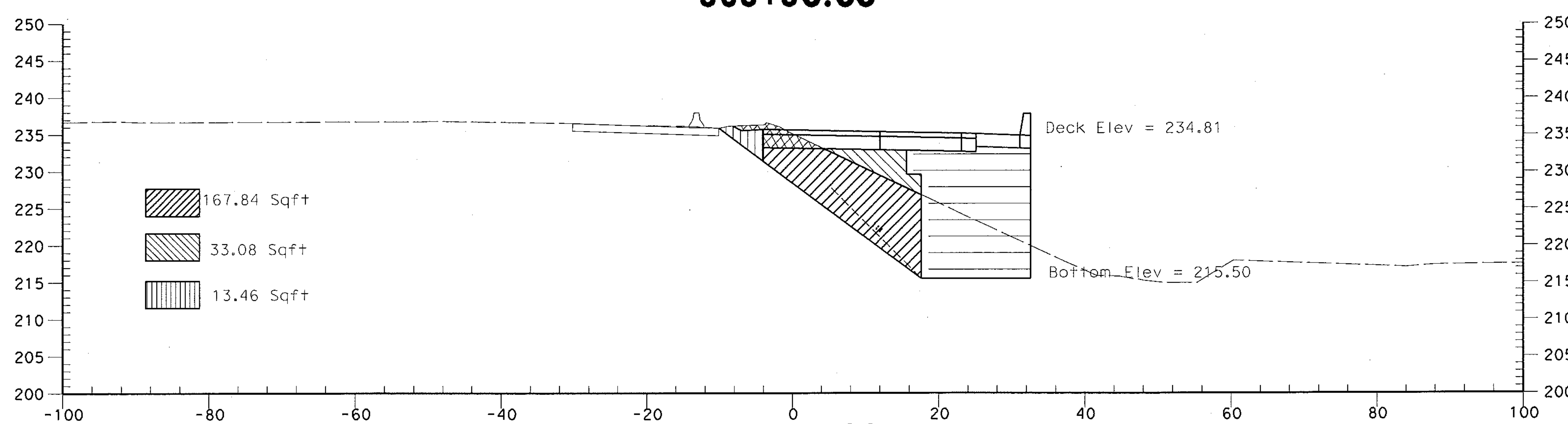

565+25.00

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REVISED INITIAL SITE ASSESSMENT
FOR HAZARDOUS MATERIALS IMPACT
for the
STATE ROUTE 99 OPERATIONAL
IMPROVEMENTS PROJECT
Between State Route 32 to East First Avenue
Chico, California

Prepared for:

JONES & STOKES

Prepared by:

ESPAÑA GEOTECHNICAL CONSULTING

JANUARY 2002

ESPAÑA

ESPAÑA
GEOTECHNICAL CONSULTING

502 Giuseppe Court, Suite 11
Roseville, California 95678
Ph 916/773.2600 Fx 916/782.4846
www.EspanaGeotechnical.com

January 6, 2003

Mr. Brian Bergfalk
Jones & Stokes Associates, Inc.
2600 V Street, Suite 100
Sacramento, CA 95818

Subject: **Revised Initial Site Assessment (ISA)**
for Hazardous Materials Impact for the
State Route 99 Operational Improvements Project
Between State Route 32 to East First Avenue
Chico, California
EGC Project No. L201

Dear Brian:

Enclosed please find our completed Initial Site Assessment for the above-referenced project. Our work was performed in accordance with the scope of work outlined in our proposal dated September 14, 2002.

Potential hazardous materials issues were identified. These include aerially deposited lead from vehicle exhaust along the State Route 99 freeway, lead-based paint in yellow pavement stripping, asbestos-bearing materials within the existing bridge structures, polychlorinated biphenyls (PCB's) in electrical transformers, and contaminated groundwater impacts from a former dry cleaners adjacent to the project. The potential presence of these contaminants may present significant cost implications for remediation prior to or during construction and is discussed in the report. No known or potentially hazardous materials issues that are likely to present a "Fatal Flaw" impact to the project were identified as occurring either within or adjacent to the study area.

We appreciate the opportunity to work with you on this project. If you have any questions concerning this report or if we can be of further assistance, please do not hesitate to call our office.

Sincerely,

ESPAÑA GEOTECHNICAL CONSULTING

Michael Wilson
Staff Geologist

Alfred Worcester, CEG
Senior Engineering Geologist

REGISTERED GEOLOGIST
ALFRED P. WORCESTER
No. 2093
Exp. 5-22-04
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

TABLE OF CONTENTS

SUMMARY

Our Initial Site Assessment (ISA) for the State Route (SR) 99 Operational Improvements Project located between the intersections of SR 99 with SR 32 and East First Avenue, included: 1) a database search of existing environmental records to identify standard agency listings of sources of hazardous materials/waste which might impact the study alignment, 2) a historical aerial photo review of the study area to identify past land use which may indicate potential sources of hazardous materials, 3) a site reconnaissance of the study area to identify present land use and visual evidence of possible sources of hazardous materials, and 4) preparation of the Caltrans ISA Checklist.

The database search did not identify, nor did we observe any direct indications of, the presence of hazardous materials/wastes occurring within the areas proposed for roadway improvements. Based on our research, there is no direct evidence to suggest that hazardous materials/waste conditions are likely to cause a "Fatal Flaw" impact to the project. However, the potential for aerially deposited lead (ADL) in the surface and near-surface soils along SR 99 will require, at a minimum, the preparation of a Health and Safety Plan to address worker safety when working with potentially lead contaminated soils. Should these soils require removal from the site, additional soil sampling and laboratory analysis will be required to determine the lead content of these soils and the need any for special removal and disposal requirements.

It is also possible that the existing yellow pavement stripping along SR 99 may contain lead. Depending upon the widening option used, yellow stripping along SR 99 may require removal. Accordingly, should removal of the yellow pavement stripping be necessary, sampling and testing of the yellow stripping scheduled for removal should be performed to determine the presence of lead and the need for mitigation prior to or during construction if the lead content of the paint is above the regulatory thresholds. A Heath and Safety Plan should be prepared to address worker safety when working with potentially lead-bearing paint.

Construction of the existing bridge over-crossings along SR 99 may have involved the use of asbestos-bearing construction materials. It is anticipated that the existing bridge structures within the project area will be modified, which may involve disturbance or removal of existing bridge materials. Accordingly, an asbestos survey should be performed to determine the presence of asbestos-bearing material. Visual inspections of the bridge structures may also conclude the need for sampling and testing of potential asbestos-bearing material. Should asbestos be encountered above the regulatory thresholds, mitigation plans for disturbance and/or removal of asbestos-bearing materials will need to be prepared. A Heath and Safety Plan should be prepared to address worker safety when working with potentially asbestos-bearing materials. Finally, the possibility exists that contaminated groundwater may be encountered during foundation construction in the vicinity of a former dry cleaners, which may require mitigation if the planned roadway construction anticipates encountering groundwater. A Heath and Safety Plan should be prepared to address worker safety when working with potentially contaminated groundwater.

INTRODUCTION

Project Location and Description

The project includes operational improvements on SR 99 between SR 32 to East First Avenue and on East First Avenue from ramp intersection to 62 meters (200 feet) west of Holben Avenue. The proposed improvements will primarily consist of adding northbound and southbound auxiliary lanes on SR 99 between SR 32 and East First Avenue interchanges, the widening of SR 32 on- and off-ramps, and East First Avenue on- and off-ramps. Included in the widening for the East First Avenue northbound off-ramp will be the provision for dual left-turn lanes to facilitate the turning movements of existing northbound traffic to westbound traffic on East First Avenue and the widening of East First Avenue. This project has been broken into three phases of construction. This ISA will include the area of proposed work that encompasses the three planned phases. A Site Map is provided as Figure 1.

Within the project area, the existing portion of SR 99 consists of a divided four-lane (two lanes in each direction) freeway with on- and off-ramps at SR 32 and East First Street. This portion of the freeway has been constructed on embankment fill and is higher in elevation than the adjacent lands, with bridge over-crossings at Bidwell Park, Vallombrosa Avenue, Palmetto Avenue and East First Avenue. Land use adjacent to SR 99 is primarily residential between East First Street and Vallombrosa Avenue. A small retail center is located on the north site of East First Avenue at Sarah Avenue. The relatively undeveloped park lands of Bidwell Park are located between Vallombrosa Avenue and South Park Drive and includes Chico Creek. South of Bidwell Park the land use adjacent to SR 99 is a mixture of residential, municipal and commercial properties. These municipal/commercial properties include the City of Chico Municipal Service Center, City Fire Department, California Highway Patrol offices, pest control business, a gas station and an auto repair business.

The topography within the vicinity of the project slopes gently to the southwest. However, the elevations along SR 99 between East First Avenue to the north and SR 32 to the south range are relatively flat with an approximate elevation of 65.5 meters (215 feet) (USGS, 7.5 minute, Chico, California Quadrangle).

Based on historical groundwater data for Butte County (with approximately 15 wells in the project vicinity) that is available for viewing on the Department of Water Resources website (http://well.water.ca.gov/cgi-bin/gwater/clickmap.pl), the groundwater gradient in the vicinity of the project trends to the south-southwest. Depth to groundwater from the well data indicates that the depth to groundwater from the ground surface ranges from approximately 3 to 91 meters (10 to 30 feet) in the vicinity of the project.

Purpose and Scope of Work

The purpose of this ISA is to provide preliminary information regarding potential hazardous materials impacts on the proposed project. The data, conclusions, and recommendations are intended for the proposed project only. Our approach has been to identify hazardous materials issues which could have a significant effect on the feasibility or cost of the proposed project. Our scope of work is limited to that considered to be appropriate for an ISA and is not considered a Preliminary Site Assessment as defined by ASTM Standard E1527. Our scope of work was outlined in our proposal, dated September 14, 2002 and is described as follows:

- A database search of existing environmental records to identify standard agency listings of sources of hazardous materials/waste which might impact the study alignment.

- A historical aerial photo and map review of the study area to identify past land use which may indicate potential sources of hazardous materials.

- A site reconnaissance of the study area to identify present land use and visual evidence of possible sources of hazardous materials.

- Preparation of this ISA for the SR 99 Operational Improvements Project between SR 32 to East First Avenue which includes the results of our database search, site reconnaissance, and aerial photo review. The report also includes discussions of identified or suspected hazardous material sites and recommendations for further investigation (if necessary) to verify or clarify information obtained during our study.

ENVIRONMENTAL RECORDS REVIEW

Previous Studies

We are not aware of any currently available Initial Site Assessments, Preliminary (or Preacquisition/Phase I) Site Assessments, or other hazardous material studies which have been conducted for the subject project.

Database Search

A database search was provided by Radius Maps, Inc. (RMI) for the subject project. This search produces a map and list of sites with known, potential, or existing hazardous materials within a specified area. The databases searched include records kept by federal, state, and local agencies. Individual sites can occur on several lists for the same reason and are sometimes repeated under different names. A summary of the primary listings is presented below. The complete listing, additional databases that were searched, and details of the search are presented in Appendix I.

Review of Federally Reported Environmental Data:

National Priorities List (NPL) of Superfund Sites:

The NPL is the Federal Environmental Protection Agency's (EPA's) database of hazardous waste sites currently identified and targeted for priority cleanup action under the Superfund Program. A search of the National Priorities List identified no Superfund sites within a distance of approximately 1.6 kilometers (1 mile) of the subject parcels.

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS):

Mandated as part of the 1980 Superfund Act, the CERCLIS list is an EPA compilation of sites identified as known or suspect abandoned, inactive, or uncontrolled hazardous waste sites which may require cleanup. A search of the CERCLIS database identified 2 sites within a distance of approximately 0.8 kilometers (0.5 miles) of the subject project.

1. 1082 East First Avenue First Avenue Cleaners
2. 660 Mangrove Avenue Flair Custom Cleaners

The Flair Custom Cleaners site greater than 0.375 kilometers (0.25 miles) away from and down gradient of the project alignment and is not expected to impact the project. The First Avenue Cleaners site is currently undergoing remediation and has been since at least 1986. Groundwater sampling and analysis from observation wells and a nearby drinking water well generally indicates that no contaminants are currently detected, or if detected, exist at very low levels. Accordingly, groundwater contamination at this site is not expected to significantly impact the planned freeway improvements.

Emergency Response Notification System (ERNS):

The ERNS is an EPA database of reported releases of oil and other hazardous substances. A search of the ERNS database identified no sites within a distance of approximately 0.2 kilometers (0.125 miles) of the study area.

Resource Conservation and Recovery Act (RCRA):

The RCRA is an EPA database which includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Identification on this list does not indicate that there has been an impact on the environment. A search of the RCRIS database identified no sites within a distance of approximately 0.375 kilometers (0.25 miles) of the subject project.

Review of California Reported Environmental Data:

AWP Database:

The AWP database is compiled by the state EPA and identifies known hazardous substance sites targeted for clean-up. A search of the AWP database identified 1 site within 1.6 kilometers (1 mile) of the subject project.

1. Mangrove Avenue and Vallombrosa Avenue — Groundwater Plume - Central Chico

Further review of this listing indicated that this plume of groundwater contamination is located in the vicinity of Mangrove Avenue and Vallombrosa Avenue approximately 0.8 kilometers (0.5 miles) southwest of the proposed alignment and is heading to the southwest from that general location. Accordingly, this contaminated groundwater plume is not anticipated to impact the subject project.

State Priority List (SPL) Database:

The SPL database is compiled by the State of California Health and Welfare Agency, Department of Health Services and includes known and potential hazardous substance sites. A search of the SPL database identified no sites within a distance of approximately 1.6 kilometers (1.0 mile) of the subject project.

Leaking Underground Storage Tank (LUST):

The LUST database is compiled by the State Water Resources Control Board (SWRCB) and contains an inventory of reported leaking underground storage tanks statewide. A search of the LUST database identified 6 sites within a distance of approximately 0.8 kilometers (0.5 miles) of the subject project:

1. 901 Fir Street	Chico Municipal Service Center
2. 1295 8th Street	Former Mike's Shell Station
3. 1180 9th Street	Jack Cacitti Property
4. 890 Mangrove Avenue	Former Tosco Service Station #6009
5. 1055 Mangrove Avenue	Vanella Oil Company
6. 1501 Mangrove Avenue	King Chevrolet

Further review of these sites indicated that the cases for these sites have either been closed (no further action required) or, in the case of King Chevrolet, only soil at the site had been contaminated with no off-site impact. Accordingly, these sites are not expected to significantly impact the project.

Solid Waste Landfill (SWLF):

The SWLF database is compiled by the SWRCB and contains information on groundwater monitoring of sanitary landfills. A search of the SWLF database identified no sites within a distance of approximately 0.8 kilometers (0.5 miles) of the subject property.

Underground Storage Tanks (UST):

The UST database is compiled by the SWRCB and lists registered underground storage tanks. UST's are regulated under Subtitle I of RCRA. These are registered UST's only. Identification on this list does not indicate that there has been an impact on the environment. A search of the UST database identified 3 sites within a distance of approximately 0.375 kilometers (0.25 miles) of the subject property:

1.	995 Fir Street	California Highway Patrol
2.	901 Fir Street	City of Chico Municipal Service Center
3.	1295 East 8th Street	8th and 9th Street Automotive

Further review of these sites did not reveal any current hazardous materials issues associated with the listed underground storage tanks and accordingly are not expected to pose a significant impact to the project.

Unlocatable Site List

An unloctable site is a listing that may occur in the project vicinity but has insufficient address information for accurate location. The database search did not identify any "Unlocatable Sites".

The sites listed above are shown on the site map accompanying the Radius Maps, Inc. report presented in Appendix I.

AERIAL PHOTOGRAPH REVIEW

Aerial photographs were reviewed to obtain information about the history of development and land use on, and adjacent to, the study area. The date of each photograph and significant observations noted during the review of the photographs are summarized below:

June 28, 1962; Cartwright Aerial Surveys, Photo No. But-3-60, Scale - 1"=1,667': The photograph revealed that Bidwell Park appeared to be well defined with moderately dense development surrounding the park site. The areas surrounding the subject alignment northwest of Bidwell Park were predominantly residential, consisting of a mixture of subdivisions and large lot home sites. Occasional small orchards were visible within a few of the large lot residential properties just to the northeast of the study area. To the southwest of the study area, on the southwest side of Sheridan Avenue was a large "L-shaped" parcel of vacant land. A small farm appeared to exist on the northwest corner of Sheridan Avenue and East First Avenue. Southeast of Bidwell Park, along 8th and 9th Streets, the land use appeared to be a mixture of residential and commercial, and further to the southeast agricultural lands (row crops and orchards). At the time of this photograph SR 99 had not been constructed; however, the area of the proposed SR 99 alignment consisted of vacant land northwest of Bidwell Park and in the area between 8th and 9th Streets.

August 24, 1975; Cartwright Aerial Surveys, Photo No. 5147-1-113, Scale - 1"=2,000': SR 99 had been constructed after the 1962 photograph, and included interchanges at 8th /9th Streets and East First Street. Bridge over-crossings were apparent over Bidwell Park, Vallombrosa Avenue and Palmetto Avenue. It appeared that some structures that were visible in the 1962 photograph had been removed in the vicinity of 8th and 9th Streets and immediately to the southeast, for construction of the freeway interchange. Some of the properties between 8th and 9th Streets, just southwest of the freeway, appeared to be commercial rather than residential. An "L-shaped" structure had been constructed on the parcel at the northwest corner of Sheridan Avenue and East First Avenue which had the appearance of a possible gas station. With the exception of the freeway construction and residential subdivision development in the previously vacant lots and/or large lot residential properties, the construction of a possible gas station at Sheridan Avenue and East First Street, and the addition of commercial properties between 8th and 9th Streets, the land use in the general vicinity of the study area had remained essentially unchanged since the 1962 photograph.

July 29, 1986; Cartwright Aerial Surveys, Photo No. 86063-412, Scale - 1"=1,833': With the exception of what appeared to be the City of Chico municipal structures and California Highway Patrol facility south of 9th Street and east of Fir Street, the land use in the near vicinity of the study area had remained relatively unchanged since the 1975 photograph.

March 20, 1990; Cartwright Aerial Surveys, Photo No. 90068-6-24, Scale - 1"=2,000': The land use in the vicinity of the study area had remained essentially unchanged since the 1986 photograph.

August 1, 2002; Project photograph provided by Jones & Stokes, Scale - 1:2,000: Since the 1990 photograph, a medium-sized "L-shaped" structure had been build immediately southwest of the freeway interchange between 8th and 9th Streets. The previously described "L-shaped" structure which had the appearance of a gas station and was situated on the northwest corner of Sheridan Avenue and East First Street was no longer visible and the land was vacant. The previously vacant lands immediately to the north and west of this parcel now contained residential structures. With the above exceptions, the land use in the immediate vicinity of the project study area had remained essentially unchanged since the 1990 photograph.

A review of the aerial photographs indicates that construction of the SR 99 freeway had occurred and moderate residential development and some minor commercial/light industrial development had occurred in the vicinity of the subject alignment between 1962 and 2002. Indications of potentially significant hazardous materials and/or petroleum hydrocarbon sources within, or adjacent to, the subject alignment were not observed on the aerial photographs.

HISTORIC MAP REVIEW

The USGS topographic maps for the Chico, California Quadrangle dated 1949, 1950, 1969 and 1978 were reviewed for significant changes in geographical and/or topographic features which would have indicated changes in site use. The maps did not reveal the presence of any structures, railroad tracks/facilities, roads, lagoons, landfills, etc., other than those discussed previously. Significant changes in topography (cut or fill areas) were not shown on any of the revised maps. However, our physical site review did reveal that the SR 99 freeway study area had been constructed on an earth embankment which was not reflected on the maps reviewed.

SITE RECONNAISSANCE

A site reconnaissance was completed on September 25, 2002 to record observations of present land use and readily observable indications of hazardous materials use, storage, generation, or spills. The site reconnaissance consisted of a cursory review of the properties within and adjacent to the proposed project area.

Within the project area, the existing portion of SR 99 consists of a divided four-lane (two lanes in each direction) freeway with on- and off-ramps at SR 32 and East First Street. This portion of the freeway has been constructed on embankment fill and is higher in elevation than the adjacent lands, with bridge over-crossings at Bidwell Park, Vallombrosa Avenue, Palmetto Avenue and East First Avenue. Land use adjacent to SR 99 is primarily residential between East First Street and Vallombrosa Avenue. A "windshield" inspection of the study area did not disclose the presence of obvious sources of hazardous materials other than occasional surface stains on the pavement. The median of the raised portion of the freeway contained large bushes.

Beginning at the southern end of the project study area, the land use east of the freeway consisted mostly of the City of Chico Municipal Facility. This municipal facility has underground fuel storage and fuel dispensing pumps. Adjacent to and southeast of the City of Chico Municipal Facility are a California Highway Patrol facility and a City of Chico Fire Station. From the off-site vantage point there did not appear to be any significant hazardous materials/waste issues at these locations.

Just south of the SR 99 freeway, the land use along 8th and 9th Streets consists of a mixture of commercial and residential properties. These commercial enterprises consist of a gas station, automotive repair business and pest control company. Although it is likely that these businesses store and/or use hazardous substances (such as petroleum hydrocarbons, lubricants, solvents and pesticides), no obvious hazardous issues (i.e., improper storage, leaks or spills) were observed from our off-site vantage point at the time of our site visit.

Northwest of 8th Street the freeway crosses over Bidwell Park and Big Chico Creek. The parkland is wooded and other than occasional trash and miscellaneous debris did not contain any obvious signs of hazardous materials or wastes. Beyond Bidwell Park, north of Vallombrosa Avenue and east of the freeway to East First Street, the land use consists primarily of single-family residential properties.

These properties are generally well maintained with no obvious evidence of hazardous materials conditions. A pumping facility owned by the California Water Service Company was observed on Palmetto Avenue just east of the freeway. This facility was fenced, and from the off-site vantage point, the property appeared wooded and contained a paved driveway and three above-ground storage tanks and associated piping. No obvious hazardous materials issues were evident from the off-site vantage point at the California Water Service Facility.

A small retail facility is situated on the north side of East First Avenue, just north of Sarah Avenue and adjacent to the northbound freeway on-ramp. This facility contains a liquor store and spa dealership and is the former location of First Avenue Cleaners. A paved parking area surrounds this facility. A groundwater monitoring well was observed on the southwest corner of this retail property. This monitoring well was flush with the ground surface and contained a steel lid which was encased in concrete. A vacant lot is situated just east of this retail structure and contained only minor amounts of miscellaneous trash. Other than the presence of the groundwater monitoring well and likely chemical storage within the spa dealership, no obvious indications of hazardous materials leaks or spills were observed at this location.

South of the SR 99 freeway, between Vallombrosa Avenue and East First Street and southward to Mangrove Avenue, the land use is also predominantly residential consisting primarily of single-family homes. Heading north of East First Avenue along Sheridan Avenue the residential use includes apartment complexes. Land use changes to primarily commercial properties along Mangrove Avenue, approximately one-half mile south of the freeway. The residential properties in the vicinity of the project study area (west of the freeway) are generally well kept with no obvious indications of hazardous materials issues. The vacant lot on the northwest corner of Sheridan Avenue and East First Street which, from the aerial photographs, had the appearance of a former gas station, did not present any obvious indicators of the past site use and no obvious signs of hazardous materials issues were evident upon visual inspection of this location.

Our site reconnaissance did not reveal the presence of any obvious hazardous materials/wastes issues such as leaks or spills or improper hazardous materials storage that would likely impact the subject alignment. However, the presence of the groundwater monitoring well on the retail property just east of the northbound freeway on-ramp at East First Street and Sarah Avenue is an indicator of possible groundwater contamination at this location (and is discussed in the following section). Also, various pole-mounted electrical transformers, which may lie within the planned construction area, may be potential sources of polychlorinated biphenyls (PCB's). No evidence of leaks or stains were observed in any of the readily visible pole-mounted transformers encountered near the project area. Yellow pavement stripping, which is visible along SR 99, may potentially contain lead. Although not readily visible, bridge structures within the project area may potentially contain asbestos-bearing construction materials such as expansion joint material and abutment bearing pads. Within the project area, exposed soils along the shoulders of SR 99, may also contain ADL above the current regulatory thresholds.

GOVERNMENT/PRIVATE AGENCIES

- **State of California Environmental Protection Agency, Department of Toxic Substances Control** - Telephone conversation with Don Mandel indicated that he is the project manager for the First Avenue Cleaners site (now a Spa dealership and Liquor Store). The First Avenue Cleaners business was in operation from 1960 to 1965 and was located at 1082 East First Avenue. This site has been on the State Superfund List since the early 1990's. The groundwater at this location was contaminated with perchloroetheylene (PCE). There are currently three groundwater monitoring wells on this property and recent sampling and analysis has shown no detectible levels of PCE in two of the wells and only low levels of PCE in the third well. This site is currently being remediated through a drinking water well (California Water Service Well Number 16) which is located just west of the SR 99 freeway. The remediation method is by "air stripper" and the most recent sampling and analysis of the groundwater at this location has indicated very low levels of PCE.

- **State of California Regional Water Quality Control Board (Redding Office)** - Telephone conversation with Dale Stultz on October 4, 2002 revealed that their office did not have any record of a gas station at the corner of Sheridan Avenue and East First Street.

- **Butte County Department of Environmental Health** - Telephone conversation with agency personnel on October 3, 2002 indicated that the "Central Chico Plume" is groundwater contamination located near Mangrove Avenue and Vallombrosa Avenue, approximately 0.8 kilometers (0.5 miles) southwest of the planned alignment, and trends southwest from that location. This plume originated from two dry cleaning operations in this area, where PCE has contaminated the groundwater and migrated to the southwest.

- **California Water Service Company** - Telephone conversation with Tony Ruggle on October 4, 2002 indicated that their facility located at 1065 Palmetto Avenue is a pumping facility for domestic water and fire for the City of Chico. He indicated that only small quantities of chlorine are used and stored on site.

CALTRANS INITIAL SITE ASSESSMENT CHECKLIST

A checklist form, prepared by Caltrans, entitled, "Initial Site Assessment (ISA) Checklist" from Appendix DD - Hazardous Waste in the Project Development Procedures Manual, was completed for this study. This checklist was prepared to determine if the project has a potential hazardous waste involvement, and if so, will additional ISA work be needed. The determination made from the checklist was that the project does have a potential hazardous waste involvement (ADL, lead-based paint, contaminated groundwater, asbestos and PCB's). Additional ISA work required may include soil sampling and analysis for ADL if existing soils are to be removed or regraded at the site; visual inspection of all electrical transformers within the planned construction easement for possible PCB involvement; sampling of the yellow pavement stripping that will be removed for this project, and tested for the presence of lead above the regulatory thresholds; an asbestos survey of any bridge structure within the project area that will be disturbed and/or removed; sampling and testing of groundwater for PCE or other potential contaminants in areas where project construction will encounter groundwater. This checklist is presented as Appendix II.

CONCLUSIONS AND RECOMMENDATIONS

We did not observe any direct indication of the presence of hazardous materials/wastes within the subject study area. A review of government agency listings indicates: 1) the areas of the planned improvements are not referenced as using, generating, storing, or disposing of hazardous materials; 2) underground storage tanks are not likely to be located within or immediately adjacent to the subject roadway improvement; and 3) with the exception of the First Avenue Cleaner's site, unauthorized releases of petroleum products or hazardous materials have not been reported within the immediate study area.

A review of historical aerial photographs and maps did not directly indicate the presence of potential hazardous materials or potential hydrocarbon sources within the study area.

Observations noted during our site visit indicated that the subject alignment and surrounding properties generally have a low risk of presenting significant impacts from hazardous materials or wastes and/or petroleum hydrocarbons. The currently vacant property located on the northwest corner of Sheridan Avenue and East First Avenue, which upon aerial photograph review resembled a possible gas station, did not present any significant signs of hazardous materials/wastes. Our database search and discussions with government officials did not disclose any indications that a gas station (and it's associated hazardous materials issues) was ever located on this site.

Our research and discussions with government officials regarding the "Central Chico Plume" indicated that this is groundwater contaminated by PCE from dry cleaning operations. This plume originated near the intersection of Mangrove Avenue and Vallombrosa Avenue, approximately 0.8 kilometers (0.5 miles) southwest of the planned project improvements and continues to trend away from this location to the southwest. Due to the distance from the planned project and it's migration to the southwest away from SR 99, it is not expected that this groundwater plume will significantly impact the proposed project.

It should be noted that as of the date of this ISA the existence and/or levels of PCB's associated with any of the pole-mounted electrical transformers which may be encountered within the planned construction area had not been determined. Should leaks from electrical transformers (that will either remain within the construction easement or will require removal and/or relocation) be encountered prior to or during construction, the transformer fluid should be sampled and analyzed by qualified personnel for detectable levels of PCB's. Should PCB's be detected, the transformer should be removed and disposed of in accordance with the appropriate regulatory agency. Any stained soil encountered below electrical transformers with detectable levels of PCB's should also be handled and disposed of in accordance with the appropriate regulatory agency. It is anticipated, however, that with the current standard of care, removal of any transformers for the project improvements by qualified personnel should not pose a significant hazardous materials impact to the subject project.

A groundwater monitoring well was observed on the southwest corner of the parcel located immediately adjacent to the existing northbound freeway on-ramp at East First Street. Further research has indicated that this observation well is one of three on that parcel. These monitoring wells are associated with groundwater contamination from the former First Avenue Cleaners (1082 East First Avenue), which existed at this location from 1960 to 1965. Discussions with officials from DTSC indicated that current groundwater sampling and analysis from the on-site groundwater monitoring wells have indicated either no detectible levels of PCE or, where detected, at only very low levels. However, we currently understand that the construction of deep foundations for the widening of the existing bridge over-crossings are anticipated. Accordingly, it is possible that these deep foundations may encounter groundwater. Therefore, if it is expected that workers will come in contact with groundwater during construction or if construction dewatering is necessary for foundation construction, additional groundwater sampling and testing should be performed. Groundwater sampling should be performed in areas where contact with groundwater is expected and analytical testing performed to determine the presence of contaminants above the regulatory thresholds. Should it be determined that groundwater contamination levels are above the regulatory thresholds, then mitigation plans should be prepared to address the safe handling, dewatering, and/or disposal of contaminated groundwater.

It is possible that one or more of the above-referenced observation wells may be located within the proposed acquisition area for the project. If any well is within the planned construction zone, proper well destruction procedures will be required prior to the planned roadway construction.

ADL can be found along some roadways at concentrations above regulatory thresholds. At this time we understand that no soils within the project area will be removed. Accordingly, only the preparation of a health and safety plan to address worker safety and proper handling procedures of potentially lead-impacted soils should be required. However, should it be necessary to remove soil from the project site, tests of field samples of surface/near surface soils along the existing freeway will also need to be conducted for determination of soluble lead, pH and total lead to assess lead concentrations of soils which will require off-site disposal. After testing, the lead concentration of these soils can be evaluated to determine if:

a. lead concentrations are below regulatory thresholds, or
b. lead levels are considered hazardous in which case, lead-contaminated soils must be handled and disposed of in accordance with applicable state and federal regulations.

The potential exists that lead-based paint was used for the yellow pavement stripping along SR 99. Accordingly, sampling and testing of the yellow pavement stripping that may be removed, should be performed to determine the presence of lead above the regulatory thresholds. If lead content of the yellow pavement stripping are found to be above the regulatory thresholds, then mitigation plans should be developed to address the safe removal and disposal of the lead-impacted paint.

Based on our research, with the exception of the potential for ADL and lead-based pavement stripping along the existing freeway, groundwater contamination associated with the former First Avenue Cleaners and potential asbestos-bearing construction materials associated with the existing bridge structures, there is no direct evidence to suggest that hazardous materials/waste conditions exist within or adjacent to the study area. Accordingly, with the exception of the possible mitigation of lead-impacted soil and paint, potentially contaminated groundwater and possible asbestos associated with the existing bridge structures, hazardous materials/wastes issues are not considered to have a significant impact on the planned project.

LIMITATIONS

Site assessment activities were performed, our findings obtained, and our recommendations prepared in accordance with currently and generally accepted principles and practices for an ISA. Information in this report does not confirm the presence or absence of hazardous materials on the site, but indicates whether the possibility of such materials exists. On-site observations were made by reconnaissance of visible surface features only. A detailed, subsurface investigation by exploratory drilling, soil or groundwater sampling and analysis are excluded from the scope of services. No representation as to the potential subsurface presence of features is either made, expressed, or implied.

Environmental issues not specifically addresses in the proposal or this report were also beyond the scope of services, and are not included in our evaluation. This report is based upon various selected information sources available to us at the time of our investigation. These sources may not have accurate or complete information. Our conclusions and recommendations are based on the information available and our interpretation of this information.

Review of historical aerial photographs included those photographs and maps that were readily available to us. Our interpretation of structures and/or activities on the site was made in those years for which photographs and or maps were readily available. Other structures may have been present or activities may have occurred during years for which photographs or maps were not available or obtained.

Our communications with selected agency personnel is limited to the information kept on file at the various offices we contacted. Some agencies may not maintain accurate or complete records. Many agencies have only recently developed hazardous materials programs and so historical information may be incomplete. We did not contact property renters or operators. Our on-site study was limited to a general observation of the property and use. There may, therefore, be evidence of hazardous material use or misuse which was not observed during our site visit.

This document is intended only for its expressed purpose and only for the intended client(s). Use of this report by third parties may only be done by consent of España Geotechnical Consulting. The proposed use of the project alignment, site conditions, adjacent properties, and regulatory requirements may change over time. The information presented in this report is valid only as of the date of this report. This report should not be relied upon after 180 days from the date of its issue.

The property owner is solely responsible for notifying all governmental agencies, and the public at large, of the existence, release, treatment, or disposal of any hazardous materials observed at the project site. España Geotechnical Consulting assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing hazardous materials conditions being encountered or present on the project site, or from discovery of such hazardous materials.

REFERENCES

Butte County Department of Environmental Health, 2002, Personal communication with department personnel, October 3, 2002.

California Environmental Protection Agency, Department of Toxic Substances Control, 2002, Personal communication with Don Mandel on October 11, 2002.

California Department of Transportation, 1999, Project Development Procedures Manual, Appendix DD, Hazardous Waste, Initial Site Assessment (ISA) Checklist for Hazardous Wastes, July 1, 1999.

California Regional Water Quality Control Board, 2002, Personal communication with Dale Stultz on October 4, 2002.

California Department of Water Resources, 2002, Groundwater web-site (http://well.water.ca.gov/cgi-bin/gwater/clickmap.pl).

California Water Service Company, 2002, Personal communication with Tony Ruggle, October 4, 2002.

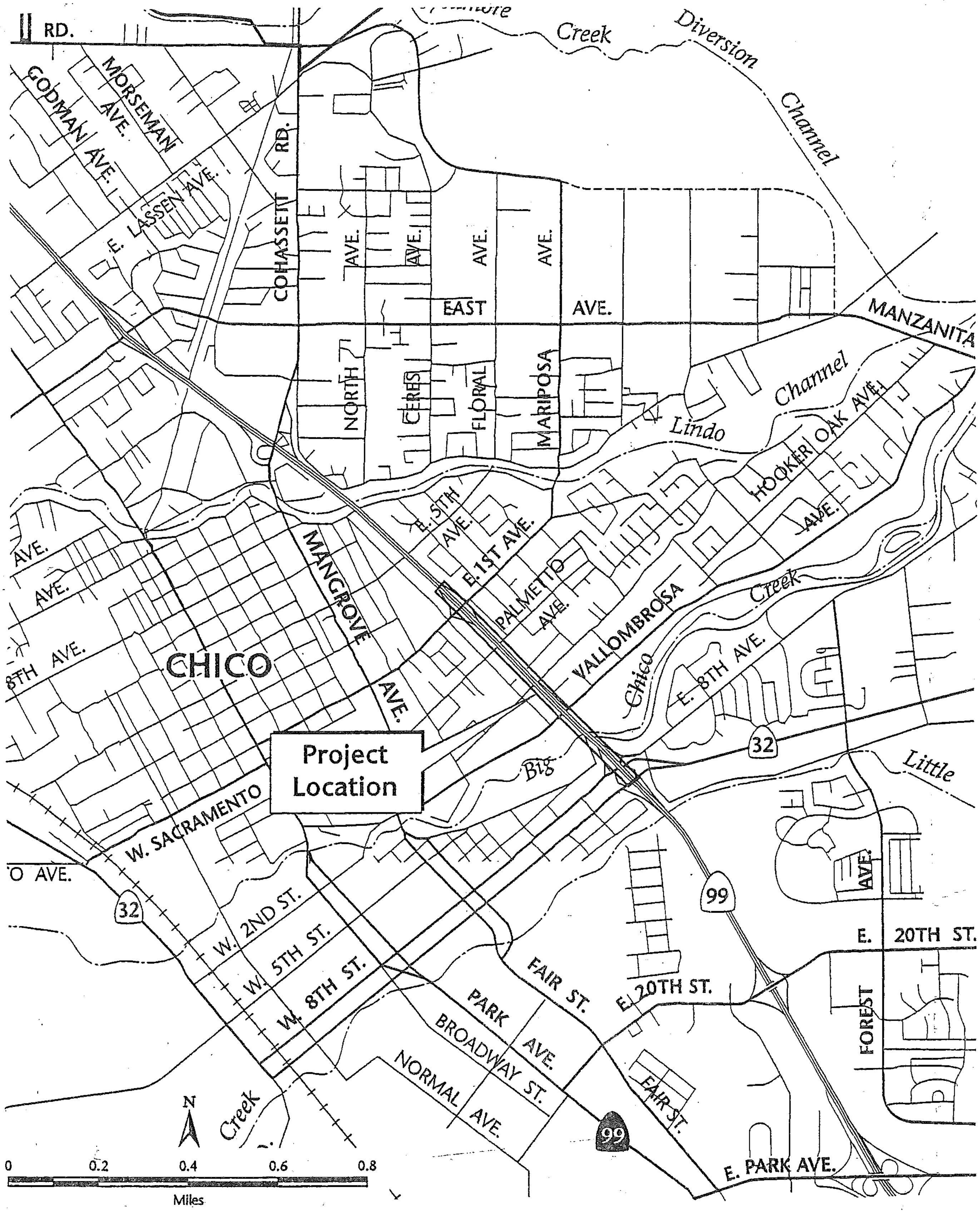
Cartwright Aerial Surveys, June 28, 1962, Photo No. But-3-60, Scale - 1"=1,667'; August 24, 1975, Photo No. 5147-1-113, Scale - 1"=2,000'; July 29, 1986, Photo No. 86063-412, Scale - 1"=1,833';March 20, 1990, Photo No. 90068-6-24, Scale - 1"=2,000'.

Jones & Stokes, Inc., 2002, Aerial photograph of project alignment (Inside and Outside Widening), August 1, 2002, Scale - 1:2000.

Radius Maps, Inc. (RMI), 2002, Corridor Study, RMI WO #1088, September 23, 2002.

USGS, 1950, 1969 and 1978, 7.5 Minute Topographic Map, Chico, California Quadrangle

USGS, 1949, 15 Minute Topographic Map, Chico, California Quadrangle



Source: Jones & Stokes, 2002

SITE MAP

State Route 99
Operational Improvements Project
Chico, California

ESPAÑA
Geotechnical Consulting
502 Giuseppe Ct, Ste 11, Roseville, CA 95678
(916) 773-2600 FAX (916) 782-4846

Project No. L201

Figure 1

Drawn by: MEW | Date: 10/02 | Field Rep: JS | Date: 9/02 | Checked by: MEW | Date: 10-11-02 | Reviewed by: [signature] | Date: 10/18/02

APPENDIX I

Radius Maps, Inc. Corridor Study Report
Number: 1088

ESPAÑA

RADIUS MAPS INC.

WO# 1088
September 23, 2002

Client: Michael Wilson
ESPANA Geotechnical Consulting
502 Giuseppe Court, Suite 11
Roseville, California 95678

Environmental Radius Report

Subject Property: State Highway 99 Between 5th Avenue & Humboldt Road
Chico, California 95926

Latitude: 39.740732
Longitude: -121.825299

This report identifies agency-listed hazardous waste/contaminated sites, solid waste landfills, hazardous waste transfer stations, spills, underground storage tanks, and leaking underground fuel tanks in proximity to the subject site. The databases used were obtained from selected government agencies in charge of collecting and keeping such records in accordance with ASTM E-1527-00 (Standard Government Records Inquiry for Commercial Real Estate Transactions). The ASTM records search includes potential sources of contamination including "Hazardous Waste Generators" such as dry cleaning facilities and service stations operating under valid permits.

The subject property:

	is	✓	*is not*	located within 1.0 mile of a known NPL (National Priority List Site-Superfund Site).
✓	*is*		*is not*	located within 0.5 mile of a known CERCLIS list site.
✓	*is*		*is not*	located within 1.0 mile of a " No Further Remedial Action Planned" site (NFRAP)
	is	✓	*is not*	located within 1.0 mile of a known RCRA CORRACTS TSD facility.
✓	*is*		*is not*	located within 0.5 mile of a known RCRA NON-CORRACTS TSD facility.
✓	*is*		*is not*	located within 0.125 mile of a know RCRA generator site.
	is	✓	*is not*	located within 0.125 mile of a known ERNS list site.
	is	✓	*is not*	located within 0.125 mile of a known SLIC list site.
	is	✓	*is not*	located within 1.0 mile of a known State Priority List Site (SPL).
✓	*is*		*is not*	located within 1.0 mile of a known CalSite ANNUAL WORKPLAN Site (AWP).
✓	*is*		*is not*	located within 0.5 mile of a known State-equivalent CERCLIS site (SCL).
	is	✓	*is not*	located within 0.5 mile of a known solid waste landfill (SWIS, SWLF).
✓	*is*		*is not*	located within 0.5 mile of a known leaking underground storage tank (LUST).
	is	✓	*is not*	located within 0.25 mile of a aboveground storage tank (AST).
✓	*is*		*is not*	located within 0.25 mile of a known state listed underground storage tank (UST).
✓	*is*		*is not*	located within 0.25 mile of a known local listed underground storage tank (UST).

The results of this report are computer generated. Lists of contaminated sites, usually including the addresses, have been "geocoded" for geographic location. Therefore, the locations of sites on the accompanying map are considered approximate. It is the responsibility of the users of this report to verify actual locations show on the map to the precision required for their purposes. Known contaminated sites that could not be located by geocoding methods are listed in this report as "unlocatable sites".

Located Sites

CERCLIS

1. FIRST AVENUE CLEANERS
1082 EAST FIRST AVENUE
CHICO, CA 95927
Site ID : 900028
EPA ID : CAD983567439
NPL Status : not on the NPL
Qual Code : high

Distance: 0.471 mile to the center of the Corridor
Direction: NW

2. FLAIR CUSTOM CLEANERS
660 MANGROVE AVENUE
CHICO, CA 95926
Site ID : 901953
EPA ID : CAD980677462
NPL Status : not on the NPL
Qual Code : high

Distance: 0.680 mile to the center of the Corridor
Direction: SW

NFRAP

3. DIAMOND INTL CORP
W 16TH ST PO BOX 1070
CHICO, CA 95927
Site ID : 901207
EPA ID : CAD009212945
NFRAP Flag: No Further Action
NPL Status : N
Description :
Qual Code : no further remedial action planned

Distance: 1.478 mile to the center of the Corridor
Direction: SW

4. PG&E GAS PLANT CHICO 210 1A
SE COR 2ND & BROADWAY
CHICO, CA 95927
Site ID : 902409
EPA ID : CAD981416159
NFRAP Flag: No Further Action
NPL Status : N
Description :
Qual Code : no further remedial action planned

Distance: 1.138 mile to the center of the Corridor
Direction: SW

5. PG&E GAS PLANT CHICO 210 1
2ND ST BET ORANGE & CHERRY ST
CHICO, CA 95927
Site ID : 902341
EPA ID : CAD981414956
NFRAP Flag: No Further Action
NPL Status : N
Description :
Qual Code : no further remedial action planned

Distance: 1.536 mile to the center of the Corridor
Direction: SW

6. COMSTOCK ROAD-CHICO CHEMICALS
7 COMSTOCK ROAD
CHICO, CA 95928
Site ID : 0904444
EPA ID : CAD983623802
NFRAP Flag: No Further Action
NPL Status : N
Description : APPROXIMATELY 500 CHEMICAL CONTAINERS WERE FOUND IN A PRIVATE RESIDENCE IN CHICO, CALIFORNIA.
Qual Code :

Distance: 2.051 mile to the center of the Corridor
Direction: SE

RCRA_Non_Corracts

7. CHICO BUTTE DSPL SERV INC
451 E 9TH AVE
CHICO, CA 95926
EPA ID : CAD065018814
Generator : This Facility is not a Generator
Transporter : This Facility is a Transporter

Distance: 1.229 mile to the center of the Corridor
Direction: NW

RCRA_Generator

8. CHICO CITY OF FIRE DEPT
901 FIR ST
CHICO, CA 95928
EPA ID : CAD981627110
Generator : This Facility is a Small Quantity Generator
Transporter : This Facility is not a Transporter

Distance: 0.512 mile to the center of the Corridor
Direction: SE

Annual Work Plan (AWP)

9. CHICO GROUNDWATER - CENTRAL PLUME
CHICO AREA GROUNDWATER
CHICO, CA 95926
ID # : 04990003
Address Used for This Site : MAIN CITY AREA OF CHICO
Status : 06/13/1997 - ANNUAL WORKPLAN – ACTIVE SITE
Lead : DEPT OF TOXIC SUBSTANCES CONTROL
Type : STATE FUNDED SITE
NPL Status : NOT LISTED

Distance: 0.359 mile to the center of the Corridor
Direction: S

10. VICTOR INDUSTRIES - 20TH STREET
365 EAST 20TH STREET
CHICO, CA 95926
ID # : 04360003
Status : 10/01/1990 - ANNUAL WORKPLAN – ACTIVE SITE
Lead : DEPT OF TOXIC SUBSTANCES CONTROL
Type : STATE FUNDED SITE
NPL Status : NOT LISTED

Distance: 1.353 mile to the center of the Corridor
Direction: S

11. NORTH VALLEY PLAZA CLEANERS
801 EAST AVENUE
CHICO, CA 95926
ID # : 04720005
Status : 07/01/1995 - ANNUAL WORKPLAN – ACTIVE SITE
Lead : DEPT OF TOXIC SUBSTANCES CONTROL
Type : RESPONSIBLE ARTY
NPL Status : NOT LISTED

Distance: 1.783 mile to the center of the Corridor
Direction: NW

State CERCLIS (SCL)

12. FIRST AVENUE CLEANERS
1082 EAST 1ST AVENUE
CHICO, CA 95927
ID # : 4720002
Status : DELISTED
Status Date : 10/5/1996

Distance: 0.475 mile to the center of the Corridor
Direction: NW

13. CHICO GROUNDWATER - SOUTHWEST PLUME
CHICO AREA GROUNDWATER
CHICO, CA 95926
ID # : 4990002
Status : BACKLOG - POTENTIAL AWP SITE
Status Date : 6/12/1997

Distance: 0.359 mile to the center of the Corridor
Direction: S

14. FLAIR CUSTOM CLEANERS
660 MANGROVE AVENUE
CHICO, CA 95927
ID # : 4720003
Status : BACKLOG - POTENTIAL AWP SITE
Status Date : 6/12/1997

Distance: 0.680 mile to the center of the Corridor
Direction: SW

15. CHICO SCRAP METAL YARD
1197 HUMBOLDT AVENUE
CHICO, CA 95928
ID # : 4500009
Status : BACKLOG - POTENTIAL AWP SITE
Status Date : 10/1/1990

Distance: 0.643 mile to the center of the Corridor
Direction: SSE

Leaking Underground Storage Tanks (LUST)

16. CHICO MUNICIPAL SERVICE CENTER
901 FIR ST & HWY 32
CHICO, CA 95928
Case # : 40025
Case Type : Surface Water has been contaminated
Leak Cause : Structure Failure
Leak Source : Piping
Stop Date : 1989/07/21
Abatement Method : Excavate & Dispose, Remove Free Product
Substance : diesel
MTBE Tested : Not Required to be Tested
Status : case closed

Distance: 0.512 mile to the center of the Corridor
Direction: SE

17. SHELL SS MIKES FORMER
1295 8TH ST E & BARTLETT ST
CHICO, CA 95928
Case # : 40036
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Overfill
Leak Source : Unknown
Stop Date : 1989/10/09
Abatement Method : Excavate & Treat
Substance : gasoline
MTBE Tested : Site Not Tested for MTBE
Status : case closed

Distance: 0.423 mile to the center of the Corridor
Direction: SSE

18. GASAMAT #954
580 10TH AVE E & LINDO E
CHICO, CA 95928
Case # : 40203
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1998/08/07
Abatement Method : Other
Substance : gasoline
MTBE Tested : MTBE Detected
Status : Remediation Plan

Distance: 0.647 mile to the center of the Corridor
Direction: SSE

19. CACITTI JACK PROPERTY
1180 9TH ST E & LINDEN & BARTLETT
CHICO, CA 95926
Case # : 40117
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Corrosion
Leak Source : Tank
Stop Date : 1994/06/29
Abatement Method : Excavate & Dispose
Substance : gasoline
MTBE Tested : MTBE Detected
Status : case closed

Distance: 0.604 mile to the center of the Corridor
Direction: SSE

20. TOSCO (UNOCAL) SS #6009 FORMER
890 MANGROVE AVE & PALMETTO AVE
CHICO, CA 95926
Case # : 40200
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1998/05/27
Abatement Method : Excavate & Dispose
Substance : gasoline
MTBE Tested : MTBE Detected
Status : case closed

Distance: 0.592 mile to the center of the Corridor
Direction: SW

21. VANELLA OIL COMPANY
1055 MANGROVE AVE & 1ST AVE E
CHICO, CA 95926
Case # : 40200
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1998/12/05
Abatement Method :
Substance : gasoline
MTBE Tested : MTBE Detected
Status : Pollution Characterization

Distance: 0.645 mile to the center of the Corridor
Direction: W

22. KING CHEVROLET
1501 MANGROVE AVE
CHICO, CA 95926
Case # : 40074
Case Type : Soil only has been impacted by the leak
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1991/08/01
Abatement Method :
Substance : waste oil
MTBE Tested : Not Required to be Tested
Status : case closed

Distance: 0.897 mile to the center of the Corridor
Direction: NW

23. ERICS CABLE CAR WASH
1625 MANGROVE AVE & 7TH AVE
CHICO, CA 95928
Case # : 40197
Case Type : Aquifer used for drinking water has been contaminated
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1998/04/14

Distance: 0.972 mile to the center of the Corridor
Direction: NW

Abatement Method :
Substance : gasoline
MTBE Tested : MTBE Detected
Status : Pollution Characterization

24. CALIFORNIA CLEANERS
471 7TH AVE E & PALM
CHICO, CA 95926
Case # : 40011
Case Type : Soil only has been impacted by the leak
Leak Cause : Overfill
Leak Source : Other
Stop Date : 1990/01/15
Abatement Method : Cap Site, Excavate & Dispose
Substance : solvent
MTBE Tested : Not Required to be Tested
Status : case closed

Distance: 1.082 mile to the center of the Corridor
Direction: NW

25. BAR-X LIQUOR STORE #3
601 MANGROVE AVE & VALLOMROSA AVE
CHICO, CA 95926
Case # : 40145
Case Type : Groundwater not used for drinking water has been contaminated
Leak Cause : Overfill
Leak Source : Unknown
Stop Date : 1995/07/17
Abatement Method :
Substance : gasoline
MTBE Tested : MTBE Detected
Status : case closed

Distance: 0.719 mile to the center of the Corridor
Direction: SW

26. SUPER SHOPPER
1885 8TH ST E
CHICO, CA 95928
Case # : 40051
Case Type : Soil only has been impacted by the leak
Leak Cause : Unknown
Leak Source : Unknown
Stop Date : 1991/12/04
Abatement Method : Excavate & Treat
Substance : gasoline
MTBE Tested : Site Not Tested for MTBE
Status : case closed

Distance: 0.833 mile to the center of the Corridor
Direction: NNE

27. ARCO FACILITY #5639
2000 BUSINESS LN & 20TH ST
CHICO, CA 95928
Case # : 40152
Case Type : Soil only has been impacted by the leak
Leak Cause : Other Cause
Leak Source : Unknown
Stop Date : 1995/05/09
Abatement Method : Excavate & Dispose
Substance : gasoline
MTBE Tested : Site Not Tested for MTBE
Status : case closed

Distance: 1.385 mile to the center of the Corridor
Direction: SE

State Listed Underground Storage Tanks (UST)

28. CALIFORNIA HIGHWAY PATROL
995 FIR ST
CHICO, CA 95928
Facility ID : 17941

Distance: 0.603 mile to the center of the Corridor
Direction: SE

29. CITY OF CHICO
901 FIR ST
CHICO, CA 95928
Facility ID : 42698

Distance: 0.512 mile to the center of the Corridor
Direction: SE

30. 8TH & 9TH ST AUTHOMTIVE
1295 E 8TH ST
CHICO, CA 95928
Facility ID : 1015

Distance: 0.423 mile to the center of the Corridor
Direction: SSE

Local Underground Storage Tanks (UST)

31. CDHP
995 FIR ST
CHICO, CA 95928

Distance: 0.603 mile to the center of the Corridor
Direction: SE

32. CITY OF CHICO
901 FIR ST
CHICO, CA 95928

Distance: 0.512 mile to the center of the Corridor
Direction: SE

33. 8TH & 9TH ST AUTHOMTIVE
1295 E 8TH ST
CHICO, CA 95928

Distance: 0.423 mile to the center of the Corridor
Direction: SSE

EXPLANATION OF DATABASES SEARCHED

NATIONAL PRIORITY LIST (NPL, Superfund)
RMI conducts a database search to identify all NPL sites within 1.0 mile the subject property.

In the past, many people were less aware of how dumping chemical wastes might affect public health and the environment. On thousands of properties where such practices were intensive or continuous, the result was uncontrolled or abandoned hazardous was sites, such as abandoned warehouses and landfills. Citizen concern over the extent of this problem led Congress to establish the Superfund Program in 1980 to locate, investigate, and clean up the worst sites nationwide. The EPA administers the Superfund program in cooperation with individual states and tribal governments.

Sites are listed on the National Priorities List (NPL) upon completion of Hazard Ranking System (HRS) screening, public solicitation of comments about the proposed site, and final placement of the site on the NPL after all comments have been addressed. Steps in this process include:

The NPL primarily serves as an information and management tool. It is part of the Superfund cleanup process. The NPL is updated periodically. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the HRS be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. This list, which is Appendix B of the National Contingency Plan (NCP), is the NPL.

The identification of a site for the NPL is intended primarily to guide EPA in: determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site; identifying what CERCLA-financed remedial actions may be appropriate; notifying the public of sites EPA believes warrant further investigation; and serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action.

Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions.

Source: Environmental Protection Agency
National Priorities Sites (NPL Sites "Superfund" or "CERCLIS")
Updated May 1, 2000

FEDERAL COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY INFORMATION SYSTEM (CERCLIS)
RMI conducts a database search to identify all CERCLIS sites within 0.5 mile the subject property.

The list of sites compiled by EPA that EPA has investigated or is currently investigating for potential hazardous substance contamination for possible inclusion on the National Priorities List.

Source: Environmental Protection Agency
Updated May 1, 2000

FEDERAL NO FURTHER REMEDIAL ACTION PLANNED (NFRAP)
RMI conducts a database search to identify all NFRAP sites within 1.0 mile of the subject property.

The Archive (NFRAP) database contains information on sites which have been removed and archived from the inventory of Superfund sites. Archive status indicates that to the best of the EPA's knowledge, Superfund has completed its assessment of a site and has determined that no further steps will be taken to list that site on the NPL.

Source: EPA
Updated: April 2001

FEDERAL RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) CORRACTS TSD FACILITIES
RMI conducts a database search to identify all RCRA CORRACTS TSD sites within 1.0 mile the subject property.

The environmental protection agencies (EPS's) list of treatment, storage, or disposal facilities subject to corrective action under RCRA.

The EPA Office of Solid Waste (OSW) manages the Resource Conservation and Recovery Information System. RCRIS is a national program management and inventory system of RCRA hazardous waste handlers.

RCRIS captures identification and location data for all handlers and a wide range of information on TSDs regarding permit/closure status, compliance with Federal and State regulations, and cleanup activities.

Source: Environmental Protection Agency Office of Solid Waste
Updated September 19, 2000

FEDERAL RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) NON-CORRACTS TSD FACILITIES
RMI conducts a database search to identify all RCRA Non-Corracts TSD sites within 0.5 mile the subject property.

Those facilities on which treatment, storage, and/or disposal of hazardous wastes takes place, and defined and regulated by RCRA.

The EPA Office of Solid Waste (OSW) manages the Resource Conservation and Recovery Information System. RCRIS is a national program management and inventory system of RCRA hazardous waste handlers.

RCRIS captures identification and location data for all handlers and a wide range of information on TSDs regarding permit/closure status, compliance with Federal and State regulations, and cleanup activities.

Source: Environmental Protection Agency Office of Solid Waste
Updated September 19, 2000

FEDERAL RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) GENERATORS LIST
RMI conducts a database search to identify all RCRA Generators sites within 0.125 mile the subject property.

The list kept by EPA of those persons or entities that generate hazardous wastes as defined and regulated by RCRA.

The EPA Office of Solid Waste (OSW) manages the Resource Conservation and Recovery Information System. RCRIS is a national program management and inventory system of RCRA hazardous waste generators.

Source: Environmental Protection Agency Office of Solid Waste
Updated September 19, 2000

FEDERAL EMERGENCY RESPONSE NOTIFICATION SYSTEM (ERNS)
RMI conducts a database search to identify all ERNS sites within 0.125 mile the subject property.

EPS's emergency response notification system list of reported CERCLA hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center. Notification requirements for such releases or spills are codified in 40 CFR Pars 302 and 355.

Source: Environmental Protection Agency
Updated May 1, 2000

SPILLED LEAK INVESTIGATIVE CLEANUP (SLIC)
RMI conducts a database search to identify all SLIC sites within 0.125 mile the subject property.

Source: State Water Regional Control Boards
Updated March 31, 2000

STATE PRIORITY LIST (SPL)
RMI conducts a database search to identify all SPL sites within 1.0 mile of the subject property.

In 1985, after the Federal Government passed the Superfund Bill, the State of California Health and Welfare Agency, Department of Health Services, passed it's own bond for it's hazardous sites. It was called *Expenditure Plan for the Hazardous Substance Cleanup Bond Act of 1984.* Sites that were considered "priority" were listed in this bond. This list was considered the State Priority List.

In 1991 the CalSites database was developed by the department of Toxic Substance Control and the State priority list archived. Sites listed have either been remediated or reclassified per the CalSite program.

CALSITE ANNUAL WORKPLAN (AWP)
RMI conducts a database search to identify all AWP sites within 1.0 mile the subject property.

The California Department of Toxic Substances Control (DTSC) has developed an electronic database system with information about sites that are known to be contaminated with hazardous substances as well as information on uncharacterized properties where further studies may reveal problems. The database, referred to as "CalSites," is used primarily by DTSC's staff as an informational tool to evaluate and track activities at properties that may have been affected by the release of hazardous substances.

Sites that have been classified AWP are considered to be of the highest priority and are now under remediation.

Source: California Department of Toxic Substance Control
Updated August 1, 2000

STATE EQUIVALENT CERCLIS LIST (SCL)
RMI conducts a database search to identify all State Equivalent CERCLIS sites within 0.5 mile the subject property.

The California Department of Toxic Substances Control (DTSC) has developed an electronic database system with information about sites that are known to be contaminated with hazardous substances as well as information on uncharacterized properties where further studies may reveal problems. The database, referred to as "CalSites," is used primarily by DTSC's staff as an informational tool to evaluate and track activities at properties that may have been affected by the release of hazardous substances.

Sites that are not AWP (Annual workplan) are not actively being remediated, but are stilled being tracked.

Source: California Department of Toxic Substance Control
Updated August 1, 2000

SOLID WASTE LANDFILLS (SWLF, SWIS List)
RMI conducts a database search to identify all Solid Waste Landfill sites within 0.5 mile of the subject property.

This database contains information on solid waste facilities, operations, and disposal sites throughout the State of California. The types of facilities found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites.

For each facility, the database contains information about location, owner, operator, facility type, regulatory and operational status, waste types received, and local enforcement agency.

Source: Integrated Waste Management Board
Updated March 21, 2000

LEAKING UNDERGROUND STORAGE TANKS (LUST)
RMI conducts a database search to identify all LUST sites within 0.5 mile of the subject property.

A major source of groundwater pollution is leaking underground storage tanks. Local agencies, such as health departments, water districts, or fire departments, are primarily responsible for permitting and monitoring these tanks to prevent problems. When leaks are discovered the local agencies usually regulate any necessary cleanups. The Regional Water Board works with the local agencies, providing general guidance and technical advice. The Regional Board will also use its enforcement powers when needed in order to assure cleanup.

Source: Regional Water Quality Control Board
Updated March 15, 2002

UNDERGROUND STORAGE TANKS (UST)
RMI conducts a database search to identify all UST sites within 0.25 mile of the subject property.

ASTM standards require disclosure from state UST databases . However, California is one of the few states that does not yet maintain a comprehensive UST database. Therefore, RMI reviews available local and county UST databases.
Updated June, 2002

ABOVEGROUND STORAGE TANKS (AST)
RMI conducts a database search to identify all AST sites within 0.25 mile of the subject property.

This database was provided by the State Water Resources, Division of Clean Water Programs, Aboveground Tank Division

Source: State Water Resources Board
Updated September 1, 2000

APPENDIX II

Caltrans Initial Site Assessment Checklist

Initial Site Assessment (ISA) Checklist

Project Information

District 3 County Butte Route SR99 Kilometer Post (Post Mile) R53.4 (R33.2) EA 3A040K

Description SR99 Improvements Project between SR32 and East First Ave, Chico, CA. SR99 is a 4-lane divided freeway separated by 14-M median with connector ramps at both SR 32 and East First Avenue.

Is the project on the HW Study Minimal-Risk Projects List (HW1)? unknown

Project Manager Mike Forga phone # (530) 741-5456

Project Engineer N/a phone # ____

Project Screening

Attach the project location map to this checklist to show location of all know and/or potential HW sites identified.

1. Project Features: New R/W? yes Excavation? yes Railroad Involvement? no
   Structure demolition/modification? likely Subsurface utility relocation? likely
2. Project Setting SR99 Freeway (from SR 32 to E First Avenue)
   Rural or Urban Urban
   Current land uses SR99 Freeway
   Adjacent land uses Primarily residential, minor commercial
   (industrial, light industry, commercial, agricultural, residential, etc.)
3. Check federal, State, and local environmental and health regulatory agency records as necessary, to see if any known hazardous waste site is in or near the project area. If a known site is identified, show its location on the attached map and attach additional sheets, as needed, to provide pertinent information for the proposed project.
4. Conduct Field Inspection. Date 9-25-02 Use the attached map to locate potential or known HW sites. See Attached Appendix 1, RM1 Corridor Study

   STORAGE STRUCTURES / PIPELINES:

   Underground tanks yes (offsite) Surface tanks yes (water, offsite)
   Sumps No Ponds No
   Drums No Basins No
   Transformers yes Landfill No
   Other N/a

Initial Site Assessment (ISA) Checklist

(continued)

CONTAMINATION: (spills, leaks, illegal dumping, etc.)

Surface staining Minor oil stains on freeway Oil sheen No

Odors No Vegetation damage No

Other No

HAZARDOUS MATERIALS: (asbestos, lead, etc.)

Buildings n/a Spray-on fireproofing n/a

Pipe wrap n/a Friable tile N/a

Acoustical plaster n/a Serpentine n/a

Paint potential for lead in yellow pavement stripping Other Possible ADL in soil. Possible PCB's in electrical transformers. Possible asbestos-bearing construction materials. Possible GW contamination.

5. Additional record search, as necessary, of subsequent land uses that could have resulted in a hazardous waste site. Use the attached map to show the location of potential hazardous waste sites.

6. Other comments and/or observations: Possible ADL from vehicle exhaust in surface and near surface soils within existing and future right-of-ways. Potential for PCB's to exist within electrical transformers which may be encountered w/in construction easement. Possible lead w/in yellow pavement stripping. Possible asbestos-bearing construction materials w/in bridge structures. Potential contaminated groundwater involvement for planned deep foundations.

ISA Determination

Does the project have potential hazardous waste involvement? yes If there is known or potential hazardous waste involvement, is additional ISA work needed before task orders can be prepared for the Investigation? yes If "YES," explain; then give an estimate of additional time required: If soil will be transported offsite, surface and near surface sampling and analysis should be performed for ADL. Yellow pavement stripping requiring removal should be sampled and tested for lead. Perform a visual inspection of all electrical transformers w/in construction easement for fluid leaks and soil staining. If bridge structures will be altered, an asbestos survey should be performed for the presence of asbestos-bearing materials. If deep foundations are planned to encounter groundwater, sampling and testing of groundwater should be performed to determine potential contaminant levels.

A brief memo should be prepared to transmit the ISA conclusions to the Project Manager and Project Engineer.

ISA Conducted by Michael Wilson **Date** 12-19-02

FOUNDATION INVESTIGATION REPORT

BIDWELL PARK VIADUCT (WIDEN)
(BRIDGE NO. 12-151 R/L)
CHICO, CALIFORNIA
03-BUT-99 PM 32.61 EA 03-3A0421

B06-200
102
(440)

FILE

For

QUINCY ENGINEERING INC.
3247 Ramos Circle
Sacramento, CA 95827-2512

PARIKH CONSULTANTS, INC.
2360 Qume Drive, Suite A, San Josoe, CA 95131
(408) 452-9000

February 2009

Job No. 202101.BID

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BIDWELL PARK VIADUCT (WIDEN)
(BRIDGE NO. 12-151 R/L)
CHICO, CALIFORNIA
03-BUT-99 PM 32.61 EA 03-3A0421

1. INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the "Bidwell Park Viaduct (Widen)" in Chico, California, hereinafter referred to as "PROJECT". The work was performed in general accordance with the scope of work outlined in our proposal to Quincy Engineering Inc. (hereinafter referred to as Designer). The approximate location of the project site is shown on the Project Location Map, Plate 1.

The geotechnical recommendations presented in this report are intended for design input and are not intended to be used as specifications. In addition, the data provided in this report including these geotechnical recommendations should not be used for bidding purposes or for construction cost estimates. If the report is provided as a reference document, any interpretation of the data and recommendations should be the sole responsibility of the user and PARIKH Consultants, Inc. (PARIKH) shall not be liable for any consequences.

2. PURPOSE AND SCOPE

The purpose of this investigation was to evaluate the general subsurface conditions at the project site, to evaluate their engineering properties, and to provide geotechnical recommendations for the foundation design of the proposed project.

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the site including available as-built Log of Test Borings (LOTB); site reconnaissance; obtaining representative soil samples and logging soil materials encountered in six exploratory borings; laboratory testing of the collected soil samples, performing engineering analyses based on the field and laboratory data, and preparation of this report.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the subsurface soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain properly constructed project. We, therefore, recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

3. EXISTING BRIDGE STRUCTURES AND PROPOSED CONSTRUCTION

Existing Bridge Structures

The Bidwell Park Viaduct carries State Route (SR) 99 over Bidwell Park and Big Chico Creek. The existing Bidwell Park Viaduct consists of two bridge structures (Bridge No. 12-151 R/L), which were constructed in 1963. The existing Bidwell Park Viaduct has fourteen spans with total structure length of 762'-0" and a width of that varies from 39'-8" to 53'-10". Each bridge carries two 12' traffic lanes with 5'-0" interior shoulders and 8'-0" exterior shoulders.

Both bridges are 3'-6" deep reinforced concrete box girders supported by single pier walls at each bent and closed bin abutments. Pier walls are supported by either spread footing or pile foundations. Diaphragm abutments are supported on piles with curtain walls between end diaphragms and first interior piers to form the closed bin.

Based on the "as-built" drawings, all piles for the existing bridge structures are 45-ton precast concrete displacement piles. Piles appear to be point end bearing and are short in length, with no pile reaching an embedment greater than 13 feet. Difficult pile driving was encountered during pile installation and several piles failed by cracking. Spread footings in the vicinity of Big Chico Creek required the use of a poured trimie seal course.

Proposed Construction

The project is part of the "Chico SR 99 Auxiliary Lane" project in Butte County, California. The " Chico SR 99 Auxiliary Lane" project is to add auxiliary lanes between the SR 32 Interchange and East 1st Avenue Interchange and construct associates ramp improvements.

As part of the "Chico SR 99 Auxiliary Lane" project, it is proposed to widen the existing bridges of "Bidwell Park Viaduct" with a median widening and exterior widenings in order to accommodate the proposed roadway section. The new superstructure will be reinforced concrete box girder to match existing type and depth.

Based on our discussions with the designer, it is recommended that the proposed bridge structure widening is to be supported on HP 14x89 steel piles at Abutment 1, Piers 2 and 14 and supported on spread footings at Piers 3 through 13. The widened structures at Abutment 15 will be supported on the existing foundation.

Our recommendations presented in this report are based on the above information. Any major deviation should be reported to PARIKH for further consideration.

4. SITE CONDITIONS

The existing Bidwell Park Viaduct is located along SR 99 between SR 32 and East 1st Avenue. The ground surface below the Bidwell Park Viaduct is considered relatively level. Big Chico Creek crosses between Pier 4 and Pier 5.

5. FIELD EXPLORATION AND LABORATORY TESTING

Borings BID-1 through BID-6 (except Boring BID-3) were drilled in March 2008 for the proposed bridge widening. Boring BID-3 was stopped at the depth of 7 feet because of difficult drilling. These borings were drilled to the approximate depths between 60 feet and 70 feet and at elevations between Elev. +145.0 feet and Elev. +156.5 feet. The as-built LOTB of the "Bidwell Park Viaduct" (March 1960) are also referred.

The approximate locations of the borings are shown on the Site Plan, Plate 2. The details of the field exploration are included in Appendix A. The descriptions of the materials encountered in the field exploration are shown on the LOTB in Appendix A. The relevant as-built boring information available in the vicinity of the project is included in Appendix A.

Laboratory tests were performed on selected soil samples collected during field exploration to evaluate the physical and engineering properties of the subsurface soils. The laboratory test methods and test results are presented on plates included in Appendix B. Laboratory test results for moisture content, dry unit weight, unconfined compressive strength, Plasticity Index and grain size classification of the soil samples are presented on the LOTB in Appendix A.

It should be noted that the descriptions of the soils encountered and relevant boring information presented on the LOTB depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the boring locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

6. SUBSURFACE CONDITIONS

As-built Data Review

Based on the as-built LOTB of the "Bidwell Park Viaduct" (March 1960). Borings B-2, B-6, B-10, B-20 and B-25 were drilled to the depths between 15 feet and 70 feet and Cone Penetration Tests (CPT) were performed in Borings B-1 through B-31 (except the 5 soil borings). These CPT were penetrated to the depths between 10 feet and 73 feet.

As-built borings indicate subsurface soil conditions at the project site generally consists of loose to medium dense sands underlain by dense to very dense sands/gravels/cobbles/boulders with occasional pockets/lenses of firm to very stiff clays. Groundwater was recorded at the depths of 5 feet to 10 feet between Elev. +205 feet and Elev. +210 feet in the soil borings/CPTs in March 1960.

Field Exploration in March 2008

Based on the LOTB of Borings BID-1 through BID-6, the subsurface soil conditions of the project site generally consists of firm to very stiff lean clay/loose to medium dense sands, underlain by dense to very dense gravels/sands, underlain by intermittent layers of medium dense to very dense sands/gravels with layers of firm to very stiff clays. This is generally consistent with the subsurface soil conditions of as-built borings.

Groundwater was recorded at the depth of 7 feet at Elev. +208 feet during drilling in Boring BID-4 in March 2008. The groundwater level is anticipated to vary with the passage of time due to seasonal groundwater fluctuations, fluctuation of water elevations in the Big Chico Creek and nearby creeks, surface and subsurface flows, ground surface run-off, and other environmental factors, which may not be present at the time of the investigation.

7. GEOLOGY

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California (D.S. Harwood, E.J. Helley and M.P. Doukas, 1981; Scale 1:62,500; USGS Map I-1238). Based on the map, the project site subsurface soils consist of the upper member of the Pleistocene Modesto Formation (Qmu). In the vicinity of the project, Holocene Basin Deposits (Qb) can also be found. A geologic map of the general project area is shown on Plate 3. Description of the main geologic units is as follows:

Qmu – Modesto Formation – Upper Member (Pleistocene). Gravel, sand and clay derived from the Tuscan Formation and from rocks of the Coast Ranges and Klamath Mountain. Lithologically similar to the lower member and forms the lower of the two Modesto Terraces. Both the upper and lower members probably were deposited by the same streams that flow today because they tend to border existing channels.

Qb – Basin Deposits (Holocene). Fine grained silt and clay derived from the same sources as alluvial deposits but laid down in low-lying overflow flood basins between modern watercourses.

8. EARTHQUAKE CONSIDERATIONS

8.1 Seismic Sources

The project site is located within an area of northern California known to be seismically active. Seismic activity may result in geological and seismic hazards including seismically induced fault displacement and rupture, ground shaking, liquefaction, lateral spreading, landslides, avalanches, and structural hazards.

Faults in the vicinity of the project site with a moderate to high potential for surface rupture include the Bear Mountains Fault Zone and Great Valley Fault 1. These faults are capable of producing earthquakes, and may cause strong ground shaking at the site. The attached Fault Map (Plate 4) presents the locations of the fault systems relative to the project site.

The Fault Map has been prepared from the Caltrans Seismic Hazard Map (Mualchin, 1996) and presents the maximum credible earthquake magnitudes for the fault systems and the anticipated peak bedrock accelerations at various locations due to seismic activity in the area.

Maximum Credible Earthquake magnitudes for some of the major faults in the area determined by Mualchin (California Seismic Hazard Map 1996) are summarized in Table 1 below. These Maximum Credible Earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

TABLE 1:EARTHQUAKE DATA

Fault	Estimated Distance from Project Site (Mile)	Maximum Credible Earthquake (MCE)	Peak Bedrock Acceleration (PBA) (g)	Peak Ground Acceleration (PGA) (g)
Bear Mountain Fault Zone (Normal)	22.2	6.5	0.2	0.3
Great Valley Fault 1 (Reverse)	26.2	6.7	0.2	0.3

According to Caltrans Guidelines for Structures Foundation Report (March 2006), the value of PBA (for a specific project site) from the seismic hazard map should be verified with that calculated using the attenuation relation by Sadigh et al (1997). Based on attenuation relation by Sadigh, the maximum PBA anticipated at the project site is 0.2 g (as shown in Table 1).

Based on the available boring information in the vicinity of the project site, the subsurface soil conditions at the project site generally match the criteria for Soil Type D, as per Caltrans Seismic Design Criteria (Version 1.4, June 2006). Based on Caltrans Seismic Design Criteria and the above information, the seismic design criteria for M=6.5, +/- 0.25 are as follows:

1. Closest Distance to Fault	=	22.2 miles
2. Peak Bedrock Acceleration	=	0.2 g
3. Soil Type	=	Type D
4. ARS Design Curve	=	Figure B-7 for Soil Type D with no modification.

A copy of the "ARS Design Curve" (Plate No. 5) is included. The calculation for attenuation relationship based on Sadigh is included in Appendix C.

8.2 Seismic Hazards/Liquefaction Potential

Potential seismic hazards may arise from three sources: surface fault rupture; ground shaking; and liquefaction. Since no active fault passes through the project site, the potential for fault rupture is relatively low. Based on available geological and seismic data, the possibility that the site will experience strong ground shaking may be considered low to moderate.

Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on the available boring information, the subsurface soil conditions of the project site generally consist of firm to very stiff lean clay/medium dense sands, underlain by dense to very dense gravels/sands. Based on this boring log and the as-built LOTB, it appears that the liquefaction potential is generally considered as relatively low due to the low seismicity at the project site and does not appear to be a significant issue.

9. FINDINGS AND RECOMMENDATIONS

9.1 General

Based on the findings of our investigation, it is our opinion that the proposed project is feasible from a geotechnical engineering standpoint provided the recommendations presented in this report are incorporated into the final design and construction.

This report was prepared specifically for the proposed project. Normal construction procedures were assumed throughout our analyses and represent one of the bases of recommendations presented herein. Our design criteria have been based upon the materials and conditions encountered in the soil borings. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

9.2 Grading

All grading operations should be performed in accordance with the project specifications and Caltrans Standard Specifications for Earthwork (Section 19). A representative from PARIKH or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill materials.

9.3 Bridge Foundation

Based on the available boring information and requirements for vertical and horizontal demands, it is recommended that Standard Steel H-piles (HP 14x89) with driving shoes be used at Abutments 1, and Piers 2 and 14. Spread footing is recommended as foundation system for the supports at Piers 3 through 13. Abutment 15 will be supported on existing pile foundation.

9.3.1 Pile Design

According to the designer, the planned pile cap/ footing bottom elevations are between Elev. +214 feet and Elev. +222 feet at Abutment 1, Elev. +210 feet at Pier 2 and Elev. +211 feet at Pier 14. Pertinent foundation design information (except the pile type) provided by the designer for the pile design is presented in the following tables (Foundation Design

Data and Foundation Design Loads).

TABLE 2: FOUNDATION DESIGN DATA

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement (in)	No. of Piles per Support
					B	L		
Abut 1 R (step #1)	WSD	HP 14x89	237.0	222.0	8.0	13.0	1	8
Abut 1 R (step #2)	WSD	HP 14x89	237.0	218.0	8.0	13.0	1	6
Abut 1 R (step #3)	WSD	HP 14x89	237.0	214.0	8.0	15.5	1	4
Abut 1 L (step #1)	WSD	HP 14x89	237.0	222.0	8.0	15.5	1	6
Abut 1 L (step #2)	WSD	HP 14x89	237.0	218.0	8.0	15.5	1	8
Pier 2 Right	LRFD	HP 14x89	215.0	210.0	7.0	31.5	1	10
Pier 2 Left	LRFD	HP 14x89	215.0	210.0	7.0	31.5	1	10
Pier 14 Right	LRFD	HP 14x89	215.0	210.0	7.0	4.5	1	2
Pier 14 Left	LRFD	HP 14x89	215.0	210.0	7.0	4.5	1	2

TABLE 3: FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	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 R	251	90	26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 1 L	191	90	22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pier 2 R	868	124	634	830	170	N/A*	33	1734	236	N/A*	130
Pier 2 L	784	124	572	1105	175	N/A*	11	1647	230	N/A*	135
Pier 14 R	265	133	190	346	175	N/A*	30	400	200	N/A*	110
Pier 14 L	265	133	190	346	175	N/A*	30	400	200	N/A*	110

* Entire support remains in overall compression

The abutment foundations were evaluated for the foundation design data and loading condition using Caltrans November 2003 Bridge Design Specifications for foundations, using Working Stress Design (WSD) methods with “LRFD Service-I Loads”. With “LRFD Service-I Loads”, the Pier 2 and Pier 14 foundations were evaluated for the foundation design data and loading conditions using AASHTO LRFD Bridge Design Specifications – 3rd Edition, with Interims Through 2006 and current Caltrans Amendments (v3.06.01).

The actual load demands on the piles, based upon WSD and LRFD are presented in the

Tables 4 and 5 below. The estimated specified tip elevations for the anticipated design loading of the piles are shown in the Table 4 and 5 below. The pile cut-off elevations are shown in the Table 2.

TABLE 4: PILE DATA TABLE (ABUTMENT)

Location	Pile Type	Design Method (WSD or LRFD)	LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance (kips)
Abut 1 R (Step #1)	HP 14x89	WSD	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 R (Step #2)	HP 14x89	WSD	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 R (Step #3)	HP 14x89	WSD	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 L (Step #1)	HP 14x89	WSD	90	180	192.5 (a), 197.0 (b)	192.5	188.0
Abut 1 L (Step #2)	HP 14x89	WSD	90	180	192.5 (a), 197.0 (b)	192.5	188.0

Notes:
Design tip elevations are controlled by (a) Compression, (b) Lateral Load.

TABLE 5: PILE DATA TABLE (PIERS)

Location	Pile Type	Design Method (WSD or LRFD)	Required Factored Nominal Resistance (kips)				Design Tip Elev.[(1)] (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance Required (kips)(iii)
			Strength Limit		Extreme Event				
			Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)			
Pier 2 Right	HP 14x89	LRFD	250	50	240	130	170.0 (a), 188.0 (b) 171.0 (c), 178.0 (d) 187.0 (e)	170.0	252.4
Pier 2 Left	HP 14x89	LRFD	250	20	230	135	170.0 (a), 199.0 (b) 172.0 (c), 177.0 (d) 187.0 (e)	170.0	252.4
Pier 14 Right	HP 14x89	LRFD	250	43	200	110	160.5 (a), 190.5 (b) 169.5 (c), 166.5 (d) 186.5 (e)	160.5	252.8
Pier 14 Left	HP 14x89	LRFD	250	43	200	110	160.5 (a), 190.5 (b) 169.5 (c), 166.5 (d) 186.5 (e)	160.5	252.8

Notes
(i) Design tip elevations are controlled by (a) Compression (Strength Limit), (b) Tension (Strength Limit), (c) Compression (Extreme Event), (d) Tension (Extreme Event), (e) Lateral Load, (f) Settlement respectively.
(ii) The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
(iii) The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the penetrated soil layers, if any, which do not contribute to the design resistance.

Based on subsurface soil conditions at the project site, it is our opinion that the design tip elevation is not controlled by settlement and therefore not included in Table 5.

The pile capacity estimation is based on procedures outlined by U.S. Army Corps of Engineers. Only skin friction was considered in the pile capacity calculations. Based on the Pile Data Tables 4 and 5, the pile tip elevations are controlled by the demand in compression on the pile. The assumed soil profiles with strength parameters and pile capacity calculations are provided in Appendix C.

The design tip elevations and specified tip elevations are based on the planned footing bottom elevations provided by the designer. In the event that the footing bottom elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity. A "P-Y Curve Modification Factor" of 0.6 should be adopted in the lateral pile analysis for pile spacing of 3 times the pile diameter.

Due to the variable consistencies of the dense to very dense sand/gravel layers and cobbles and boulders, hard driving conditions should be anticipated. We therefore recommend that a driving shoe be used for the pile driving. We recommend that the piles be driven to the specified elevations. It is anticipated that the pile capacity will develop after driving as a result of soil "freeze" and dissipation of excess pore water pressures. The gain of pile capacity after initial driving may be evaluated based on "re-striking" after 24-hour (minimum) set-up.

According to the designer, there are few residential houses north of Abutment 15. The closest distance between the residential house and the pile driving location is estimated to be approximately 120 feet. There is no historical building in the vicinity of the project site. The following mitigation measures can be considered (not limited to) if noise and vibration is a concern during pile driving:

- Provide schedule of pile driving with restricted times;
- Monitor noise and vibration. Commonly used noise descriptors such as A-Weighting

(dBA), Equivalent Sound Level (Leq) and Statistical Descriptors can be considered. Peak Particle Velocity (PPV) is appropriate for evaluating vibration associated with pile driving;

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity gain due to soil "freeze". Typical applications include capacity evaluation (for both during driving and re-striking). The geotechnical engineer should be consulted for any unanticipated pile driving conditions.

9.3.2 Spread Footing

The minimum footing widths, bottom of footing elevations provided by the designer and recommended bearing limits of the spread footings are summarized in the following "Spread Footing Data Table" Table 6.

Other Geotechnical Parameters for Foundation Design

(a) The recommended passive resistance against the side of the footing is 345 pcf Equivalent Fluid Pressure.

(b) A coefficient of friction of 0.35 may be used to estimate the friction resistance at the bottom of the footing. Only dead loads should be used to estimate the frictional resistance at the bottom of footings.

(c) Sliding resistance should be calculated using only 100% of the base resistance, or, 100% of passive resistance behind the footing, or using 50% of base resistance plus 50% of passive resistance.

TABLE 6: SPREAD FOOTING DATA TABLE

Median Support No.	Design Method (WSD or LRFD)	Finish Grade Elev. (ft)	BOF Elevation (ft)	Footing Size (ft)		Net Permissible Contact Stress (Service) LRFD	Factored Gross Nominal Bearing Resistance (Resistance Factor=0.45) (Strength) LRFD)	Factored Gross Nominal Bearing Resistance (Resistance Factor=1.00) (Extreme Event) LRFD)
				B	L			
Pier 3 Median	LRFD	~215.0	206.0	18	18	7.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Left	LRFD	~215.0	206.0	14	14	9.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Right	LRFD	~215.0	206.0	16	16	8.0 ksf	18.0 ksf	32.0 ksf
Pier 4 Median	LRFD	~215.0	204.0	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 4 Left & Right	LRFD	~215.0	204.0	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Median	LRFD	~215.0	205.0	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Left & Right	LRFD	~215.0	205.0	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 6 Median	LRFD	~215.0	208.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 6 Left & Right	LRFD	~215.0	208.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Median	LRFD	~215.0	209.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Left & Right	LRFD	~215.0	209.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 8 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 8 Left & Right	LRFD	~215.0	209.0	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 9 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 9 Left & Right	LRFD	~215.0	209.0	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 10 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 10 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 11 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 11 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 12 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	6.5 ksf	14.0 ksf
Pier 12 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	6.5 ksf	14.0 ksf
Pier 13 Median	LRFD	~215.0	207.0[1]	18	18	6.0 ksf	8.0 ksf	18.0 ksf
Pier 13 Left & Right	LRFD	~215.0	207.0[1]	12	12	9.0 ksf	8.0 ksf	18.0 ksf

Notes

(1) The "Bottom of Footing Elevation" of Pier 13 is recommended to be 207.0 feet based on the subsurface soil conditions. As an option, the material can be over-excavated to this depth and replaced with lean concrete base or compacted aggregate base to Elev. +208.5 feet.

9.3.3. Scour

Scour analyses included in the hydraulic study shows pier scour is anticipated to be generally minimal (except at Piers 4 and 5), as majority of the piers are located away from the low flow channel. Big Chico Creek has a low flow rate and existing piers appear to have minor scour issues.

The estimated total scour is 6 feet (contraction scour of 0.5 feet and local scour of 5.5 feet) at Piers 4 and 5 according to the hydraulic studies. The scour elevation was assumed to be +209 feet in the calculations of bearing capacity at Piers 4 and 5. Riprap will be provided at Piers 4 and 5 for scour protection.

9.4 Lateral Design for Piles

Under seismic loading conditions, lateral pile capacity analyses were performed for the H-steel piles using LPILE program. A "fixed" pile head connection was assumed in the lateral pile capacity analyses.

Following are the lateral loads for Piers 2 and 14 according to the designer:

Loading	Lateral Load at Piers 2&14 South (kips)	Lateral Load at Piers 2&14 North (kips)
Service	8.3	17.5
Strength	12.0	25.8
Extreme	7.9	9.2

Plots of deflection, bending moment, shear and soil reaction together with typical input files are attached in Appendix C. According to Caltrans, group effect for lateral pile resistance analyses was accounted for by adopting a p-y reduction factor of 40% (60% effective) for a pile spacing of 3D.

9.5 Lateral Earth Pressures

Abutment retaining walls and wing walls should be designed to resist the following applied lateral earth pressures and live loads. These values assume no hydrostatic pore pressure build-up behind the wall and are based on well-drained backfill behind the walls.

Applied Lateral Earth Pressures

Active Condition- 36 pcf Equivalent Fluid Pressure (EFP) for Caltrans "Structure Backfill" material.

At-Rest Condition-55 pcf EFP for Caltrans "Structure Backfill" material.

Passive Resistance-350 pcf Equivalent Fluid Pressure with a maximum value of 3500 psf. 5.0 ksf (ultimate) for seismic design of the abutment wall (5.5 feet or greater); for activated height less than 5.5 feet (1.7 m), modify proportionally i.e. 5.0x(H/5.5) ksf per Caltrans SDC v.1.4. A minimum lateral wall movement of 2% of wall height to mobilize the full ultimate passive resistance is required.

Traffic Load Surcharge The effect of any surcharge (dead or live load) should be added to the preceding lateral earth pressures. An additional height with equivalent earth pressure of not less than 2 feet of uniform soil weight at 125 pcf is added to the ground profile to account for the additional earth pressure resulting from the surcharge. Surcharge load due to the traffic has to be included in the design if the traffic is within a horizontal distance of one half of the wall height. A coefficient of 0.4 may be used to determine the additional lateral earth pressures resulting from the surcharge.

Cantilever walls which are free to rotate at least 0.005 radii may be assumed flexible for the active condition. Walls that are not capable of this movement should be assumed rigid and designed for the at-rest condition. The effect of any surcharge (dead or live load) should be added to the preceding lateral earth pressures. A coefficient of 0.3 and 0.5 may be used to determine the additional earth pressure resulting from the surcharge for cantilever walls and rigid walls, respectively.

9.6 Settlement Evaluation at Foundation Supports

Embankment fill is required at Abutment 1 on the south side of this project. The maximum height of the embankment fill is approximately 12 feet above the existing ground surface.

Boring BID-2 indicates that the subsurface soil conditions in the vicinity of Abutment1 generally consists of firm clay, underlain by medium dense to very dense gravels/sands, underlain by very stiff clays. Consolidation settlement due to the placement of the embankment fill is anticipated to be on the order of 1inch in the over-consolidated range and appears to be not a concern. Caltrans standard 30-day waiting period is generally a normal construction practice prior to the foundation construction of the abutments.

Based on the LRFD design method (for "Net Permissible Contact Stress (Service)" in the estimation of the bearing capacity for the spread footings from Pier 3 through Pier 13, the immediate settlement underneath the spread footing is limited to be an inch. The available boring data indicates that the subsurface soil conditions at the project site generally consist of firm to very stiff lean clay/loose to medium dense sands, underlain by medium dense to very dense gravels/sands with layers of firm to very stiff clays, long-term consolidation settlement should be relatively insignificant at the pier locations.

9.7 Low Expansion Material at Abutment

As per Caltrans standards, "Low Expansion Material" should be used at the abutments. A schematic drawing showing limits of "Low Expansion Material" at the abutments is shown on Plate 6. The material within this limit should have Expansion Index (EI) less than 50, (Expansion Index to be determined in accordance with ASTM D 4829), and a Sand Equivalent (SE) greater than 20 (Sand Equivalent to be determined in accordance with California Test Method 217. If the on-site material meets the criteria (EI<50 and SE>20), it can be used as the abutment fill for this project.

However, based on our discussions with the designer and considering the fact that the new structures will be resting on existing embankment (which is also supporting the adjacent structures), the specific requirement beneath the footing may be waved. New backfill material should still conform to the above recommendations.

9.8 Corrosion

Chemical tests were performed on soil sample from Borings BID-1, BID-5 and BID-6 to evaluate the corrosion potential of the subsoil. The test results are as follows:

TABLE 7: SUMMARY OF CORROSION TEST RESULTS

Boring No.	Depth (ft)	Resistivity (ohm-cm)	pH	Sulfate (ppm)	Chloride (ppm)
BID-1	40	1470	6.4	1.0	31.5
BID-5	5	3220	7.0	4.5	16.8
BID-6	10	8580	6.3	0.3	11.8

Based on the corrosion test results and Caltrans guidelines, the native subsurface soil near the surface is considered non-corrosive. Standard Type II modified or Type I-P (MS) modified cement may be used for the concrete substructure. The minimum cement factor should be per Section 8.22 of Caltrans Bridge Design Specifications – September 2003.

9.9 Construction Considerations

Prospective contractors for the project must evaluate construction-related issues on the basis of their own knowledge and experience in the local area, on the basis of similar projects in other localities, taking into account their own proposed construction methods and procedures.

9.9.1 Temporary Excavations Slope and Shoring

Excavations should not be expected to stand vertically without any support. According to Occupational Safety and Health Administration (OSHA) safety standards, temporary excavations with personnel working within the excavations should be sloped or shored if the excavations are deeper than 5 feet.

All excavations should be closely monitored during excavation/construction to detect any evidence of instability, soil creep, settlements, etc. Appropriate mitigation measures and a comprehensive monitoring plan should be implemented to correct such situations that may cause or lead to future damage to facilities, utilities and other improvements.

Operation of construction equipment and the resulting vibrations may adversely affect the native soils and other buildings/improvements at the site. This should be taken into consideration in the evaluation of temporary slope stability and shoring system.

Temporary Excavation Slope

The slope height, inclination, and excavation depths should not exceed those specified in local, state, or federal safety regulations. The design of the temporary slopes by the contractor or his specialty subcontractor should conform to the OSHA's "Guidelines for Excavations and Temporary Sloping". The contractor or responsible subcontractor should develop or modify their design based on the subsurface soil conditions exposed at the time of construction.

For excavations up to 20 feet deep in homogenous soils, OSHA guidelines state that the maximum allowable slope should be 3/4H: 1V, 1H:1V and 1-1/2H:1V for Type A, B and C soils, respectively. (In general, Type A soils are stronger; Type B soils are intermediate, and Type C soils are weaker.) Based on the evaluation of the subsurface soil materials encountered in the current soil borings, the sand and gravels and clay should be considered as OSHA Type C. It should be noted that the slope ratios recommended by OSHA are for temporary, un-surcharged slopes. Traffic and surcharge loads should be set back at least 15 feet from the top of the excavations unless they are accounted for in the design. The temporary cut slopes discussed above assume that the groundwater is maintained below the bottom of the excavation at all times during construction. Slopes may need to be flattened based on the soil materials exposed during construction.

Surficial drying of these granular soils may result in erosion and/or minor sloughing if the bare (before the application of surface protection) surficial soil materials are exposed to weather and rain for extended period of time. Stiff clays also tend to develop soil creep due to seasonal change in moisture content resulting in sloughing and cracking. Adequate surface protection should be provided to the slope surface after its exposure from excessive drying and/or saturation during construction and the exposed slopes should be kept moist (but not saturated) by occasional light spraying of water during construction.

Selection of Shoring System

Temporary shoring may be necessary for the support of proposed excavations for the footing construction. The selection, design and performance of the temporary shoring system should be the responsibility of the contractor. The contractor should have the shoring system designed and signed by a Registered Engineer. The contractor should evaluate the conditions and select appropriate construction methods.

The shoring system should be designed to be relatively rigid and with as many supports or struts as necessary to prevent excessive straining and deformation of the supported soils. This is also important with regard to existing surface improvements and existing utilities where tension cracking or movement may develop, even under minor strains.

9.9.2 Excavation Bottom Stability

Due to fluctuation in groundwater elevation, excavation bottom instability during the excavation for the spread footing may occur, especially in the vicinity of Big Chico Creek, as a result of bottom heave, piping, or blow-out. If excavation bottom failure due to bottom heave, piping or blow-out occurs, measures such as trimie seal course, dewatering, installing deep sheeting, etc. will be required to mitigate these conditions. It s recommended supplemental funds be provided for such mitigation measure(s).

9.9.3 Dewatering

Dewatering of excavations is normally the responsibility of the contractor. As described in Section 6 "Subsurface Conditions", groundwater was measured at the depth of 7 feet at Elev. +208 feet during drilling in Boring BID-4 in March 2008. Groundwater should be expected during excavations. A properly designed and constructed dewatering operation is recommended irrespective of the construction method used. The groundwater should be maintained at least 3 feet below the bottom of the excavation at all times.

10. PLAN REVIEW

This report is prepared for the proposed "Bidwell Park Viaduct (Widen)". We recommend that final foundation plans for the proposed project be reviewed by PARIKH prior to construction so that the intent of our recommendations is included in the project plans and specifications and to further see that no misunderstandings or misinterpretations have occurred. However, design-build elements should be reviewed only from overall compliance standpoint.

11. CONSTRUCTION OBSERVATION

To a degree, the performance of any structure is dependent upon construction procedures and quality control measures. Hence, geotechnical observation and testing of grading operations, and foundation excavations should be carried out by the Geotechnical Engineer. If the subsurface conditions different from those forming the basis of our recommendations are encountered, this office should be informed in order to assess the need for design changes. Therefore, the recommendations presented in this report are contingent upon good quality control and these geotechnical observations during construction.

12. INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions. All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed "Bidwell Park Viaduct (Widen)" project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project plans and specifications.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

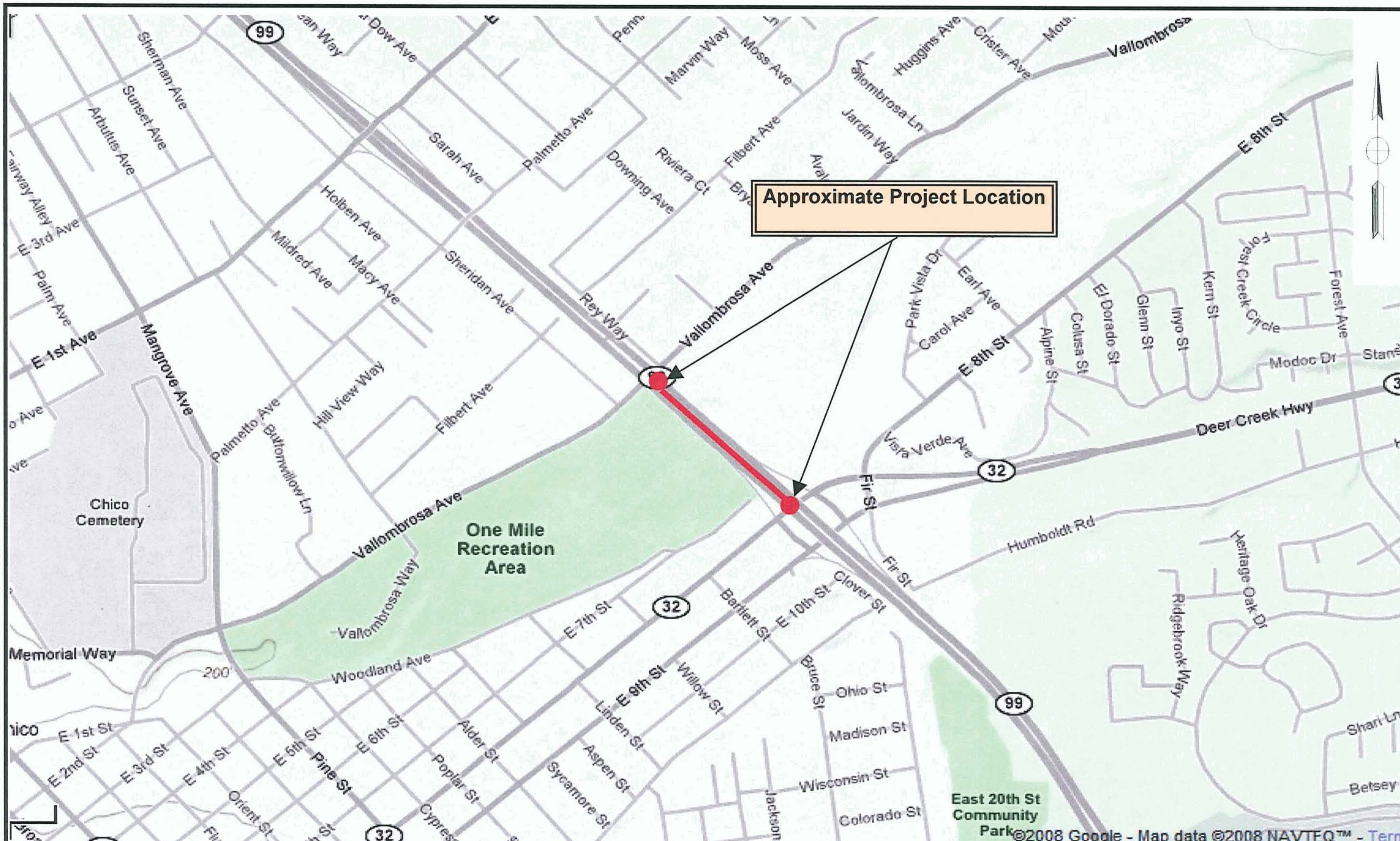
Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, P.E., G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

S:\Ongoing Projects\202101\Bidwell Park Viaduct (Widen)(a).rpt

PLATES AND APPENDICES

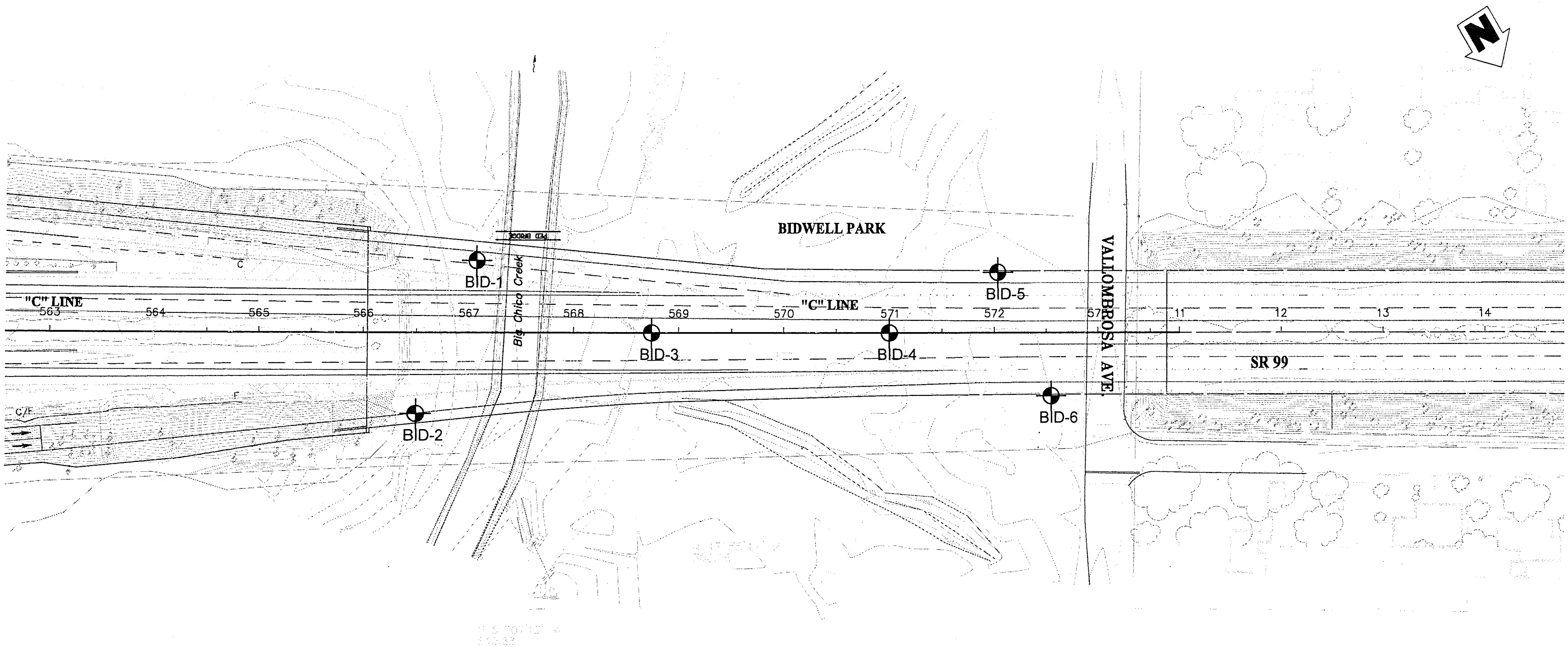


SCALE:
1000 ft
200 m

SOURCE:
2008 GOOGLE MAP DATA,
2008 NAVATEQ

PROJECT LOCATION MAP

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**BIDWELL PARK VIADUCT (WIDEN) (PM 32.61 EA 03-3A0421)** **CHICO, CALIFORNIA**
JOB NO.: 202101.BID	PLATE NO.: 1



SITE PLAN

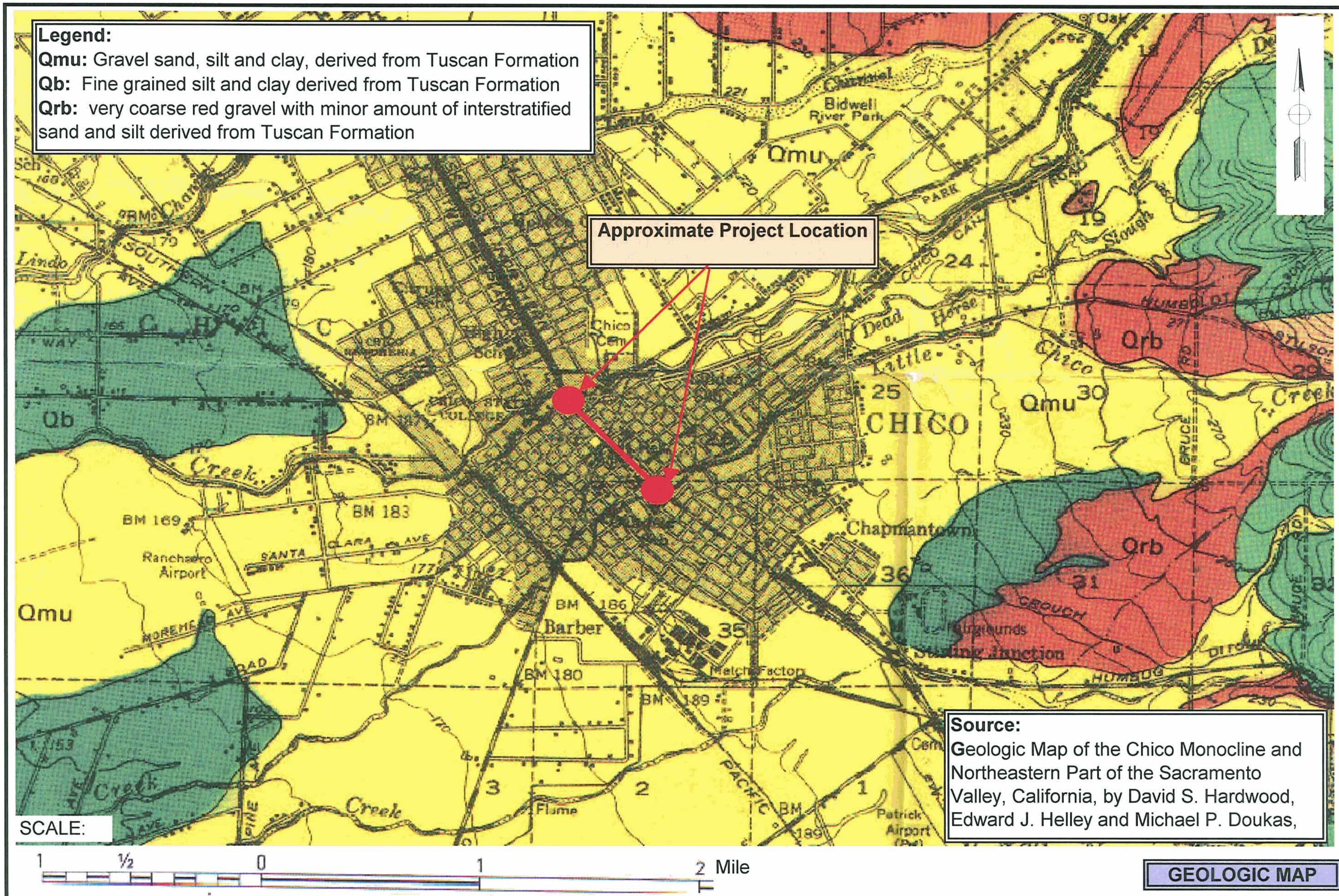
LEGEND

BID-1 Approx. Boring Location

SCALE 1 inch = 100 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by Quincy Engineering, Inc.

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING	BIDWELL PARK VIADUCT (WIDEN) (PM 32.61 EA 03-3A0421) CHICO, CALIFORNIA
JOB NO.: 202101.BID	PLATE NO: 2

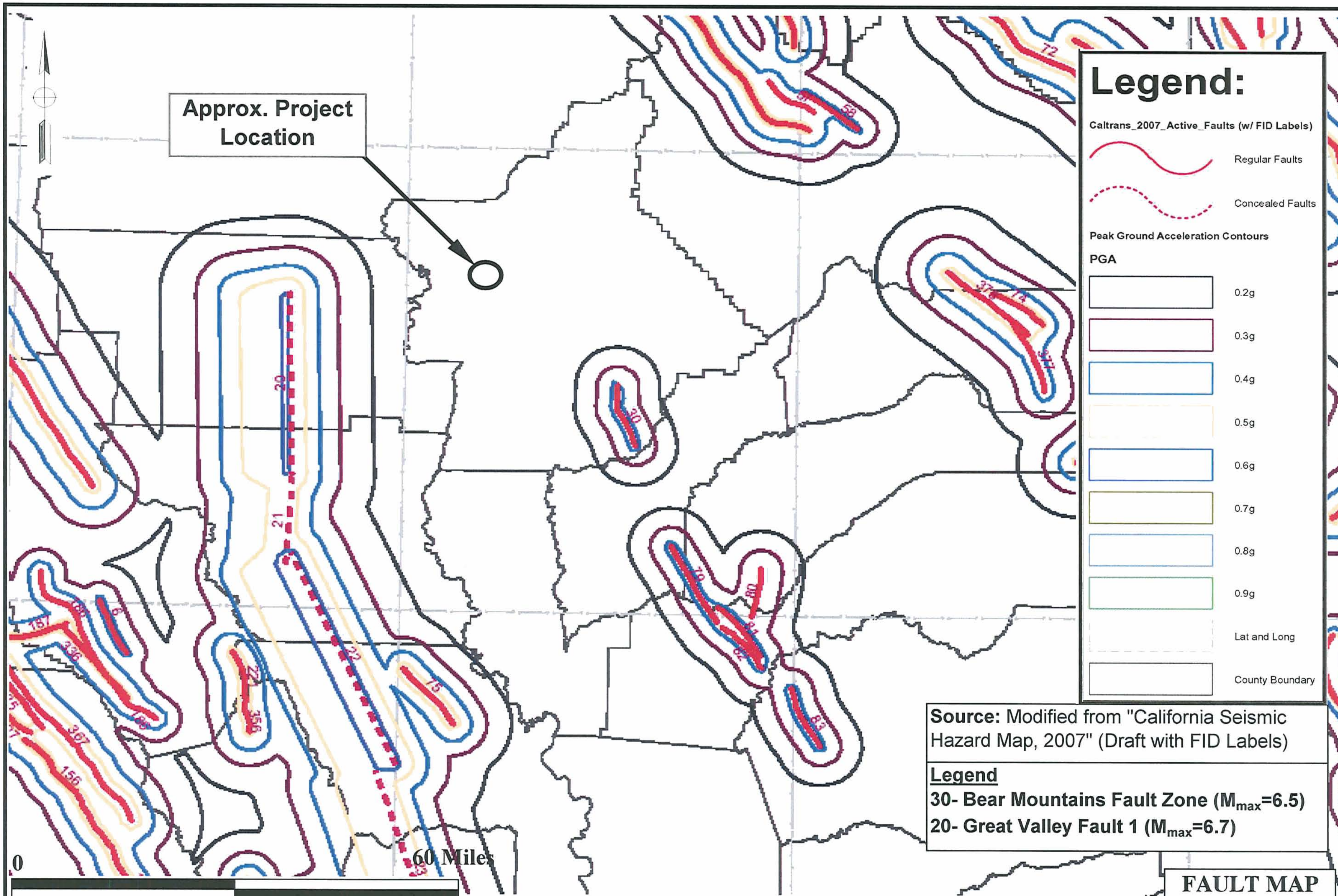


GEOLOGIC MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

BIDWELL PARK VIADUCT (WIDEN) (PM 32.61 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.BID | PLATE NO.: 3



Source: Modified from "California Seismic Hazard Map, 2007" (Draft with FID Labels)

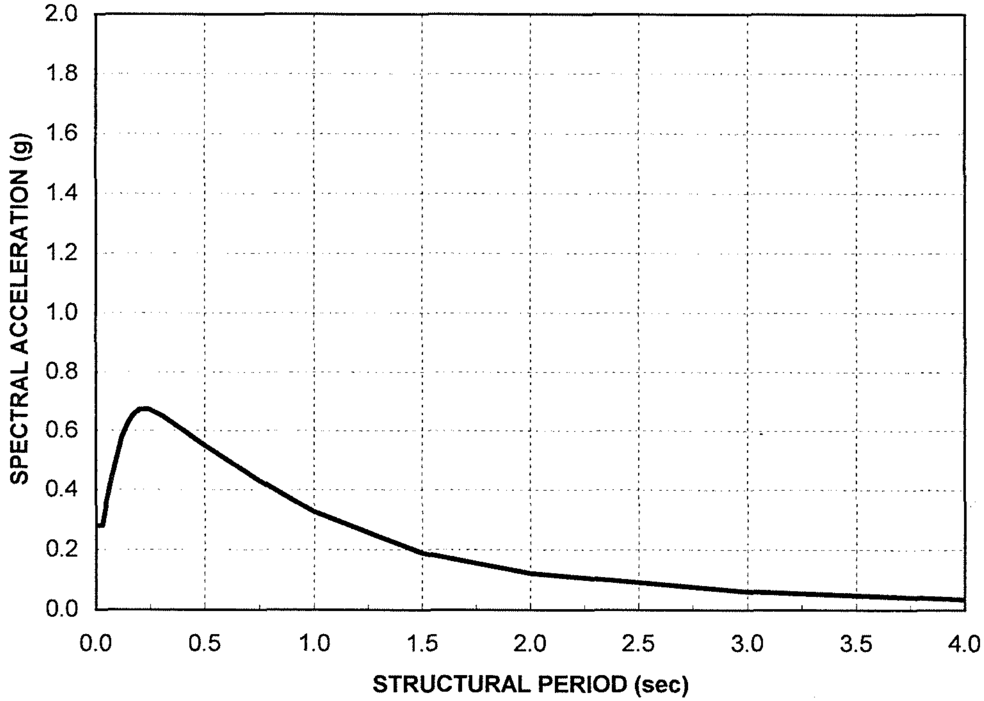
Legend

30- Bear Mountains Fault Zone (M_{max}=6.5)

20- Great Valley Fault 1 (M_{max}=6.7)

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	PALMETTO AVENUE UNDERCROSSING (WIDEN) (PM 33.08 EA 03-3A0421) CHICO, CALIFORNIA	
	JOB NO.: 202101.PLM	PLATE NO.: 4

ARS DESIGN CURVE
BIDWELL PARK VIADUCT (WIDEN)
CHICO, CALIFORNIA



Spectral Data

Period (sec)	20 (6.7) Spectral Accel. (g)
0.010	0.280
0.020	0.280
0.030	0.280
0.050	0.364
0.075	0.448
0.100	0.519
0.120	0.579
0.150	0.629
0.170	0.653
0.200	0.673
0.240	0.674
0.300	0.653
0.400	0.602
0.500	0.551
0.750	0.431
1.000	0.327
1.500	0.190
2.000	0.122
3.000	0.061
4.000	0.035

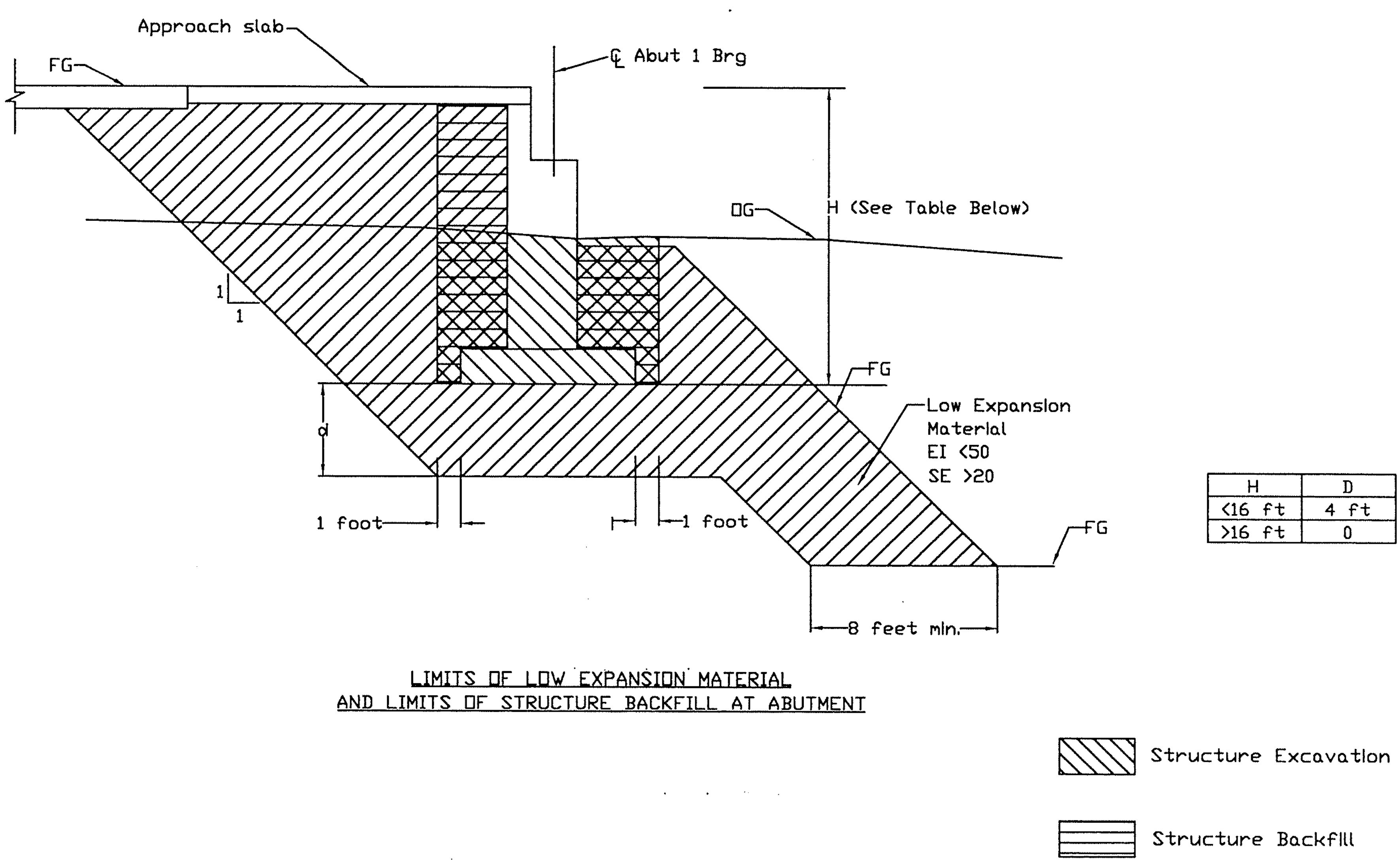
1. Caltrans SDC (v 1.4, June 2006), Figure B.7, Governing Fault: Great Valley Fault 1 (R) (Mw = 6.7, Soil Profile Type D, PBA = 0.2g) with no modification.

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

BIDWELL PARK VIADUCT (WIDEN) (PM 32.61 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.BID

PLATE NO.:5



LIMITS OF LOW EXPANSION MATERIAL
AND LIMITS OF STRUCTURE BACKFILL AT ABUTMENT

H	D
<16 ft	4 ft
>16 ft	0

PARIKH CONSULTANTS INC.
GEOTECHNICAL CONSULTANTS AND MATERIALS TESTING

BIDWELL PARK VIADUCT (WIDEN) (PM 32.61 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.BID

PLATE NO.: 6

APPENDIX A

APPENDIX A
FIELD EXPLORATION

The test borings were advanced with truck-mounted drill rig with 8-inch diameter hollow-stem auger drilling method. The soil samples were obtained from the borings during drilling at various depths by driving a 2.5-inch Inside Diameter (I. D.) Modified California Sampler or a 1.375-inch I.D. Standard Penetration Sampler (ASTM Test Method No. 1586). The sampler was driven into the subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the Logs of Test Borings (LOTB), Appendix A. When correlating standard penetration data in similar soils, the blow counts for the Modified California sampler can be taken as roughly twice that for the Standard Penetration Test sampler in similar soils. Pocket penetration tests were also performed on clay samples to evaluate their consistency. Upon completion of drilling, the drillhole was backfilled with cement grout.

The borings were drilled under the technical supervision of our engineer, who visually classified in the field (according to the Unified Soil Classification System) and continuously logged the soils encountered during drilling. The engineer supervised the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples were then transported to our laboratory for further evaluation and testing.

The descriptions of the soils encountered and relevant boring information are presented on the boring logs in the LOTB in Appendix A. The laboratory test methods and results are presented in Appendix B. The logs presented in Appendix A were prepared from the field logs which were edited after visual re-examination of the soil samples in the laboratory and results of classification tests on selected soil samples as indicated on the logs.

The descriptions and related information presented on these LOTB depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the logs. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99	32.4-33.28		

REGISTERED ENGINEER-GEOTECHNICAL DATE

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
No. G.E. 666
Exp 12/31/09
GEOTECHNICAL
STATE OF CALIFORNIA

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- C Consolidation (ASTM D 2435)
- CL Collapse Potential (ASTM D 5333)
- CP Compaction Curve (CTM 216)
- CR Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- CU Consolidated Undrained Triaxial (ASTM D 4767)
- DS Direct Shear (ASTM D 3080)
- EI Expansion Index (ASTM D 4829)
- M Moisture Content (ASTM D 2216)
- OC Organic Content-% (ASTM D 2974)
- P Permeability (CTM 220)
- PA Particle Size Analysis (ASTM D 422)
- PI Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- PL Point Load Index (ASTM D 5731)
- PM Pressure Meter
- PP Pocket Penetrometer
- R R-Value (CTM 301)
- SE Sand Equivalent (CTM 217)
- SG Specific Gravity (AASHTO T 100)
- SL Shrinkage Limit (ASTM D 427)
- SW Swell Potential (ASTM D 4546)
- TV Pocket Torvane
- UC Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- UU Unconsolidated Undrained Triaxial (ASTM D 2850)
- UW Unit Weight (ASTM D 4767)
- VS Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

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

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

ENGINEERING SERVICES | GEOTECHNICAL SERVICES

PREPARED BY L. TRAN

CHECKED BY D. WANG

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH ___

BRIDGE NO. 12-0151R/L

32.61

SOIL LEGEND

LOG OF TEST BORINGS

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU _____
EA 03-3A0421

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 12/03/2008

REVISION DATES | SHEET | OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99	32.4-33.28		

REGISTERED ENGINEER-GEOTECHNICAL DATE

PLANS APPROVAL DATE

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PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

CEMENTATION

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

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

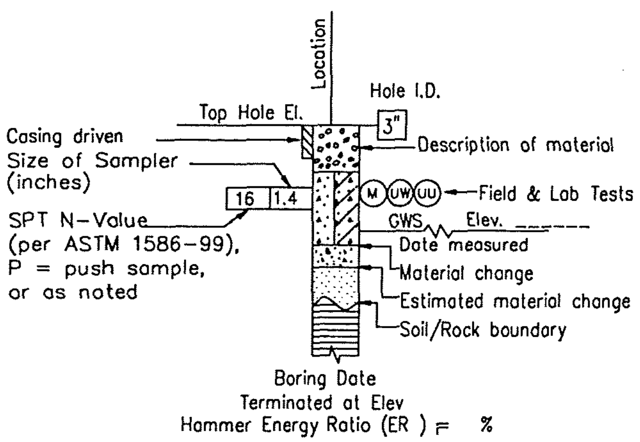
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
□	O	Other

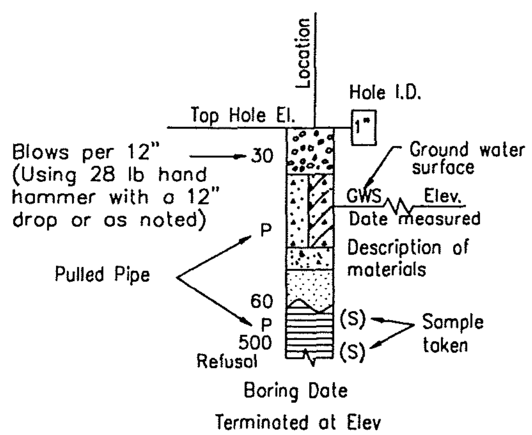
Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

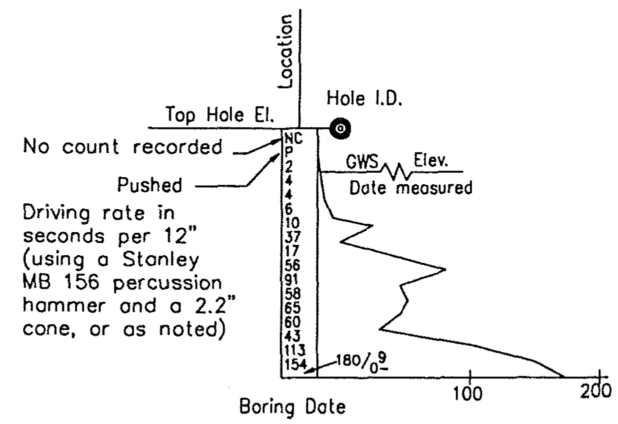
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.



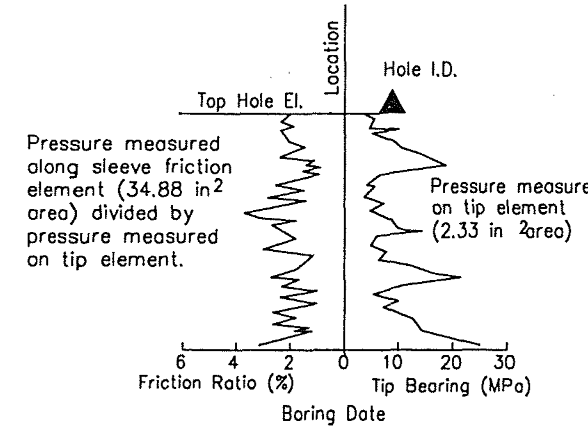
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO. 12-0151R/L	SOIL LEGEND
PREPARED BY	L. TRAN		DESIGN BRANCH	POST MILE 32.61	LOG OF TEST BORINGS
CHECKED BY	D. WANG				

CS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU
EA 03-3A0421

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99	32.4–33.28		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

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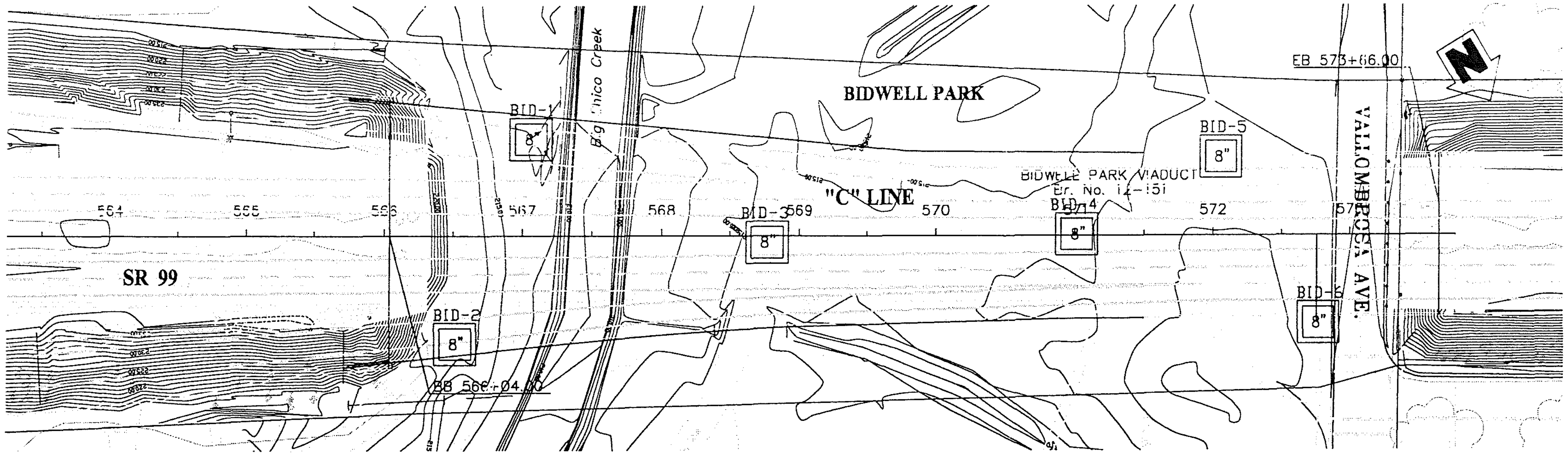
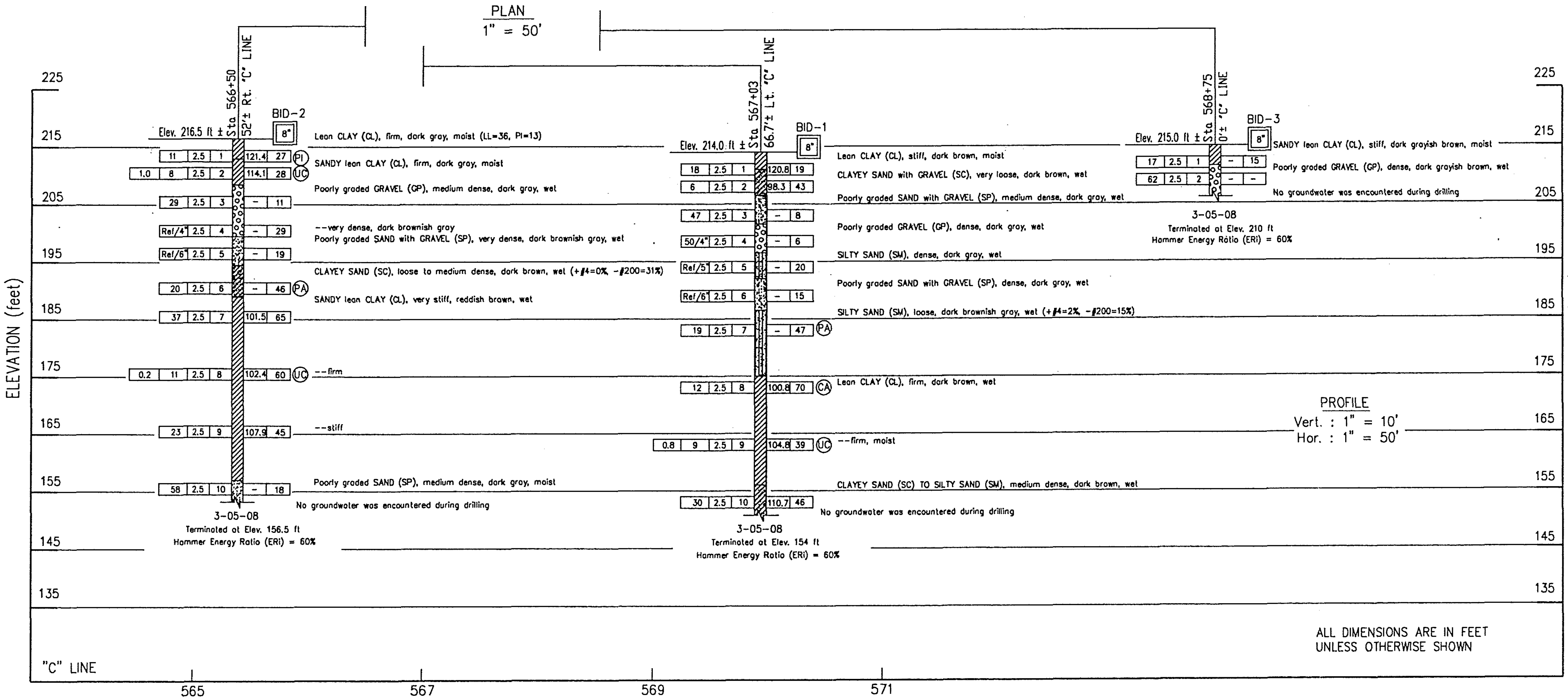
REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA



PLAN
1" = 50'

NOTES: This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

Benchmark
Horizontal Coordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO. 12-0151R/L	BIDWELL PARK VIADUCT (WIDEN)
FUNCTIONAL SUPERVISOR	DRAWN BY: L. TRAN	FIELD INVESTIGATION BY:		DESIGN BRANCH	POST MILES 32.61	LOG OF TEST BORINGS
NAME:	CHECKED BY: D. WANG	V. SANTOS				
OOS CIVIL LOG OF TEST BORINGS SHEET		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU EA 03-3A0421	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 12/03/2008 SHEET OF

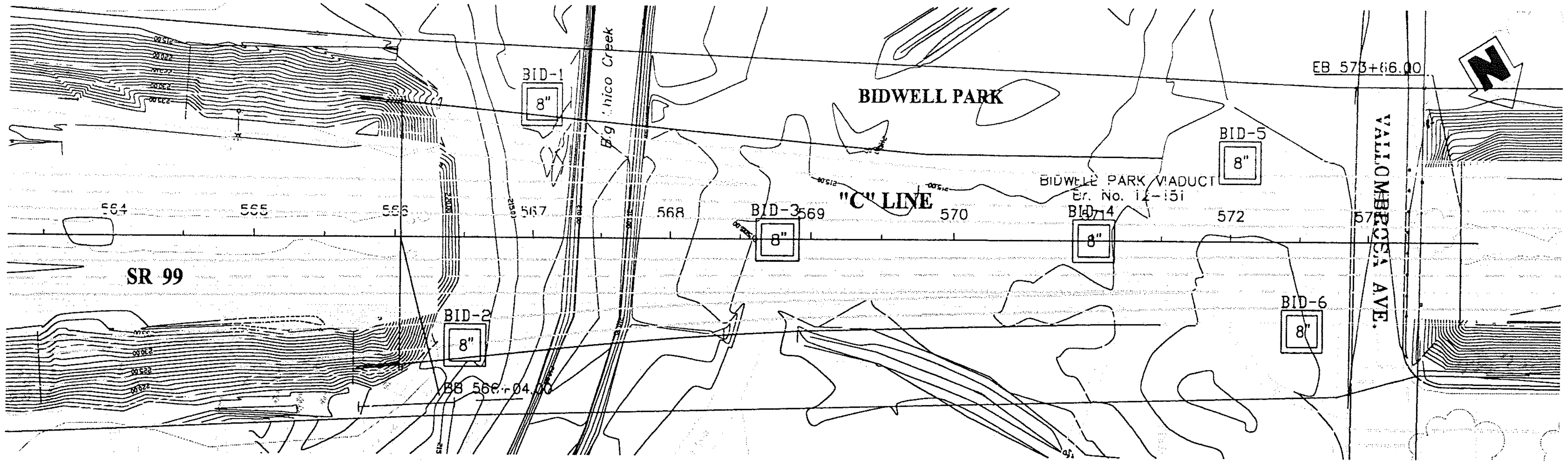
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99	32.4–33.28		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

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

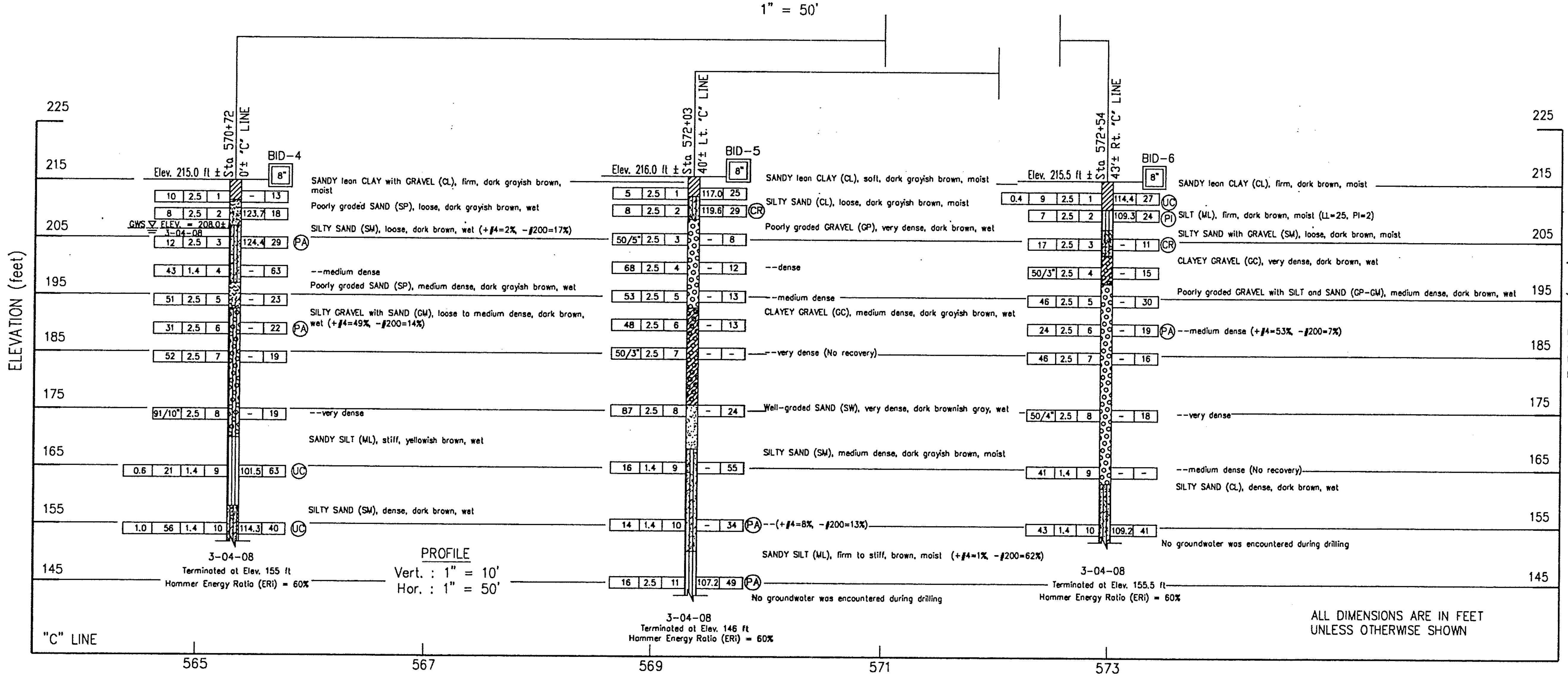
REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA



PLAN
1" = 50'

NOTES: This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

Benchmark
Horizontal Coordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO. 12-0151R/L	BIDWELL PARK VIADUCT (WIDEN)
FUNCTIONAL SUPERVISOR	DRAWN BY: L. TRAN	FIELD INVESTIGATION BY:		DESIGN BRANCH ___	POST MILES 32.61	LOG OF TEST BORINGS
NAME: ______________________	CHECKED BY: D. WANG	V. SANTOS				
OGS CIVIL LOG OF TEST BORINGS SHEET		ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3		CU _____ EA 03-3A0421	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES 12/03/2008 SHEET OF

APPENDIX B

APPENDIX B

LABORATORY TESTS

Classification Tests

The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented on "Log of Test Borings", Appendix A.

Moisture-Density

The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D 2216-98. This information was used to classify and correlate the soils. The results are presented at the appropriate depths on the "Log of Test Borings", Appendix A.

Atterberg Limits

The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D 4318-00. The results of these tests are presented on Plate B-2, "Plasticity Chart".

Grain Size Classification

Grain size classification tests (ASTM Test Method D 420) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plates B-3A and B-3B, "Grain Size Distribution Curves".

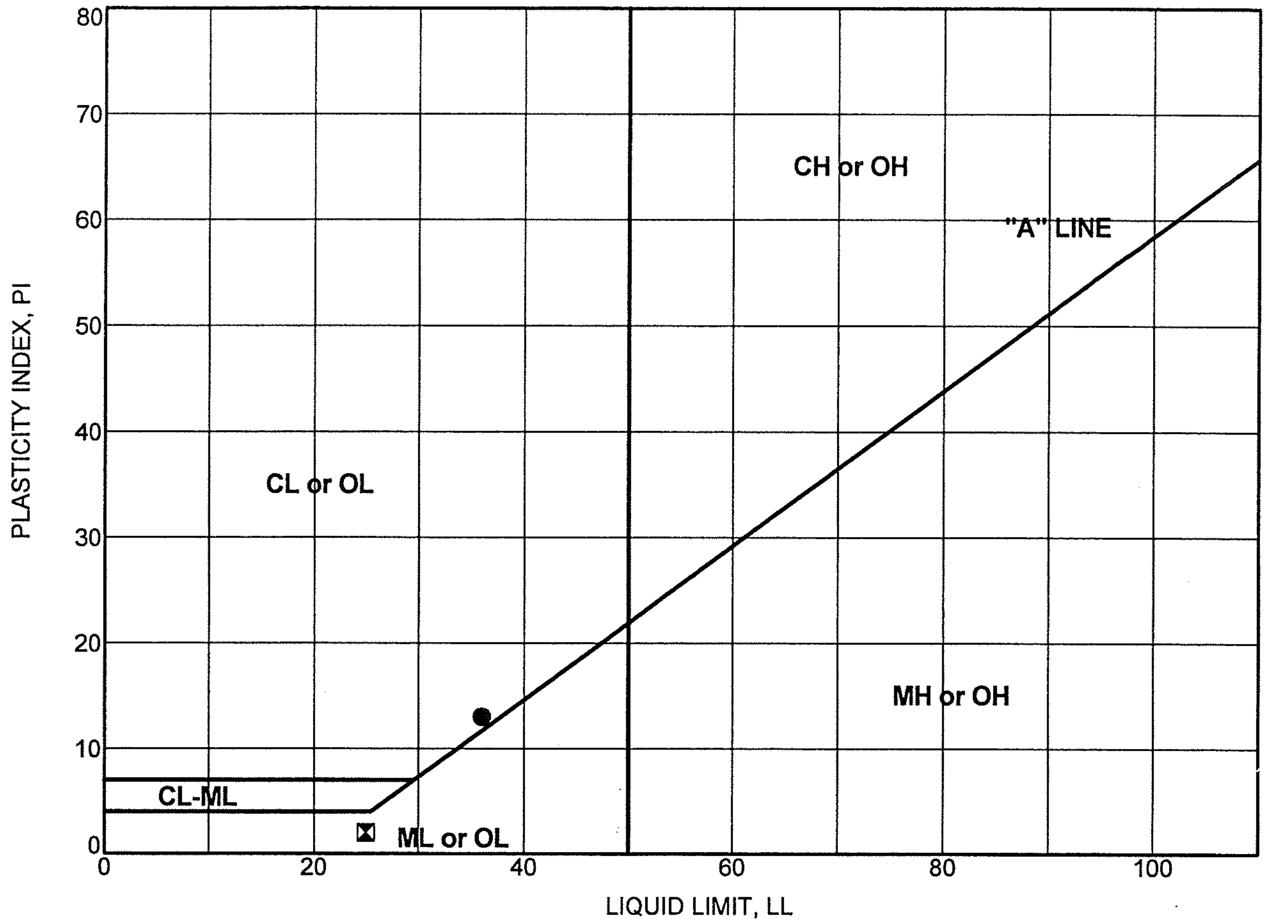
Unconfined Compression Tests

Strength tests were performed on selected undisturbed sample using unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method D 2166-00. The results are presented on "Log of Test Borings", Appendix A.

LABORATORY TESTS
(Continued)

Corrosion Tests

Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistivity tests were performed according to California Test Method 643. Sulfate and chloride tests were performed by AnaCon Testing Laboratory. The test results are presented on Plates B-4A through B-4D.



PLASTICITY CHART

Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
BID-2	MC-1	2.0	●	27	36	23	13	LEAN CLAY (CL)
BID-6	MC-2	5.0	⊠	24	25	23	2	SILT (ML)

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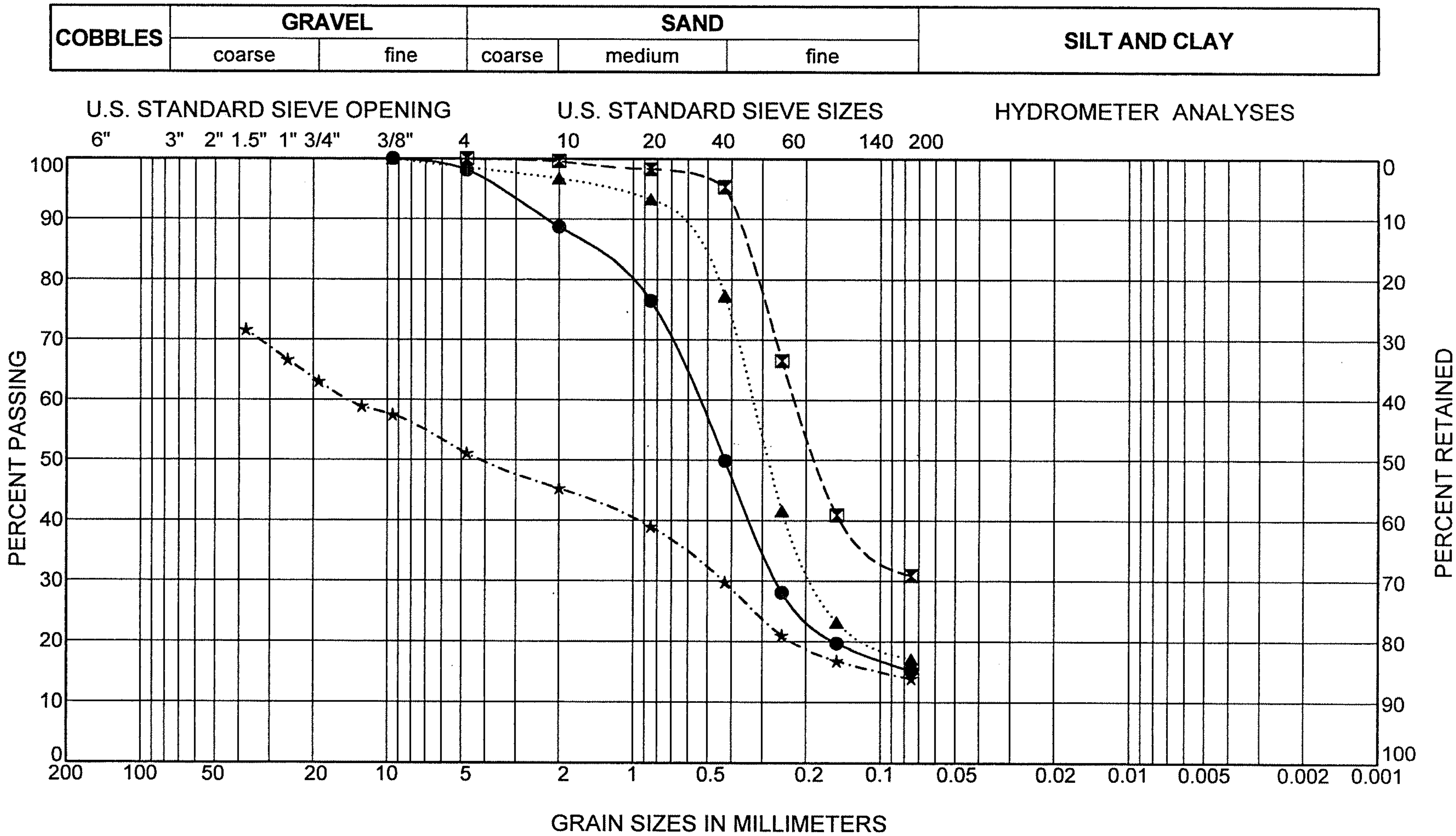
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

BIDWELL PARK VIADUCT (WIDEN)
CHICO, CA

JOB NO: 202101.BID

PLATE NO: B-2

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
BID-1	MC-7	30.0	●			SILTY SAND (SM)
BID-2	MC-6	25.0	⊠			CLAYEY SAND (SC)
BID-4	MC-3	10.0	▲			SILTY SAND (SM)
BID-4	MC-6	25.0	★			SILTY GRAVEL WITH SAND (GM)

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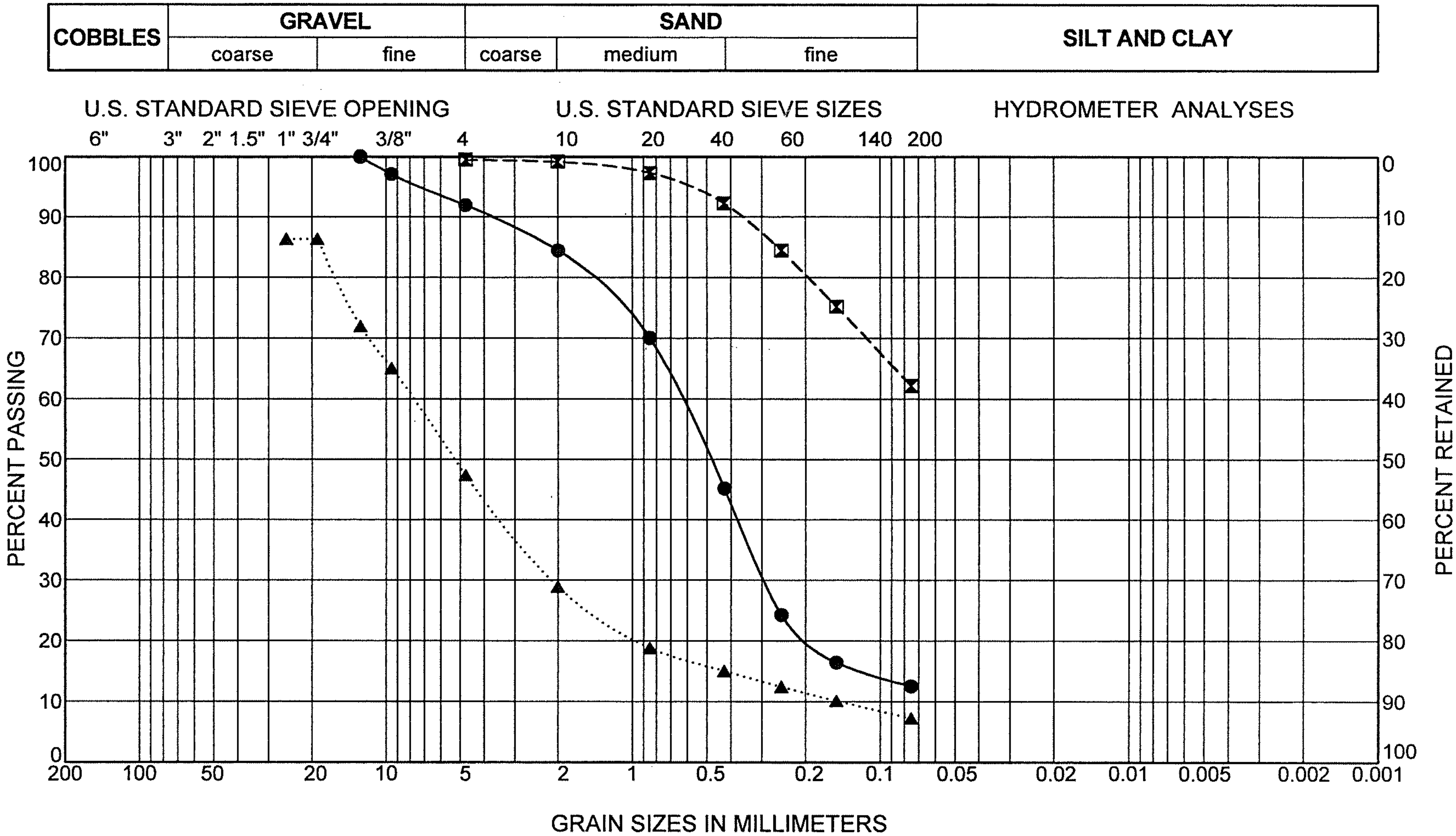
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

BIDWELL PARK VIADUCT (WIDEN)
CHICO, CA

JOB NO: 202101.BID

PLATE NO: B-3A

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
BID-5	SPT-10	60.0	●			SILTY SAND (SM)
BID-5	MC-11	70.0	⊠			SANDY SILT (ML)
BID-6	MC-6	25.0	▲			POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)

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MATERIALS ENGINEERING

BIDWELL PARK VIADUCT (WIDEN)
CHICO, CA

JOB NO: 202101.BID

PLATE NO: B-3B

Corrosion Test (pH, Minimum Resistivity Test, Chloride and Sulfate)

Sample Location	pH	Minimum Resistivity ohm-cm)	Chloride (ppm)	Sulfate (ppm)
BID-1 (#8) 40 ft.	6.4	1470	31.5	1.0
BID-2 (#2) 5 ft.	7.0	3220	16.8	4.5
BID-6 (#3) 10 ft.	6.3	8580	11.8	0.3

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney RH
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID1#8 @ 40'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106936.

EVALUATION FOR SOIL CORROSION

Soil pH	6.40		
Minimum Resistivity	1.47	ohm-cm (x1000)	
Chloride	31.5 ppm	00.00315	%
Sulfate	1.0 ppm	00.00010	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID5#2 @ 5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106934.

EVALUATION FOR SOIL CORROSION

Soil pH	7.02	
Minimum Resistivity	3.22 ohm-cm (x1000)	
Chloride	16.8 ppm	00.00168 %
Sulfate	4.5 ppm	00.00045 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID6#3 @ 10'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106935.

EVALUATION FOR SOIL CORROSION

Soil pH	6.30		
Minimum Resistivity	8.58	ohm-cm (x1000)	
Chloride	11.8 ppm	00.00118	%
Sulfate	0.3 ppm	00.00003	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

APPENDIX C

Calculation for Attenuation Relationship

Attenuation Relationships for Shallow Crustal Earthquakes (Sadigh, et al, 1997)

Fault = Coast Ranges-Sierran Block Fault (Reverse)

Mw = 7 Rrup = 56 km

M>6.5 _ROCK SITE:_

C1 = -1.274	C2 = 1.1	C3 = 0	C4 = -2.1
C5 = -0.48451	C6 = 0.524	C7 = 0	

A=C1+C2M+C3(8.5M)^2.5=	6.426
B=C4*Ln(Rrup+exp(C5+C6M))=	-9.206
C=C7*Ln(Rrup+2)=	0
Ln(y) = A+B+C =	-2.780
y = Exp(Ln(y)) =	0.0621 g (Peak Bed Rock Acceleration)

PBA = 0.0621*1.2 = 0.1g (assuming 20 % increase in thrust/reverse fault)

Fault = Cleveland/W Fault (Normal)

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

Mw = 6.5 Rrup = 29 km

A=	5.876
B=	-8.111
C=	0
Ln(y) =	-2.235
y =	0.1070 g (Peak Bed Rock Acceleration)

PBA = 0.2 g

Fault = Big Bend Fault (Unknown)

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

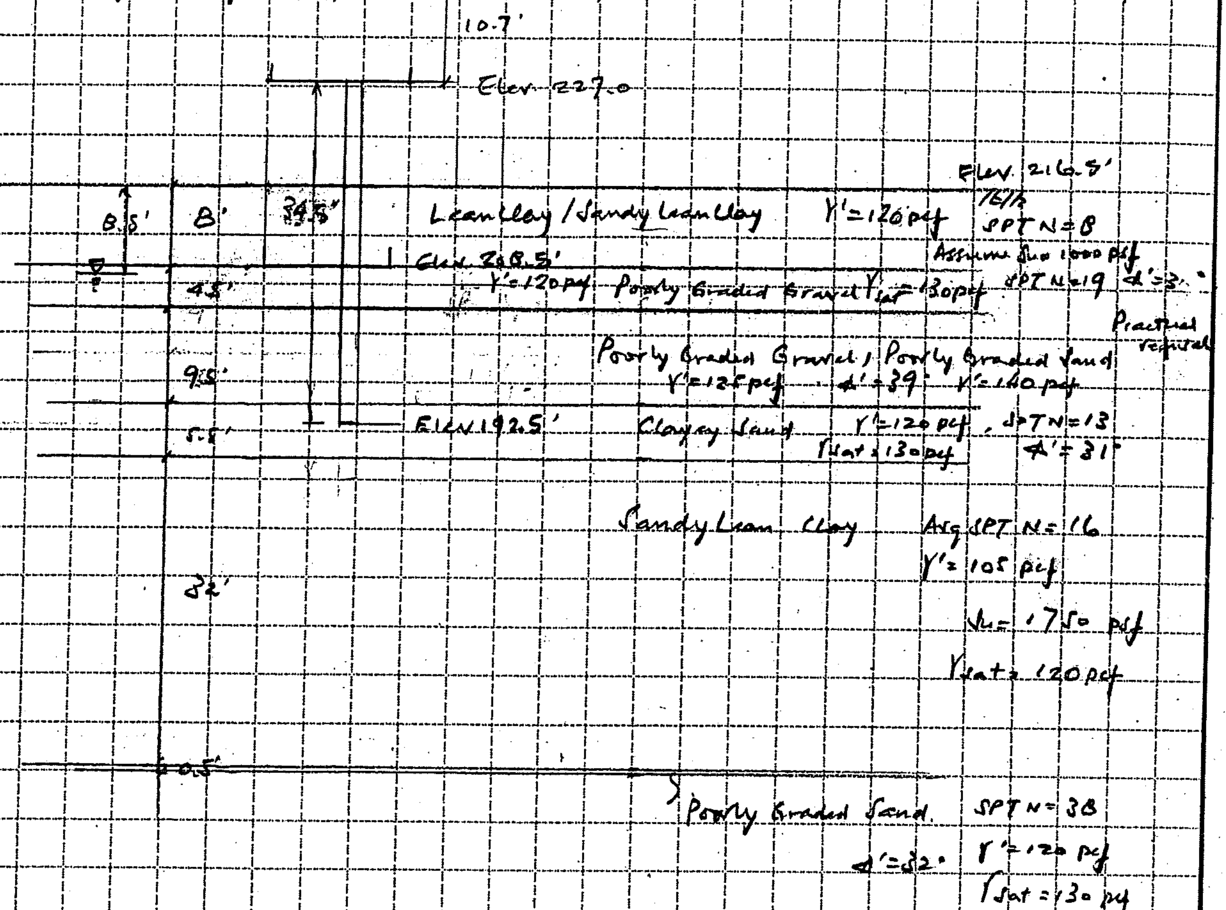
Mw = 6.25 Rrup = 21 km

A=	5.626
B=	-7.663
C=	0
Ln(y) =	-2.037
y =	0.13 g (Peak Bed Rock Acceleration)

PBA = 0.2g

Pile Capacity Calculations/Lateral Pile Capacity Analyses

Pile Capacity Analysis (Boring B2D-2) Abut 1 (p16) ~237.7' (HP14×89)



Pile Capacity Analyses (Boring B10-2) Abut 1 HP 14 x 89 45-tons pile

Friction in Lean Clay / Sandy Lean Clay (S_u = 1000 psf) (Ignore the friction in the fill)

Assume F.G at 287.5'

σ_{v0}' at 25' = 25 x 115
= 2875 psf

$$\frac{S_u}{\sigma_{v0}'} = \frac{1000}{2875} = 0.35 \quad \alpha_1 = 1.0 \quad \alpha_2 = 1.0 \quad L/B < 50$$

$$Q_{all} = \frac{1.0 \times 1.0 \times 1000 \times 7.01 \times 8}{2 \times 2000}$$

= 14.0 tons

Friction in Poorly Graded Gravel (ϕ' = 34°)

$20B = 20 \times 14/12 = 23.3$ feet

σ_{v0}' at 23.3' = 23.3 x 120 = 2817 psf

$\delta = 0.67 \times 34°$ (Army Corp of Engineers)
= 22.8°

$$Q_{all} = \frac{1.0 \times \tan 22.8° \times 2817 \times 7.01 \times 45}{2 \times 2000}$$

= 9.3 tons

Pile Capacity Analyses (Boring R1D-2) Abut 1 (HP 14×89) 45-tons

Friction in Poorly Graded Gravel ($\phi' = 36°$)

$$\delta = 0.67 \times 36° = 24.1°$$

$$Q_{all} = \frac{1.0 \times \tan 24.1° \times 2817 \times 7.01 \times 9.5}{2 \times 2000}$$

$$= 21.0 \text{ tons}$$

Friction in Clayey Sand ($\phi' = 31°$) (Assume 2' into the sand)

$$\delta = 0.67 \times 31° = 20.8°$$

$$Q_{all} = \frac{1.0 \times \tan 20.85° \times 2817 \times 7.01 \times 2}{2 \times 2000}$$

$$= 3.8 \text{ tons}$$

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JOB Bedwell Park Viaduct Widening 202101.B20
SHEET NO 4 OF 4
CALCULATED BY A Lam DATE 9/2009
CHECKED BY DATE
SCALE

Pile Capacity Analyses - Abut 1 (HP 14x89)

Total Qall = 14.0 + 9.3 + 21.0 + 3.8 = 48.1 tons > 45 tons

Total pile length = 10.5 + 8 + 4.5 + 9.5 + 2

= 34.5 feet

Proposed pile tip elevation = 227.0 - 34.5

= 192.5 feet

Design pile length (due to lateral load) = 30 feet

Design pile tip elevation (due to lateral load)

= 227.0 - 30

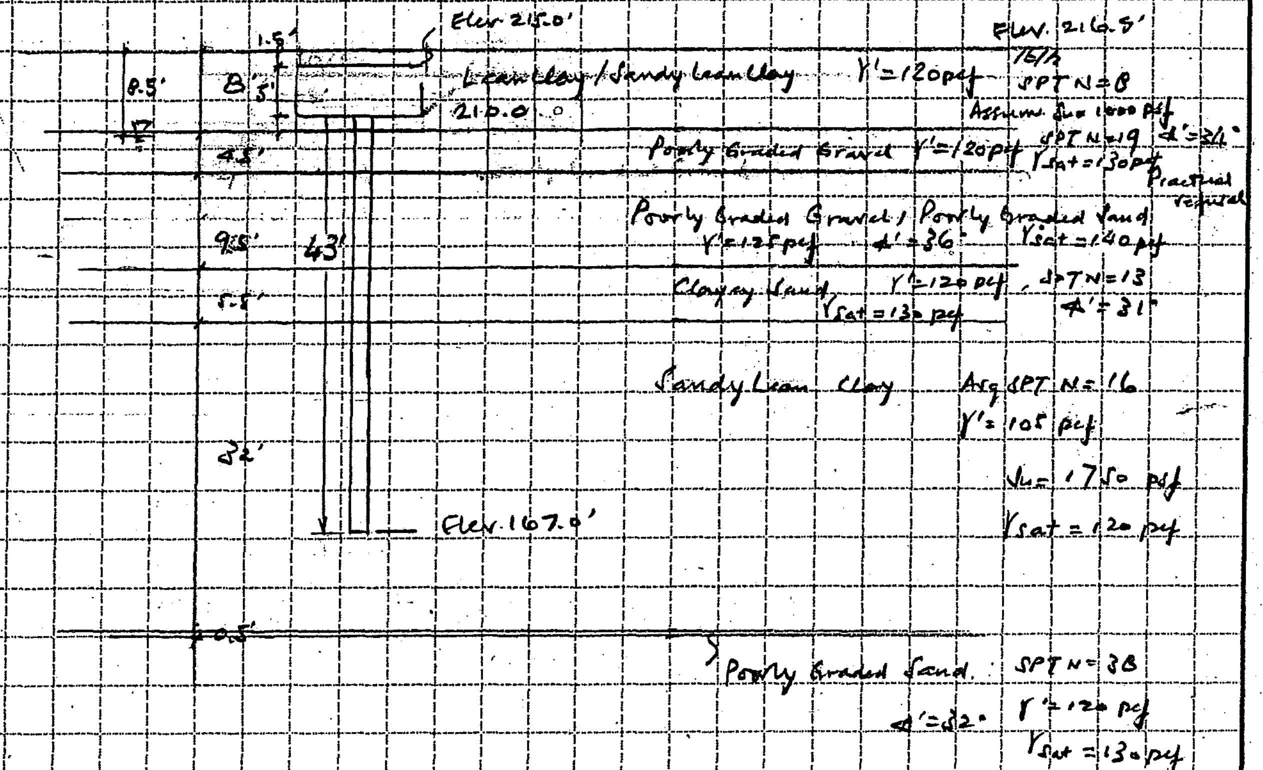
= 197.0 feet

Nominal driving resistance = 48.1 x 2 x 2

= 192.4 kips

JOB: BIDWELL PARK VIADUCT (WIDENING), [illegible]
SHEET NO: 1 OF 9
CALCULATED BY: A. Lam DATE: 7/25/2008
CHECKED BY: DATE:
SCALE:

Pile capacity Analysis (Boring B20-2) Pier 2 (p36) (HP 12×63)



Pile Capacity Analysis (Boring B10-2) Pier 2 (HP 14×89)

Friction in Clay (S_u = 1000 psf)

σ_{vo}' at 5.75' = 5.75 × 120 = 690 psf

$\frac{S_u}{\sigma_{vo}'} = \frac{1000}{690} = 1.4$ $\alpha_1 = 0.5$ $\alpha_2 = 1.0$ $L/B > 50$

$Q_{ult} = \frac{0.5 \times 1.0 \times 1000 \times 7.01 \times 1.5}{2000}$

$= \underline{2.6 \text{ tons}}$

Friction in Poorly Graded Gravel (ϕ' = 34°)

σ_{vo}' at 8.75' = 6.5 × 120 + 0.5 × 120 + 1.75 × (130 − 62.4)

= 958.3 psf

$Q_{ult} = \frac{1.0 \times 958.3 \times \tan(0.67 \times 34°) \times 7.01 \times 4.5}{2000}$

$= \underline{6.3 \text{ tons}}$

Friction in Poorly Graded Gravel (ϕ' = 36°)

σ_{vo}' at 15.75' = 958.3 + 2.25 × (130 − 62.4) + 4.75 × (140 − 62.4)
= 1479.0 psf

δ = 0.67 × 36°
= 24.1°

Pile capacity Analysis · Pier 2 (HP 14 × 89)

$$Q_{ult} = \frac{1.0 \times 1479.0 \times \tan 24.1° \times 7.01 \times 9.5}{2000}$$

$$= \underline{22.0 \text{ tons}}$$

Friction in Clayey Sand ($\phi' = 31°$) $\delta = 0.67 \times 31° = 20.8°$

Refers to Sheet 2 σ_{vo}' at 23.3' $= 1479.0 + 4.75 \times (140 - 62.4) + 2.8 \times (130 - 62.4)$

$= 2036.9$ psf

$$Q_{ult} = \frac{1.0 \times 2036.9 \times \tan 20.8° \times 7.01 \times 5.5}{2000}$$

$$= \underline{14.9 \text{ tons}}$$

Pier 2 South Extreme Event
Comp = 230^k

Friction in Sandy Lean Clay ($N_u = 1750$ psf) (Assume 17' into the clay)

σ_{vo}' at 34.5 $1479.0 + 4.75 \times (140 - 62.4) + 5.5 \times (130 - 62.4) + 18.5 \times (120 - 62.4)$

$= 2709.0$

$$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2709.0} = 0.65 \quad \alpha = 0.67$$

$$Q_{ult} = \frac{0.67 \times 1.0 \times 1750 \times 7.01 \times 17}{2000}$$

$$= \underline{69.9 \text{ tons}}$$

45.8

Total Q_{ult} = 2.6 + 6.3 + 22.0 + 14.9 + 69.9 = 115.7 tons ≈ 115 tons (230^k)

Total pile length = 1.5 + 4.5 + 9.5 + 5.5 + 17 = $\underline{38 \text{ feet}}$

Pile Capacity Analysis - Pier 2 (HP 14x 89)

Proposed pile tip elevation = 210.0 - 38.0
= 172.0 feet

Pier 2 North Extreme Event
Comp = 240^k (120 tons)

Friction in Sandy Lean Clay (S_u = 1750 psf) (Assume 18' into the clay)

σ_{vo}' at 35.0' = 2709 + 0.5 × (120 - 62.4)
= 2737.8

$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2737.8} = 0.64$ $\alpha_1 = 0.68$

$Q_{ult} = \frac{0.68 \times 1.0 \times 1750 \times 7.01 \times 18}{2000}$
= 75.1 tons

Total Q_{ult} = 2.6 + 6.3 + 22.0 + 14.9 + 75.1 = 120.9 tons
> 120 tons

Total pile length = 1.5 + 4.5 + 9.5 + 5.5 + 18 = 39 feet

Proposed pile tip elevation = 210.0 - 39.0 = 171.0 feet

Pier 2 North / South Strength
Comp = 250^k (125 tons)

Friction in Sandy Lean Clay (S_u = 1750 psf) (Assume 19' into the clay)

σ_{vo}' at 35.5' = 2737.8 + 0.5 × (120 - 62.4) = 2766.6 psf

$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2766.6} = 0.63$ $\alpha_1 = 0.69$ $Q_{ult} = \frac{0.69 \times 1.0 \times 1750 \times 7.01 \times 19}{2000} = 80.4$ tons

Pile Capacity Analyses - Pier 2 (HP 14x89)

Total Qult = 2.6 + 6.3 + 22.0 + 14.9 + 80.4 = 126.2 tons > 250 kips

Total pile length = 1.5 + 4.5 + 9.5 + 5.5 + 19

= 40 feet

Proposed pile tip elevation = 210 - 40 = 170 feet

Nominal driving resistance = 126.2 x 2

= 252.4 kips

Pile length due to the lateral load = 23.0 feet

Design pile tip elevation (due to lateral load)

= 210.0 - 23.0

= 187.0 feet

Pile capacity Analyses (Boring B2D-2) Pier 2 (HP 14×89)

Tension

Pier 2 South Strength Limit Tension ($\varphi = 0.7$)

Refers to Sheet 2 Friction in Clay Qult = 2.6 tons

Friction in Poorly Graded Gravel ($\phi' = 34°$)

Assume $K_{HT} = 0.5$

$$Q_{ult} = \frac{0.5 \times 958.3 \times \tan 22.8° \times 7.01 \times 4.5}{2000}$$

$= 3.2$ tons

Friction in Poorly Graded Gravel ($\phi' = 36°$) (Assume 5' into the gravel)

σ_v' at 13.5' $= 6.5 \times 120 + 0.5 \times 120 + 4 \times (130 - 62.4) + 2.5 \times (140 - 62.4)$
$= 1304.4$ psf

$\delta = 0.67 \times 36° = 24.1°$

$$Q_{ult} = \frac{0.5 \times 1304.4 \times \tan 24.1° \times 7.01 \times 5}{2000} = 5.1 \text{ tons}$$

Total Qult = 2.6 + 3.2 + 5.1 = 10.9 tons > 10 tons

Total pile length = 1.5 + 4.5 + 5 = 11 feet

Design pile tip elevation = 210.0 − 11.0 = 199.0 feet

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JOB Birdwell Park Viaduct (Widen) 20C101.B20
SHEET NO 7 OF 9
CALCULATED BY A Lam DATE 9/2008
CHECKED BY DATE
SCALE

Pile Capacity Analyses (Boring BID-2) Pier 2 (HP 14 x 89)

Tension

Pier 2 North Strength Limit Tension ($\varphi = 0.7$)

Refers to Sheet 3

Friction in Poorly Graded Gravel ($\delta' = 36°$) (1)

$Q_{ult} = 22.0 \times 0.5$

$= 11.0$ tons

Friction in Clayey Sand ($\delta' = 31°$)

$Q_{ult} = 14.9 \times 0.5 = 7.5$ tons

Total $Q_{ult} = 2.6 + 3.2 + 11.0 + 7.5 = 24.3$ tons

Friction in Sandy Lean Clay ($S_u = 1750$ psf) (Assume 1' into the clay)

Refers to Sheet 6 σ_{vo}' at $26.5' = 1304.4 + 7 \times (140 - 62.4) + 5.5 \times (130 - 62.4)$
$+ 0.5 \times (120 - 62.4)$

$= 2248.2$ psf

$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2248.2} = 0.78 \quad \alpha = 0.52$

$Q_{ult} = \frac{0.52 \times 1.0 \times 1750 \times 7.01 \times 1}{2000} = 3.2$ tons

Total $Q_{ult} = 24.3 + 3.2 = 27.5$ tons $>$ 25 tons (OK)

Total pile length $= 1.5 + 4.5 + 9.5 + 5.5 + 1 = 22$ feet

Design pile tip elevation $= 210.0 - 22.0 = 188$ feet

Geotechnical * Environmental * Materials Testing * Construction Inspection
Offices: Milpitas * Fremont * Sacramento * Walnut Creek

Pile Capacity Analyses (Boring B-10-1) Pier 2 (HP14×89)

Tension

Pier 2 North Extreme Event Tension

Friction in Sandy Lean Clay (S_u = 1750 psf) (Assume 11' into the clay)

Refers to Sheet 7 σ_{vo}' at 31.5' = 2248.2 + 5.0 × (120 − 62.4)

= 2536.2 psf

$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2536.2} = 0.69$ $\alpha = 0.62$

$Q_{ult} = \frac{0.62 \times 1.0 \times 1750 \times 7.01 \times 11}{2000}$

= 42.0 tons

Refers to Sheet 7 Total Q_{ult} = 24.3 + 42.0 = 66.3 tons > 65 tons (or 130 k)

Total pile lengths = 1.5 + 4.5 + 9.5 + 5.5 + 11

= 32 feet

Design pile tip elevation = 210.0 − 32.0

= 178.0 feet

Pile Capacity Analyses (Boring B10-2) Pier 2 (HP14x89)

Tension

Pier 2 South Extreme Event Tension

Friction in Sandy Lean Clay (S_u = 1750 psf) (Assume 12' into the clay)

σ_{vo}' at 32.0' = 2536.2 + 0.5 × (120 − 62.4)
= 2565.0 psf

$\frac{S_u}{\sigma_{vo}'} = \frac{1750}{2565.0} = 0.68$ $\alpha = 0.63$

$Q_{ult} = \frac{0.63 \times 1.0 \times 1750 \times 7.01 \times 12}{2000}$

= 46.6 tons

Refer to Sheet 7 Total Q_{ult} = 24.3 + 46.6 = 70.9 tons ≥ 67.5 tons (135 k)

Total pile length = 1.5 + 4.5 + 9.5 + 5.5 + 12

= 33.0 feet

Design tip elevation = 210.0 − 33.0
= 177.0 feet

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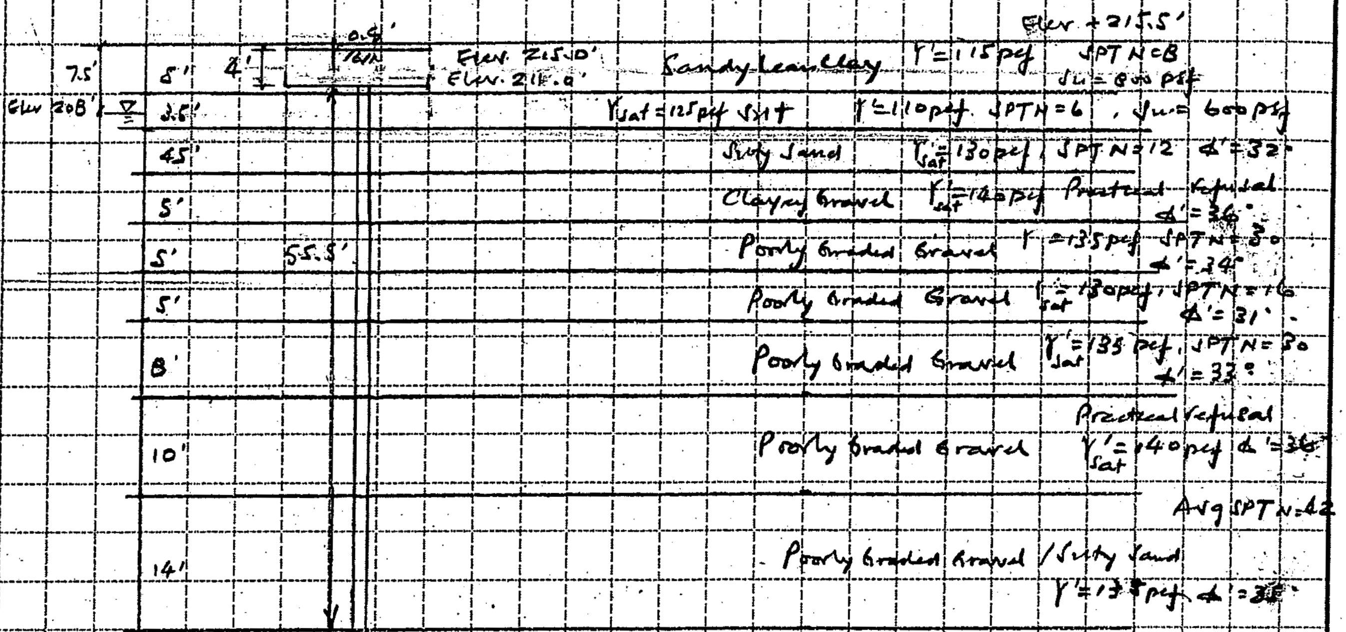
JOB Bidwell Park Viaduct (Widening) 202101.BFL
SHEET NO 1 OF 9
CALCULATED BY A Lam DATE 8/2008
CHECKED BY DATE
SCALE

Pile Capacity Analyses (Boring R20-(a) Piers 14" Pile (HP 14 x 89)



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JOB: Bidwell Park Viaduct (Widen)
SHEET NO: 2 OF 9
CALCULATED BY: A Lam DATE: 9/2008
CHECKED BY: DATE:
SCALE:

Pile Capacity Analysis - Pier 14 HP14×89

Ignore the friction in Sandy Lean Clay (S_u = 800 psf)

Friction in Silt (S_u = 600 psf)

σ_{vo}' at 6.25' = 4.5 × 115 + 1.75 × 110
= 710 psf

$$\frac{S_u}{\sigma_{vo}'} = \frac{600}{710} = 0.85 \quad \alpha = 0.5$$

$$Q_{ult} = \frac{0.5 \times 1.0 \times 600 \times 7.01 \times 3.5}{2000}$$

= 3.7 tons

Friction in Silty Sand (ϕ' = 32°)

σ_{vo}' at 10.25' = 4.5 × 115 + 2.5 × 110 + 1 × (125 - 62.4) + 2.25 × (130 - 62.4)
= 1007.2 psf

δ = 0.67 × 32°
= 21.4°

$$Q_{ult} = \frac{1007.2 \times \tan 21.4° \times 7.01 \times 4.5}{2000}$$

= 6.8 tons

Friction in Clayey Gravel (ϕ' = 36°)

σ_{vo}' at 15' = 1007.2 + 2.25 × (130 - 62.4) + 2.5 × (140 - 62.4)

= 1353.3 psf

Pile Capacity Analyses - Pier 14 HP14×89

$\delta = 0.67 \times 36°$
$= 24.1°$

$Q_{ult} = \dfrac{1353.3 \times \tan 24.1° \times 7.01 \times 5}{2000}$

$= 10.6$ tons

Friction in Poorly Graded Gravel ($\phi' = 34°$)

σ_{vo}' at 20' $= 1353.3 + 2.5 \times (140 - 62.4) + 2.5 \times (135 - 62.4)$

$= 1728.8$ psf

$\delta = 0.67 \times 34°$
$= 22.8°$

$Q_{ult} = \dfrac{1728.8 \times \tan 22.8° \times 7.01 \times 5}{2000} = 12.7$ tons

Friction in Poorly Graded Gravel ($\phi' = 31°$)

$\delta = 0.67 \times 31°$
$= 20.8°$

$20B = 20 \times 14/12 = 23.3'$

σ_{vo}' at 23.3' $= 1728.8 + 2.5 \times (135 - 62.4) + 0.8 \times (130 - 62.4)$
$= 1964.4$ psf

$Q_{ult} = \dfrac{1964.4 \times 1.0 \times \tan 20.8° \times 7.01 \times 5}{2000}$
$= 13.1$ tons

Pile Capacity Analysis - Pier 14 HP14x89

Friction in Poorly Graded Gravel ($\phi' = 33°$)

$\delta = 0.67 \times 33°$

$= 22.1°$

$Qult = \frac{1964.4 \times 1.0 \times \tan 22.1° \times 7.01 \times 8}{2000}$

$= \underline{22.4 \text{ tons}}$

Extreme Event Limit State
Comp 100 tons

Friction in Poorly Graded Gravel ($\phi' = 36°$)

$\delta = 36° \times 0.67$

$= 24.1°$

$Qult = \frac{1964.4 \times 1.0 \times \tan 24.1° \times 7.01 \times 10}{2000}$

$= \underline{30.8 \text{ tons}}$

Total Qult $= 3.7 + 6.2 + 10.6 + 12.7 + 13.1 + 22.4 + 30.8$

$= \underline{99.5 \text{ tons}}$ ≈ 100 tons

Total pile length $= 0.5 + 3.5 + 4.5 + 5 \times 3 + 8 + 10$

$= \underline{41.5 \text{ feet}}$

Design pile tip elevation $= 211.0 - 41.5$

$= \underline{169.5 \text{ feet}}$

PARIKH
Practicing in the Geosciences

JOB Bidwell Park Viaduct (Widen) 20 2101.B70
SHEET NO 5 OF 9
CALCULATED BY A Lam DATE 2/2009
CHECKED BY DATE
SCALE

Pile Capacity Analyses – Pier 14 (HP14x89)

Strength Limit State
Comp. 125 tons

Friction in Poorly Graded Gravel/Silty Sand ($\phi' = 35°$)
(Assume 5' into the gravel)

$\delta = 0.67 \times 35° = 23.5°$

Refers to Sheet 3.

$Q_{ult} = \dfrac{1964.4 \times 1.0 \times \tan 23.5° \times 7.01 \times 5}{2000}$

$= 15.0$ tons

Friction in Poorly Graded Gravel/Silty Sand ($\phi' = 35°$) (Assume 9' into the gravel)

$\delta = 23.5°$

$Q_{ult} = \dfrac{1964.4 \times 1.0 \times \tan 23.5° \times 7.01 \times 9}{2000}$

$= 26.9$ tons

Total $Q_{ult} = 3.7 + 6.2 + 12.6 + 12.7 + 13.1 + 22.4 + 30.8 + 26.9$

$= 126.4$ tons > 125 tons

Total pile length $= 0.5 + 3.5 + 4.5 + 5 \times 3 + 8 + 10 + 9$

$= 50.5$ feet

Proposed pile tip elevation $= 211.0 - 50.5 = 160.5$ feet

Nominal driving resistance $= 126.4 \times 2$

$= 252.8$ kips

PARIKH

Practicing in the Geosciences

JOB	Bidwell Park Viaduct (Widen) 202101.BID
SHEET NO	6 OF 9
CALCULATED BY	A Lam DATE 2/2009
CHECKED BY	DATE
SCALE	

Pile Capacity Analyses - Pier 14 (HP 14 x 89)

Pile length due to lateral load = 24.5 feet

Design pile tip elevation due to lateral load

= 211.0 - 24.5

= 186.5 feet

Pile Capacity Analyses - Pier 14 HP14x89

Tension

Pier 14: Strength Limit State Tension ($\varphi = 0.7$) $30/0.7 = 43$ kips

Friction in Silt ($S_u = 600$ psf)

Refers to Sheet 2 $Q_{ult} = 37$ tons

Friction in Silty Sand ($\phi' = 32°$)

Now $K_{HT} = 0.5$

$Q_{ult} = 6.2 \times 0.5 = 3.1$ tons

Friction in Clayey Gravel ($\phi' = 36°$)

Refers to Sheet 3 $Q_{ult} = 0.5 \times 10.6$

$= 5.3$ tons

Friction in Poorly Graded Gravel ($\phi' = 34°$)

$Q_{ult} = 0.5 \times 12.7$
$= 6.4$ tons

Friction in Poorly Graded Gravel ($\phi' = 31°$) (Assume 2' into the gravel)

$$Q_{ult} = \frac{0.5 \times 1964.4 \times \tan 29.8° \times 7.01 \times 2'}{2000}$$

$= 2.6$ tons

Pile Capacity Analyses - Pier 14 HP 14×89

Tension

Total Qult = 3.7 + 3.1 + 5.3 + 6.4 + 2.6 = 21.1 tons ≈ 21.5 tons (43 kips)

Total pile length = 0.5 + 3.5 + 4.5 + 5×2 + 2

= 20.5 feet

Design pile tip elevation = 211.0 - 20.5

= 190.5 feet

Extreme Event Limit Static Tension - 110 kips

Refers to Sheet 3 Friction in Poorly Graded Gravel ($\phi' = 31°$)

Qult = 0.5 × 13.1

= 6.6 tons

Friction in Poorly Graded Gravel ($\phi' = 33°$)

Qult = 0.5 × 22.4

= 11.2 tons

Friction in Poorly Graded Gravel ($\phi' = 36°$)

$\delta = 36° \times 0.67 = 24.1$

$$Qult = \frac{1964.4 \times 0.5 \times \tan 24.1° \times 7.01 \times 10}{2000}$$

= 15.4 tons

Pile capacity Analyses - Pier 14 HP14x89

Tension

Total Qult = 3.7 + 3.1 + 5.3 + 6.4 + 6.6 + 11.2 + 15.4

= 51.7 tons

Friction in Poorly Graded Gravel ($\phi' = 35°$) (Assume 3' into the gravel)

$$Q_{ult} = \frac{0.5 \times 1964.4 \times \tan 23.5° \times 7.01 \times 3}{2000}$$

= 4.5 tons

Total Qult = 51.7 + 4.5

= 56.2 tons > 55 tons (or 110 kips)

Total pile length = 0.5 + 3.5 + 4.5 + 5 x 3 + 8 + 10 + 3

= 44.5 feet

Design pile tip elevation = 211.0 - 44.5

= 166.5 feet

Pile Capacity Analysis (Boring ~~R20-6xx/Abut 15~~ 14/ 236.8 (HP 14x89))

Elev. 226.0'

Elev. 215.5'

0.5'

7.5' 7.0'

Elev. 208.5' ▽

38.5'

8'	Sandy Lean Clay $\gamma' = 115$ pcf SPT N=8, $S_u = 800$ psf
3.5'	$\gamma_{sat} = 125$ pcf Silt $\gamma' = 110$ pcf. SPT N=6, $S_u = 600$ psf
4.5'	$\gamma_{sat} = 130$ pcf Silty Sand $\gamma' = 115$ pcf, SPT N=12 $\phi' = 32°$
5'	$\gamma_{sat} = 140$ pcf Clayey Gravel $\gamma' = 120$ pcf Practical Refusal $\phi' = 36°$
5'	$\gamma_{sat} = 135$ pcf Poorly Graded Gravel $\gamma' = 115$ pcf SPT N=30 $\phi' = 34°$ 34°
5'	$\gamma_{sat} = 130$ pcf Poorly Graded Gravel $\gamma' = 110$ pcf, SPT N=16 $\phi' = 31°$
8'	$\gamma_{sat} = 135$ pcf Poorly Graded Gravel $\gamma' = 115$ pcf, SPT N=30 $\phi' = 33°$
10'	$\gamma_{sat} = 140$ pcf Poorly Graded Gravel Practical Refusal $\gamma' = 120$ pcf $\phi' = 36°$
	Avg SPT N=42
14'	Poorly Graded Gravel / Silty Sand $\gamma' = 125$ pcf, $\phi' = 35°$

Pile Capacity Analysis (Boring BID-6) Abutis (HP 14x89) 45 tons

Friction in Sandy Lean Clay (S_u = 800psf) (Ignore the friction in the fill)

Assume EG = 236.5' σ_{vo}' at 23.5' = 23.5 x 115

= 2702.5 psf

$$\frac{S_u}{\sigma_{vo}'} = \frac{800}{2702.5} = 0.30 \quad \alpha_1 = 1.0 \quad \alpha_2 = 1.0 \quad L/B < 50$$

$$Q_{all} = \frac{800 \times 1.0 \times 1.0 \times 7.01' \times 5}{2 \times 2000}$$

= 7.0 tons

Friction in Silt (S_u = 600 psf)

σ_{vo}' at 27.75' = 26 x 115 + 1.75 x 110

= 3182.5 psf

$$\frac{S_u}{\sigma_{vo}'} = \frac{600}{3182.5} = 0.19$$

$$Q_{all} = \frac{600 \times 1.0 \times 1.0 \times 7.01' \times 3.5}{2 \times 2000}$$

= 3.7 tons

Friction in Silty Sand (ϕ' = 32°)

σ_{vo}' at 23.3' = 23.3 x 115

= 2679.5 psf

PARIKH

Practicing in the Geosciences

JOB: Sidwell Park Viaduct (W2dm)
SHEET NO: 3 OF 4
CALCULATED BY: A Lam DATE: 9/2008
CHECKED BY: DATE:
SCALE:

Pile Capacity Analysis Abut 15 Pile (HP14 x 89)

$$\delta = 0.67 \times 32^\circ$$
$$= 21.4^\circ$$

$$Q_{all} = \frac{2679.5 \times \tan 21.4^\circ \times 7.01 \times 4.5}{2 \times 2000}$$
$$= 8.3 \text{ tons}$$

Friction in Clayey Gravel ($\phi' = 36^\circ$)

$$\delta = 0.67 \times 36^\circ$$
$$= 24.1^\circ$$

$$Q_{all} = \frac{2679.5 \times \tan 21.4^\circ \times 7.01 \times 5}{2 \times 2000}$$
$$= 9.2 \text{ tons}$$

Friction in Poorly Graded Gravel ($\phi' = 34^\circ$ and 31°)

$$\delta = 34^\circ \times 0.67$$
$$= 22.8^\circ$$
$$\delta = 31^\circ \times 0.67$$
$$= 20.8^\circ$$

$$Q_{all} = \frac{2679.5 \times (\tan 22.8^\circ + \tan 20.8^\circ) \times 5 \times 7.01}{2 \times 2000}$$
$$= 18.8 \text{ tons}$$

Pile Capacity Analyses Abut 15 Pile (HP 14x89)

Total Qall = 7.0 + 3.7 + 8.3 + 9.2 + 18.8 = 47.0 tons > 45 tons

Nominal driving resistance = 47.0 x 2 x 2 = 188 kips

Total pile length = 10.5 + 5 + 3.5 + 4.5 + 5 + 5 + 5

= 38.5 feet

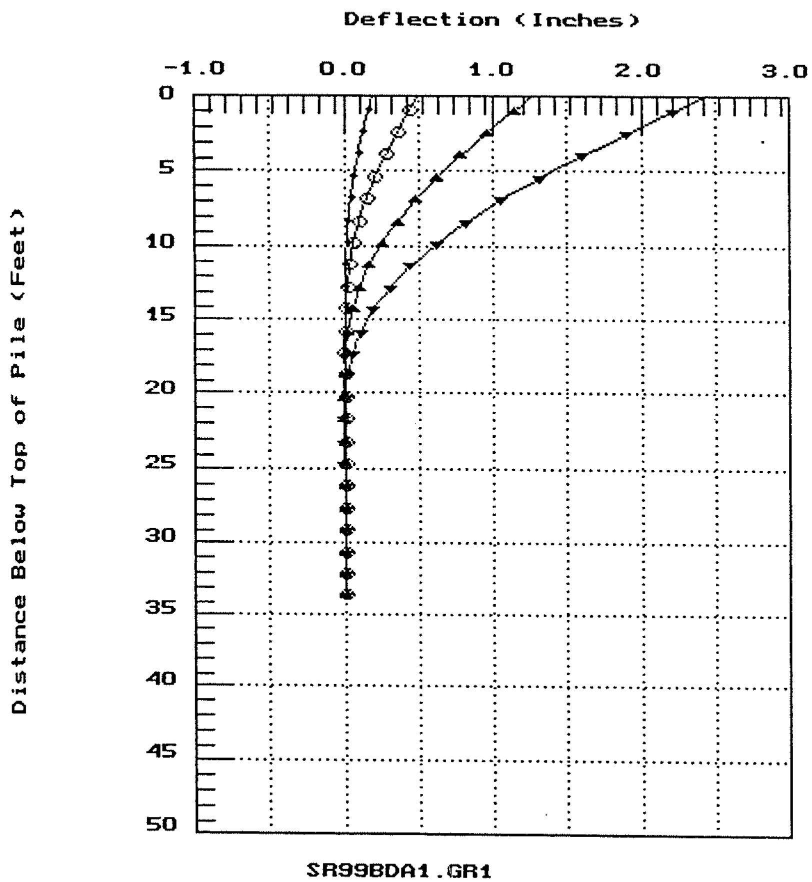
Proposed pile tip elevation = 226.0 - 38.5

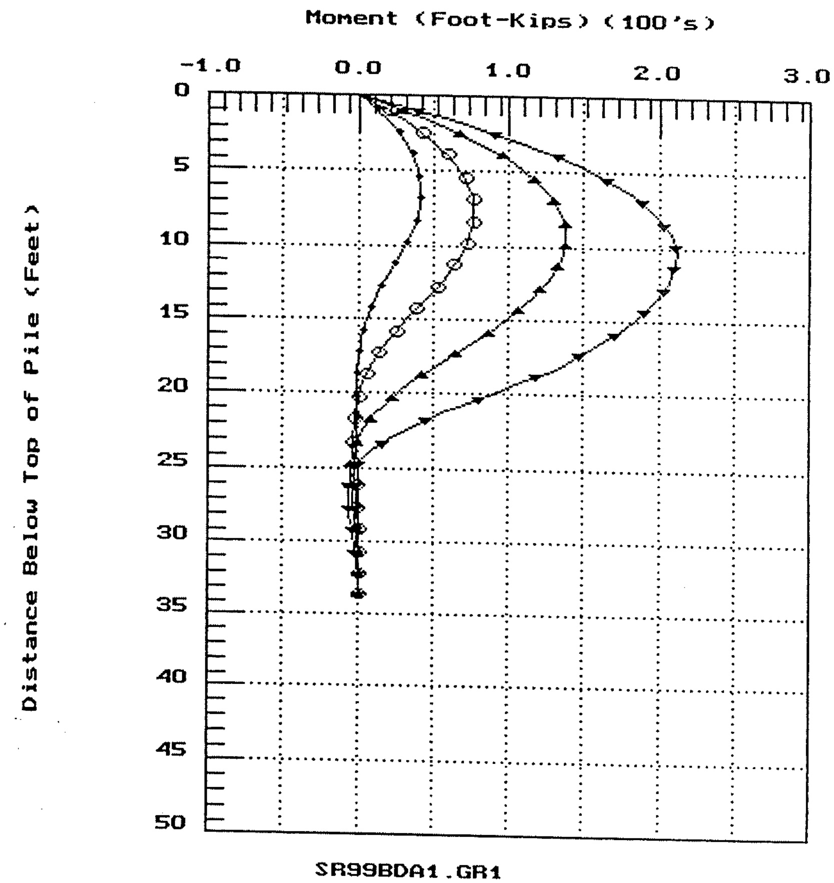
= 187.5 feet

Pile length due to lateral load = 34 feet

Design pile tip elevation = 226.0 - 34.0

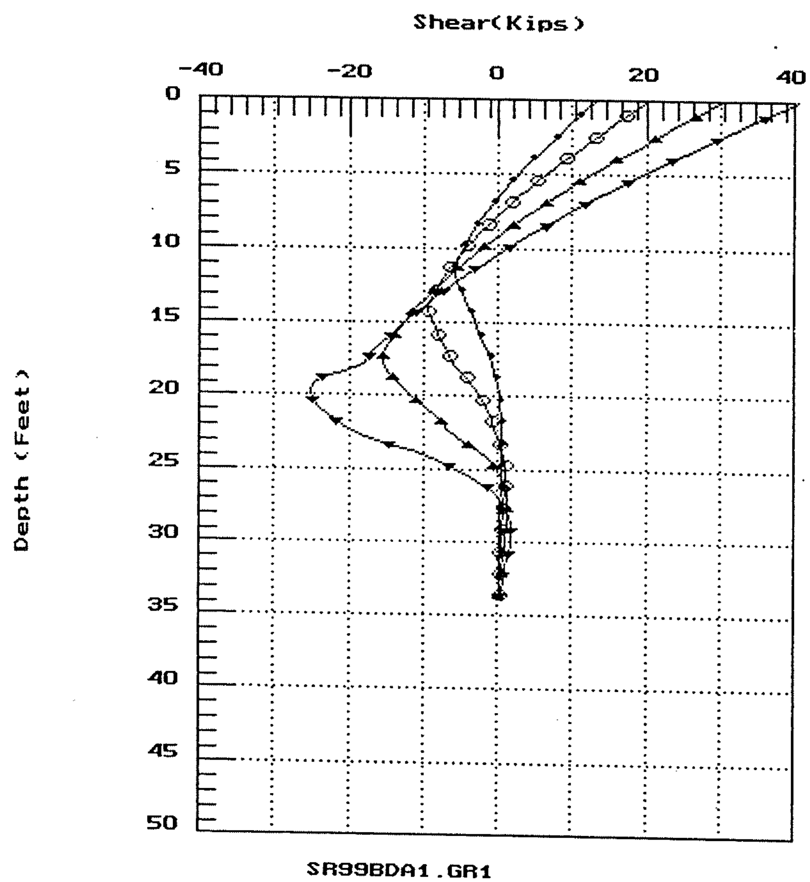
= 192.0 feet

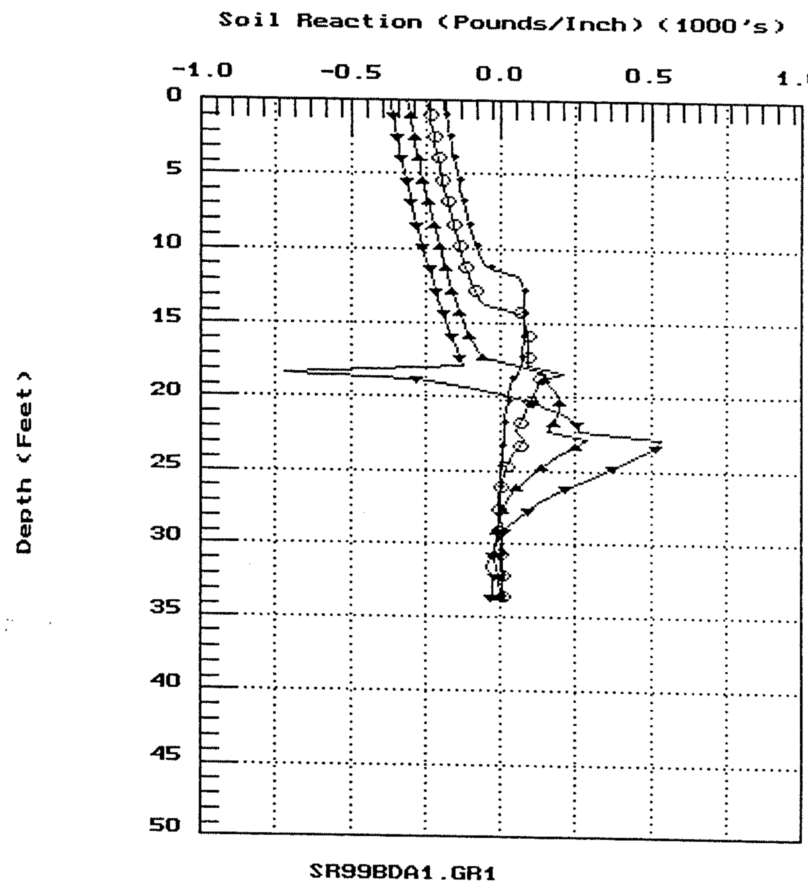




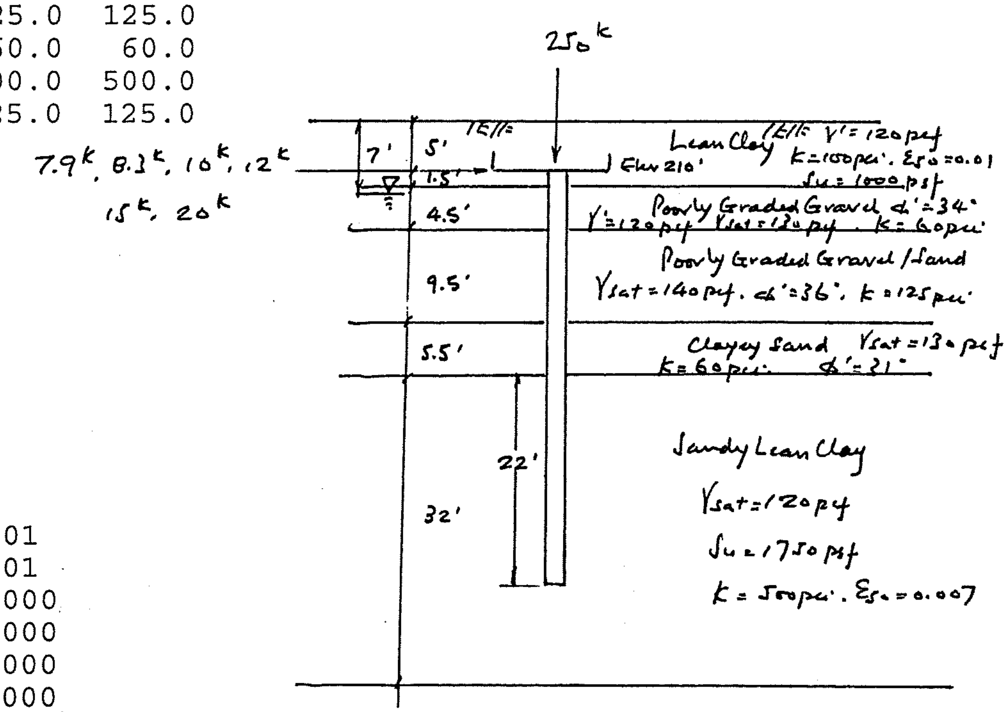
Abutment 1 Fixed Head —— · 13^k
○ 20^k
▲ 30^k
▼ 40^k

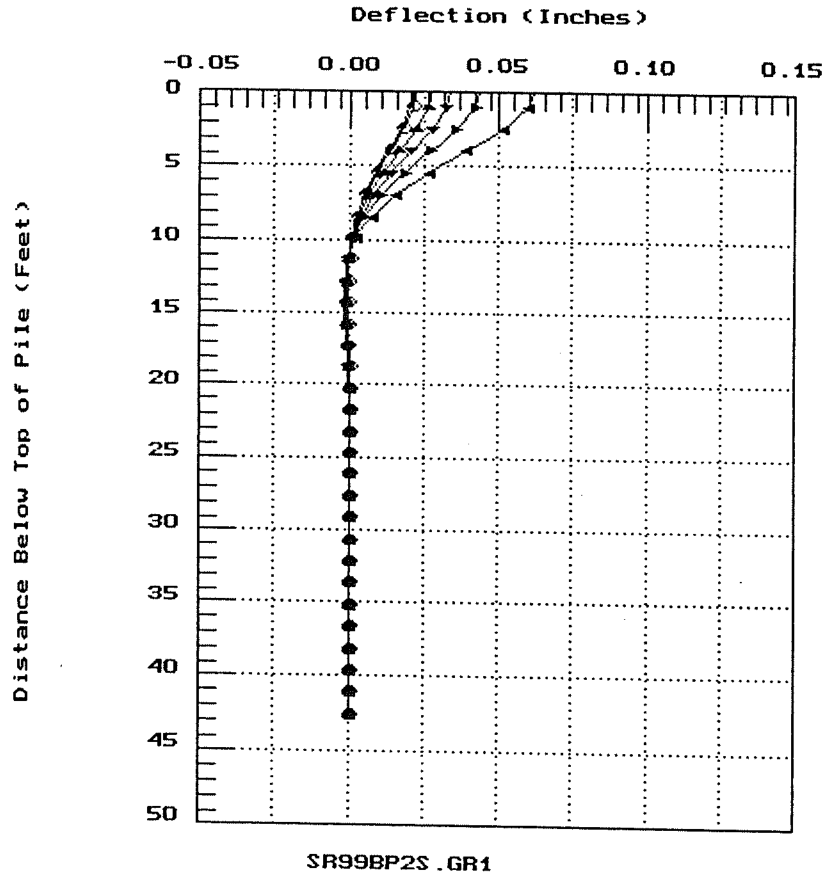
BIDWELL PARK VIADUCT (WIDEN) 202101.BI

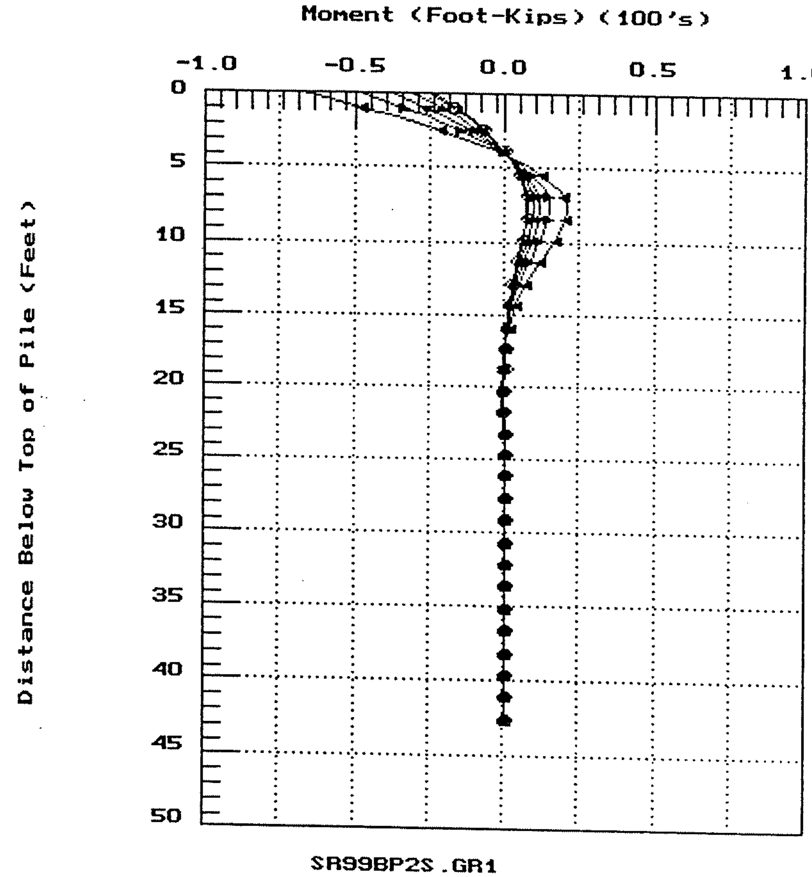

Shear(Kips)
-40
-20
0
20
40
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99BDA1.GR1


Soil Reaction (Pounds/Inch) (1000's)
-1.0
-0.5
0.0
0.5
1.0
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99BDA1.GR1

```
B dwell Park Viaduct (Widen) (Pier 2-South (LRFD)-HP14x89-250 kips)
   1       1       0       0       0
  86       2     -60.0     516.0       0.0
   0.0     11.76           904.00          26.10          29000000
 516.0     11.76           904.00          26.10          29000000
   7      12       12        0       2
   3     -60.0     18.0       100.0   100.0
   4      18.0     24.0        90.0    90.0
   4      24.0     72.0        60.0    60.0
   4      72.0    186.0       125.0   125.0
   4     186.0    252.0        60.0    60.0
   3     252.0    636.0       500.0   500.0
   4     636.0    756.0       125.0   125.0
 -60.0       0.069
  24.0       0.069
  24.0       0.039
  72.0       0.039
  72.0       0.045
 186.0       0.045
 186.0       0.039
 252.0       0.039
 252.0       0.033
 636.0       0.033
 636.0       0.039
 756.0       0.039
 -60.0        6.94       0.0     0.01
  18.0        6.94       0.0     0.01
  18.0        0.00      34.0     0.000
  72.0        0.00      34.0     0.000
  72.0        0.00      36.0     0.000
 186.0        0.00      36.0     0.000
 186.0        0.00      31.0     0.000
 252.0        0.00      31.0     0.000
 252.0       12.15       0.0     0.007
 636.0       12.15       0.0     0.007
 636.0        0.00      32.0     0.000
 756.0        0.00      32.0     0.000
 -60.0     0.6   1
 756.0     0.6   1
   0       1     1
   6
   2    0.79D+04   0.0D+05   2.50D+05
   2    0.83D+04   0.0D+05   2.50D+05
   2    1.00D+04   0.0D+05   2.50D+05
   2    1.20D+04   0.0D+05   2.50D+05
   2    1.50D+04   0.0D+05   2.50D+05
   2    2.00D+04   0.0D+05   2.50D+05
   0
   1       1       0
 500    1.00D-5    2500.0
```

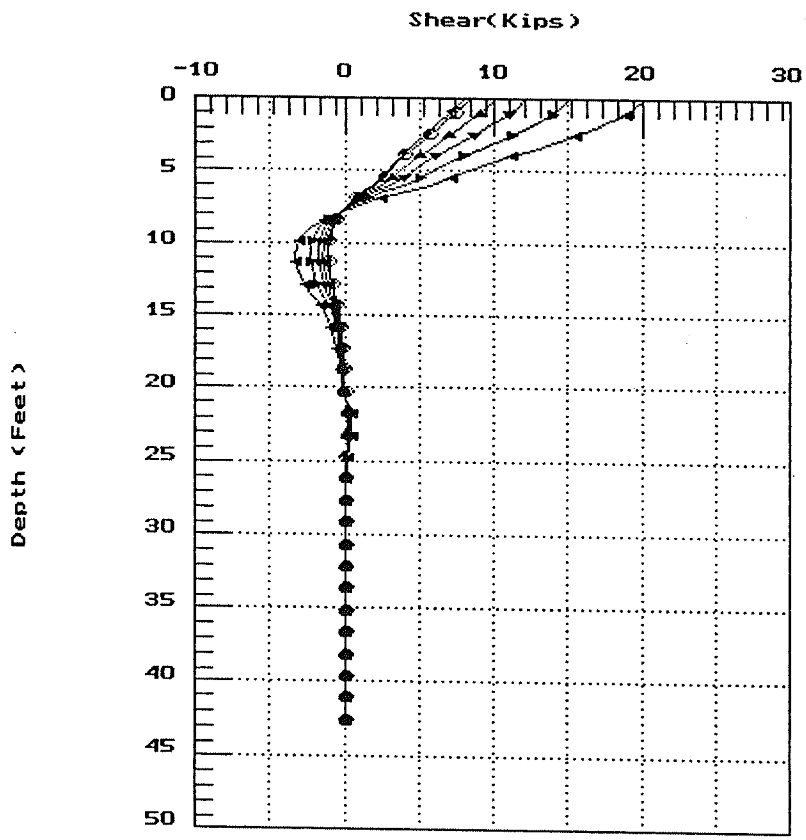




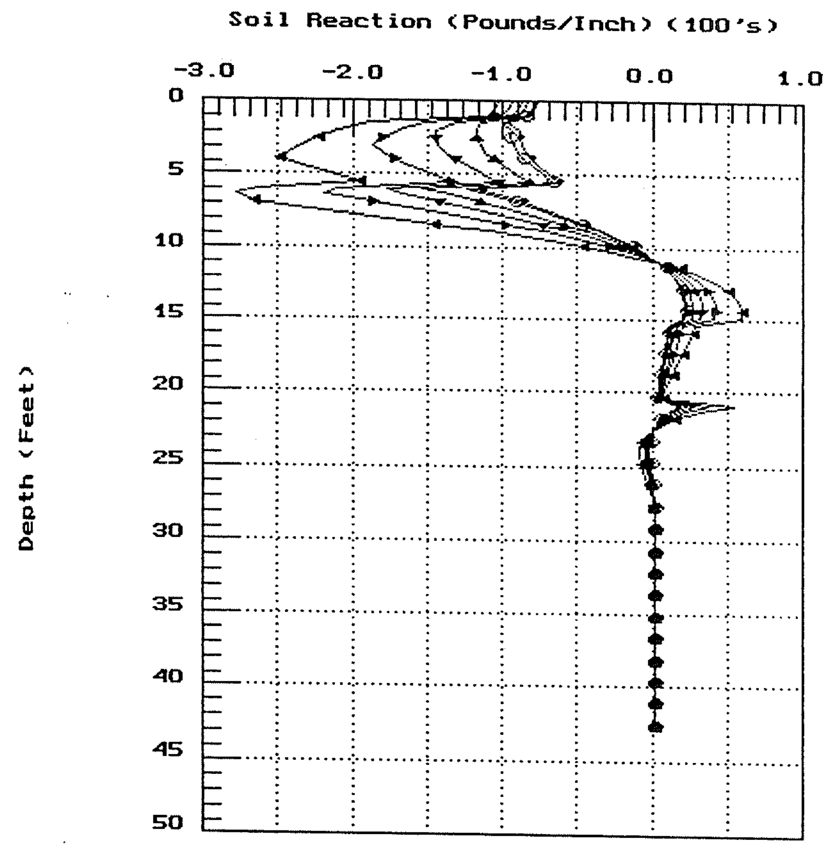


Pier 2 (South) Fixed Head ⟶ • 7.9 k
o 8.3 k
▲ 10 k
▼ 12 k
▶ 15 k
◀ 20 k

BIDWELL PARK VIADUCT (WIDEN) 202101.BID

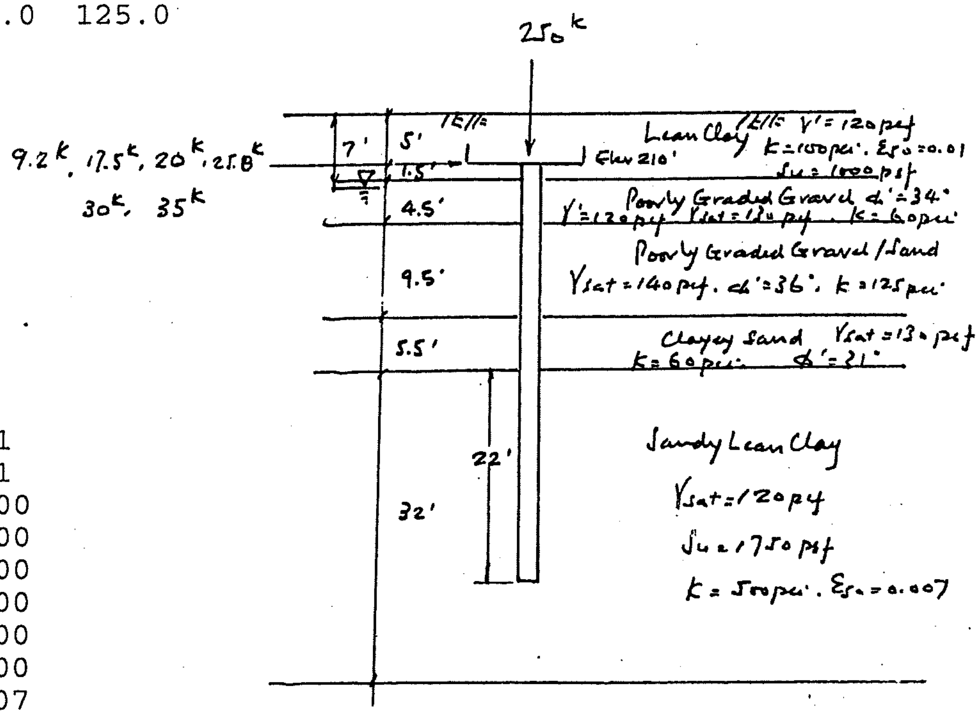


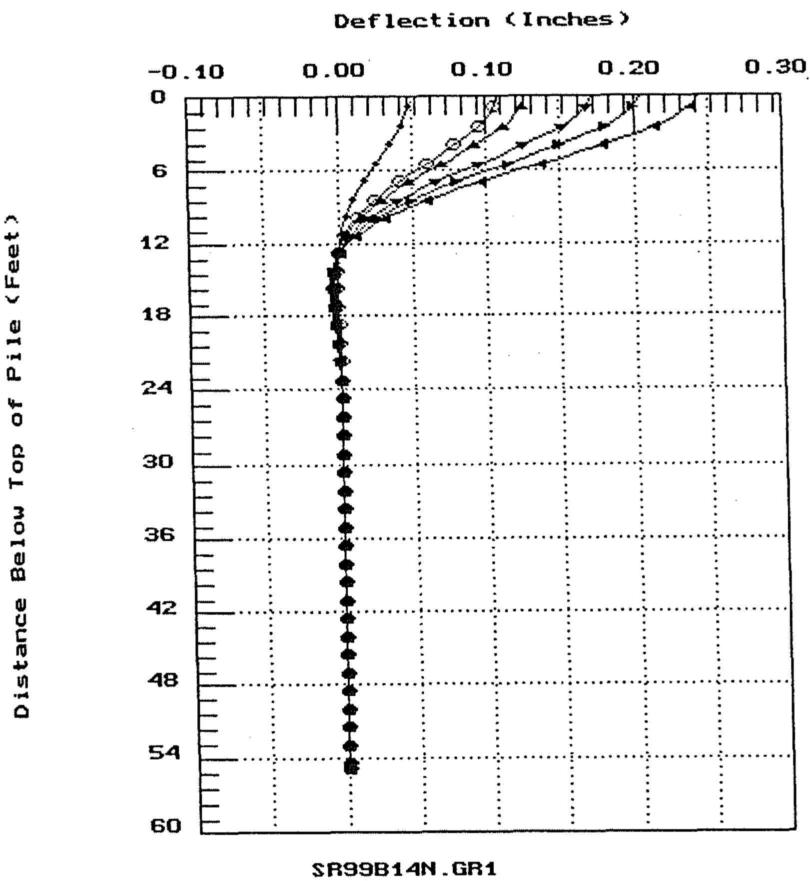
SR99BP2S.GR1

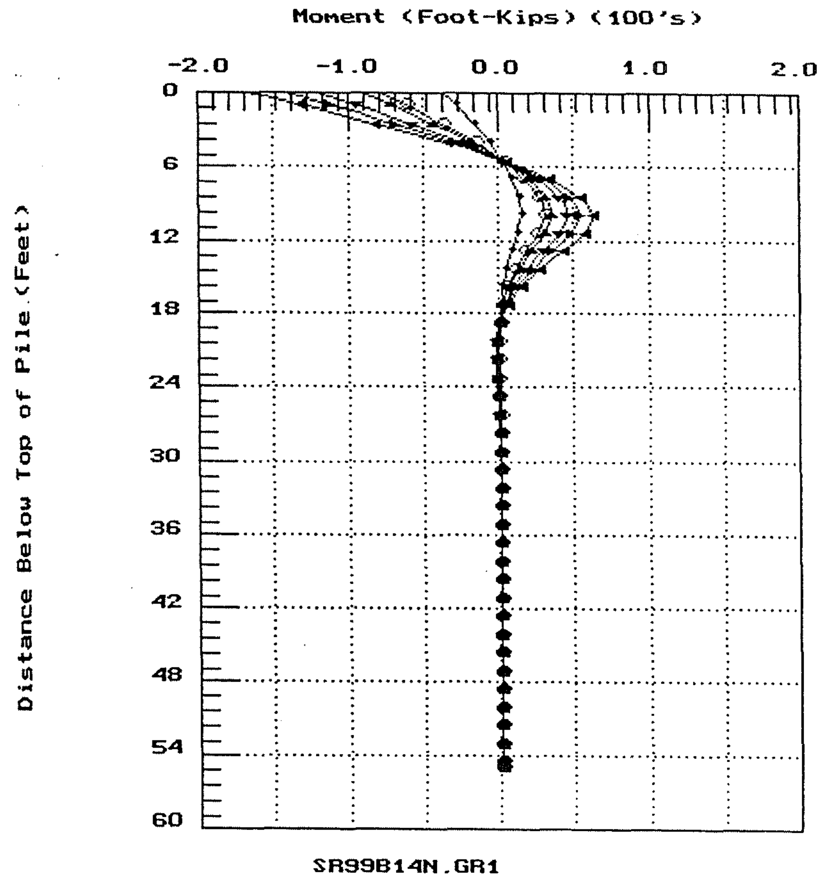


SR99BP2S.GR1

```
I .dwell  Park  Viaduct  (Widen)  (Pier 2-North  (LRFD)-HP14x89-250  kips)
   1      1      0      0      0
  86      2    -60.0    516.0       0.0
   0.0     11.76        904.00          26.10         29000000
 516.0     11.76        904.00          26.10         29000000
   7     12      12       0       2
   3    -60.0    18.0       100.0   100.0
   4     18.0    24.0        90.0    90.0
   4     24.0    72.0        60.0    60.0
   4     72.0   186.0       125.0   125.0
   4    186.0   252.0        60.0    60.0
   3    252.0   636.0       500.0   500.0
   4    636.0   756.0       125.0   125.0
 -60.0      0.069
  24.0      0.069
  24.0      0.039
  72.0      0.039
  72.0      0.045
 186.0      0.045
 186.0      0.039
 252.0      0.039
 252.0      0.033
 636.0      0.033
 636.0      0.039
 756.0      0.039
 -60.0      6.94      0.0     0.01
  18.0      6.94      0.0     0.01
  18.0      0.00     34.0     0.000
  72.0      0.00     34.0     0.000
  72.0      0.00     36.0     0.000
 186.0      0.00     36.0     0.000
 186.0      0.00     31.0     0.000
 252.0      0.00     31.0     0.000
 252.0     12.15      0.0     0.007
 636.0     12.15      0.0     0.007
 636.0      0.00     32.0     0.000
 756.0      0.00     32.0     0.000
 -60.0    0.6   1
 756.0    0.6   1
   0      1     1
   6
   2    0.92D+04   0.0D+05   2.50D+05
   2    1.75D+04   0.0D+05   2.50D+05
   2    2.00D+04   0.0D+05   2.50D+05
   2    2.58D+04   0.0D+05   2.50D+05
   2    3.00D+04   0.0D+05   2.50D+05
   2    3.50D+04   0.0D+05   2.50D+05
   0
   1      1      0
 500    1.00D-5    2500.0
```







Pier 2 (North) Fixed Head → • 9.2k

○ 17.5k

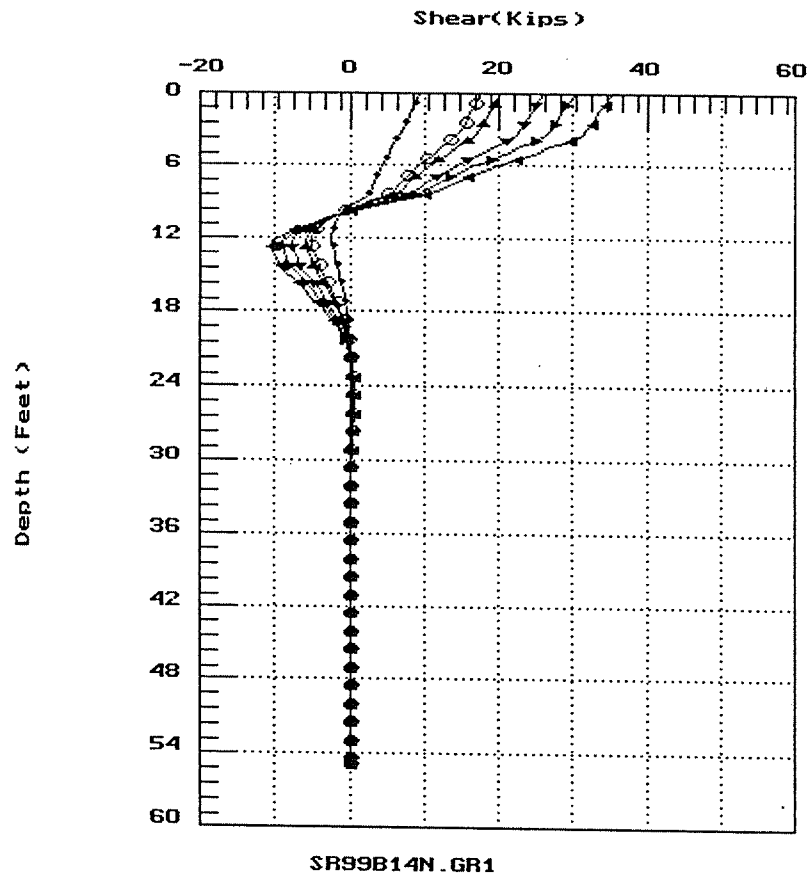
▲ 20k

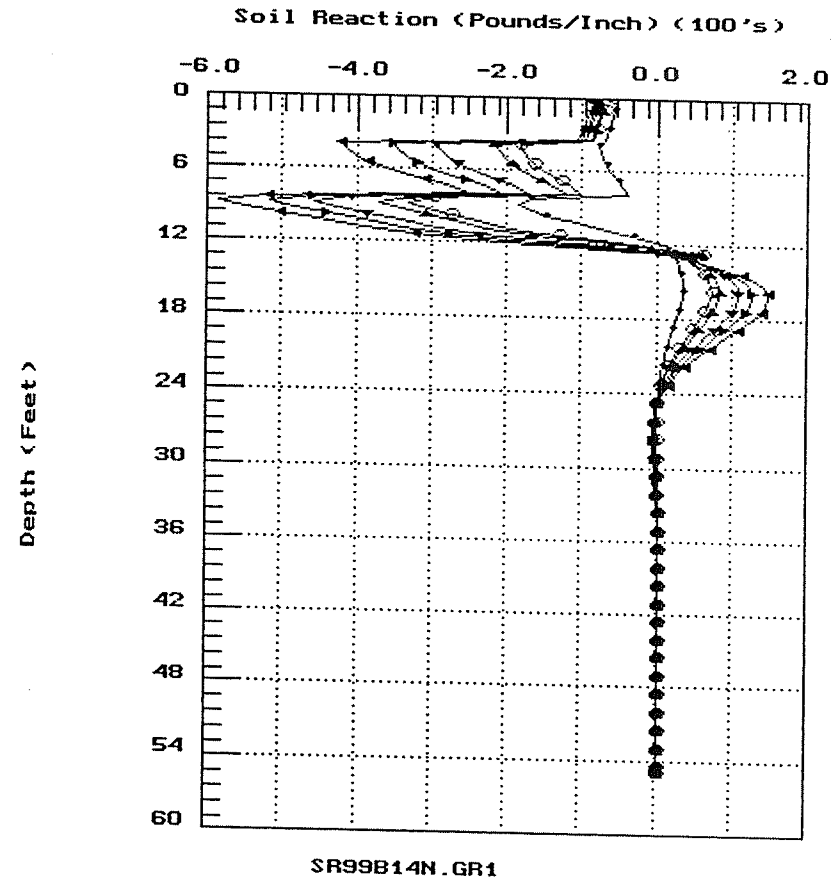
▼ 25.8k

▶ 30k

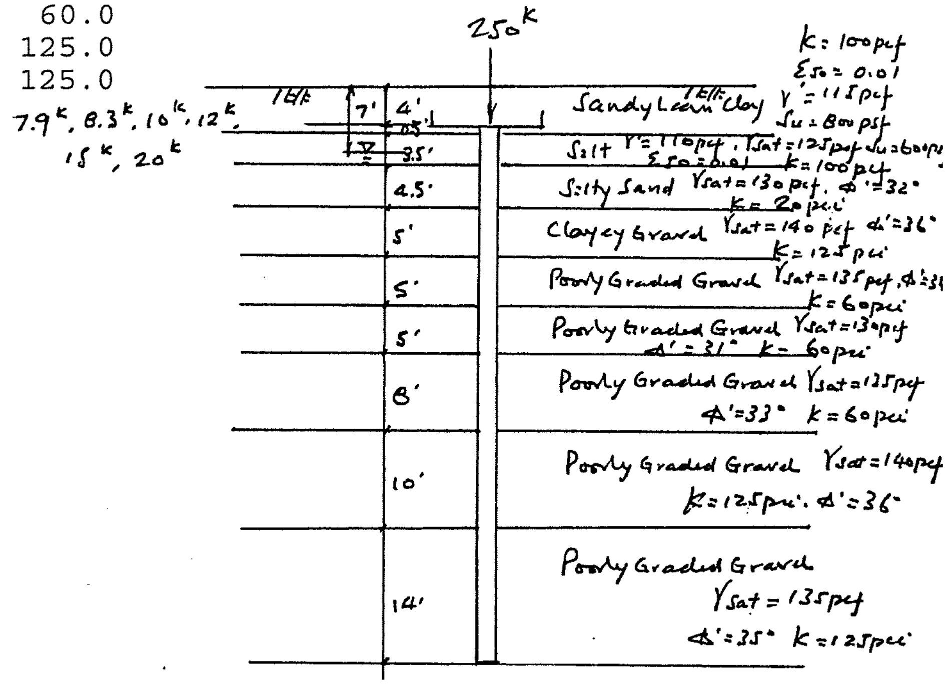
◀ 35k

BIDWELL PARK VIADUCT (WIDEN) 20Z101.BIE

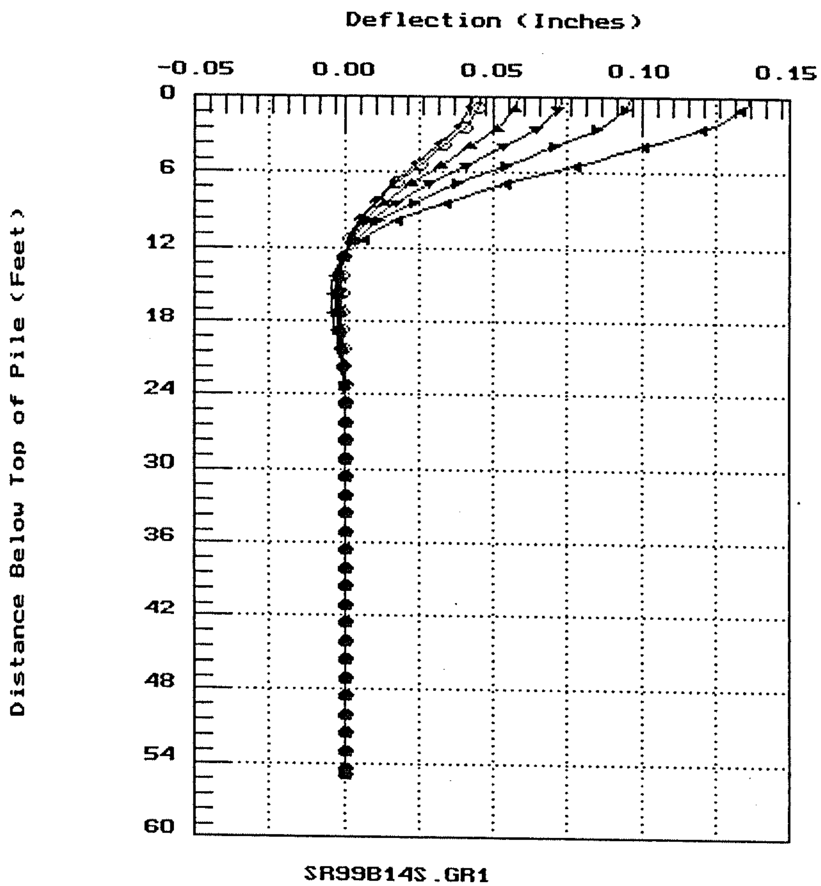

Shear(Kips)
-20
0
20
40
60
Depth (Feet)
0
6
12
18
24
30
36
42
48
54
60
SR99B14N.GR1

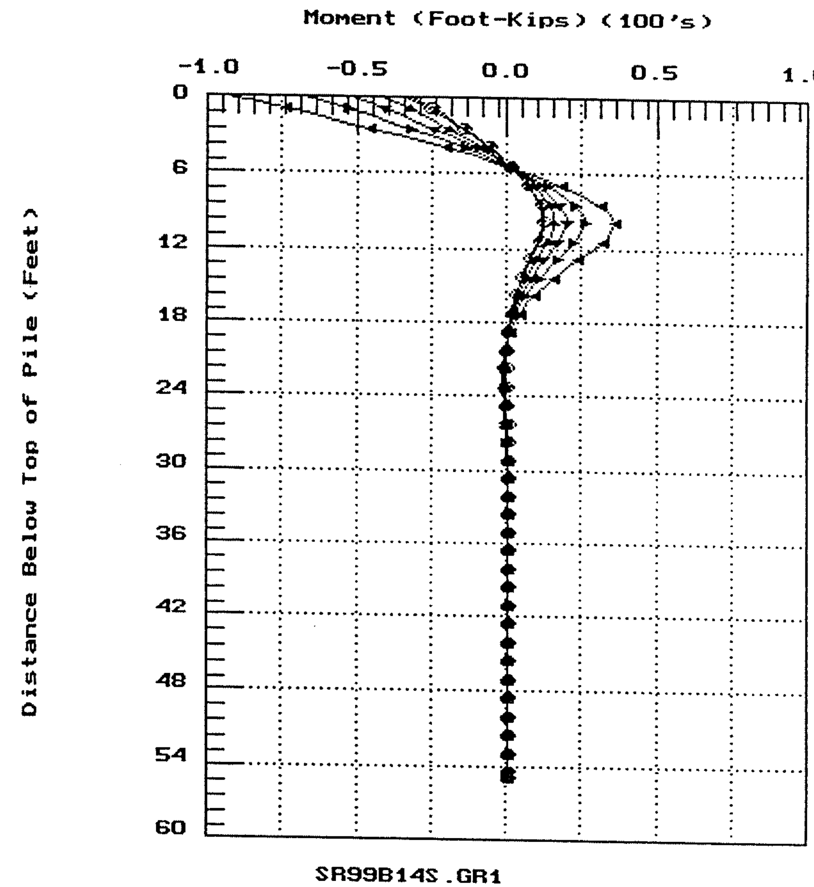

Soil Reaction (Pounds/Inch) (100's)
-6.0
-4.0
-2.0
0.0
2.0
Depth (Feet)
0
6
12
18
24
30
36
42
48
54
60
SR99B14N.GR1

```
.dwell  Park Viaduct  (Widen)  (Pier 14-South  (LRFD)-HP14x89-250 kips)
   1       1       0       0       0
 111       2     -48.0      666.0       0.0
   0.0     11.76            904.00           26.10           29000000
 666.0     11.76            904.00           26.10           29000000
   9     20        18        0       2
   3    -48.0      6.0        100.0   100.0
   3      6.0     48.0        100.0   100.0
   4     48.0    102.0         20.0    20.0
   4    102.0    162.0        125.0   125.0
   4    162.0    222.0         60.0    60.0
   4    222.0    282.0         60.0    60.0
   4    282.0    378.0         60.0    60.0
   4    378.0    498.0        125.0   125.0
   4    498.0    678.0        125.0   125.0
 -48.0      0.067
   6.0      0.067
   6.0      0.064
  36.0      0.064
  36.0      0.036
  48.0      0.036
  48.0      0.039
 102.0      0.039
 102.0      0.045
 162.0      0.045
 162.0      0.042
 222.0      0.042
 222.0      0.039
 282.0      0.039
 282.0      0.042
 378.0      0.042
 378.0      0.045
 498.0      0.045
 498.0      0.042
 678.0      0.042
 -48.0       5.56      0.0    0.01
   6.0       5.56      0.0    0.01
   6.0       4.17      0.0    0.01
  48.0       4.17      0.0    0.01
  48.0       0.00     32.0    0.000
 102.0       0.00     32.0    0.000
 102.0       0.00     36.0    0.000
 162.0       0.00     36.0    0.000
 162.0       0.00     33.0    0.000
 222.0       0.00     33.0    0.000
 222.0       0.00     31.0    0.000
 282.0       0.00     31.0    0.000
 282.0       0.00     32.0    0.000
 378.0       0.00     32.0    0.000
 378.0       0.00     36.0    0.000
 498.0       0.00     36.0    0.000
 498.0       0.00     33.0    0.000
 678.0       0.00     33.0    0.000
 -48.0     0.6   1
 678.0     0.6   1
   0       1     1
   6
   2    0.79D+04   0.0D+05   2.50D+05
   2    0.83D+04   0.0D+05   2.50D+05
   2    1.00D+04   0.0D+05   2.50D+05
```



```
  2    1.20D+04  0.0D+05  2.50D+05
  2    1.50D+04  0.0D+05  2.50D+05
  2    2.00D+04  0.0D+05  2.50D+05
  0
  1      1      0
500    1.00D-5   2500.0
```





Pier 14 (South) Fixed Head ⟶ • 7.9^k

○ 8.3^k

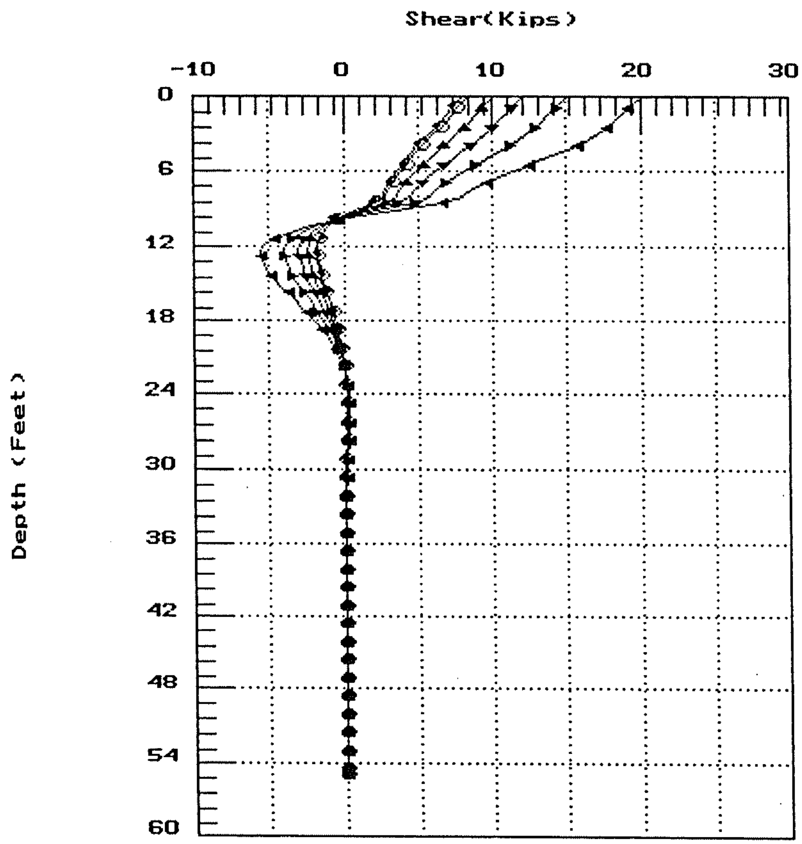
▲ 10^k

▼ 12^k

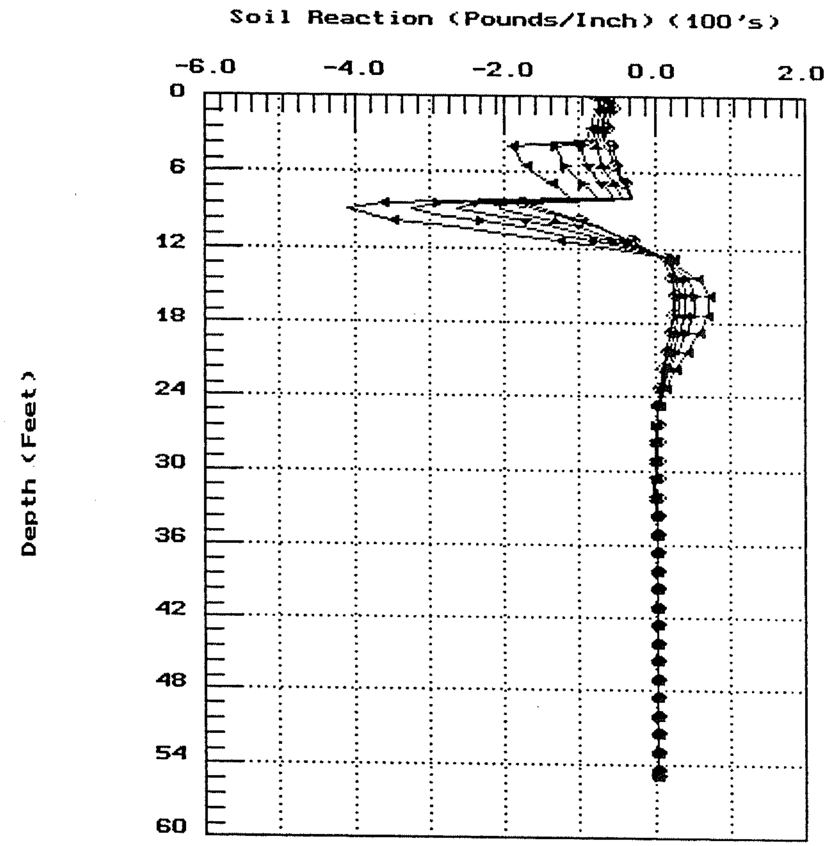
▶ 15^k

◀ 20^k

BIDWELL PARK VIADUCT (WIDEN)

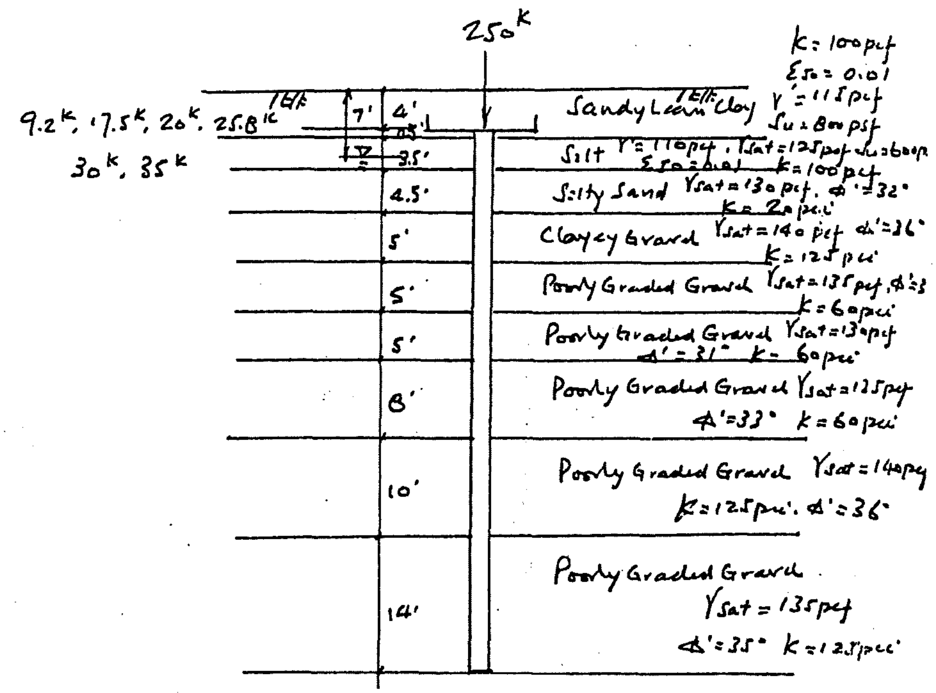


SR99B14S.GR1

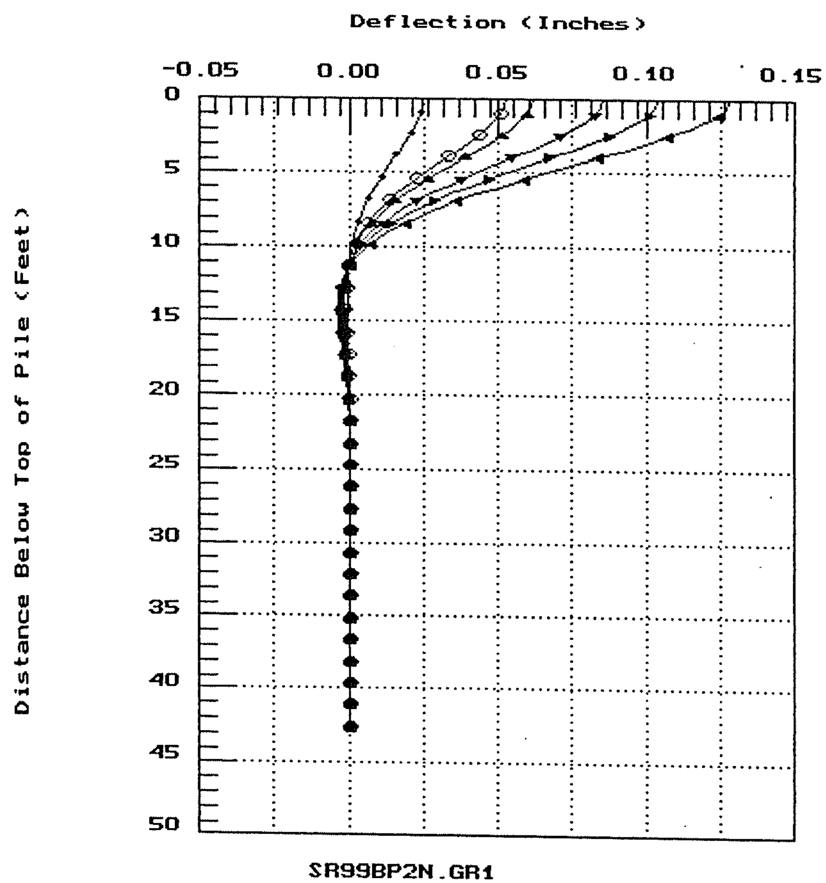


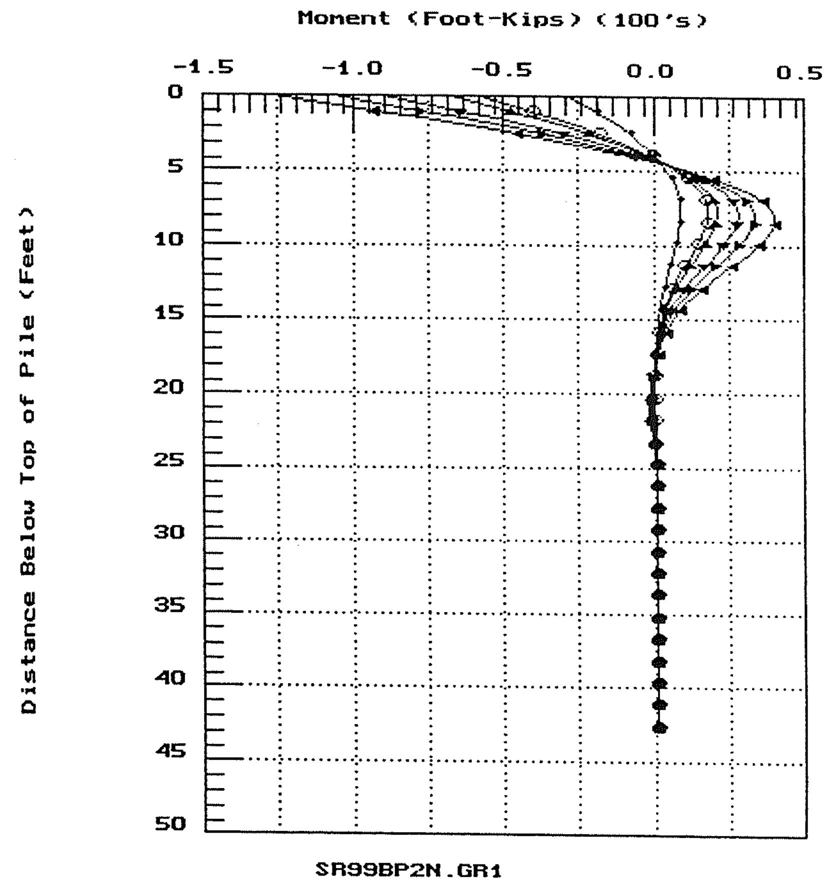
SR99B14S.GR1

```
E dwell Park Viaduct (Widen) (Pier 14-North (LRFD)-HP14x89-250 kips)
   1      1      0      0      0
 111      2    -48.0     666.0       0.0
   0.0    11.76          904.00          26.10          29000000
 666.0    11.76          904.00          26.10          29000000
   9     20      18       0       2
   3   -48.0      6.0       100.0   100.0
   3     6.0     48.0       100.0   100.0
   4    48.0    102.0        25.0    25.0
   4   102.0    162.0       225.0   225.0
   4   162.0    222.0        90.0    90.0
   4   222.0    282.0        90.0    90.0
   4   282.0    378.0        90.0    90.0
   4   378.0    498.0       225.0   225.0
   4   498.0    678.0       225.0   225.0
 -48.0     0.067
   6.0     0.067
   6.0     0.064
  36.0     0.064
  36.0     0.036
  48.0     0.036
  48.0     0.039
 102.0     0.039
 102.0     0.045
 162.0     0.045
 162.0     0.042
 222.0     0.042
 222.0     0.039
 282.0     0.039
 282.0     0.042
 378.0     0.042
 378.0     0.045
 498.0     0.045
 498.0     0.042
 678.0     0.042
 -48.0      5.56      0.0     0.01
   6.0      5.56      0.0     0.01
   6.0      4.17      0.0     0.01
  48.0      4.17      0.0     0.01
  48.0      0.00     32.0     0.000
 102.0      0.00     32.0     0.000
 102.0      0.00     36.0     0.000
 162.0      0.00     36.0     0.000
 162.0      0.00     33.0     0.000
 222.0      0.00     33.0     0.000
 222.0      0.00     31.0     0.000
 282.0      0.00     31.0     0.000
 282.0      0.00     32.0     0.000
 378.0      0.00     32.0     0.000
 378.0      0.00     36.0     0.000
 498.0      0.00     36.0     0.000
 498.0      0.00     33.0     0.000
 678.0      0.00     33.0     0.000
 -48.0    0.6   1
 678.0    0.6   1
   0      1     1
   6
   2    0.92D+04   0.0D+05   2.50D+05
   2    1.75D+04   0.0D+05   2.50D+05
   2    2.00D+04   0.0D+05   2.50D+05
```



```
  2    2.58D+04  0.0D+05  2.50D+05
  2    3.00D+04  0.0D+05  2.50D+05
  2    3.50D+04  0.0D+05  2.50D+05
  0
  1      1      0
500    1.00D-5    2500.0
```





Pier 14 (North) Fixed Head → • 9.2^k

○ 17.5^k

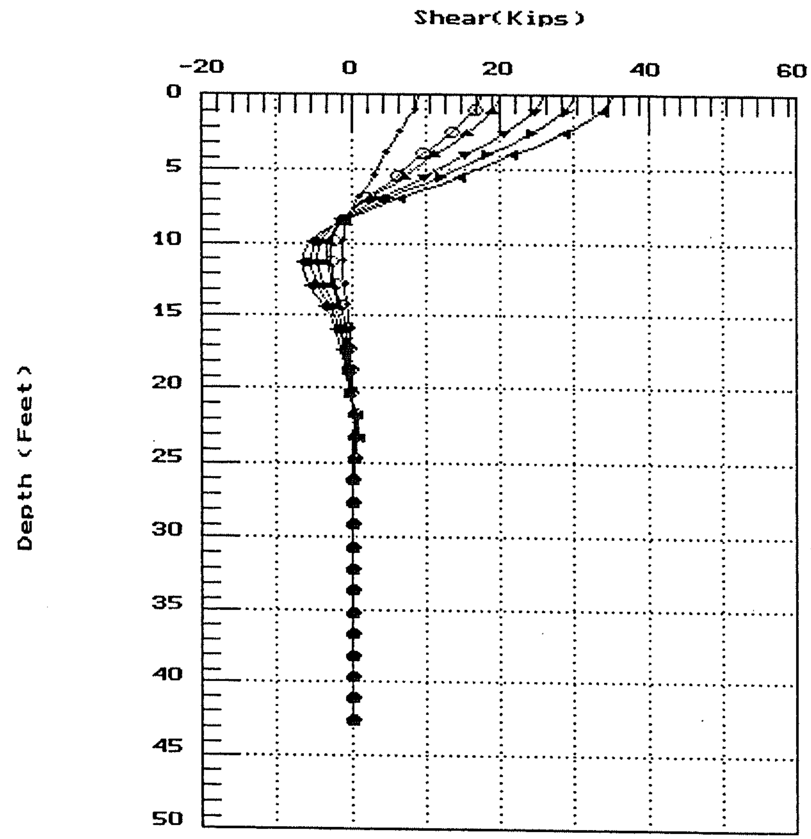
▲ 20^k

▼ 25.8^k

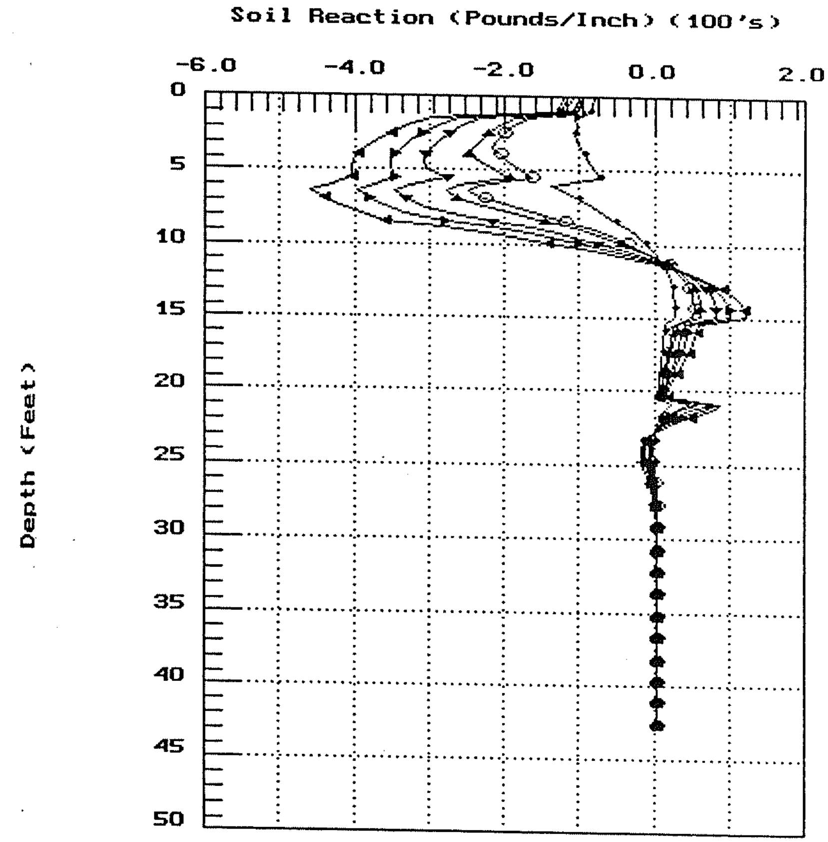
▶ 30^k

◀ 35^k

BIDWELL PARK VIADUCT (WIDEN) 202101.BID

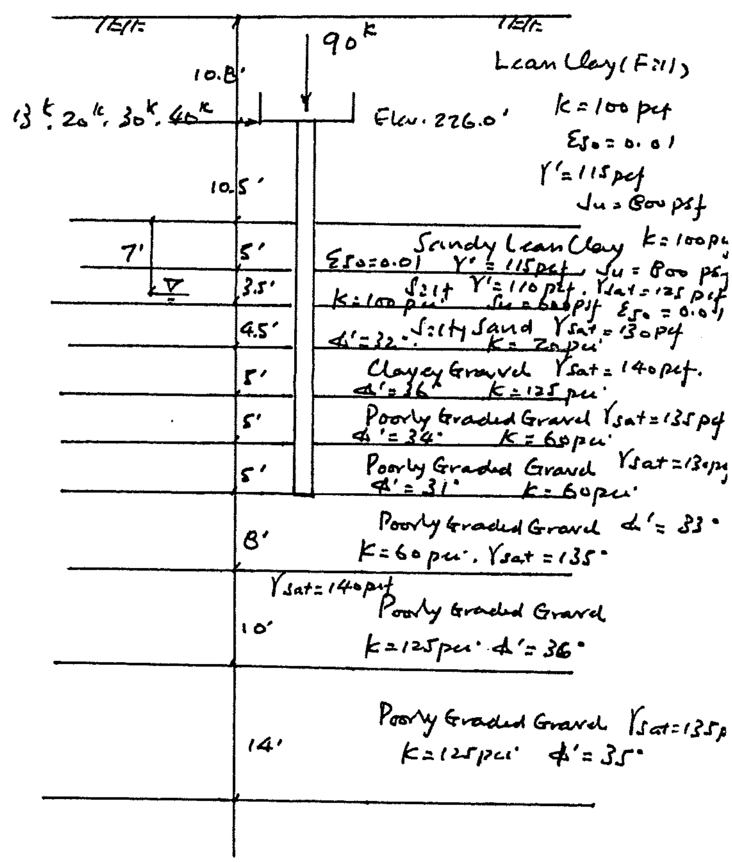


SR99BP2N.GR1

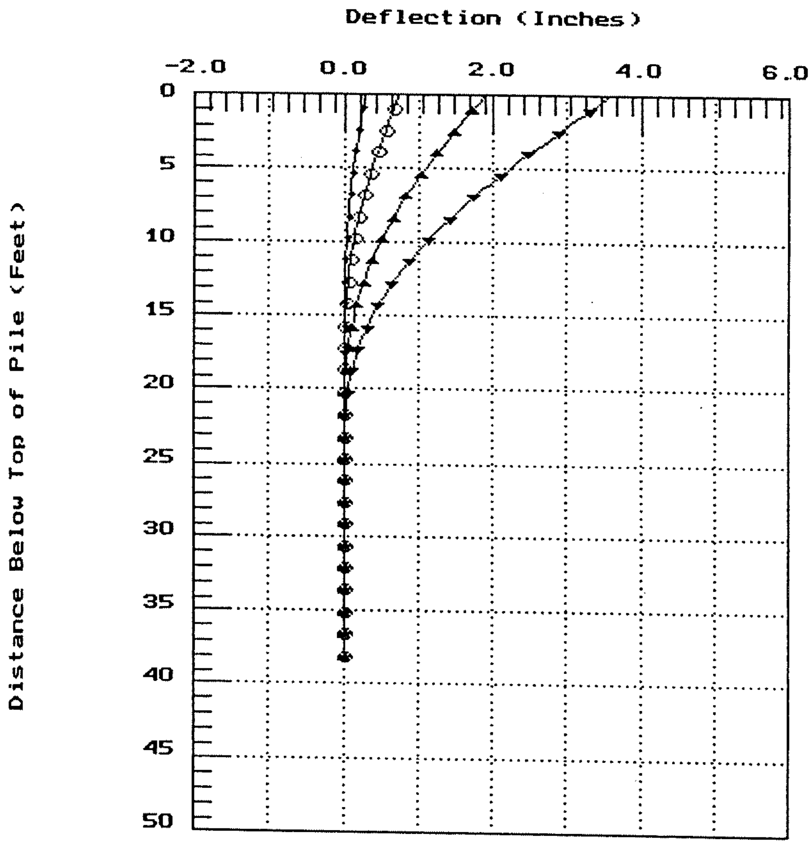


SR99BP2N.GR1

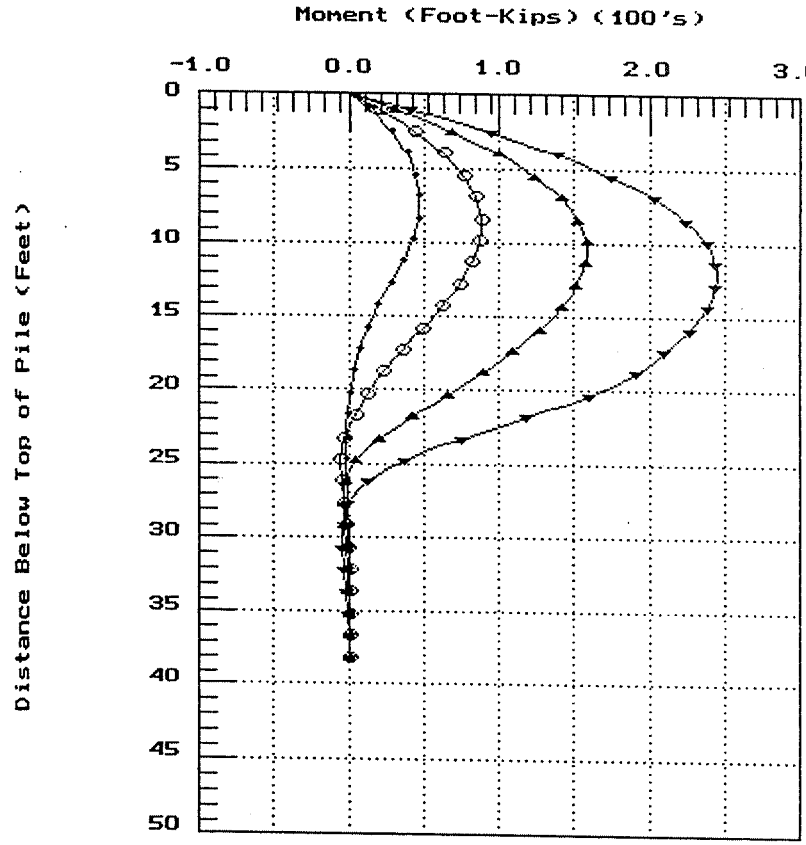
```
E dwell Park Viaduct (Widen) (Abut 15-HP14x89 -45 tons)
  1     1     0     0     0
 77     2    -129.6   462.0      0.0
  0.0    11.76        904.00          26.10         29000000
462.0    11.76        904.00          26.10         29000000
 10    20     18      0     2
  3  -129.6   186.0      100.0  100.0
  3   186.0   216.0      100.0  100.0
  3   216.0   228.0      100.0  100.0
  4   228.0   282.0       20.0   20.0
  4   282.0   342.0      125.0  125.0
  4   342.0   402.0       60.0   60.0
  4   402.0   462.0       60.0   60.0
  4   462.0   558.0       60.0   60.0
  4   558.0   678.0      125.0  125.0
  4   678.0   846.0      125.0  125.0
129.6     0.067
186.0     0.067
186.0     0.064
216.0     0.064
216.0     0.036
228.0     0.036
228.0     0.039
282.0     0.039
282.0     0.045
342.0     0.045
342.0     0.042
402.0     0.042
402.0     0.039
462.0     0.039
462.0     0.042
558.0     0.042
558.0     0.045
678.0     0.045
678.0     0.042
846.0     0.042
129.6      5.56      0.0    0.01
186.0      5.56      0.0    0.01
186.0      4.17      0.0    0.01
228.0      4.17      0.0    0.01
228.0      0.00     32.0    0.000
282.0      0.00     32.0    0.000
282.0      0.00     36.0    0.000
342.0      0.00     36.0    0.000
342.0      0.00     33.0    0.000
402.0      0.00     33.0    0.000
402.0      0.00     31.0    0.000
462.0      0.00     31.0    0.000
462.0      0.00     32.0    0.000
558.0      0.00     32.0    0.000
558.0      0.00     36.0    0.000
678.0      0.00     36.0    0.000
678.0      0.00     33.0    0.000
846.0      0.00     33.0    0.000
129.6    0.6   1
846.0    0.6   1
  0      1     1
  4
  1   1.30D+04   0.0D+05   9.00D+04
  1   2.00D+04   0.0D+05   9.00D+04
```



```
  1   3.00D+04  0.0D+05  9.00D+04
  1   4.00D+04  0.0D+05  9.00D+04
  0
  1     1     0
500   1.00D-5   2500.0
```



S99BDA15.GR1



S99BDA15.GR1

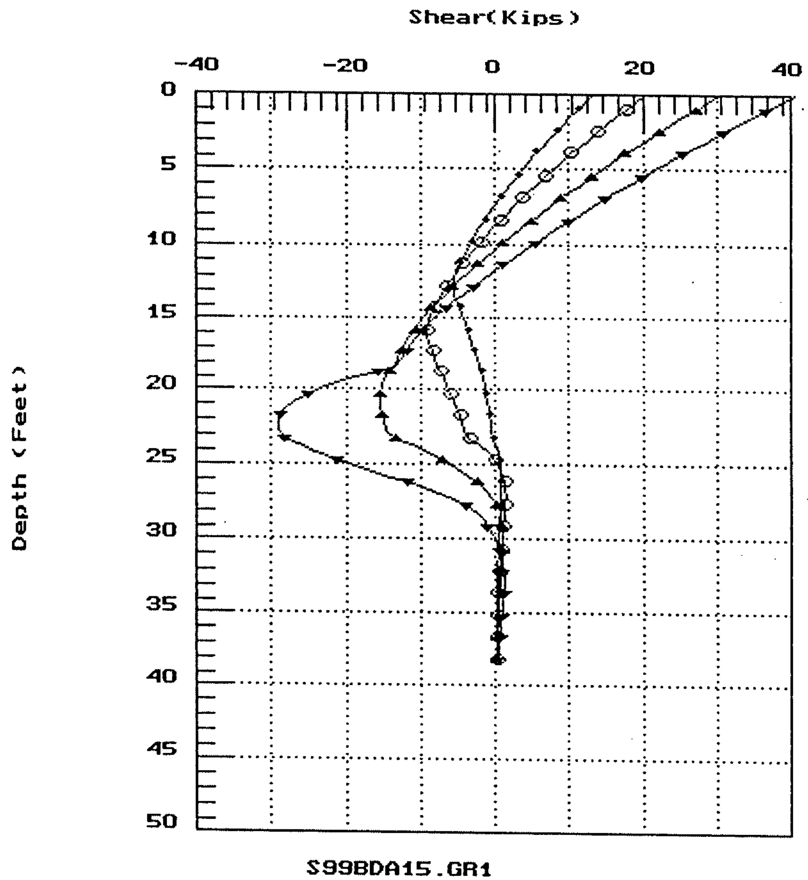
Abutment 15 Fixed Head ⟶ • 13^k

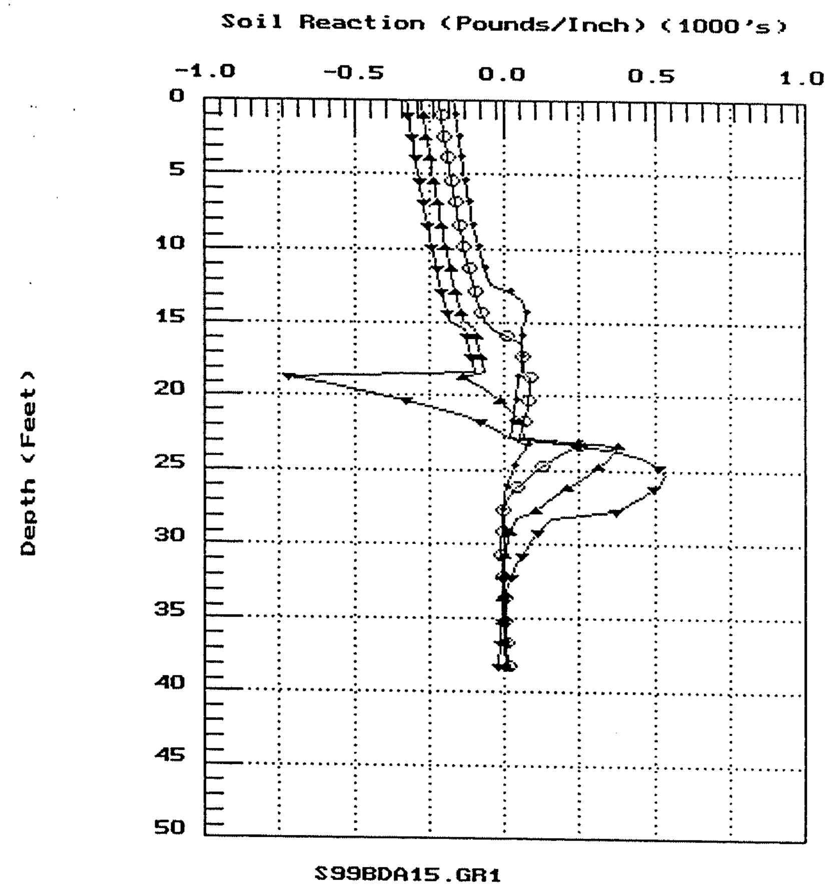
○ 20^k

▲ 30^k

▼ 40^k

BIDWELL PARK VIADUCT (WIDEN) 262101-B


Shear(Kips)
-40
-20
0
20
40
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
S99BDA15.GR1


Soil Reaction (Pounds/Inch) (1000's)
-1.0
-0.5
0.0
0.5
1.0
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
S99BDA15.GR1

Bearing Capacity Analyses

PARIKH

Practicing in the Geosciences

JOB

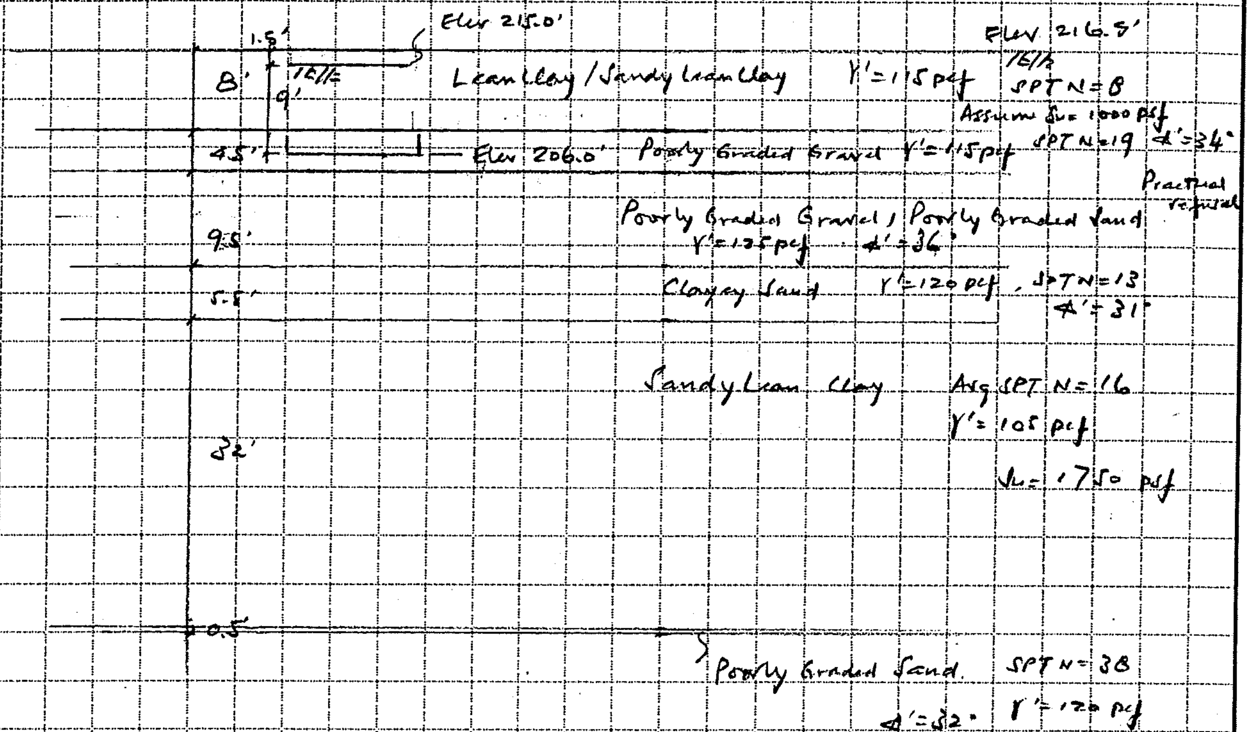
SHEET NO 1 OF 17

CALCULATED BY A. Lam DATE 7/25/2008

CHECKED BY YIDW DATE 9/08

SCALE

Bearing Capacity Analysis (Boring B2D-2) Pier 3 (spread footing)



PARIKH
Practicing in the Geosciences

JOB Bidwell Park Viaduct (Widen) 202101.BID
SHEET NO 2 OF
CALCULATED BY A-Lam DATE 2/2009
CHECKED BY DATE
SCALE

Bearing Capacity Analyses (Boring BID-2) Pier 3

Immediate Settlement $\delta v = q B \frac{(1-\nu^2)}{E} I$

$$\Rightarrow q = \frac{\delta v \, E}{B(1-\nu^2) I}$$

Now $B = 18'$ Assume Square (rigid) $L/B = 1.0$

$I_{avg} = 0.82$

Assume $\nu = 0.33$

Poorly Graded Gravel $E = 600$ Pa (SPT N = 19)
$= 1200$ ksf

$$q = \frac{0.083 \text{ ft} \times 1200 \text{ ksf}}{18 \text{ ft} \times (1-0.33^2) \times 0.82}$$

$= \underline{7.6 \text{ ksf}}$ Say $\underline{\underline{7.0 \text{ ksf}}}$

Left $B = L = 14'$

$$q = \frac{0.083 \text{ ft} \times 1200 \text{ ksf}}{14 \text{ ft} \times (1-0.33^2) \times 0.82}$$

$= \underline{9.7 \text{ ksf}}$ Say $\underline{9.0 \text{ ksf}}$

Right $B = L = 16$ $q = \frac{0.083 \text{ ft} \times 1200 \text{ ksf}}{16 \text{ ft} \times (1-0.33^2) \times 0.82}$

$= \underline{8.5 \text{ ksf}}$ Say $\underline{8.0 \text{ ksf}}$

PARIKH

Practicing in the Geosciences

JOB Bidwell Park Viaduct (Widening ...)
SHEET NO 3 OF 17
CALCULATED BY A Lam DATE 8/2008
CHECKED BY DATE
SCALE

Bearing Capacity Analyses (Boring BID-2) Pier 3 (Assume 3' scour)

Gross Nominal Bearing Resistance

$\phi' = 34°$ $N_q = 36.5$ $N_c = 52.64$ $N_\gamma = 36.0$ $B' = 6.8'$ $D = 6'$

$\gamma' = 115$ pcf $\gamma_{sat} = 125$ pcf

Assume groundwater at footing elevation

$Q_n = (0.5 \times \gamma B N_\gamma + c N_c + \gamma D N_q)$

$= 0.5 \times (125 - 62.4) \times 6.8 \times 36.0 + 115 \times 6 \times 36.5$

$= 7662.2 + 25185.0$

$= 32847$ psf Say $\underline{32.0 \text{ ksf}}$

Q_R (Factored Gross Nominal Bearing Resistance) $= \phi_b \times Q_n$

$B' = 14.4$

$\phi_b = 0.45$

$= 0.45 \times 32847$

$= 14781.2$ psf Say $\underline{14.0 \text{ ksf}}$

Geotechnical * Environmental * Materials Testing * Construction Inspection
Offices: Milpitas * Fremont * Sacramento * Walnut Creek

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Practicing in the Geosciences

JOB Bidwell Park Viaduct (Widening)

SHEET NO 4 OF 17

CALCULATED BY A Lam DATE 8/2000

CHECKED BY DATE

SCALE

Bearing Capacity Analyses (Boring B20-1) Piers 4, 5, 6, 7 (Spread footing)

Elev +215.0'

Elev 214.0

Thickness	Elevation	Soil	Unit weight	Properties
3'		Lean Clay	γ' = 120 pcf	SPT N = 12, Su = 1000 psf
4.5'	+209.0'	Clayey Sand	γ' = 100 pcf	SPT N = 4, ϕ' = 29.5°
5'	+205.0	Poorly Graded Sand	γ' = 125 pcf	SPT N = 31, ϕ' = 33°
15'		Poorly Graded Sand / Silty Sand	γ' = 125 pcf	Practical refusal, ϕ' = 36°
11.5'		Silty Sand	γ' = 125 pcf	SPT N = 13, ϕ' = 31°
19'		Lean Clay	γ' = 105 pcf	Avg SPT N = 8, Su = 1000 psf
2'		Clayey Sand	γ' = 110 pcf	SPT N = 20, ϕ' = 31°

Geotechnical * Environmental * Materials Testing * Construction Inspection

Offices: Milpitas * Fremont * Sacramento * Walnut Creek

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Practicing in the Geosciences

JOB Bidwell Park Viaduct (Widen) 202101.BID
SHEET NO 5 OF
CALCULATED BY A Lam DATE 2/2009
CHECKED BY DATE
SCALE

Permissible Net Contact Stress q_{pn} (Boring BID-1) Piers 4 & 5 (Assume 6' scour)

Immediate settlement $\delta_v = q B \frac{(1-\nu^2)}{E} I$

$\Rightarrow q = \frac{\delta_v \cdot E}{B(1-\nu^2)\cdot I}$

Now $B' = 18'$ Assume Square (rigid) $L/B = 1.0$

$I_{average} = 0.82$

Assume $\nu = 0.33$

Poorly Graded Sand $E = 600\ Pa$ $1\ Pa = 2\ ksf$
(N = 31) $= 1200\ ksf$

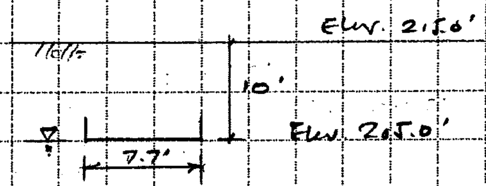
$q = \frac{0.083\ ft \times 1200\ ksf}{18\ ft\ (1-0.33^2) \times 0.82}$

$= \underline{7.6\ ksf}$ Say $\underline{\underline{7.0\ ksf}}$

Left & Right $q = \frac{0.083\ ft \times 1200\ ksf}{14\ ft\ (1-0.33^2) \times 0.82}$

$= \underline{9.7\ ksf}$ Say $\underline{\underline{9.0\ ksf}}$

<u>Bearing Capacities</u> (Piers 4 & 5) Spread Footing (Assume 6' dim



Assume $\phi' = 33°$ (SPT N = 31)
$\gamma' = 110$ pcf $\gamma_{sat} = 125$ pcf
$B = 7.7'$ $D = 4'$

$\phi' = 33°$ $N_q = 32.51$ $N_c = 48.34$ $N_\gamma = 31.95$

$Q_n = (0.5 \times \gamma B \times N_\gamma + c N_c + \gamma D N_q)$

$= 0.5 \times (125 - 62.4) \times 7.7 \times 31.95 + 110 \times 4 \times 32.51$

$= 7700 + 14304$
$= 22004.4$ psf Say <u>22.0 ksf</u>

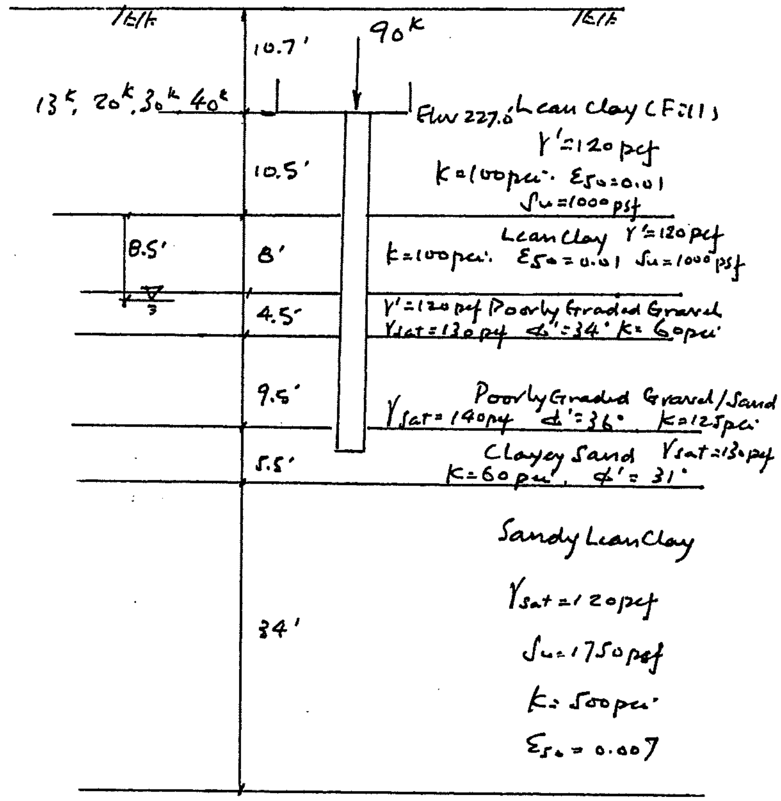
Q_R (Factored Gross Nominal Bearing Resistance) $= \phi_b \times Q_n$

Now $\phi_b = 0.45$

$Q_R = 0.45 \times 22004.4$

$= 9902.0$ psf Say <u>9.0 ksf</u>

```
idwell Park Viaduct (Widen) (GW-Elev. 208')(Abut 1-HP14x89 -45 tons)
   1      1      0      0      0
  68      2   -128.4   408.0       0.0
   0.0    11.76          904.00          26.10          29000000
 408.0    11.76          904.00          26.10          29000000
   7     12      12       0      2
   3  -128.4   222.0        100.0   100.0
   4   222.0   228.0         90.0    90.0
   4   228.0   276.0         60.0    60.0
   4   276.0   390.0        125.0   125.0
   4   390.0   456.0         60.0    60.0
   3   456.0   840.0        500.0   500.0
   4   840.0   960.0        125.0   125.0
-128.4     0.069
 228.0     0.069
 228.0     0.039
 276.0     0.039
 276.0     0.045
 390.0     0.045
 390.0     0.039
 456.0     0.039
 456.0     0.033
 840.0     0.033
 840.0     0.039
 960.0     0.039
-128.4      6.94      0.0     0.01
 222.0      6.94      0.0     0.01
 222.0      0.00     34.0     0.000
 276.0      0.00     34.0     0.000
 276.0      0.00     36.0     0.000
 390.0      0.00     36.0     0.000
 390.0      0.00     31.0     0.000
 456.0      0.00     31.0     0.000
 456.0     12.15      0.0     0.007
 840.0     12.15      0.0     0.007
 840.0      0.00     32.0     0.000
 960.0      0.00     32.0     0.000
-128.4    0.6   1
 960.0    0.6   1
   0      1     1
   4
   1    1.30D+04   0.0D+05   9.00D+04
   1    2.00D+04   0.0D+05   9.00D+04
   1    3.00D+04   0.0D+05   9.00D+04
   1    4.00D+04   0.0D+05   9.00D+04
   0
   1      1      0
 500    1.00D-5    2500.0
```



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Practicing in the Geosciences

JOB Bedwell Park Viaduct (Widen) 202101 BED
SHEET NO 7 OF
CALCULATED BY A Lam DATE 2/2009
CHECKED BY DATE
SCALE

Bearing Capacity Analysis (Boring BED-1) Piers 6 & 7

Immediate Settlement $\delta_v = q B \left(\frac{1-\nu^2}{E}\right) I$

Now $B = 18$ $L/B = 1.0$

$I_{average} = 0.82$

Assume $\nu = 0.33$

Clayey Sand $E = 400$ Pa
(N = 4) $= 800$ ksf

$$q = \frac{0.083 \text{ ft} \times 800 \text{ ksf}}{18 \text{ ft} (1-0.33^2) \times 0.82}$$

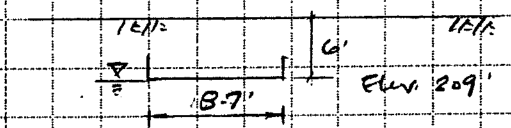
$= 5.0$ ksf Say 5.0 ksf

Left & Right $q = \frac{0.083 \text{ ft} \times 800 \text{ ksf}}{14 \text{ ft} (1-0.33^2) \times 0.82}$

$= 6.5$ ksf Say 6.0 ksf

Bearing Capacity Analyses Piers 6-8-7 (Assume 3' Lower)

Elev. 215.0



$N = 6$ $\phi' = 29.5°$, $c' = 50$ psf
$\gamma' = 110$ pcf $\gamma_{sat} = 125$ pcf
$B = 8.7'$ $D = 3'$

$\phi' = 29.5°$ $N_q = 21.3$ $N_c = 35.8$ $N_\gamma = 18.7$

$Q_n = 0.5 \times \gamma B N_\gamma + cN_c + \gamma D N_q$

$= 0.5 \times (125 - 62.4) \times 8.7 \times 18.7 + 35.8 \times 100 + 110 \times 3 \times 21.3$

$= 5092.2 + 3580 + 7029$

$= 15701.2$ Say $\underline{15.0 \text{ ksf}}$

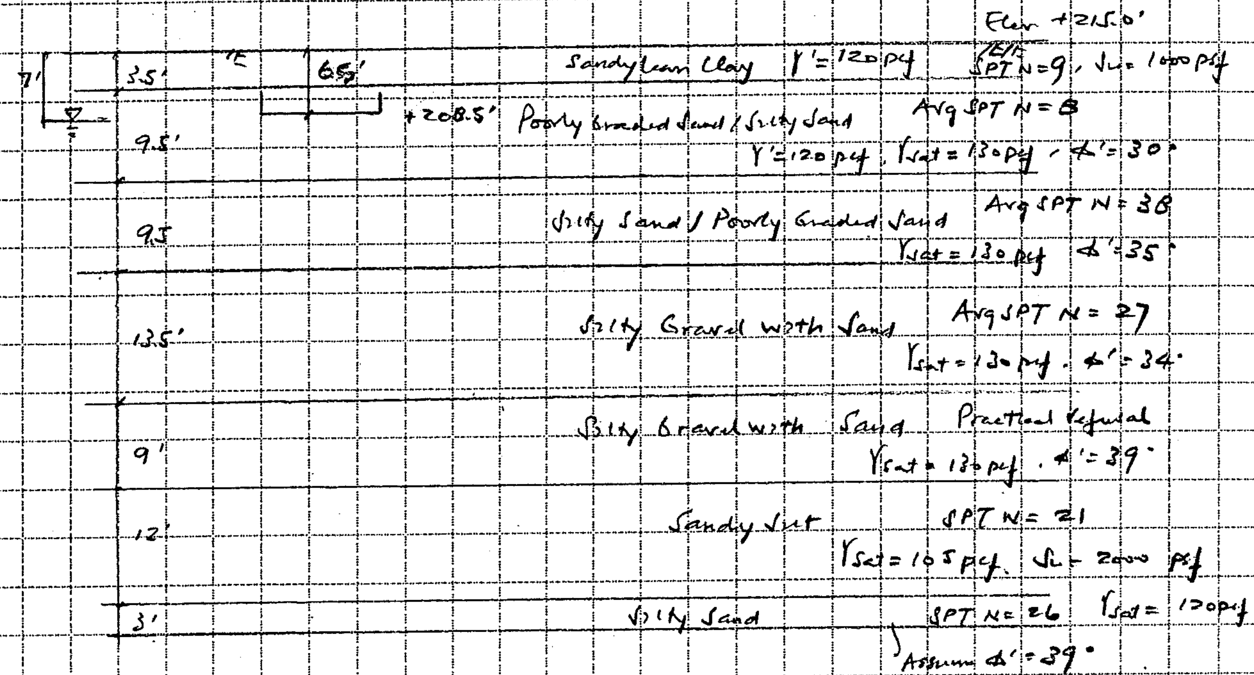
Q_R (Factored Gross Nominal Bearing Resistance) $= \varphi_b \times Q_n$

$\varphi_b = 0.45$

$Q_R = 0.45 \times 15701.2$

$= 7066$ psf Say $\underline{7.0 \text{ ksf}}$

Bearing Capacity Analyses (Boring B5D-4) Piers 8, 9, 10 & 11



PARIKH
Practicing in the Geosciences

JOB Bidwell Park Viaduct Widening 202101. BID
SHEET NO 10 OF
CALCULATED BY Alam DATE 2/2009
CHECKED BY DATE
SCALE

Bearing Capacity Analysis (Boring BID-4) Piers 8, 9, 10 & 11 Spread ftg

Immediate Settlement $\delta_v = \frac{q B (1-\nu^2)}{E} I$

$\Rightarrow q = \frac{\delta_v E}{B (1-\nu^2) I}$

New B = 18' Square (rigid) L/B = 1.0

$I_{average} = 0.82$ $\nu = 0.33$

Poorly Graded Sand / Silty Sand $E = 450\ P_a$
(N = 8) $= 900$ ksf

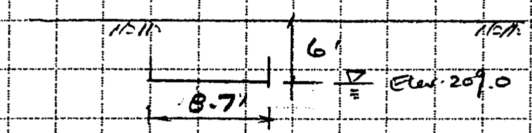
$q = \frac{0.083\ ft \times 900\ ksf}{18\ ft \times (1-0.33^2) \times 0.82}$

$= \underline{5.7\ ksf}$ Say $\underline{5.5\ ksf}$

Left & Right $q = \frac{0.083\ ft \times 900\ ksf}{12\ ft \times (1-0.33^2) \times 0.82}$

$= \underline{8.5\ ksf}$ Say $\underline{8.0\ ksf}$

Bearing Capacity Analyses (Boring B2D-4) Piers 8, 9, 10 & 11 Spread ftg
(Assume 3' scour)



Elev 215.0
Assume $\phi' = 30.5°$ (SPT N = 8)
$\gamma' = 120$ pcf $\gamma_{sat} = 130$ pcf
$B' = 8.7'$ $D = 3'$

$\phi' = 30.5°$ $N_q = 24.0$ $N_c = 38.9$ $N_\gamma = 21.8$

$Q_u = 0.5 \times \gamma \times B N_\gamma + c N_c + \gamma D N_q$

$= 0.5 \times (130 - 62.4) \times 8.7 \times 21.8 + 120 \times 3 \times 24.0$

$= 6411 + 8640$

$= 15051$ psf Say 15.0 ksf

Q_R (Factored Gross Nominal Bearing Resistance) $= \varphi_b \times Q_u$

$\varphi_b = 0.45$

$Q_R = 0.45 \times 15051$

$= 6773$ psf Say 7.0 ksf

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Practicing in the Geosciences

JOB: Bidwell Park Viaduct (Widening) 20210.15
SHEET NO: 12 OF 17
CALCULATED BY: A Lam DATE: 7/25/2008
CHECKED BY: DATE:
SCALE:

Bearing Capacity Analysis (Boring B1D-5) Pier 12 (Spread footing)

Elev. +216.0

Thickness	Footing	Soil	Properties
3.5'	1'; B/F +215.0'	Sandy Lean Clay	$\gamma' = 115$ pcf, SPT N=5, $S_u = 600$ psf
4'	6.5'; +208.5'	Silty Sand	$\gamma' = 120$ pcf, SPT N=7, $\phi' = 30°$
6'		Poorly Graded Sand	Practical refusal; $\gamma' = 125$ pcf, $\phi' = 36°$
14.5'		Poorly Graded Sand / Clayey Gravel	Avg SPT N=37; $\gamma' = 120$ pcf, $\phi' = 35°$
19.5'		Clayey Gravel / Well-Graded Sand	Practical refusal; $\gamma' = 125$ pcf; Assume $\phi' = 39°$
18'		Silty Sand	Avg SPT N=15; $\gamma' = 115$ pcf, $\phi' = 30°$
6'		Sandy Silt	SPT N=11, $\gamma' = 110$ pcf, $S_u = 1250$ psf

Bearing Capacity Analyses (Boring B20-5) Pier 12 (Spread footing)

Immediate Settlement $\delta v = \frac{q B (1-\nu^2) I}{E}$

$\Rightarrow q = \frac{\delta v \, E}{B (1-\nu^2) I}$

B = 18' Square (rigid) L/B = 1.0

$I_{average} = 0.82$ $\nu = 0.33$

Silty Sand (N = 7)

$E = 450\ Pa$
$= 900\ ksf$

$q = \frac{0.083\ ft \times 900\ ksf}{18\ ft \times (1-0.33^2) \times 0.82}$

$= \underline{5.7\ ksf}$ Say $\underline{5.5\ ksf}$

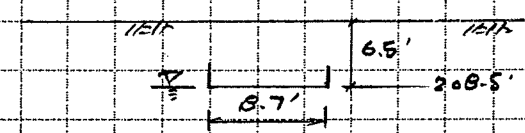
Left & Right

$q = \frac{0.083\ ft \times 900\ ksf}{12\ ft \times (1-0.33^2) \times 0.82}$

$= \underline{8.5\ ksf}$ Say $\underline{8.0\ ksf}$

Bearing Capacity Analysis (Boring BID-4) Rev 1? (Spread footing)
(Assume 3' ...)

Elev. 215.0'



Silty sand $\phi' = 30°$ (N = 7)
$\gamma' = 120$ pcf $\gamma_{sat} = 125$ pcf

$\phi' = 30°$ $N_q = 22.46$ $N_c = 37.16$ $N_\gamma = 19.7$

$Q_n = 0.5 \times \gamma \times B \times N_\gamma + cN_c + \gamma D N_q$

$= 0.5 \times (125 - 62.4) \times 8.7 \times 19.7 + 120 \times 3.5 \times 22.46$

$= 5365 + 9433.2$

$= 14012.1$ Say $\underline{14.0 \text{ ksf}}$

Q_R : (Factored Gross Nominal Bearing Resistance) $= \varphi_b \times Q_n$

$\varphi_b = 0.45$

$Q_R = 0.45 \times 14021$

$= 6305.4$ psf Say $\underline{6.5 \text{ ksf}}$

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JOB: Bidwell Park Viaduct (Widening) 202161.BZI
SHEET NO: 15 OF 17
CALCULATED BY: A Lam DATE: 7/2008
CHECKED BY: DATE:
SCALE:

Pile Capacity Analyses (Boring R20-6) Piers 13 (p-1)

0.5'
16IN
6.5'

Elev. +215.5'

Thickness	Elevation	Soil	Properties
8'	Elev. 215.0'	Sandy Lean Clay	$\gamma' = 115$ pcf, SPT N=8, Su = 800 psf
3.5'	Elev. 208.5'	Silt	$\gamma' = 110$ pcf, SPT N=6, Su = 600 psf
4.5'		Silty Sand	$\gamma' = 115$ pcf, SPT N=12, $\phi' = 32°$
5'		Clayey Gravel	$\gamma' = 120$ pcf, Practical Refusal, $\phi' = 39°$
5'		Poorly Graded Gravel	$\gamma' = 115$ pcf, SPT N=30, $\phi' = 35°$
5'		Poorly Graded Gravel	$\gamma' = 110$ pcf, SPT N=16, $\phi' = 31°$
8'		Poorly Graded Gravel	$\gamma' = 115$ pcf, SPT N=30, $\phi' = 34°$
10'		Poorly Graded Gravel	Practical Refusal, $\gamma' = 120$ pcf, $\phi' = 39°$
14'		Poorly Graded Gravel / Silty Sand	Avg SPT N=42, $\gamma' = 125$ pcf, $\phi' = 33°$

Over-excavate and backfill with LCB/AB

Bearing Capacity Analysis (Boring BID-6) Pier 13 Spread Footing

Permissible Net Contact Stress q_{pn}

Immediate Settlement $\delta v = qB\left(\frac{1-\nu^2}{E}\right)I$

$$q = \frac{\delta v \; E}{B(1-\nu^2)\cdot I}$$

B = 18' Assume Square (rigid) L/B = 1.0

$I_{average} = 0.82$

Over-excavate to Elev. +207.0 feet and backfilled with LCB

Silty Sand (N = 12) E = 500 Pa = 1000 ksf 1 Pa = 2 ksf

$$q_{pn} = \frac{0.083' \times 1000 \text{ ksf}}{18' \times (1-0.33^2) \times 0.82}$$

$= \underline{6.3 \text{ ksf}}$ say $\underline{6.0 \text{ ksf}}$

Left & Right

$$q = \frac{0.083 \text{ ft} \times 1000 \text{ ksf}}{12' \times (1-0.33^2) \times 0.82}$$

$= \underline{9.5 \text{ ksf}}$ say $\underline{9.0 \text{ ksf}}$

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JOB Bidwell Park Viaduct (Widen) 202161.BZD
SHEET NO 17 OF
CALCULATED BY A Lam DATE 8/2008
CHECKED BY DATE
SCALE /

Bearing Capacity Analysis (Boring BZD-6) Pier 13 (Assume 3' scour)

Assume $\phi' = 32°$ (SPT N = 12) $\gamma' = 110$ pcf $\gamma_{sat} = 125$ pcf

$B = 8.9'$ $D = 3.5'$ $N_q = 28.5$ $N_c = 44.0$ $N_\gamma = 27.9$

$Q_u = (0.5 \times \gamma B N_\gamma + c N_c + \gamma D N_q)$

$= 0.5 \times (125 - 62.4) \times 8.9 \times 27.9 + 110 \times 3.5 \times 28.5$

$= 7772.1$ psf $+ 10972.5$ psf

$= 18745.0$ psf Say $\underline{18.0 \text{ ksf}}$

Q_R = Factored Gross Nominal Bearing Resistance = $\phi_b \times Q_u$

$\phi_b = 0.45$

$Q_R = 0.45 \times 18745.0$

$= 8435.1$ psf Say $\underline{8.0 \text{ ksf}}$

Geotechnical * Environmental * Materials Testing * Construction Inspection
Offices: Milpitas * Fremont * Sacramento * Walnut Creek

(1) **Bearing Capacity Factors.** The Terzaghi bearing capacity factors N_c and N_q for general shear are shown in Table 4-1 and may be calculated by

TABLE 4-1

Terzaghi Dimensionless Bearing Capacity Factors (after Bowles 1988)

ϕ'	N_q	N_c	N_γ
0	1.00	5.70	0.0
2	1.22	6.30	0.2
4	1.49	6.97	0.4
6	1.81	7.73	0.6
8	2.21	8.60	0.9
10	2.69	9.60	1.2
12	3.29	10.76	1.7
14	4.02	12.11	2.3
16	4.92	13.68	3.0
18	6.04	15.52	3.9
20	7.44	17.69	4.9
22	9.19	20.27	5.8
24	11.40	23.36	7.8
26	14.21	27.09	11.7
28	17.81	31.61	15.7
30	22.46	37.16	19.7
32	28.52	44.04	27.9
34	36.50	52.64	36.0
35	41.44	57.75	42.4
36	47.16	63.53	52.0
38	61.55	77.50	80.0
40	81.27	95.66	100.4
42	108.75	119.67	180.0
44	147.74	151.95	257.0
45	173.29	172.29	297.5
46	204.19	196.22	420.0
48	287.85	258.29	780.1
50	415.15	347.51	1153.2

$$N_c = (N_q - 1)\cot\phi' \tag{4-3a}$$

$$N_q = \frac{e^{\frac{270-\phi'}{180}\pi\tan\phi'}}{2\cos^2(45+\phi'/2)} \tag{4-3b}$$

Factor N_γ depends largely on the assumption of the angle ψ in Figure 1-3a. N_γ varies from minimum values using Hansen's solution to maximum values using the original Terzaghi solution. N_γ shown in Table 4-1, was backfigured from the original Terzaghi values assuming $\psi = \phi'$ (Bowles 1988).

(2) **Correction Factors.** The Terzaghi correction factors ζ_c and ζ_γ consider foundation shape only and are given in Table 4-2. ζ_q = 1.0 (Bowles 1988).

TABLE 4-2

Terzaghi Correction Factors ζ_c and ζ_γ

Factor	Strip	Square	Circular
ζ_c	1.0	1.3	1.3
ζ_γ	1.0	0.8	0.6

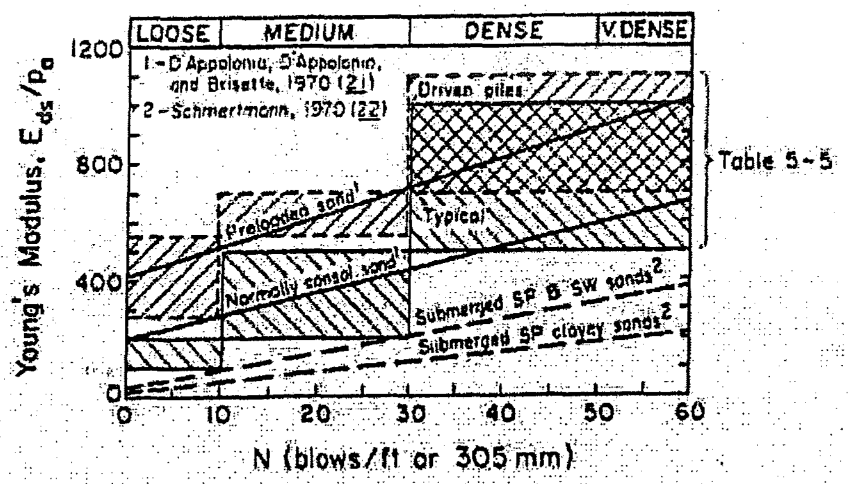


Figure 5-13. Comparative Plot of Drained Modulus Correlations for Sand

Source: Callanan and Kulhawy (13), p. 3-16.

scatter. This lack of correlation is to be expected because the SPT N value varies with many factors, as described in Section 2, and these factors have yet to be incorporated in these correlations. Therefore, as a first order estimator, the following may be used:

$$E/p_a \approx 5\ N_{60} \quad \text{(sands with fines)} \tag{5-26a}$$

$$\approx 10\ N_{60} \quad \text{(clean NC sands)} \tag{5-26b}$$

$$\approx 15\ N_{60} \quad \text{(clean OC sands)} \tag{5-26c}$$

in which N_{60} is the N value corrected for field procedures to an average energy ratio of 60 percent. Equation 2-11 gives the appropriate correction factors.

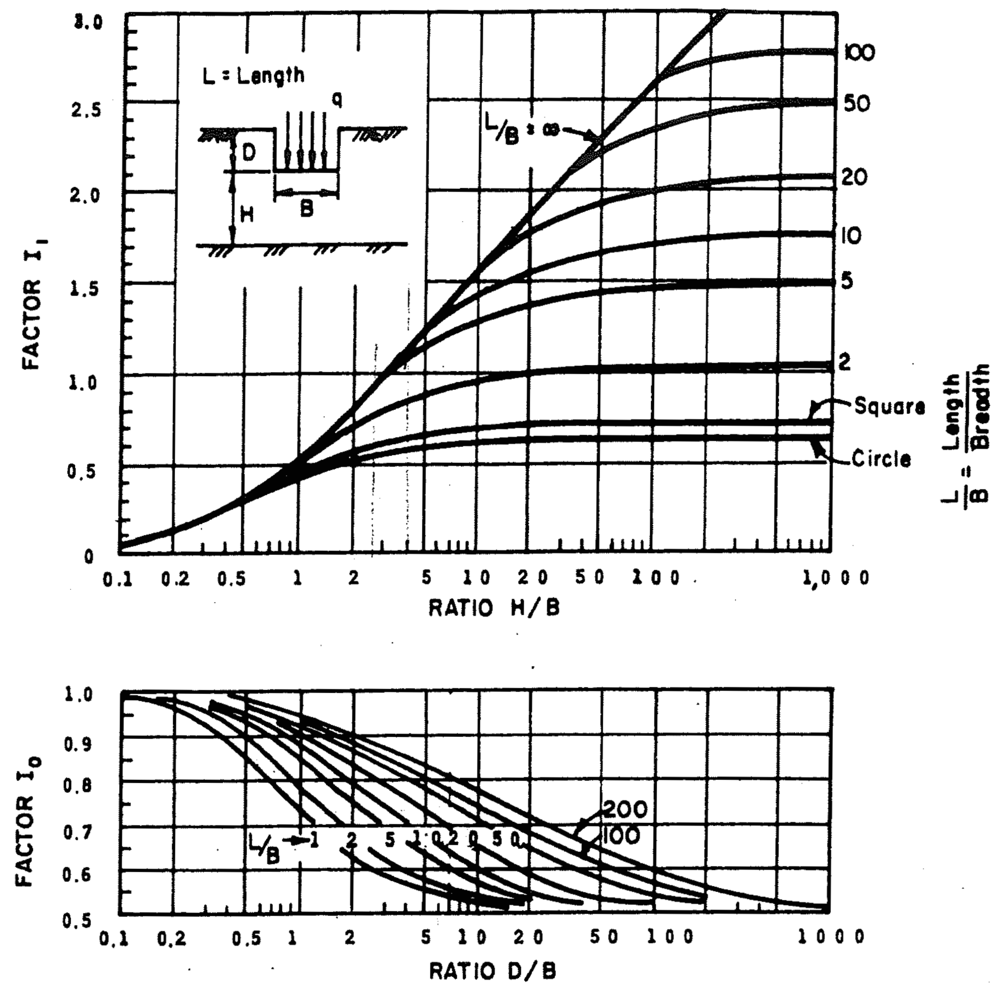
<u>Pressuremeter Modulus</u>. The pressuremeter test (PMT) provides a direct measurement of the horizontal modulus of cohesionless soils. This modulus (E_{PMT}) often is presumed to be roughly equivalent to Young's modulus (E). Correlations between the N value and E_{PMT} have been developed, as shown in Figure 5-14. The scatter shown is typical of other N correlations because of the reasons noted above.

<u>Dilatometer Modulus</u>. The dilatometer test (DMT) also provides a direct modulus measurement for cohesionless soils. The dilatometer modulus (E_D) is related to Young's modulus as follows:

TABLE 1

Shape and Rigidity Factors I for Calculating Settlements of Points on Loaded Areas at the Surface of an Elastic Half-Space

Shape and Rigidity Factor I for Loaded Areas on an Elastic Half-Space of Infinite Depth				
Shape and Rigidity	Center	Corner	Edge/Middle of Long Side	Average
Circle (flexible)	1.00		0.64	0.85
Circle (rigid)	0.79		0.79	0.79
Square (flexible)	1.12	0.56	0.76	0.95
Square (rigid)	0.82	0.82	0.82	0.82
Rectangle: (flexible) length/width				
2	1.53	0.76	1.12	1.30
5	2.10	1.05	1.68	1.82
10	2.56	1.28	2.10	2.24
Rectangle: (rigid) length/width				
2	1.12	1.12	1.12	1.12
5	1.6	1.6	1.6	1.6
10	2.0	2.0	2.0	2.0



$$\rho_i = I_0 I_1 \frac{qB}{E}(1-\nu^2)$$

ρ_i = IMMEDIATE SETTLEMENT (AVERAGE VALUE)

q = AVERAGE BEARING PRESSURE

B = FOUNDATION WIDTH

E = YOUNG'S MODULUS OF FOUNDATION SOIL

ν = POISSON'S RATIO OF FOUNDATION SOIL

I_0 & I_1 = FACTORS FROM CHART ABOVE

Fig. 4 CHART FOR ESTIMATING IMMEDIATE SETTLEMENTS OF FOUNDATIONS ON CLAY (FROM JANBU, BJERRUM AND KJAERNSLI, 1956)

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JOB Bidwell Park Viaduct Widening 2008101.GID
SHEET NO OF
CALCULATED BY A Lam DATE 9/2008
CHECKED BY DATE
SCALE

Lateral Earth Pressures for Spread Footing (Borings BID-1, BID-2, BID-4, BID-5, BID-6)

For clay assume $\phi' = 30°$

$$k_p = \frac{1+\sin 30°}{1-\sin 30°}$$

$$= \frac{1+0.5}{1-0.5} = 3$$

Passive Equivalent Fluid Pressure $= 3.0 \times 115$ pcf
$= \underline{\underline{345 \text{ pcf}}}$

Coefficient of Friction

$$\mu = \tan \tfrac{2}{3}\phi'$$

$$= \tan \tfrac{2}{3} \cdot (30°)$$

$$= \tan 20°$$

$$= 0.36 \qquad \text{say } \underline{\underline{0.35}}$$

APPENDIX D

<u>BIDWELL PARK VIADUCT (WIDEN)</u>
CHICO-99 AUXILIARY LANE, PHASE 2 & 3
DRAFT FOUNDATION REPORT
REVIEW COMMENTS

03-3A0421 10-13-08
03-But-99

To: Tim Osterkamp – Quincy Engineering, Sacramento
From: Eric Fredrickson – Special Funded Projects, Structures 916-227-8916

ADDITIONAL COMMENTS TO GEOTECHNICAL SERVICES' COMMENTS, DATED 10-21-08. PLEASE FORWARD ALL COMMENTS TO PARIKH CONSULTANTS, INC.

Cover Page
- Revise "BUTT" to "BUT" on all titles.

Page 7
- Seismic Design Criteria – Should include information for "M=6.5, +/- 0.25".
- 4. ARS Design Curve – Clarify if "<u>Modified</u> Figure B-7" has "<u>no modifications</u>".

Page 10, 11
- Tables – Suggest revising "north" and "south" descriptions to "left" and "right".
- Table 5 – Verify Specified Tip with Design Tip elevations.

Page 13
- Table – Need to include information about the Left and Right structures, along with the Median structure.

General
- Do you need any discussion about difficult pile driving and related vibrations or noise?

GEOTECHNICAL CONSULTANT SUBMITTAL REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

☐ OSFP

Attention: Eric Fredrickson

DATE: 10/21/08

FILE: 03 (District) BUTT (County) 99 (Route) 32.4 (PM)

SUB CONSULTANT: Parikh Consultants Report Date: 9/08 Structure Name: Bidwell Park Viaduct (Widen)

PRIME CONSULTANT: Quincy Engr. Inc. Contract No.:

GENERAL PLAN DATED: 9/19/08 FDN PLAN DATED: 9/19/08 EA Number: 03-3A0421 Bridge Number: 12-0151

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

Foundation Investigation Report (Draft) Comments:

1. According to Caltrans plans the post miles are 32.4 – 33.28.
2. The site is in Caltrans District 3 not 4.
3. FHWA methods for driven pile analysis are recommended for future reports. A comparison check was made using FHWA methods for the H pile at Pier 2. The tip elevations are within close range.

☐ Special Funded Project (OSFP) ☐ Local Assistance Project (OSFP) ☐ OSCM Project

Approval:

OSFP/OSCM

Lupe Leon
Office of Geotechnical Design - North

cc: OGDx, Lab File Room (Sacramento) DES Specifications and Estimates (JStayton-4 copies) Structure Construction R.E. Pending File

Revised 05/04

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Geotechnical ■
Environmental ■
Materials Testing ■
Construction Inspection ■

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.BID
February 26, 2009

Attn: Ms. Carolyn Davis

Sub: Chico-99 Auxiliary Lane, Phase 2 & 3
Bidwell Park Viaduct (Bridge No. 12-151 R/L)
Chico, California
04-BUT-99 PM 32.4-33.28 EA 03-3A0421

Ref: 1. Foundation Investigation Report (Draft) dated September 2008
2. Caltrans' Comments dated October 13, 2008
3. Caltrans' Comments dated October 21, 2008

Dear Ms. Carolyn Davis:

Following are our responses to the comments by Caltrans on the referenced report. We have listed the comments and responses in sequences for convenience:

October 13, 2008

Cover Page

Comment 1: Revise "BUTT" to "BUT" on all titles.

Response 1: Comment will be incorporated. "BUTT" will be revised to "BUT".

Page 7

Comment 2: Seismic Design Criteria – Should include information for "M=6.5, +/- 0.25".

Response 2: Comment will be incorporated. "M=6.5, +/- 0.25" will be referred in this section.

Comment 3: 4. ARS Curve – Clarify if "<u>Modified</u> Figure B-7" has "<u>no modifications</u>".

Response 3: Comment will be incorporated. "Figure B-7" has no modification. This has been changed in the report.

Page 10, 11

Comment 4: Tables – Suggest revising "north" and "south" descriptions to "left" and "right".

Response 4: Comment will be incorporated. "North' and "south" will be changed to "left" and "right" as appropriate.

Comment 5: Table 5 – Verify Specified Tip with Design Tip elevations.

Response 5: Comment will be incorporated. The specified tip elevation in Table 5 will be changed to be consistent with the lowest design tip elevation in the same table.

Page 13

Comment 6: Tables – Need to include information about the Left and Right structures, along with the median structure.

Response 6: Comment will be incorporated. Information about the Left and Right structures will be included in Table 6 "Spread Footing Data Table".

General

Comment 7: Do you need any discussion about difficult pile driving and related vibrations or noises?

Response 7: Comment will be incorporated. Vibration and noise related to pile driving will be discussed in the report.

October 21, 2008

Comment 1: According to Caltrans plans the post miles are 32.4 – 33.28.

Response 1: Comment will be incorporated. The post miles will be changed to 32.4 – 33.28.

Comment 2: The site is in Caltrans District 3, not 4.

Response 2: Comment will be incorporated. The District number will be changed to 3.

Comment 3: FHWA methods for driven pile analyses are recommended for future reports. A comparison check was made using FHWA methods for the H piles at Pier 2. The tip elevations are within close range.

Response 3: Comment is noted.

Please call if you have any questions on the above.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

S: 202101\Bridge\202101BID FIR Response to Caltrans' Comments (2-09)

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.BID
December 24, 2009

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 1 to FOUNDATION INVESTIGATION REPORT
Bidwell Park Viaduct (Widen) (Bridge No. 12-151 R/L)
Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 32.61 EA 03-3A0421

Ref: 1. Foundation Investigation Report dated February 2009

Dear Ms. Carolyn Davis:

The following are the changes made to the Foundation Investigation Report dated February 2009. This addendum addresses the change in a) the "Bottom of Footing Elevation" at Pier 4 and Pier 5 in Table 6 and b) geotechnical parameters for foundation design of "Section 9.3.2 Spread Footing".

Item 1: In "Table 6: Spread Footing Data Table", bottom of footing elevation of Pier 4 Left and Pier 4 Right changed from +204.0 feet to +201.5 feet, bottom of footing elevation of Pier 5 Left and Pier 5 Right changed from +205.0 feet to +202.5 feet, bottom of footing elevation of Piers 4 and 5 Median changed from +204.0 feet (Pier 4) and +205 feet (Pier 5) to +200.5 feet.

Item 2: Page 12, Section 9.3.2 (a), "The recommended passive resistance against the slide of the footing is 345 pcf Equivalent Fluid Pressure."

Change to "The recommended passive resistance against the slide of the footing is 700 pcf Equivalent Fluid Pressure."

Item 3: Page 12, Section 9.3.2 (b), "A coefficient of friction of 0.35 may be used to estimate the friction resistance at the bottom of footing."

Change to "A coefficient of friction of 0.39 may be used to estimate the friction resistance at the bottom of footing."

Item 4: Page 12, Section 9.3.2 (c), "Sliding resistance should be calculated using only 100% of the base resistance, or, 100% of passive resistance behind the footing, or using 50% of base resistance plus 50% of passive resistance."

Change to "According to Caltrans Bridge Design Specifications (August 2003) Section 5 (5-47), not more than 50% of the available passive lateral earth pressure and 100% friction between the footing and the foundation soil shall be considered in the determining the factor of safety against sliding."

Copies of the excerpt of the Foundation Investigation Report with the relevant changes are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

Gary Parikh, G.E. 666
Project Manager

TABLE 6: SPREAD FOOTING DATA TABLE

Median Support No.	Design Method (WSD or LRFD)	Finish Grade Elev. (ft)	BOF Elevation (ft)	Footing Size (ft)		Net Permissible Contact Stress (Service) LRFD	Factored Gross Nominal Bearing Resistance (Resistance Factor=0.45) (Strength) LRFD	Factored Gross Nominal Bearing Resistance (Resistance Factor=1.00) (Extreme Event) LRFD
				B	L			
Pier 3 Median	LRFD	~215.0	206.0	18	18	7.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Left	LRFD	~215.0	206.0	14	14	9.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Right	LRFD	~215.0	206.0	16	16	8.0 ksf	18.0 ksf	32.0 ksf
Pier 4 Median	LRFD	~215.0	200.5	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 4 Left & Right	LRFD	~215.0	201.5	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Median	LRFD	~215.0	200.5	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Left & Right	LRFD	~215.0	202.5	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 6 Median	LRFD	~215.0	208.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 6 Left & Right	LRFD	~215.0	208.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Median	LRFD	~215.0	209.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Left & Right	LRFD	~215.0	209.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 8 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 8 Left & Right	LRFD	~215.0	209.0	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 9 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 9 Left & Right	LRFD	~215.0	209.0	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 10 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 10 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 11 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 11 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	7.0 ksf	15.0 ksf
Pier 12 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	6.5 ksf	14.0 ksf
Pier 12 Left & Right	LRFD	~215.0	208.5	12	12	8.0 ksf	6.5 ksf	14.0 ksf
Pier 13 Median	LRFD	~215.0	207.0[(1)]	18	18	6.0 ksf	8.0 ksf	18.0 ksf
Pier 13 Left & Right	LRFD	~215.0	207.0[(1)]	12	12	9.0 ksf	8.0 ksf	18.0 ksf

Notes

(1) The "Bottom of Footing Elevation" of Pier 13 is recommended to be 207.0 feet based on the subsurface soil conditions. As an option, the material can be over-excavated to this depth and replaced with lean concrete base or compacted aggregate base to Elev. +208.5 feet.

(dBA), Equivalent Sound Level (Leq) and Statistical Descriptors can be considered. Peak Particle Velocity (PPV) is appropriate for evaluating vibration associated with pile driving;

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity gain due to soil "freeze". Typical applications include capacity evaluation (for both during driving and re-striking). The geotechnical engineer should be consulted for any unanticipated pile driving conditions.

9.3.2 Spread Footing

The minimum footing widths, bottom of footing elevations provided by the designer and recommended bearing limits of the spread footings are summarized in the following "Spread Footing Data Table" Table 6.

Other Geotechnical Parameters for Foundation Design

(a) The recommended passive resistance against the side of the footing is 700 pcf Equivalent Fluid Pressure.

(b) A coefficient of friction of 0.39 may be used to estimate the friction resistance at the bottom of the footing. Only dead loads should be used to estimate the frictional resistance at the bottom of footings.

(c) According to Caltrans Bridge Design Specifications (August 2003) Section 5 (5-47), not more than 50% of the available passive lateral earth pressure and 100% friction between the footing and the foundation soil shall be considered in the determining the factor of safety against sliding.

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Construction Inspection ■

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.BID
February 1, 2010

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 2 to FOUNDATION INVESTIGATION REPORT
Bidwell Park Viaduct (Widen) (Bridge No. 12-151 R/L)
Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 32.61 EA 03-3A0421

Ref: 1. Foundation Investigation Report dated February 2009
2. Addendum No. 1 to Foundation Investigation Report dated December 24, 2009

Dear Ms. Carolyn Davis:

The following are the changes made to the Foundation Investigation Report dated February 2009 and Addendum No. 1 to the Foundation Investigation Report dated December 24, 2009. This addendum addresses the change in a) the "Pile Data Tables" according to the Caltrans Memo to Designers 3-1, July 2008 and b) change in the bottom of footing elevation at Pier 5 Left and Right Structures.

Item 1: Table 4 changed to "Foundation Recommendations for Abutments". Table 5 changed to "Foundation Recommendations for Piers". Table 6 changed from "Spread Footing Data Table" to "Pile Data Table". These changes were made according to the requirements in Caltrans Memo to Designer Section 3-1.

Item 2: Section 9.3.2 **Spread Footing**, first paragraph, "Table 6" is changed to "Table 7".

Item 3: Section 9.3.2 "Table 6: Spread Footing Data Table" changed to "Table 7: Spread Footing Data Table".

Item 4: Table 7 "Spread Footing Data Table", bottom of footing elevation of Pier 5 Left and Pier 5 Right changed from +202.5 feet to +201.5 feet to match the Pier 4 Left/Right for scour considerations.

Item 5: Section 9.7, "Low Expansion Material at Abutment" is deleted and section no. for "Corrosion" changed from Section 9.8 to Section 9.7 and for "Construction Consideration" changed from Section 9.9 to Section 9.8 accordingly.

Item 6: Section 9.7, "Table 7: Summary of Corrosion Test Results" changed to "Table 8: Summary of Corrosion Test Results" because of the change in Item 3 above.

Copies of the excerpt of the Foundation Investigation Report with the relevant changes are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

S: On-going\2002\202101\Bidwell Park Viaduct Foundation Report dated February 2009 Addendum #2

TABLE 2: FOUNDATION DESIGN DATA

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft) B	Pile Cap Size (ft) L	Permissible Settlement (in)	No. of Piles per Support
Abut 1 R (step #1)	WSD	HP 14x89	237.0	222.0	8.0	13.0	1	8
Abut 1 R (step #2)	WSD	HP 14x89	237.0	218.0	8.0	13.0	1	6
Abut 1 R (step #3)	WSD	HP 14x89	237.0	214.0	8.0	15.5	1	4
Abut 1 L (step #1)	WSD	HP 14x89	237.0	222.0	8.0	15.5	1	6
Abut 1 L (step #2)	WSD	HP 14x89	237.0	218.0	8.0	15.5	1	8
Pier 2 Right	LRFD	HP 14x89	215.0	210.0	7.0	31.5	1	10
Pier 2 Left	LRFD	HP 14x89	215.0	210.0	7.0	31.5	1	10
Pier 14 Right	LRFD	HP 14x89	215.0	210.0	7.0	4.5	1	2
Pier 14 Left	LRFD	HP 14x89	215.0	210.0	7.0	4.5	1	2

TABLE 3: FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	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 R	251	90	26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 1 L	191	90	22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pier 2 R	868	124	634	830	170	N/A*	33	1734	236	N/A*	130
Pier 2 L	784	124	572	1105	175	N/A*	11	1647	230	N/A*	135
Pier 14 R	265	133	190	346	175	N/A*	30	400	200	N/A*	110
Pier 14 L	265	133	190	346	175	N/A*	30	400	200	N/A*	110

* Entire support remains in overall compression

The abutment foundations were evaluated for the foundation design data and loading condition using Caltrans November 2003 Bridge Design Specifications for foundations, using Working Stress Design (WSD) methods with "LRFD Service-I Loads". With "LRFD Service-I Loads", the Pier 2 and Pier 14 foundations were evaluated for the foundation design data and loading conditions using AASHTO LRFD Bridge Design Specifications – 3rd Edition, with Interims Through 2006 and current Caltrans Amendments (v3.06.01).

The actual load demands on the piles, based upon WSD and LRFD are presented in the Tables 4 and 5 below. The estimated specified tip elevations for the anticipated design loading of the piles are shown in the Table 4 and 5 below. The pile cut-off elevations are shown in the Table 2.

TABLE 4: FOUDNATION RECOMMENDATIONS FOR ABUTMENTS

Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Total Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance (kips)
			Total	Permanent					
Abut 1 R (Step #1)	HP 14x89	222.0	251	26	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 R (Step #2)	HP 14x89	218.0	251	26	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 R (Step #3)	HP 14x89	214.0	251	26	90	180	192.5 (a), 197.0 (b)	192.5	192.4
Abut 1 L (Step #1)	HP 14x89	222.0	191	22	90	180	192.5 (a), 197.0 (b)	192.5	188.0
Abut 1 L (Step #2)	HP 14x89	218.0	191	22	90	180	192.5 (a), 197.0 (b)	192.5	188.0

Notes:

(i) Design tip elevations are controlled by (a) Compression, (b) Lateral Load, respectively.
(ii) The specified tip elevation shall not be raised above the design tip elevations for lateral.

TABLE 5: FOUDNATION RECOMMENDATION FOR PIERS

Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev.[1] (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance Required (kips)(iii)
					Strength Limit		Extreme Event				
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)			
Pier 2 Right	HP 14x89	210.0	868	1	170	33	236	130	170.0 (a), 188.0 (b) 171.0 (c), 178.0 (d) 187.0 (e)	170.0	252.4
Pier 2 Left	HP 14x89	210.0	784	1	175	11	230	135	170.0 (a), 199.0 (b) 172.0 (c), 177.0 (d) 187.0 (e)	170.0	252.4
Pier 14 Right	HP 14x89	210.0	265	1	175	30	200	110	160.5 (a), 190.5 (b) 169.5 (c), 166.5 (d) 186.5 (e)	160.5	252.8
Pier 14 Left	HP 14x89	210.0	265	1	175	30	200	110	160.5 (a), 190.5 (b) 169.5 (c), 166.5 (d) 186.5 (e)	160.5	252.8

Notes

(i) Design tip elevations are controlled by (a) Compression (Strength Limit), (b) Tension (Strength Limit), (c) Compression (Extreme Event), (d) Tension (Extreme Event), (e) Lateral Load, (f) Settlement respectively.
(ii) The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.
(iii) The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the penetrated soil layers, if any, which do not contribute to the design resistance.

TABLE 6: PILE DATA TABLE

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance Required (kips)
		Compression	Tension			
Abut 1 R (Step #1)	HP 14x89	180	0	192.5 (a), 197.0 (e)	192.5	180
Abut 1 R (Step #2)	HP 14x89	180	0	192.5 (a), 197.0 (e)	192.5	180
Abut 1 R (Step #3)	HP 14x89	180	0	192.5 (a), 197.0 (e)	192.5	180
Abut 1 L (Step #1)	HP 14x89	180	0	192.5 (a), 197.0 (e)	192.5	180
Abut 1 L (Step #2)	HP 14x89	180	0	192.5 (a), 197.0 (e)	192.5	180
Pier 2 Right	HP 14x89	250	130	170.0 (a), 178.0 (d) 187.0 (e)	170.0	250
Pier 2 Left	HP 14x89	250	135	170.0 (a), 177.0 (d) 187.0 (e)	170.0	250
Pier 14 Right	HP 14x89	250	110	160.5 (a), 166.5 (d) 186.5 (e)	160.5	250
Pier 14 Left	HP 14x89	250	110	160.5 (a), 166.5 (d) 186.5 (e)	160.5	250

Notes
(i) Design tip elevations for the ***Abutments*** are controlled by (a) Compression (e) Lateral Load.
(ii) Design tip elevations for the ***Piers*** are controlled by (a) Compression, (d) Tension, (e) Lateral Load.
(ii) The specified tip elevation shall not be raised above the design tip elevations for tension and lateral load.

Based on subsurface soil conditions at the project site, it is our opinion that the design tip elevation is not controlled by settlement and therefore not included in Tables 4 and 5.

The pile capacity estimation is based on procedures outlined by U.S. Army Corps of Engineers. Only skin friction was considered in the pile capacity calculations. Based on the Pile Data Table 6, the pile tip elevations are controlled by the demand in compression on the pile. The assumed soil profiles with strength parameters and pile capacity calculations are provided in Appendix C.

The design tip elevations and specified tip elevations are based on the planned footing bottom elevations provided by the designer. In the event that the footing bottom elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity. A "P-Y Curve Modification Factor" of 0.6 should be adopted in the lateral pile analysis for pile spacing of 3 times the pile diameter.

Due to the variable consistencies of the dense to very dense sand/gravel layers and cobbles and boulders, hard driving conditions should be anticipated. We therefore recommend that a driving shoe be used for the pile driving. We recommend that the piles be driven to the specified elevations. It is anticipated that the pile capacity will develop after driving as a result of soil "freeze" and dissipation of excess pore water pressures. The gain of pile capacity after initial driving may be evaluated based on "re-striking" after 24-hour (minimum) set-up.

According to the designer, there are few residential houses north of Abutment 15. The closest distance between the residential house and the pile driving location is estimated to be approximately 120 feet. There is no historical building in the vicinity of the project site. The following mitigation measures can be considered (not limited to) if noise and vibration is a concern during pile driving:

- Provide schedule of pile driving with restricted times;
- Monitor noise and vibration. Commonly used noise descriptors such as A-Weighting (dBA), Equivalent Sound Level (Leq) and Statistical Descriptors can be considered. Peak Particle Velocity (PPV) is appropriate for evaluating vibration associated with pile driving;

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity gain due to soil "freeze". Typical applications include capacity evaluation (for both during driving and re-striking). The geotechnical engineer should be consulted for any unanticipated pile driving conditions.

9.3.2 Spread Footing

The minimum footing widths, bottom of footing elevations provided by the designer and recommended bearing limits of the spread footings are summarized in the following

"Spread Footing Data Table" Table 7.

Other Geotechnical Parameters for Foundation Design

(a) The recommended passive resistance against the side of the footing is 700 pcf Equivalent Fluid Pressure.

(b) A coefficient of friction of 0.39 may be used to estimate the friction resistance at the bottom of the footing. Only dead loads should be used to estimate the frictional resistance at the bottom of footings.

(c) According to Caltrans Bridge Design Specifications (August 2003) Section 5 (5-47), not more than 50% of the available passive lateral earth pressure and 100% friction between the footing and the foundation soil shall be considered in the determining the factor of safety against sliding.

TABLE 7: SPREAD FOOTING DATA TABLE

Median Support No.	Design Method (WSD or LRFD)	Finish Grade Elev. (ft)	BOF Elevation (ft)	Footing Size (ft)		Net Permissible Contact Stress (Service) LRFD	Factored Gross Nominal Bearing Resistance (Resistance Factor=0.45) (Strength) LRFD)	Factored Gross Nominal Bearing Resistance (Resistance Factor=1.00) (Extreme Event) LRFD)
				B	L			
Pier 3 Median	LRFD	~215.0	206.0	18	18	7.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Left	LRFD	~215.0	206.0	14	14	9.0 ksf	18.0 ksf	32.0 ksf
Pier 3 Right	LRFD	~215.0	206.0	16	16	8.0 ksf	18.0 ksf	32.0 ksf
Pier 4 Median	LRFD	~215.0	200.5	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 4 Left & Right	LRFD	~215.0	201.5	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Median	LRFD	~215.0	200.5	18	18	7.0 ksf	9.0 ksf	22.0 ksf
Pier 5 Left & Right	LRFD	~215.0	201.5	14	14	9.0 ksf	9.0 ksf	22.0 ksf
Pier 6 Median	LRFD	~215.0	208.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 6 Left & Right	LRFD	~215.0	208.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Median	LRFD	~215.0	209.0	18	18	5.0 ksf	7.0 ksf	15.0 ksf
Pier 7 Left & Right	LRFD	~215.0	209.0	14	14	6.0 ksf	7.0 ksf	15.0 ksf
Pier 8 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 8 Left & Right	LRFD	~215.0	209.0	12	14	8.0 ksf	7.0 ksf	15.0 ksf
Pier 9 Median	LRFD	~215.0	209.0	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 9 Left & Right	LRFD	~215.0	209.0	12	14	8.0 ksf	7.0 ksf	15.0 ksf
Pier 10 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 10 Left & Right	LRFD	~215.0	208.5	12	14	8.0 ksf	7.0 ksf	15.0 ksf
Pier 11 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	7.0 ksf	15.0 ksf
Pier 11 Left & Right	LRFD	~215.0	208.5	12	14	8.0 ksf	7.0 ksf	15.0 ksf
Pier 12 Median	LRFD	~215.0	208.5	18	18	5.5 ksf	6.5 ksf	14.0 ksf
Pier 12 Left & Right	LRFD	~215.0	208.5	12	14	8.0 ksf	6.5 ksf	14.0 ksf
Pier 13 Median	LRFD	~215.0	207.0(1)	18	18	6.0 ksf	8.0 ksf	18.0 ksf
Pier 13 Left & Right	LRFD	~215.0	207.0(1)	12	14	9.0 ksf	8.0 ksf	18.0 ksf

Notes

(1) The "Bottom of Footing Elevation" of Pier 13 is recommended to be 207.0 feet based on the subsurface soil conditions. As an option, the material can be over-excavated to this depth and replaced with lean concrete base or compacted aggregate base to Elev. +208.5 feet.

Boring BID-2 indicates that the subsurface soil conditions in the vicinity of Abutment1 generally consists of firm clay, underlain by medium dense to very dense gravels/sands, underlain by very stiff clays. Consolidation settlement due to the placement of the embankment fill is anticipated to be on the order of 1inch in the over-consolidated range and appears to be not a concern. Caltrans standard 30-day waiting period is generally a normal construction practice prior to the foundation construction of the abutments.

Based on the LRFD design method (for "Net Permissible Contact Stress (Service)" in the estimation of the bearing capacity for the spread footings from Pier 3 through Pier 13, the immediate settlement underneath the spread footing is limited to be an inch. The available boring data indicates that the subsurface soil conditions at the project site generally consist of firm to very stiff lean clay/loose to medium dense sands, underlain by medium dense to very dense gravels/sands with layers of firm to very stiff clays, long-term consolidation settlement should be relatively insignificant at the pier locations.

9.7 Corrosion

Chemical tests were performed on soil sample from Borings BID-1, BID-5 and BID-6 to evaluate the corrosion potential of the subsoil. The test results are as follows:

TABLE 8: SUMMARY OF CORROSION TEST RESULTS

Boring No.	Depth (ft)	Resistivity (ohm-cm)	pH	Sulfate (ppm)	Chloride (ppm)
BID-1	40	1470	6.4	1.0	31.5
BID-5	5	3220	7.0	4.5	16.8
BID-6	10	8580	6.3	0.3	11.8

Based on the corrosion test results and Caltrans guidelines, the native subsurface soil near the surface is considered non-corrosive. Standard Type II modified or Type I-P (MS) modified cement may be used for the concrete substructure. The minimum cement factor should be per Section 8.22 of Caltrans Bridge Design Specifications – September 2003.

9.8 Construction Considerations

Prospective contractors for the project must evaluate construction-related issues on the basis of their own knowledge and experience in the local area, on the basis of similar projects in other localities, taking into account their own proposed construction methods and procedures.

9.8.1 Temporary Excavations Slope and Shoring

Excavations should not be expected to stand vertically without any support. According to Occupational Safety and Health Administration (OSHA) safety standards, temporary excavations with personnel working within the excavations should be sloped or shored if the excavations are deeper than 5 feet.

All excavations should be closely monitored during excavation/construction to detect any evidence of instability, soil creep, settlements, etc. Appropriate mitigation measures and a comprehensive monitoring plan should be implemented to correct such situations that may cause or lead to future damage to facilities, utilities and other improvements.

Operation of construction equipment and the resulting vibrations may adversely affect the native soils and other buildings/improvements at the site. This should be taken into consideration in the evaluation of temporary slope stability and shoring system.

Temporary Excavation Slope

The slope height, inclination, and excavation depths should not exceed those specified in local, state, or federal safety regulations. The design of the temporary slopes by the contractor or his specialty subcontractor should conform to the OSHA's "Guidelines for Excavations and Temporary Sloping". The contractor or responsible subcontractor should develop or modify their design based on the subsurface soil conditions exposed at the time of construction.

For excavations up to 20 feet deep in homogenous soils, OSHA guidelines state that the maximum allowable slope should be 3/4H: 1V, 1H:1V and 1-1/2H:1V for Type A, B and C soils, respectively. (In general, Type A soils are stronger; Type B soils are intermediate, and Type C soils are weaker.) Based on the evaluation of the subsurface soil materials encountered in the current soil borings, the sand and gravels and clay should be considered as OSHA Type C. It should be noted that the slope ratios recommended by OSHA are for temporary, un-surcharged slopes. Traffic and surcharge loads should be set back at least 15 feet from the top of the excavations unless they are accounted for in the design. The temporary cut slopes discussed above assume that the groundwater is maintained below the bottom of the excavation at all times during construction. Slopes may need to be flattened based on the soil materials exposed during construction.

Surficial drying of these granular soils may result in erosion and/or minor sloughing if the bare (before the application of surface protection) surficial soil materials are exposed to weather and rain for extended period of time. Stiff clays also tend to develop soil creep due to seasonal change in moisture content resulting in sloughing and cracking. Adequate surface protection should be provided to the slope surface after its exposure from excessive drying and/or saturation during construction and the exposed slopes should be kept moist (but not saturated) by occasional light spraying of water during construction.

Selection of Shoring System

Temporary shoring may be necessary for the support of proposed excavations for the footing construction. The selection, design and performance of the temporary shoring system should be the responsibility of the contractor. The contractor should have the shoring system designed and signed by a Registered Engineer. The contractor should evaluate the conditions and select appropriate construction methods.

The shoring system should be designed to be relatively rigid and with as many supports or struts as necessary to prevent excessive straining and deformation of the supported soils. This is also important with regard to existing surface improvements and existing utilities where tension cracking or movement may develop, even under minor strains.

9.8.2 Excavation Bottom Stability

Due to fluctuation in groundwater elevation, excavation bottom instability during the excavation for the spread footing may occur, especially in the vicinity of Big Chico Creek, as a result of bottom heave, piping, or blow-out. If excavation bottom failure due to bottom heave, piping or blow-out occurs, measures such as trimie seal course, dewatering, installing deep sheeting, etc. will be required to mitigate these conditions. It s recommended supplemental funds be provided for such mitigation measure(s).

9.8.3 Dewatering

Dewatering of excavations is normally the responsibility of the contractor. As described in Section 6 "Subsurface Conditions", groundwater was measured at the depth of 7 feet at Elev. +208 feet during drilling in Boring BID-4 in March 2008. Groundwater should be expected during excavations. A properly designed and constructed dewatering operation is recommended irrespective of the construction method used. The groundwater should be maintained at least 3 feet below the bottom of the excavation at all times.

10. PLAN REVIEW

This report is prepared for the proposed “Bidwell Park Viaduct (Widen)”. We recommend that final foundation plans for the proposed project be reviewed by PARIKH prior to construction so that the intent of our recommendations is included in the project plans and specifications and to further see that no misunderstandings or misinterpretations have occurred. However, design-build elements should be reviewed only from overall compliance standpoint.

11. CONSTRUCTION OBSERVATION

To a degree, the performance of any structure is dependent upon construction procedures and quality control measures. Hence, geotechnical observation and testing of grading operations, and

FOUNDATION INVESTIGATION REPORT

PALMETTO AVENUE UNDERCROSSING (WIDEN)
(BRIDGE NO. 12-152 R/L)
CHICO, CALIFORNIA
03-BUT-99 PM 33.08 EA 03-3A0421

For

QUINCY ENGINEERING INC.
3247 Ramos Circle
Sacramento, CA 95827-2512

PARIKH CONSULTANTS, INC.
2360 Qume Drive, Suite A, San Jose, CA 95131
(408) 452-9000

December 14, 2009

Job No. 202101.PLM

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FOUNDATION INVESTIGATION REPORT
PALMETTO AVENUE UNDERCROSSING (WIDEN)
(BRIDGE NO. 12-152 R/L)
CHICO, CALIFORNIA
03-BUT-99 PM 33.08 EA 03-3A0421

1. INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the "Palmetto Avenue Undercrossing (Widen)" in Chico, California, hereinafter referred to as "PROJECT". The work was performed in general accordance with the scope of work outlined in our proposal to Quincy Engineering Inc. (hereinafter referred to as Designer). The approximate location of the project site is shown on the Project Location Map, Plate 1.

The geotechnical recommendations presented in this report are intended for design input and are not intended to be used as specifications. In addition, the data provided in this report including these geotechnical recommendations should not be used for bidding purposes or for construction cost estimates. If the report is provided as a reference document, any interpretation of the data and recommendations should be the sole responsibility of the user and PARIKH Consultants, Inc. (PARIKH) shall not be liable for any consequences.

2. PURPOSE AND SCOPE

The purpose of this investigation was to evaluate the general subsurface conditions at the project site, to evaluate their engineering properties, and to provide geotechnical recommendations for the foundation design of the proposed project.

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the site including available as-built Log of Test Borings (LOTB); site reconnaissance; obtaining representative soil samples and logging soil materials encountered in two exploratory borings; laboratory testing of the collected soil samples, performing engineering analyses based on the field and laboratory data, and preparation of this report.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the subsurface soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain properly constructed project. We, therefore, recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

3. EXISTING BRIDGE STRUCTURES AND PROPOSED CONSTRUCTION

Existing Bridge Structures

The Palmetto Avenue Undercrossing (UC) carries State Route (SR) 99 over Palmetto Avenue. The existing Palmetto Avenue UC consists of two bridge structures (Bridge No. 12-152 R/L), which were constructed in 1963. The existing Palmetto Avenue UC has three spans with total structure length of 114'-0" and a typical width of 39'-8" for the right structure and 44'-9" for the left structure. Each bridge carries two 12' traffic through lanes with 5'-0" interior shoulders and 8'-0" and 11'-6" exterior shoulders.

Both bridges are 3' deep reinforced concrete T beams supported by pier walls at the front of each closed bin abutments. Based on the "as-built" drawings, Piers 2 and 3 are supported on spread footings and end diaphragms are supported on pile foundation. All piles for the existing bridge structures are 45-ton precast concrete displacement piles. Piles appear to be end bearing and are short in length, with no pile reaching an embedment greater than 30 feet.

Proposed Construction

The project is part of the "Chico SR 99 Auxiliary Lane" project in Butte County, California. The "Chico SR 99 Auxiliary Lane" project is to add auxiliary lanes between the SR 32 Interchange and East 1st Avenue Interchange and construct associated ramp improvements.

As part of the "Chico SR 99 Auxiliary Lane" project, it is proposed to widen the existing bridges of "Palmetto Avenue Undercrossing" with a median widening between bridges and exterior widening on each structure in order to accommodate the proposed roadway section.

Based on our discussions with the designer, it is our understanding that the proposed bridge structure widening is to be supported on HP 14x89 steel piles at Abutment 1 and Abutment 4 due to the difficult pile driving encountered during the previous phase construction and spread footing at Pier 2 and Pier 3.

Our recommendations presented in this report are based on the above information. Any major deviation should be reported to PARIKH for further consideration.

4. SITE CONDITIONS

The existing Palmetto Avenue UC is located along SR 99 between Filbert Avenue and East 1st Avenue. The roadway surface below the Palmetto Avenue UC is considered relatively level.

5. FIELD EXPLORATION AND LABORATORY TESTING

Borings PLM-1 and PLM-2 were drilled in March 2008 for the proposed bridge widening. These borings were drilled to the approximate depths between 60 feet and 70 feet and terminated at elevations between Elev. +145.0 feet and Elev. +155.0 feet. The as-built LOTB of the "Palmetto Avenue UC (March 1960) is also referred.

The approximate locations of the borings are shown on the Site Plan, Plate 2. The details of the field exploration are included in Appendix A. The descriptions of the materials encountered in the field exploration are shown on the LOTB in Appendix A. The relevant as-built boring information available in the vicinity of the project is included in Appendix A.

Laboratory tests were performed on selected soil samples collected during field exploration to evaluate the physical and engineering properties of the subsurface soils. The laboratory test methods and test results are presented on plates included in Appendix B. Laboratory test results for moisture content, dry unit weight, unconfined compressive strength, Plasticity Index and grain size classification of the soil samples are presented on the LOTB in Appendix A.

It should be noted that the descriptions of the soils encountered and relevant boring information presented on the LOTB depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the boring locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

6. SUBSURFACE CONDITIONS

As-Built Data Review

Based on the as-built LOTB of the "Palmetto Avenue UC" (March 1960), Borings B-5 and B-6 were drilled to the depths between 25 feet and 30 feet. Cone Penetration Tests (CPT) were performed in Borings B-1 through B-4. These CPT were penetrated to the depths between 15 feet and 20 feet.

As-built borings indicate subsurface soil conditions at the project site generally consists of stiff to very stiff silt, underlain by dense to very dense gravels/sands. Groundwater was recorded at approximate elevations between Elev. +200 feet and Elev. +201 feet in the as-built borings/CPTs in March 1960.

Field Exploration in March 2008

Based on the LOTB of Borings PLM-1 and PLM-2, the subsurface soil conditions of the project site generally consists of soft to hard lean clay, underlain by medium dense to very dense sands/gravels, underlain by medium dense to dense sands/stiff to very stiff lean clays. This is generally consistent with the subsurface soil conditions of as-built borings.

Groundwater was recorded at the depth of 12 feet at Elev. +203 feet during drilling in Boring PLM-2 in March 2008. The groundwater level is anticipated to vary with the passage of time due to seasonal groundwater fluctuations, fluctuation of water elevations in the nearby creeks, surface and subsurface flows, ground surface run-off, and other environmental factors, which may not be present at the time of the investigation.

7. GEOLOGY

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California (D.S. Harwood, E.J. Helley and M.P. Doukas, 1981; Scale 1:62,500; USGS Map I-1238). Based on the map, the project site subsurface soils consist of the upper member of the Pleistocene Modesto Formation (Qmu). In the vicinity of the project, Holocene Basin Deposits (Qb) can also be found. A geologic map of the general project area is shown on Plate 3. Description of the main geologic units is as follows:

Qmu – Modesto Formation – Upper Member (Pleistocene). Gravel, sand and clay derived from the Tuscan Formation and from rocks of the Coast Ranges and Klamath Mountain. Lithologically similar to the lower member and forms the lower of the two Modesto Terraces. Both the upper and lower members probably were deposited by the same streams that flow today because they tend to border existing channels.

Qb – Basin Deposits (Holocene). Fine grained silt and clay derived from the same sources as alluvial deposits but laid down in low-lying overflow flood basins between modern watercourses.

8. EARTHQUAKE CONSIDERATIONS

8.1 Seismic Sources

The project site is located within an area of northern California known to be seismically active. Seismic activity may result in geological and seismic hazards including seismically induced fault displacement and rupture, ground shaking, liquefaction, lateral spreading, landslides, avalanches, and structural hazards.

Faults in the vicinity of the project site with a moderate to high potential for surface rupture include the Bear Mountain Fault Zone and Great Valley Fault 1. These faults are capable of producing earthquakes, and may cause strong ground shaking at the site. The attached Fault Map (Plate 4) presents the locations of the fault systems relative to the project site.

The Fault Map has been prepared from the Caltrans Seismic Hazard Map (Mualchin, 1996) and presents the maximum credible earthquake magnitudes for the fault systems and the anticipated peak bedrock accelerations at various locations due to seismic activity in the area.

Maximum Credible Earthquake magnitudes for some of the major faults in the area determined by Mualchin (California Seismic Hazard Map 1996) are summarized in Table 1 below. These Maximum Credible Earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

TABLE 1:EARTHQUAKE DATA

Fault	Estimated Distance from Project Site (Mile)	Maximum Credible Earthquake (MCE)	Peak Bedrock Acceleration (PBA) (g)	Peak Ground Acceleration (PGA) (g)
Bear Mountain Fault Zone (Normal)	22.2	6.5	0.2	0.3
Great Valley Fault 1 (Reverse)	26.2	6.7	0.2	0.3

According to Caltrans Guidelines for Structures Foundation Report (March 2006), the value of PBA (for a specific project site) from the seismic hazard map should be verified with that calculated using the attenuation relation by Sadigh et al (1997). Based on attenuation relation by Sadigh, the maximum PBA anticipated at the project site is 0.2 g (as shown in Table 1).

Based on the available boring information in the vicinity of the project site, the subsurface soil conditions at the project site generally match the criteria for Soil Type D, as per Caltrans Seismic Design Criteria (Version 1.4, June 2006). Based on Caltrans Seismic Design Criteria and the above information, the seismic design criteria for M=6.5, +/- 0.25 are as follows:

1. Closest Distance to Fault = 22.2 miles
2. Peak Bedrock Acceleration = 0.2 g
3. Soil Type = Type D
4. ARS Design Curve = Figure B-7 for Soil Type D with no modification.

A copy of the "ARS Design Curve" (Plate No. 5) is included. The calculation for attenuation relationship based on Sadigh is included in Appendix C.

8.2 Seismic Hazards/Liquefaction Potential

Potential seismic hazards may arise from three sources: surface fault rupture; ground shaking; and liquefaction. Since no active fault passes through the project site, the potential for fault rupture is relatively low. Based on available geological and seismic data, the possibility that the site will experience strong ground shaking may be considered low to moderate.

Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on the available boring information, the subsurface soil conditions of the project site generally consist of soft to hard lean clay, underlain by medium dense to very dense sands/gravels, underlain by medium dense to dense/stiff to very stiff lean clays. Based on this boring log and the as-built LOTB, it appears that the liquefaction potential is generally considered as relatively low due to the low seismicity at the project site and does not appear to be a significant issue.

9. FINDINGS AND RECOMMENDATIONS

9.1 General

This report was prepared specifically for the proposed project. Normal construction procedures were assumed throughout our analyses and represent one of the bases of recommendations presented herein. Our design criteria have been based upon the materials and conditions encountered in the soil borings. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

9.2 Grading

All grading operations should be performed in accordance with the project specifications and Caltrans Standard Specifications for Earthwork (Section 19). A representative from PARIKH or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill materials.

9.3 Bridge Foundation

Based on the available boring information and requirements for vertical and horizontal demands, it is recommended that Standard Steel H-piles (HP 14x89) be used at Abutments 1 and Abutment 4 and spread footing at Pier 2 and Pier 3. Due to anticipated hard driving conditions, driving shoes are recommended for the H-piles.

9.3.1 Pile Design

According to the designer, the planned pile cap/ footing bottom elevations are Elev. +221 feet and +225 feet at Abutment 1 and Abutment 4. Pertinent foundation design information provided by the designer for the pile design is presented in the following tables (Foundation Design Data and Foundation Design Loads).

TABLE 2: FOUNDATION DESIGN DATA

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement (in)	No. of Piles per Support
					B	L		
Abut 1 Step 1	WSD	HP 14x89	~230.0±	225.0	7	6/11	1	2/4
Abut 1 Step 2	WSD	HP 14x89	~227.5±	221.0	7	~5±/~8±	1	2/4
Abut 4 Step 1	WSD	HP 14x89	~230.0±	225.0	7	11/17	1	4/6
Abut 4 Step 2	WSD	HP 14x89	~228.0±	221.0	7	~9.5±/~9±	1	4

TABLE 3: FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	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	750	110	580	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 4	390	110	310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* Entire support remains in overall compression

The abutment foundations were evaluated for the foundation design data and loading condition using Caltrans November 2003 Bridge Design Specifications for foundations, using Working Stress Design (WSD) methods with "LRFD Service-I Loads".

The actual load demands on the piles, based upon WSD and LRFD are presented in Table 3 above. The estimated specified tip elevations for the anticipated design loading of the piles are shown in Table 4 below. The pile cut-off elevations are shown in Table 2.

TABLE 4: PILE DATA TABLE (ABUTMENT)

Location	Pile Type	Design Method (WSD or LRFD)	LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance (kips)
Abut 1 Step 1	HP 14x89	WSD	110	220	181.5 (a), 193.0 (b)	181.5	220
Abut 1 Step 2	HP 14x89	WSD	110	220	181.5 (a), 193.0 (b)	181.5	220
Abut 4 Step 1	HP 14x89	WSD	110	220	183.0 (a), 192.5 (b)	183.0	224
Abut 4 Step 2	HP 14x89	WSD	110	220	183.0 (a), 192.5 (b)	183.0	224

Notes

1. Design tip elevations are controlled by (a) Compression, (b) Lateral Load.
2. The specified tip elevation shall not be raised above the design tip elevations from lateral load (i.e. Elev. + 193.0 feet at Abutment 1 and Elev. +192.5 feet at Abutment 4 as shown in Table 4 above).

The pile capacity estimation is based on procedures outlined by U.S. Army Corps of Engineers. Only skin friction was considered in the pile capacity calculations. Based on Pile Data Table 4, the pile tip elevations are controlled by the demand in compression on the pile. The assumed soil profiles with strength parameters and pile capacity calculations are provided in Appendix C.

The design tip elevations and specified tip elevations are based on the planned footing bottom elevations provided by the designer. In the event that the footing bottom elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity. A "P-Y Curve Modification Factor" of 0.6 should be adopted in the lateral pile analysis for pile spacing of 3 times the pile diameter.

Due to the variable consistencies of the dense to very dense sand/gravel layers and cobbles and boulders, hard driving conditions should be anticipated. We therefore recommended that driving shoe be used for the pile driving. We recommend that the piles be driven to the specified elevations. It is anticipated that the pile capacity will develop after driving as a result of soil "freeze" and dissipation of excess pore water pressures. The gain of pile capacity after initial driving may be evaluated based on "re-striking" after 24-hour (minimum) set-up.

According to the designer, there are few residential houses in the vicinity of the project site. The closest distance between the residential house and the pile driving location is estimated to be approximately 55 feet to 60 feet on the northwest side. There is no historical building in the vicinity of the project site. The following mitigation measures can be considered (not limited to) if noise and vibration is a concern during pile driving:

- Provide schedule of pile driving with restricted times;
- Monitor noise and vibration. Commonly used noise descriptors such as A-Weighting (dBA), Equivalent Sound Level (Leq) and Statistical Descriptors can be considered. Peak Particle Velocity (PPV) is appropriate for evaluating vibration associated with pile driving;

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity after re-striking. Typical applications include capacity evaluation (for both during driving and re-striking). The geotechnical engineer should be consulted for any unanticipated pile driving conditions.

9.3.2 Spread Footing

The minimum footing widths, bottom of footing elevations and recommended bearing limits of the spread footings are summarized in the following "Spread Footing Data Table" Table 5.

TABLE 5: SPREAD FOOTING DATA TABLE

Median Support No.	Design Method (WSD or LRFD)	Finish Grade Elev. (ft)	BOF Elevation (ft)	Footing Size (ft)		Net Permissible Contact Stress (Service) LRFD	Factored Gross Nominal Bearing Resistance (Resistance Factor=0.45) (Strength) LRFD)	Factored Gross Nominal Bearing Resistance (Resistance Factor=1.00) (Extreme Event) LRFD)
				B	L			
Pier 2 Left	LRFD	~217	207.90	11'	14'-11 3/8"	9.0 ksf	14.0 ksf	30.0 ksf
Pier 2 Right	LRFD	~217	207.90	11'	22'-10 1/4"	9.0 ksf	14.0 ksf	30.0 ksf
Pier 3 Left	LRFD	~216	206.85	11'	19'-2 3/4"	11.5 ksf	6.0 ksf	16.0 ksf
Pier 3 Right	LRFD	~216	206.85	11'	26'-11 5/8"	11.0 ksf	6.0 ksf	16.0 ksf

Other Geotechnical Parameters for Foundation Design

(a) The recommended passive resistance against the side of the footing is 490 pcf Equivalent Fluid Pressure.

(b) A coefficient of friction of 0.30 may be used to estimate the friction resistance at the bottom of the footing. Only dead loads should be used to estimate the frictional resistance at the bottom of footings.

(c) No more than 50% of the available passive lateral earth pressures and 100% friction between the footing and the foundation soil shall be considered in determining the factor of safety against sliding.

9.3.3 Scour

According to the designer, scour is not an issue for this project since the proposed bridge structures are over a roadway.

9.4 Lateral Design for Piles

Under seismic loading conditions, lateral pile capacity analyses were performed for the H-steel piles using LPILE program. A "free" pile head connection was assumed in the lateral pile capacity analyses.

Plots of deflection, bending moment, shear and soil reaction together with typical input files are attached in Appendix C. According to Caltrans, group effect for lateral pile resistance analyses was accounted for by adopting a p-y reduction factor of 40% (60% effective) for a pile spacing of 3D.

9.5 Lateral Earth Pressures

Abutment retaining walls and wing walls should be designed to resist the following applied lateral earth pressures and live loads. These values assume no hydrostatic pore pressure build-up behind the wall and are based on well-drained backfill behind the walls.

	Applied Lateral Earth Pressures
Active Condition	36 pcf Equivalent Fluid Pressure for Caltrans "Structure Backfill" material.
At-Rest Condition	55 pcf Equivalent Fluid Pressure for Caltrans "Structure Backfill" material.
Passive Resistance	350 pcf Equivalent Fluid Pressure with a maximum value of 3500 psf. 5.0 ksf (ultimate) for seismic design of the abutment wall (5.5 feet or greater); for activated height less than 5.5 feet (1.7 m), modify proportionally i.e. 5.0x(H/5.5) ksf per Caltrans SDC v.1.4. A minimum lateral wall movement of 2% of wall height to mobilize the full ultimate passive resistance is required.
Traffic Load Surcharge	The effect of any surcharge (dead or live load) should be added to the preceding lateral earth pressures. An additional height with equivalent earth pressure of not less than 2 feet of uniform soil weight at 125 pcf is added to the ground profile to account for the additional earth pressure resulting from the surcharge. Surcharge load due to the traffic has to be included in the design if the traffic is within a horizontal distance of one half of the wall height. A coefficient of 0.4 may be used to determine the additional lateral earth pressures resulting from the surcharge.

Cantilever walls which are free to rotate at least 0.005 radii may be assumed flexible for the active condition. Walls that are not capable of this movement should be assumed rigid and designed for the at-rest condition. The effect of any surcharge (dead or live load) should be added to the preceding lateral earth pressures. A coefficient of 0.3 and 0.5 may be used to determine the additional earth pressure resulting from the surcharge for cantilever walls and rigid walls, respectively.

9.6 Settlement

It is our understanding that there will be no new approach embankment required for this project. Sliver fill retained by retaining wall is required for the widening of the existing embankment. Therefore settlement should not be a concern for the widening of the existing embankment.

9.7 Corrosion

Chemical tests were performed on soil sample from Boring PLM-2, to evaluate the corrosion potential of the subsoil. The test results are as follows:

TABLE6: SUMMARY OF CORROSION TEST RESULTS

Boring No.	Depth (ft)	Resistivity (ohm-cm)	pH	Sulfate (ppm)	Chloride (ppm)
PLM-2	40	1740	6.4	2.3	34.0

Based on the corrosion test results and Caltrans guidelines, the native subsurface soil near the surface is considered non-corrosive. Standard Type II modified or Type I-P (MS) modified cement may be used for the concrete substructure. The minimum cement factor should be per Section 8.22 of Caltrans Bridge Design Specifications – September 2003.

9.8 Construction Considerations

Prospective contractors for the project must evaluate construction-related issues on the basis of their own knowledge and experience in the local area, on the basis of similar projects in other localities, taking into account their own proposed construction methods and procedures.

9.8.1 Temporary Excavations Slope and Shoring

Excavations should not be expected to stand vertically without any support. According to Occupational Safety and Health Administration (OSHA) safety standards, temporary excavations with personnel working within the excavations should be sloped or shored if the excavations are deeper than 5 feet.

All excavations should be closely monitored during excavation/construction to detect any evidence of instability, soil creep, settlements, etc. Appropriate mitigation measures and a comprehensive monitoring plan should be implemented to correct such situations that may cause or lead to future damage to facilities, utilities and other improvements.

Operation of construction equipment and the resulting vibrations may adversely affect the native soils and other buildings/improvements at the site. This should be taken into consideration in the evaluation of temporary slope stability and shoring system.

Temporary Excavation Slope

The slope height, inclination, and excavation depths should not exceed those specified in local, state, or federal safety regulations. The design of the temporary slopes by the contractor or his specialty subcontractor should conform to the OSHA's "Guidelines for Excavations and Temporary Sloping". The contractor or responsible subcontractor should develop or modify their design based on the subsurface soil conditions exposed at the time of construction.

OSHA guidelines state that for excavations up to 20 feet deep in homogenous soils, the maximum allowable slope should be 3/4H: 1V, 1H:1V and 1-1/2H:1V for Type A, B and C soils, respectively (In general, Type A soils are stronger; Type B soils are intermediate, and Type C soils are weaker.) Based on the evaluation of the subsurface soil materials encountered in the current soil borings, the sand and gravels and clay should be considered as OSHA Type C. It should be noted that the slope ratios recommended by OSHA are for temporary, un-surcharged slopes. Traffic and surcharge loads should be set back at least 15 feet from the top of the excavations unless they are accounted for in the design. The temporary cut slopes discussed above assume that the groundwater is maintained below the bottom of the excavation at all times during construction. Slopes may need to be flattened based on the soil materials exposed during construction.

Surficial drying of these granular soils may result in erosion and/or minor sloughing if the bare (before the application of surface protection) surficial soil materials are exposed to weather and rain for extended period of time. Stiff clays also tend to develop soil creep due to seasonal change in moisture content resulting in sloughing and cracking. Adequate surface protection should be provided to the slope surface after its exposure from excessive drying and/or saturation during construction and the exposed slopes should be kept moist (but not saturated) by occasional light spraying of water during construction.

Selection of Shoring System

Temporary shoring may be necessary for the support of proposed excavations for the footing construction. The selection, design and performance of the temporary shoring system should be the responsibility of the contractor. The contractor should have the shoring system designed and signed by a Registered Engineer. The contractor should evaluate the conditions and select appropriate construction methods.

The shoring system should be designed to be relatively rigid and with as many supports or struts as necessary to prevent excessive straining and deformation of the supported soils. This is also important with regard to existing surface improvements and existing utilities where tension cracking or movement may develop, even under minor strains.

9.8.2 Excavation Bottom Stability

Due to fluctuation in groundwater elevation, excavation bottom instability during the excavation for the pile cap footing may occur as a result of bottom heave, piping, or blow-out. If excavation bottom failure due to bottom heave, piping or blow-out occurs, measures such as trimie seal course, dewatering, installing deep sheeting, continuous inter-locking sheet piles or deep soil mixing etc. will be required to mitigate these conditions. It s recommended supplemental funds be provided for such mitigation measure(s).

9.8.3 Dewatering

Dewatering of excavations is normally the responsibility of the contractor. As described in Section 6 "Subsurface Conditions", groundwater was measured at the depth of 12 feet at Elev. +203 feet during drilling in Boring PLM-2 in March 2008.

Groundwater should be expected during excavations. A properly designed and constructed dewatering operation is recommended irrespective of the construction method used. This may include, but not limited to, continuous inter-locking sheet piles, deep soil mix walls or other appropriate methods. The groundwater should be maintained at least 3 feet below the bottom of the excavation at all times.

10. PLAN REVIEW

This report is prepared for the proposed project described above. We recommend that final foundation plans for the proposed project be reviewed by PARIKH prior to construction so that the intent of our recommendations is included in the project plans and specifications and to further see that no misunderstandings or misinterpretations have occurred. However, design-build elements should be reviewed only from overall compliance standpoint.

11. CONSTRUCTION OBSERVATION

To a degree, the performance of any structure is dependent upon construction procedures and quality control measures. Hence, geotechnical observation and testing of grading operations, and foundation excavations should be carried out by a Geotechnical Engineer. If the subsurface conditions different from those forming the basis of our recommendations are encountered, this office should be informed in order to assess the need for design changes. Therefore, the recommendations presented in this report are contingent upon good quality control and these geotechnical observations during construction.

12. INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions. All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project plans and specifications.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, P.E., G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

SCALE:
1000 ft
200 m

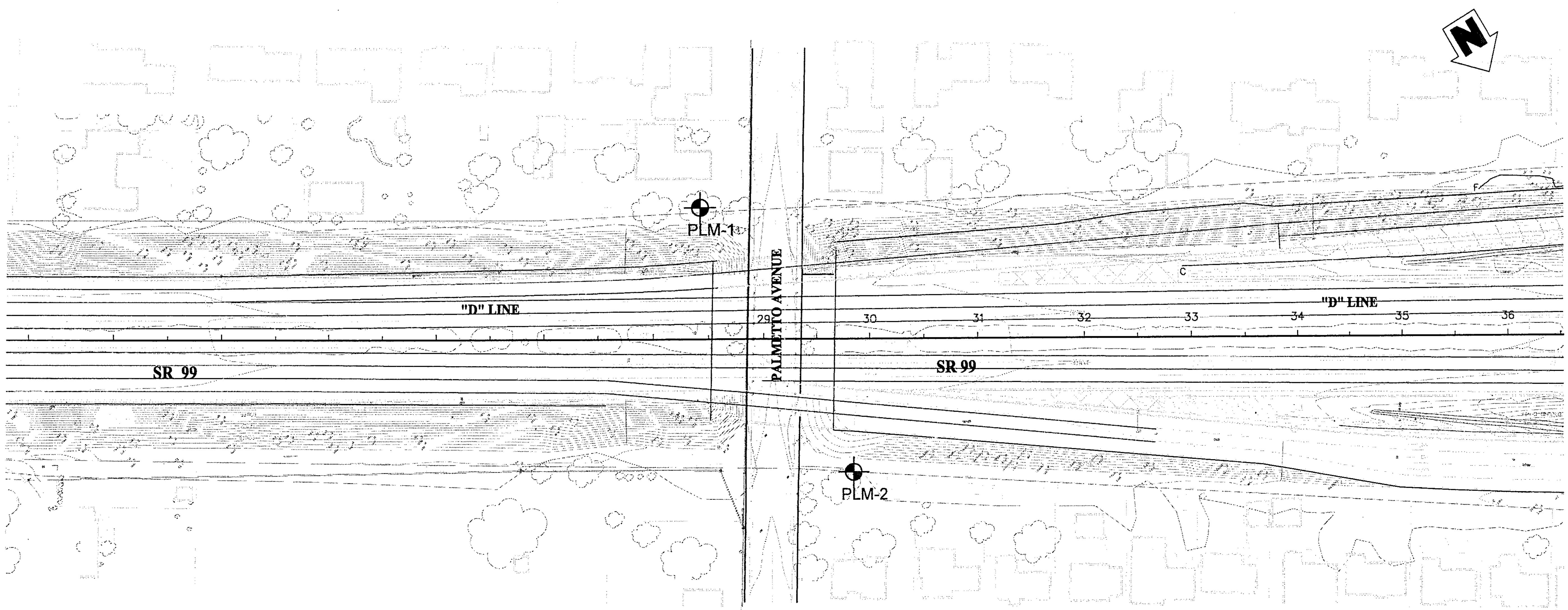
SOURCE:
2008 GOOGLE MAP DATA,
2008 NAVATEQ

PROJECT LOCATION MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

PALMETTO AVENUE UNDERCROSSING (WIDEN) (PM 33.08 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.PLM	PLATE NO.: 1



SITE PLAN

LEGEND

PLM-1
Approx. Boring Location

SCALE 1 inch = 100 feet

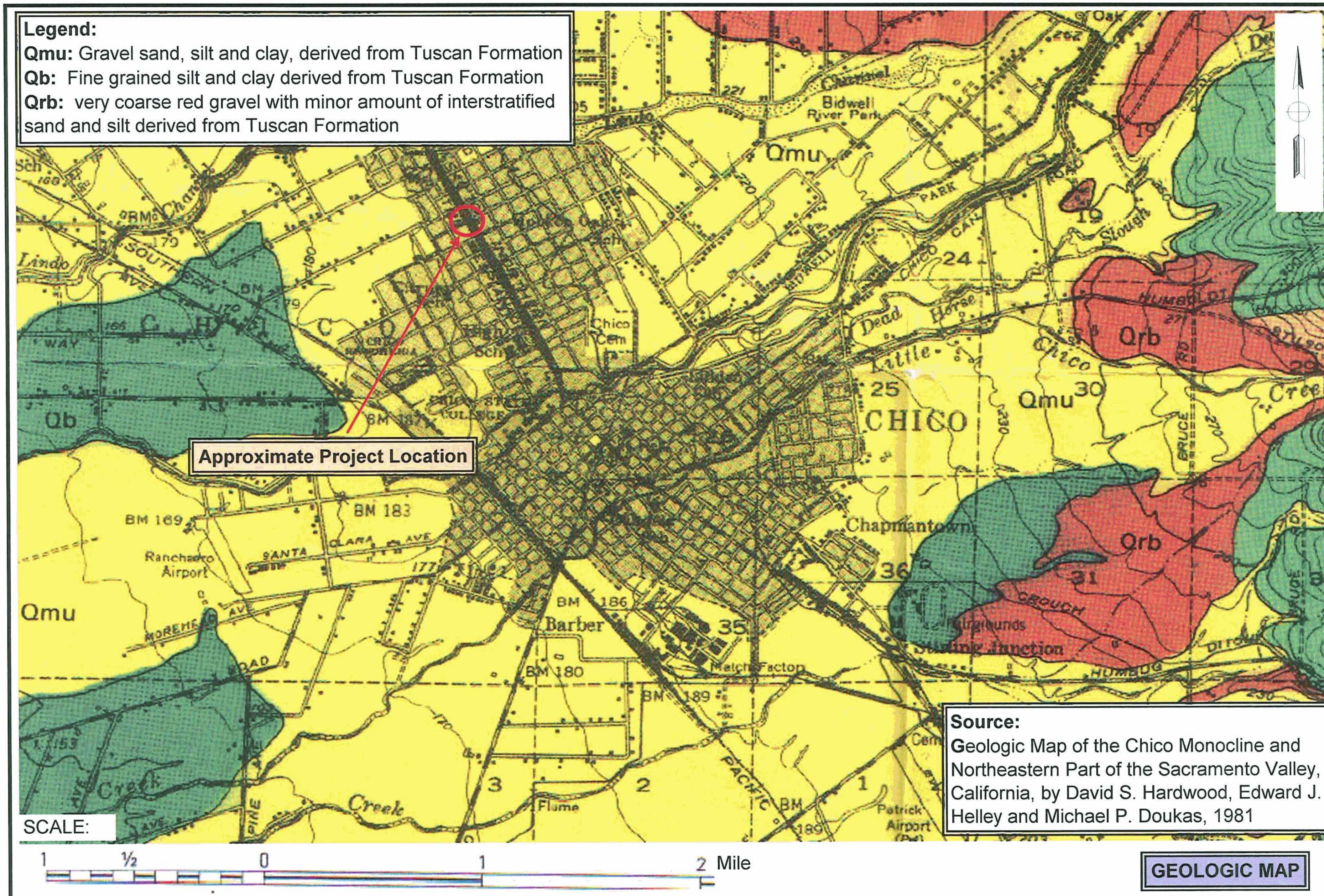
Note: All units are in feet unless otherwise specified
Reference Map was provided by Quincy Engineering, Inc.

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PALMETTO AVENUE UC (WIDEN) (PM 33.08 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.PLM

PLATE NO: 2

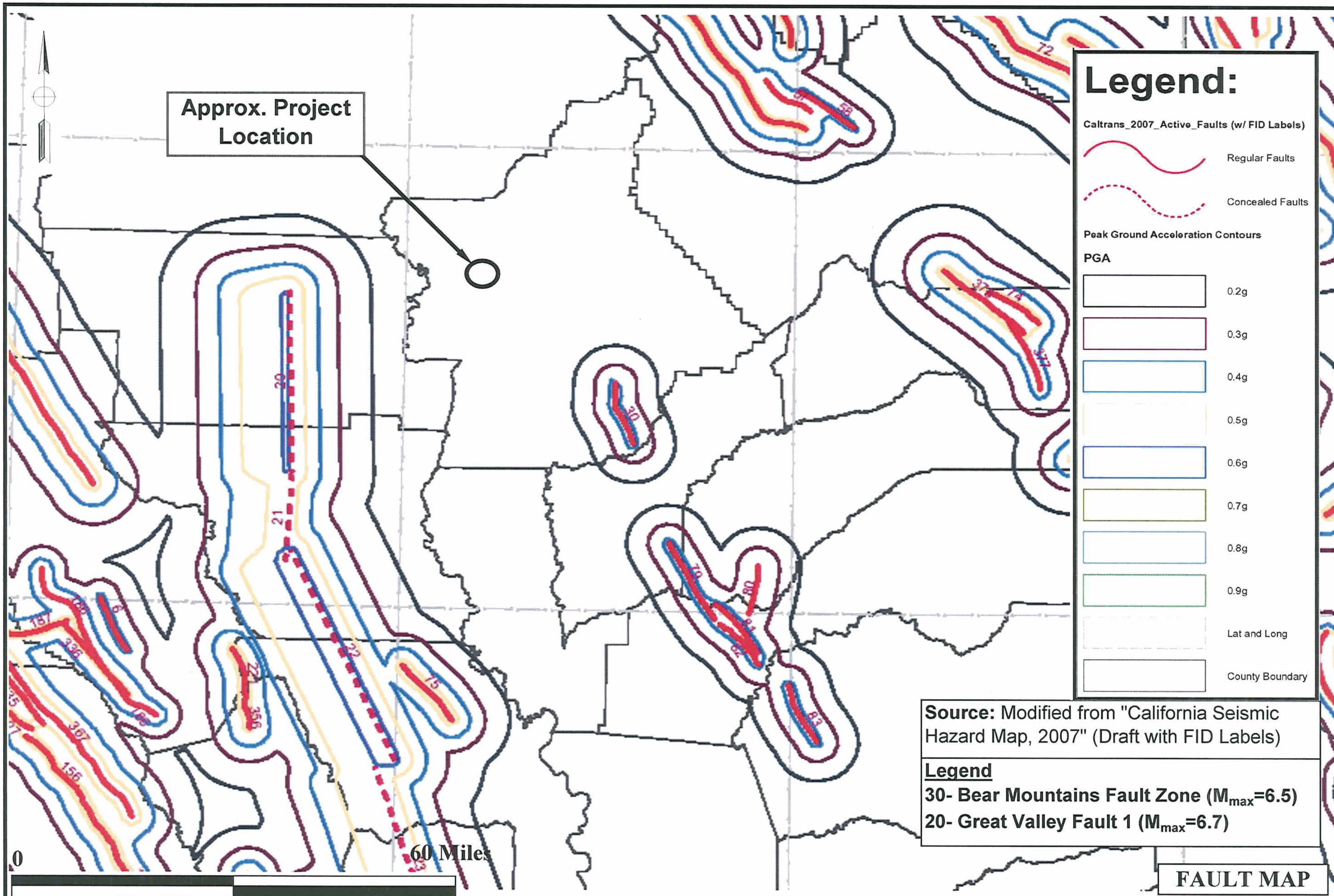


GEOLOGIC MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

PALMETTO AVENUE UNDERCROSSING (WIDEN) (PM 33.08 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.PLM	PLATE NO.: 3

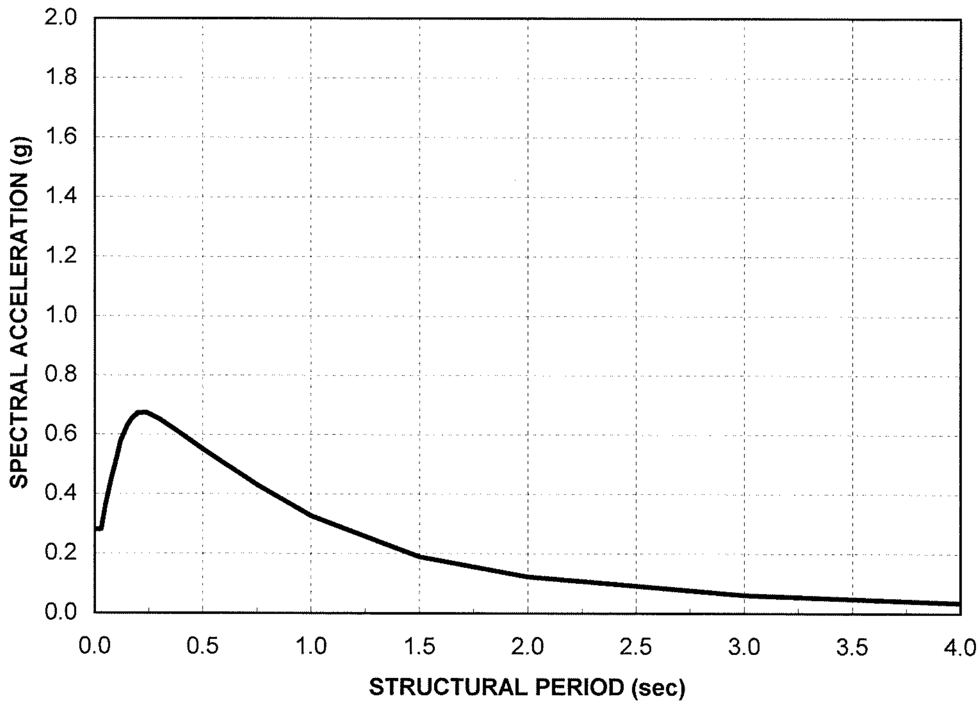


PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

PALMETTO AVENUE UNDERCROSSING (WIDEN) (PM 33.08 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.PLM	PLATE NO.: 4

ARS DESIGN CURVE
PALMETTO AVENUE UNDERCROSSING (WIDEN)
CHICO, CALIFORNIA



Spectral Data

Period (sec)	20 (6.7) Spectral Accel. (g)
0.010	0.280
0.020	0.280
0.030	0.280
0.050	0.364
0.075	0.448
0.100	0.519
0.120	0.579
0.150	0.629
0.170	0.653
0.200	0.673
0.240	0.674
0.300	0.653
0.400	0.602
0.500	0.551
0.750	0.431
1.000	0.327
1.500	0.190
2.000	0.122
3.000	0.061
4.000	0.035

1. Caltrans SDC (v 1.4, June 2006), Figure B.7, Governing Fault: Great Valley Fault 1 (R) (Mw = 6.7, Soil Profile Type D, PBA = 0.2g) with no modification.

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

PALMETTO AVENUE UNDERCROSSING (WIDEN) (PM 33.08 EA 03-3A0421)
CHICO, CALIFORNIA

JOB NO.: 202101.PLM

PLATE NO.:5

APPENDIX A

APPENDIX A
FIELD EXPLORATION

The test borings were advanced with truck-mounted drill rig with 8-inch diameter hollow-stem auger drilling method. The soil samples were obtained from the borings during drilling at various depths by driving a 2.5-inch Inside Diameter (I. D.) Modified California Sampler or a 1.375-inch I.D. Standard Penetration Sampler (ASTM Test Method No. 1586). The sampler was driven into the subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the Logs of Test Borings (LOTB), Appendix A. When correlating standard penetration data in similar soils, the blow counts for the Modified California sampler can be taken as roughly twice that for the Standard Penetration Test sampler in similar soils. Pocket penetration tests were also performed on clay samples to evaluate their consistency. Upon completion of drilling, the drillhole was backfilled with cement grout.

The borings were drilled under the technical supervision of our engineer, who visually classified in the field (according to the Unified Soil Classification System) and continuously logged the soils encountered during drilling. The engineer supervised the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples were then transported to our laboratory for further evaluation and testing.

The descriptions of the soils encountered and relevant boring information are presented on the boring logs in the LOTB in Appendix A. The laboratory test methods and results are presented in Appendix B. The logs presented in Appendix A were prepared from the field logs which were edited after visual re-examination of the soil samples in the laboratory and results of classification tests on selected soil samples as indicated on the logs.

The descriptions and related information presented on these LOTB depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the logs. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99, 32	32.4/33.3,10.1		

GEOTECHNICAL PROFESSIONAL DATE

11/18/09
PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- C Consolidation (ASTM D 2435)
- CL Collapse Potential (ASTM D 5333)
- CP Compaction Curve (CTM 216)
- CR Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- CU Consolidated Undrained Triaxial (ASTM D 4767)
- DS Direct Shear (ASTM D 3080)
- EI Expansion Index (ASTM D 4829)
- M Moisture Content (ASTM D 2216)
- OC Organic Content-% (ASTM D 2974)
- P Permeability (CTM 220)
- PA Particle Size Analysis (ASTM D 422)
- PI Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- PL Point Load Index (ASTM D 5731)
- PM Pressure Meter
- PP Pocket Penetrometer
- R R-Value (CTM 301)
- SE Sand Equivalent (CTM 217)
- SG Specific Gravity (AASHTO T 100)
- SL Shrinkage Limit (ASTM D 427)
- SW Swell Potential (ASTM D 4546)
- TV Pocket Torvane
- UC Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- UU Unconsolidated Undrained Triaxial (ASTM D 2850)
- UW Unit Weight (ASTM D 4767)
- VS Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

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

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

DESIGN OVERSIGHT
SIGN OFF DATE

DRAWN BY O. GOUTHIER
CHECKED BY A. LAM

V. SANTOS
FIELD INVESTIGATION BY:
DATE: MARCH 2008

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

BRIDGE NO. 12-0152
POST MILES 33.08

PALMETTO AVENUE UC (WIDEN)
LOG OF TEST BORINGS 1 OF 4

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

CEMENTATION

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

CONSISTENCY OF COHESIVE SOILS

Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

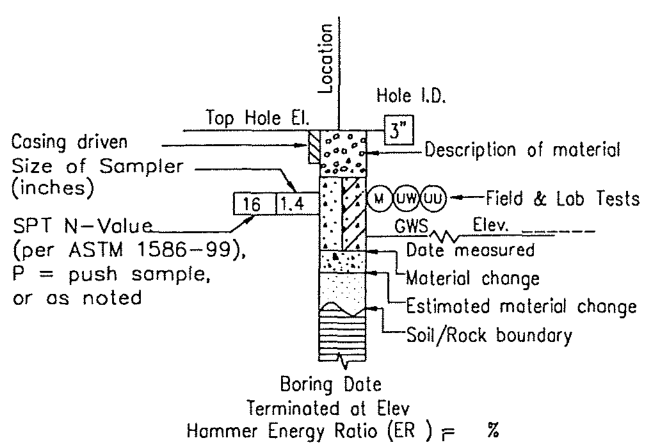
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
□	O	Other

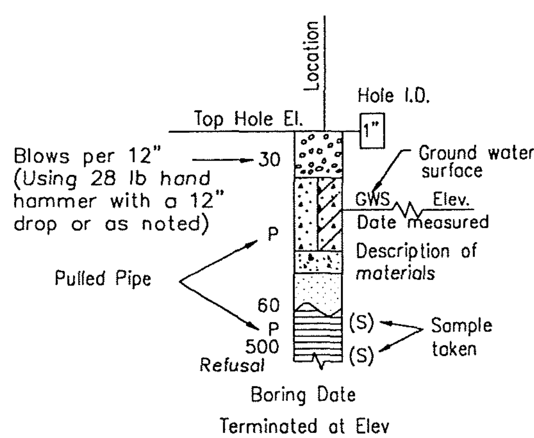
Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

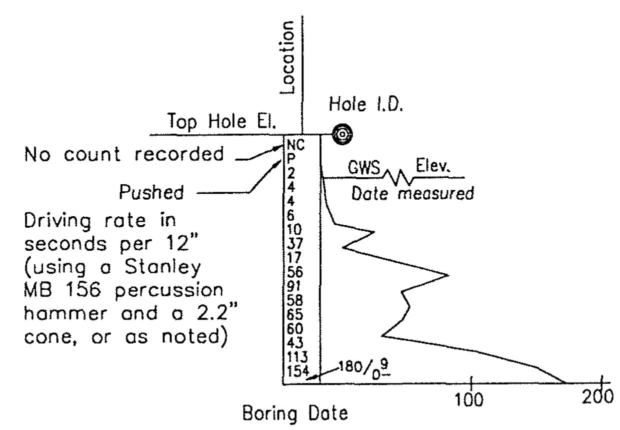
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.



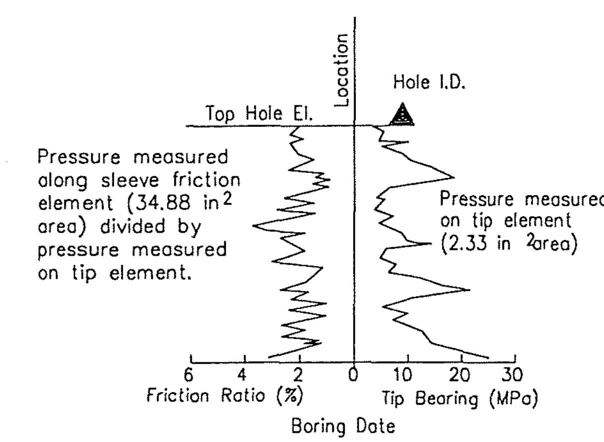
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99, 32	32.4/33.3,10.1		

GEOTECHNICAL PROFESSIONAL DATE

11/18/09
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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

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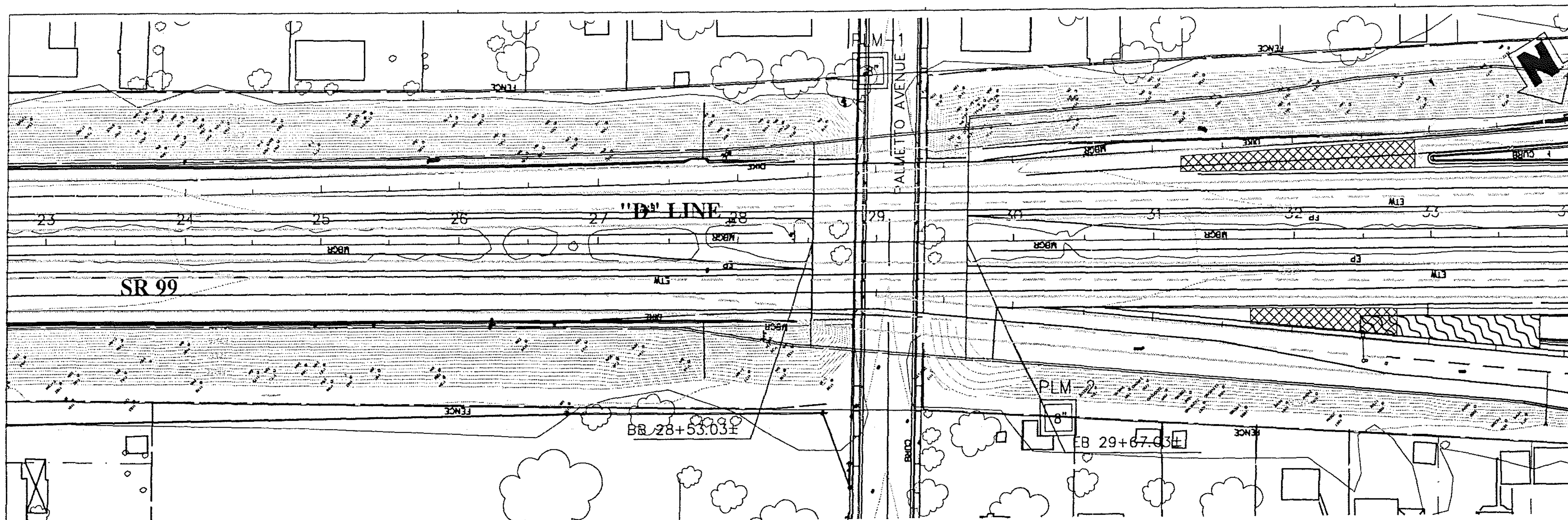
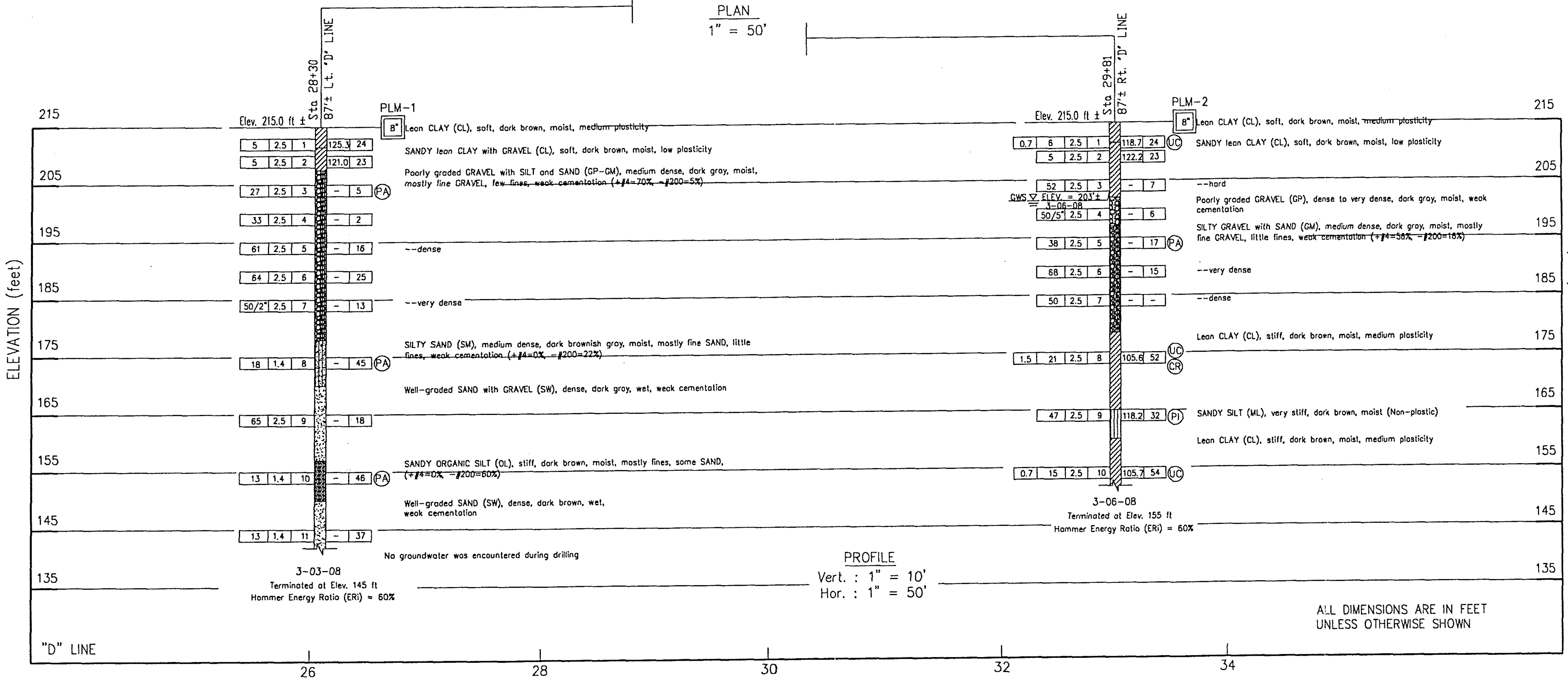
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131



PLAN
1" = 50'

NOTES: This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007)

Benchmark
Horizontal Coordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42



PROFILE
Vert. : 1" = 10'
Hor. : 1" = 50'

DESIGN OVERSIGHT	DRAWN BY	O. GOUTHIER	V. SANTOS FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	A. LAM PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	A. LAM	DATE: MARCH 2008		CU - EA 03-3A0421

BRIDGE NO. 12-0152
POST MILES 33.08

PALMETTO AVENUE UC (WIDEN)
LOG OF TEST BORINGS 3 OF 4

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12/03/08 11/10/09

SHEET 27 OF 28

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

Dec 09, 2009 - 9:22am S:\CADD\2021018\LOTB-PLM.dwg

DIVISION OF ENGINEERING SERVICES – GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST–TOTAL PROJECT	Sheet No.	Total Sheets
03	But	99	R32.4/R33.2		

REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

PALMETTO AVENUE UNDERCROSSING (WIDEN)

LOG OF TEST BORINGS 4 OF 4

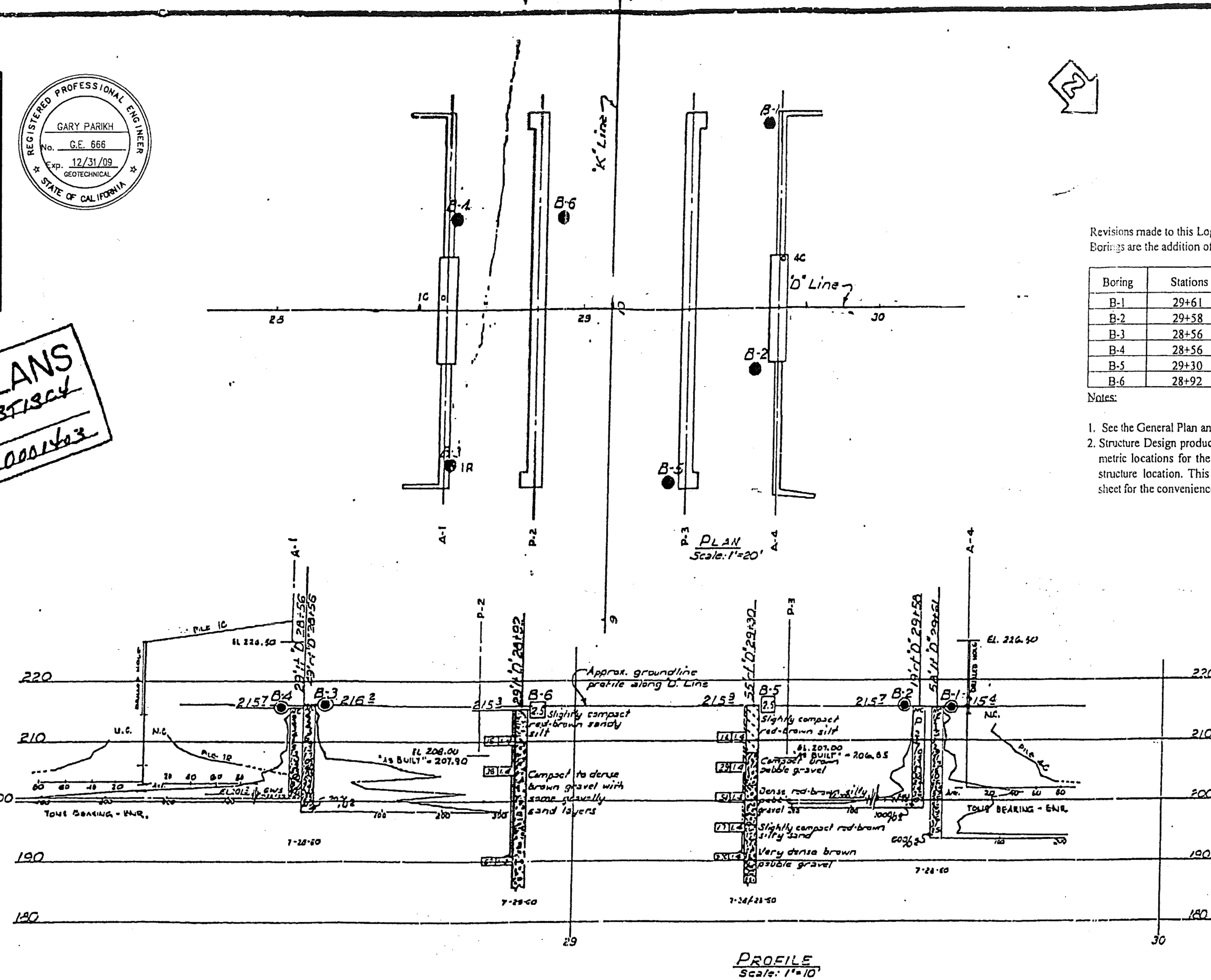
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: EA03-3A0421

BRIDGE No. 12-0152R/L

Sheet of

AS BUILT PLANS
Contract No. 63-3T13C4
Date Completed
Document No. 3 0001403



BM 29
R.R. spike in power pole
295' Lt 'D' 29+00±
Elev. 214.825

Design pile loading: 45T

Type Pile: Macco spun pile

Diameter: Tip 10" Butt 16"

Total number piles: 42

Lineal ft. piles called for on plans: 1195

Hammer: Vulcan No. 1

PLAN
Scale: 1"=20'

PROFILE
Scale: 1"=10'

Revisions made to this Log of Test Borings from the original 1962 Log of Test Borings are the addition of the following table and notes:

Boring	Stations	Offset from "D" Line
B-1	29+61	58 feet Lt.
B-2	29+58	19 feet Rt.
B-3	28+56	49 feet Rt.
B-4	28+56	29 feet Lt.
B-5	29+30	55 feet Rt.
B-6	28+92	29 feet Lt.

Notes:

1. See the General Plan and/or Foundation Plan for Stationing.
2. Structure Design produced the data presented in the table above. The data are the metric locations for the "As-built" Test Boring referenced to the proposed new structure location. This table is presented on the As-Built Log of Test Boring sheet for the convenience of any bidder, contractor, or other interested party.

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ______, AS SUBMITTED BY RESIDENT ENGINEER ______
TRACINGS CORRECTED BY: ____ DATE: ____

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

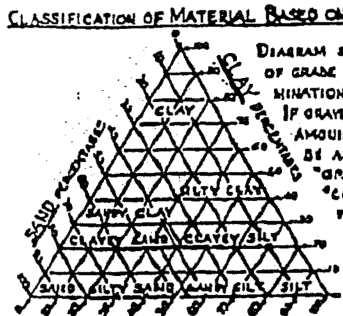


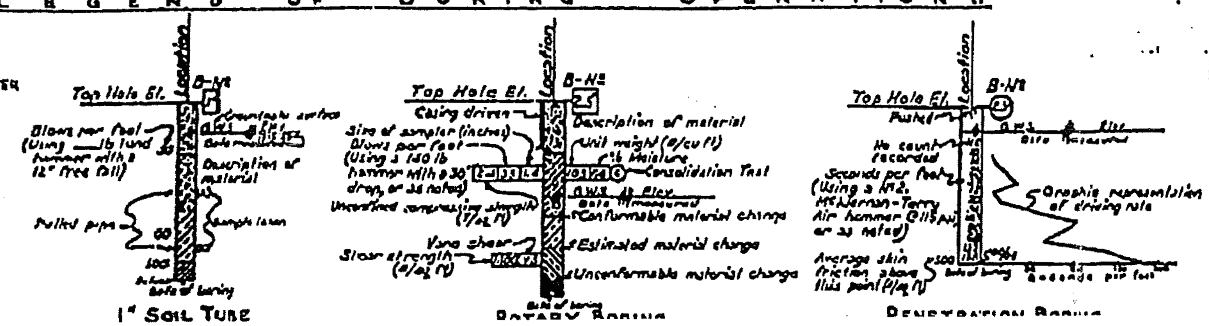
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



1" SOIL TUBE

ROTARY BORING

PENETRATION BORING

NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

PALMETTO AVENUE UNDERCROSSING

LOG OF TEST BORINGS

APPENDIX B

APPENDIX B

LABORATORY TESTS

Classification Tests

The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented on "Log of Test Borings", Appendix A.

Moisture-Density

The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D 2216-98. This information was used to classify and correlate the soils. The results are presented at the appropriate depths on the "Log of Test Borings", Appendix A.

Atterberg Limits

The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D 4318-00. The results of these tests are presented on Plate B-2, "Plasticity Chart".

Grain Size Classification

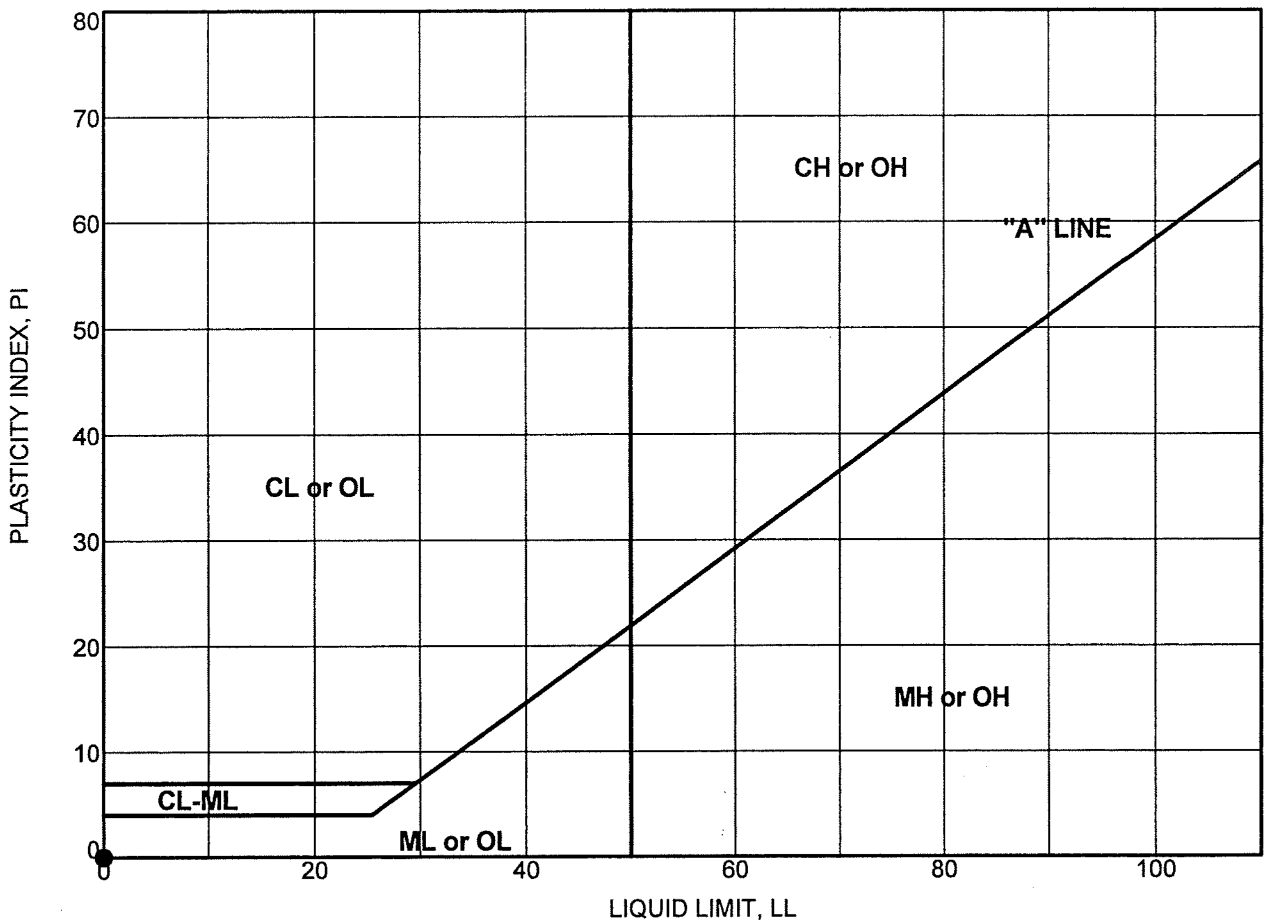
Grain size classification tests (ASTM Test Method D 420) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plate B-3, "Grain Size Distribution Curves".

Unconfined Compression Tests

Strength tests were performed on selected undisturbed sample using unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method D 2166-00. The results are presented on "Log of Test Borings", Appendix A.

Corrosion Tests

Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistivity tests were performed according to California Test Method 643. Sulfate and chloride tests were performed by AnaCon Testing Laboratory. The test results are presented on Plate B-4.



PLASTICITY CHART

Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
PLM-2	MC-9	50.0	●	32	NP	NP	NP	SANDY SILT (ML)

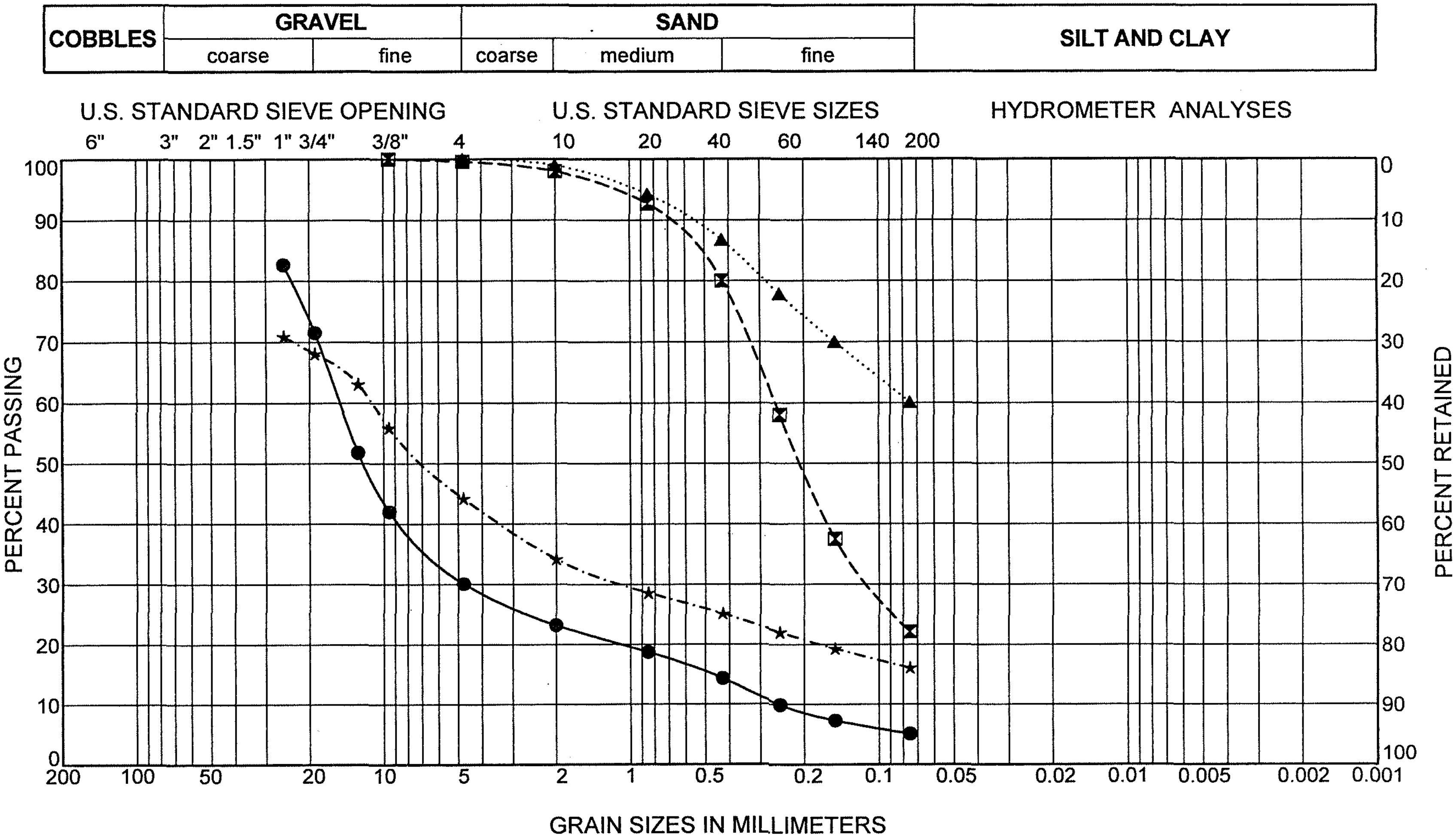
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PALMETTO AVENUE UC (WIDEN)
CHICO, CA

JOB NO: 202101.PLM

PLATE NO: B-2

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
PLM-1	MC-3	10.0	●			POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)
PLM-1	SPT-8	40.0	⊠			SILTY SAND (SM)
PLM-1	SPT-10	60.0	▲			SANDY ORGANIC SILT (OL)
PLM-2	MC-5	20.0	★			SILTY GRAVEL WITH SAND (GM)

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PALMETTO AVENUE UC (WIDEN)
CHICO, CA

JOB NO: 202101.PLM

PLATE NO: B-3

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.PLM/ PLM Site ID : PLM-2#8 @ 40'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53377-106931.

EVALUATION FOR SOIL CORROSION

Soil pH	6.35		
Minimum Resistivity	1.74	ohm-cm (x1000)	
Chloride	34.0 ppm	00.00340	%
Sulfate	2.3 ppm	00.00023	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

APPENDIX C

Calculation for Attenuation Relationship

Attenuation Relationships for Shallow Crustal Earthquakes (Sadigh, et al, 1997)

Fault = **Coast Ranges-Sierran Block Fault (CSB;Reverse)**

Mw = 7 Rrup = 56 km

M>6.5 ROCK SITE:

C1 = -1.274	C2 = 1.1	C3 = 0	C4 = -2.1
C5 = -0.48451	C6 = 0.524	C7 = 0	

A=C1+C2M+C3(8.5M)^2.5=	6.426
B=C4*Ln(Rrup+exp(C5+C6M))=	-9.206
C=C7*Ln(Rrup+2)=	0
Ln(y) = A+B+C =	-2.780
y = Exp(Ln(y)) =	0.0621 g (Peak Bed Rock Acceleration)

PBA = 0.0621*1.2 = 0.1g (assuming 20 % increase in thrust/reverse fault)

Fault = **Cleveland/W Fault (CHL; Normal)**

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

Mw = 6.5 Rrup = 29 km

A=	5.876
B=	-8.111
C=	0
Ln(y) =	-2.235
y =	0.1070 g (Peak Bed Rock Acceleration)

PBA = 0.2 g

Fault = **Big Bend Fault (BBD; Unknown)**

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

Mw = 6.25 Rrup = 21 km

A=	5.626
B=	-7.663
C=	0
Ln(y) =	-2.037
y =	0.13 g (Peak Bed Rock Acceleration)

PBA = 0.2g

Pile Capacity Calculations/Lateral Pile Capacity Analyses

PARIHK
Practicing in the Geosciences

JOB: Palmetto Ave UC (Widening) 202101. PLM
SHEET NO: 1 OF 5
CALCULATED BY: A. Lam DATE: 1/2009
CHECKED BY: DATE:
SCALE:

Pile Capacity Analyses (Boring PLM-1)

Abutment 1

Abut 1

Median. Elev 229.0 – 231.0'
4.0 – 6.0'
Elev 225.0

Step 1

10'

Elev 227.5' – 228.0'
~6.5' – 7.0'
Elev 221.0', Abut 1 Step 2
6'
Elev 215.0'

10'

Elev 205'

Thickness	Soil	Properties
7.5'	Lean Clay	Avg SPT N=5, $\gamma' = 120$ pcf, $S_u = 600$ psf
11'	Poorly Graded Gravel	Avg SPT N=20, $\gamma' = 115$ pcf, $\phi' = 34°$, $\gamma' = 130$ pcf
18.5'	Poorly Graded Gravel	Practical Refusal, $\gamma' = 125$ pcf, $\phi' = 36°$, $\gamma_{sat} = 140$ pcf
8'	Silty Sand	SPT N=18, $\gamma' = 115$ pcf, $\phi' = 32°$, $\gamma_{sat} = 130$ pcf
13'	Well-Graded Sand	SPT N=56, $\gamma' = 125$ pcf, $\phi' = 35°$, $\gamma_{sat} = 135$ pcf
7'	Sandy Organic Silt	SPT N=14, $\gamma' = 110$ pcf, $S_u = 1500$ psf, $\gamma_{sat} = 125$ pcf
5'	Well-Graded Sand	SPT N=13, $\gamma' = 110$ pcf, $\phi' = 30°$, $\gamma_{sat} = 125$ pcf

Pile Capacity Analyses (Boring PLM-1) Abut 1 HP14×89 Step 1

Friction in Lean Clay (S_u = 600 psf)

σ_{v0}' at 18.25' = 120 × 18.25
= 2190 psf

$\frac{S_u}{\sigma_{v0}'} = \frac{600}{2190} = 0.27$ $\alpha_1 = 1.0$ $\alpha_2 = 1.0$ $L/B < 50$

$Q_{all} = \frac{1.0 \times 1.0 \times 600 \times 7.01 \times 7.5}{2 \times 2000}$

$= \underline{7.9 \text{ tons}}$

Friction in Poorly Graded Gravel ($\phi' = 34°$)

$20B = 20 \times 14/12 = 23.3'$

σ_{v0}' at 23.3' = 22 × 120 + 1.3 × 115
= 2789.5 psf

σ_{v0}' at 22' = 22 × 120
= 2640 psf

$\delta = 0.67 \times 34° = 22.8°$

$Q_{all} = \frac{1.0 \times \tan 22.8° \times \left(\frac{2640 + 2789.5}{2} \times 1.3 + 2789.5 \times 9.7\right) \times 7.01}{2 \times 2000}$

$= \frac{1.0 \times \tan 22.5° \times (3529.2 + 27058.2) \times 7.01}{2 \times 2000}$

$= \underline{22.5 \text{ tons}}$

Pile Capacity Analysis - Abut 1 (HP 14x89) Step 1

Friction in Poorly Graded Gravel ($\phi' = 36°$) (Assume 15' into the gravel)

$\delta = 0.67 \times 36°$
$= 24.1°$

$$Q_{all} = \frac{1 \times \tan 24.1° \times 2789.5 \times 7.01 \times 15}{2 \times 2000}$$

$= \underline{32.8 \text{ tons}}$

Total $Q_{all} = 7.9 + 22.5 + 32.8 = \underline{63.2 \text{ tons}} > 55$ tons ∴ ok

Total pile length $= 10 + 7.5 + 11 + 15$

$= \underline{43.5 \text{ feet}}$

Proposed pile tip elevation $= 225.0 - 43.5$

$= \underline{181.5 \text{ feet}}$

Nominal driving resistance $= (63.2 \times 2 \times 2)$ kips

$= \underline{252.8 \text{ kips}}$

Proposed pile tip elevation due to lateral load

$= 226.5 - 33.5$

$= \underline{193.0 \text{ feet}}$

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Practicing in the Geosciences

JOB Palmetto Ave Ue (Widen) 202101.PLM
SHEET NO 4 OF 5
CALCULATED BY A Lam DATE 11/2009
CHECKED BY DATE
SCALE

Pile Capacity Analyses (Boring PLM-1) Abutment 1 Step 2

Friction in Lean clay (S_u = 600 psf)

σ_{vo}' at 15.75 = 112 × 15.75
= 1890 psf

$\frac{S_u}{\sigma_{vo}'} = \frac{600}{1890} = 0.33$ $\alpha = 1.0$ $\alpha_2 = 1.0$ $\frac{L}{B} \approx 50$

$Q_{all} = \frac{1.0 \times 1.0 \times 600 \times 7.01 \times 7.5}{2 \times 2000}$

= 7.9 tons

Friction in Poorly Graded Gravel (ϕ' = 34°)

20B = 20 × 14/12 = 23.3'
σ_{vo}' at 19.5' = 19.5 × 120 = 2340 psf
σ_{vo}' at 22' = 19.5 × 120 + 3.5 × 115
= 2742.5 psf

σ_{vo}' at 23.3' = 2742.5 + 1.3 × (130 − 62.4)
= 2830.4 psf

$Q_{all} = \frac{1.0 \times \tan 22.8 \times \left(\frac{2340 + 2742.5}{2} \times 2.5 + \frac{2742.5 + 2830.4}{2} \times 1.3 + 2830.4 \times 7.2 \right) \times 7.01}{2 \times 2000}$

= 22.4 tons

Pile Capacity Analysis - Abutment 1 (HP 14x89) Step 2

Friction in Poorly Graded Gravel ($\phi' = 36°$) (Assume 15' into the gravel)

$$\delta = 0.67 \times 36°$$
$$= 24.1°$$

$$Q_{all} = \frac{1 \times \tan 24.1° \times 2830.4 \times 7.01 \times 15}{2 \times 2000}$$
$$= \underline{33.3 \text{ tons}}$$

Total $Q_{all} = 7.9 + 22.4 + 33.3 = \underline{63.6 \text{ tons}} > 55 \text{ tons}$

Total pile length $= 6 + 7.5 + 11 + 15$
$= \underline{39.5 \text{ feet}}$

Proposed pile tip elevation $= 221.0 - 39.5$
$= \underline{181.5 \text{ feet}}$

Nominal driving resistance $= 63.6 \times 2 \times 2$
$= \underline{254.4 \text{ kips}}$

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Practicing in the Geosciences

JOB Palmetto Avenue (Widening) 202101.PLM
SHEET NO 1 OF 6
CALCULATED BY A. Lam DATE 11/2009
CHECKED BY DATE
SCALE

Pile Capacity Analyses (Boring PLM-2) Abutment 4 HP 14x89 45 tons

Step 1
Elev 230.0'–230.5'
5.0'–5.5'
Elev 225.0'
10'

Step 2
Elev. 228.5'
7.5'
Elev. 221.0
6'
Elev. 215.0'

12'

8' — $\gamma' = 120$ pcf Lean Clay Avg SPT N=6 (12.5) S_u = 750 psf

5' — $\gamma' = 120$ pcf Sandy Lean Clay SPT N=34 γ_{sat} = 130 pcf S_u = 3000 psf

5' — γ_{sat} = 130 pcf (140) Poorly Graded Gravel Practical refusal ϕ' = 36°

5' — Silty Gravel with Sand SPT N=25 ϕ' = 34°

13.5' — Silty Gravel with Sand γ_{sat} = 135 pcf Avg SPT N=39 ϕ' = 35°

8.5' — Lean Clay γ_{sat} = 130 pcf SPT N=14 Assume S_u = 1250 psf

10' — Sandy Lean Clay γ_{sat} = 130 pcf SPT N=31 S_u = 2500 psf

5' — γ_{sat} = 130 pcf Lean Clay SPT N=11 S_u = 1000 psf

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Practicing in the Geosciences

JOB Palmetto Ave UC Widening 202101.PLM
SHEET NO 2 OF 6
CALCULATED BY A Lam DATE 11/2009
CHECKED BY DATE
SCALE

Pile Capacity Analyses : Palmetto Ave UC - Abutment 4 (PLM-2) Step 1

Friction in Lean Clay ($S_u = 750$ psf)

σ_{vo}' at 18.5' = 120×18.5
= 2220 psf

$$\frac{S_u}{\sigma_{vo}'} = \frac{750}{2220} = 0.34 \quad \alpha_1 = 1.0 \quad \alpha_2 = 1.0 \quad L/B < 50$$

$$Q_{all} = \frac{1.0 \times 1.0 \times 750 \times 7.01 \times 8}{2 \times 2000}$$

= 10.5 tons

Friction in Sandy Lean Clay ($S_u = 3000$ psf)

σ_{vo}' at 25' = $22.5 \times 120 + 2.5 \times 120$
= 3000

$$\frac{S_u}{\sigma_{vo}'} = \frac{3000}{3000} = 1.0 \quad \alpha_1 = 0.5$$

$$Q_{all} = \frac{0.5 \times 1.0 \times 3000 \times 7.01 \times 5}{2 \times 2000}$$

= 13.1 tons

Friction in Poorly Graded Gravel ($\phi' = 36°$)

$20B = 23.3'$

σ_{vo}' at 23.3' = $23.3 \times 120 = 2796$ psf

$\delta = 0.67 \times 36° = 24.1°$

Pile Capacity Analyses - Palmetto Ave UC - Abutment 4 Step 1

$$Q_{all} = \frac{1.0 \times \tan 24.1° \times 2796 \times 7.01 \times 5}{2 \times 2000}$$

$= 11.0$ tons

Friction in Silty Gravel with Sand ($\phi' = 34°$)

$\delta = 0.67 \times 34°$
$= 22.8°$

$$Q_{all} = \frac{1.0 \times \tan 22.8° \times 2796 \times 7.01 \times 5}{2 \times 2000}$$

$= 10.3$ tons

Friction in Silty Gravel with Sand ($\phi' = 35°$) (Assume 9.0' into the gravel)

$\delta = 0.67 \times 35°$
$= 23.5°$

$$Q_{all} = \frac{1.0 \times \tan 23.5° \times 2796 \times 7.01 \times 9.0}{2 \times 2000}$$

$= 19.2$ tons

Total Q_{all} = 10.5 + 13.1 + 11.0 + 10.3 + 19.2 = 64.1 tons > 55 tons

Total pile length = 11.5 + 8 + 5 + 5 + 5 + 9
= 43.5 feet

Pile Capacity Analysis - Palmetto Ave UC - Abutment 4 Step 1

Proposed pile tip elevation = 226.5 - 43.5 = 183.0 feet

Nominal driving resistance = 64.1 x 2 x 2 = 256.4 kips

Proposed pile tip elevation (due to lateral load)

= 226.5 - 34.0

= 192.5 feet

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Practicing in the Geosciences

JOB: Palmetto Ave UC (Widen) 202101.PLM
SHEET NO: 5 OF 6
CALCULATED BY: A Lam DATE: 1/12009
CHECKED BY: DATE:
SCALE:

Pile Capacity Analysis - Palmetto Ave UC - Abutment 4 (PLM-2) Step 2

Friction in Lean Clay ($S_u = 750$ psf)

σ_{vo}' at $16' = 120 \times 16$
$= 1920$ psf

$\frac{S_u}{\sigma_{vo}'} = \frac{750}{1920} = 0.39$ $\alpha_1 = 0.96$ $\alpha_2 = 1.0$ $L/B < 50$

$Q_{all} = \frac{0.96 \times 1.0 \times 750 \times 7.01 \times 8}{2 \times 2000}$

$= 10.1$ tons

Friction in Sandy Lean Clay ($S_u = 3000$ psf)

σ_{vo}' at $22.5 = 22.5 \times 120$
$= 2700$ psf

$\frac{S_u}{\sigma_{vo}'} = \frac{3000}{2700} = 1.11$ $\alpha_1 = 0.5$

$Q_{all} = \frac{0.5 \times 1.0 \times 3000 \times 7.01 \times 5}{2 \times 2000}$

$= 13.1$ tons

Friction in Poorly Graded Gravel ($\phi' = 36°$)

$20B = 23.3'$

σ_{vo}' at $23.3' = 23.3 \times 120$
$= 2796$ psf

Pile capacity Analyses - Palmetto Ave LLC - Abutment 4 Step 2

Refers to Sheets 2 and 3 Friction in Poorly Graded Gravel = 11.0 tons

Total Qall = 10.1 + 13.1 + 11.0 + 10.3 + 19.2 = 63.7 tons > 55 tons

Total pile length = 6 + 8 + 5 + 5 + 5 + 9

= 38 feet

Proposed pile tip elevation = 221.0 - 38.0

= 183.0 feet

Nominal driving resistance = 63.7 x 2 x 2

= 254.8 kips

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Practicing in the Geosciences

JOB Palmetto Ave UC (Widening) 202101. PLM
SHEET NO ______ OF ______
CALCULATED BY A. Lam DATE 9/2008
CHECKED BY ______ DATE ______
SCALE ______

Lateral Pile Capacity Analyses (Boring PLM-1) Abutment 1

Abut 19b

13k, 20k, 30k, 40k — 3' — Elev 229.5'

Elev. 226.5'

115 pcf Elev 215.0'

10'

7.5' Lean Clay ε_{50} = 0.01 γ' = 120 pcf

Su = 600 psf k = 100 pci

38'

Elev 205' ▽

11' Poorly Graded Gravel k = 90 pci γ' = 115 pcf

k = 60 pci ϕ' = 34° γ' = 130 pcf

Practical Refusal

Poorly Graded Gravel γ' = 125 pcf

18.5' k = 125 pci ϕ' = 36° γ_{sat} = 140 pcf

γ' = 115 pcf

8' Silty Sand k = 60 pci ϕ' = 32° γ_{sat} = 130 pcf

Well-Graded Sand γ' = 125 pcf

13' k = 125 pci ϕ' = 35° γ_{sat} = 135 pcf

Sandy Organic Silt ε_{50} = 0.007 γ' = 110 pcf

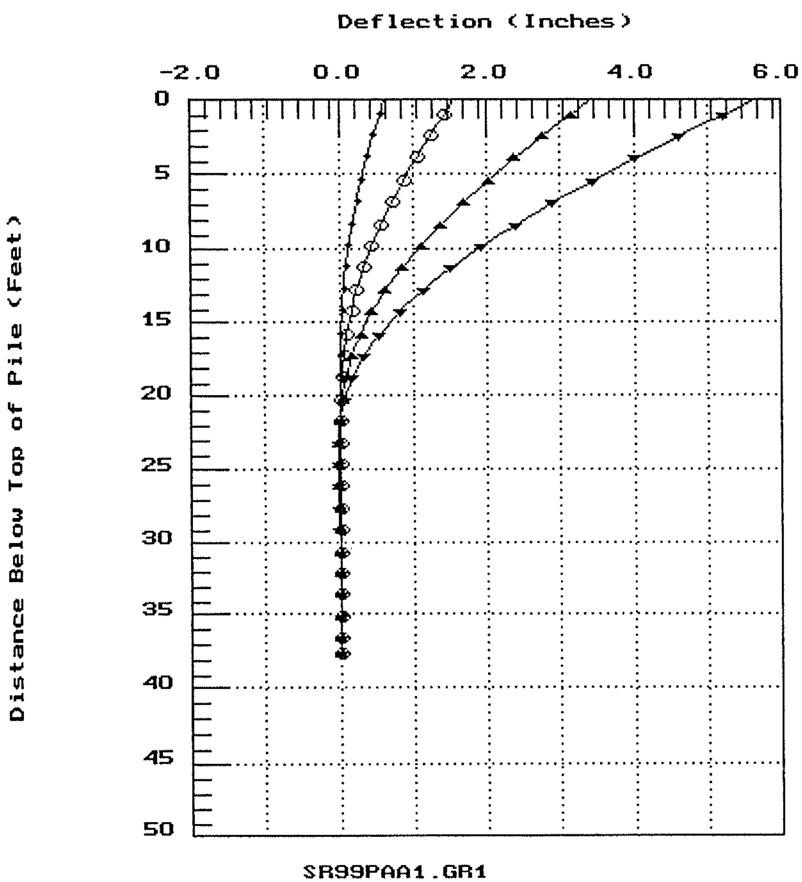
7' k = 500 pci Su = 1500 psf γ_{sat} = 125 pcf

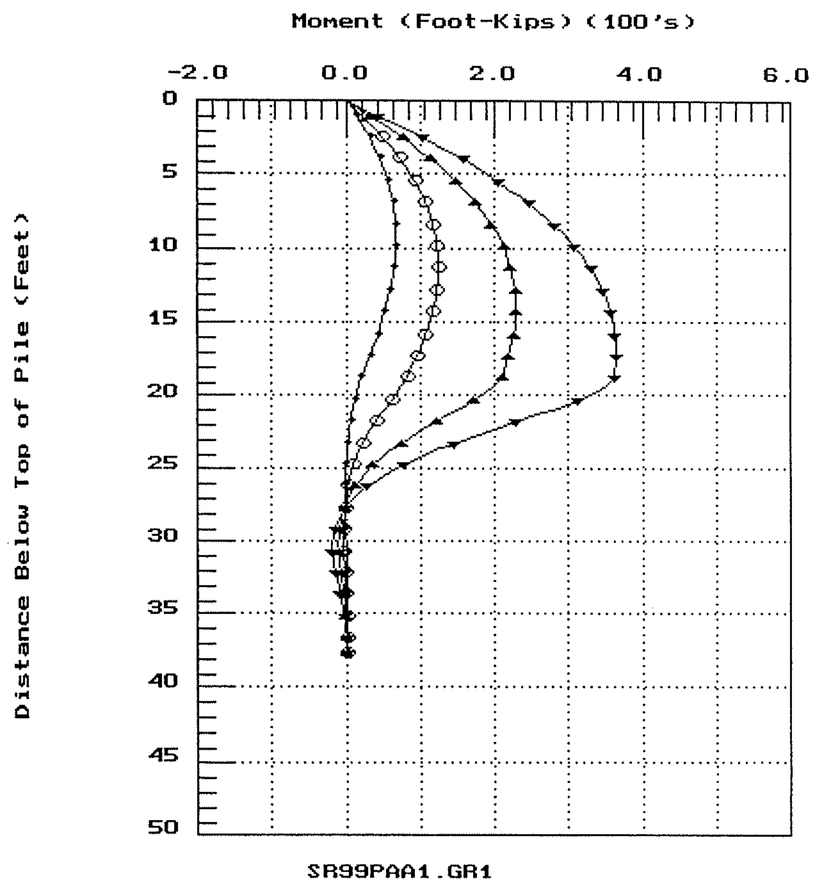
5' Well-Graded Sand k = 60 pci γ' = 110 pcf

ϕ' = 30°

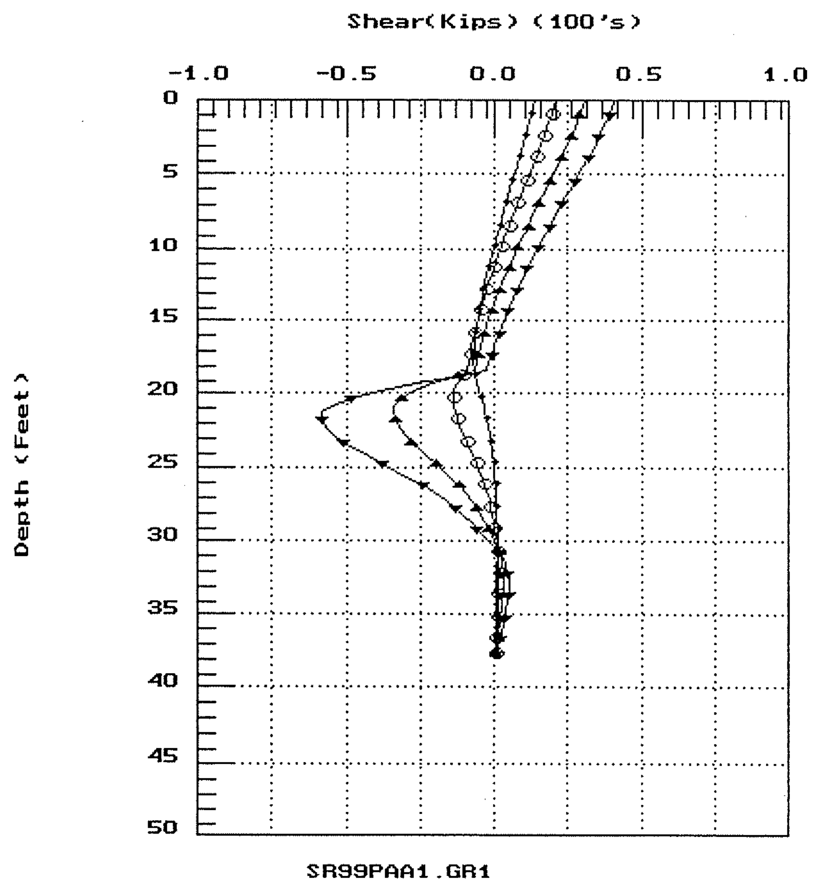
γ_{sat} = 125 pcf

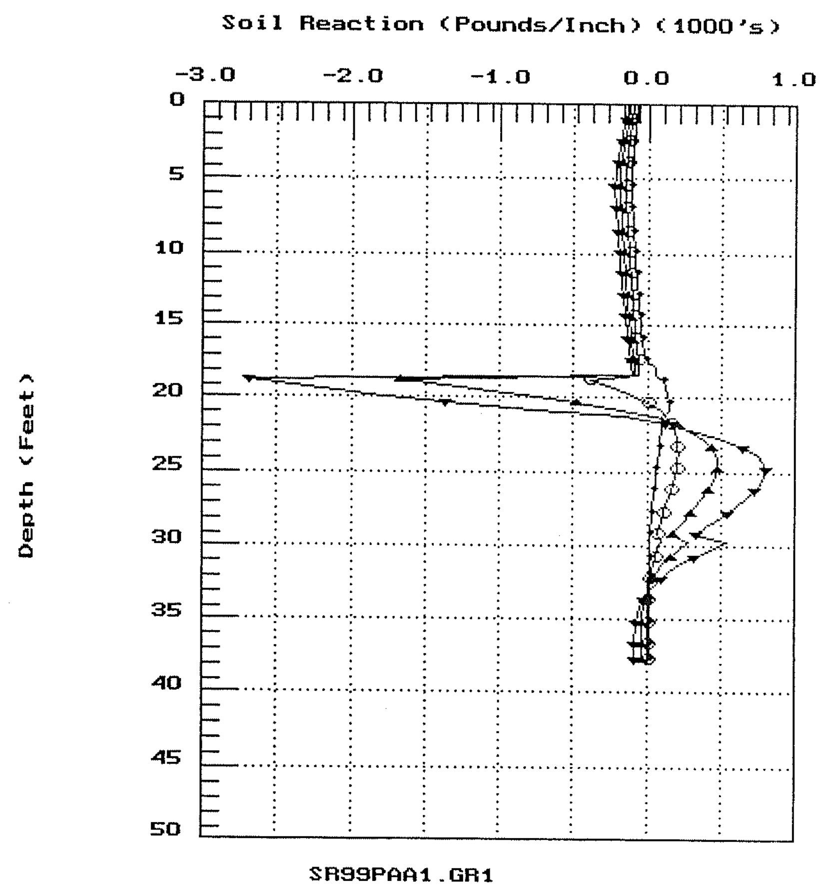
```
almetto Ave. UC (Widen) (GW-Elev. 205')(Abut 1-HP14x89 -45 tons)
   1      1      0      0      0
  76      2    -36.0    456.0      0.0
   0.0    11.76         904.00          26.10        29000000
 456.0    11.76         904.00          26.10        29000000
   8     16      14       0      2
   3    -36.0   228.0       100.0  100.0
   4    228.0   258.0        90.0   90.0
   4    258.0   360.0        60.0   60.0
   4    360.0   582.0       125.0  125.0
   4    582.0   678.0        60.0   60.0
   4    678.0   834.0       125.0  125.0
   3    834.0   918.0       500.0  500.0
   4    918.0   978.0        60.0   60.0
 -36.0     0.069
 228.0     0.069
 228.0     0.067
 258.0     0.067
 258.0     0.039
 360.0     0.039
 360.0     0.045
 582.0     0.045
 582.0     0.039
 678.0     0.039
 678.0     0.042
 834.0     0.042
 834.0     0.036
 918.0     0.036
 918.0     0.036
 978.0     0.036
 -36.0      4.17     0.0    0.01
 228.0      4.17     0.0    0.01
 228.0      0.00    34.0    0.000
 360.0      0.00    34.0    0.000
 360.0      0.00    36.0    0.000
 582.0      0.00    36.0    0.000
 582.0      0.00    32.0    0.000
 678.0      0.00    32.0    0.000
 678.0      0.00    35.0    0.000
 834.0      0.00    35.0    0.000
 834.0     10.42     0.0    0.007
 918.0     10.42     0.0    0.007
 918.0      0.00    30.0    0.000
 978.0      0.00    30.0    0.000
 -36.0    0.6   1
 978.0    0.6   1
   0      1     1
   4
   1    1.30D+04  0.0D+05  9.00D+04
   1    2.00D+04  0.0D+05  9.00D+04
   1    3.00D+04  0.0D+05  9.00D+04
   1    4.00D+04  0.0D+05  9.00D+04
   0
   1      1      0
 500    1.00D-5   2500.0
```





Abutment 1 Fixed Head →
• 13^K
○ 20^K
▲ 30^K
▼ 40^K


Shear(Kips) (100's)
-1.0
-0.5
0.0
0.5
1.0
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
SR99PAA1.GR1


Soil Reaction (Pounds/Inch) (1000's)
-3.0
-2.0
-1.0
0.0
1.0
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
SR99PAA1.GR1

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Practicing in the Geosciences

JOB Palmetto Ave. (Widening) 202101.PLM
SHEET NO ____ OF ____
CALCULATED BY Alam DATE 9/2008
CHECKED BY ____ DATE ____
SCALE ____

Lateral Pile Capacity Analysis (Boring PLM-2) Abutment 4 HP 14x89 45 tons

90k

13k, 20k, 30k, 40k — Elev 229.5'

3' Elev 226.5'

11.5'

Elev. 215.0'

12' 8' $\gamma' = 120$ pcf Lean Clay k = 100 pci $\varepsilon_{50} = 0.01$ $S_u = 750$ psf

5' $\gamma' = 120$ pcf Sandy Lean Clay k = 1000 pci $\varepsilon_{50} = 0.005$ $\gamma_{sat} = 130$ pcf $S_u = 3000$ psf

5' $\gamma_{sat} = 130$ pcf (140) Poorly Graded Gravel Practical refusal k = 125 pci $\phi' = 36°$

5' Silty Gravel with Sand k = 60 pci $\phi' = 34°$ $\gamma_{sat} = 135$ pcf

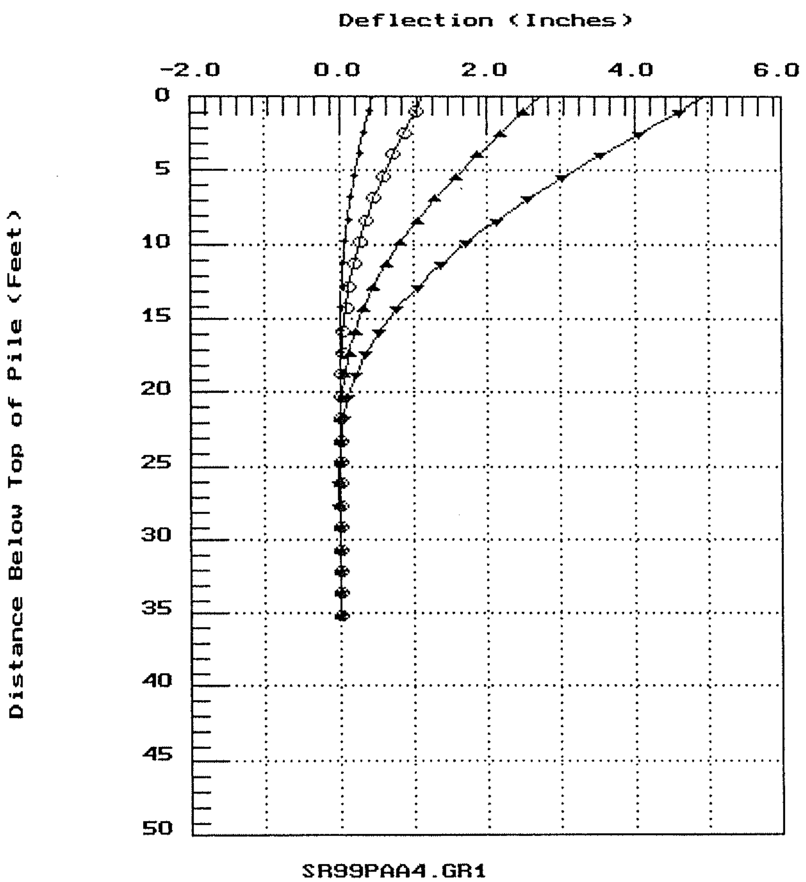
13.5' Silty Gravel with Sand k = 125 pci Avg SPT N = 39 $\phi' = 38°$

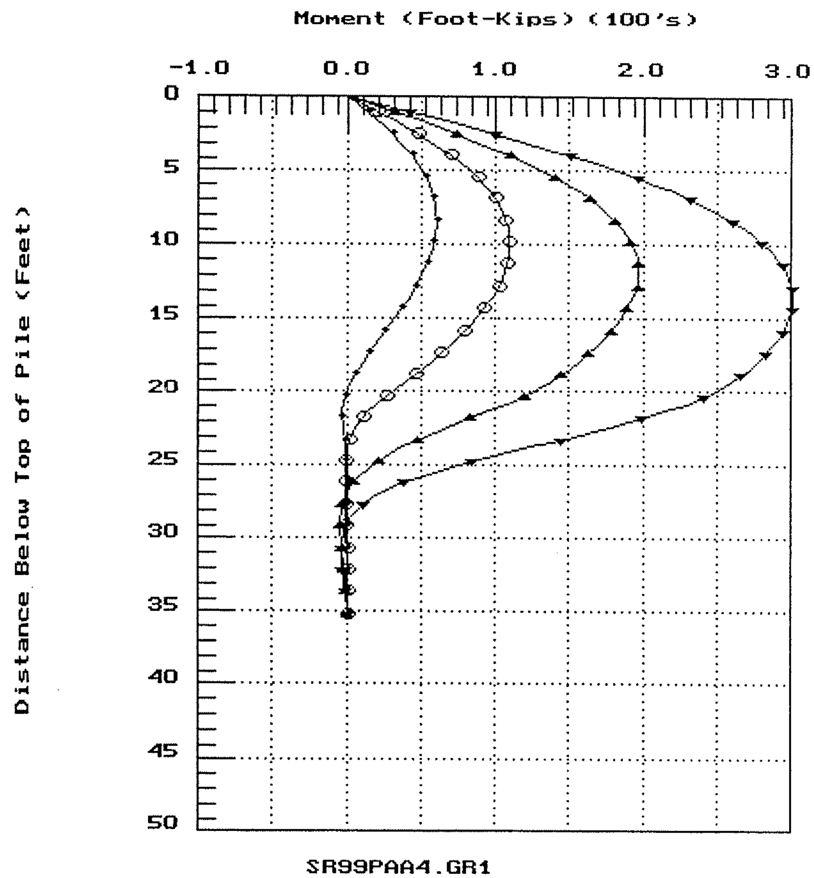
8.5' Lean Clay $\gamma_{sat} = 130$ pcf $\varepsilon_{50} = 0.007$ k = 500 pci Assume $S_u = 1250$ psf

10' Sandy Lean Clay $\gamma_{sat} = 130$ pcf $\varepsilon_{50} = 0.005$ k = 1000 pci $S_u = 2500$ psf

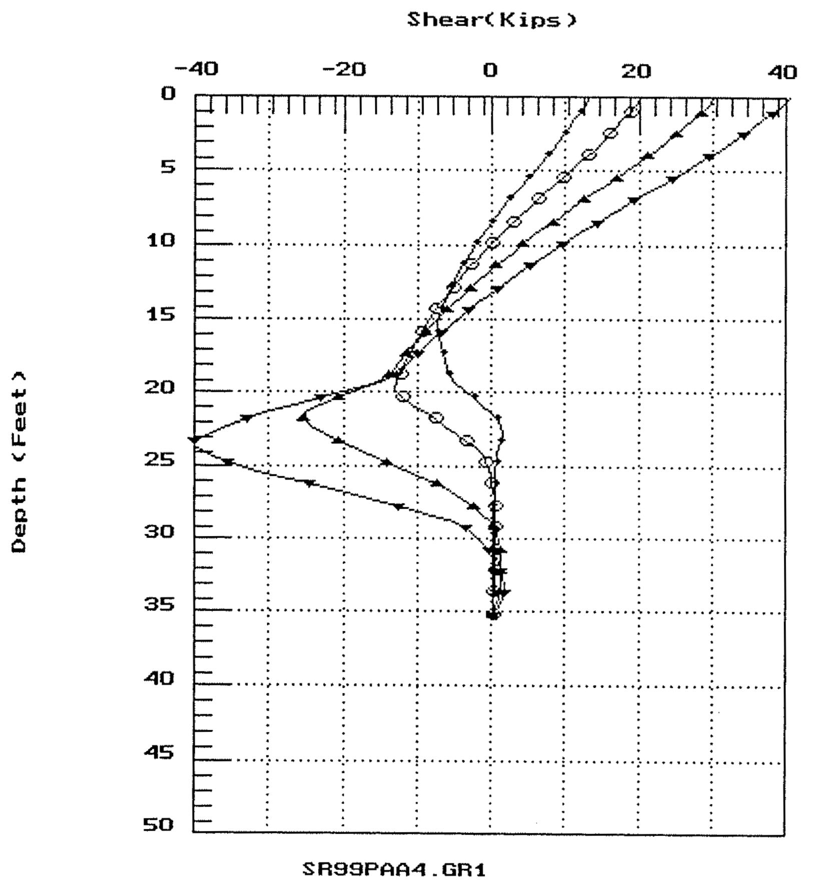
8' $\gamma_{sat} = 130$ pcf Lean Clay k = 100 pci $\varepsilon_{50} = 0.01$ $S_u = 1000$ psf

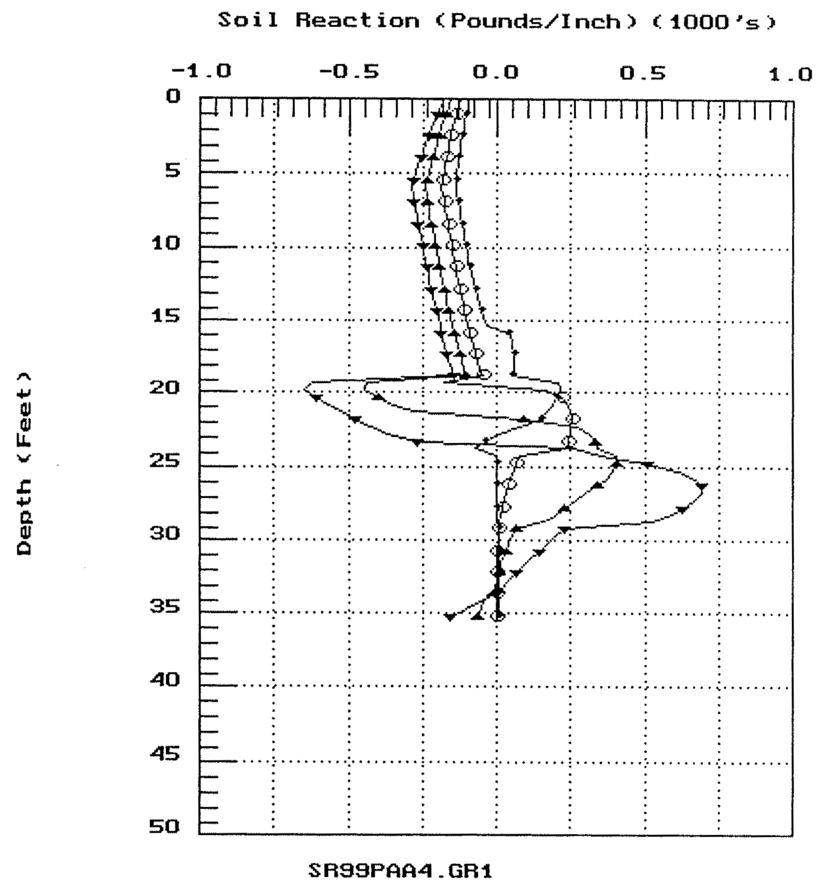
```
>almetto Ave. UC (Widen) (GW-Elev. 205')(Abut 4-HP14x89 -45 tons)
    1      1      0      0      0
   71      2    -36.0    426.0       0.0
   0.0    11.76          904.00          26.10          29000000
 426.0    11.76          904.00          26.10          29000000
    8     18      16       0      2
    3   -36.0   234.0      100.0   100.0
    3   234.0   294.0     1000.0  1000.0
    4   294.0   354.0      125.0   125.0
    4   354.0   414.0       60.0    60.0
    4   414.0   576.0      125.0   125.0
    3   576.0   678.0      500.0   500.0
    3   678.0   798.0     1000.0  1000.0
    3   798.0   858.0      100.0   100.0
 -36.0    0.069
 234.0    0.069
 234.0    0.069
 282.0    0.069
 282.0    0.039
 294.0    0.039
 294.0    0.045
 354.0    0.045
 354.0    0.042
 414.0    0.042
 414.0    0.042
 576.0    0.042
 576.0    0.039
 678.0    0.039
 678.0    0.039
 798.0    0.039
 798.0    0.039
 858.0    0.039
 -36.0     5.21     0.0    0.01
 234.0     5.21     0.0    0.01
 234.0    20.83     0.0    0.005
 294.0    20.83     0.0    0.005
 294.0     0.00    36.0    0.000
 354.0     0.00    36.0    0.000
 354.0     0.00    34.0    0.000
 414.0     0.00    34.0    0.000
 414.0     0.00    35.0    0.000
 576.0     0.00    35.0    0.000
 576.0     8.68     0.0    0.007
 678.0     8.68     0.0    0.007
 678.0    17.36     0.0    0.005
 798.0    17.36     0.0    0.005
 798.0     6.94     0.0    0.01
 858.0     6.94     0.0    0.01
 -36.0   0.6  1
 858.0   0.6  1
    0     1    1
    4
    1   1.30D+04  0.0D+05  9.00D+04
    1   2.00D+04  0.0D+05  9.00D+04
    1   3.00D+04  0.0D+05  9.00D+04
    1   4.00D+04  0.0D+05  9.00D+04
    0
    1     1     0
  500   1.00D-5   2500.0
```





Abutment Fixed Head →
· 13^k
○ 20^k
▴ 30^k
▾ 40^k


Shear(Kips)
-40
-20
0
20
40
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99PAA4.GR1


Soil Reaction (Pounds/Inch) (1000's)
-1.0
-0.5
0.0
0.5
1.0
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99PAA4.GR1

Bearing Capacity Analyses

Bearing Capacity Analyses (Boring PLM-1) Prev 2. Spread Footing

+216.5' 1.5' 7'
+207.9' (≈208')
10'

Elev 215.0'

Thickness	Soil	Properties
7.5'	Lean Clay	Avg SPT N=5, γ'=120 pcf, S_u=600 psf
11'	Poorly Graded Gravel	Avg SPT N=20, γ'=115 pcf, ϕ'=34°, γ_{sat}=130 pcf
18.5'	Poorly Graded Gravel	Practical Refusal, γ'=125 pcf, ϕ'=38°, γ_{sat}=140 pcf
8'	Silty Sand	SPT N=18, γ'=115 pcf, ϕ'=32°, γ_{sat}=130 pcf
13'	Well-Graded Sand	SPT N=56, γ'=125 pcf, ϕ'=35°, γ_{sat}=135 pcf
7'	Sandy Organic Silt	SPT N=14, S_u=1500 psf, γ'=110 pcf, γ_{sat}=125 pcf
5'	Well-Graded Sand	SPT N=13, γ'=110 pcf, ϕ'=30°, γ_{sat}=125 pcf

Bearing Capacity Analysis - Pier 2 (Boring PLM-1)

Immediate Settlement $\delta v = q B \frac{(1-\nu^2)}{E} I$

$\Rightarrow q = \frac{\delta v E}{B(1-\nu^2) I}$

Pier 2 right L = 22.8' Now B = 10' Assume Rectangle (rigid) L/B = 2.3

I average = 1.12

Assume ν = 0.33

Poorly graded gravel E = 600 ksf (SPT N = 20)
= 1200 ksf

$q = \frac{0.083 \text{ ft} \times 1200 \text{ ksf}}{10.0 \text{ ft} \times (1-0.33^2) \times 1.12}$

= 10.0 ksf q_{all} 9.0 ksf > 4.5 ksf

Pier 2 left L = 15' B = 10' L/B = 1.5 Assume I average = 1.12

q = 10.0 ksf q_{all} 9.0 ksf > 6.1 ksf

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JOB Palmetto Ave IC (Widening) 20 2101.PLM

SHEET NO 3 OF 3

CALCULATED BY A Lam DATE 11/2009

CHECKED BY DATE

SCALE

Bearing Capacity Analysis - Pier 2 (Based on Boring PLM-1)

Assume $\phi' = 34°$, $c' = 0$

$N_\gamma = 36.0$ $N_q = 36.5$ $N_c = 0$ $B' = 10.1'$ $D = 8.5'$

Assume below groundwater

$Q_n = 0.5 \times (130 - 62.4) \times 10.1' \times 36.0 + (130 - 62.4) \times 8.5 \times 36.5$

$= 33263$ psf Say 30 ksf > 9.6 ksf

Q_R = Factored Gross Nominal Bearing Resistance) $= Q_b \times Q_n$

Now $Q_b = 0.45$

$Q_R = 0.45 \times 33263$

$= 14968$ psf Say 14.0 ksf > 5.7 ksf

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JOB	Palmetto Ave LLC (Widening) 202101.PLM
SHEET NO	1 OF 3
CALCULATED BY	A. Lam DATE 1/1/2009
CHECKED BY	DATE
SCALE	

Bearing Capacity Analyses (Boring PLM-2) Pier 3

Elev 216.0' Elev 215.0'

12' 8' 8.5' $\gamma' = 120$ pcf Lean Clay Avg SPT N = 6. $S_u = 750$ psf

Elev 206.5'

5' $\gamma' = 120$ pcf Sandy Lean Clay SPT N = 34 $\gamma_{sat} = 130$ pcf $S_u = 3000$ psf

5' $\gamma_{sat} = 140$ pcf Poorly Graded Gravel Practical refusal $\phi' = 36°$

5' Silty Gravel with Sand SPT N = 25 $\phi' = 34°$

13.5' Silty Gravel with Sand $\gamma_{sat} = 135$ pcf Avg SPT N = 39 $\phi' = 35°$

8.5' Lean Clay $\gamma_{sat} = 130$ pcf SPT N = 14 Assume $S_u = 1500$ psf

10' Sandy Lean Clay $\gamma_{sat} = 130$ pcf SPT N = 31 $S_u = 2500$ psf

5' $\gamma_{sat} = 130$ pcf Lean Clay SPT N = 11 $S_u = 1000$ psf

Bearing Capacity Analyses: Pier 3 (Boring PLM-2)

Immediate Settlement $\rho_i = I_o I_1 \frac{qB}{E}(1-\nu^2)$

$$q = \frac{\rho_i E}{I_o I_1 B(1-\nu^2)}$$

Pier 3, right $L=27'$, $B=10'$ Now. $D=0.5'$, $H=4.5'$, $B=10'$, $L/B=2.7$

$H/B = 0.45$ $I_1 = 0.5$ $D/B = 0.05$ $I_o = 0.9$

Assume $\nu = 0.33$

E is usually 200 to 400 Su

Now assume $E = 200 Su = 200 \times 3$ ksf
$= 600$ ksf

ρ_i limited to 1 inch settlement

$$q = \frac{0.083 ft \times 600 ksf}{10 ft \times (1-0.33^2) \times 0.5 \times 0.9}$$

$= 12.4$ ksf Say $\underline{\underline{11.0 \text{ ksf}}}$

> 5.42 ksf ∴ ok

Pier 3 Left. $L=19.2'$, $B=10'$ $D=0.5'$, $H=4.5'$ $B=10'$, $L/B=1.9$

$H/B = 0.45$ $I_1 = 0.5$ $D/B = 0.05$, $I_o = 0.85$

$$q = \frac{0.083 ft \times 600 ksf}{10 ft \times (1-0.33^2) \times 0.5 \times 0.85}$$

$= 13.1$ ksf Say $\underline{\underline{11.5 \text{ ksf}}} > 5.41$ ksf

PARIKH

Practicing in the Geosciences

JOB Palmetto Ave UC (Widening) 202101.PLM
SHEET NO 3 OF 3
CALCULATED BY A Lam DATE 11/2009
CHECKED BY DATE
SCALE

Bearing Capacity Analyses - Pier 3 (Based on Boring PLM-2)

$\phi = 0$, $c = 3000$ psf $N_\gamma = 0$ / $N_q = 1$ $N_c = 5.7$ $c = 3000$ psf $D = 8.5'$

Assume below groundwater $Q_u = c N_c + \gamma D N_q$

$= 5.7 \times 3000 + (130 - 62.4) \times 2 \times 8.5'$

$Q_u = 17674.6$ psf   Say 16.0 ksf > 9.0 ksf

Q_R (Factored Gross Nominal Bearing Resistance) $= Q_b \times Q_u$

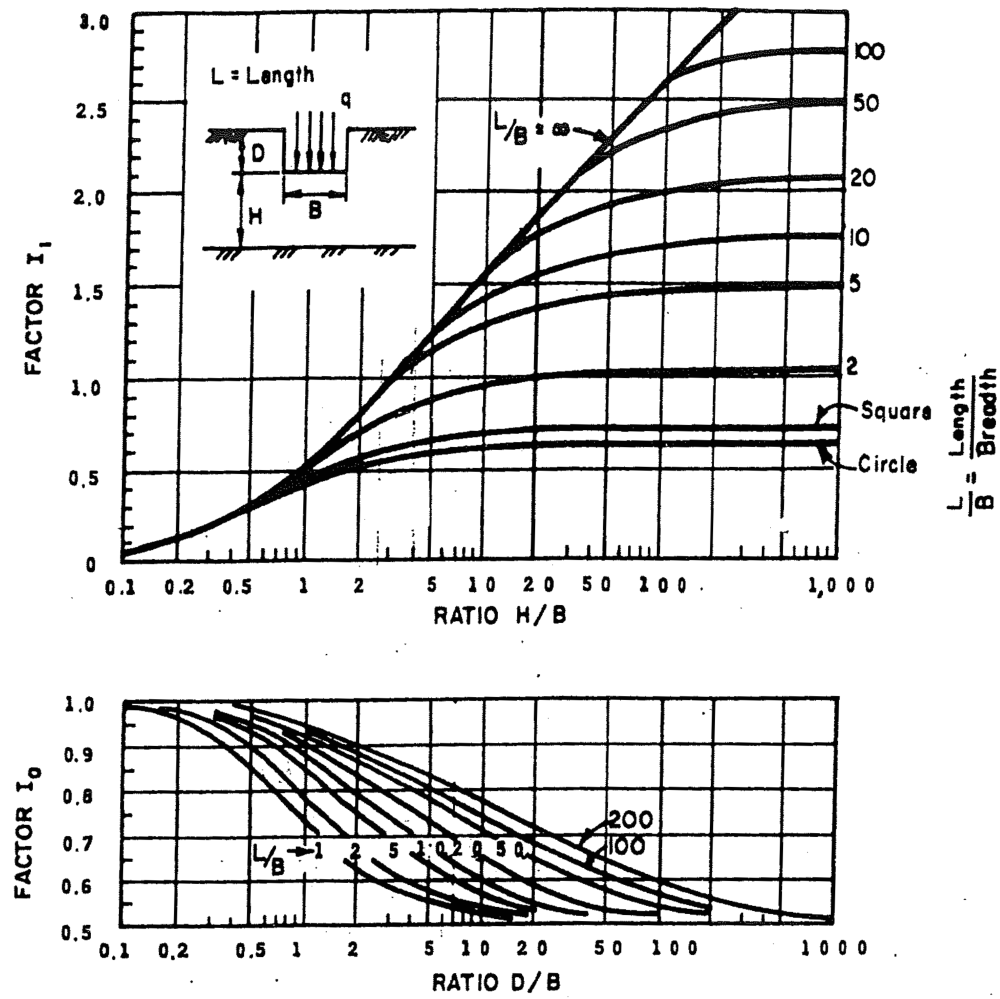
Now $Q_b = 0.45$

$Q_R = 0.45 \times 17674.6$

$= 7954$ psf   Say 6.0 ksf > 4.75 ksf

TABLE 1
Shape and Rigidity Factors I for Calculating Settlements
of Points on Loaded Areas at the Surface of an Elastic Half-Space

Shape and Rigidity Factor I for Loaded Areas on an Elastic Half-Space of Infinite Depth				
Shape and Rigidity	Center	Corner	Edge/Middle of Long Side	Average
Circle (flexible)	1.00		0.64	0.85
Circle (rigid)	0.79		0.79	0.79
Square (flexible)	1.12	0.56	0.76	0.95
Square (rigid)	0.82	0.82	0.82	0.82
Rectangle: (flexible) length/width				
2	1.53	0.76	1.12	1.30
5	2.10	1.05	1.68	1.82
10	2.56	1.28	2.10	2.24
Rectangle: (rigid) length/width				
2	1.12	1.12	1.12	1.12
5	1.6	1.6	1.6	1.6
10	2.0	2.0	2.0	2.0



$$\rho_i = I_0 I_1 \frac{qB}{E} (1 - \nu^2)$$

ρ_i = IMMEDIATE SETTLEMENT (AVERAGE VALUE)
q = AVERAGE BEARING PRESSURE
B = FOUNDATION WIDTH
E = YOUNG'S MODULUS OF FOUNDATION SOIL
ν = POISSON'S RATIO OF FOUNDATION SOIL
I_0 & I_1 = FACTORS FROM CHART ABOVE

Fig. 4 CHART FOR ESTIMATING IMMEDIATE SETTLEMENTS OF FOUNDATIONS ON CLAY (FROM JANBU, BJERRUM AND KJAERNSLI, 1956)

Lateral Earth Pressure and Friction Coefficient for Spread Footing

Lateral Earth Pressure for Spread Footing of Piers 2 and 3

Using Coulomb to calculate passive equivalent fluid pressure

$c = 600 psf$ Assume $\phi' = 26°$ $\beta = 0$ $\delta/\phi = 0.6$

Based on Figure 5.5.5.4-2 (Assuming "wall with friction")

$\phi' = 26°$, $\delta/\phi' = 0.6$ Reduction factor $= 0.86 - (0.86 - 0.811) \times 1/5$

$= 0.87$

$k_p = 4.7 \times 0.87 = 4.1$

Passive Equivalent Fluid Pressure $= 4.1 \times 120$

$= 492$ pcf Say 490 pcf

Coefficient of Friction

$\mu = \tan 2/3\ \phi'$

$= \tan 2/3\ (26°)$

$= 0.31$ Say 0.30

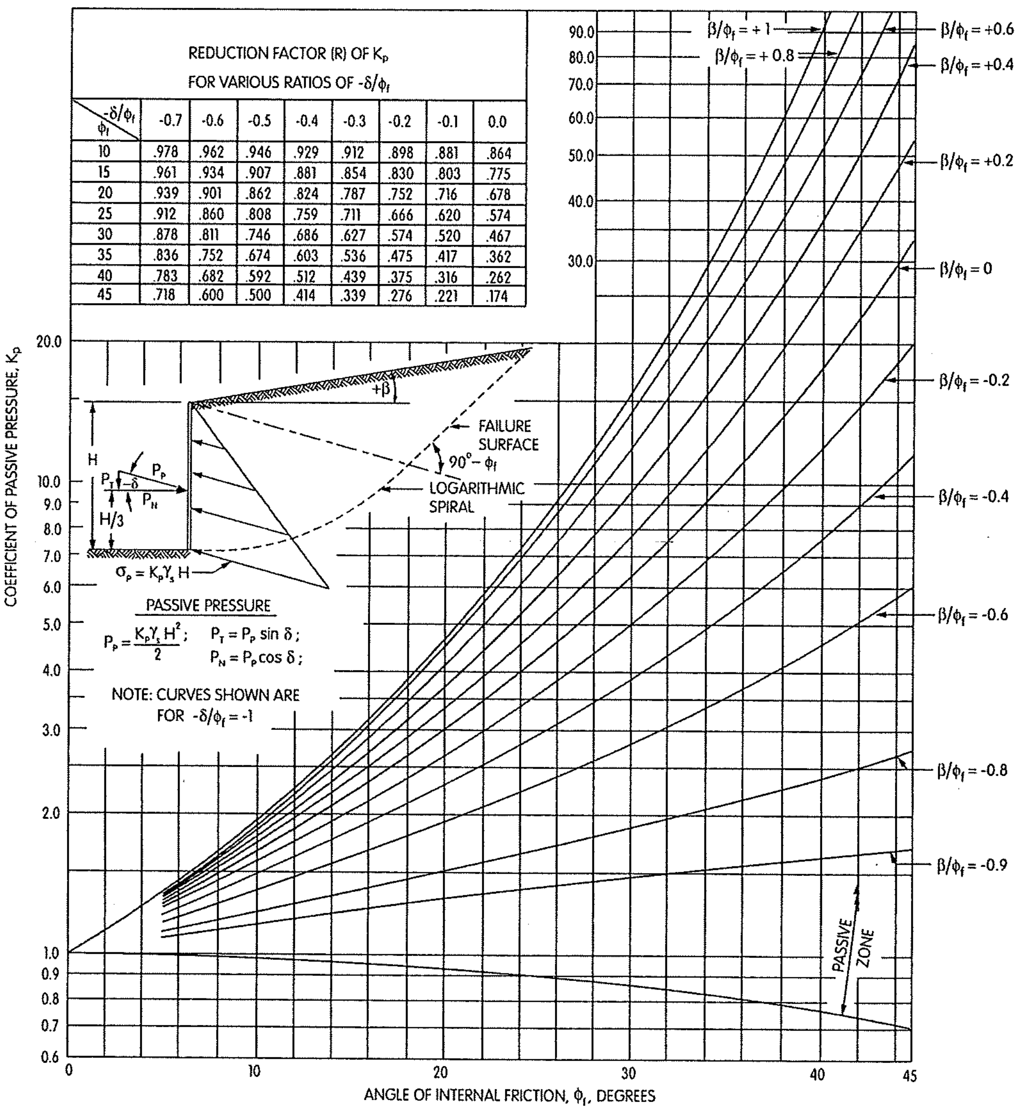
For cohesive soils, passive lateral earth pressures may be estimated by:

$$P_p = k_p \gamma_s z + 2c(k_p)^{0.5} \qquad (5.5.5.4\text{-}1)$$

where:

P_p = passive lateral earth pressure (KSF)
γ_s = unit weight of soil (KCF)
z = depth below surface of soil (FT)
c = unit cohesion (KSF)

k_p = coefficient of passive lateral earth pressure specified in Figures 5.5.5.4-1 and 5.5.5.4-2, as appropriate.



REDUCTION FACTOR (R) OF K_p FOR VARIOUS RATIOS OF $-\delta/\phi_f$

ϕ_f \ $-\delta/\phi_f$	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0.0
10	.978	.962	.946	.929	.912	.898	.881	.864
15	.961	.934	.907	.881	.854	.830	.803	.775
20	.939	.901	.862	.824	.787	.752	.716	.678
25	.912	.860	.808	.759	.711	.666	.620	.574
30	.878	.811	.746	.686	.627	.574	.520	.467
35	.836	.752	.674	.603	.536	.475	.417	.362
40	.783	.682	.592	.512	.439	.375	.316	.262
45	.718	.600	.500	.414	.339	.276	.221	.174

Figure 5.5.5.4-2 Coefficient of Passive Lateral Earth Pressure for Vertical Walls with Sloping Backfill (Caquot and Kerisel Analysis), Modified after U.S. Department of Navy (1971)

APPENDIX D

<u>PALMETTO AVE UC (WIDEN)</u>
CHICO-99 AUXILIARY LANE, PHASE 2 & 3
DRAFT FOUNDATION REPORT
REVIEW COMMENTS

03-3A0421 10-9-08
03-But-99

To: Tim Osterkamp – Quincy Engineering, Sacramento
From: Eric Fredrickson – Special Funded Projects, Structures 916-227-8916

ADDITIONAL COMMENTS TO GEOTECHNICAL SERVICES' COMMENTS, DATED 10-24-08. PLEASE FORWARD ALL COMMENTS TO PARIKH CONSULTANTS, INC.

Cover Page
- Revise "BUTT" to "BUT" on all titles.
- Revise District "04" to "03", all locations.

Page 7
- Seismic Design Criteria – Should include information for "M=6.5, +/- 0.25".
- 4. ARS Design Curve – Clarify if "<u>Modified</u> Figure B-7" has "<u>no modifications</u>".

Page 10
- Table 5 – Verify Design Tip and Specified Tip elevations shown.

Page 13
- 9.6 – Verify where new embankment is, and is not being planned (southbound-no, northbound-yes with retaining walls).

General
- Do you need any discussion about difficult pile driving and related vibrations or noise?

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SERVICES

TO: MR. ERIC FREDRICKSON
Office of Special Funded Projects (OSFP)
Division of Engineering Services

DATE: October 24, 2008

FILE: 03 (District) BUT (County) 99 (Route) 22.4 (Post Mile)

FDN REPORT BY: PARIKH DATED: 10/2008 Palmetto Avenue UC (Widen) (Structure Name)

GENERAL PLAN DATED: 9/19/08 FDN PLAN DATED: 9/19/08 03-3A0421 (EA Number) 12-0152L (Bridge Number)

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other: Type: DraftFR

The Office of Geotechnical Design – North has completed its review of the following documents:

(a) The Draft Foundation Investigations for the Palmetto Avenue UC (Widen) (Bridge No. 12-0152L). This report, dated September 2008, was prepared by PARIKH Consultants Inc. for Quincy Engineering Inc.

(b) Contract Plans consisting of General Plan, Foundation Plan, Abutment and Pier Layout and Detail Plans, dated September 19, 2008.

(c) Log of Test Borings for Palmetto Avenue UC (Widen) (Bridge No. 12-0152L), dated September 19, 2008, and As-Built Log of Test Borings for Palmetto Avenue UC (Widen) (Bridge No. 12-0152L), dated January 12, 1961..

1. Please include Post Mile and EA number in all the report pages including the report cover sheet. Additionally, Post Mile and EA number shall be included in title blocks of figures 1 thru 6

2. Please explain on Table 4, Pile Data Table (Abutment), the values obtained on the column titled "LRFD Service-I Limit State Total Load (kips) per pile." These values appear to be inconsistent with those of Table 3 (Foundation Design Loads).

3. In table 5, Pile Data Table (Piers), the values in the Specified Tip column are not stated in the Design Tip Elevation column. Please explain your criteria for obtaining such values. According to your calculations in Appendix C the current design tip elevations were calculated for a strength limit compression load of 280 kips. This value does not seem to be consistent with those of Table 5.

4. Please show the calculations for the Nominal Driving Resistance Required values shown in Tables 4 and 5.

5. Please revise soil descriptions stated in the Log of Test Boring to conform the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007.

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SERVICES

TO: MR. ERIC FREDRICKSON
Office of Special Funded Projects (OSFP)
Division of Engineering Services

DATE: October 24, 2008

FILE: 03 (District) BUT (County) 99 (Route) 22.4 (Post Mile)

FDN REPORT BY: PARIKH Consultants, Inc DATED: 10/08 Palmetto Avenue UC (Widen) (Structure Name)

GENERAL PLAN DATED: 9/19/08 FDN PLAN DATED: 9/19/08 03-3A0421 (EA Number) 12-0152L (Bridge Number)

6. Please follow the quality control/assurance process established in Appendix C of the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007. The LOTB check is to be completed by an independent checker, not the field investigator or registered professional signing the LOTB. The completed LOTB Sheet Checklist and Signature Sheet shall be completed and placed in the geotechnical project file, and a copy sent to the Geotechnical Services Corporate Unit. The following procedural documents discussed above and their web links are provided below for your convenience:

   Quality control procedures:
   http://www.dot.ca.gov/hq/esc/geotech/requests/logging_manual/MEMO_all_staff_LOTB_QMP_07012007.pdf

   Documentation of the quality control procedures:
   http://www.dot.ca.gov/hq/esc/geotech/requests/logging_manual/LOTB_Quality_Checklist_07012007.pdf

   If you feel that the LOTB should be exempt from the procedures stated in the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007, please visit the following web link:
   http://www.dot.ca.gov/hq/esc/geotech/requests/logging_manual/Exception_Process.pdf

   The request for exemption form is found in the following web link:
   http://www.dot.ca.gov/hq/esc/geotech/requests/logging_manual/Exception_Request_Form.pdf

Please do not hesitate to call Luis Paredes-Mejia at (916) 227-1047 for further clarification of these or other issues.

Approval: (C3) Not Approved (Resubmittal to OGDN Required)

Office of Special Funded Projects (OSFP)

Luis M. Paredes-Mejia. 10/24/08
Geotechnical Design Branch – North

Cc: OGS (Sacramento) DES Specifications and Estimates Branch (All Reviews) OSC R.E Pending File

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.PLM
December 14, 2009

Attn: Ms. Carolyn Davis

Sub: Chico-99 Auxiliary Lane, Phase 2 & 3
Palmetto Avenue UC (Bridge No. 12-152 R/L)
Chico, California
03-BUT-99 PM 32.4-33.28 EA 03-3A0421

Ref: 1. Foundation Investigation Report (Draft) dated September 2008
2. Caltrans' Comments dated October 9, 2008
3. Caltrans' Comments dated October 24, 2008

Dear Ms. Carolyn Davis:

Following are our responses to the comments by Caltrans on the referenced report. We have listed the comments and responses for convenience:

October 9, 2008

Cover Page

Comment 1: Revise "BUTT" to "BUT" on all titles.

Response 1: Comment will be incorporated. "BUTT" will be revised to "BUT".

Comment 2: Revise District "04" to "03", all locations.

Response 2: Comment will be incorporated. The District number will be changed to 03.

Page 7

Comment 3: Seismic Design Criteria – Should include information for "M=6.5, +/- 0.25".

Response 3: Comment will be incorporated. "M=6.5, +/- 0.25" will be referred in this section.

Comment 4: 4. ARS Curve – Clarify if "Modified Figure B-7" has "no modifications".

Response 4: Comment will be incorporated. "Figure B-7" has no modification. This has been changed in the report.

Page 10

Comment 5: Table 5 – Verify Specified Tip with Design Tip elevations.

Response 5: The foundation system of Piers 2 and 3 had been changed from pile foundation to spread footing as requested by Quincy Engineering, Inc. This comment is not applicable to the new foundation system.

Page 13

Comment 6: 9.6 – Verify where new embankment is, and is not being planned (southbound-no, northbound-yes with retaining walls).

Response 6: Comment noted. Sliver fill retained by retaining wall is required for the widening of the existing embankment. No new embankment is being planned .

General

Comment 7: Do you need any discussion about difficult pile driving and related vibrations or noises?

Response 7: Comment will be incorporated. Driving of the pile will be discussed in the report.

October 24, 2008

Comment 1: Please include Post Mile and EA number in all the report pages including the report cover sheet. Additionally, Post Mile and EA number shall be included in title blocks of figures 1 thru 6

Response 1: Comment will be incorporated. Post Mile and EA number will be included in all the report pages including the report cover sheet.

Comment 2: Please explain on Table 4, Pile Data Table (Abutment), the values obtained on the column titled "LRFD Service-I Limit State Total Load (kips) per pile." These values appear to be inconsistent with those of Table 3 (Foundation Design Load).

Response 2: Comment will be incorporated.

Comment 3: In Table 5, Pile Data Table (Piers), the values in the Specified Tip column are not stated in the Design Tip Elevation column. Please explain your criteria for obtaining such values. According to your calculations in Appendix C, the current design tip elevations were calculated for a strength limit compression load of 280 kips. This value does not seem to be consistent with those of Table 5.

Response 3: The pile tips should be determined based on the governing load rather than the pile classification based on the discussions between Caltrans and Quincy Engineering, Inc. However, similar to Response 2 above, this comment is not applicable for the spread footing at Piers 2 and 3.

Comment 4: Please show the calculations for the Nominal Driving Resistance Required values shown in Tables 4 and 5.

Response 4: Comment noted. Since all the penetrated soil layers contributed to the design resistance, the nominal driving resistance is assumed to be the same as the nominal resistance at the abutments. The calculations for the "Nominal Resistance" are shown in the "Pile Capacity Calculations/Lateral Pile Capacity Analyses" in Appendix C.

Comment 5: Please revise soil descriptions stated in the Log of Test Boring to conform the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007.

Response 5: Comment will be incorporated. The soil descriptions stated in the Log of Test Boring will be revised to conform to the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007.

Comment 6: Please follow the quality control/assurance process established in Appendix C of the Caltrans Soil & Rock Logging, Classification, and Presentation Manual dated June 2007. The LOTB check is to be completed by an independent checker, not the field investigator or registered professional signing the LOTB. The completed LOTB Sheet Checklist and Signature Sheet shall be completed and placed in the geotechnical project file, and a copy sent to the Geotechnical Services Corporate Unit. The following procedural documents discussed above and their web links are provided below for your convenience:

Response 6: Comment incorporated. The LOTB check is to be completed by an independent checker. The completed LOTB Sheet Checklist and Signature Sheet shall be completed and placed in the project file.

Please call if you have any questions on the above.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

No. 666
EXP. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

S: 202101\Bridge\202101BID FIR Response to Caltrans' Comments (12-09)

PARIKH

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Environmental ▪
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Construction Inspection ▪

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.PLM
February 22, 2010

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 1 to FOUNDATION INVESTIGATION REPORT
Palmetto Avenue Undercrossing (Widen) (Bridge No. 12-152 R/L)
Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 33.08 EA 03-3A0421

Ref: 1. Foundation Investigation Report dated December 2009

Dear Ms. Carolyn Davis:

The following are the changes made to the Foundation Investigation Report dated December 2009. This addendum addresses the foundation recommendation for the retaining walls behind Abutment 1 and 4.

Item 1: Page 8, 3rd Paragraph Section 9.3.1 Pile Design, "According to the designer, the planned pile cap/footing bottom elevations are Elve. +221 feet and +225 feet at Abutment 1 and Abutment 4."

Change to "According to the designer, the planned pile cap/footing bottom elevations are Elve. +221 feet and +225 feet at Abutment 1 and Abutment 4 and Elev. +221 feet at the retaining walls."

Item 2: Table 2 "Foundation Design Data" and Table 4 "Pile Data Table (Abutment)" were revised to include the foundation design data and pile data for retaining walls behind the abutments.

Copies of the excerpt of the Foundation Investigation Report with the relevant changes are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

S: On-going\2002\202101\Palmetto Ave. UC (Widen) Foundation Report dated December 2009 Addendum #1 and Caltrans Standard Specifications for Earthwork (Section 19). A representative from PARIKH or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill materials.

9.3 Bridge Foundation

Based on the available boring information and requirements for vertical and horizontal demands, it is recommended that Standard Steel H-piles (HP 14x89) be used at Abutments 1, Abutment 4 and retaining walls and spread footing at Pier 2 and Pier 3. Due to anticipated hard driving conditions, driving shoes are recommended for the H-piles.

9.3.1 Pile Design

According to the designer, the planned pile cap/ footing bottom elevations are Elev. +221 feet and +225 feet at Abutment 1 and Abutment 4 and Elev. + 221 feet at the retaining walls. Pertinent foundation design information provided by the designer for the pile design is presented in the following tables (Foundation Design Data and Foundation Design Loads).

TABLE 2: FOUNDATION DESIGN DATA

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement (in)	No. of Piles per Support
					B	L		
Abut 1 Step 1	WSD	HP 14x89	~230.0±	225.0	7	6/11	1	2/4
Abut 1 Lt. Wall	LFD	HP 14x89	~227.5±	221.0	8'-3"	27'-8"	1	9
Abut 1 Step 2	WSD	HP 14x89	~227.5±	221.0	7	~5±/~8±	1	2/4
Abut 4 Step 1	WSD	HP 14x89	~230.0±	225.0	7	11/17	1	4/6
Abut 4 Rt. Wall	LFD	HP 14x89	~228.0±	221.0	8'-3"	16'-6"	1	5
Abut 4 Step 2	WSD	HP 14x89	~228.0±	221.0	7	~9.5±/~9±	1	4

TABLE 3: FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	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 Wall	750	110	580	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 4 Wall	390	110	310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The abutment foundations were evaluated for the foundation design data and loading condition using Caltrans November 2003 Bridge Design Specifications for foundations, using Working Stress Design (WSD) methods with "LRFD Service-I Loads".

The actual load demands on the piles at abutments, based upon WSD and LRFD are presented in Table 3 above. The estimated specified tip elevations for the anticipated design loading of the piles are shown in Table 4 below. The pile cut-off elevations are shown in Table 2.

TABLE 4: PILE DATA TABLE (ABUTMENT)

Location	Pile Type	Design Method (WSD or LRFD)	LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance (kips)
				Comp	Tens			
Abut 1 Step 1	HP 14x89	WSD	110	220	-	181.5 (a), 193.0 (c)	181.5	220
Abut 1 Lt. Wall	HP 14x89	LFD	-	100	17	198.0 (a), 207.5 (b), 198.0 (c)	198.0	100
Abut 1 Step 2	HP 14x89	WSD	110	220	-	181.5 (a), 193.0 (c)	181.5	220
Abut 4 Step 1	HP 14x89	WSD	110	220	-	183.0 (a), 192.5 (c)	183.0	220
Abut 4 Rt. Wall	HP 14x89	LFD	-	100	23	199.5 (a), 207.0 (b), 199.5 (c)	199.5	100
Abut 4 Step 2	HP 14x89	WSD	110	220	-	183.0 (a), 192.5 (c)	183.0	220

Notes

1. Design tip elevations are controlled by (a) Compression, (b) Tension, (c) Lateral Load.
2. The specified tip elevation shall not be raised above the design tip elevations from lateral load (i.e. Elev. + 193.0 feet at Abutment 1 and Elev. +192.5 feet at Abutment 4 as shown in Table 4 above).

The pile capacity estimation is based on procedures outlined by U.S. Army Corps of Engineers. Only skin friction was considered in the pile capacity calculations. Based on Pile Data Table 4, the pile tip elevations are controlled by the demand in compression on the pile. The assumed soil profiles with strength parameters and pile capacity calculations are provided in Appendix C.

The design tip elevations and specified tip elevations are based on the planned footing bottom elevations provided by the designer. In the event that the footing bottom elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity. A "P-Y Curve Modification Factor" of 0.6 should be adopted in the lateral pile analysis for pile spacing of 3 times the pile diameter.

GEOTECHNICAL DESIGN & MATERIALS REPORT

CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CALIFORNIA
CU 03199, EA 03-3A0421, 03-BUT-99 R32.44/R33.28

For

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95827-2512

PARIKH CONSULTANTS, INC.
2360 Qume Drive, Suite A, San Jose, CA 95131
(408) 452-9000

February 2009

Job No. 202101.GDR

PARIKH

Practicing in the Geosciences

Geotechnical ▪
Environmental ▪
Materials Testing ▪
Construction Inspection ▪

QUNICY ENGINEERING, INC.
3247 Ramos Circle
Sacramento, CA 95827-2512

Job No.: 202101.GDR
February 6, 2009

Attn: Ms. Carolyn Davis:

Sub: GEOTECHNICAL DESIGN & MATERIALS REPORT
Chico SR 99 Auxiliary Lane Project, Chico, California
03-BUT-99 R32.44/R33.28, EA 03-3A0421

Dear Ms. Carolyn Davis:

Transmitted herewith is the Geotechnical Design & Materials Report for the subject project. The report was prepared in accordance with the scope of work outlined in our proposal. The report has incorporated Caltrans' review comments.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning our findings or conclusions, please feel free to contact this office at (408) 452-9000.

Very truly yours,
PARIKH CONSULTANTS, INC.

Gary Parikh, P.E., G.E., 666
Project Manager

Attachment: Geotechnical Design & Materials Report

"Approved as to impact on State facilities and conformance with applicable State standards and practices, and the technical oversight were performed as described in the California Department of Transportation A&E Consultant Services Manual."

Caltrans____

Title____

Date____

Caltrans____

Title____

Date____

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GEOTECHNICAL DESIGN & MATERIALS REPORT
CHICO SR 99 AUXILIARY LANE PROJECT, CHICO, CALIFORNIA
03-BUT-99, R32.44/R33.28 EA 03-3A0421

1. INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the proposed "Chico SR 99 Auxiliary Lane Project" in Chico, California, hereinafter referred to as "PROJECT". The work was performed in general accordance with the scope of work outlined in our proposal to Quincy Engineering, Inc. (Designer). The general location of the project site and its vicinity are shown in the Project Location Map, Plate 1.

This report addresses geotechnical design recommendations for earth retaining systems, soundwalls, culverts and structural pavement sections. The investigation included review of readily available soil and geologic literature pertaining to the site including as-built information and as-built Log of Test Borings (LOTB), site reconnaissance, obtaining representative soil samples and logging soil materials encountered in exploratory borings, laboratory testing of the representative soil samples, performing engineering analyses, and preparation of this report.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions, if any. Separate Foundation Investigation Reports for the Bidwell Park Viaduct (Widen) and Palmetto Avenue Undercrossing (Widen) are prepared by PARIKH Consultants, Inc. (PARIKH).

This report is intended for use by the project roadway design engineer, construction personnel, bidders and contractors for information and reference purposes only and should not be construed as project specifications.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the subsurface soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain a properly constructed project. We, therefore, recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

2. EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

Existing Facilities

The proposed project is located in the City of Chico in Butte County. The existing facility for this segment of State Route (SR) 99 was constructed by Caltrans, and is a north-south freeway with 2 lanes in each direction. There are two existing bridge structures, Palmetto Avenue Undercrossing (UC) (Bridge No. 12-0152 R/L) and Bidwell Park Viaduct (Bridge No. 12-151 R/L) within the project limits.

The entire SR 99 within the project limits is built on embankment that ranges between 20 to 25 feet in height. The elevations along the edge of the existing pavement in both northbound (NB) and southbound (SB) direction (at the locations of proposed soundwall) are between Elev. +233.7 feet and Elev. +237.5 feet. The existing toes of the embankment vary from approximate Elev. +212.0 feet to Elev. +217.5 feet.

The existing embankment slope is approximately 2(H): 1(V) or flatter. There is a maintenance access between the toe of the existing embankment and the residential properties. Tall trees, low bushes and grass cover the embankment slopes. Overhead power and/or other utility lines exist along East 1st Avenue, Palmetto, Vallombrosa and Filbert Ave.

Big Chico Creek passes under the Bidwell Park Viaduct within the project limits.

Proposed Improvements

The Butte County Association of Governments (BCAG), in cooperation with California Department of Transportation (Caltrans), proposes to improve the traffic operations on a portion of SR 99 in the Chico urbanized area. The improvement is to construct auxiliary lanes between the SR 32 Interchange and East 1st Avenue Interchange; and improve the interchange ramps to accommodate the auxiliary lane; improve the sight distance; and improve operations at the ramp intersections. As part of the improvements the Bidwell Park Viaduct and the Palmetto Avenue UC will be widened to accommodate the auxiliary lanes and the ramp connections. Both bridge structures will be widened to the inside and outside. Outside widenings will also incorporate the retaining walls and soundwalls.

This project would consist of adding NB and SB auxiliary lanes on SR 99 between SR 32 and East 1st Avenue interchanges. Upon the project completion, there will be two lanes for through traffic, one auxiliary lane and inside and outside shoulders in each direction. This project is divided into 3 different phases (Phases 1 through 3) as described below:

Phase 1 – This phase is under construction. The NB off-ramp to East 1st Avenue will be widened to two left-turn lanes and one right-turn lane at the ramp intersection. A retaining wall (constructed to support a future soundwall) will retain the embankment for the ramp widening and East 1st Avenue will be widened. Geotechnical recommendations for this phase is include in PARIKH's Geotechnical Design and Materials Report dated July 2006.

Phase 2 – Construction of the NB SR 99 on-ramp from SR 32, the NB auxiliary lane and the remainder of the NB SR 99 off-ramp to East 1st Avenue. This phase includes the inside and outside widening of all structures.

Phase 3 – Construction of the SB SR 99 on-ramp from East 1st Avenue, the SB auxiliary lane and the SB SR 99 off-ramp at SR 32.

The work includes in Phases 2 and 3 may be adjusted according to available construction funds.

Site Plans (Plates 2A and 2B) based on the layout plan provided by the designer are included in this report to show the existing facilities, proposed improvements, and boring locations.

Bridge Structures

- Outside and median widening of Bidwell Park Viaduct;
- Outside and median widening of Palmetto Avenue UC.

Earth Retaining System at the Following Locations

- SR 32 SB Off-Ramp;
- SR 32 NB On-ramp;
- East 1st Avenue SB On-Ramp;
- SR 99 NB South of Palmetto Ave. UC;
- Extension of the retaining wall between Palmetto Avenue and the northbound off-ramp.

Minor Structures

- Soundwall in NB and SB directions

  - On Bidwell Park Viaduct
  - On Palmetto Avenue Undercrossing
  - On existing embankment
  - On retaining walls at NB off-ramp and SB on-ramp
- Overhead Signpost Structure.

Based on the plan, the project will require a relatively small amount of sliver fill for the roadway widening of SR 99 and widening of the on-ramps and off-ramps. Bidwell Park Viaduct (Widen) and Palmetto Avenue UC (Widen) are also included in this project. The proposed side slopes will have a gradient of 2(H): 1(V) or flatter.

Our recommendations presented in this report are based on the above information. Any major deviation should be reported to our office for consideration.

3. PERTINENT REPORTS AND INVESTIGATION

In addition to the field explorations, we referred to the following available investigation reports and as-built information:

- "Geotechnical Engineering Investigation Report for State Route 99 Auxiliary Lane Project Phase 1 – East 1st Avenue Northbound Off-Ramp" July 2006 by PARIKH
- LOTB of Bidwell Park Viaduct (Bridge No. 12-151 R/L) dated October 1960
- LOTB of Palmetto Ave. UC (Bridge No. 12-52) dated April 1969

4. PHYSICAL SETTING

4.1 Climate

The project site is located on the southwest side of Northern Sacramento Valley of California. The climate of the project site is influenced by the Mediterranean Climate, humid summer and fairly mild winter. The temperature ranges in the project vicinity are from 58 °F to 94 °F in summer and from 38 °F to 56 °F in winter. The annual precipitation averages about 25.8 inches a year with about 92% of the total precipitation falling between October and April.

4.2 Topography

The regional terrain gently slopes towards the southwest (less than 1% slope). The overall project site may be considered as relatively level. Based on the available plan, original ground elevation in the area of the proposed project ranged between +210 feet and +220 feet. Along the existing facility, the grade has been raised by approximately 20 to 25 feet due to roadway embankment.

4.3 Surface Drainage

The project site is located near the southern end of the Big Chico Creek Watershed. The Big Chico Creek drains the western slope of the Sierra Nevada from an elevation of 5400 feet to the Sacramento River. The watershed includes four tributaries: Rock Creek, Mud Creek, Sycamore Creek, and Lindo Channel. Mud Creek eventually unites with Big Chico Creek shortly before it enters the Sacramento River. Chico is Big Chico Creek's largest urbanized area.

4.4 Man-Made and Natural Features of Engineering and Construction Significance

The subject was considered and was determined to be not applicable to the project.

4.5 Regional Geology and Seismicity

The Chico Monocline is a complexly faulted northwest-trending, southwest-dipping flexure that extends about 47 miles along the northeast side of the Sacramento Valley from Chico to Red Bluff, California. It coincides approximately with the contact between volcanic rocks and interbedded sedimentary rocks of the Pliocene Tuscan Formation to the east and a variety of quaternary alluvial units of the northern Sacramento Valley to the west.

A Fault Map, showing the site location relative to the major active faults in the vicinity, is presented on Plate 4.

5. EXPLORATION

5.1 Drilling and Sampling

Based on the discussions with the designer, and readily available geotechnical data in the vicinity of the project area, a total of twenty-four borings were drilled along SR

99 between SR 32 and East 1st Avenue in March 2008. Following is the discussion on the exploration program:

- Eight borings (BID-1 through BID-6 and PLM-1 and PLM-2) were drilled to the depths between 60 feet and 70 feet. These borings were drilled for the design of outside and median widening of Bidwell Park Viaduct and Palmetto Avenue UC.

- Sixteen borings (Borings RW-1 through RW-21, except Borings RW-3, SW-12, SW-13, SW-14 and SW-19 which were deleted and not used) were drilled to the depths between 28 feet and 50 feet for the design of retaining walls, retaining wall supporting soundwall and soundwalls.

- Bulk samples collected from Borings SW-16 and SW-18 were tested for the R-Value for the structural pavement design.

The approximate locations of these borings are shown on the attached Site Plans (Plates 2A and 2B). The as-built Log of Test Borings (LOTB) of the Bidwell Park Viaduct and Palmetto Avenue UC are included in Appendix A.

All the soil borings were drilled with truck-mounted and track-mounted drill rigs using an 8-inch diameter hollow stem auger drilling method.

The borings were drilled under the technical supervision of our engineer, who classified and continuously logged the soils encountered during drilling and supervised the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples were obtained during drilling by driving a 2.5-inch Inside Diameter (I.D.) Modified California sampler or a 1.375-inch I.D. Standard Penetration Test sampler into the subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the LOTB, Appendix A. The boring locations and stations are summarized in Table 1 below.

The descriptions of the soil materials encountered in the exploratory borings and relevant boring information are presented in the LOTB attached in Appendix A. The laboratory test methods and results are presented in Appendix B. The logs presented in Appendix A were prepared from the field logs which were edited after visual re-examination of the soil samples in the laboratory and results of classification tests on selected soil samples as indicated on the LOTB.

TABLE 1A: SUMMARY OF BORINGS (FOR PAVEMENT DESIGN AND ROADWAY)

Boring No.	Station (ft)	Offset (ft)	Boring Depth (ft)	Approx. Ground Elev. (ft)	Approx. Groundwater Elev. (ft)	Soil Description
SW-16	"D" Line 23+00	38 Rt.	30.5	235.0	-	Lean Clay with Gravel
SW-18	"D" Line 17+06	40 Rt.	30.0	235.0	-	Lean Clay with Gravel

Note: No groundwater was encountered in the above borings.

TABLE 1B: SUMMARY OF BORINGS (FOR RETAINING WALLS and SOUNDWALLS)

Boring No.	Station (ft)	Offset (ft)	Boring Depth (ft)	Approx. Ground Elev. (ft)	Approximate. Groundwater Elev. (ft)
RW-1	"SBOFF" Line 562+01	34 Lt.	51.5	223.0	-
RW-2	"SBOFF" Line 565+09	32 Lt.	51.5	228.0	199.0
SW-4	" D" Line 14+35	38 Lt.	31.0	234.0	205.0
SW-5	" D" Line 17+75	40 Lt.	28.0	234.0	-
SW-6	" D" Line 21+00	38 Lt.	31.0	235.0	-
SW-7	" D" Line 23+85	30 Lt.	31.0	235.0	-
SW-8	" D" Line 27+20	41 Lt.	31.0	235.0	-
RW/SW-9	"SBON" Line 31+99	38 Lt.	50.0	222.0	212.0
RW/SW-10	"SBON" Line 34+93	38 Lt.	48.0	220.0	215.0
SW-11	"SBON" Line 38+27	40 Lt.	32.0	215.0	205.0
SW-15	" D" Line 25+75	39 Rt.	31.0	234.0	-
SW-16	" D" Line 23+00	38 Rt.	30.5	235.0	-
SW-17	" D" Line 19+35	38 Rt.	30.0	235.0	-
SW-18	" D" Line 17+06	40 Rt.	30.0	235.0	-
RW-20A	"NBON" Line 565+05	31 Rt.	50.0	220.0	-
RW-21	"NBON" Line 561+95	39 Rt.	50.0	216.0	-

TABLE 1C: SUMMARY OF BORINGS (FOR BRIDGE STRUCTURES)

Boring No.	Station (ft)	Offset (ft)	Boring Depth (ft)	Approx. Ground Elev. (ft)	Approximate. Groundwater Elev. (ft)
BID-1	" C" Line 567+03	67 Lt.	60.0	214.0	-
BID-2	" C" Line 566+50	52 Rt.	60.0	216.5	-
BID-3	" C" Line 568+54	67	60.0	215.0	-
BID-4	"C" Line 571+00	0	60.0	215.0	208.0
BID-5	"C" Line 572+03	40 Lt.	70.0	216.0	-
BID-6	"C" Line 572+54	43 Rt.	60.0	216.5	-
PLM-1	"D" Line 28+30	87 Lt.	70.0	215.0	-
PLM-2	"D" Line 29+81	87 Rt.	60.0	215.0	203.0

5.2 Geologic Mapping

Based on the "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California (D.S. Harwood, E.J. Helley and M.P. Doukas, 1981; Scale 1:62,500; USGS Map I-1238), the geology of the project site can be generally mapped as gravel, sand, silt and clay derived from Tuscan Formation.

5.3 Geophysical Studies

The subject was considered and was determined to be not applicable to the project.

5.4 Instrumentation

The subject was considered and was determined to be not applicable to the project.

5.5 Exploration Notes

Hard drilling (within the dense to very dense sands/gravels) was generally encountered at depths between 10 feet and 30 feet for all the borings, other than the borings within the embankment, along the project alignment. Hard drilling was encountered at a depth between 14 feet and 15 feet in Boring RW-20 (south side of Big Chico Creek) and the boring was relocated to location of RW-20A. Boring BID-3 was terminated at a depth of 5 feet because the auger was deflected by the presence of cobbles or boulders.

6. GEOTECHNICAL TESTING

6.1 In-Situ Testing

In-situ testing consists of recording blow counts during sampling in the field. The soil samples were obtained during drilling by driving a 2.5-inch I.D. Modified California sampler or a 1.375-inch I.D. Standard Penetration Test (SPT) Sampler into the subsurface soils under the impact of a 140-lb hammer falling through 30 inches. Based on our previous experience, when correlating standard penetration data in similar soils, the blow counts for the Modified California Sampler can be taken as roughly 2 times that for the Standard Penetration Test in similar soils. The field blow counts (SPT-N values) typically ranged from 4 to "Practically Refusal". From the average value of the SPT-N value for various soil materials encountered in the field exploration, the subsurface soils are generally soft to hard for the clays/silt and loose to very dense for the sands/gravels.

6.2 Laboratory Testing

Laboratory tests performed for the study include the following: Laboratory determination of Moisture-Density (California Test Method T226), Atterberg Limits (California Test Method T204), Grain Size Distribution Analysis (California Test Method T203), Unconfined Compression Test (California Test Method T221), R-value Test (California Test Method T301), Corrosion Test (California Test Method T643). The laboratory test results are contained in Appendix B.

Based on the laboratory test results, the natural moisture content of the soil samples ranged from a minimum value of 2% for the sand to a maximum value of approximately 60% for the clays. Laboratory unconfined compression test results are presented on the LOTB at the appropriate sample depths.

7. GEOTECHNICAL CONDITIONS

7.1 Site Geology

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento

Valley, California (D.S. Harwood, E.J. Helley and M.P. Doukas, 1981; Scale 1:62,500; USGS Map I-1238). Based on the map, the project site subsurface soils consist of the upper member of the Pleistocene Modesto Formation (Qmu). In the vicinity of the project, Holocene Basin Deposits (Qb) and Pleistocene Red Bluff Formation (Qrb) can also be found. A geologic map of the general project area is shown on Plate 3. Descriptions of the primary geologic units are as follows:

Qmu – Modesto Formation – Upper Member (Pleistocene). Gravel, sand and clay derived from the Tuscan Formation and from rocks of the Coast Ranges and Klamath Mountain.

Qb – Basin Deposits (Holocene). Fine grained silt and clay derived from the same sources as alluvial deposits but laid down in low-lying overflow flood basins between modern watercourses.

Qrb – Red Bluff Formation (Pleistocene). The vicinity of the Chico Monocline, consists of very coarse red gravel with minor amounts of interstratified sand and silt, all derived from the Tuscan Formation.

7.1.1 Lithology

The geological unit present at the project site consists of mainly the Modesto Formation. The subject was considered and was determined to be not applicable for the project.

7.1.2 Structure

The fault that is closest to the project site is Bear Mountain Fault Zone, which is a normal fault. The structures of the geological units such as bedding, folds, fracture, jointing, and foliation had been considered and were determined to be not applicable for the project.

7.1.3 Existing Slope Stability

The existing slopes at the project site consist of embankment slopes on both sides of SR 99. The existing slopes are relatively gentle with established trees and vegetation and appear to be in an acceptable condition. Based on the field review, no slope instability was observed.

7.2 Subsurface Soil Conditions

Based on the available boring information, the embankment fill is comprised mainly of stiff to hard sandy lean clay/lean clay/lean clay with gravel. Medium dense to dense silty/clayey gravels were encountered underneath the clay in Boring SW-5. The native soils underneath the embankment fill generally consist of 3 to 30 feet of firm to very stiff lean clay/ silt and/or loose to medium dense clayey sand/silty sand/poorly graded sand, underlain by 5 to 40 feet of very dense sand and gravel. Stiff to hard lean clays were encountered at greater depths interbedded with medium dense to very dense sand and gravel (except the soft to firm lean clay and loose sand layers encountered in Borings RW/SW-10, BID-1, BID-2 and BID-5). Bedrock was not encountered during the field exploration program. The results of the field exploration in March 2008 are in general agreement with the as-built LOTB.

Groundwater was encountered in some of the borings at depths between 5 feet and 29 feet (equivalent to elevations between Elev. +199 feet and Elev. +215 feet) as shown in Tables 1B and 1C. Groundwater conditions at the project site are described in Section 7.3.2.

Detailed descriptions of the materials encountered in the exploratory borings are presented in the LOTB in Appendix A. It should be noted that these descriptions and related information depict subsurface conditions only at the locations indicated and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock, general subsurface conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational, and relatively minor changes in soil types within a stratum may not be noted due to field limitations. Also, the passage of time may result in a change in the soil conditions at the locations due to environmental changes.

7.3 Water

7.3.1 Surface Water

The terrain at the project site gently slopes towards the west, and the surface water /drainage sheet flows towards the west.

7.3.1.1 Scour

Scour analyses included in the hydraulic study shows pier scour is anticipated to be generally minimal (except at Piers 4 and 5), as majority of the piers are located away from the low flow channel. Big Chico Creek has a low flow rate and existing piers appear to have minor scour issues.

The estimated total scour is 6 feet (contraction scour of 0.5 feet and local scour of 5.5 feet) at Piers 4 and 5 according to the designer. The scour elevation was assumed to be +209 feet in the calculations of bearing capacity at Piers 4 and 5. Riprap will be provided at Piers 4 and 5 for scour protection.

7.3.1.2 Erosion

The existing slopes have established landscaping to help control erosion. The subject was considered and was determined to be not applicable for the project. It is recommended that construction of the proposed project be undertaken during the dry season.

7.3.2 Groundwater

Groundwater was encountered between the depths of 5 feet and 29 feet (between Elev. +199.0 feet and Elev. +215 feet) in the borings as shown in Tables 1B and 1C during field exploration in March 2008.

It is anticipated that groundwater level will vary with the passage of time due to seasonal groundwater fluctuations, surface and subsurface flow, ground surface run-off, water level in the adjacent Big Chico Creek and/or other creeks in the area, as well as other environmental factors that may not be present at the time of our investigation.

7.4 Project Site Seismicity

7.4.1 Ground Motions

The project site is located in a seismically active part of northern California. Two primary fault systems exist in the vicinity of Butte County. These faults may cause moderate ground-shaking at the project site. The Fault Map, Plate 4 presents the locations of the fault systems relative to the project site.

Maximum credible earthquake magnitudes for some of the major faults in the area determined by Mualchin (California Seismic Hazard Map 1996) and peak rock accelerations are summarized in Table 2 below. These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

TABLE 2:EARTHQUAKE DATA

Fault	Estimated Distance from Project Site (Mile)	Maximum Credible Earthquake (MCE)	Peak Bedrock Acceleration (PBA) (g)	Peak Ground Acceleration (PGA) (g)
Bear Mountain Fault Zone (Normal)	22.2	6.5	0.2	0.3
Green Valley Fault 1 (Reverse)	26.2	6.7	0.2	0.3

7.4.2 Ground Rupture

Since no active faults pass through the site, the potential for fault rupture is low.

8. GEOTECHNICAL ANALYSES AND DESIGN

8.1 Dynamic Analysis

8.1.1 Parameter Selection

According to Caltrans Guidelines for Structures Foundation Report (March 2006), the value of PBA (for a specific project site) from the seismic hazard map should be calculated using the attenuation relation by Sadigh et al. (1997). Based on Sadigh attenuation relation, the maximum PBA anticipated within the project limit is 0.2 g.

Based on the available boring information in the vicinity of the project site, the subsurface soil conditions at the project site generally matches the criteria for Soil Type D, as per Caltrans Seismic Design Criteria (Version 1.4, June 2006). Based on Caltrans Seismic Design Criteria and the above information, the seismic design criteria are as follows:

1. Closest Distance to Fault = 22.2 miles
2. PBA = 0.2 g
3. Design ARS Curve = Caltrans Seismic Design Criteria June 2006 Version 1.4 Figure B.8 (Soil Profile Type D) with no modification.

A copy of the ARS Design Curve is included on Plate No. 5 of this report. The calculation for attenuation relationship based on Sadigh is included in Appendix C.

8.1.2 Analysis

Based on the "Typical Cross Section", both cut and sliver fill will be required for the roadway widening. The proposed gradient of the newly formed slope is 2(H): 1(V) or flatter. The stability of the cut and sliver fill will be discussed in Section 8.2.1.

8.1.3 Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on the field boring log and available data, the native soils generally consist of firm to very stiff lean clay/ silt and/or loose to medium dense clayey sand/silty sand/poorly graded sand, underlain by very dense sand and gravel. Stiff to hard lean clays were encountered at greater depths interbedded with medium to very dense sand and gravel (except the soft to firm lean clay and loose sand layers encountered in Borings RW/SW-10, BID-1, BID-2 and BID-5). Groundwater was encountered at the depths between 5 feet and 29 feet during drilling in March 2008.

Generally, the liquefaction potential at the proposed project site is considered to be relatively low. However, relatively thin lenses/pockets/layers of loose to medium dense sand were encountered in some of the borings.

Analyses of the liquefaction potential of the loose to medium dense sand deposits were analyzed based on Borings RW -2, SW-4, RW/SW-9, RW/SW-10 and RW/SW-11. The analyses were performed using the procedure developed by Seed and Idriss (1982) for a magnitude 6½ Earthquake, on the nearby Bear Mountain Fault Zone, resulting in a peak ground acceleration of about 0.3 g. This method compares the estimates of the earthquake-induced shear stress to the susceptibility of soil liquefaction. Based on the results of the analyses, it appears that the liquefaction potential at the project site is anticipated to be relatively low.

8.2 Cuts and Excavations

Based on the "Typical Cross Sections" provided by the designer, minor cut (estimated to be less than 5 feet) at a gradient of 1.5(H): 1(V) is anticipated between the mainline and the on-ramps and off-ramp.

8.2.1 Stability

The subject was considered and was determined to be not applicable for the project.

8.2.2 Rippability

The proposed cuts are anticipated to be in roadway embankment fill. Based on the investigation, rippability does not appear to be a concern for construction.

8.2.3 Grading Factor

Source of the fill may include the fill generated from the cuts (as long as the on-site native soil meets the project specifications) planned for the project. Fill may also be imported from outside borrow sources. The source of borrow is unknown at the time of report preparation. Based on previous experience, for preliminary estimate, a grading factor of 0.9 may be assumed for import materials.

8.3 Embankments

8.3.1 Evaluation of Embankment Settlements

There is no new embankment required for the proposed project. Only sliver fill will be placed at some locations for the on-ramps and off-ramp according to the "Typical Cross Sections" provided by the designer. Consolidation settlement due to the placement of the sliver fill should not be a geotechnical concern.

8.3.2 Evaluation of Embankment Stability

The existing slopes of the embankment along SR 99 are relatively gentle with estimated slope gradient between 2(H): 1(V) to 4(H): 1(V). Based on the "Typical Cross Sections" provided by the designer, the configuration of the existing slopes within the project limits remain apparently unchanged. The height of the slope will be reduced due to the construction of the proposed retaining walls along the on-ramps and off-ramp. In our opinion, the stability of the existing embankment slope should not be a geotechnical concern.

8.4 Earth Retaining System

It is our understanding that due to right-of-way and other geometric constraints, the project will require construction of four retaining walls. Information of approximate wall locations, type of walls, design loading cases, and maximum wall heights was provided by the designer and is summarized in Table 3.

TABLE 3: SUMMARY OF PROPOSED RETAINING WALLS

Wall No.	Wall Location	Wall Type	Design Loading Case	Location (Along approx. Sta.)	Wall Height (ft)	Top of Footing Elev. (ft)	Approx. Length (ft)	Supporting Soundwall
1	SR 32 NB On-ramp	MSE	1	"NBON" Line 559+75 to 566+00	8-22	213.0-215.5	625.0	No
2	SR 99 NB (S. of Palmetto Ave. UC)	Type 1	1	"D" Line 27+52.83 to 28+52.01	8-12	221.0-227.0	100.0	Yes
3	SR 32 SB Off-ramp	MSE	1	"SBOFF" Line 561+00 to 565+98.89	8-16	217.0-222.5	500.0	No
4	East 1st Ave. SB On-Ramp	MSE	1	"SBON" Line 29+70.49 to 36+00	8-18	212.5-222.5	629.5	Yes

- **Retaining Wall No. 1 SR 32 NB On-Ramp - "NBON" Line, 559+75 to 566+00**

This wall is to support the SR 32 northbound on-ramp to SR 99. The anticipated total wall length is 625 feet with a maximum height of 22 feet. Based on the boring data (08-RW-20A and 08-RW-21) in the vicinity of the proposed wall, the subsurface soil material at the anticipated footing subgrade generally consists of loose to medium dense sand/gravel/soft silt, underlain by very dense sand/gravel, underlain by medium dense sands/gravel/very stiff clays. No groundwater was encountered during drilling in March 2008.

Mechanically Stabilized Earth (MSE) Wall is proposed for the northbound on-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

Based on the subsurface soil conditions as indicated in Boring RW-21, foundation subgrade elevation is recommended to be +212.5 feet or lower. The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans "Bridge Design Aids". However, based on our analyses, the pressure exerted on the foundation soils should be limited to 4.0 Ksf.

- **Retaining Wall No. 2 SR 99 NB - "D" Line, 27+52.83 to 28+52.01**

This wall is to support the SR 99 northbound off-ramp. This retaining wall also supports the soundwall. The anticipated total wall length is 100 feet with a maximum height of 12 feet. Based on the boring data (08-SW-8 and 08-PLM-1) in the vicinity of the proposed wall, the subsurface soil material generally consists of stiff to very stiff clays, underlain by firm clay, underlain by medium dense to dense gravel. No groundwater was encountered during drilling in March 2008.

Based on the boring data, loading conditions and discussions with the designer, 16-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are recommended to support the retaining wall.

The 16-inch CIDH concrete piles may be designed for maximum factored axial load of 113 kips to the indicated pile tip elevations. According to the designer, the "planned pile cap/footing bottom" elevations are +221 feet and +225 feet.

The design tip elevations, specified tip elevations and allowable design capacities of the piles are summarized in the Table 4 "Pile Data Table" below.

TABLE 4: PILE DATA TABLE

Bottom of Pile Cap Footing Elevation (ft)	Pile Type	Maximum Factored (LFD) Axial Load	Nominal Resistance		Design Tip Elev.[1] (ft)	Specified Tip Elev. (ft)
			Compression	Tension		
221.0	16-inch CIDH	113 k	151 k	-	193.5 (1), 195.5 (2)	193.5
225.0	16-inch CIDH	113 k	151 k	-	197.5 (1), 202.5 (2)	197.5

Design tip elevations are controlled by the following demands: (1) compression and (2) lateral load.

Only skin friction was considered in the pile capacity calculations. Based on Table 4, the pile tip elevations are controlled by the compression demand on the pile.

The design tip elevations and specified tip elevations are based on the "planned pile cap footing bottom" elevations provided by the designer. In the event that the "planned pile cap footing bottom" elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity.

Construction Considerations for the CIDH Piles

Caltrans standard specifications for "Cast-in-Place Concrete Piling" should be used for the construction of CIDH concrete piles. Due to presence of sand and gravel and cobbles, raveling or caving may be expected if groundwater is encountered during pile installation, which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. Relatively difficult drilling conditions are expected for drilling into the gravelly and sandy layers. It is prudent to make the contractor aware of these conditions so that appropriate steps can be taken to comply with the standards and to maintain the integrity of the CIDH concrete piles. The CIDH holes are not expected to remain open without implementation of appropriate measures. Temporary steel casing and/or slurry displacement method of construction may be required to maintain the integrity of the piles. Caltrans Standard Specifications and SSPs should be used for such construction and quality assurance procedures. All pile excavations should be observed by the Geotechnical Engineer prior to the placement of reinforcement and concrete so that if conditions differ from those anticipated, appropriate recommendations can be made.

Lateral Design for Piles

Lateral pile analyses were performed for the 16-inch diameter CIDH concrete piles under seismic loading conditions using the L-PILE program. A "p-y Curve Modification Factor" of 0.6 was adopted in the lateral pile analyses for pile spacing of 3 times the pile diameter. The results of lateral pile analyses, with the plots of the pile deflection, moment, shear and soil reaction along the pile length are included in the Appendix C.

- **Retaining Wall No. 3 SR 32 SB Off-Ramp - "SBOFF" Line, 561+00 to 565+98.89**

This wall is to support the SR 32 southbound off-ramp from SR 99. The anticipated total wall length is about 500 feet with a maximum height of 16 feet. Based on the boring data (08-RW-1 and 08-RW-2) in the vicinity of the proposed wall, the subsurface soil materials at the anticipated footing subgrade generally consists of stiff to very stiff lean clay, underlain by loose to medium dense sands, underlain by very dense gravels, underlain by very stiff clay/medium dense gravel. No groundwater was encountered during drilling in March 2008.

MSE Wall is proposed for the southbound off-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 2.75 Ksf.

- **Retaining Wall No. 4 East 1st Avenue SB On-Ramp - "SBON" Line, 29+70.49 to 36+00**

This wall is to support the East 1st Avenue southbound on-ramp to SR 99. The anticipated total wall length is about 629.5 feet with a maximum height of 18 feet. This retaining wall also supports the soundwall. Based on the boring data (08-RW/SW-9 and 08-RW/SW-10) in the vicinity of the proposed wall, the soil material at the anticipated footing subgrade generally consists of loose silty sand/very stiff lean clay, underlain by very dense poorly graded sand, underlain by medium dense sands/very stiff to hard lean clay in Boring RW/SW-9 and soft to firm lean clays in Boring RW/SW-10. Groundwater was encountered during drilling in March 2008 at the elevations between Elev. +212 feet and +215 feet (between 5 feet to 10 feet below existing ground surface).

MSE Wall is proposed for the East 1st Avenue southbound on-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 3.0 Ksf.

Design/Construction Considerations for the CIDH Concrete Piles on the MSE Wall

MSE wall is preferred, instead of retaining wall supported on piles, according to the designer. The following design/construction issues should be considered for the soundwall supported on CIDH piles on the MSE wall.

- The overall stability of the embankment due to the loads (vertical and lateral) of the soundwall on the MSE wall should be evaluated.
- The location of CIDH concrete piles should not conflict with the reinforcement strip of the MSE wall.
- Provisions for reinforcement repair, if damaged during CIDH concrete piles installation, should be provided..
- The CIDH concrete piles are most likely to be constructed after the completion of the MSE wall. Considering that MSE wall material is predominantly granular, temporary casing will be required. Caving should not be permitted to occur.

8.5 Corrosion Investigation

The corrosion investigation for this project was performed in general accordance with the provisions of California Test Method 643. Representative native soil sample at the anticipated pipe subgrade were obtained for corrosion tests. A summary of the corrosion test results is presented in Table 5.

TABLE 5: SUMMARY OF CORROSION TEST RESULTS

Sample No.	Depth (ft)	Resistivity (ohm-cm)	pH	Sulfate (ppm)	Chloride (ppm)
RW-2 #3	11	1690	6.9	11.4	8.5
SW-4 #6	16	2120	6.9	7.1	18.8
RW-8 #3	11	1740	6.4	29.7	8.7
RW-11 #3	10	1150	6.4	0.9	5.2
SW-15 #4	16	2300	6.5	14.4	17.8
SW-17 #4	16	2120	6.5	3.2	28.0

RW-21 #8	40	1370	6.6	4.6	20.2
BID-1 #8	40	1470	6.4	1.0	31.5
BID-5 #2	5	3220	7.0	4.5	16.8
BID-6 #3	10	8580	6.3	0.3	11.8
PLM-2 #8	40	1740	6.4	2.3	34.0

Corrosion test results indicate that the Subsurface soil is generally non- corrosive according to Caltrans guidelines. Based on CULVERT 4 analysis, Standard reinforced concrete pipe design is suitable with Type IP (MS) modified cement or Type II Modified cement, minimum required as per Caltrans Bridge Design Specifications (Section 8.22).

8.6 Culverts

It is our understanding that small diameter culverts (24 inches and under) can be designed and constructed using Standard Plans and Specifications, and no specific geotechnical investigation is required per Caltrans guidelines. According to the designer, reinforced concrete pipe with maximum 24 inches diameter will be used for this project.

Based on the results obtained, corrosion analyses were carried out using Caltrans CULVERT 4 program. The analysis results and design for culverts are presented in Table 6.Based on the Caltrans "CULVERT 4" program, for corrugated steel pipes (25-yr., Galv. 57g), the recommended pipe thickness is gage no. 12. For corrugated steel pipes (50-yr., Galv. 57g), the recommended pipe thickness is gage no. 8. For corrugated steel pipes (50-yr., Galv. with bituminous coating on the soil side), the recommended pipe thickness is gage no. 12.

A copy of the "Culvert 4" analyses is include in Appendix C

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TABLE 6: RECOMMENDED MINIMUM THICKNESS AND PROTECTIVE MEASURES FOR CULVERTS

Location		Culvert Type		Corrugated Steel/Steel Spiral Rib Pipe (Gal.) (Gage)			Reinforced Concrete	Alternative Design (also see note below): Corrugated Aluminum (mm)	Corrugated Aluminized Steel (Type 2, mm)	Steel Pipe (Gal., Gage)
		Est. Service Life (yr.)		25	50	50		50	50	50
Station & Offset	Boring No.	Resistivity (ohm-cm)	pH	Gal. (57 g)		Bit. Coat. (Soil Sides)				(90° Invert)
"SBOFF" Line 565+09, 32 Lt.	RW-2 #3	1690	6.9	14	10	14	See note (2)	No	No	18
"SR 99 D" Line 14+35, 38 Lt.	SW-4 #6	2120	6.9	16	10	16	See note (2)	No	No	18
"SR 99 D" Line 27+20, 41 Lt.	RW-8 #3	1740	6.4	12	-	12	See note (2)	No	No	18
"SBON" Line 38+27, 40 Lt.	RW-11 #3	1150	6.4	12	-	12	See note (2)	No	No	18
"SR 99 D" Line 25+75, 39 Lt.	SW-15 #4	2300	6.5	14	8	14	See note (2)	No	No	18
"SR 99 D" Line 19+35, 38 Rt.	SW-17 #4	2120	6.5	14	8	14	See note (2)	No	No	18
"NBON" Line 561+95, 39 Rt.	RW-21 #8	1370	6.6	12	-	12	See note (2)	No	No	18
"SR 99 C" Line 567+03, 67 Lt.	BID-1 #8	1470	6.4	12	-	12	See note (2)	No	No	18
"SR 99 C" Line 572+03, 40 Lt.	BID-5 #2	3220	7.0	16	12	16	See note (2)	No	No	18
"SR 99 C" Line 572+54, 43 Rt.	BID-6 #3	8580	6.3	16	12	16	See note (2)	No	No	18
"SR 99 D" Line 29+81, 87 Rt.	PLM-2 #8	1740	6.3	12	-	12	See note (2)	No	No	18

Note (1): Thermoplastic pipe can be used as an alternative and should not have any corrosion concerns. However, the types of thermoplastic pipe that can be used will depend on the height of fill, available sizes and manufacturer's specifications.

Note (2): Standard reinforced concrete pipe design is suitable with Type IP (MS) modified cement or Type II modified cement, minimum required by Caltrans Std. Specs 90-1.01.

Note (3): The result of analysis from Program "Culvert4" is included.

Note (4): A Corrugated Aluminum Pipe (CAP) or Corrugated Aluminumized Steel Pipe (CASP) should not be used due to corrosive condition.

8.7 Minor Structure Foundations

8.7.1 Soundwalls

Based on the "Layout Plan" provided by the designer (plan), soundwalls are proposed along the northbound and southbound outside lanes of SR 99 (from "SR 99 C" Line 571+50 to "SR 99 D" Line 27+53 and on top of retaining walls no. 2 and 4). Soundwalls are also proposed on top of Palmetto Ave. UC, Bidwell Park Viaduct and the existing retaining wall along the East 1st Ave. NB off-ramp. The soundwalls will be along the "hinge point" of the existing embankment slope. The soundwalls will be supported on concrete barrier. The maximum combined height of the soundwall and concrete barrier will be 14 feet. The soundwall/concrete barrier will be supported on 16-inch diameter Cast-In-Drilled-Hole (CIDH) concrete pile foundation.

8.7.1.1 Subsurface Soil Conditions

Based on the "Layout Plan" provided by the designer, the following are the borings are applicable for the soundwalls.

1. Southbound Soundwall – Borings SW-4 through SW-8
2. Northbound Soundwall – Borings SW-15 through SW-18
3. Soundwall on retaining wall – Borings RW/SW-9 and RW/SW-10

Based on the boring logs, the subsurface soil conditions along the proposed soundwalls are summarized in the table below. The LOTB should be referred to for more details.

Location	Reference Boring	Subsurface Soil Conditions
NB Soundwall	SW-15 through SW-18	Soft to hard clays/silt, underlain by medium dense to dense sands/gravels
SB Soundwall	SW-4 through SW-8	Stiff to very stiff lean clays interbedded with loose to very dense sands/gravels

Groundwater was encountered at the depth of 29 feet in Boring SW-4 during drilling in March 2008.

8.7.1.2 Foundation Recommendations

Based on the subsurface soil conditions, Caltrans standard soundwall supported on Cast-in-drilled-hole (CIDH) concrete piles can be used for the project along embankments. According to Caltrans Bridge Design Aids, pile foundation for soundwall may be designed by Sheet Piling Procedure or by using a variation of the simplified and approximate method outlined in the Uniform Building Code (1997) Section 1806.8. For lateral design, Caltrans standard design can be used for this project as applicable. Based on the Caltrans "Standard Drawing-Soundwall-Masonry Block on Type 736 S/SV Barrier Details (3)" and an assumed angle of shearing resistance of 30°, an allowable ultimate lateral soil pressure of 395 psf/ft can be used for level ground condition and an allowable ultimate lateral soil pressure of 10.5 KPa/m (67 psf/ft) can be used for the condition of level ground on one side of wall and sloping ground on the opposite side. As discussed with the designer, the maximum down slope gradient is 2(H): 1(V). It is anticipated that the soundwall foundation will be in relatively competent native soils. The criteria for level ground condition are described in Caltrans Memo to Designer (22-1, Section IV).

8.7.1.3 Construction Considerations for the CIDH Piles

Refers to Section 8.4 for the construction considerations of the CIDH concrete piles.

8.7.2 Overhead Signpost Structures

It is proposed to construct five overhead signs along SR 99 9 (one of these overhead signs will be constructed on the bridge structure). Based on the "Overhead Sign Details and Quantities SD-1", the overhead sign structures will be either Caltrans Standard "Overhead Signs-Truss Single Post Type VII" or Caltrans Standard "Overhead Signs-Truss Single Post Type VIII". The overhead signs will be along the median and northbound of SR 99. The proposed sign structures will be 15.5 feet and 20 feet above grade. The recommended foundation system will consist of 5 feet diameter "Cast-in-drilled-hole" (CIDH) piles, which is used in the Caltrans standard design.

8.7.2.1 Subsurface Soil Conditions

The relevant borings, which were drilled in the vicinity of the proposed overhead sign structures are Borings BID-6, SW-8, SW-16 and SW-18. These borings were drilled to the depths between 31.5 feet and 60 feet. Based on the boring data, the subsurface soil conditions at each overhead sign structure location are summarized in the table below.

Sign	Location "D" Line	Post Type	Relevant Boring	Subsurface Soil Conditions
2-07	11+38.20	VIII	BID-6	Firm clays underlain by medium dense to very dense sands
3-07	16+93	VII	SW-18	Stiff to very stiff clays underlain by very dense gravel
2-07	22+30	VIII	SW-16	Very stiff clay underlain by loose to very dense sand/gravel
4-07	27+34.90	VIII	SW-8	Firm to very stiff silt/clay underlain by very dense sand

8.7.2.2 Pile Capacity Analyses

The piles for the overhead sign structures are subject to vertical loads, lateral loads, bending moment and torsional moment. The following is the information provided by the designer:

Sign	Vertical Load (Kip)	Shear (Kip)	Overturning Moment (Kip-ft)	Torsional Moment (Kip-ft)
2-07	8.3	13.4	323.0	242.5
3-07	9.5	14.8	357.1	0
4-07	8.3	13.4	323.0	242.5

According to the "Reference Sheets Structural Design Aids Overhead and Roadside Signs October 2006" issued by Caltrans, the recommended pile diameter is 5 feet and the recommended pile lengths between 21 feet and 30 feet for Post Types VII and VIII. Based on the laboratory test results, the existing subsurface soil conditions generally meet the requirements as specified in the Caltrans Standard Plans.

The vertical load is relatively small and the pile vertical capacities developed from the frictional resistance along the pile length should be acceptable.

Lateral pile analyses were performed for the 5-foot CIDH piles using the L-PILE program. Assumed soil profiles with strength parameters and the results of lateral pile analyses with the plots of the pile deflection, moment, shear and reaction along the pile length and torsional capacities analyses are included in the Appendix C. Based on the results of the computer analyses, the maximum deflection at the pile head is less than 0.05 inches. According to the designer, the maximum pile head deflection is acceptable and the flexural (moment) and shear capacities of the piles were found to be in excess of the moment and shear resulted from the corresponding external loads.

According to the designer, the other minor structures for this project include the traffic signal systems. The foundation design of these minor structures should be according to the Caltrans Standard Plans.

9. STRUCTURAL PAVEMENT

R-value tests were conducted on representative samples collected at subgrade level. The test results are summarized in Table 7.

TABLE 7: SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Station & Offset (ft)	Approximate Ground Elev. (ft)	R-value
SW-16	"D" Line 23+00	235.0	25
SW-18	"D" Line 17+06	235.0	22

As-built Pavement Sections

The existing pavement sections of SR 99 within the project limits are shown in the "Typical Cross Section" in Plate Nos. 6 and 7. The existing pavement section along SR 99 generally consists of 0.67 feet PCC/0.33 feet CTB/0.17 feet AB/0.33 feet AS and 0.4 feet AC/0.67 feet AB/0.92 feet AS.

Findings and Recommendations:

The R-values of the soil samples from the project site are 22 and 25. An R-Value of 15 is assumed for the design of structural pavement sections along SR 99. An R-Value of 30 is assumed for the design of structural pavement sections along East 1st Avenue as recommended in the Geotechnical Engineering Investigation Report for "State Route 99 Auxiliary Lane Project Phase 1 – East 1st Ave. Northbound Off-Ramp" dated July 2006 prepared by PARIKH. According to Caltrans guidelines, fill material placed within 4 feet of the finish pavement subgrade should have a minimum R-Value of 15. The following are the recommended pavement sections based on the above R-Value and design Traffic Indices provided by the designer.

R-Value = 15 (for the native soil material/fill)

Location	Option	HMA (Type A) (ft)	AB (Class 2) (ft)
SR 99 Auxiliary Lane (TI=12.5)	1	0.65	2.10
	2	1.60	-
SR 99 Inside Lane (TI=10.5)	1	0.55	1.75
	2	1.30	-
Ramps (TI=11.5)	1	0.65	1.80
	2	1.45	-

R-Value = 30 (for the native soil material)

Location	Option	HMA (Type A) (ft)	AB (Class 2) (ft)
East 1st Ave (TI=10)	1	0.50	1.65
	2	1.05	-

The calculations for the proposed pavement sections are contained in Appendix C.

10. MATERIAL SOURCES

There are several commercial sources of asphalt, concrete, and aggregate products in the vicinity of the project. Some of the available commercial suppliers in the vicinity of the project area are listed in the following table.

TABLE 8:SOURCES OF IMPORTED BORROW

Source	Location	Approx. Haul Distance(one way, mile)
Western Ready Mix	Highway 32, Chico, California	4
A&A Concrete Supply Incorporated	3578 Esplanade, Chico, California	5
Taylor Mobile Mix Concrete	3375 Hubbard Lane, Chico, California	7

11. MATERIAL DISPOSAL

Majority of the project will require imported borrow material for the project. Disposal of ADL and other contaminated material (if any) is beyond the scope of this report.

12. CONSTRUCTION CONSIDERATIONS

12.1 Construction Advisories

Majority of the project requires fill material for the proposed widening. The site is along the SR 99. Therefore traffic control is required to maintain traffic flow during construction. There are numerous utility lines at the site. The contractor should verify the utility lines, be aware of the existing conditions and plan the construction activities accordingly.

The borings encountered clayey/sandy materials near the existing ground surface. Localized subgrade pumping may be encountered during earthwork construction depending on the weather, subsurface moisture, and surface drainage conditions. Equipment mobility may also be difficult if the subgrade is wet, in which case, the subgrade soils may require reworking, aeration, or over-excavation and replacing with dry granular fill to facilitate earthwork construction.

12.2 Construction Consideration that Influence Specifications

The contractor should verify the existing utility line conditions, and these locations should not be used for stockpiling of borrow materials. Any utility conflicts with proposed construction should also be reviewed prior to construction.

12.3 Construction Monitoring and Instrumentation

The construction monitoring and instrumentation subject was considered and was determined to be not significant for the project.

12.4 Hazardous Waste Considerations

The project environmental study report should be referred to for further details at the sites within the project.

12.5 Differing Site Conditions

The soil conditions described in this report are based on available boring data. It should be noted that these borings depict subsurface conditions only at the locations drilled. Because of the variability from place to place within soils in general, and the nature of geologic depositions, subsurface soil conditions could change between the explored locations.

Early communication should be made between the Resident Engineer, the Contractor and the Geotechnical Engineer as soon as conditions that differ from those established in this report are recognized by any of the parties. Additional recommendations could be provided if such conditions arise.

13. RECOMMENDATIONS AND SPECIFICATIONS

13.1 Summary of Recommendations

If the designer has questions or concerns with any of these recommendations, or, if conditions are found to be different during construction, the Geotechnical Engineer who prepared this report should be contacted. Additional fieldwork, analysis or changes in recommendations may be required. These services may be provided under a separate authorization, as necessary. A concise summary of the geotechnical recommendations is presented below:

- Design peak bedrock acceleration (PBA) = 0.2 g.
- The boring data indicates that the embankment fill generally consists of stiff to very stiff clays and the native soils generally consist of firm to very stiff clays/loose to medium dense sands, underlain by dense to very dense sand/gravel, underlain by interbedded layers of stiff to hard clays and medium dense to very dense sands. Groundwater was encountered at the depths between 5 feet and 29 feet. The impact of liquefaction potential to this roadway-widening project is considered relatively low. (Ref.: Section 8.1.3)

- Retaining Walls (Ref.: Section 8.4):

  Retaining Wall No. 2 is to be supported on CIDH concrete piles. MSE walls are recommended for Retaining Wall Nos. 1, 3 and 4.

- Soundwalls (Ref.: Section 8.6):

  Caltrans standard soundwall supported on barrier on Cast-in-drilled-hole (CIDH) concrete piles can be used.

- Pavement Sections for widening (Ref: Section 9):

  The structural pavement sections recommended for this project are summarized in the table below.

Location	Option	HMA (Type A) (ft)	AB (Class 2) (ft)
SR 99 (TI=12.5)	1	0.65	2.10
	2	1.60	-
SR 99 (TI=10.5)	1	0.55	1.75
	2	1.30	-
Ramps (TI=11.5)	1	0.65	1.80
	2	1.45	-
East 1st Ave (TI=10)	1	0.50	1.65
	2	1.05	-

13.2 Recommended Materials Specifications

13.2.1 Standard Specifications

Unless otherwise stated in the special provisions, all materials specifications should conform to Caltrans Standard Specifications, May 2006 edition, including but not limited to the following: Earthwork, Structure Backfill, Pervious Backfill Material, Reinforcing Geofabric, Thermoplastic Pipes, Hot-Mixed Asphalt, Aggregate Base and Aggregate Subbase etc.

13.2.2 Special Provisions

Imported Borrow:

Imported material should be in accordance with the specifications set forth in

Caltrans Section 19. In particular, for new embankment/roadway construction, the material placed within 4 feet of the finish pavement subgrade should meet the following requirements:

1. Free of organic or other deleterious materials.
2. An R-value of no less than 15.

<u>Aggregate Base:</u> Aggregate Base (Class 2) shall conform to the provisions in Section 26 of the Caltrans Standard Specifications and to these Special Provisions. It shall also be clean and free from organic matter and other deleterious substances. The percentage composition by weight of Class 2 aggregate base shall conform to the following grading as determined by California Test Method No. 202.

Gradation Requirement (Percent Passing ¾" Maximum)

Sieve Sizes	Operating Range	Contract Compliance
1-inch	100	100
¾-inch	90 – 100	87 – 100
No. 4	35 – 60	30 – 65
No. 30	10 – 30	5 – 35
No. 200	2 – 11	0 – 14

Gradation Requirement (Percent Passing 1 ½" Maximum)

Sieve Sizes	Operating Range	Contract Compliance
2-inch	100	100
1 ½-inch	90 – 100	87 – 100
1-inch	------	------
¾-inch	50 – 85	45 – 90
No. 4	24 – 45	20 – 50
No. 30	10 – 25	6 – 29
No. 200	2 – 11	0 – 14

Aggregate Base (Class 2) shall also conform to the quality requirements given on the following table:

Quality Requirements

California Test Method	Operating Range	Contract Compliance
Sand Equivalent (217)	25 min	22 Min.
Resistance (R-value) (301)	-	78 Min.
Durability Index	-	35 Min.

Aggregate Subbase: Aggregate Subbase (Class 2) shall conform to the provisions in Section 25 of the Caltrans Standard Specifications and to these Special Provisions.

Aggregate Subbase (Class 2) shall be clean and free from organic matter and other deleterious substances. The percentage composition by weight of Class 2 aggregate subbase shall conform to the following grading as determined by California Test Method No. 202.

Gradation Requirement (Percent Passing)

Sieve Sizes	Operating Range	Contract Compliance
3-inch	100	100
2 ½-inch	90 – 100	87 – 100
No. 4	40 – 90	35 – 95
No. 200	0 – 25	0 – 29

Aggregate Subbase (Class 2) shall also conform to the quality requirements given on the following table:

Quality Requirements

California Test Method	Operating Range	Contract Compliance
Sand Equivalent (217)	21 Min.	18 Min.
Resistance (R-value) (301)	-	50 Min.

14. INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our field exploration and the assumption that the soil conditions do not deviate from observed conditions. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed "Chico SR 99 Auxiliary Lane Project" as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our findings and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the soil conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

Alston S. Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

S:\Ongoing Projects\202101\Report\202101GDR (2-09).rpt

REFERENCES

1. California Department of Transportation, May 2006, Standard Plans.

2. California Department of Transportation, May 2006, Standard Specifications, Sections 1 through 95.

3. California Department of Transportation, Highway Design Manual, June 2006.

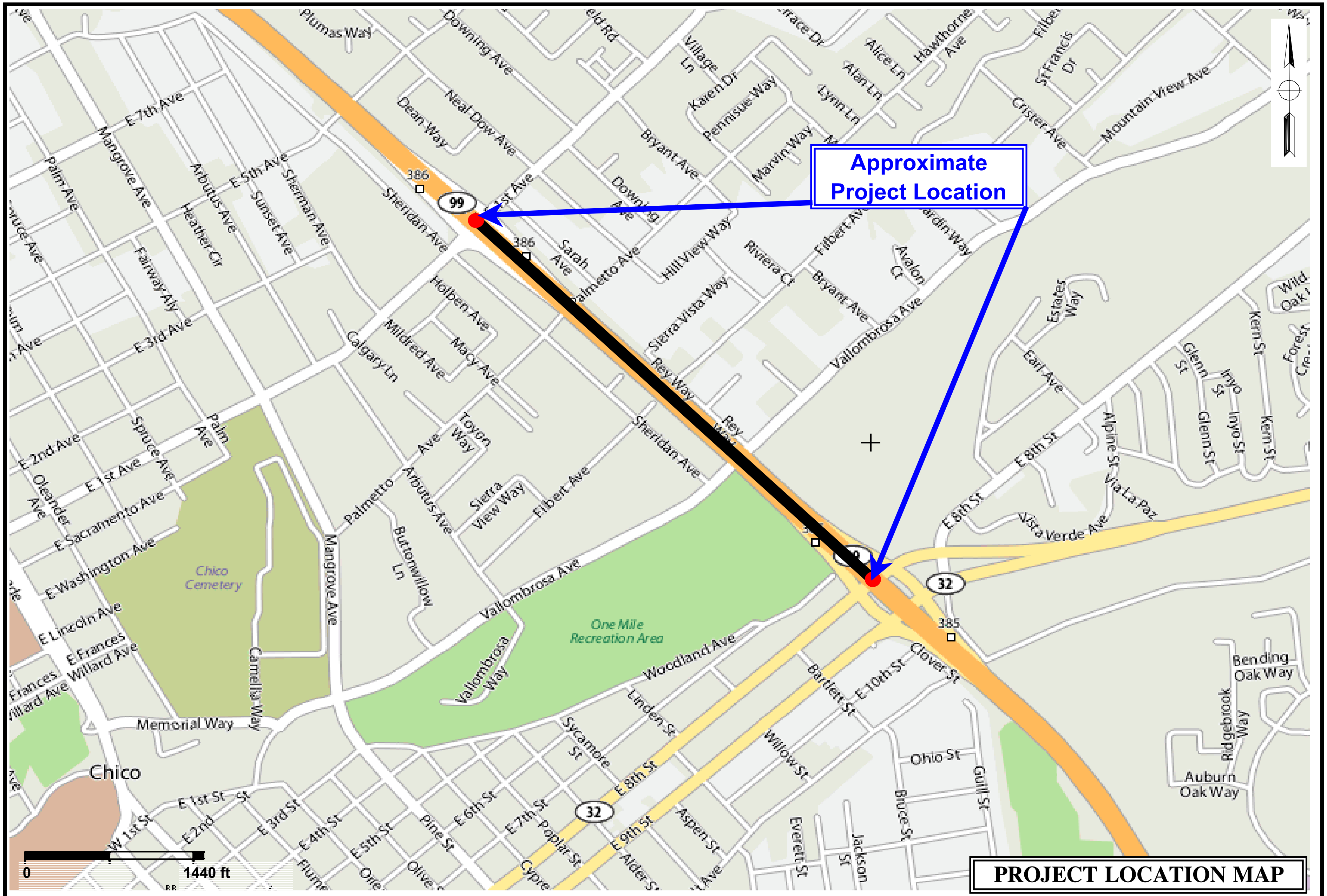
4. D.S. Harwood, E. J. Helley and M.P. Doukas, 1981, "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California, 1981; Scale 1:62,500; USGS Map I-1238).

5. Mualchin, L., 1996, The Caltrans California Seismic Hazard Map.

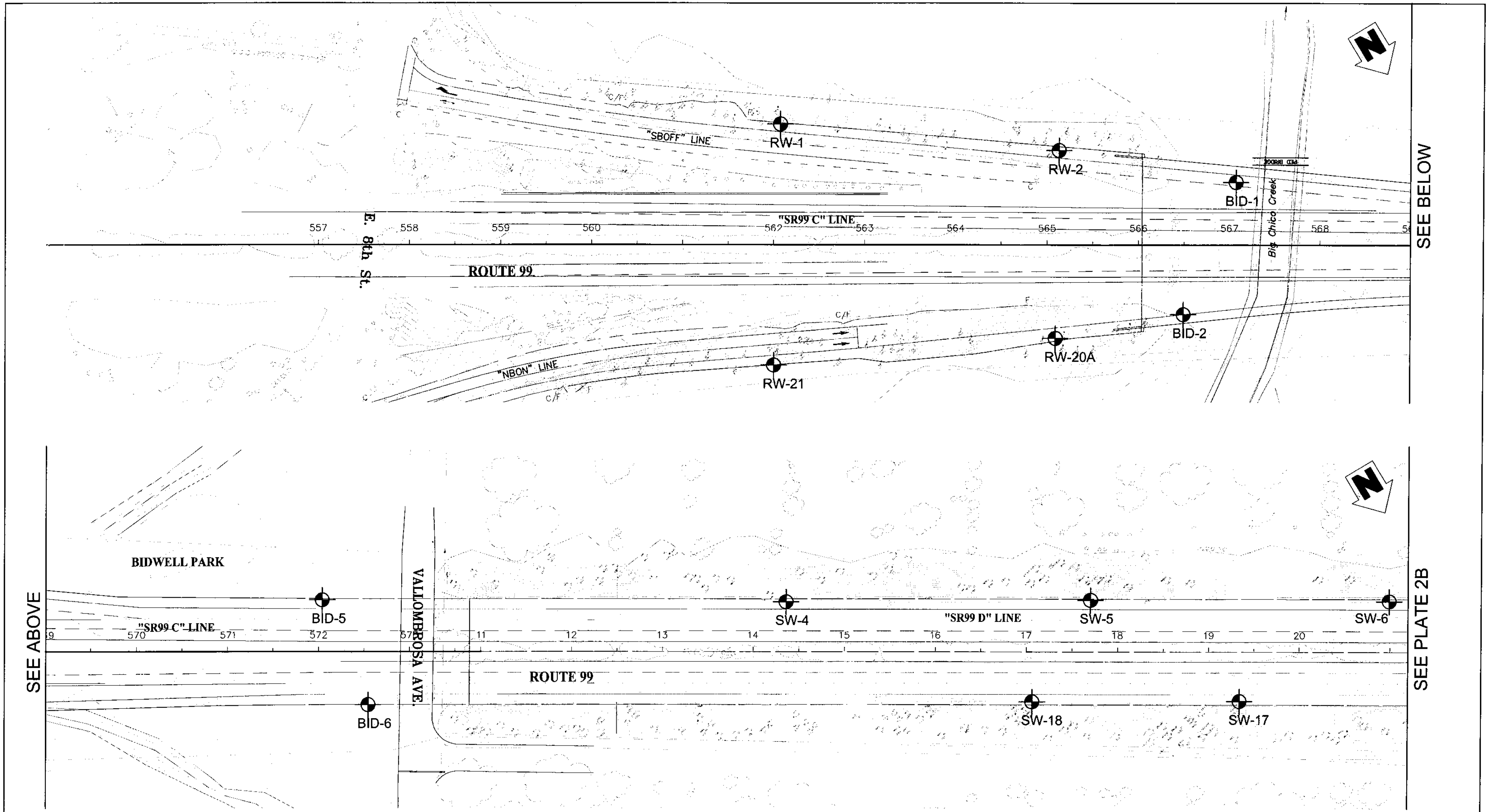
6. National Research Council, Washington, DC, 1985, Liquefaction of Soils during Earthquakes, PB86-163110, November 1985.

7. "Geotechnical Engineering Investigation Report for State Route 99 Auxiliary Lane Project Phase 1 – East 1st Avenue Northbound Off-Ramp" July 2006, PARIKH Consultants, Inc.

PLATES AND APPENDICES



PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	CHICO SR99 AUXILIARY LANE PROJECT BUTTE COUNTY, CALIFORNIA
	JOB NO.: 202101.GDR PLATE NO.: 1



SITE PLAN

LEGEND

RW-1 Approx. Boring Location

SCALE 1 inch = 100 feet

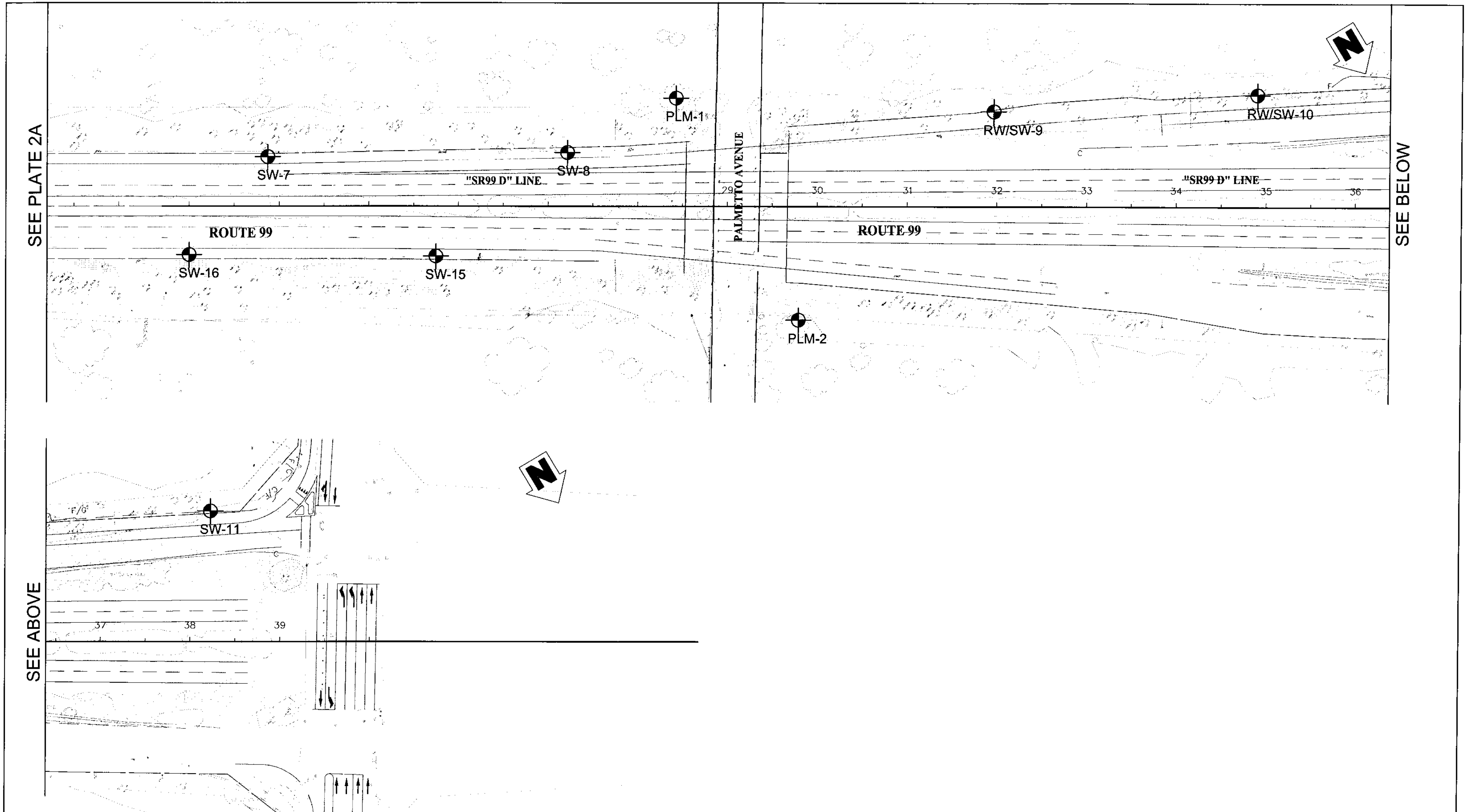
Note: All units are in feet unless otherwise specified
Reference Map was provided by Quincy Engineering

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

CHICO SR99 AUXILIARY LANE PROJECT
BUTTE COUNTY, CALIFORNIA

JOB NO.:202101.GDR

PLATE NO: 2A



SITE PLAN

LEGEND

B-1 Approx. Boring Location

R-1 Approx. R-Value Boring Location

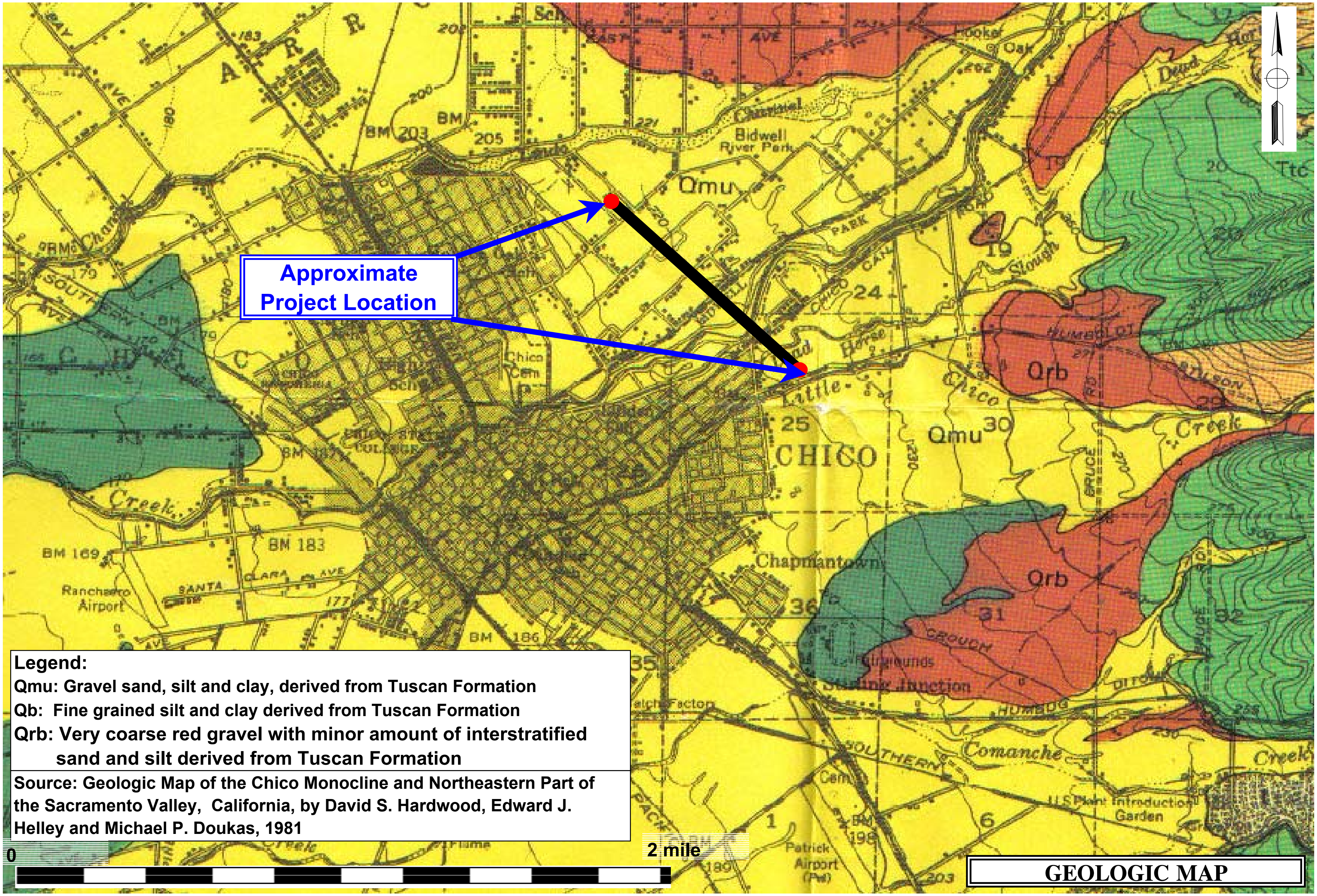
SCALE 1 inch = 100 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by Quincy Engineering

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

CHICO SR99 AUXILIARY LANE PROJECT
BUTTE COUNTY, CALIFORNIA

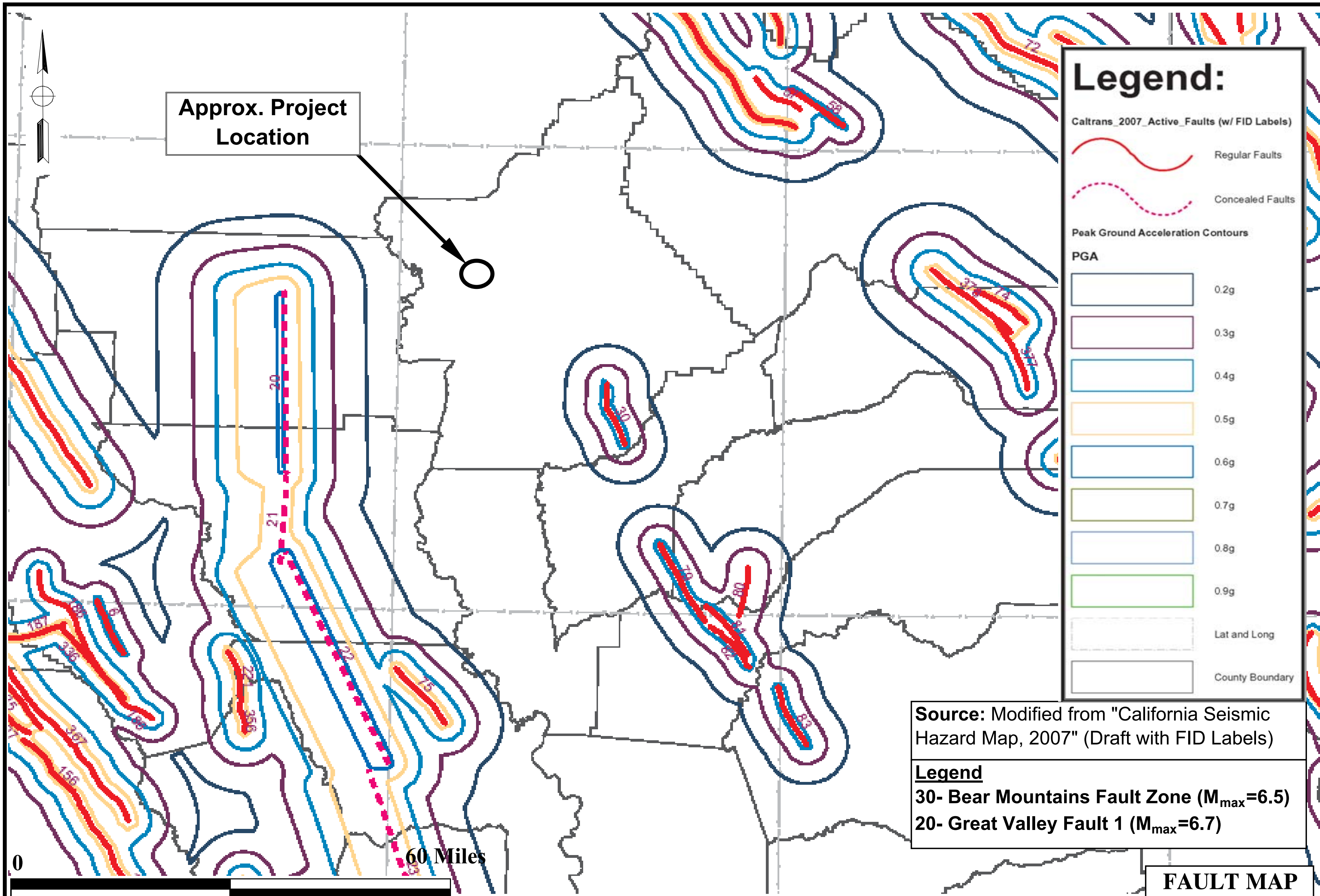
JOB NO.:202101.GDR	PLATE NO: 2B



PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

CHICO SR99 AUXILIARY LANE PROJECT
BUTTE COUNTY, CALIFORNIA

JOB NO.: 202101.GDR	PLATE NO.: 3

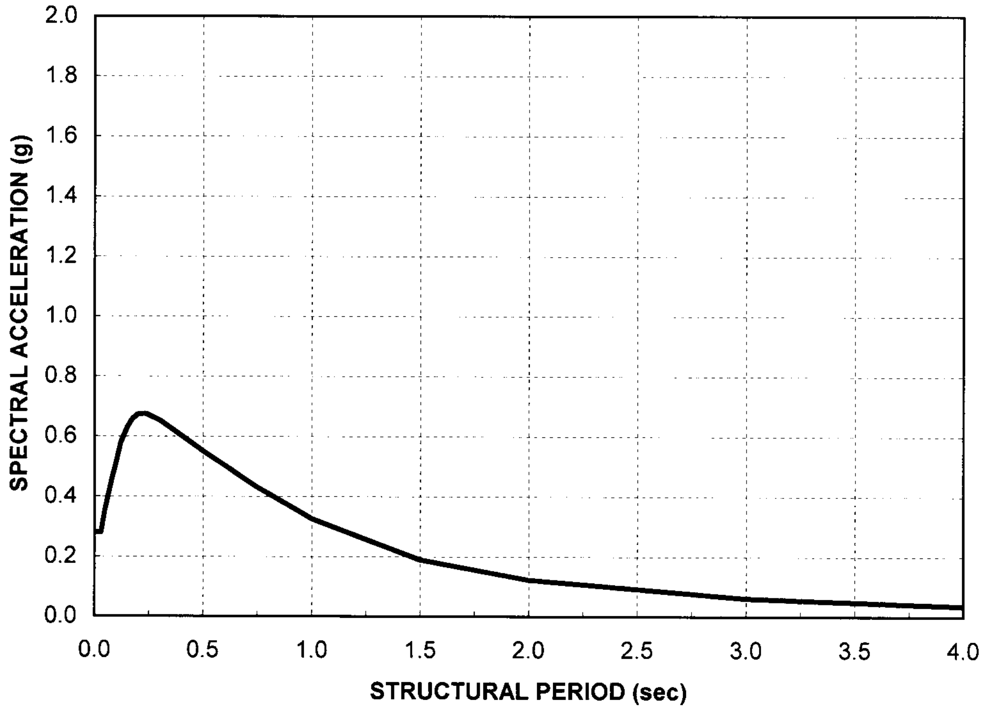


PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

CHICO SR99 AUXILIARY LANE PROJECT
BUTTE COUNTY, CALIFORNIA

JOB NO.: 202101.GDR	PLATE NO.: 4

ARS DESIGN CURVE
CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CALIFORNIA



Spectral Data

Period (sec)	20 (6.7) Spectral Accel. (g)
0.010	0.280
0.020	0.280
0.030	0.280
0.050	0.364
0.075	0.448
0.100	0.519
0.120	0.579
0.150	0.629
0.170	0.653
0.200	0.673
0.240	0.674
0.300	0.653
0.400	0.602
0.500	0.551
0.750	0.431
1.000	0.327
1.500	0.190
2.000	0.122
3.000	0.061
4.000	0.035

1. Caltrans SDC (v 1.4, June 2006), Figure B.6, Governing Fault: Great Valley Fault 1 (R) (Mw = 6.7, Soil Profile Type D, PBA = 0.2g) with no modification.

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CALIFORNIA

JOB NO.: 202101.GDR

PLATE NO.:5

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	But	99	32.44-33.28		

GAD

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER Lindsay J Juarez No. C69432 Exp. 9/30/09 CIVIL STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

NOTES:

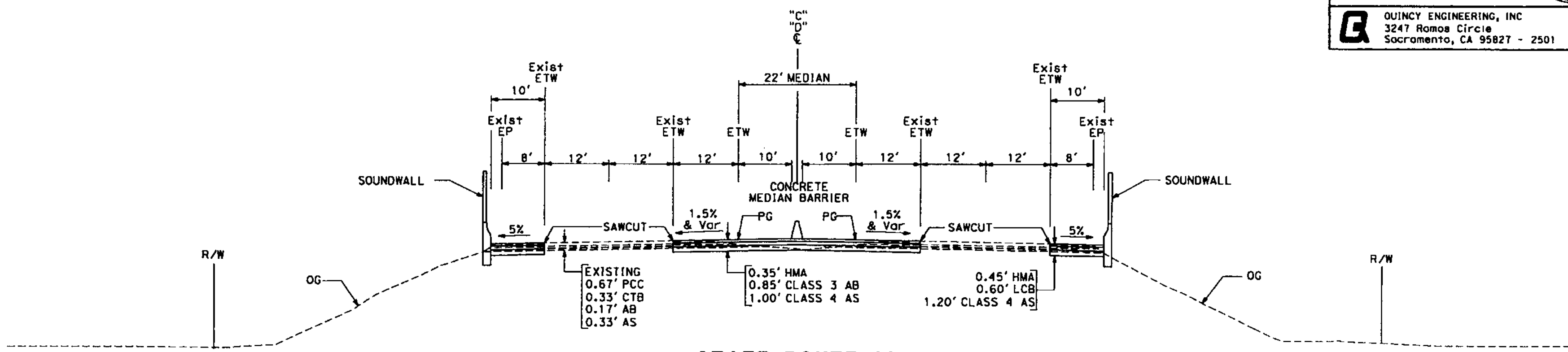
1. DIMENSIONS OF THE STRUCTURAL SECTIONS ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATION AS SHOWN OR AS DIRECTED BY THE ENGINEER.
3. SEE LAYOUT SHEETS FOR SOUNDWALL LIMITS.

DESIGN DESIGNATION FOR SR 99

AADT (2027) = 116,900 TI(20 YEARS) = 12.5 (AUXILIARY LANE)
DHV (2027) = 6090 TI(20 YEARS) = 10.5 (NUMBER 1 LANE)
T=4% D = 50%

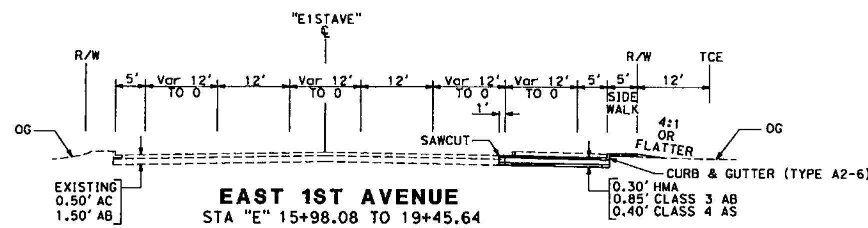
DESIGN DESIGNATION FOR EAST 1ST AVENUE

AADT (2027) = 25,650 TI(20 YEARS) = 12.0
DHV (2027) = 1805 D = 67%
T=2%

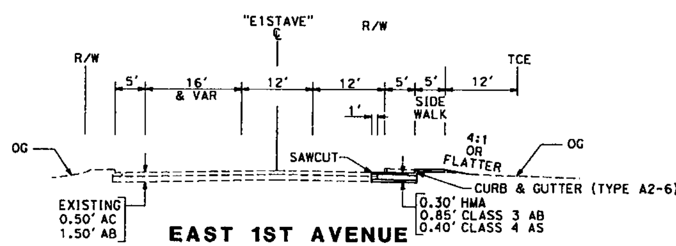


STATE ROUTE 99
STA "C" 558+44.04 TO 566+04.00
STA "C" 573+66.00 TO 573+78.33
STA "D" 11+00.00 TO 28+53.03
STA "D" 29+67.03 TO 38+64.00

BIDWELL PARK VIADUCT STA "C" 566+04.00 TO 573+66.00
PALMETTO AVENUE UNDERCROSSING STA "D" 28+53.03 TO 29+67.03



EAST 1ST AVENUE
STA "E" 15+98.08 TO 19+45.64



EAST 1ST AVENUE
STA "E" 24.93.02 TO 28+22.81

TYPICAL CROSS SECTIONS
NO SCALE
X-1

AGENCY NAME: BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
PROJECT ENGINEER: LINDSAY J JUAREZ
CALCULATED/DESIGNED BY / CHECKED BY
REVISED BY / DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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CU 03-199 EA 3A0421

LAST REVISION 00-00-00 DATE PLOTTED => 9/10/2008 TIME PLOTTED => 11:33:46 AM

PLATE NO.: 6

NOTES:

1. DIMENSIONS OF THE STRUCTURAL SECTIONS ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATION AS SHOWN OR AS DIRECTED BY THE ENGINEER.
3. SR = SUPERELEVATION RATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	But	99	32.44-33.28		

GAD
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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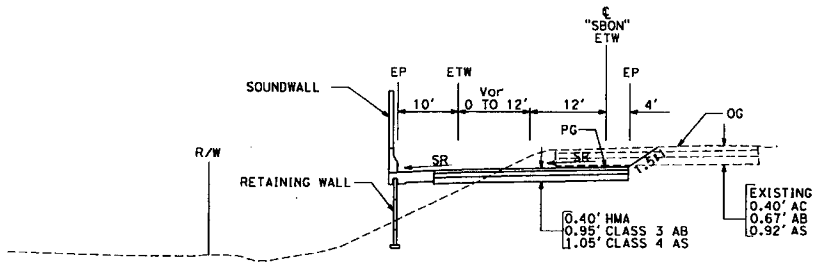
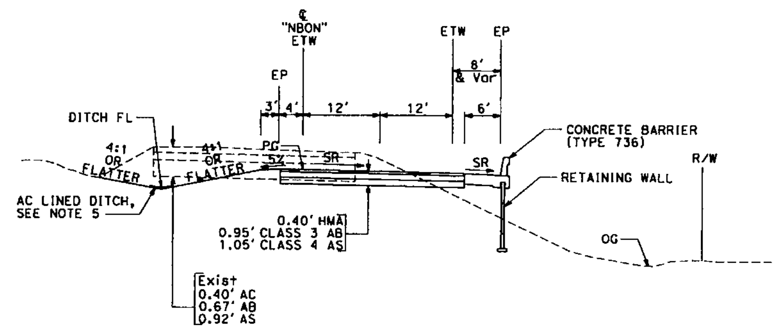
REGISTERED PROFESSIONAL ENGINEER
Lindsay J Juarez
No. C69432
Exp. 9/30/09
CIVIL
STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501



SOUTHBOUND ON RAMP

STA "SBON" 23+87.99 TO 28+53.85 BB
STA "SBON" 29+68.17 EB TO 39+77.91



NORTHBOUND ON RAMP

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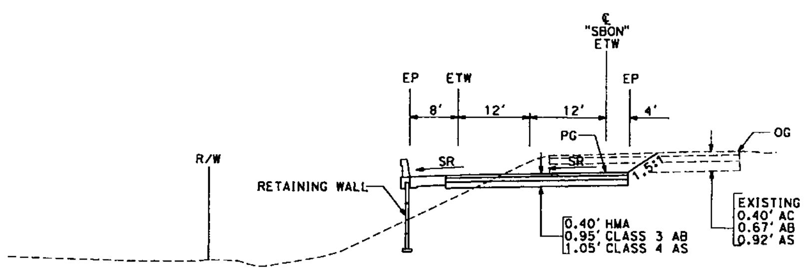

SOUTHBOUND OFF RAMP

STA "SBOFF" 557+58.79 TO 566+02.87 BB

CALCULATED/DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
PROJECT ENGINEER	LINDSAY J JUAREZ		
AGENCY NAME	BUTTE COUNTY ASSOCIATION OF GOVERNMENTS		

DATE

TYPICAL CROSS SECTIONS

NO SCALE

X-2

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CU 03-199

EA 3A0421

PLATE NO.: 7

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	But	99	32.44-33.28		

GAD

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER Lindsay J Juarez No. C58432 Exp. 9/30/09 CIVIL STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

NOTES:

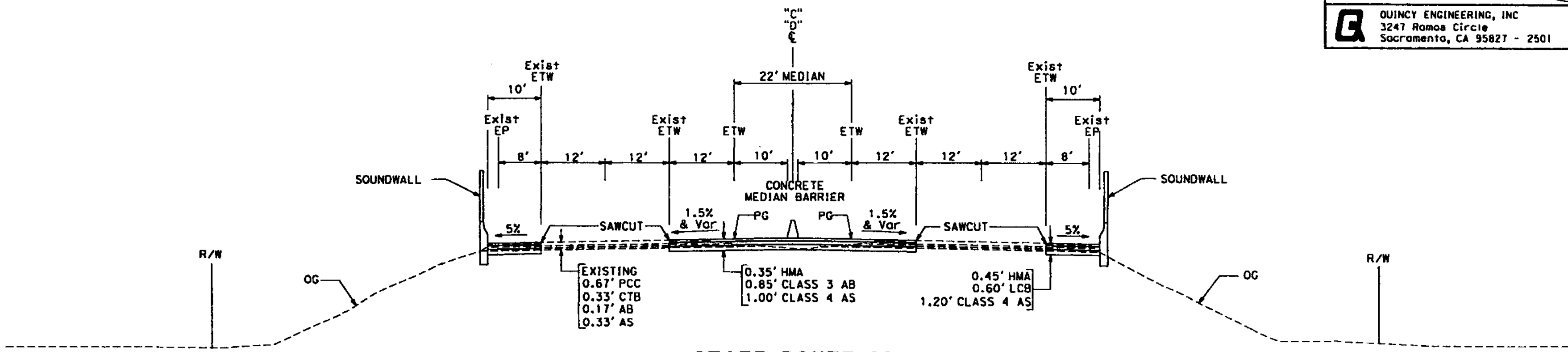
1. DIMENSIONS OF THE STRUCTURAL SECTIONS ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATION AS SHOWN OR AS DIRECTED BY THE ENGINEER.
3. SEE LAYOUT SHEETS FOR SOUNDWALL LIMITS.

DESIGN DESIGNATION FOR SR 99

AADT (2027) = 116,900 TI(20 YEARS) = 12.5 (AUXILIARY LANE)
DHV (2027) = 6090 TI(20 YEARS) = 10.5 (NUMBER 1 LANE)
T=4% D = 50%

DESIGN DESIGNATION FOR EAST 1ST AVENUE

AADT (2027) = 25,650 TI(20 YEARS) = 12.0
DHV (2027) = 1805 D = 67%
T=2%



STATE ROUTE 99
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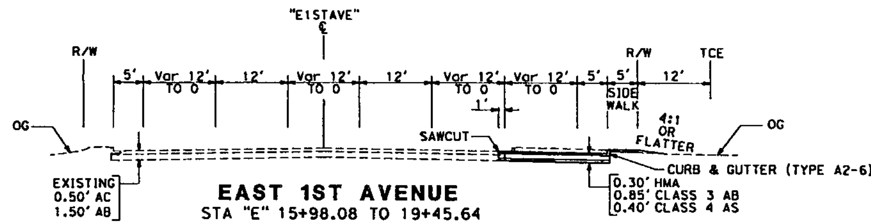
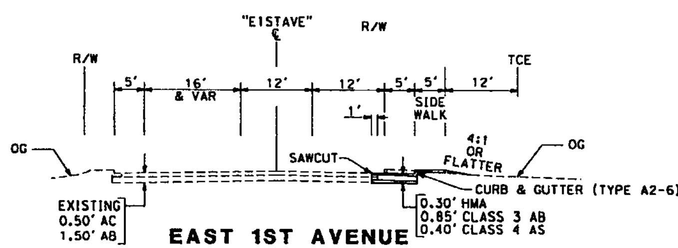
STA "C" 573+66.00 TO 573+78.33
STA "D" 11+00.00 TO 28+53.03
STA "D" 29+67.03 TO 38+64.00

BIDWELL PARK VIADUCT STA "C" 566+04.00 TO 573+66.00
PALMETTO AVENUE UNDERCROSSING STA "D" 28+53.03 TO 29+67.03



EAST 1ST AVENUE
STA "E" 15+98.08 TO 19+45.64



EAST 1ST AVENUE
STA "E" 24.93.02 TO 28+22.81

TYPICAL CROSS SECTIONS
NO SCALE

X-1

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

AGENCY NAME

PROJECT ENGINEER LINDSAY J JUAREZ

CALCULATED/DESIGNED BY
CHECKED BY

REVISED BY
DATE REVISED

DATE PLOTTED => 5/10/2008
TIME PLOTTED => 11:33:46 AM

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CU 03-199

EA 3A0421

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	But	99	32.44-33.28		

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REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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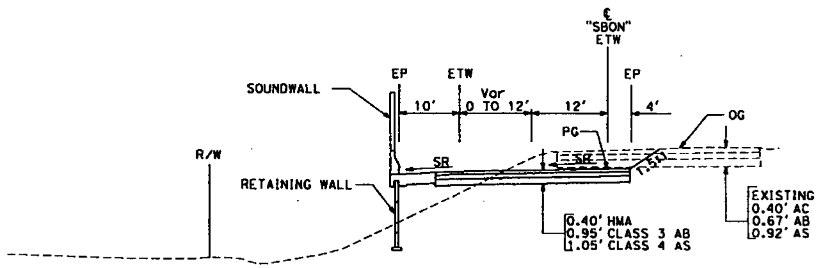
REGISTERED PROFESSIONAL ENGINEER
Lindsay J Juarez
No. C68452
Exp. 9/30/09
CIVIL
STATE OF CALIFORNIA

QUINCY ENGINEERING, INC
3247 Ramos Circle
Sacramento, CA 95827 - 2501

NOTES:

1. DIMENSIONS OF THE STRUCTURAL SECTIONS ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATION AS SHOWN OR AS DIRECTED BY THE ENGINEER.
3. SR = SUPERELEVATION RATE



SOUTHBOUND ON RAMP

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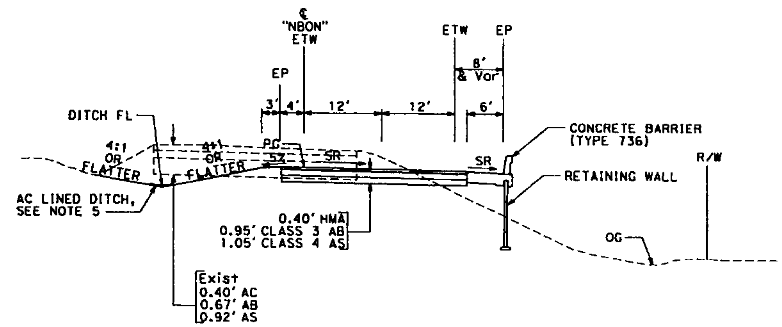
STA "SBON" 29+68.17 EB TO 39+77.91



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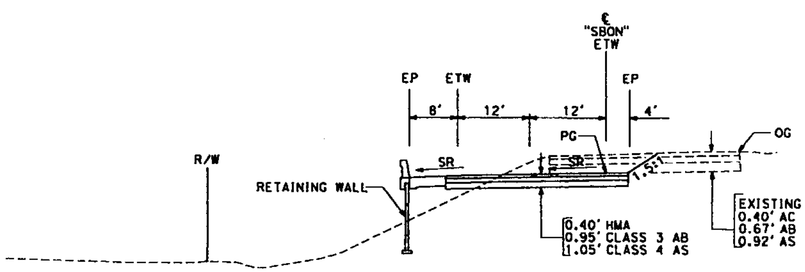

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TYPICAL CROSS SECTIONS

NO SCALE

X-2

DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY — CHECKED BY

PROJECT ENGINEER: LINDSAY J JUAREZ

AGENCY NAME: BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

LAST REVISION 00-00-00 | DATE PLOTTED => 9/10/2008 | TIME PLOTTED => 11:31:25 AM

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CU 03-199

EA 3A0421

APPENDIX A

APPENDIX A
FIELD EXPLORATION

The test borings were advanced with a truck-mounted and track-mounted drill rig using 8-inch diameter hollow-stem auger. The soil samples were obtained from the borings during drilling at various depths by driving a 2.5-inch Inside Diameter (I.D.) Modified California Sampler or a 1.375-inch I.D. Standard Penetration Sampler (ASTM Test Method No. 1586). The sampler was driven into the subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the boring logs in the Log of Boring, Appendix A. When correlating standard penetration data in similar soils, the blow counts for the Modified California sampler can be taken as roughly twice that for the Standard Penetration Test sampler in similar soils. Pocket penetration tests were also performed on clay samples to evaluate their consistency. Upon completion of drilling, the boreholes were backfilled with cement grout.

The soil samples were visually classified in the field according to Unified Soil Classification System and then transported to our laboratory for further evaluation and testing. The descriptions of the soils encountered and relevant boring information are presented on the Log of Boring attached in Appendix A. The laboratory test methods and results are presented in Appendix B.

The descriptions and related information presented on the logs of boring depict subsurface conditions only at the locations indicated on the plan and on the particular date noted on the logs. Because of the variability from place to place within soil/rock in general, subsurface conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental changes.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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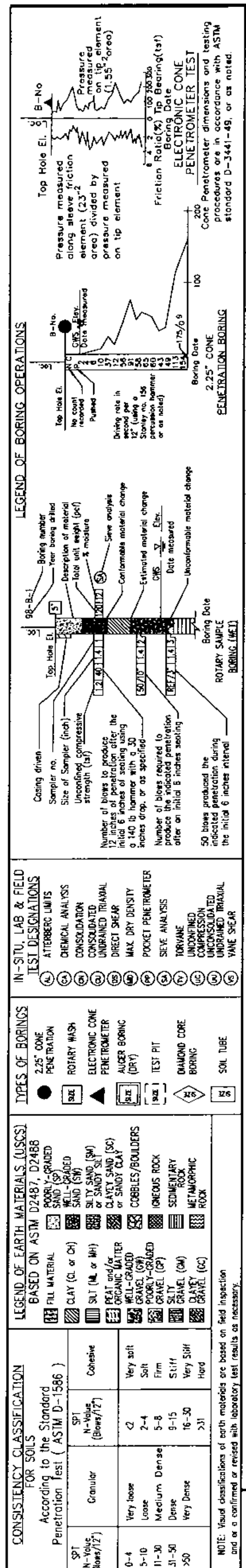
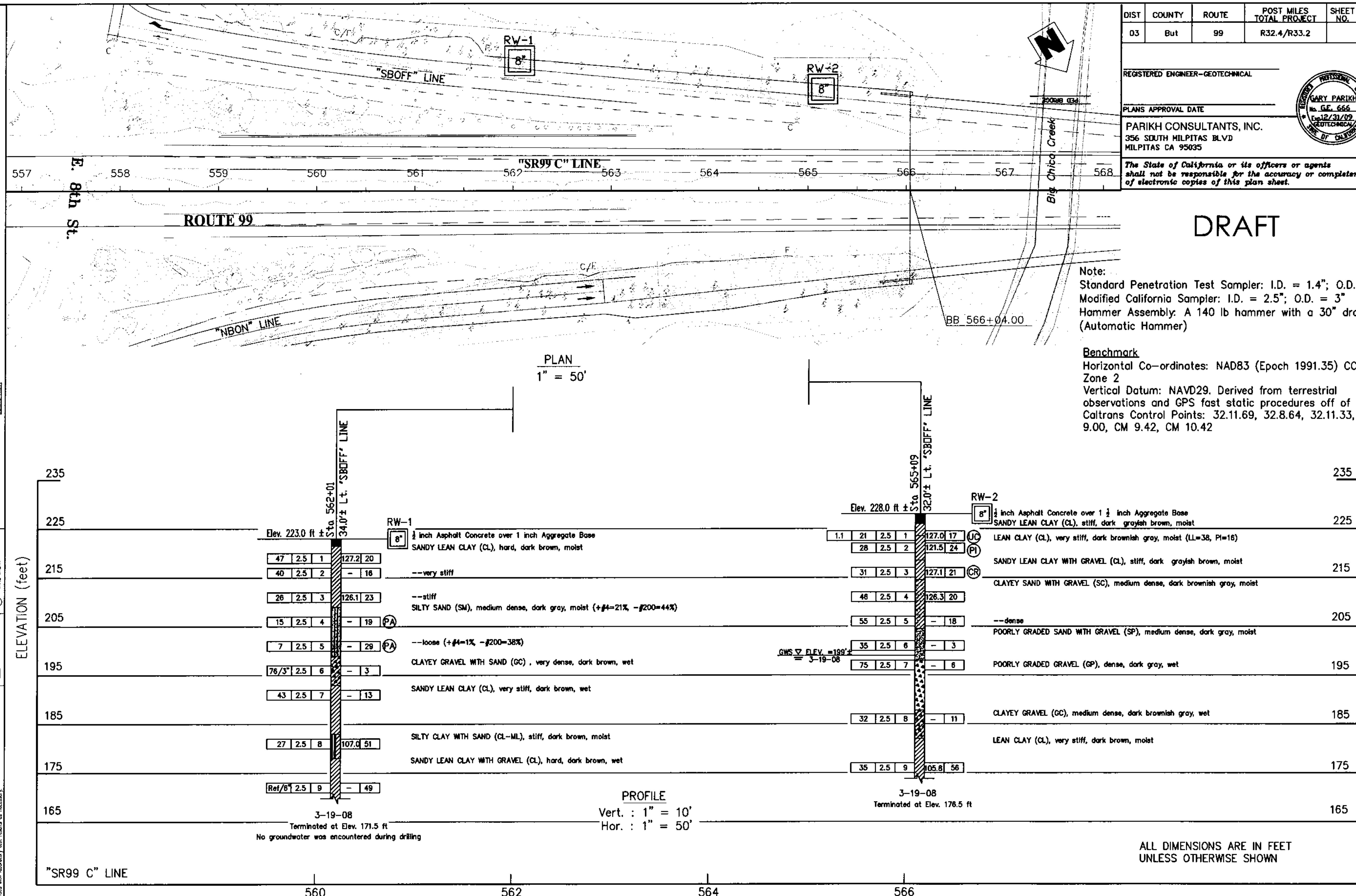
DRAFT

Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

Benchmark
Horizontal Co-ordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42





ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT

SIGN OFF DATE

DESIGN	By: D. GOUTHIER	Field investigation by: V. SANTOS
CHECKED	By: A. LAM	

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

CU 03-199
EA 03-3A0421

STRUCTURE NO. –
KILO POST (PM) –

CHICO SR99 AUXILIARY LANE PROJECT

LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

PLATE A-1

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER-GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

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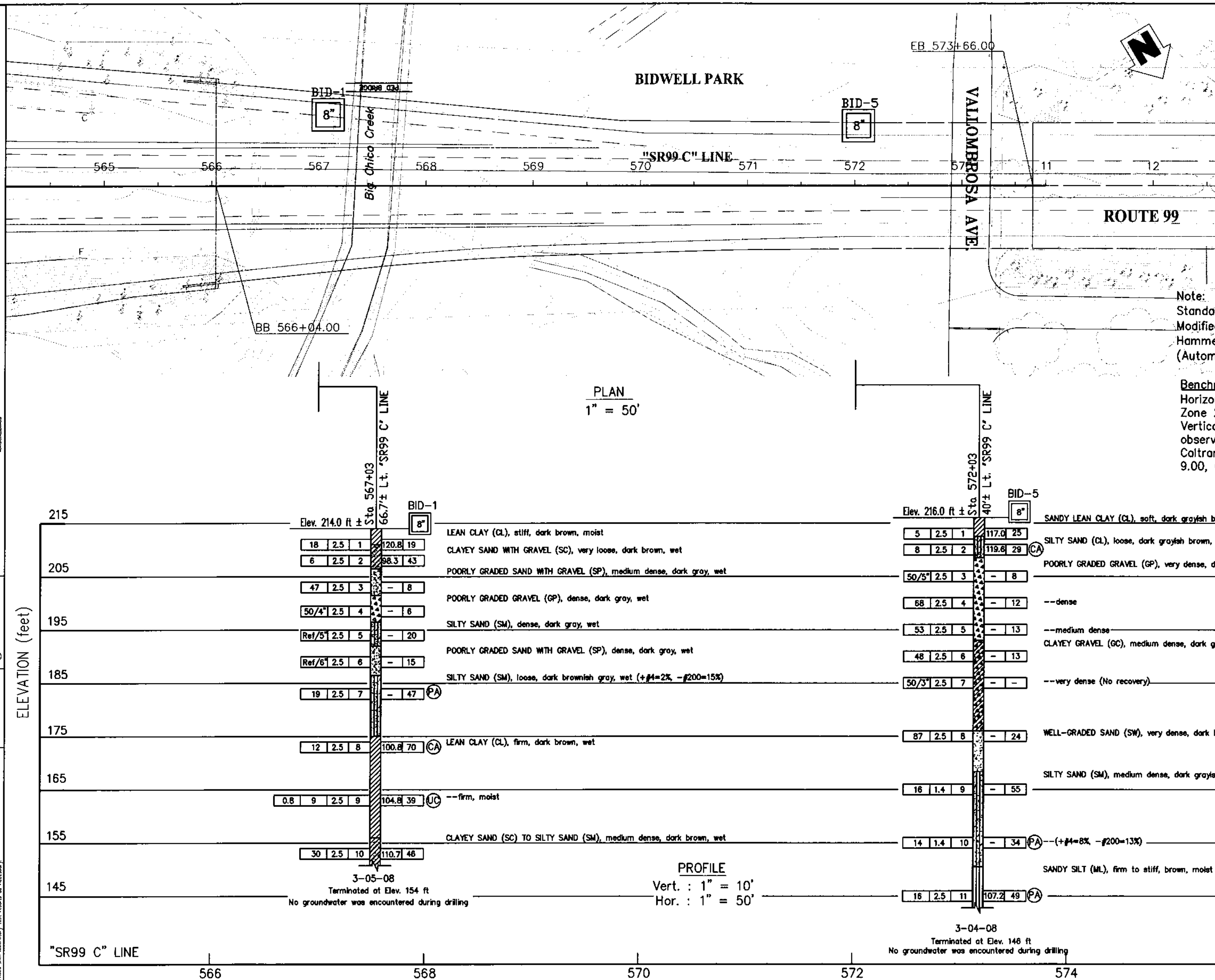
GARY PARIKH No. G.E. 666 Exp.12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

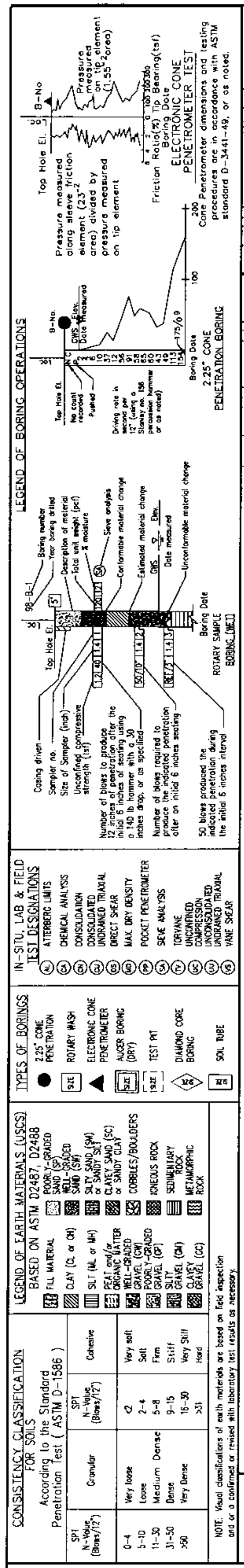
DRAFT



Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

Benchmark
Horizontal Co-ordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN



DESIGN OVERSIGHT
SIGN OFF DATE

DESIGN	By: D. GOUTHIER	Field investigation by:
CHECKED	By: A. LAM	V. SANTOS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

CU 03-199
EA 03-3A0421

STRUCTURE NO. -
KILO POST (PM) -

CHICO SR99 AUXILIARY LANE PROJECT
LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-2

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER–GEOTECHNICAL

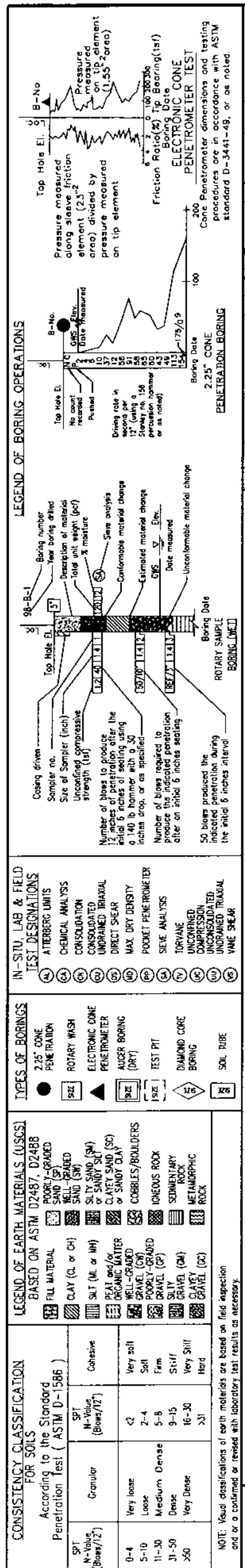
PLANS APPROVAL DATE

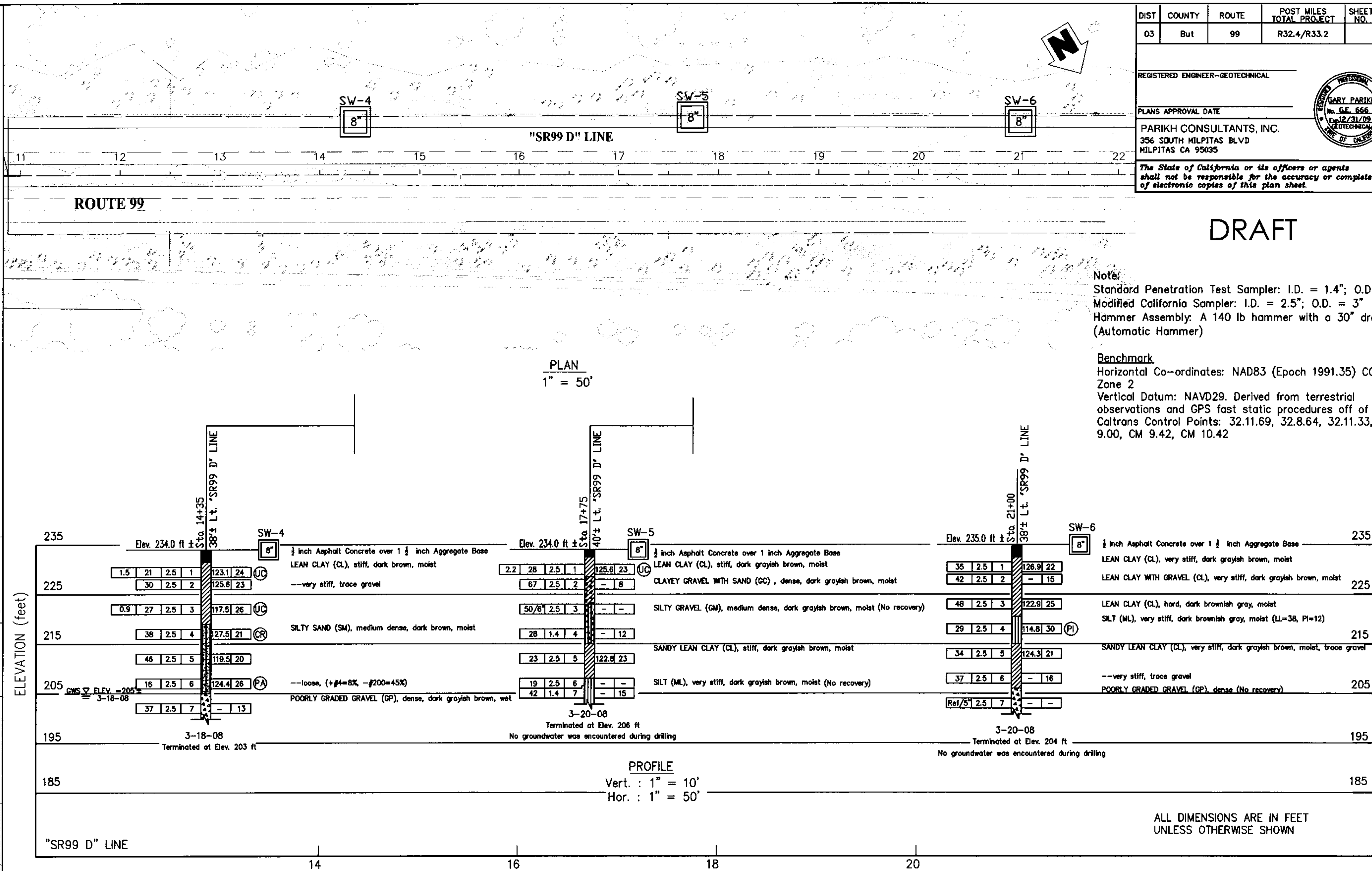
PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. GE 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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

DRAFT





Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

Benchmark
Horizontal Co-ordinates: NAD83 (Epoch 1991.35) CCS 83 Zone 2
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT
SIGN OFF DATE

DESIGN By: D. GOUTHIER
CHECKED By: A. LAM
Field investigation by: V. SANTOS

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

STRUCTURE NO. -
KILO POST (PM) -

CHICO SR99 AUXILIARY LANE PROJECT
LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5
CU 03-199
EA 03-3A0421
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-3

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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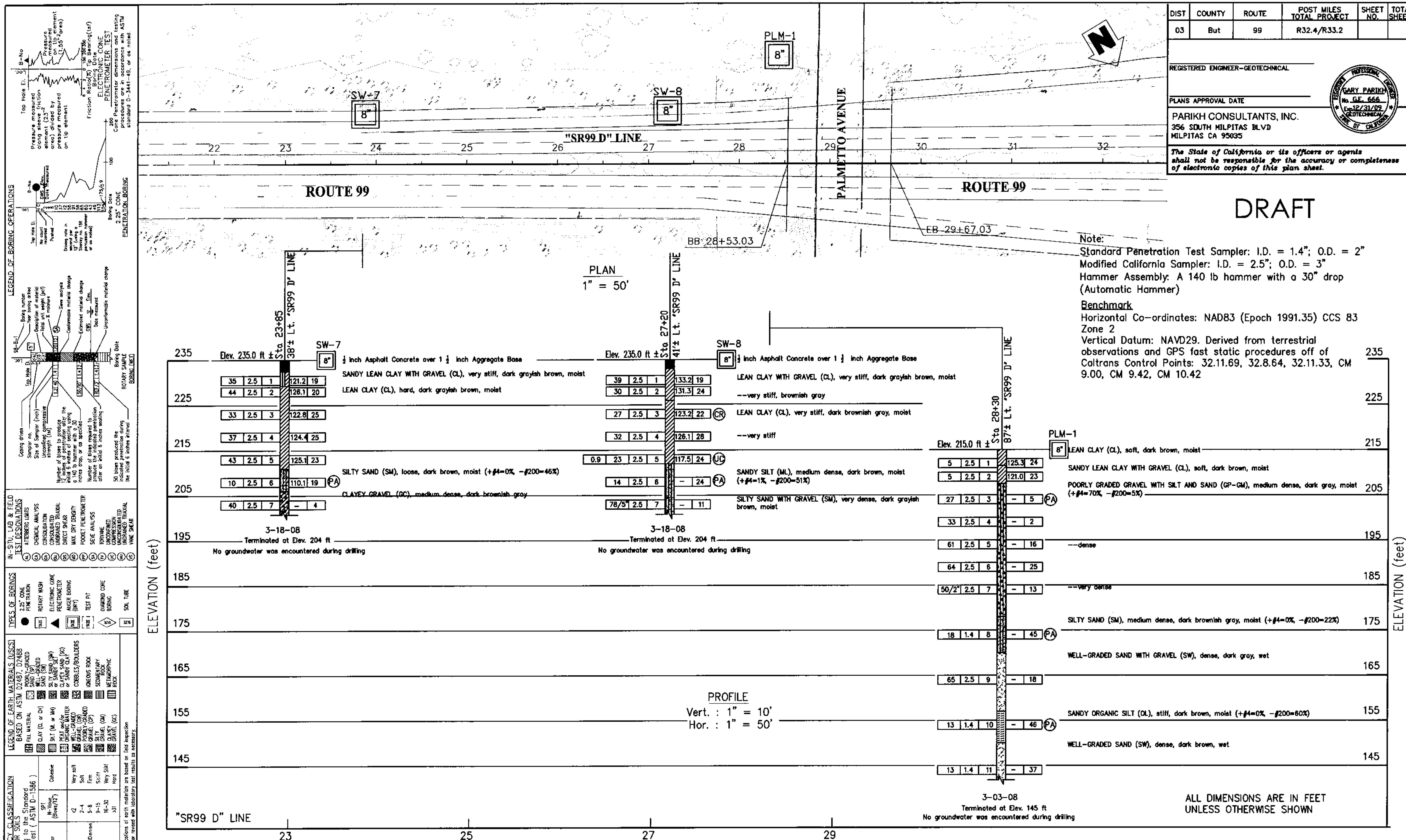

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DESIGN OVERSIGHT
SIGN OFF DATE

DESIGN By: D. GOUTHIER
CHECKED By: A. LAM

Field Investigation by: V. SANTOS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

CU 03-199
EA 03-3A0421

STRUCTURE NO. -
KILO POST (PM) -

CHICO SR99 AUXILIARY LANE PROJECT
LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-4

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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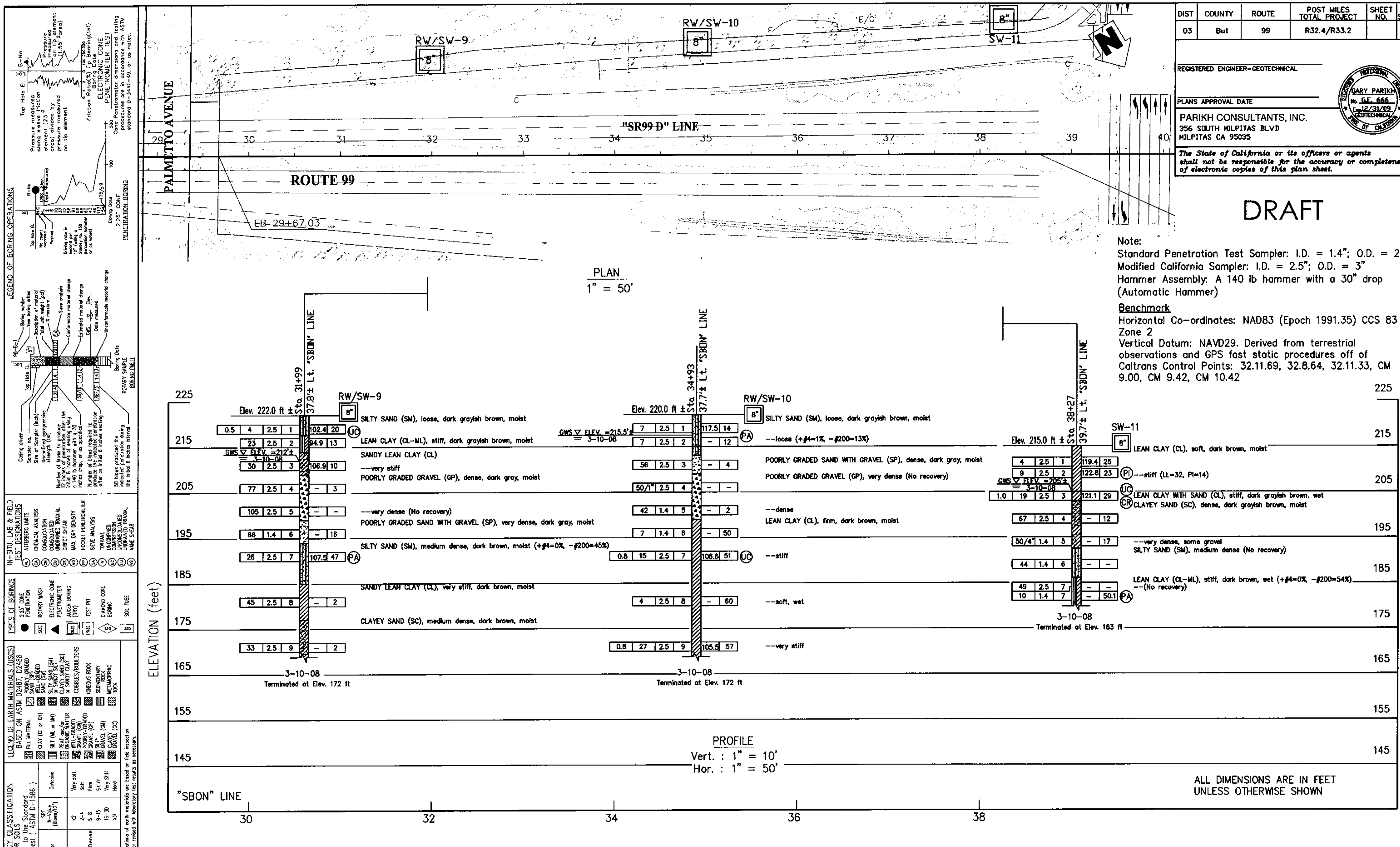

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Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT

SIGN OFF DATE

DESIGN By: D. GOUTHIER
CHECKED By: A. LAM

Field investigation by: V. SANTOS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

CU 03-199
EA 03-3A0421

STRUCTURE NO. -
KILO POST (PM) -

DISREGARD PRINTS BEARING EARLIER REVISION DATES

CHICO SR99 AUXILIARY LANE PROJECT

LOG OF TEST BORINGS

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-5

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER-GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. GE 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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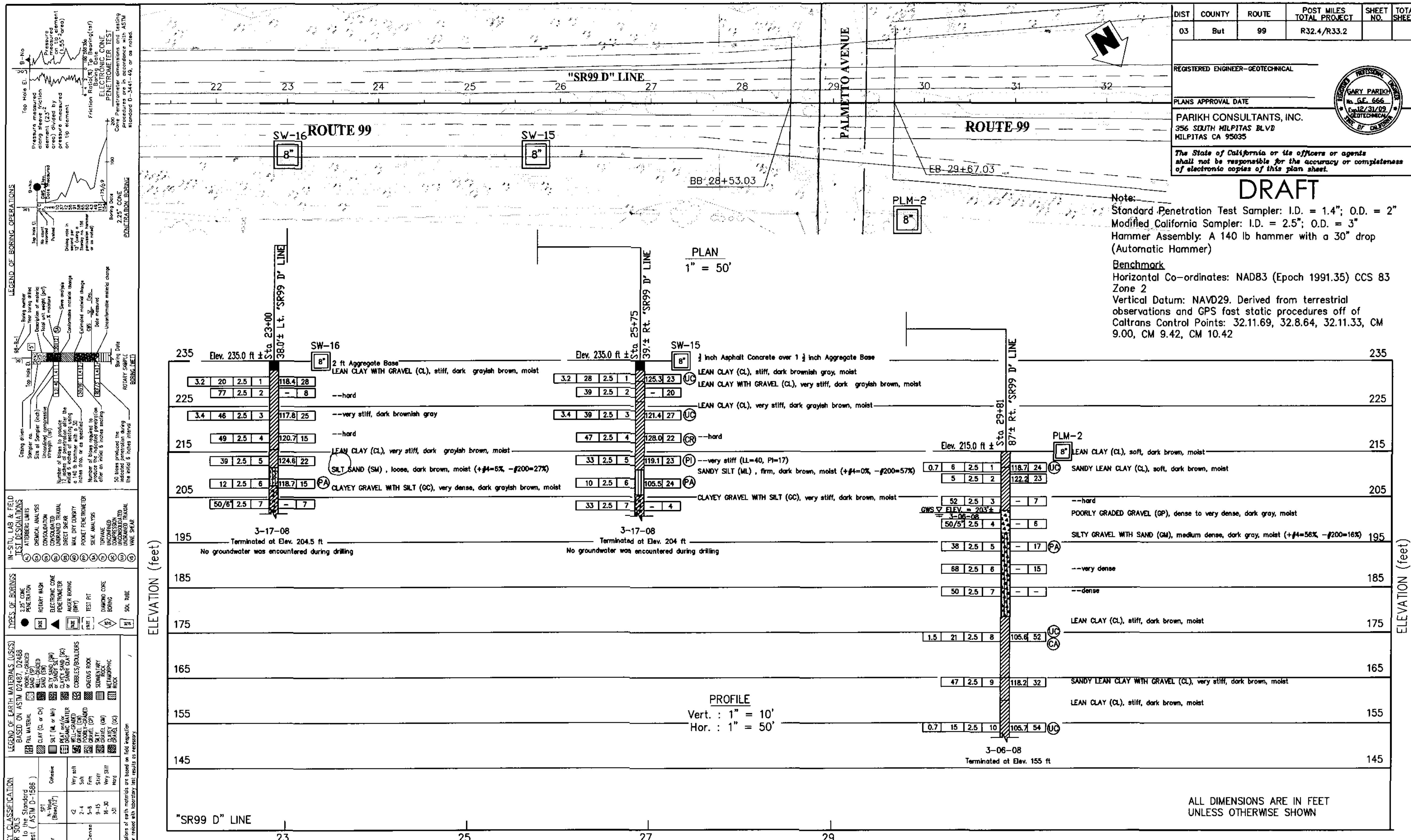

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DESIGN OVERSIGHT

SIGN OFF DATE

DESIGN	By: D. GOUTHIER	Field investigation by: V. SANTOS
CHECKED	By: A. LAM	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

CU 03-199
EA 03-3A0421

STRUCTURE NO. -
KILO POST (PM) -

CHICO SR99 AUXILIARY LANE PROJECT

LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-6

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER–GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. GE 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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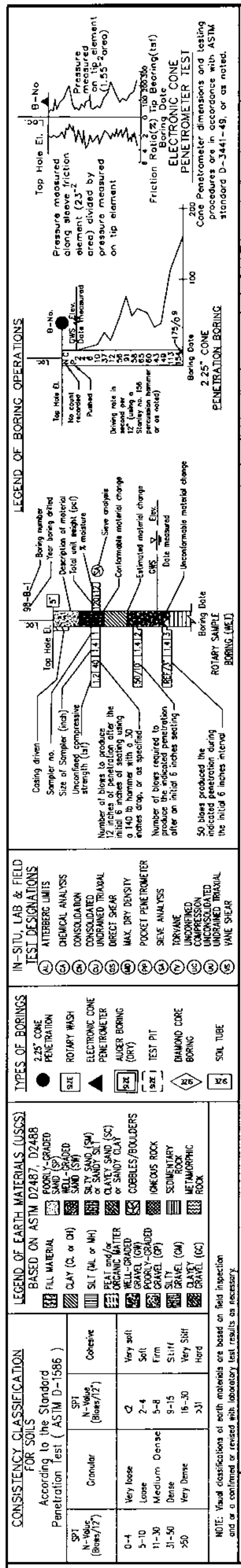

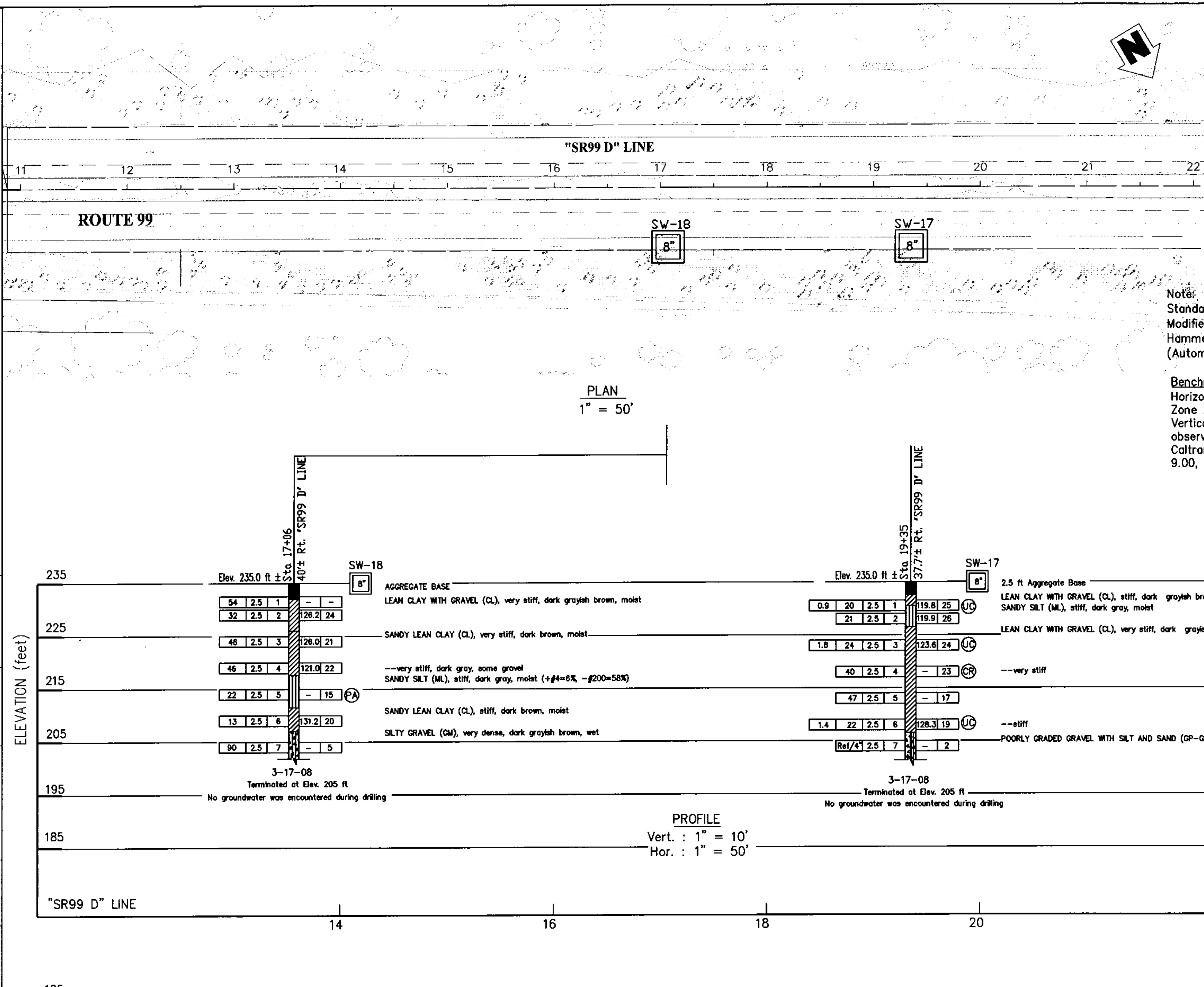

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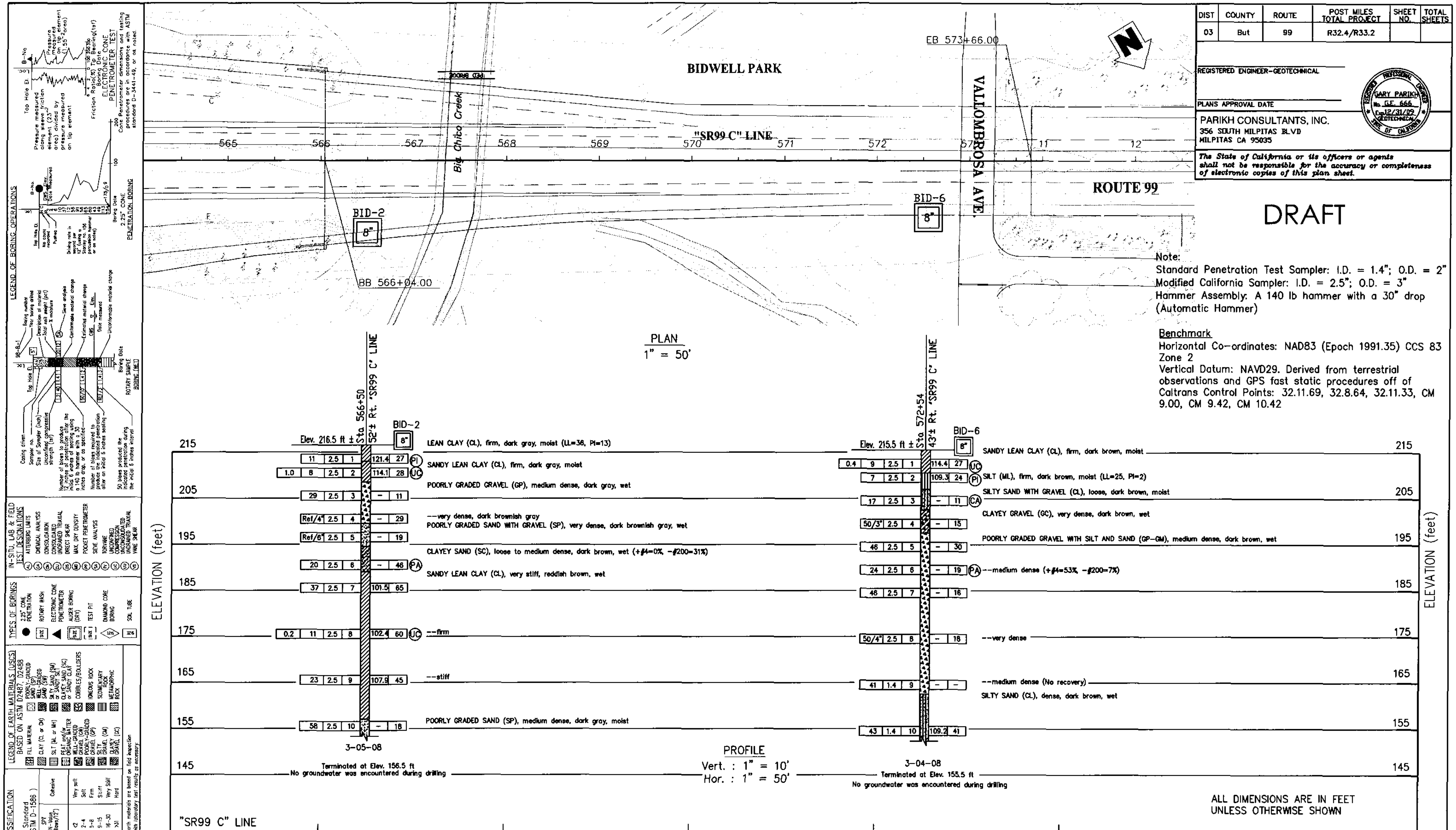
DESIGN OVERSIGHT	DESIGN	By: D. GOUTHIER	Field investigation by:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	A. LAM PROJECT ENGINEER	STRUCTURE NO. –	CHICO SR99 AUXILIARY LANE PROJECT
SIGN OFF DATE	CHECKED	By: A. LAM	V. SANTOS			KILO POST (PM) –	LOG OF TEST BORINGS
			ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5		CU 03-199 EA 03-3A0421	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

PLATE A-7



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER-GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. G.E. 666 Exp.12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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DRAFT

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ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT
SIGN OFF DATE

DESIGN By: D. GOUTHIER
CHECKED By: A. LAM
Field investigation by: V. SANTOS

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

STRUCTURE NO. –
KILO POST (PM) –

CHICO SR99 AUXILIARY LANE PROJECT
LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5
CU 03-199
EA 03-3A0421
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-8

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	99	R32.4/R33.2		

REGISTERED ENGINEER-GEOTECHNICAL

PLANS APPROVAL DATE

PARIKH CONSULTANTS, INC.
356 SOUTH MILPITAS BLVD
MILPITAS CA 95035

GARY PARIKH No. G.E. 666 Exp. 12/31/09 GEOTECHNICAL STATE OF CALIFORNIA

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Benchmark
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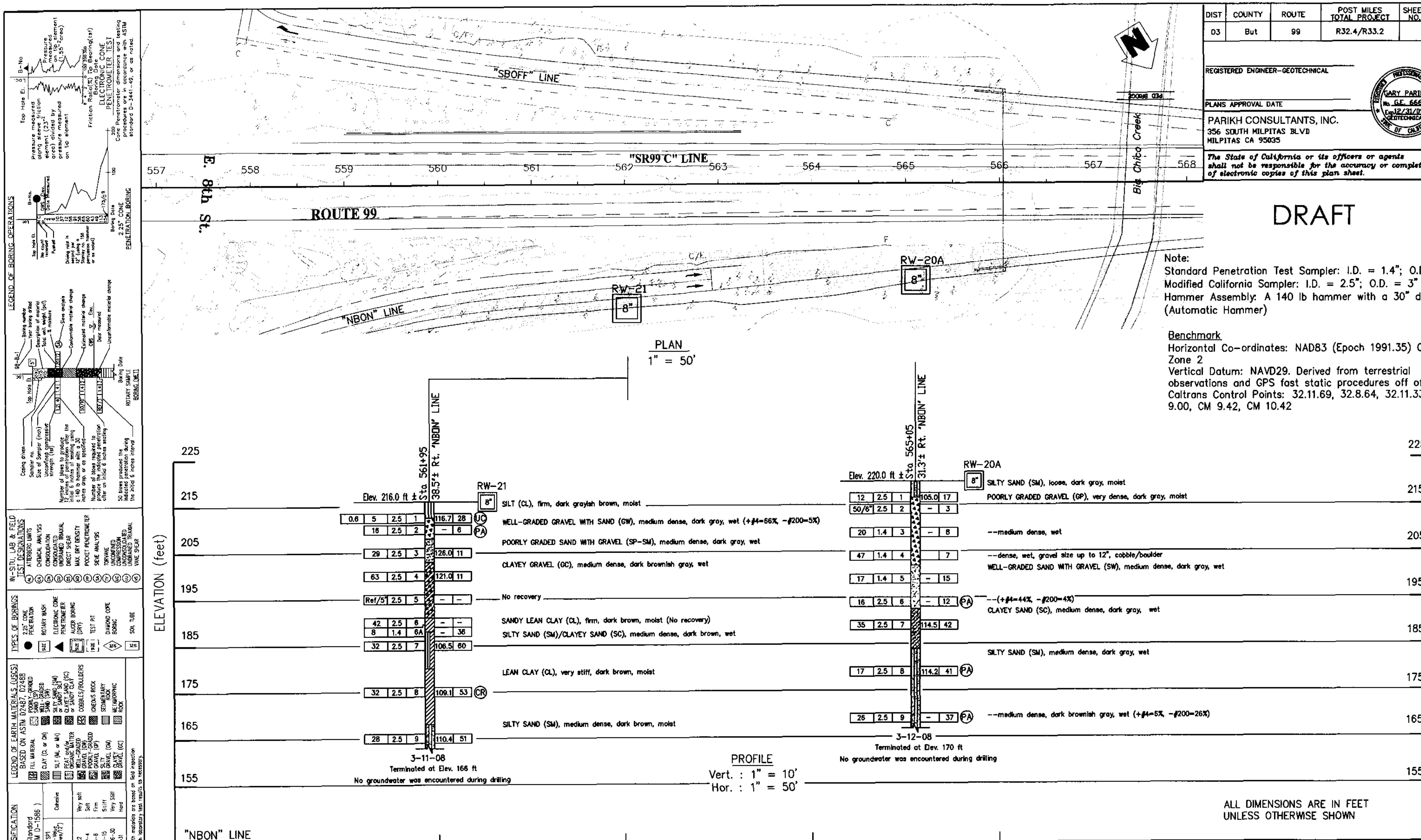
Vertical Datum: NAVD29. Derived from terrestrial observations and GPS fast static procedures off of Caltrans Control Points: 32.11.69, 32.8.64, 32.11.33, CM 9.00, CM 9.42, CM 10.42



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN	By: D. GOUTHIER	Field Investigation by: V. SANTOS
CHECKED	By: A. LAM	

DESIGN OVERSIGHT

SIGN OFF DATE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

A. LAM
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03-199
EA 03-3A0421

STRUCTURE NO. -
KILO POST (PM) -

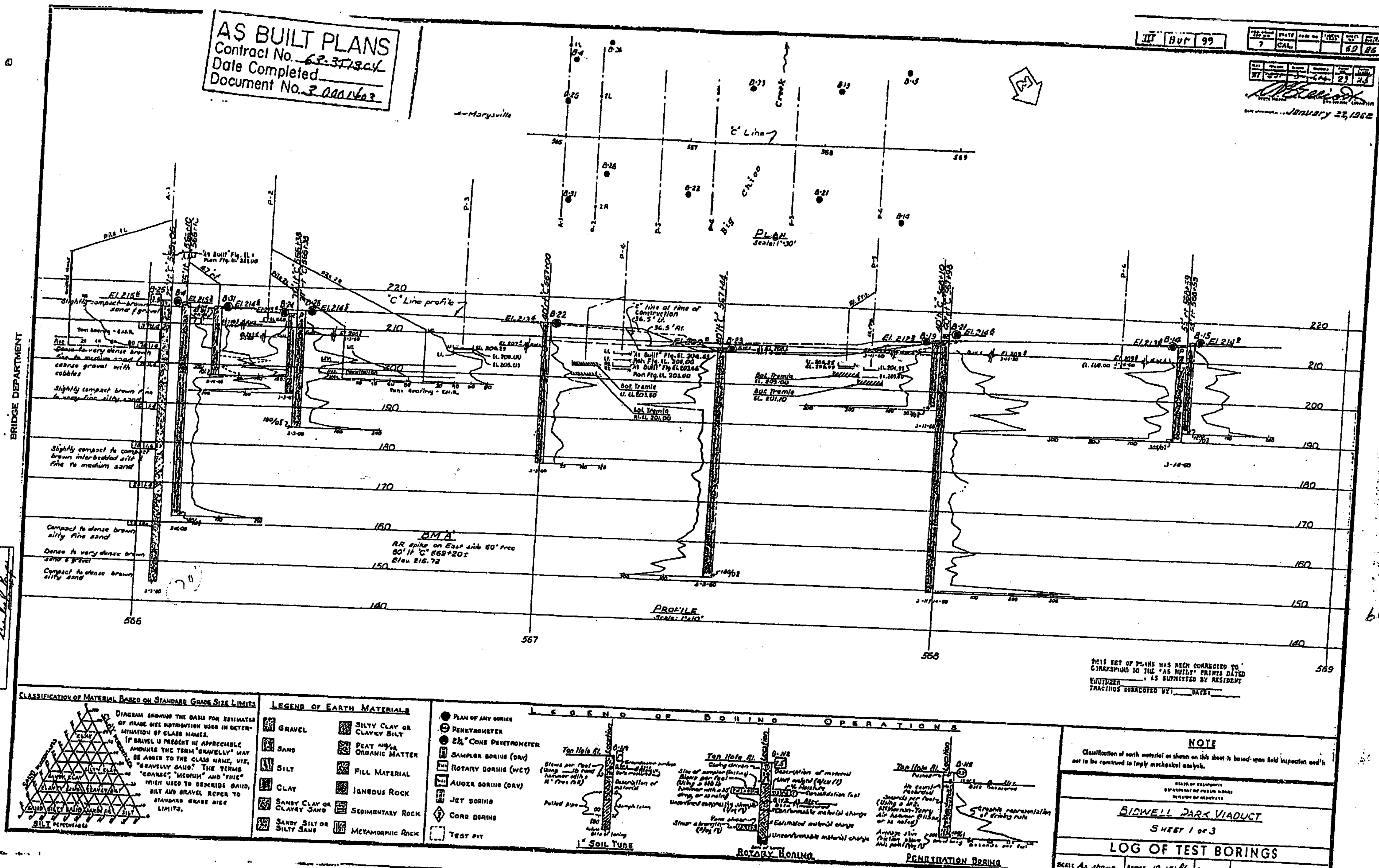
CHICO SR99 AUXILIARY LANE PROJECT

LOG OF TEST BORINGS

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

PLATE A-9



THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ______, AS SUBMITTED BY RESIDENT ENGINEER ______
TRACINGS CORRECTED BY: ______ DATE: ______

NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BIDWELL PARK VIADUCT

SHEET 1 OF 3

LOG OF TEST BORINGS

SCALE As shown | BRIDGE 12-151 R/L | FILE | DRAWING C-12151-23

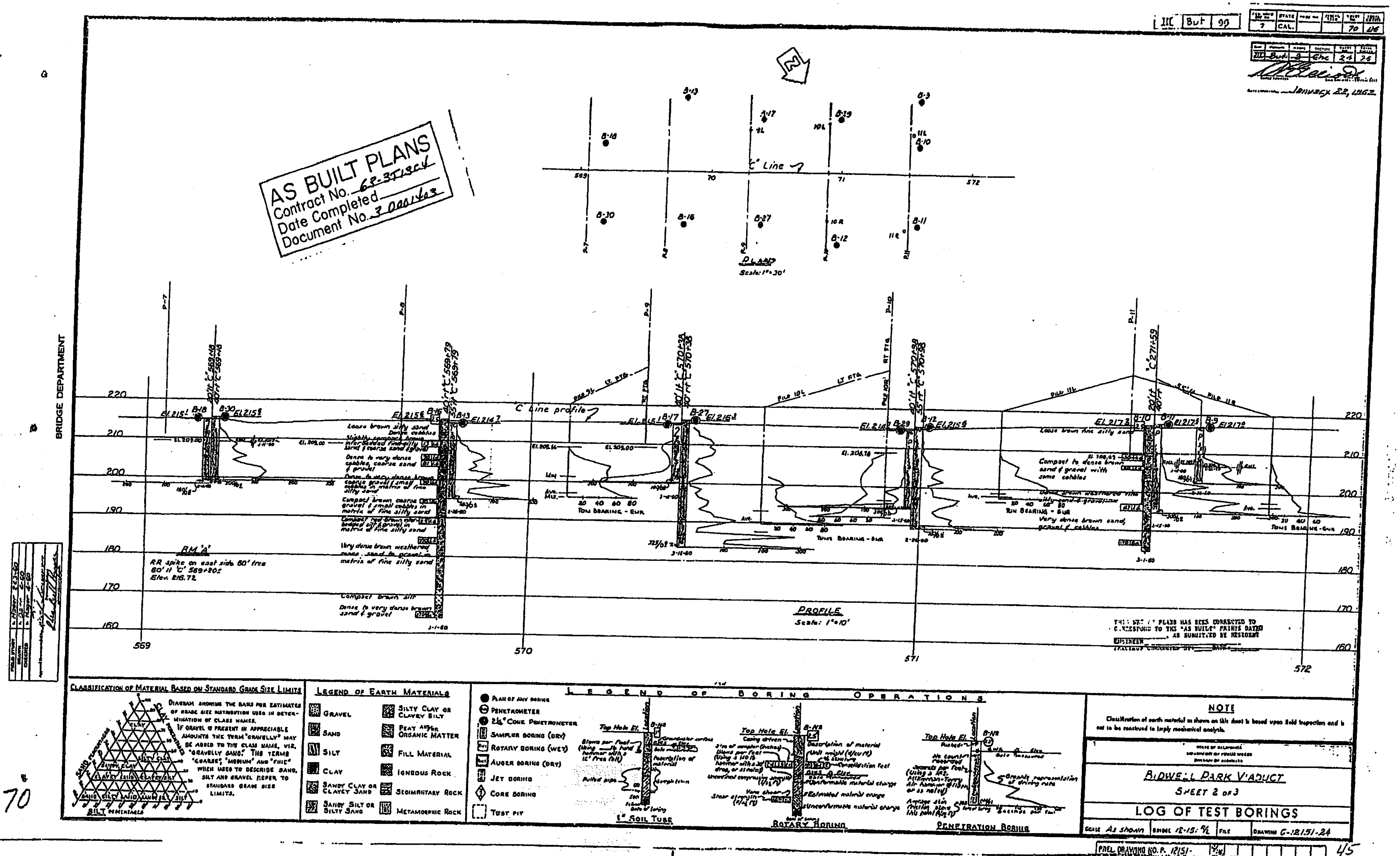
PREL. DRAWING NO. P-12151- R/L

44

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 1/7/77 SIGNATURE TITLE S.P. [illegible]

69

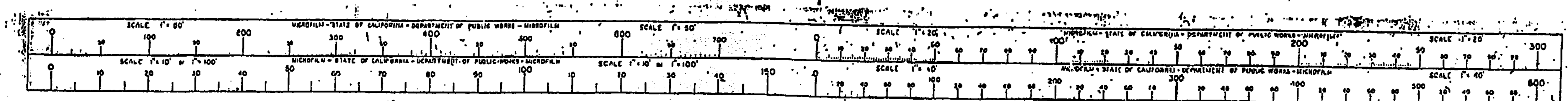


70

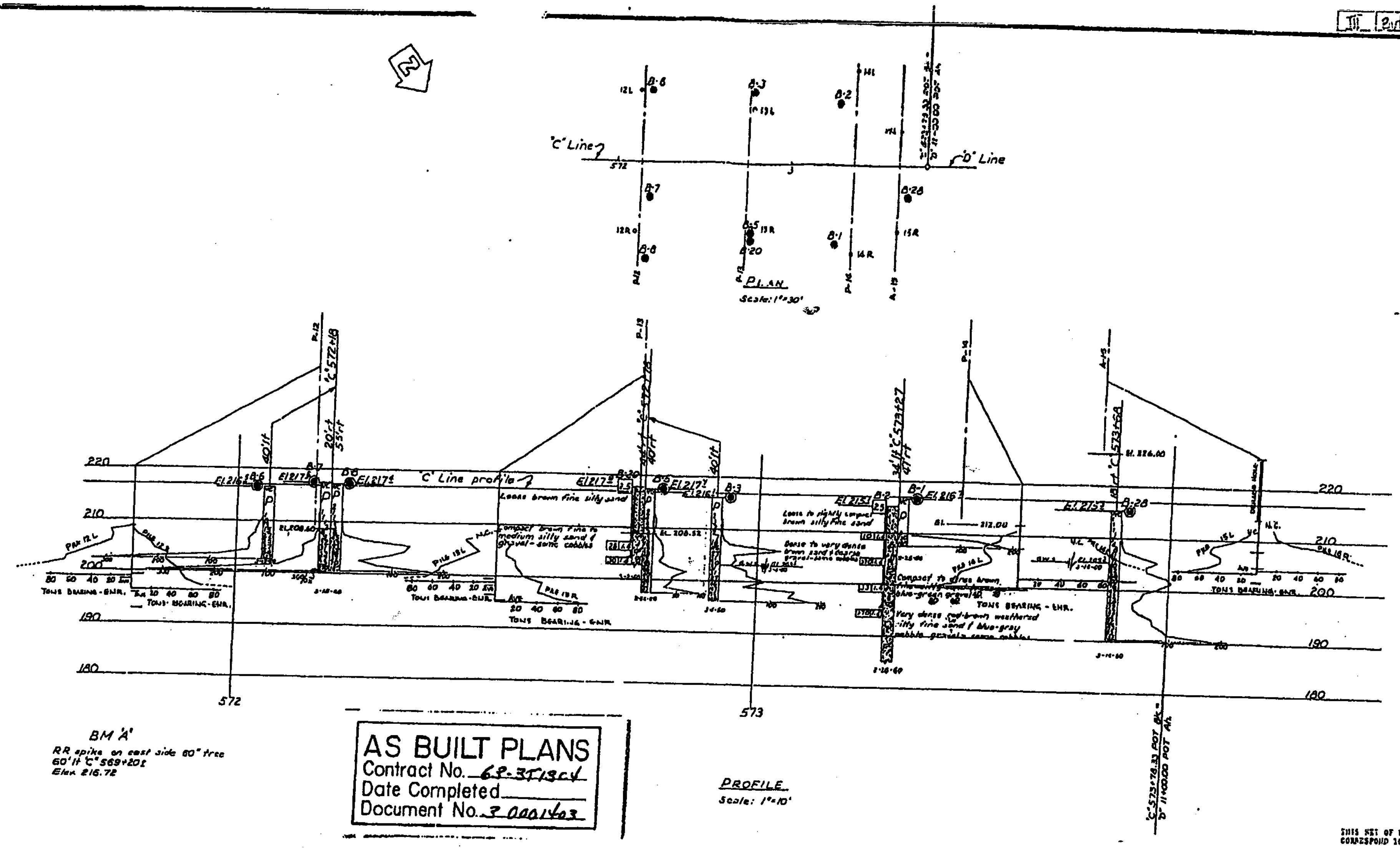
45

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 1/7/72 SIGNATURE [signature] TITLE Sr. [illegible]

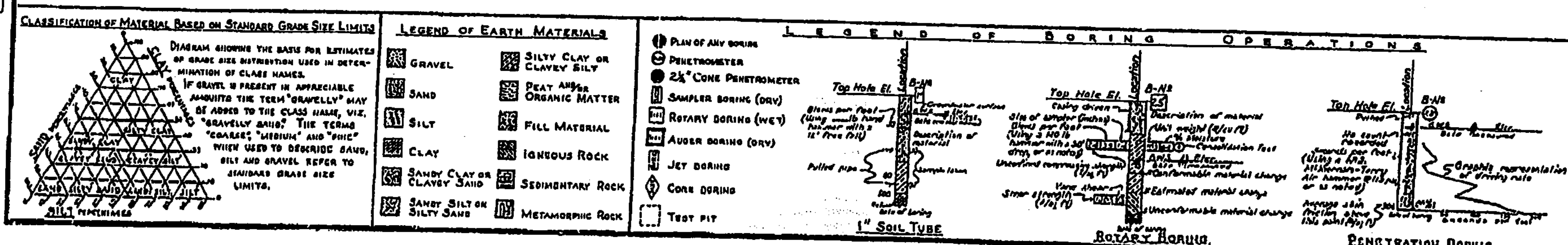


Caltrans



AS BUILT PLANS
Contract No. 63-3T13C4
Date Completed
Document No. 30001403

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ______, AS SUBMITTED BY RESIDENT ENGINEER ______
TRACINGS CORRECTED BY: ____ DATE: ______



NOTE

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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BIDWELL PARK VIADUCT

SHEET 3 of 3

LOG OF TEST BORINGS

SCALE As shown	BRIDGE 12-151 R/L	FILE	DRAWING C-12151-25

PREL. DRAWING NO. P. 12151

January 22, 1962

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.
DATE 3/2/72 SIGNATURE ______ TITLE S.P. Cma

71

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
03	But	99	R52.9/R53.3		

GEOTECHNICAL PROFESSIONAL — DATE 7-6-06

E. 1ST AVE. NB OFF-RAMP RET. WALL

LOG OF TEST BORINGS

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 03198
EA: 3A0401

BRIDGE No. 12E0001

Sheet 13 of 14

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/07 — GEOTECHNICAL — STATE OF CALIFORNIA

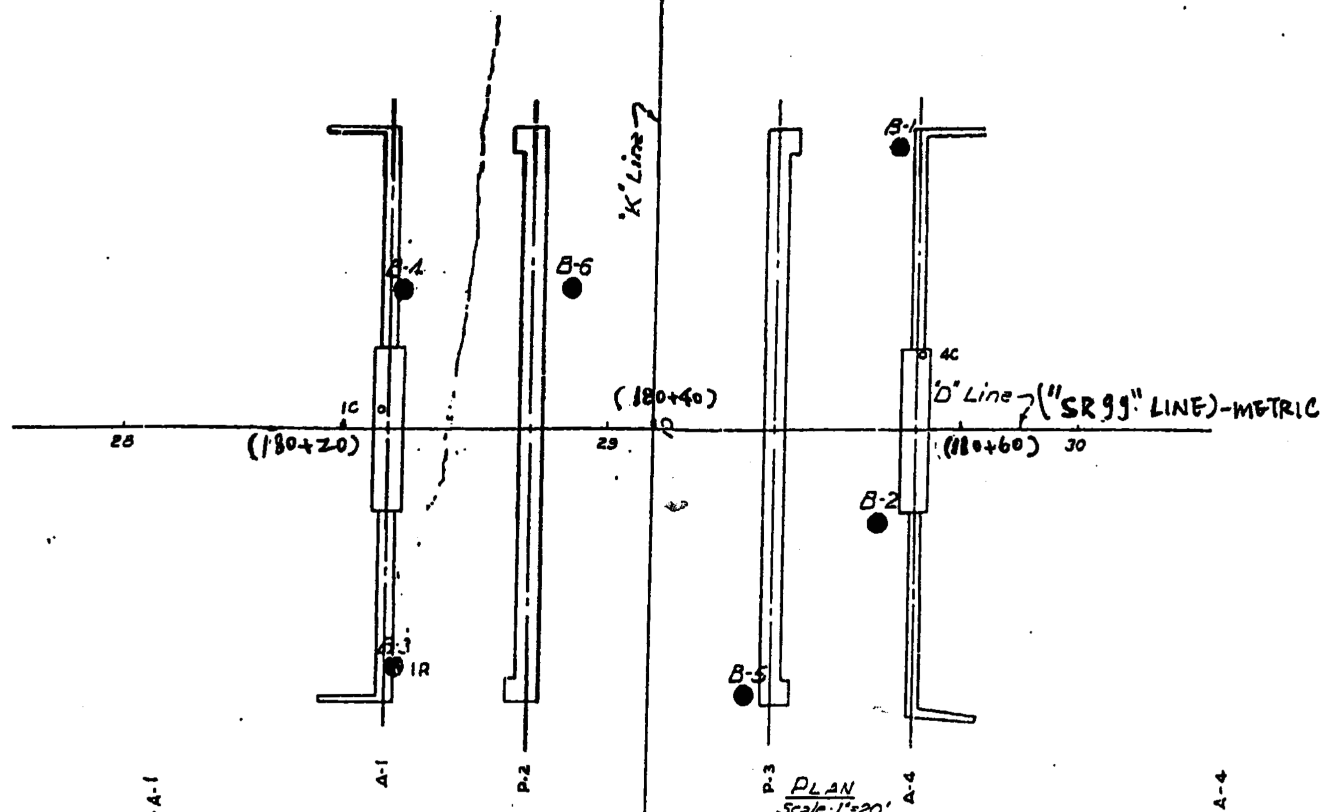
AS BUILT PLANS
Contract No. 03-3T13C4
Date Completed
Document No. 30001403

Revisions made to this Log of Test Borings from the Original 1960 is the addition of the following table:

1. "SR99" Line (metric) was added.
2. The Division of Structure Design produced the data presented in the table below, based upon a direct conversion from English to Metric and referenced to the existing structure location. This table is presented on the "As-built" Log of Test Boring sheet for the convenience of any bidder, contractor, or other interested party.
3. Metric boring locations are as follows:

Boring	Stations	Offset from "FRM" Line
B-1	180+55	17.7 m Lt.
B-2	180+54	5.8 m Rt.
B-3	180+23	8.8 m Rt.
B-4	180+23	8.8 m Lt.
B-5	180+46	16.8 m Rt.
B-6	180+34	5.6 m Lt.

4. See the "Log of Test Borings" date January 2005, for stationing.
"D" Line: Sta. 29+00 (English) = "SR99" Line Sta. 180+37 (Metric)



PLAN
Scale: 1"=20'

BM 29
R.R. spike in power pole 295'± lt "D" 29+00±
Elev. 214.825

Design pile loading: 45T

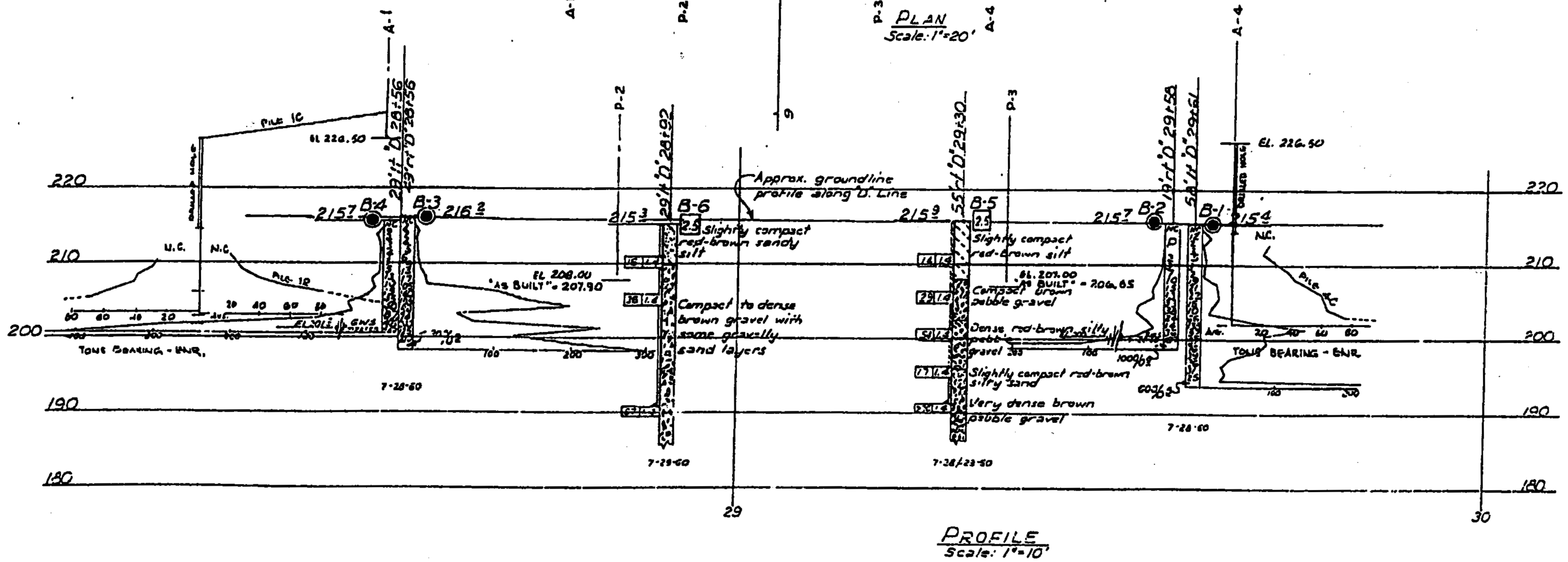
Type Pile: Macco spun pile

Diameter: Tip 10" Butt 16"

Total number piles: 42

Lineal Ft. piles called for on plans: 1195

Hammer: Vulcan No. 1



PROFILE
Scale: 1"=10'

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ______, AS SUBMITTED BY RESIDENT ENGINEER ______
ENGINEER CORRECTED BY: ______ DATE: ______

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

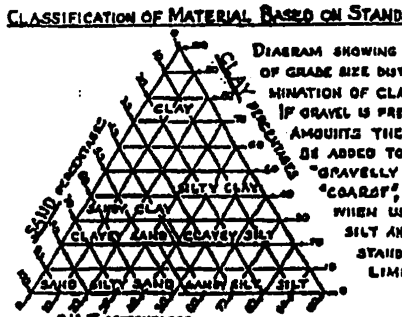


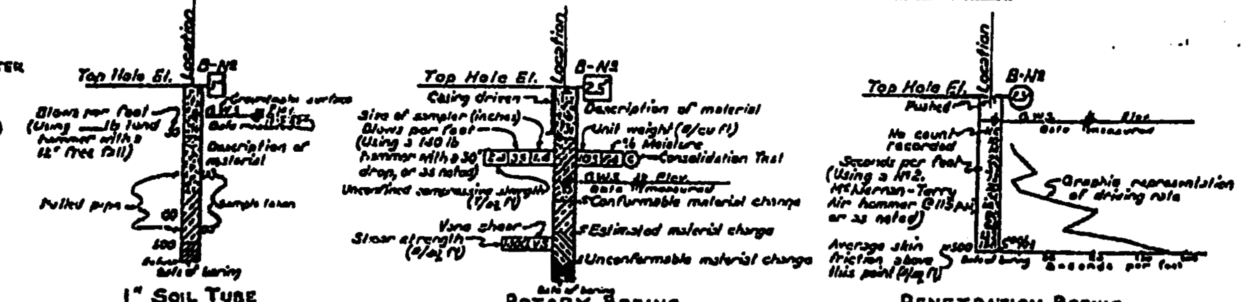
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

GRAVEL — SILTY CLAY OR CLAYEY SILT
SAND — PEAT AND/OR ORGANIC MATTER
SILT — FILL MATERIAL
CLAY — IGNEOUS ROCK
SANDY CLAY OR CLAYEY SAND — SEDIMENTARY ROCK
SANDY SILT OR SILTY SAND — METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

PLAN OF ANY BORING
PENETROMETER
2½" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (WET)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT



NOTE

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STATE OF CALIFORNIA

PALMETTO AVENUE UNDERCROSSING

LOG OF TEST BORINGS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	BUT	99	R52.9/R53.3		

GEOTECHNICAL PROFESSIONAL 7-6-06

PLANS APPROVAL DATE

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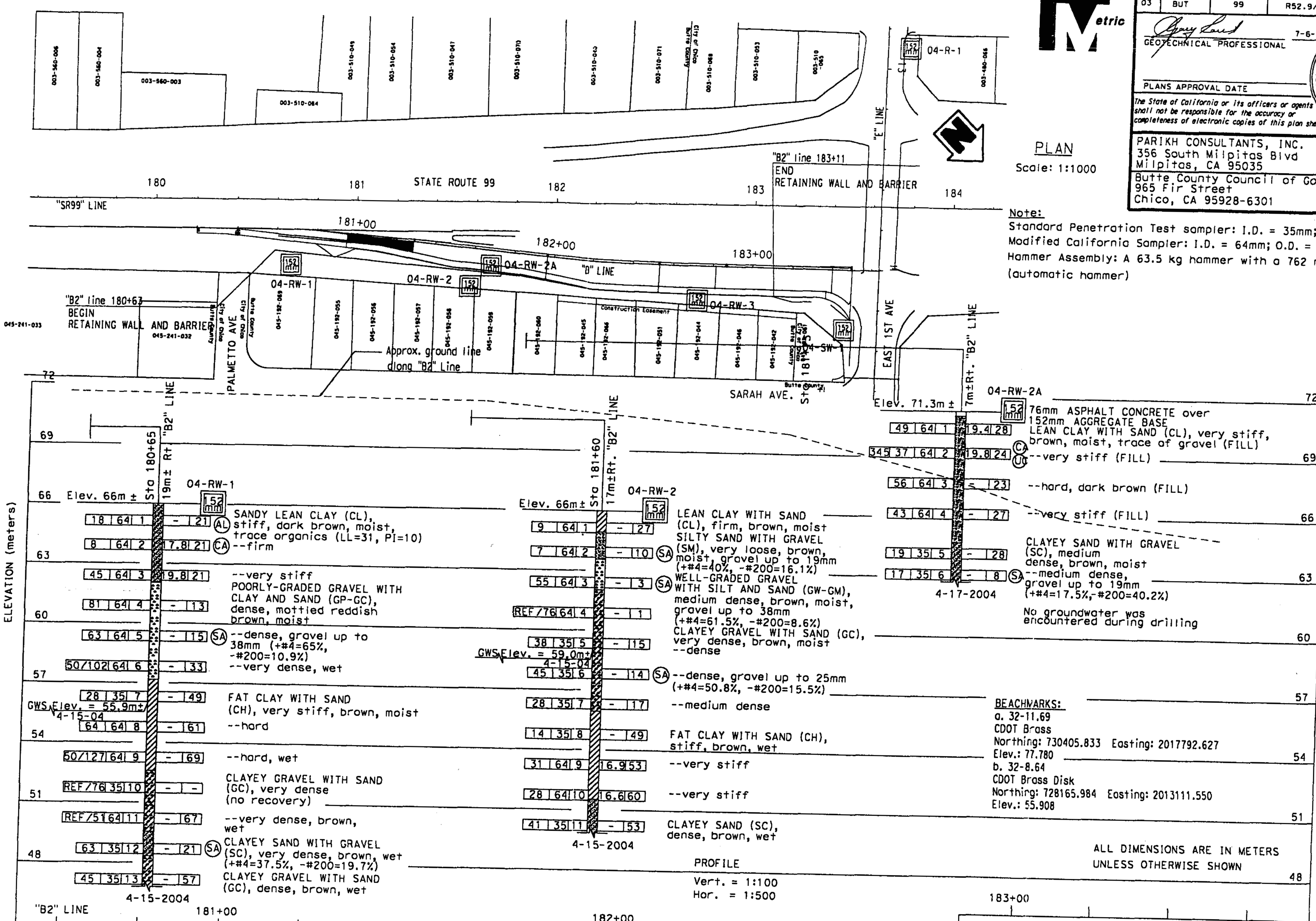
REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/07 GEOTECHNICAL STATE OF CALIFORNIA

PARIKH CONSULTANTS, INC.
356 South Milpitas Blvd
Milpitas, CA 95035

Butte County Council of Governments
965 Fir Street
Chico, CA 95928-6301



Note:
Standard Penetration Test sampler: I.D. = 35mm; O.D. = 50mm
Modified California Sampler: I.D. = 64mm; O.D. = 76mm
Hammer Assembly: A 63.5 kg hammer with a 762 mm drop (automatic hammer)

BENCHMARKS:
a. 32-11.69
CDOT Brass
Northing: 730405.833 Easting: 2017792.627
Elev.: 77.780
b. 32-8.64
CDOT Brass Disk
Northing: 728165.984 Easting: 2013111.550
Elev.: 55.908

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

GEOTECHNICAL LOG OF TEST BORINGS SHEET (METRIC) (REV 6/21/04)

DESIGN OVERSIGHT | SIGN OFF DATE
DRAWN BY: F. WANG/ R. AU
CHECKED BY: A. KOZOMPOLIS
FIELD INVESTIGATION BY: L. BHANGOO
DATE:

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

A. KOZOMPOLIS
PROJECT ENGINEER

BRIDGE NO. 12 E0001
KILOMETER POST R53.0

ROUTE 99 AUX. LANES - PHASE 1
E. 1ST AVE. NB OFF-RAMP RET. WALL
LOG OF TEST BORINGS 1 OF 4

CU 03198
EA 3A0401

DISREGARD PRINTS BEARING EARLIER REVISION DATES

SHEET 11 OF 14

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Caltrans Metric

GEOTECHNICAL PROFESSIONAL 7-6-06

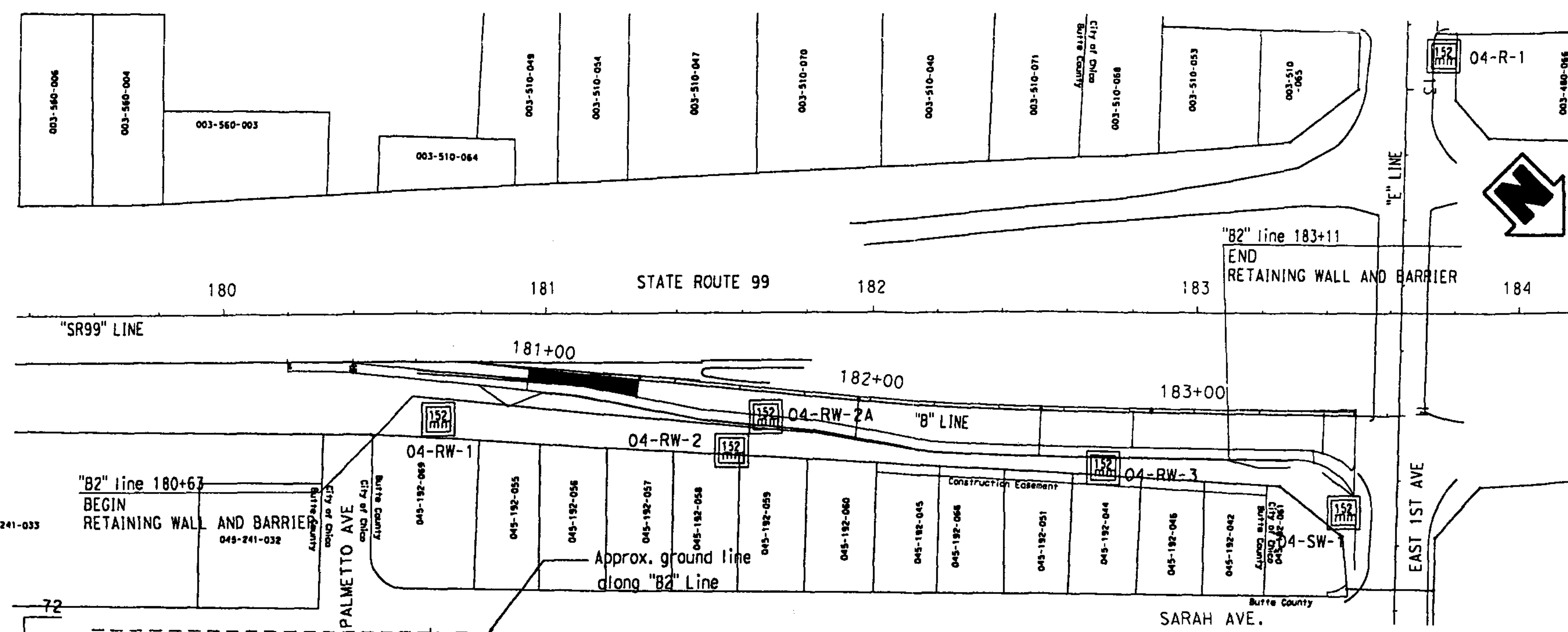
GARY PARIKH No. G.E. 666 Exp. 12/31/07 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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

PARIKH CONSULTANTS, INC.
356 South Milpitas Blvd
Milpitas, CA 95035

Butte County Council of Governments
965 Fir Street
Chico, CA 95928-6301



PLAN

Scale: 1:1000

Note:
Standard Penetration Test sampler: I.D. = 35mm; O.D. = 50mm
Modified California Sampler: I.D. = 64mm; O.D. = 76mm
Hammer Assembly: A 63.5 kg hammer with a 762 mm drop (automatic hammer)

BEACHMARKS:
a. 32-11.69
CDOT Brass
Northing: 730405.833 Easting: 2017792.627
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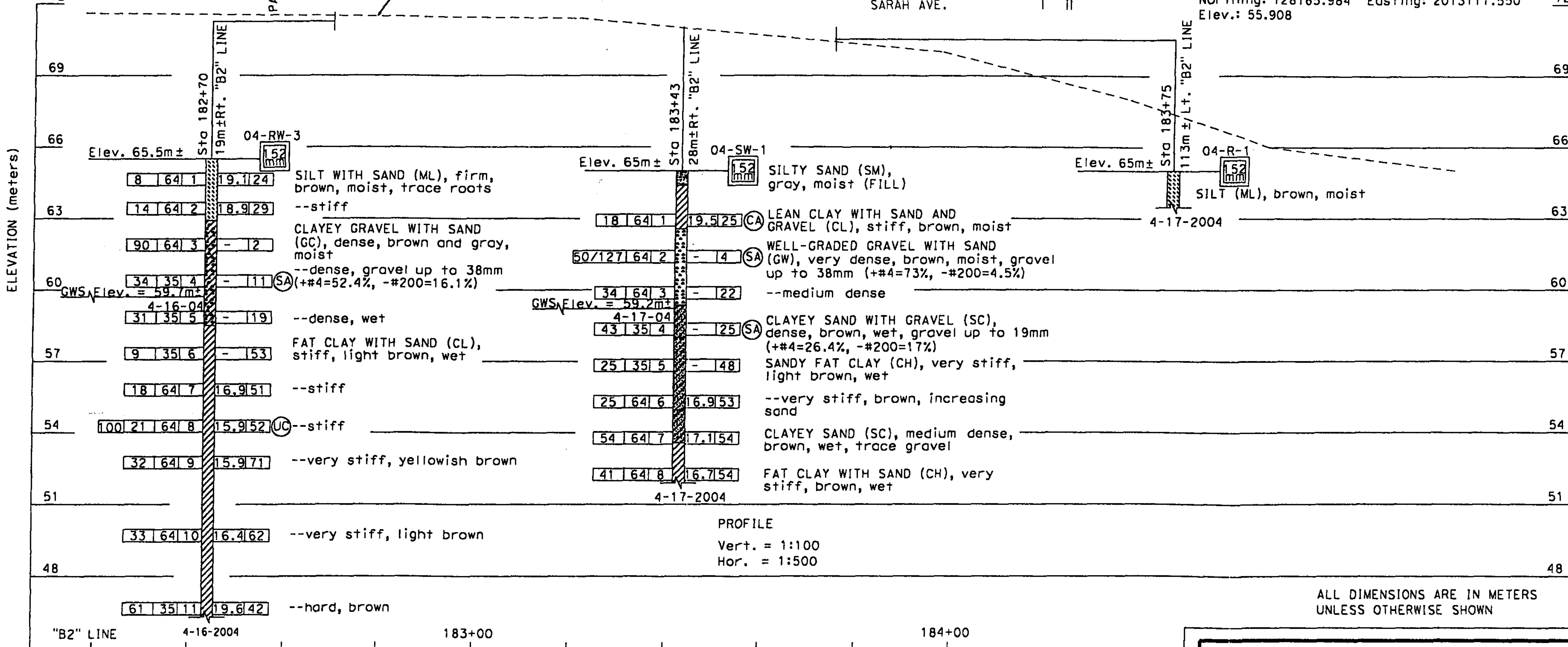
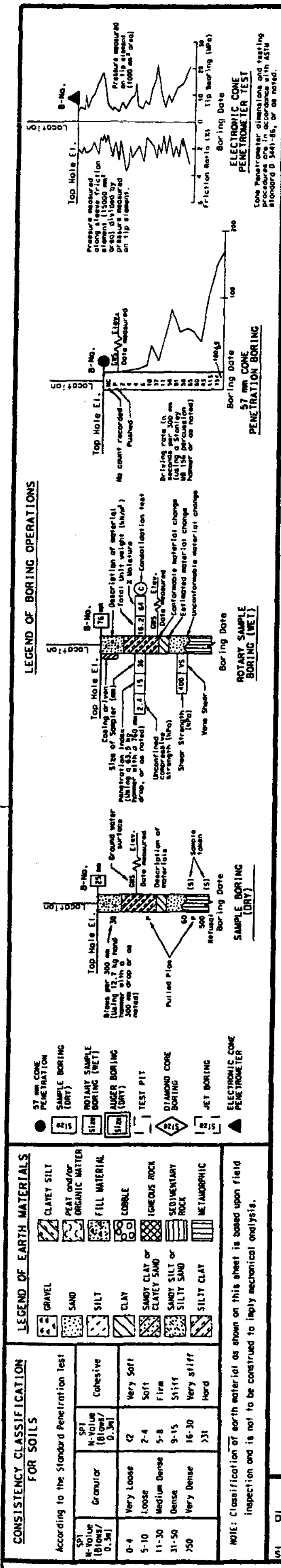
Northing: 728165.984 Easting: 2013111.550
Elev.: 55.908



PROFILE
Vert. = 1:100
Hor. = 1:500

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN



DESIGN OVERSIGHT	DRAWN BY	F. WANG/ R. AU	L. BHANGOO	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	A. KOZOMPOLIS
SIGN OFF DATE	CHECKED BY	A. KOZOMPOLIS	FIELD INVESTIGATION BY: DATE:		PROJECT ENGINEER

BRIDGE NO. 12 E0001
KILOMETER POST R53.0

ROUTE 99 AUX. LANES - PHASE 1
E. 1ST AVE. NB OFF-RAMP RET. WALL
LOG OF TEST BORINGS 2 OF 4

GEOTECHNICAL LOG OF TEST BORINGS SHEET (METRIC) (REV 6/21/04)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 03198
EA 3A0401

DISREGARD PRINTS BEARING EARLIER REVISION DATES

FILE => $REQUEST

USERNAME => $USER $USERDATE PLOTTED => $DATE TIME PLOTTED => $TIME

...\12-E0001-z-ltb01.dgn 7/7/2006 2:05:47 PM

APPENDIX B

APPENDIX B

LABORATORY TESTS

Classification Tests

The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented on "Log of Test Borings", Appendix A.

Moisture-Density

The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D 2216-98. This information was used to classify and correlate the soils. The results are presented at the appropriate depths on the "Log of Test Borings", Appendix A.

Atterberg Limits

The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D 4318-00. The results of these tests are presented on Plate B-2, "Plasticity Chart".

Grain Size Classification

Grain size classification tests (ASTM Test Method D 420) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plates B-3A through B-3F, "Grain Size Distribution Curves".

Unconfined Compression Tests

Strength tests were performed on selected undisturbed sample using unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method D 2166-00. The results are presented on "Log of Test Borings", Appendix A.

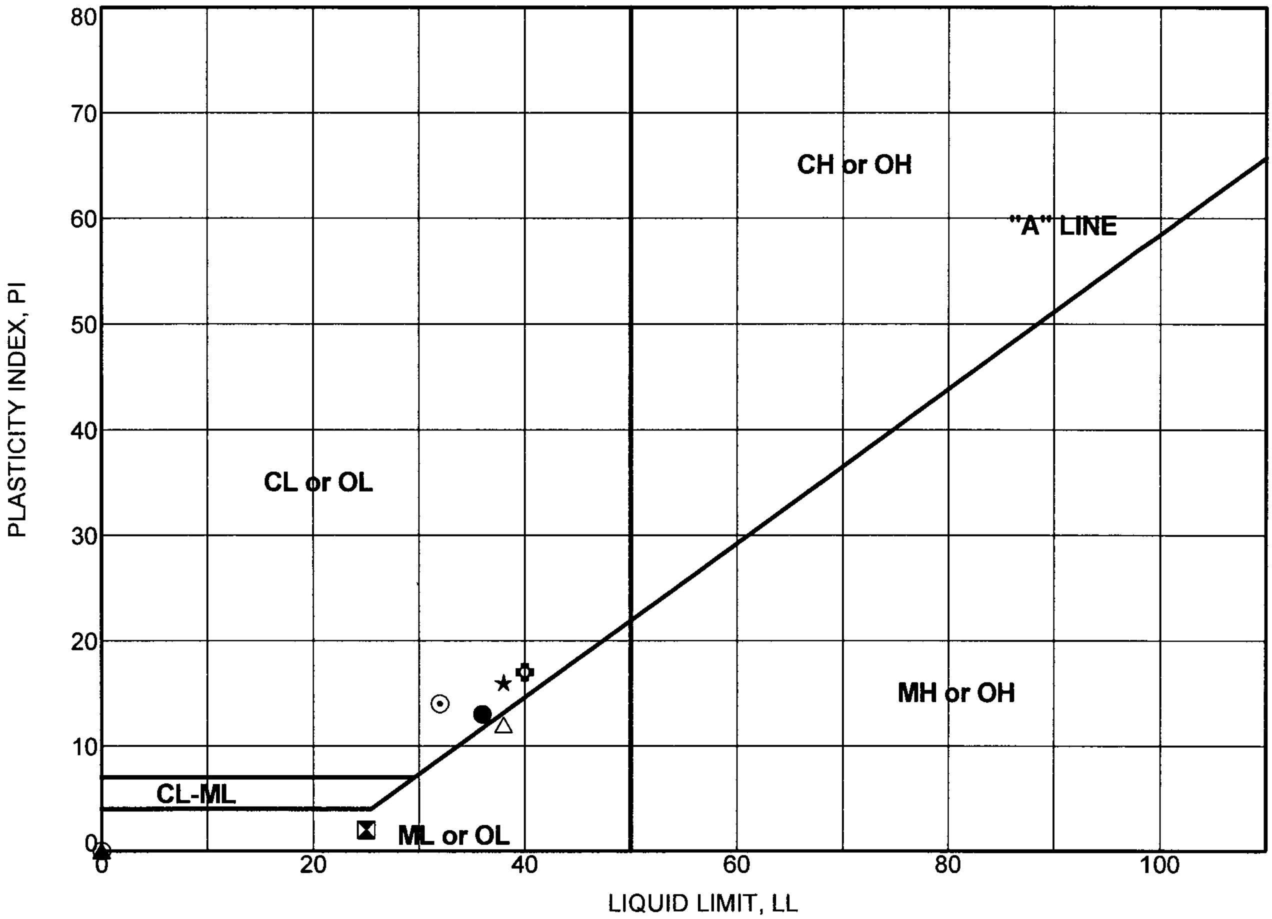
LABORATORY TESTS
(Continued)

Corrosion Tests

Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistivity tests were performed according to California Test Method 643. Sulfate and chloride tests were performed by AnaCon Testing Laboratory. The test results are presented on Plates B-4A through B-4L.

R-value Tests

R-value tests were performed on bulk samples for pavement design. The tests were performed according to California Test Method 301. The test results are presented on Plates B-5A and B-5B.



PLASTICITY CHART

Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
BID-2	MC-1	2.0	●	27	36	23	13	LEAN CLAY (CL)
BID-6	MC-2	5.0	⊠	24	25	23	2	SILT (ML)
PLM-2	MC-9	50.0	▲	32	NP	NP	NP	SANDY SILT (ML)
RW-2	MC-2	6.0	★	24	38	22	16	LEAN CLAY (CL)
SW-11	MC-2	5.0	⊙	23	32	18	14	LEAN CLAY (CL)
SW-15	MC-5	21.0	✿	23	40	23	17	LEAN CLAY (CL)
SW-17	MC-2	6.0	○	26	NP	NP	NP	SANDY SILT (ML)
SW-6	MC-4	16.0	△	30	38	26	12	SILT (ML)

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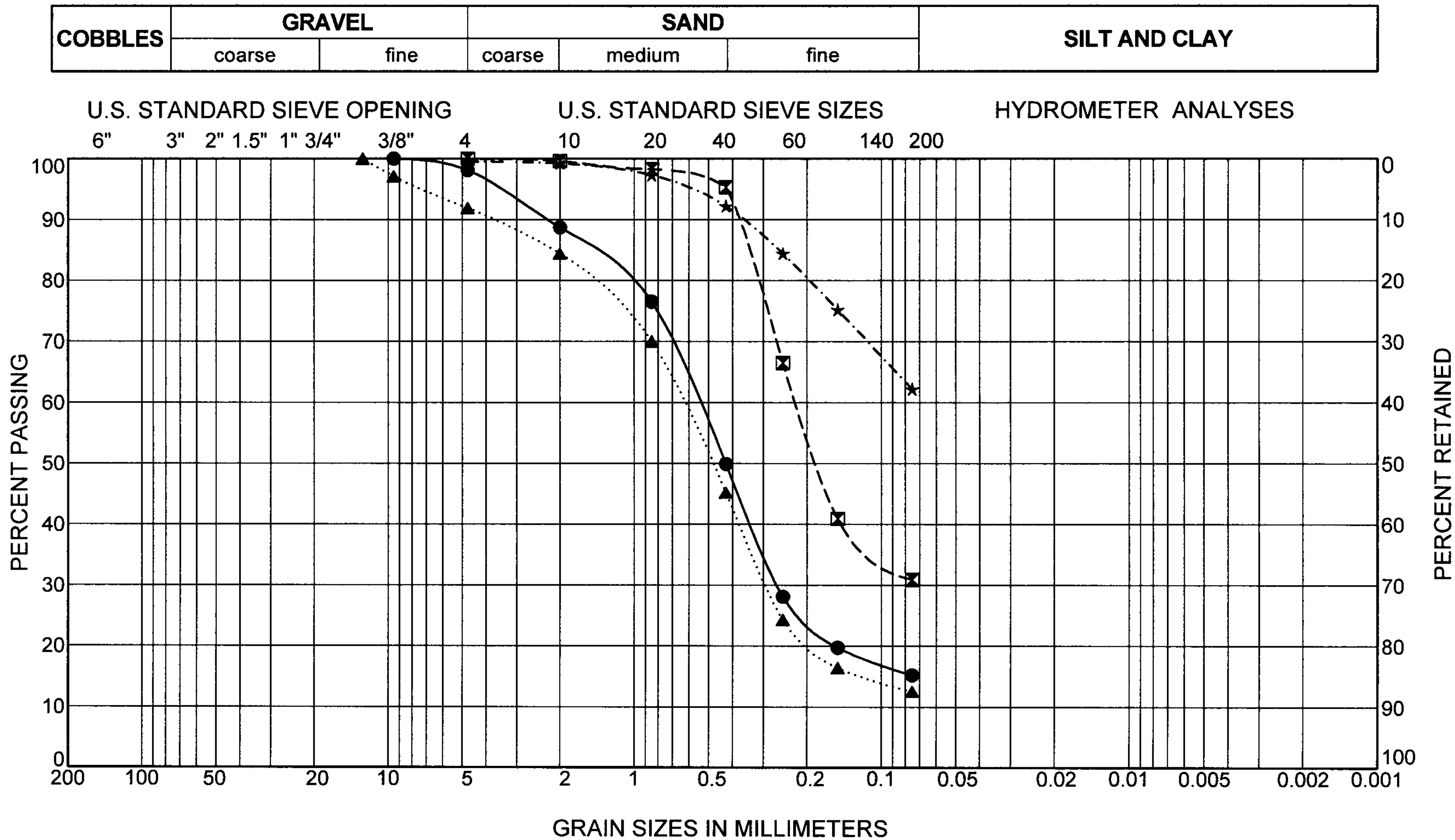
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CA

JOB NO: 202101.GDR | PLATE NO: B-2

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
BID-1	MC-7	30.0	●			SILTY SAND (SM)
BID-2	MC-6	25.0	⊠			CLAYEY SAND (SC)
BID-5	SPT-10	60.0	▲			SILTY SAND (SM)
BID-5	MC-11	70.0	★			SANDY SILT (ML)

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MATERIALS ENGINEERING

CHICO SR 99 AUXILIARY LANE PROJECT
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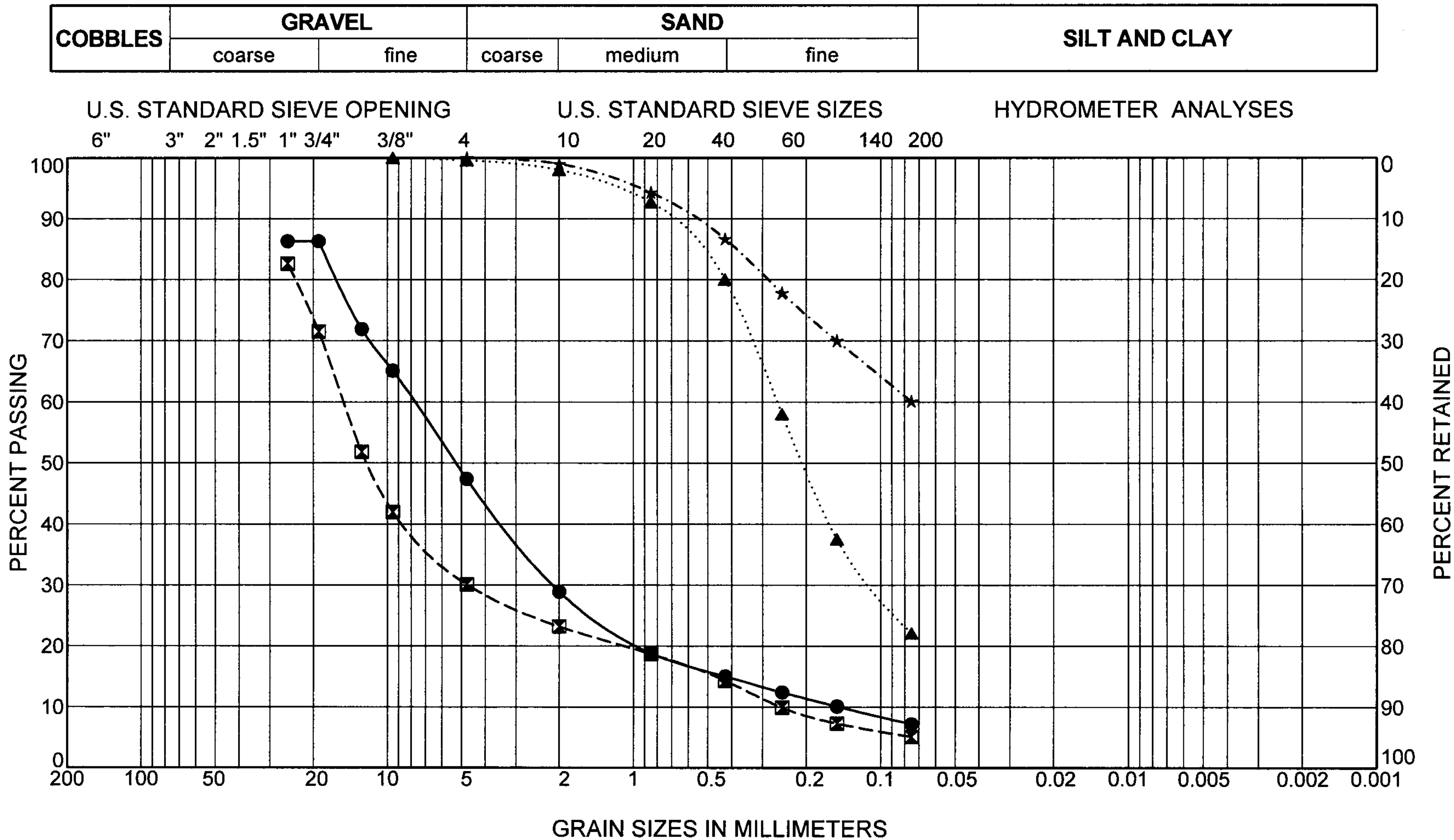
JOB NO: 202101.GDR

PLATE NO: B-3A

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
BID-6	MC-6	25.0	●			POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)
PLM-1	MC-3	10.0	⊠			POORLY-GRADED GRAVEL WITH SILT AND SAND (GP-GM)
PLM-1	SPT-8	40.0	▲			SILTY SAND (SM)
PLM-1	SPT-10	60.0	★			SANDY ORGANIC SILT (OL)

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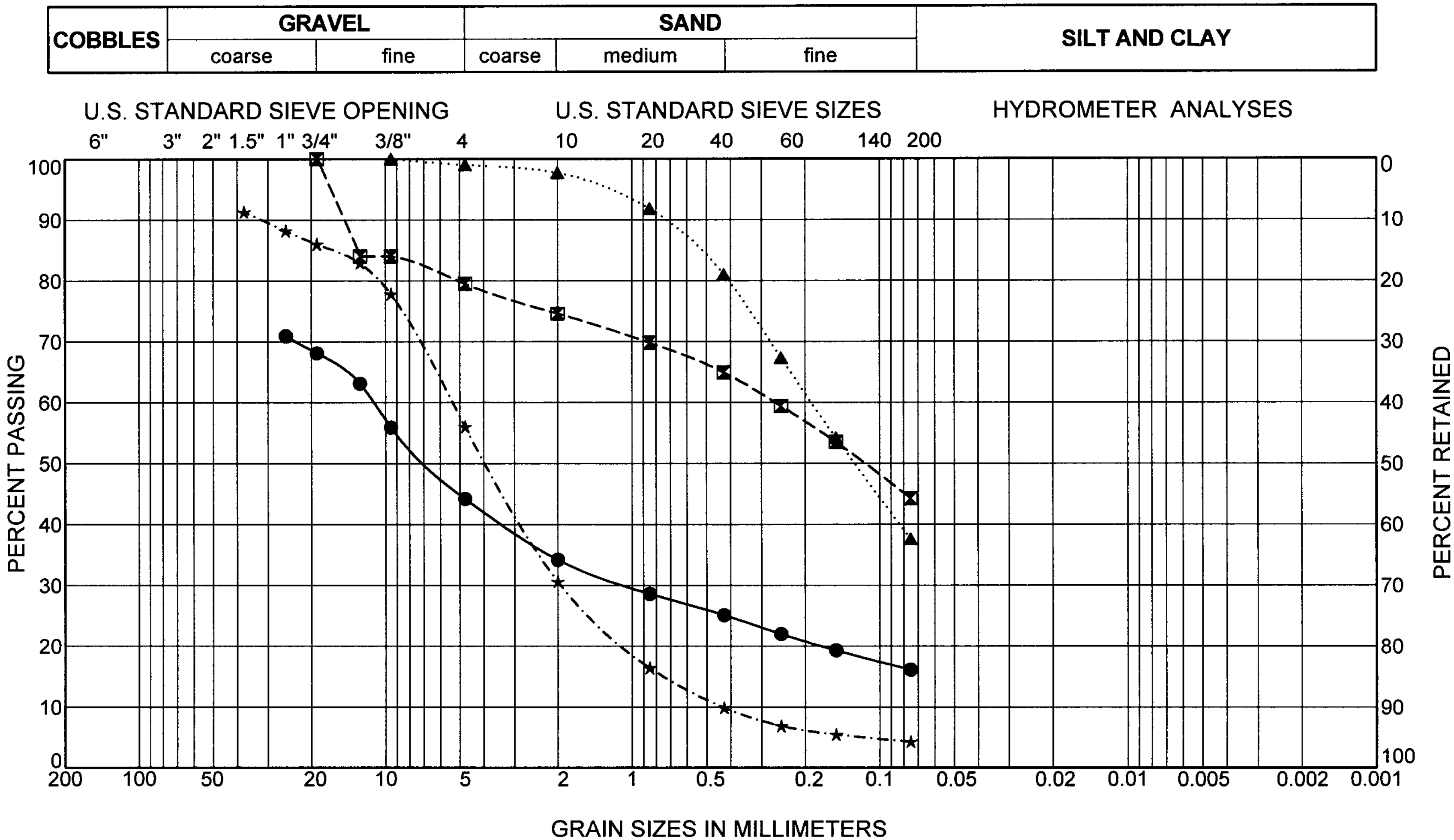
CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CA

JOB NO: 202101.GDR

PLATE NO: B-3B

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
PLM-2	MC-5	20.0	●			SILTY GRAVEL WITH SAND (GM)
RW-1	MC-4	16.0	⊠			SILTY SAND WITH GRAVEL (SM)
RW-1	MC-5	21.0	▲			SILTY SAND (SM)
RW-20A	MC-6	25.0	★			WELL-GRADED SAND WITH GRAVEL (SW)

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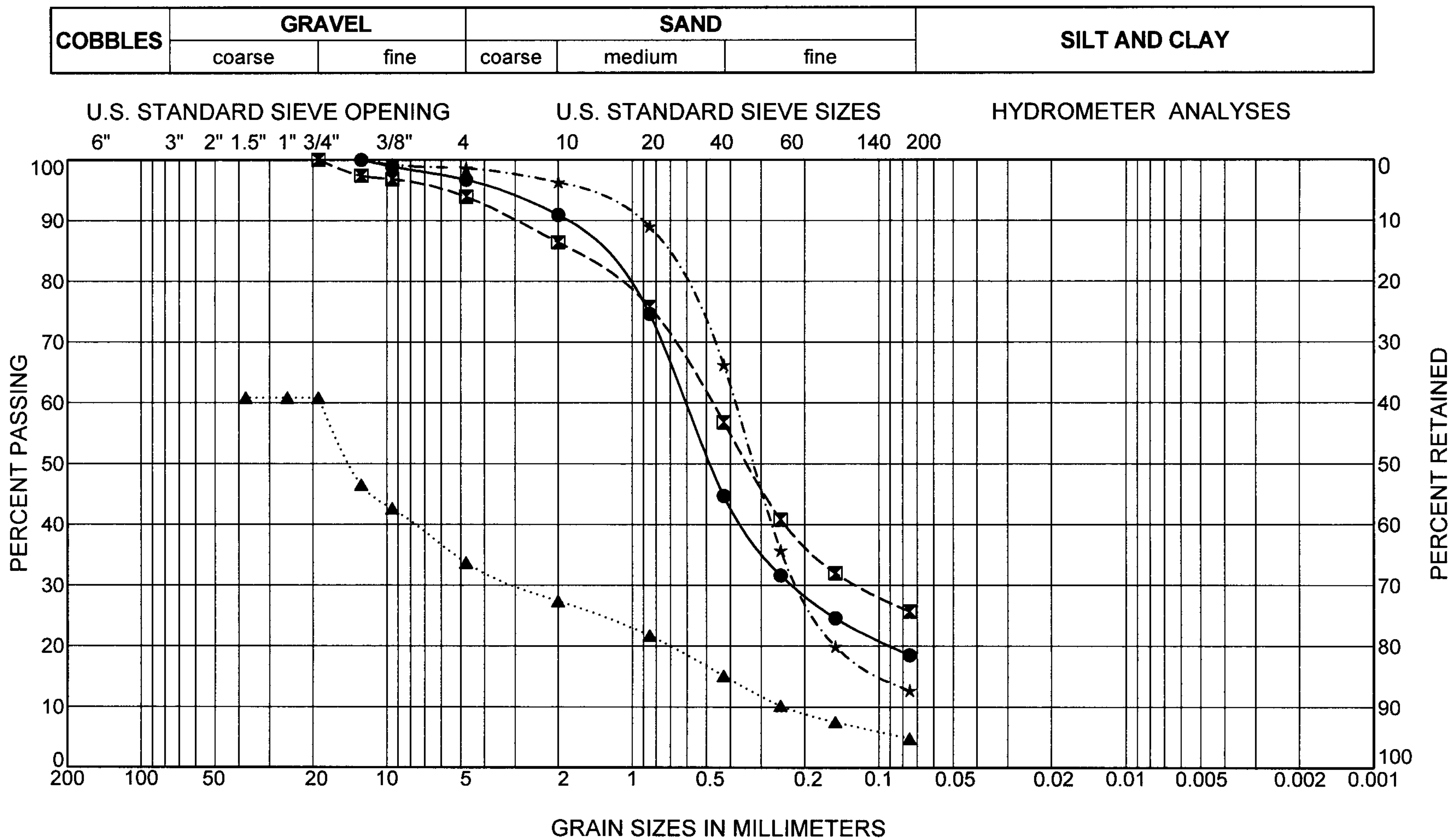
JOB NO: 202101.GDR

PLATE NO: B-3C

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
RW-20A	MC-8	40.0	●			SILTY SAND (SM)
RW-20A	MC-9	50.0	⊠			SILTY SAND (SM)
RW-21	MC-2	5.0	▲			WELL-GRADED GRAVEL WITH SAND (GW)
SW-10	MC-7	31.0	★			SILTY SAND (SM)

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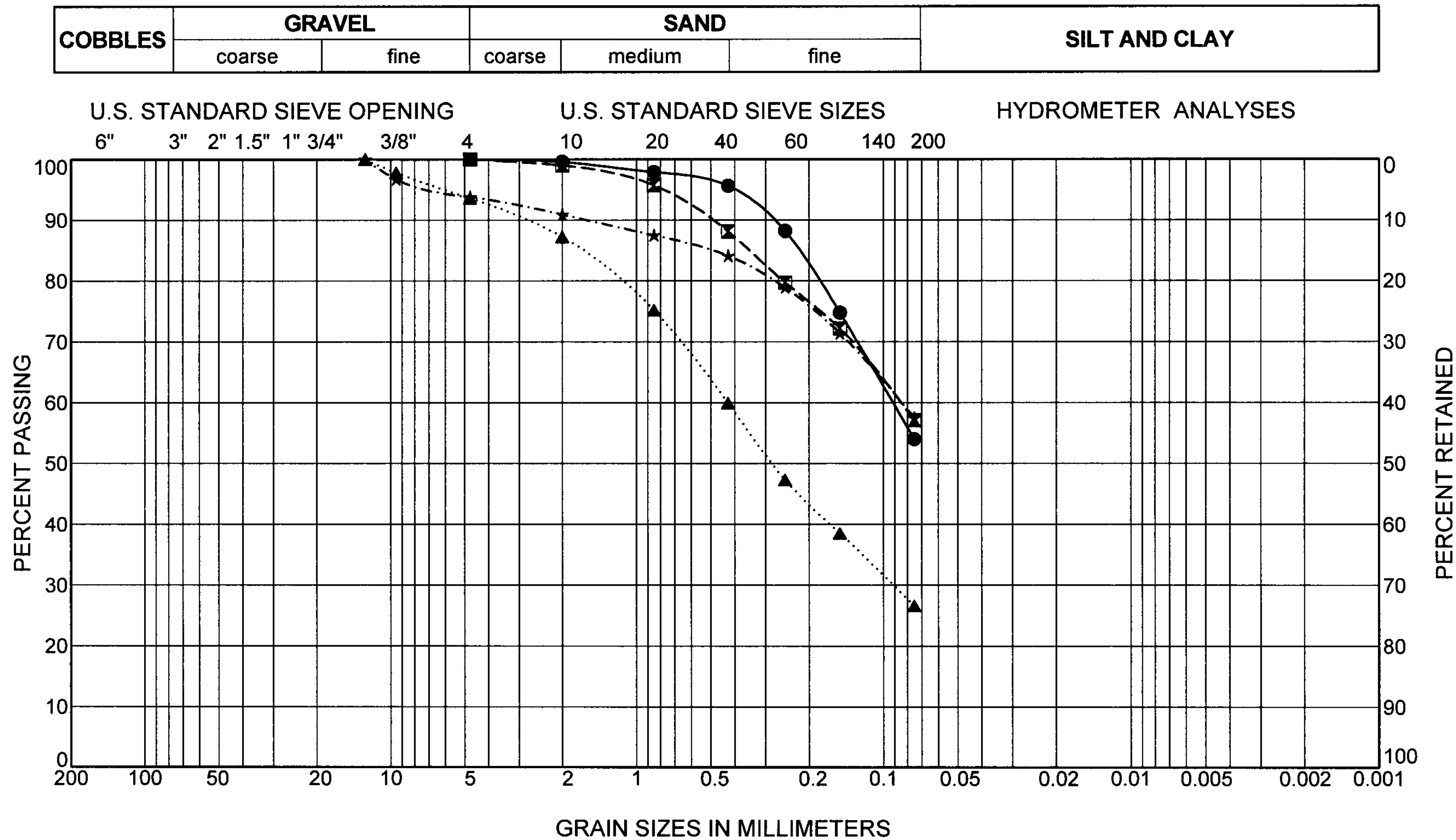
MATERIALS ENGINEERING

CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CA

JOB NO: 202101.GDR

PLATE NO: B-3D

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
SW-11	MC-7	31.0	●			SANDY SILTY CLAY (CL-ML)
SW-15	MC-6	26.0	⊠			SANDY SILT (ML)
SW-16	MC-6	26.0	▲			SILTY SAND (SM)
SW-18	MC-5	21.0	★			SANDY SILT (ML)

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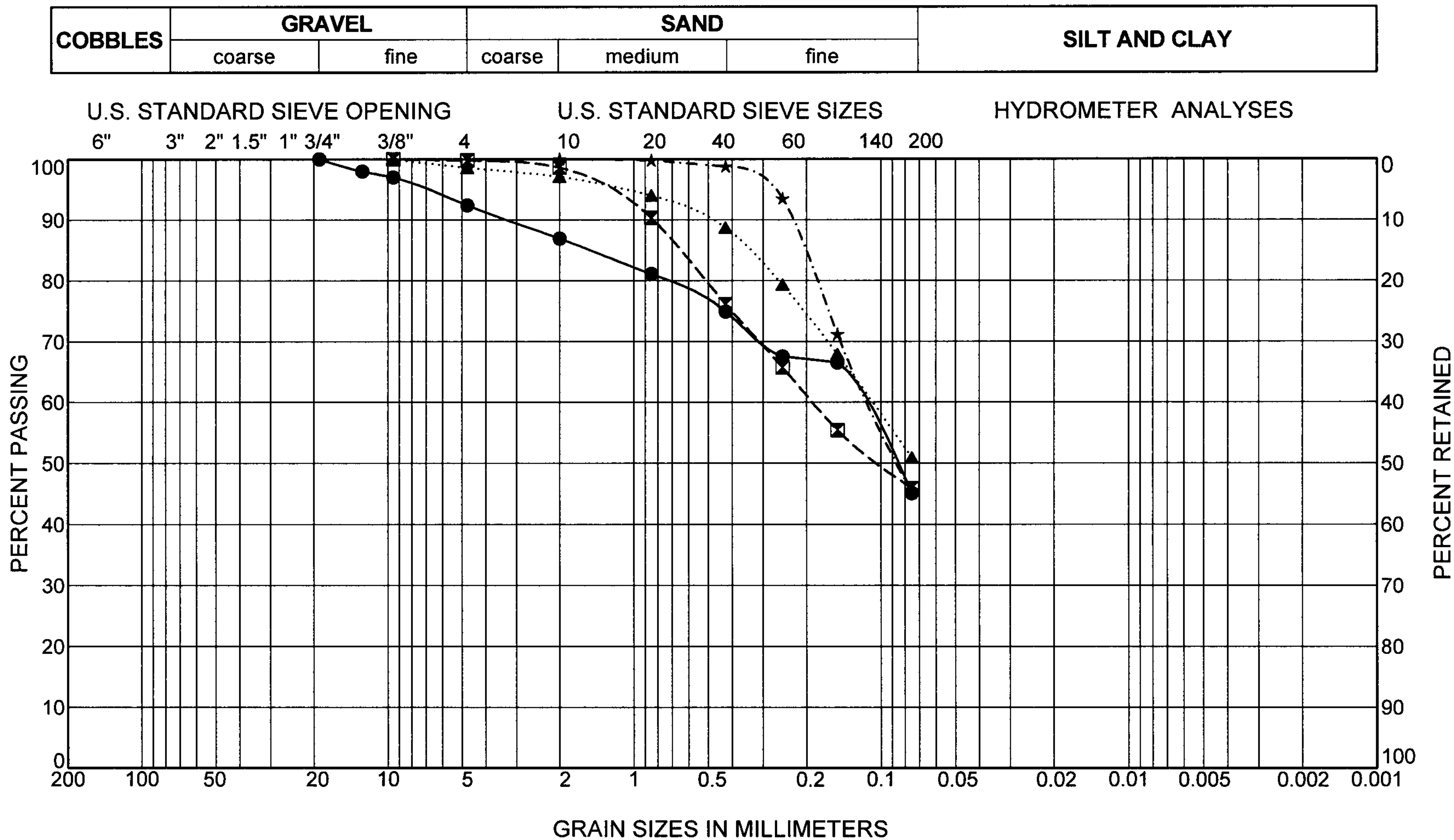
JOB NO: 202101.GDR

PLATE NO: B-3E

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
SW-4	MC-6	26.0	●			SILTY SAND (SM)
SW-7	MC-6	26.0	⊠			SILTY SAND (SM)
SW-8	MC-6	26.0	▲			SANDY SILT (ML)
SW-9	MC-7	30.0	★			SILTY SAND (SM)

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MATERIALS ENGINEERING

CHICO SR 99 AUXILIARY LANE PROJECT
CHICO, CA

JOB NO: 202101.GDR

PLATE NO: B-3F

Corrosion Test (pH, Minimum Resistivity Test, Chloride and Sulfate)

Sample Location	pH	Minimum Resistivity ohm-cm)	Chloride (ppm)	Sulfate (ppm)
RW-2 (#3) 11 ft.	6.9	1690	8.5	11.4
SW-4 (#4) 16 ft.	6.9	2120	18.8	7.1
RW-8 (#3) 11 ft.	6.4	1740	8.7	29.7
SW-11 (#3) 10 ft.	6.4	1150	5.2	0.9
SW-15 (#4) 16 ft.	6.5	2300	17.8	14.4
SW-17 (#4) 16 ft.	6.5	2120	28.0	3.2
RW-21 (#8) 40 ft.	6.6	1370	20.2	4.6
BID-1 (#8) 40 ft.	6.4	1470	31.5	1.0
BID-2 (#2) 5 ft.	7.0	3220	16.8	4.5
BID-6 (#3) 10 ft.	6.3	8580	11.8	0.3
PLM-2 (#8) 40 ft.	6.4	1740	34.0	2.3

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/13/2008
Date Submitted 06/09/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD3/ GDR#3 Site ID : RW-2#3 @ 11'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53430-107030.

EVALUATION FOR SOIL CORROSION

Soil pH	6.92		
Minimum Resistivity	1.69	ohm-cm (x1000)	
Chloride	8.5 ppm	00.00085	%
Sulfate	11.4 ppm	00.00114	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4B

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/13/2008
Date Submitted 06/09/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney RA
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD3/ GDR#3 Site ID : SW-4#4 @ 16'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53430-107029.

EVALUATION FOR SOIL CORROSION

Soil pH	6.90	
Minimum Resistivity	2.12 ohm-cm (x1000)	
Chloride	18.8 ppm	00.00188 %
Sulfate	7.1 ppm	00.00071 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4C

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/13/2008
Date Submitted 06/09/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD3/ GDR#3 Site ID : AW-8#3 @ 11'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53430-107031.

EVALUATION FOR SOIL CORROSION

Soil pH	6.40		
Minimum Resistivity	1.74	ohm-cm (x1000)	
Chloride	8.7 ppm	00.00087	%
Sulfate	29.7 ppm	00.00297	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4D

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/13/2008
Date Submitted 06/09/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD3/ GDR#3 Site ID : SW-11#3 @ 10'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53430-107028.

EVALUATION FOR SOIL CORROSION

Soil pH	6.42	
Minimum Resistivity	1.15 ohm-cm (x1000)	
Chloride	5.2 ppm	00.00052 %
Sulfate	0.9 ppm	00.00009 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager RH

The reported analysis was requested for the following location:
Location : 202101.GD2/GDR#2 Site ID : SW15#4 @ 16'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53378-106932.

EVALUATION FOR SOIL CORROSION

Soil pH	6.49		
Minimum Resistivity	2.30	ohm-cm (x1000)	
Chloride	17.8 ppm	00.00178	%
Sulfate	14.4 ppm	00.00144	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4F

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD2/GDR#2 Site ID : SW17#4 @ 16'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53378-106933.

EVALUATION FOR SOIL CORROSION

Soil pH	6.46	
Minimum Resistivity	2.12 ohm-cm (x1000)	
Chloride	28.0 ppm	00.00280 %
Sulfate	3.2 ppm	00.00032 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/13/2008
Date Submitted 06/09/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.GD2/GDR#2 Site ID : RW-21#8 @ 40'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53432-107033.

EVALUATION FOR SOIL CORROSION

Soil pH	6.57	
Minimum Resistivity	1.37 ohm-cm (x1000)	
Chloride	20.2 ppm	00.00202 %
Sulfate	4.6 ppm	00.00046 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4H

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID1#8 @ 40'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106936.

EVALUATION FOR SOIL CORROSION

Soil pH	6.40	
Minimum Resistivity	1.47 ohm-cm (x1000)	
Chloride	31.5 ppm	00.00315 %
Sulfate	1.0 ppm	00.00010 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-41

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID5#2 @ 5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106934.

EVALUATION FOR SOIL CORROSION

Soil pH	7.02		
Minimum Resistivity	3.22	ohm-cm (x1000)	
Chloride	16.8 ppm	00.00168	%
Sulfate	4.5 ppm	00.00045	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4J

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.BID/BIDWELL Site ID : BID6#3 @ 10'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53379-106935.

EVALUATION FOR SOIL CORROSION

Soil pH	6.30		
Minimum Resistivity	8.58	ohm-cm (x1000)	
Chloride	11.8 ppm	00.00118	%
Sulfate	0.3 ppm	00.00003	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4K

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 06/06/2008
Date Submitted 06/02/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 202101.PLM/ PLM Site ID : PLM-2#8 @ 40'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53377-106931.

EVALUATION FOR SOIL CORROSION

Soil pH	6.35		
Minimum Resistivity	1.74	ohm-cm (x1000)	
Chloride	34.0 ppm	00.00340	%
Sulfate	2.3 ppm	00.00023	%

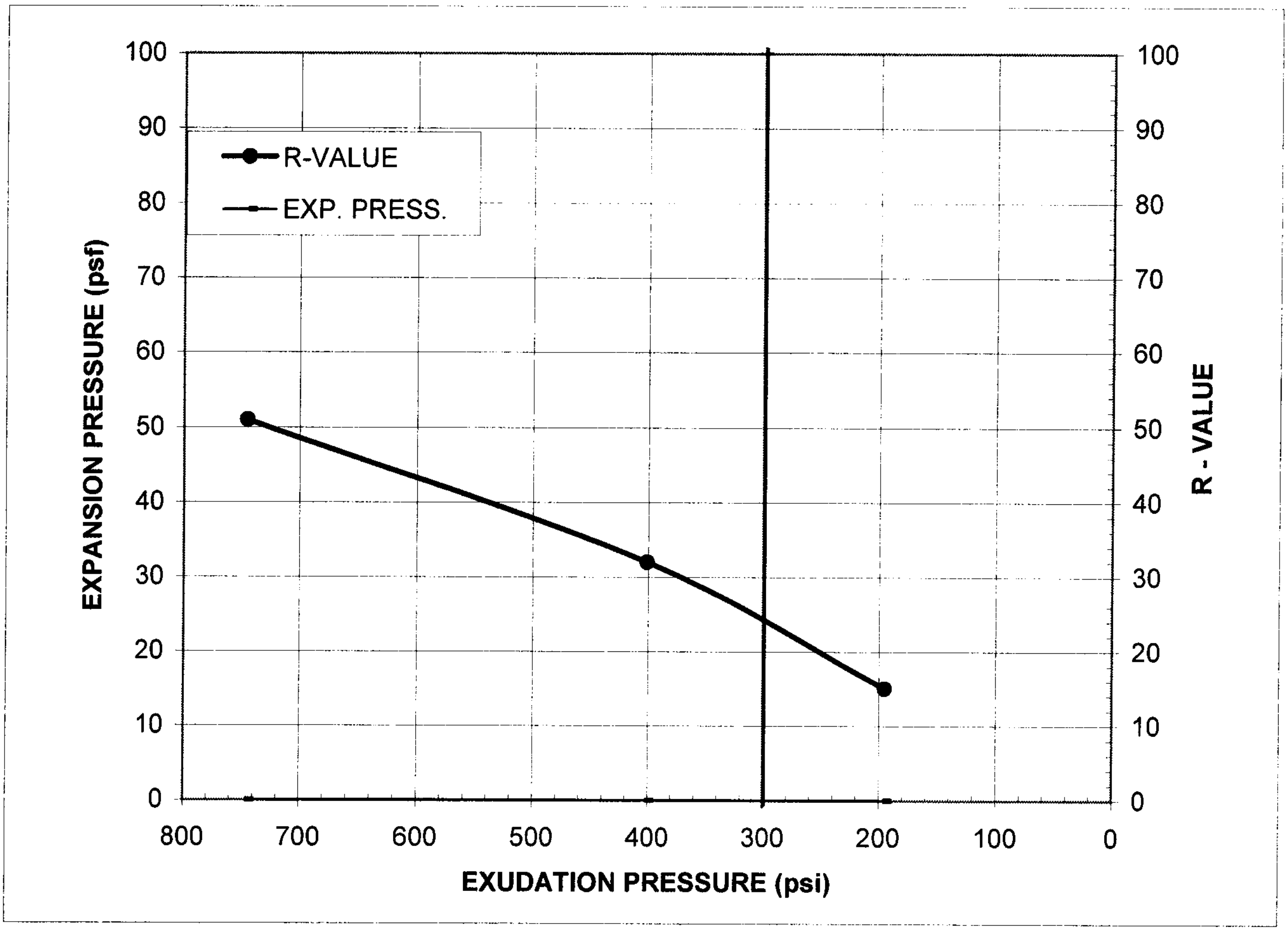
METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4L

R-VALUE REPORT

Parikh Consultants, Inc. **ASTM D2844 or CTM 301** (408) 945-1011

Project Name:	Rte 99 NB Widening, Chico	Date:	4/3/08
Client:	Quincy Engineering	Project #:	202101.GD2
Sample #:	SW-16 Depth: 2.5'-5'	Lab #:	M696
Location / Source:	Native / Onsite	Sample Date:	
Material :	Sandy clay, dark brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	195	401	745
Expansion Pressure, psf	0	0	0
R-Value	15	32	51
Moisture Content at Test, %	18.0	16.0	15.6
Dry Density at Test, pcf	110.7	113.0	114.9

R-Value @ 300 psi Exudation Pressure = 25

Expansion Pressure @300 psi Exudation, psf = **0**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

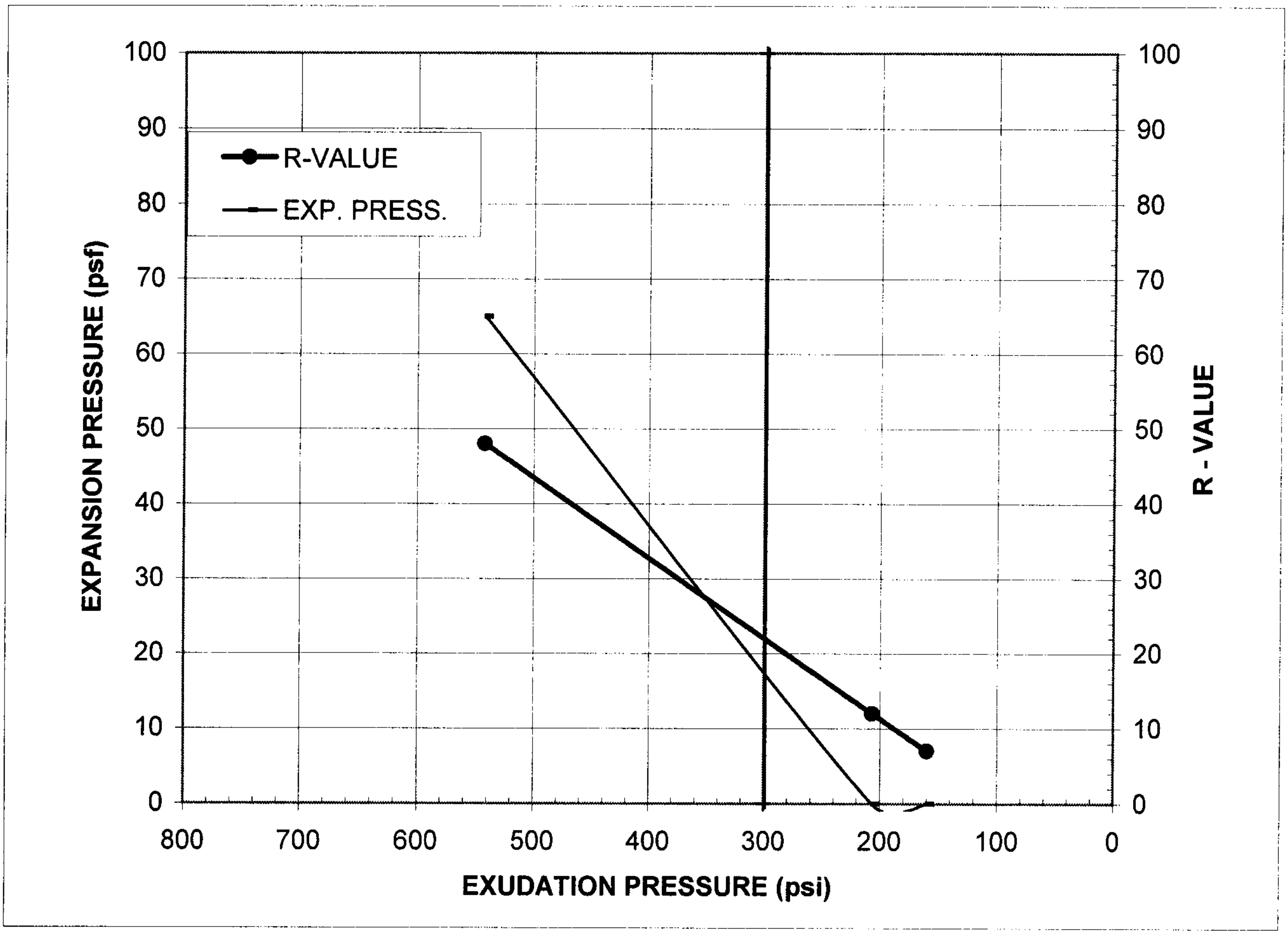
RVALUE with calcs pdp

PLATE NO.: B-5A

R-VALUE REPORT

Parikh Consultants, Inc. | **ASTM D2844 or CTM 301** | (408) 945-1011

Project Name:	Rte 99 NB Widening, Chico	Date:	4/3/08
Client:	Quincy Engineering	Project #:	202101.GD2
Sample #:	SW-18 Depth: 2'-5'	Lab #:	M696
Location / Source:	Native / Onsite	Sample Date:	
Material :	Clay, black	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	160	207	542
Expansion Pressure, psf	0	0	65
R-Value	7	12	48
Moisture Content at Test, %	21.4	19.4	17.3
Dry Density at Test, pcf	105.3	110.3	114.1

R-Value @ 300 psi Exudation Pressure = 22

Expansion Pressure @300 psi Exudation, psf = **18**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

RVALUE with calcs pdp

PLATE NO.: B-5B

APPENDIX C

CALCULATION FOR ATTENUATION RELATIONSHIP

Attenuation Relationships for Shallow Crustal Earthquakes (Sadigh, et al, 1997)

Fault = Coast Ranges-Sierran Block Fault (Reverse)

Mw = 7 Rrup = 56 km

M>6.5 ROCK SITE:

C1 = -1.274	C2 = 1.1	C3 = 0	C4 = -2.1
C5 = -0.48451	C6 = 0.524	C7 = 0	

A=C1+C2M+C3(8.5M)^2.5=	6.426	
B=C4*Ln(Rrup+exp(C5+C6M))=	-9.206	
C=C7*Ln(Rrup+2)=	0	
Ln(y) = A+B+C =	-2.780	
y = Exp(Ln(y)) =	0.0621	g (Peak Bed Rock Acceleration)

PBA = 0.0621*1.2 = 0.1g (assuming 20 % increase in thrust/reverse fault)

Fault = Cleveland/W Fault (Normal)

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

Mw = 6.5 Rrup = 29 km

A=	5.876	
B=	-8.111	
C=	0	
Ln(y) =	-2.235	
y =	0.1070	g (Peak Bed Rock Acceleration)

PBA = 0.2 g

Fault = Big Bend Fault (Unknown)

M≤6.5

C1 =	-0.624	C2 =	1	C3 =	0	C4 =	-2.1
C5 =	1.29649	C6 =	0.25	C7 =	0		

Mw = 6.25 Rrup = 21 km

A=	5.626	
B=	-7.663	
C=	0	
Ln(y) =	-2.037	
y =	0.13	g (Peak Bed Rock Acceleration)

PBA = 0.2g

EVALUATION OF LIQUEFACTION POTENTIAL

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME	***Chico SR99 Auxiliary Lane Project***	*SOIL GROUPS*		*FAULT INFO*	
PROJECT NO.	***202101.GDR***	1. GRAVELS, SANDS AND NONPLASTIC SILTS		*BEAR MOUNTAIN FAULT ZONE*	
BORING NO.	***RW-2***	2. CLAYS AND PLASTIC SILTS		*a_{max} (g)*	0.3
				FAULT l	6.5
BOREHOLE DIA (in)=	8	*HAMMER TYPE (1/2) =*	2		
GW DEPTH (ft)=	29	(1. ROPE AND PULLEY; 2. AUTOMATIC)		*MSF =*	1.13
				(Min. FS = 1.1 based on SPT)	

					CYCLIC STRESS RATIO (CSR)				*LIQUEFACTION RESISTANCE ($CRR_{6.5}$)*										*F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	s_v (psf)	s_v' (psf)	g_d	CSR	SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{6.5}$	Ks	Ka	F.S.
1	3.5	2	14	SPT	437.5	437.5	0.98		16	2.00	1	0.75	1.2	1.15	33.44	55%			1.00	1	
2	6	2	19	SPT	750.0	750.0	0.97		22	1.63	1	0.75	1.2	1.15	37.05	55%			1.00	1	
3	11	2	21	SPT	1375.0	1375.0	0.95		24	1.21	1	0.80	1.2	1.15	32.26	55%			1.00	1	
4	16	1	30	SPT	2000.0	2000.0	0.95	0.19	35	1.00	1	0.85	1.2	1.15	40.60	10%	42.35		1.00	1	
5	21	1	36	SPT	2625.0	2625.0	0.93	0.18	42	0.87	1	0.95	1.2	1.15	47.53	10%	49.43		0.92	1	
6	26	1	23	SPT	3250.0	3250.0	0.90	0.18	27	0.78	1	0.95	1.2	1.15	27.29	10%	28.75	0.40	0.86	1	2.22
7	31	1	49	SPT	3887.5	3731.3	0.87	0.18	57	0.73	1	1.00	1.2	1.15	57.12	10%	59.23		0.83	1	
8	41	1	21	SPT	5187.5	4406.3	0.83	0.19	24	0.67	1	1.00	1.2	1.15	22.53	10%	23.88	0.27	0.79	1	1.27
9	51	2	23	SPT	6362.5	4956.3	0.74		27	0.64	1	1.00	1.2	1.15	23.26	55%			0.76	1	

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME	***Chico SR99 Auxiliary Lane Project***	*SOIL GROUPS*	*FAULT INFO*
PROJECT NO.	***202101.GDR***	1. GRAVELS, SANDS AND NONPLASTIC SILTS	*BEAR MOUNTAIN FAULT ZONE*
BORING NO.	***SW-4***	2. CLAYS AND PLASTIC SILTS	*a_{max} (g):* 0.3
			FAULT I 6.5
BOREHOLE DIA (in)=	8	*HAMMER TYPE (1/2) =* 2	
GW DEPTH (ft)=	29	(1. ROPE AND PULLEY; 2. AUTOMATIC)	*MSF =* 1.13
			(Min. FS = 1.1 based on SPT)

					CYCLIC STRESS RATIO (CSR)				*LIQUEFACTION RESISTANCE ($CRR_{6.5}$)*										*F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	s_v (psf)	s_v' (psf)	g_d	CSR	SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{6.5}$	Ks	Ka	F.S.
1	3.5	2	14	SPT	420.0	420.0	0.98		16	2.00	1	0.75	1.2	1.15	33.44	55%			1.00	1	
2	6	2	20	SPT	726.3	726.3	0.97		23	1.66	1	0.75	1.2	1.15	39.64	55%			1.00	1	
3	11	2	18	SPT	1338.8	1338.8	0.95		21	1.22	1	0.80	1.2	1.15	28.03	55%			1.00	1	
4	16	1	25	SPT	1951.3	1951.3	0.95	0.19	29	1.01	1	0.85	1.2	1.15	34.26	45%	46.11		1.00	1	
5	21	1	30	SPT	2563.8	2563.8	0.93	0.18	35	0.88	1	0.95	1.2	1.15	40.08	45%	53.10		0.93	1	
6	26	1	11	SPT	3176.3	3176.3	0.90	0.18	13	0.79	1	0.95	1.2	1.15	13.20	45%	20.84	0.23	0.87	1	1.27
7	31	1	24	SPT	3813.8	3501.3	0.87	0.18	28	0.76	1	1.00	1.2	1.15	28.88	10%	30.38		0.85	1	

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME	***Chico SR99 Auxiliary Lane Project***	*SOIL GROUPS*		*FAULT INFO*	
PROJECT NO.	***202101.GDR***	1. GRAVELS, SANDS AND NONPLASTIC SILTS		*BEAR MOUNTAIN FAULT ZONE*	
BORING NO.	***RW/SW-9***	2. CLAYS AND PLASTIC SILTS		a_{max} *(g):*	0.3
				FAULT M	6.5
BOREHOLE DIA (in)=	8	*HAMMER TYPE (1/2) =*	2		
GW DEPTH (ft)=	10	(1. ROPE AND PULLEY; 2. AUTOMATIC)		*MSF =*	1.13
				(Min. FS = 1.1 based on SPT)	

					CYCLIC STRESS RATIO (CSR)				*LIQUEFACTION RESISTANCE ($CRR_{6.5}$)*										*F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	s_v (psf)	s_v' (psf)	g_d	CSR	SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{6.5}$	Ks	Ka	F.S.
1	2	1	4	SPT	210.0	210.0	0.99	0.19	5	2.00	1	0.75	1.2	1.15	9.55	30%	15.73	0.17	1.00	1	0.98 <- LIQ!!
2	5	2	15	SPT	510.0	510.0	0.98		17	1.98	1	0.75	1.2	1.15	35.47	55%			1.00	1	
3	10	2	20	SPT	1022.5	1022.5	0.96		23	1.40	1	0.80	1.2	1.15	35.63	55%			1.00	1	
4	15	1	50	SPT	1610.0	1297.5	0.96	0.23	58	1.24	1	0.85	1.2	1.15	84.02	10%	86.71		1.00	1	
5	20	1	69	SPT	2260.0	1635.0	0.93	0.25	80	1.11	1	0.95	1.2	1.15	115.44	10%	118.81		1.00	1	
6	25	1	66	SPT	2910.0	1972.5	0.91	0.26	76	1.01	1	0.95	1.2	1.15	100.53	10%	103.57		1.00	1	
7	30	1	17	SPT	3510.0	2260.0	0.88	0.27	20	0.94	1	1.00	1.2	1.15	25.46	45%	35.56		0.96	1	
8	40	2	30	SPT	4710.0	2835.0	0.84		35	0.84	1	1.00	1.2	1.15	40.12	55%			0.90	1	
9	50	1	22	SPT	6010.0	3510.0	0.75	0.25	25	0.75	1	1.00	1.2	1.15	26.44	30%	35.23		0.84	1	

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME ***Chico SR99 Auxiliary Lane Project***
PROJECT NO. ***202101.GDR***
BORING NO. ***RW/SW-10***

BOREHOLE DIA (in)= 8
GW DEPTH (ft)= 5

SOIL GROUPS

1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

HAMMER TYPE (1/2) = 2
(1. ROPE AND PULLEY; 2. AUTOMATIC)

FAULT INFO

BEAR MOUNTAIN FAULT ZONE
a_{max} (g): 0.3
FAULT 1 6.5

MSF = 1.13
(Min. FS = 1.1 based on SPT)

					CYCLIC STRESS RATIO (CSR)				*LIQUEFACTION RESISTANCE ($CRR_{6.5}$)*										*F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	s_v (psf)	s_v' (psf)	g_d	CSR	SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{6.5}$	Ks	Ka	F.S.
1	2	1	6	SPT	240.0	240.0	0.99	0.19	7	2.00	1	0.75	1.2	1.15	14.33	13%	16.75	0.18	1.00	1	1.04 <- LIQ!!
2	5	1	6	SPT	600.0	600.0	0.98	0.19	7	1.83	1	0.75	1.2	1.00	11.38	13%	13.68	0.15	1.00	1	0.87 <- LIQ!!
3	10	1	37	SPT	1231.3	915.6	0.96	0.25	43	1.48	1	0.80	1.2	1.15	69.66	13%	74.12		1.00	1	
4	15	1	50	SPT	1881.3	1253.1	0.96	0.28	58	1.26	1	0.85	1.2	1.15	85.49	13%	90.53		1.00	1	
5	20	1	42	SPT	2531.3	1590.6	0.93	0.29	48	1.12	1	0.95	1.2	1.15	71.24	13%	75.76		1.00	1	
6	25	2	7	SPT	3131.3	1878.1	0.91		8	1.03	1	0.95	1.2	1.15	10.93	55%			1.00	1	
7	30	2	11	SPT	3681.3	2115.6	0.88		13	0.97	1	1.00	1.2	1.15	17.03	55%			0.98	1	
8	40	2	4	SPT	4781.3	2590.6	0.84		5	0.88	1	1.00	1.2	1.15	5.60	55%			0.93	1	
9	50	2	18	SPT	5881.3	3065.6	0.75		21	0.81	1	1.00	1.2	1.15	23.15	55%			0.88	1	

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME ***Chico SR99 Auxiliary Lane Project***
PROJECT NO. ***202101.GDR***
BORING NO. ***RW/SW-11***

BOREHOLE DIA (in)= 8
GW DEPTH (ft)= 10

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

HAMMER TYPE (1/2) = 2
(1. ROPE AND PULLEY; 2. AUTOMATIC)

FAULT INFO
BEAR MOUNTAIN FAULT ZONE
a_{max} (g): 0.3
FAULT l 6.5

MSF = 1.13
(Min. FS = 1.1 based on SPT)

					CYCLIC STRESS RATIO (CSR)				*LIQUEFACTION RESISTANCE ($CRR_{6.5}$)*										*F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka*		
Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	s_v (psf)	s_v' (psf)	g_d	CSR	SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{6.5}$	Ks	Ka	F.S.
1	2.5	2	4	SPT	240.0	240.0	0.99		5	2.00	1	0.75	1.2	1.15	9.55	55%			1.00	1	
2	5	2	9	SPT	540.0	540.0	0.98		10	1.92	1	0.75	1.2	1.15	20.68	55%			1.00	1	
3	10	2	13	SPT	1140.0	1140.0	0.96		15	1.32	1	0.80	1.2	1.15	21.93	55%			1.00	1	
4	15	1	44	SPT	1752.5	1440.0	0.96	0.23	51	1.18	1	0.85	1.2	1.15	70.18	10%	72.57		1.00	1	
5	20	1	50	SPT	2377.5	1752.5	0.93	0.25	58	1.07	1	0.95	1.2	1.15	80.80	10%	83.42		1.00	1	
6	25	1	29	SPT	3002.5	2065.0	0.91	0.26	33	0.98	1	0.95	1.2	1.15	43.17	10%	44.97		0.99	1	
7	30	2	32	SPT	3627.5	2377.5	0.88		37	0.92	1	1.00	1.2	1.15	46.73	55%			0.95	1	
8	31	2	10	SPT	3752.5	2440.0	0.84		12	0.91	1	1.00	1.2	1.15	14.42	55%			0.94	1	

LIQUEFACTION POTENTIAL ANALYSIS

PROJECT NAME ***Chico SR99 Auxiliary Lane Project***
PROJECT NO. ***202101.GDR***
BORING NO. ***PLM-2***

BOREHOLE DIA (in)= 8
GW DEPTH (ft)= 12

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

HAMMER TYPE (1/2) = 2
(1. ROPE AND PULLEY; 2. AUTOMATIC)

FAULT INFO
BEAR MOUNTAIN FAULT ZONE
a_{max} (g): 0.3
FAULT I 6.5

MSF = 1.13
(Min. FS = 1.1 based on SPT)

Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	CYCLIC STRESS RATIO (CSR) s_v (psf)	s_v' (psf)	g_d	CSR	LIQUEFACTION RESISTANCE ($CRR_{6.5}$) SPT-N_{60}	C_N	C_E	C_R	C_S	C_B	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{6.5}$	F.S.=($CRR_{6.75}$/CSR)*MSF*Ks*Ka Ks	Ka	F.S.
1	2.5	2	5	SPT	300.0	300.0	0.99		6	2.00	1	0.75	1.2	1.15	11.94	55%			1.00	1	
2	5	2	4	SPT	600.0	600.0	0.98		5	1.83	1	0.75	1.2	1.15	8.72	55%			1.00	1	
3	10	2	34	SPT	1200.0	1200.0	0.96		39	1.29	1	0.80	1.2	1.15	55.91	55%			1.00	1	
4	15	1	50	SPT	1812.5	1656.3	0.96	0.20	58	1.10	1	0.85	1.2	1.15	74.36	10%	76.84		1.00	1	
5	20	1	25	SPT	2437.5	1968.8	0.93	0.23	29	1.01	1	0.95	1.2	1.15	38.12	10%	39.81		1.00	1	
6	25	1	45	SPT	3075.0	2293.8	0.91	0.24	52	0.93	1	0.95	1.2	1.15	63.56	10%	65.81		0.96	1	
7	30	1	33	SPT	3725.0	2631.3	0.88	0.24	38	0.87	1	1.00	1.2	1.15	45.81	10%	47.67		0.92	1	
8	40	2	14	SPT	4900.0	3181.3	0.84		16	0.79	1	1.00	1.2	1.15	17.68	10%			0.87	1	
9	50	2	31	SPT	6025.0	3681.3	0.75		36	0.74	1	1.00	1.2	1.15	36.38	55%			0.83	1	
10	60	2	10	SPT	7150.0	4181.3	0.65		12	0.69	1	1.00	1.2	1.15	11.01	55%			0.80	1	

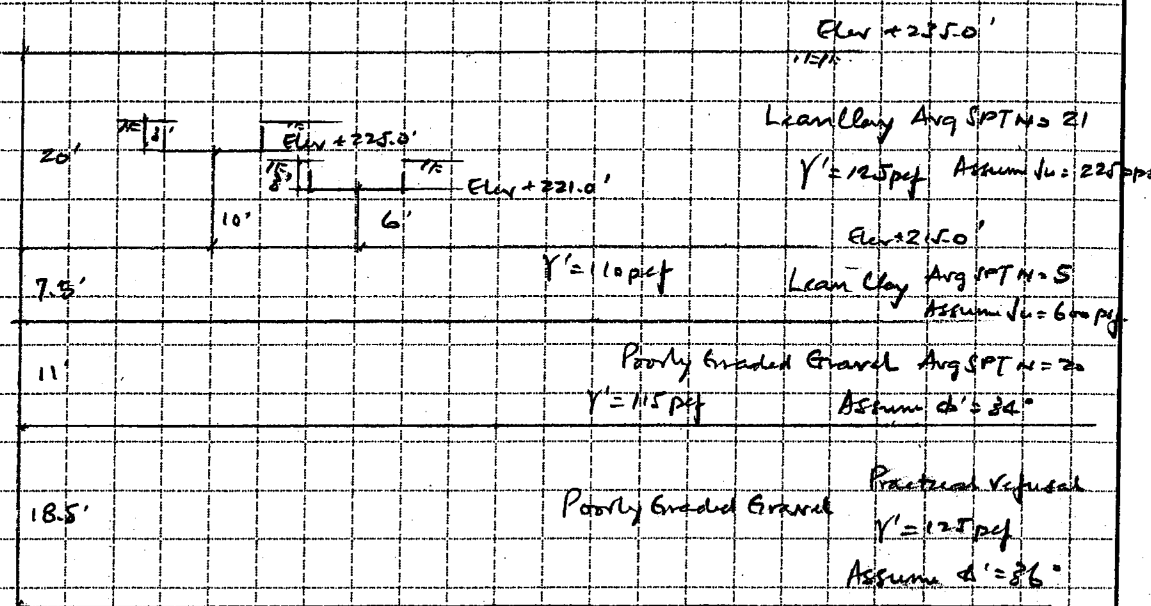
Pile Capacity Calculations/Lateral Pile Capacity Analyses

PARIKH
Practicing in the Geosciences

JOB: Chico SR 99 Auxiliary Lane 202101GDR
SHEET NO: 1 OF 5
CALCULATED BY: A Lam DATE: 8/2008
CHECKED BY: DATE:
SCALE:

Pile Capacity Analyses (Borings SW-15 and PLM-1) - Retaining Wall No. 2

Generalized Soil Profile



Pile Capacity Analysis (Boring SW-15 & PLM-1) RW No. 2 (16" ⌀ CIDH pile - 113 kips
0.75 × 4
Qall = 37.7 tons

Bottom of Footing Elevation = 225 ft

Friction in Lean Clay (Su = 2250 psf)

$$Q_{all} = \frac{0.55 \times 2250 \times \pi \times 16/12 \times 10}{2 \times 2000}$$

$= \underline{13.0 \text{ tons}}$

Friction in Lean Clay (Su = 600 psf)

$$Q_{all} = \frac{0.55 \times 600 \times \pi \times 16/12 \times 7.5}{2 \times 2000}$$

$= \underline{2.6 \text{ tons}}$

Friction in Poorly Graded Gravel ($\phi' = 34°$) (Assume 10' into the gravel)

σ_o' at 25.5' = 13 × 125 + 7.5 × 110 + 5 × 115
= 3025.0 psf

$\beta = 1.5 - 0.135(25.5)^{1/2}$
= 0.82

$$Q_{all} = \frac{0.82 \times 0.9 \times 3025.0 \times \pi \times 16/12 \times 10}{2 \times 2000}$$

$= \underline{23.4 \text{ tons}}$

Total Qall = 13.0 + 2.6 + 23.4 = $\underline{39.0 \text{ tons}}$ > 37.7 tons ∴ ok

PARIKH

Practicing in the Geosciences

JOB Chico SR 99 Auxiliary Lane Project 202101.GPR
SHEET NO 3 OF 5
CALCULATED BY A Lam DATE 8/2008
CHECKED BY DATE
SCALE

Pile Capacity Analyses - RW No. 2 16" ⌀ CIDH pile Maximum factored axial load = 113 kips

Total pile Length = 10 + 7.5 + 10

= 27.5 feet

Proposed pile tip elevation = 225 - 27.5

= 197.5 feet

Depth of Second Point of Counterflexure (42^k) =

Design Tip Elevation due to lateral load = 225 - 22.5

= 202.5 feet

Pile Capacity Analysis - Rw No. 2 16" ϕ CIDH Pile Maximum factored axial load = 113 kips

Bottom of Footing Elevation = 221 feet

Friction in Lean Clay (S_u = 2250 psf)

$$Q_{all} = \frac{0.55 \times 2250 \times \pi \times 16/12 \times 6}{2 \times 2000}$$

$$= 7.8 \text{ tons}$$

Friction in Lean Clay (S_u = 600 psf)

$$Q_{all} = \frac{0.55 \times 600 \times \pi \times 16/12 \times 7.5}{2 \times 2000}$$

$$= 2.6 \text{ tons}$$

Friction in Poorly Graded Gravel (ϕ' = 34°)

$$\sigma_{vo}' \text{ at } 22' = 9 \times 125 + 7.5 \times 110 + 5.5 \times 115$$
$$= 2582.5 \text{ psf}$$

$$\beta = 1.5 - 0.135 (22)^{1/2}$$
$$= 0.87$$

$$Q_{all} = \frac{0.87 \times 0.9 \times 2582.5 \times \pi \times 16/12 \times 11}{2 \times 2000}$$

$$= 23.3 \text{ tons}$$

Friction in Poorly Graded Gravel (ϕ' = 36°) (Assume 2' into the gravel

$$\sigma_{vo}' \text{ at } 23' = 2582.5 + 1 \times 125$$
$$= 2707.5 \text{ psf}$$

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Practicing in the Geosciences

JOB: Chico SR 99 Auxiliary Lane Project 202101.GOE
SHEET NO: 5 OF 5
CALCULATED BY: A Lam DATE: 8/2008
CHECKED BY: DATE:
SCALE:

<u>Pile capacity Analysis</u> - RW No. 2 16" ϕ CIDH pile Maximum factored axial load = 113 kip

$\beta = 2.0 - 0.062(23)^{1/2}$ Gravelly Sands or gravels SPT N > 15
$= 1.70$

$Q_{all} = \dfrac{1.70 \times 0.9 \times 2707.5 \times \pi \times {}^{16}/_{12} \times 2}{2 \times 2000}$

$= \underline{8.7 \text{ tons}}$

Total Q_{all} = 7.8 + 2.6 + 23.3 + 8.7 = <u>42.4 tons</u> > 37.7 tons

Total pile length = 6 + 7.5 + 11 + 2

= 26.5 feet Say 27.5 feet

Design Tip Elevation = 221 - 27.5

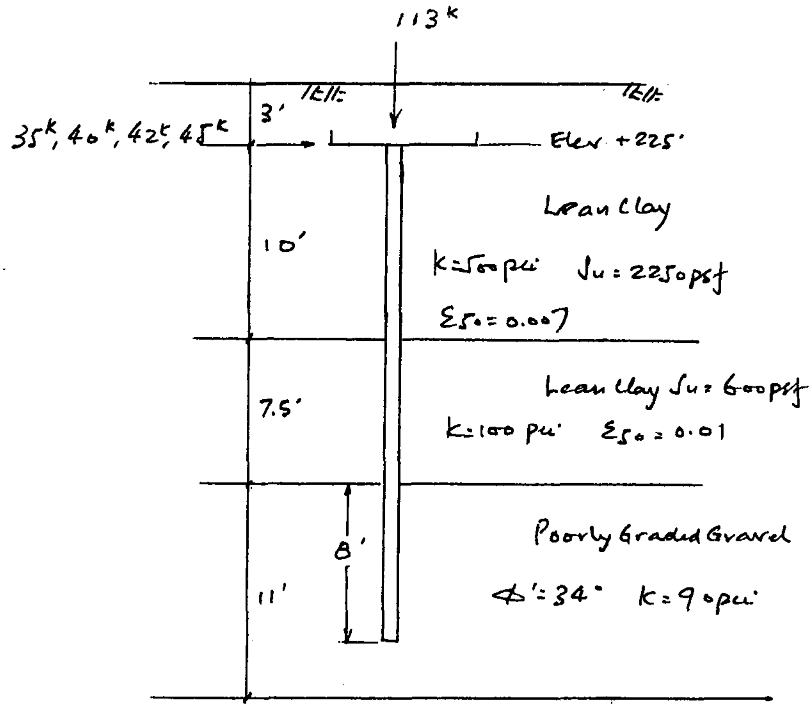
= <u>193.5 feet</u>

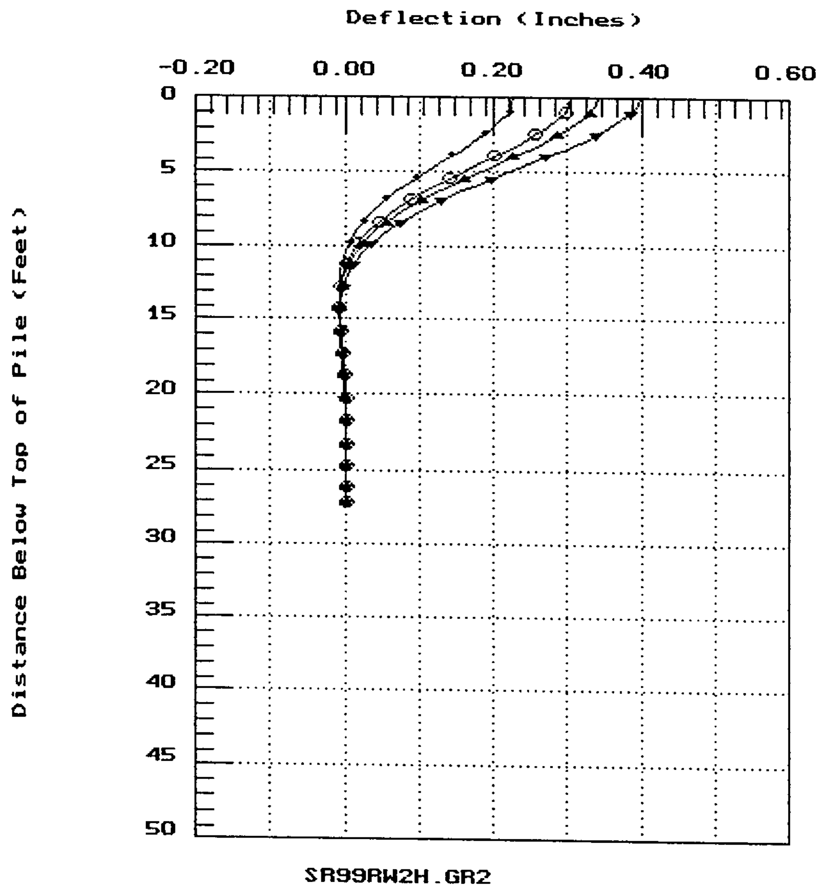
Depth of Second Point of Counterflexure =

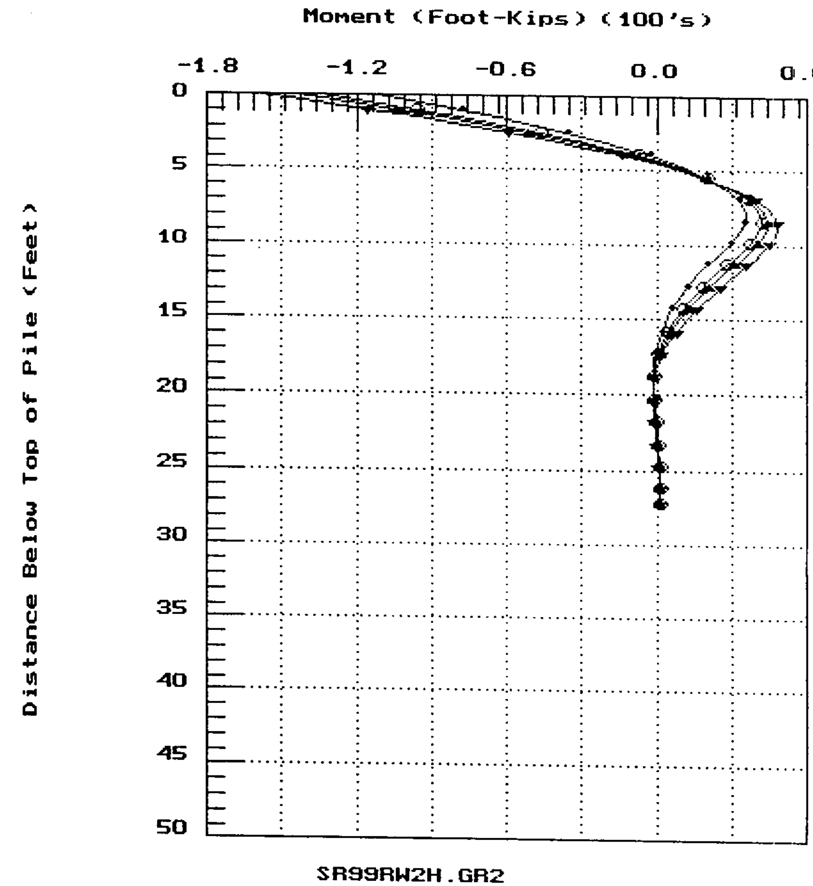
Design Tip Elevation due to lateral load = 221 - 25.5

= <u>195.5 feet</u>

```
Chico SR 99 RW No. 2 (Footing Elev.= 225.0 ft) (16-inch CIDH Pile-151 kips)
   1      1      0      0      0
  55      2    -36.0   330.0       0.0
   0.0    16.0         3217.00        201.1         3600000
 330.0    16.0         3217.00        201.1         3600000
   4      8       8       0      2
   3    -36.0   120.0       500.0  500.0
   3    120.0   210.0       100.0  100.0
   4    210.0   342.0        90.0   90.0
   4    342.0   564.0       225.0  225.0
 -36.0     0.072
 120.0     0.072
 120.0     0.064
 210.0     0.064
 210.0     0.067
 342.0     0.067
 342.0     0.072
 564.0     0.072
 -36.0     15.63      0.0    0.007
 120.0     15.63      0.0    0.007
 120.0      4.17      0.0    0.01
 210.0      4.17      0.0    0.01
 210.0      0.00     34.0    0.000
 342.0      0.00     34.0    0.000
 342.0      0.00     36.0    0.000
 564.0      0.00     36.0    0.000
 -36.0    0.6  1
 564.0    0.6  1
   0      1    1
   4
   2    3.50D+04  0.0D+05  1.13D+05
   2    4.00D+04  0.0D+05  1.13D+05
   2    4.20D+04  0.0D+05  1.13D+05
   2    4.50D+04  0.0D+05  1.13D+05
   0
   1      1      0
 500    1.00D-5   2500.0
```



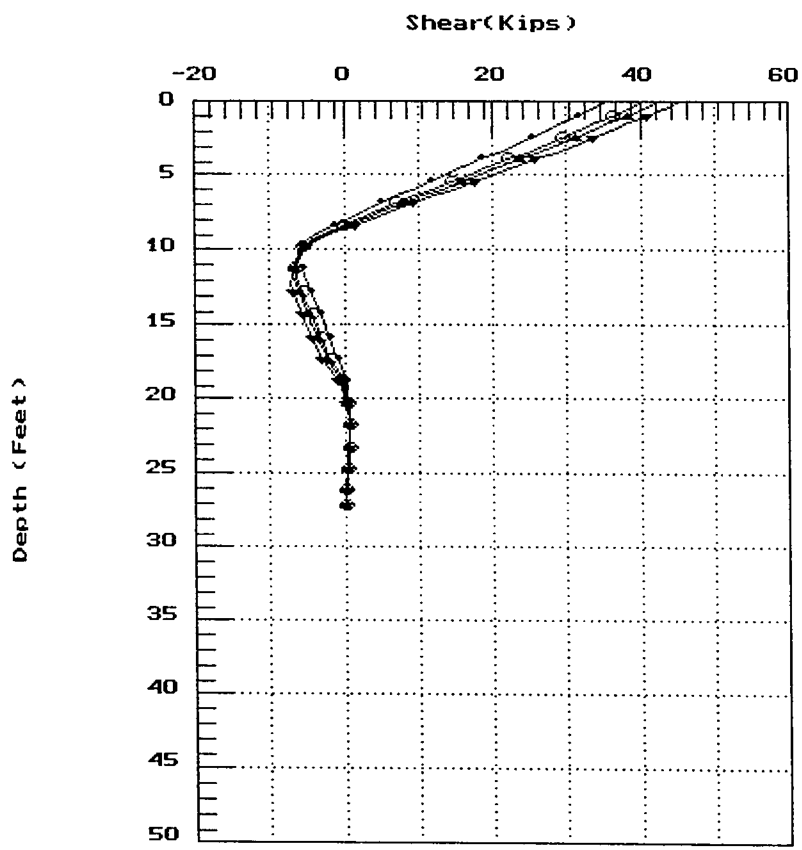




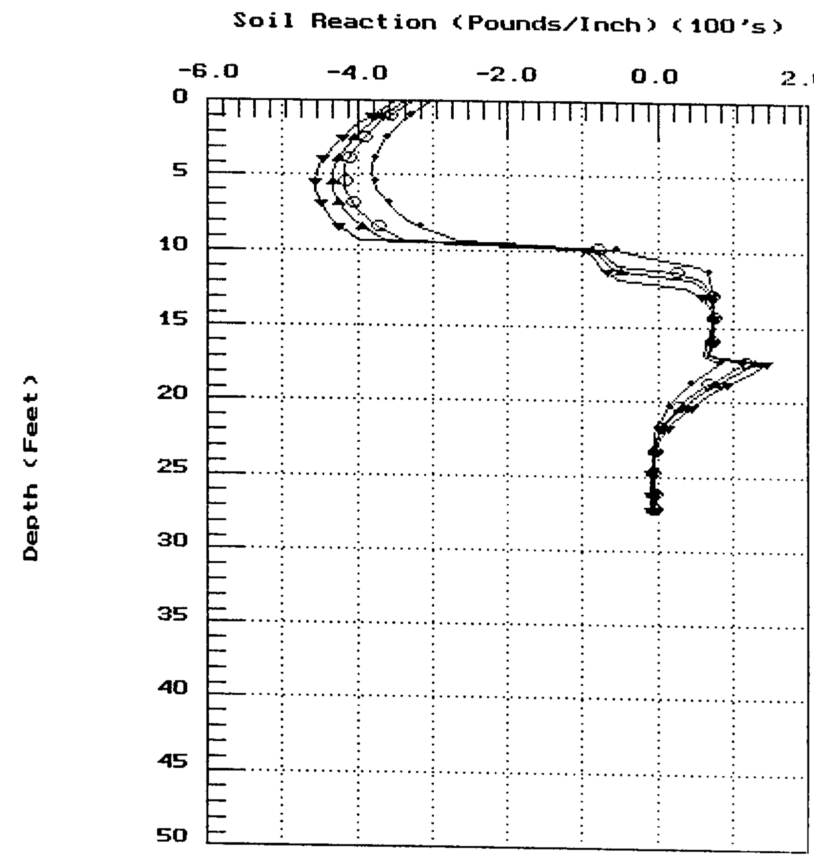
Retaining Wall No. 2. (Bottom of Footing Elev. ≈ +225 ft).

- 35^k
- 40^k
- 42^k
- 45^k

Chico SR 99 Auxiliary Lane Project 202101.GDR

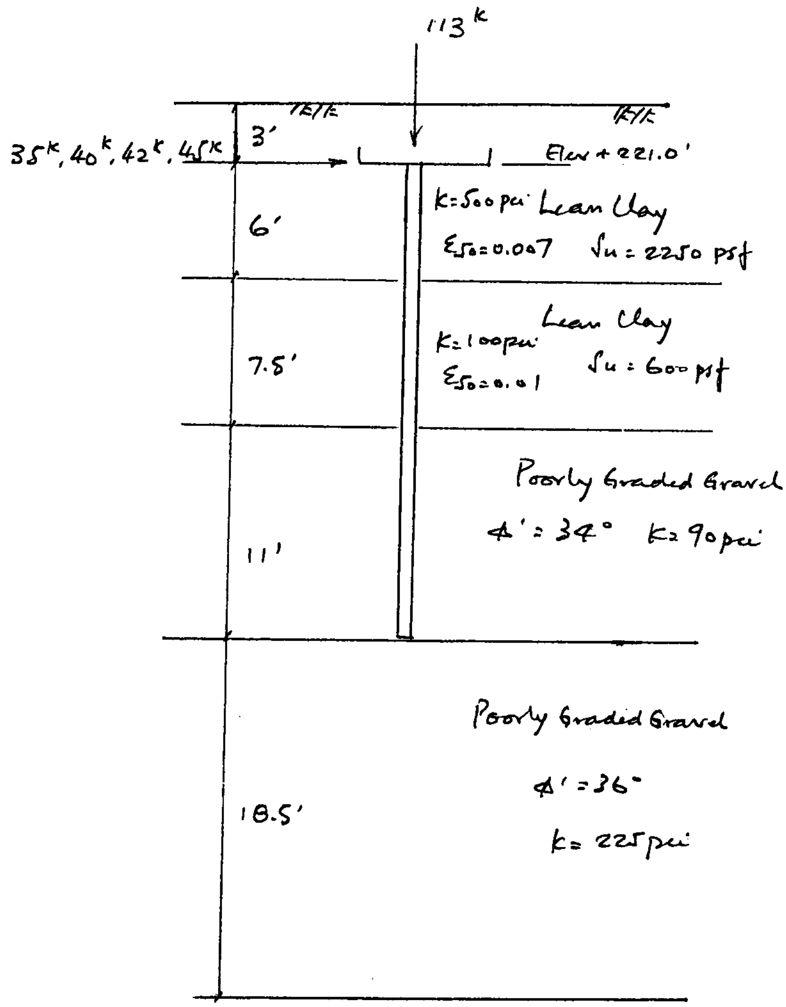


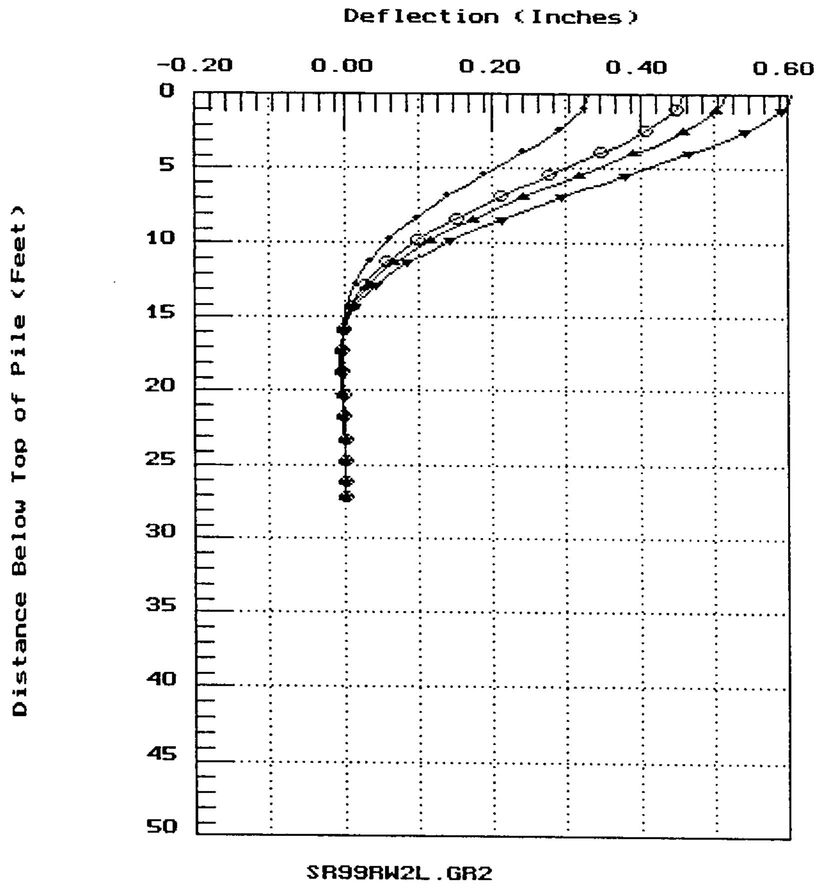
SR99RW2H.GR2

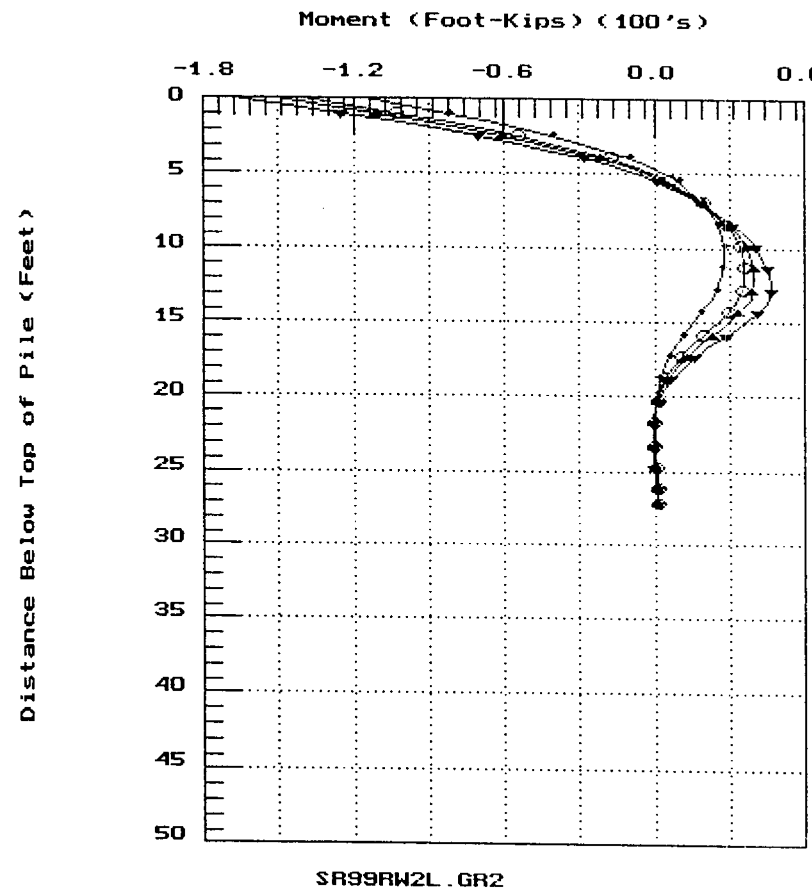


SR99RW2H.GR2

```
Chico SR 99 RW No. 2 (Footing Elev.= 221.0 ft) (16-inch CIDH Pile-151 kips)
   1      1      0      0      0
  55      2    -36.0   330.0       0.0
   0.0    16.0         3217.00         201.1         3600000
 330.0    16.0         3217.00         201.1         3600000
   4      8       8       0       2
   3    -36.0     72.0       500.0   500.0
   3     72.0    162.0       100.0   100.0
   4    162.0    294.0        90.0    90.0
   4    294.0    516.0       225.0   225.0
 -36.0     0.072
  72.0     0.072
  72.0     0.064
 162.0     0.064
 162.0     0.067
 294.0     0.067
 294.0     0.072
 516.0     0.072
 -36.0     15.63      0.0     0.007
  72.0     15.63      0.0     0.007
  72.0      4.17      0.0     0.01
 162.0      4.17      0.0     0.01
 162.0      0.00     34.0     0.000
 294.0      0.00     34.0     0.000
 294.0      0.00     36.0     0.000
 516.0      0.00     36.0     0.000
 -36.0    0.6   1
 516.0    0.6   1
   0      1     1
   4
   2    3.50D+04   0.0D+05   1.13D+05
   2    4.00D+04   0.0D+05   1.13D+05
   2    4.20D+04   0.0D+05   1.13D+05
   2    4.50D+04   0.0D+05   1.13D+05
   0
   1      1     0
 500    1.00D-5    2500.0
```



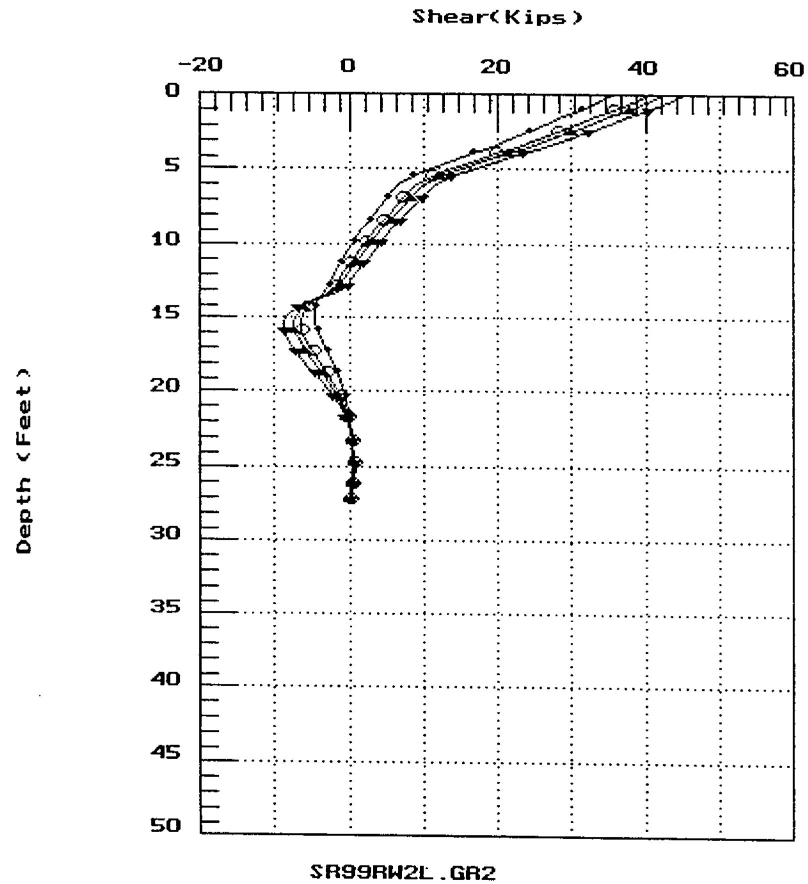


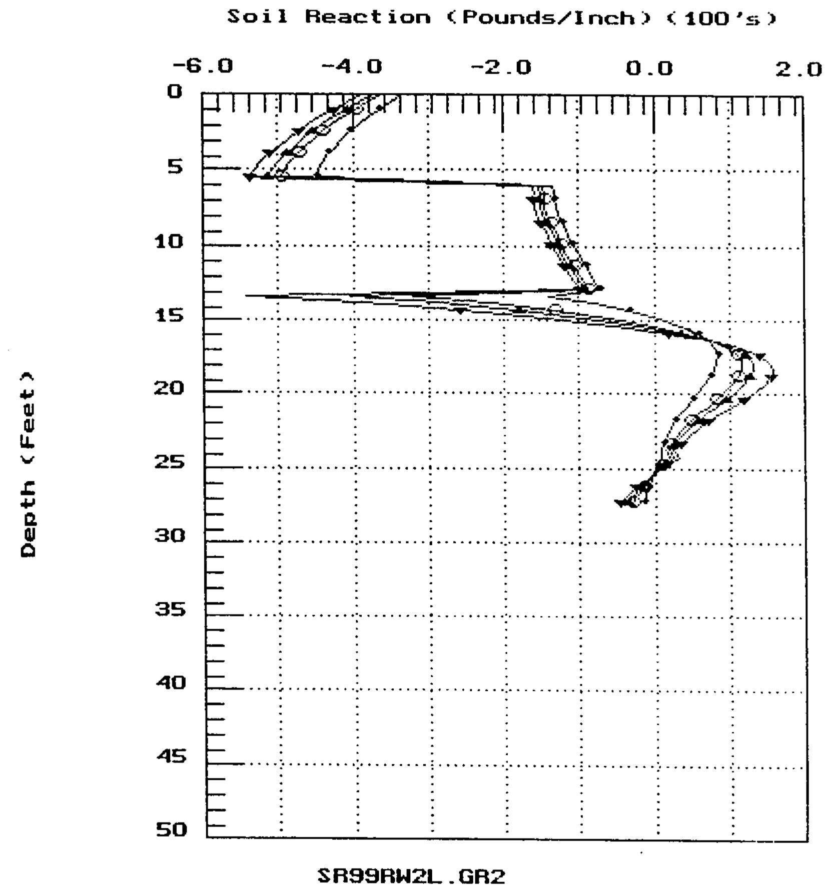


Retaining Wall No. 2 (Bottom of Footing Elev. = +221 ft)

- 35^k
- 40^k
- 42^k
- 45^k

Chico SR99 Auxiliary Lane Project 202101.GDR

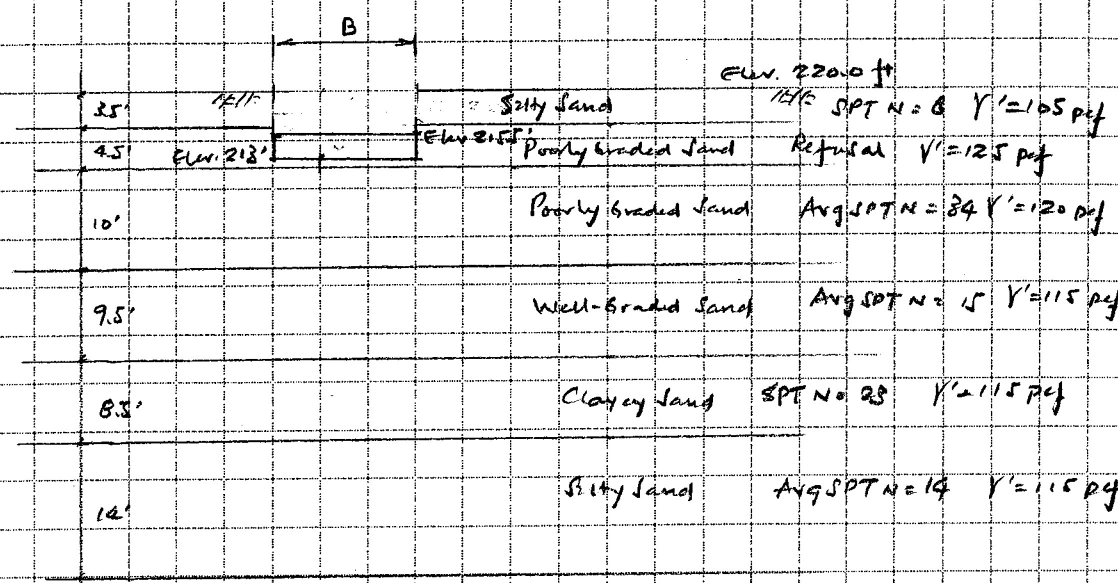

Shear(Kips)
-20
0
20
40
60
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99RW2L.GR2


Soil Reaction (Pounds/Inch) (100's)
-6.0
-4.0
-2.0
0.0
2.0
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
50
SR99RW2L.GR2

BEARING CAPACITY ANALYSES

Retaining Wall No. 1

Bearing Capacity - NB On Ramp (RW-20A) (H between 8' and 22')



Retaining Wall No. 1

<u>Bearing Capacity - NBON Ramp</u> (RW-20A) (H' between 8' and 22')

Now $\phi' = 32°$ $N_q = 28.5$, $N_c = 44.0$ $N_\gamma = 27.9$

Now assume $c = 0$, $B = 8'$ $D = 8'$ $\gamma_{sat} = 115$ pcf

$\gamma' = 105$ pcf

Assume groundwater at 8' below ground

$Q_{ult} = [0.5\gamma B N_\gamma + cN_c + \gamma D N_q]$

Assume F.o.S. = 3 $Q_{all} = \dfrac{[0.5 \times (115-62.4) \times 8 \times 27.9 + 105 \times 3 \times 28.5]}{3}$

$= \dfrac{5870.2 + 8977.5}{3}$

$= 4949.2$ psf Say $\underline{4.0 \text{ ksf}}$

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JOB: Chico SR 99 Auxiliary Lane Project 20-2101.GDR
SHEET NO: 3 OF 8
CALCULATED BY: A Lam DATE: 8/2008
CHECKED BY: DATE:
SCALE:

Retaining Wall No. 3.

Bearing Capacity - SB OFF Ramp (Boring RW-1) (H between 8' & 16')

B

Elev. 223.0

Elev 222.5'

Elev 217.0'

Thickness	Soil	Properties
13.5'	Sandy Lean Clay, $\gamma' = 127$ pcf	Avg SPT N = 25, Assume S_u = 2000 psf
10.5'	Silty Sand, $\gamma' = 125$ pcf	Avg SPT N = 8
6'	Clayey Gravel	Refusal, $\gamma' = 130$ pcf
10'	Sandy Lean Clay	Avg SPT N = 23, $\gamma' = 120$ pcf
5'	Silty Clay	Avg SPT N = 23, $\gamma' = 120$ pcf
6.5'	Sandy Lean Clay	Refusal, $\gamma' = 120$ pcf

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Practicing in the Geosciences

JOB: Chico SR 99 Auxiliary Lane Project
SHEET NO: 4 OF 8
CALCULATED BY: A Lam DATE: 8/2008
CHECKED BY: DATE:
SCALE:

Retaining Wall No. 3
(H between 8' – 16')

Bearing Capacities - SB OFF Ramp (Boring RW-1)

Short-Term $Q_{all} = \frac{[0.5 \times \gamma B N_\gamma + c N_c + \gamma D N_q]}{3}$

Elev. 228'

Elev. 219'

Assume $S_u = 2000$ psf, $\phi' = 0°$

$\gamma' = 127$ pcf

Now $N_\gamma = 0$ $N_q = 1.0$ $N_c = 5.7$

$D' = 3'$

$\phi' = 0°$ $N_c = 5.7$

$$Q_{all} = \frac{5.7 \times 2000 + 127 \times 3 \times 1}{3}$$

$= 3927$ psf Say 3.5 ksf

Long-Term

P.I = 15 Assume $\phi' = 30°$ (Army Corp of Engineers Figure 3-2)

Assume $B = 8'$ $c' = 0$

Now $N_q = 22.5$ $N_\gamma = 19.7$ $N_c = 37.2$

$$Q_{all} = \frac{[0.5 \gamma B N_\gamma + c N_c + \gamma D N_q]}{3}$$

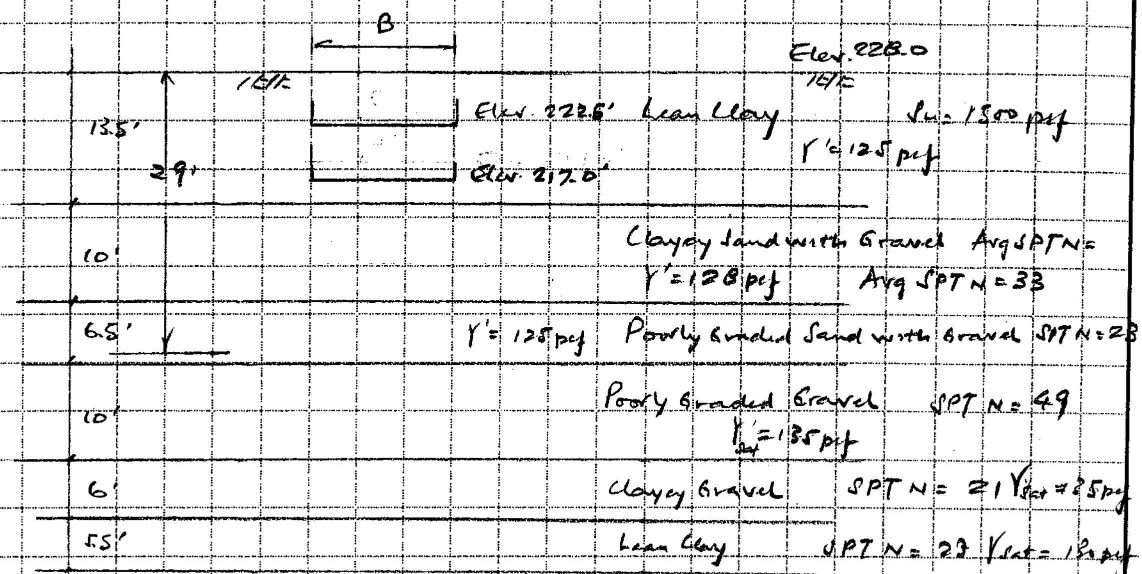
$$Q_{all} = \frac{0.5 \times (130 - 62.4) \times 8 \times 19.7 + 127 \times 3 \times 22.5}{3}$$

$$= \frac{5326.9 + 8572.5}{3}$$

$= 4633.1$ psf Say 4250 psf

Retaining Wall No. 3

Bearing Capacity - SB OFF Ramp (Boring RW-2) (H' between 8' and 16')



Retaining Wall No. 3

Bearing Capacity - SB OFF Ramp (Boring RW-2) (H' between 8'-16')

Short-Term $Q_{all} = \frac{[0.5 \times \gamma B N_\gamma + cN_c + \gamma D N_q]}{3}$

Now $N_\gamma = 0$ $N_q = 1.0$ $N_c = 5.7$ $c = S_u = 1500\,psf$

$Q_{all} = \frac{1500 \times 5.7 + 120 \times 3 \times 1}{3}$

$= 2970\,psf$ Say $\underline{2750\,psf}$

Long-Term

$PI = 15$ Assume $\phi' = 30°$ (Army Corp of Engineers Figure 3.2)

Assume $B = 8'$ $c' = 0\,psf$

Now $N_q = 22.5$ $N_\gamma = 19.7$ $N_c = 37.2$

$Q_{all} = \frac{[0.5 \times \gamma B N_\gamma + cN_c + \gamma D N_q]}{3}$

$Q_{all} = \frac{0.5 \times (130 - 62.4) \times 8 \times 19.7 + 120 \times 3 \times 22.5}{3}$

$= \frac{5326.9 + 8100}{3}$

$= 4475.6\,psf$ Say $\underline{4.0\,ksf}$

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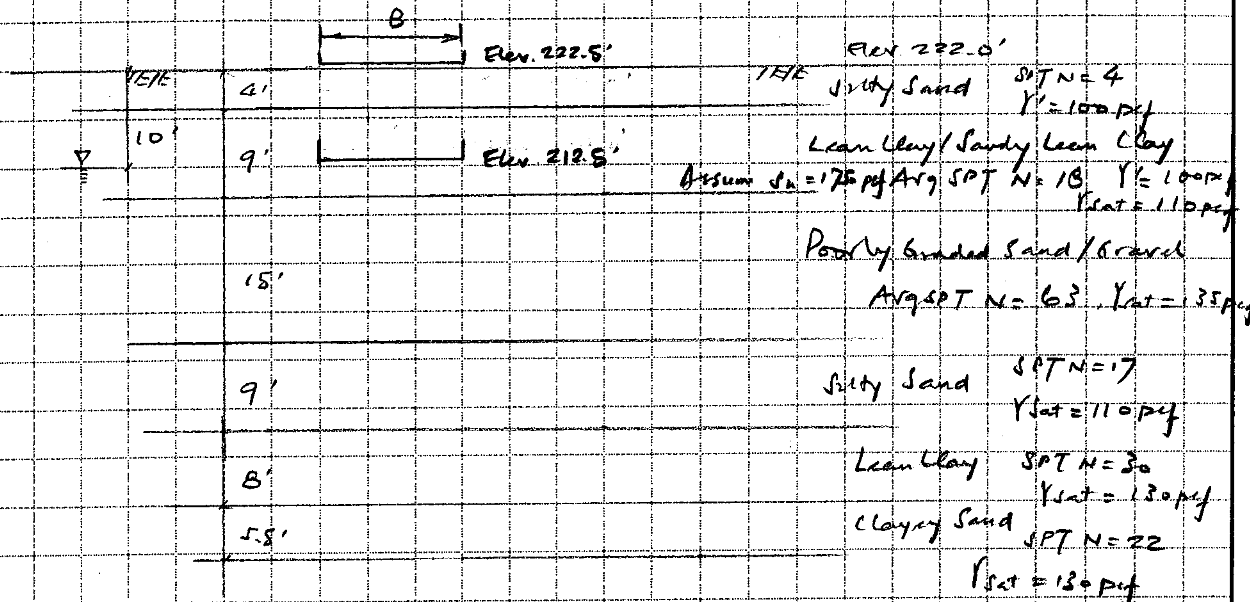
Practicing in the Geosciences

Retaining Wall No-4

Bearing Capacity - SB On Ramp (Boring RW/SW-9) Supporting soundwall (H' between 8' and 18')



Retaining Wall No. 4

Bearing Capacity - SBON Ramp (Boring RW/SW-9) ('H' between 8' and 18')

Silty Sand Now $\phi' = 31°$ $N_q = 25.5$ $N_c = 40.6$ $N_\gamma = 23.8$

Assume $c = 0$, $B = 8'$ $D = 3'$ $\gamma' = 100$ pcf. $\gamma_{sat} = 110$ pcf

Assume groundwater at 3' below ground

$$Q_{ult} = [0.5\gamma B N_\gamma + cN_c + \gamma D N_q]$$

Assume F.O.S = 3 $$Q_{all} = \frac{[0.5 \times (110-62.4) \times 8 \times 25.5 + 100 \times 3 \times 23.8]}{3}$$

$$= \frac{4855.2 + 7140.0}{3}$$

$$= 3998.4 \text{ psf}$$ Say 3750 psf

Lean Clay / Sandy Lean Clay Assume $\phi' = 0$. $S_u = c' = 1750$ psf

Short-Term $Q_{all} = \frac{[0.5 \times \gamma B N_\gamma + cN_c + \gamma D N_q]}{3}$ $\gamma' = 100$ pcf. $\gamma_{sat} = 110$ pcf

Now $\phi' = 0$ $N_c = 5.7$ $N_\gamma = 0$ $N_q = 1.0$

$$Q_{all} = \frac{1750 \times 5.7 + 1.0 \times 100 \times 3}{3}$$

$$= 3425 \text{ psf}$$ Say 3.0 ksf

"CULVERT 4" RESULTS

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 567+03

TEST SAMPLE NO.....BID-1 #8

OPERATOR...........LPT

TEST DATE..........06-06-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.4 , WATER pH = 0.0 , SOIL pH = 6.4

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1470 , WATER = 0 , SOIL = 1470

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage	& mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18	1.3	13	21	28	38	63
16	1.6	17	25	32	42	67
14	2.0	21	29	36	46	71
12	2.8	29	37	44	54	79
10	3.5	37	45	52	62	87
8	4.3	46	54	61	71	96

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 29+81

TEST SAMPLE NO.....PLM-2 #8

OPERATOR...........LPT

TEST DATE..........06-06-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.3 , WATER pH = 0.0 , SOIL pH = 6.3

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1740 , WATER = 0 , SOIL = 1740

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	14	22	29	39	64
16 1.6	18	26	33	43	68
14 2.0	22	30	37	47	72
12 2.8	31	39	46	56	81
10 3.5	39	47	54	64	89
8 4.3	48	56	63	73	98

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 565+09

TEST SAMPLE NO.....RW-2 #3

OPERATOR...........LPT

TEST DATE..........06-13-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.9 , WATER pH = 0.0 , SOIL pH = 6.9

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1690 , WATER = 0 , SOIL = 1690

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	19	27	34	44	69
16 1.6	24	32	39	49	74
14 2.0	30	38	45	55	80
12 2.8	42	50	57	67	92
10 3.5	53	61	68	78	103
8 4.3	65	73	80	90	115

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 14+35

TEST SAMPLE NO.....SW-4 #4

OPERATOR...........LPT

TEST DATE..........06-13-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.9 , WATER pH = 0.0 , SOIL pH = 6.9

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 2120 , WATER = 0 , SOIL = 2120

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	20	28	35	45	70
16 1.6	26	34	41	51	76
14 2.0	32	40	47	57	82
12 2.8	44	52	59	69	94
10 3.5	56	64	71	81	106
8 4.3	69	77	84	94	119

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 572+03

TEST SAMPLE NO.....BID-5 #2

OPERATOR...........LPT

TEST DATE..........06-06-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 7.0 , WATER pH = 0.0 , SOIL pH = 7.0

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 3220 , WATER = 0 , SOIL = 3220

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm		GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18	1.3	24	32	39	49	74
16	1.6	32	40	47	57	82
14	2.0	39	47	54	64	89
12	2.8	54	62	69	79	104
10	3.5	68	76	83	93	118
8	4.3	83	91	98	108	133

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPECS. 90-1.01

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 572+54

TEST SAMPLE NO.....BID-6 #3

OPERATOR...........LPT

TEST DATE..........06-06-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.3 , WATER pH = 0.0 , SOIL pH = 6.3

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 8580 , WATER = 0 , SOIL = 8580

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	23	31	38	48	73
16 1.6	30	38	45	55	80
14 2.0	37	45	52	62	87
12 2.8	51	59	66	76	101
10 3.5	65	73	80	90	115
8 4.3	79	87	94	104	129

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 27+20

TEST SAMPLE NO.....RW-8 #3

OPERATOR...........LPT

TEST DATE..........06-13-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.4 , WATER pH = 0.0 , SOIL pH = 6.4

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1740 , WATER = 0 , SOIL = 1740

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	14	22	29	39	64
16 1.6	18	26	33	43	68
14 2.0	23	31	38	48	73
12 2.8	32	40	47	57	82
10 3.5	40	48	55	65	90
8 4.3	49	57	64	74	99

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 38+27

TEST SAMPLE NO.....SW-11 #3

OPERATOR...........LPT

TEST DATE..........06-13-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************
CSP SITE pH = 6.4 , WATER pH = 0.0 , SOIL pH = 6.4
MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1150 , WATER = 0 , SOIL = 1150
****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage	mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18	1.3	12	20	27	37	62
16	1.6	15	23	30	40	65
14	2.0	19	27	34	44	69
12	2.8	26	34	41	51	76
10	3.5	34	42	49	59	84
8	4.3	41	49	56	66	91

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 25+75

TEST SAMPLE NO.....SW-15 #4

OPERATOR...........LPT

TEST DATE..........06-06-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.5 , WATER pH = 0.0 , SOIL pH = 6.5

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 2300 , WATER = 0 , SOIL = 2300

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	16	24	31	41	66
16 1.6	21	29	36	46	71
14 2.0	26	34	41	51	76
12 2.8	37	45	52	62	87
10 3.5	47	55	62	72	97
8 4.3	57	65	72	82	107

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 19+35

TEST SAMPLE NO.....SW-17 #4

OPERATOR...........LPT

TEST DATE..........06-06-08
************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************
CSP SITE pH = 6.5 , WATER pH = 0.0 , SOIL pH = 6.5
MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 2120 , WATER = 0 , SOIL = 2120
****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	16	24	31	41	66
16 1.6	21	29	36	46	71
14 2.0	25	33	40	50	75
12 2.8	35	43	50	60	85
10 3.5	45	53	60	70	95
8 4.3	54	62	69	79	104

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, MAY BE USED
IF ABRASIVE CONDITIONS DO NOT EXIST
SITE CONDITIONS MEET CORROSION REQUIREMENTS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, MAY BE USED
SITE CONDITIONS MEET CORROSION REQUIREMENTS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

MAINTENANCE-FREE SERVICE DESIGN ESTIMATES FOR DRAINAGE FACILITIES USING:
CALIFORNIA CULVERT CRITERIA AND CULVERT4.EXE, (RELEASE DATE 04-16-98)

PROJECT LOCATION...CHICO SR99 AUXILIARY LANE PROJECT

PROJECT ACCOUNT NO.202101.GDR

SAMPLE LOCATION....STA 562+03

TEST SAMPLE NO.....RW-21 #8

OPERATOR...........LPT

TEST DATE..........06-13-08

************* A DATA VALUE OF ZERO INDICATES NO DATA INPUT *****************

CSP SITE pH = 6.6 , WATER pH = 0.0 , SOIL pH = 6.6

MINIMUM RESISTIVITY, OHM-CM: CSP SITE = 1370 , WATER = 0 , SOIL = 1370

****

ESTIMATED SERVICE LIFE OF CSP CULVERTS, YEARS
SEE CALTRANS HIGHWAY DESIGN MANUAL CHAPTER 850

CSP THICK Gage & mm	GALV. 57 g	GALV.+ BIT COAT. (WATER SIDE)	GALV.+ BIT COAT & PAVED INV. (ABRASION)	GALV.+ BIT COAT (SOIL SIDE)	GALV.+ POLYMER 90 DEG INVERT
18 1.3	14	22	29	39	64
16 1.6	18	26	33	43	68
14 2.0	22	30	37	47	72
12 2.8	31	39	46	56	81
10 3.5	40	48	55	65	90
8 4.3	48	56	63	73	98

FLOW VEL. <1.5 m/s WITH NON-ABRASIVE CONDITIONS, (DEFAULT VALUES)
CAP, 18 GAGE (1.3 mm) CSP AND CASP MAY BE USED WITH THESE FLOW VELOCITIES

STANDARD REINFORCED CONCRETE PIPE DESIGN SHOULD BE
SUITABLE FOR THIS USER DEFINED LEVEL OF CHLORIDES

CONCRETE AND RCP MITIGATION MEASURES FOR pH
TYPE IP (MS) MODIFIED CEMENT OR TYPE II MODIFIED CEMENT
MINIMUM REQUIRED BY CALTRANS STD. SPEC. 90-1.01
MAXIMUM W/C RATIO OF 0.45

A CORRUGATED ALUMINUM PIPE, CAP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

A CORRUGATED ALUMINIZED STEEL PIPE, CASP, SHOULD NOT BE USED
DUE TO CORROSIVE CONDITIONS

PLASTIC PIPE IS APPROVED FOR 50 YEARS SERVICE LIFE FOR
CORROSIVE CONDITIONS. ABRASION MUST BE EVALUATED. ALSO,
CONSIDER CONCRETE HEADWALLS AND CONCRETE OR METAL END
TREATMENT WHERE HIGH FIRE POTENTIAL EXISTS.

OVERHEAD SIGN PILE CAPACITY ANALYSES

PARIKH
Practicing in the Geosciences

JOB: Chico SR99 Auxiliary Lane Project
SHEET NO ____ OF ____
CALCULATED BY: A. Lam DATE: 9/2008
CHECKED BY ____ DATE ____
SCALE ____

Overhead Sign 2-07 (Station 11+38.20) (Boring BSP-6) Post Type VIII Foundation Depth ≈ 30 feet

Elev 233.0'

17.5'

① $\gamma' = 120$ pcf

Assume N = 20 (Based on SW-1B)

$s_u = 2000$

Elev +215.5'

8'	7.5' ② Sandy Lean Clay	$\gamma' = 115$ pcf, SPT N = 8, $s_u = 800$ psf
3.5'	③ $\gamma_{sat} = 127$ pcf Silt	$\gamma' = 110$ pcf, SPT N = 6, $s_u = 600$ psf
4.5'	④ $\gamma_{sat} = 130$ pcf Silty Sand	$\gamma' = 115$ pcf, SPT N = 12, $\phi' = 32°$
5'	Clayey Gravel	$\gamma' = 120$ pcf, Practical refusal, $\phi' = 39°$
5'	Poorly Graded Gravel	$\gamma' = 115$ pcf, SPT N = 30, $\phi' = 35°$
5'	Poorly Graded Gravel	$\gamma' = 110$ pcf, SPT N = 16, $\phi' = 31°$
8'	Poorly Graded Gravel	$\gamma' = 115$ pcf, SPT N = 30, $\phi' = 34°$
10'	Poorly Graded Gravel	Practical refusal, $\gamma' = 120$ pcf, $\phi' = 39°$
14'	Poorly Graded Gravel / Silty Sand	Avg SPT N = 42, $\gamma' = 125$ pcf, $\phi' = 33°$

Overhead Sign 2-07 (Station 11+38.20)

Pile Torsional Capacity (5' ϕ and 30 feet long CIDH piles)

$$T_{all}\ ①+②+③ = \frac{0.55\times5\times\pi\times(2000\times17.5+800\times5+600\times3.5)\times2.5}{2\times1000}$$

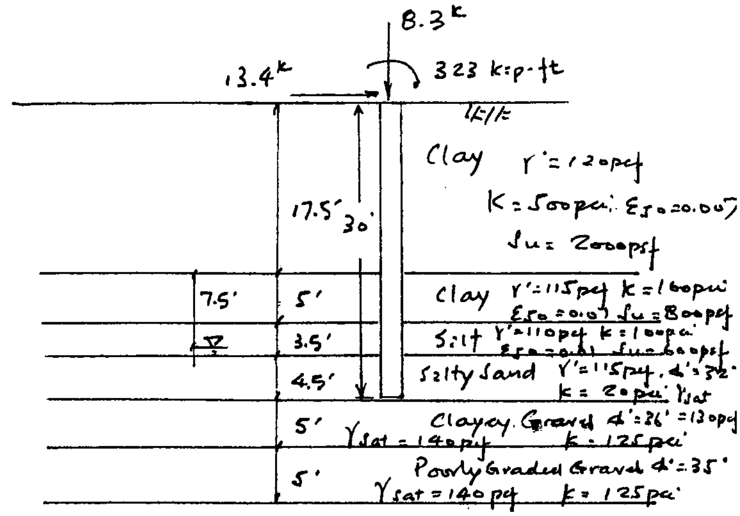
$$= \underline{\underline{443.8\ \text{kip-ft}}} \qquad > 242.5\ \text{kip-ft}$$

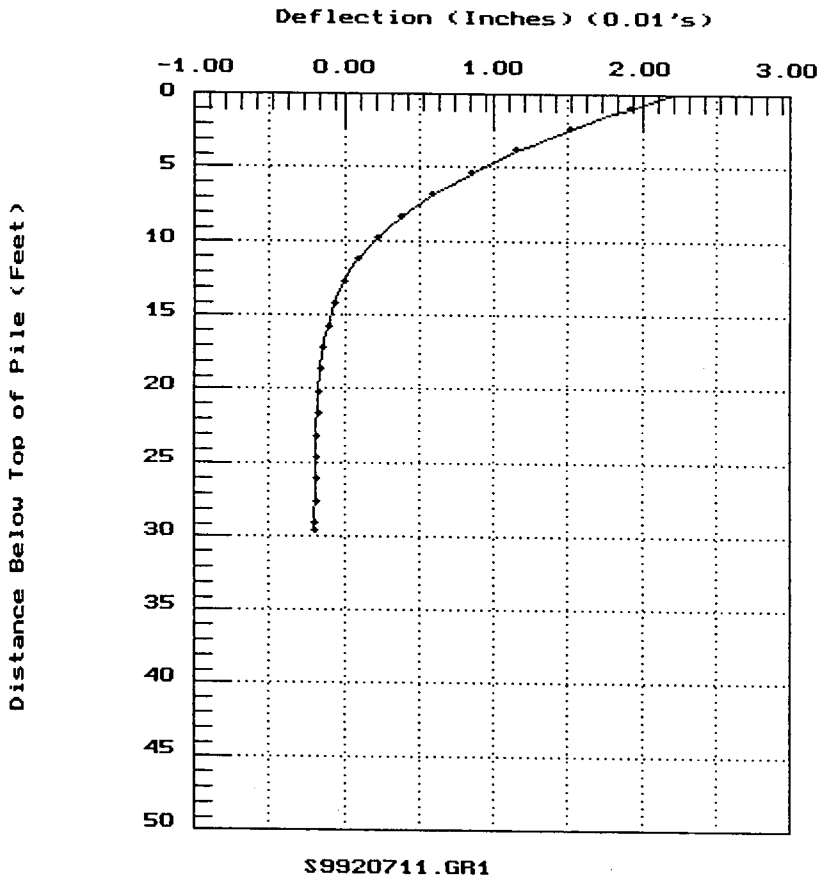
Vertical pile capacity

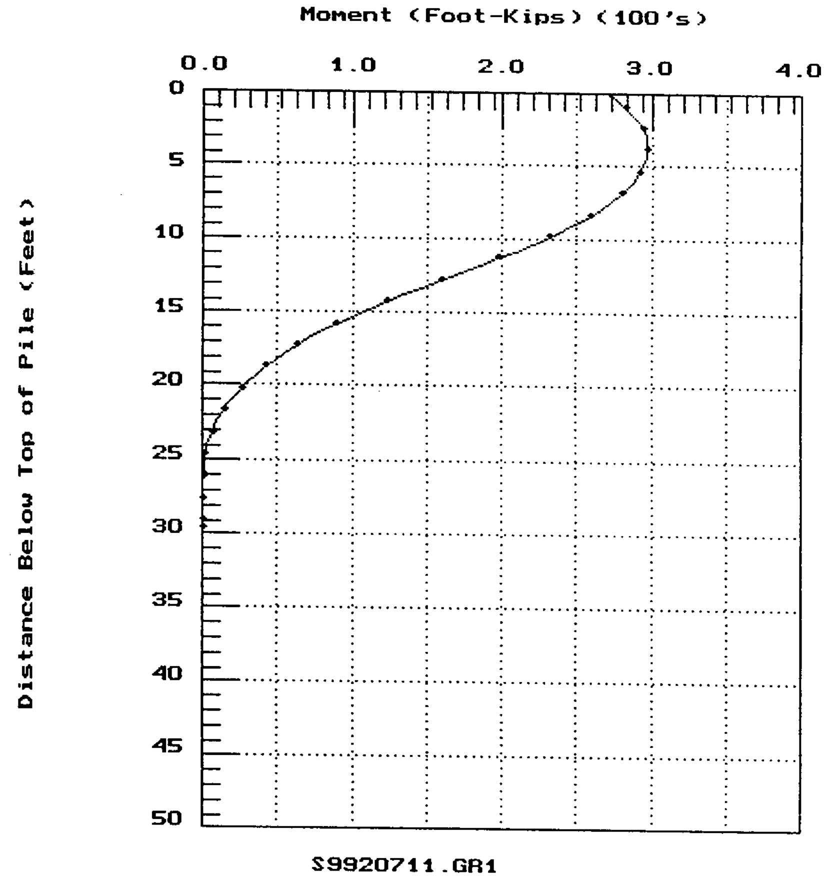
$$Q_{all} = \frac{0.55\times5\times\pi\times(2000\times17.5+800\times5+600\times3.5)}{2\times1000}$$

$$= \underline{\underline{177.5\ \text{kips}}} \qquad > 8.3\ \text{kips}$$

```
SR 99 Chico Auxiliary Lane OH 2-07(Sta. 11+38.20, 60-inch Dia. CIDH Pile) (Free
    1      1      0      0      0
   60      2    0.0      360.0      0.0
    0.0    60.0       636200.00          2827          3600000
  360.0    60.0       636200.00          2827          3600000
    5     10      10      0      2
    3      0.0    210.0       500.0   500.0
    3    210.0    270.0       100.0   100.0
    3    270.0    312.0       100.0   100.0
    4    312.0    366.0        20.0    20.0
    4    366.0    426.0       125.0   125.0
    0.0     0.069
  210.0     0.069
  210.0     0.067
  270.0     0.067
  300.0     0.036
  312.0     0.036
  312.0     0.039
  366.0     0.039
  366.0     0.045
  426.0     0.045
    0.0    13.89      0.0    0.007
  210.0    13.89      0.0    0.007
  210.0     5.56      0.0    0.01
  270.0     5.56      0.0    0.01
  270.0     4.17      0.0    0.01
  312.0     4.17      0.0    0.01
  312.0     0.00     32.0    0.000
  366.0     0.00     32.0    0.000
  366.0     0.00     36.0    0.000
  426.0     0.00     36.0    0.000
    0.0    0.6   1
  426.0    0.6   1
    0      1     1
    1
    1    1.34D+04   3.23D+06   8.35D+03
    0
    1      1      0
  200    1.00D-5    100.0
```





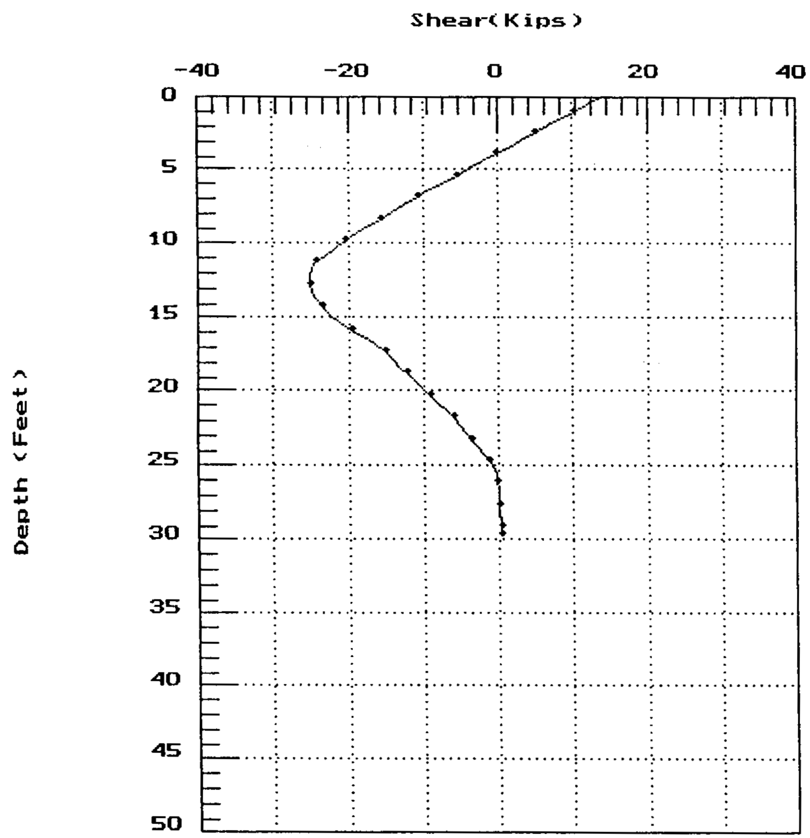


Overhead Sign 2-07 (Station 11+38.20)

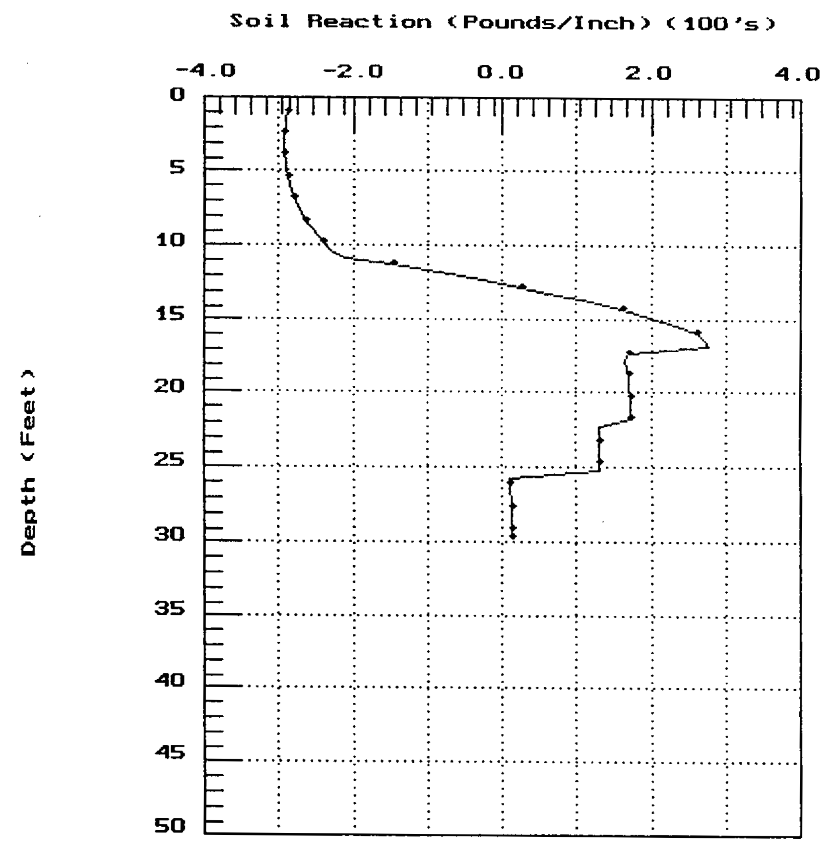
Free Head ⟶ Shear 13.4 k

Moment 323 kip-ft

Chico SR99 Auxiliary Lane Project



S9920711.GR1



S9920711.GR1

Overhead Sign 207 (Station 11+38.20)

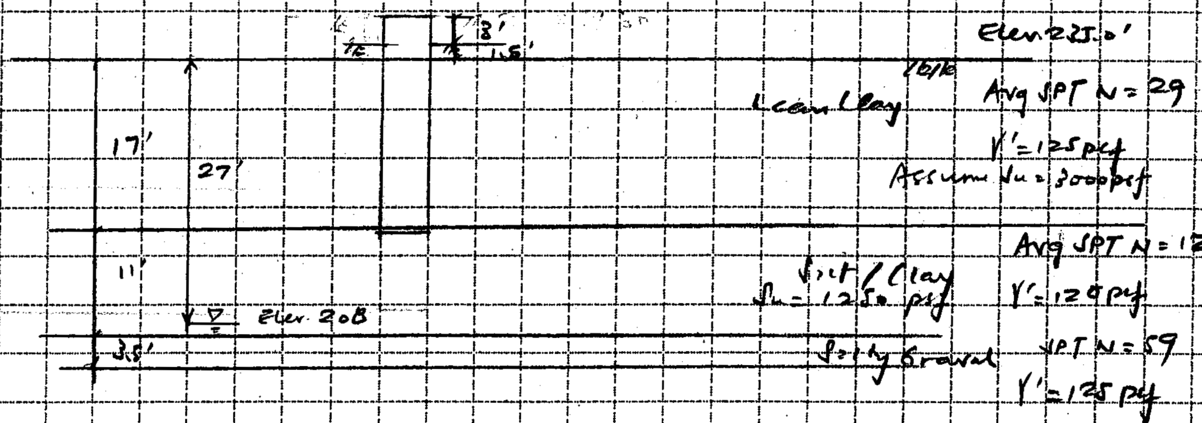
Free Head ⟶ Shear 8.35 k

Moment 323 kip-ft

Chico SR99 Auxiliary Lane Project

Overhead Sign 3-07 (Station 16+93) (Boring SW-18) Post Type VII Foundation Depth - 22 feet

19'?



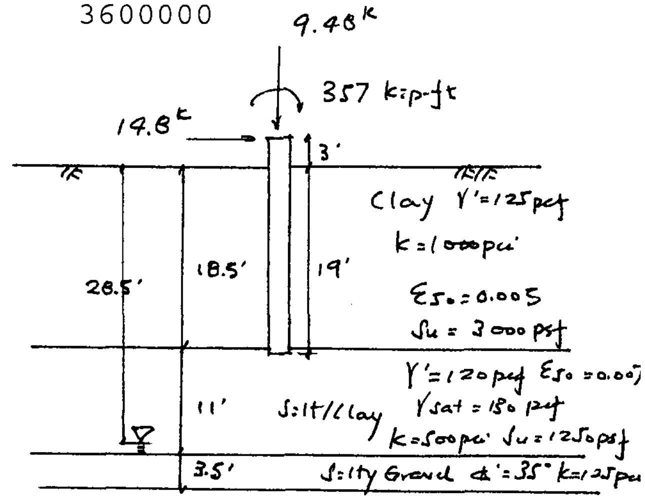
Overhead Sign 3-07 (Station 16+93)

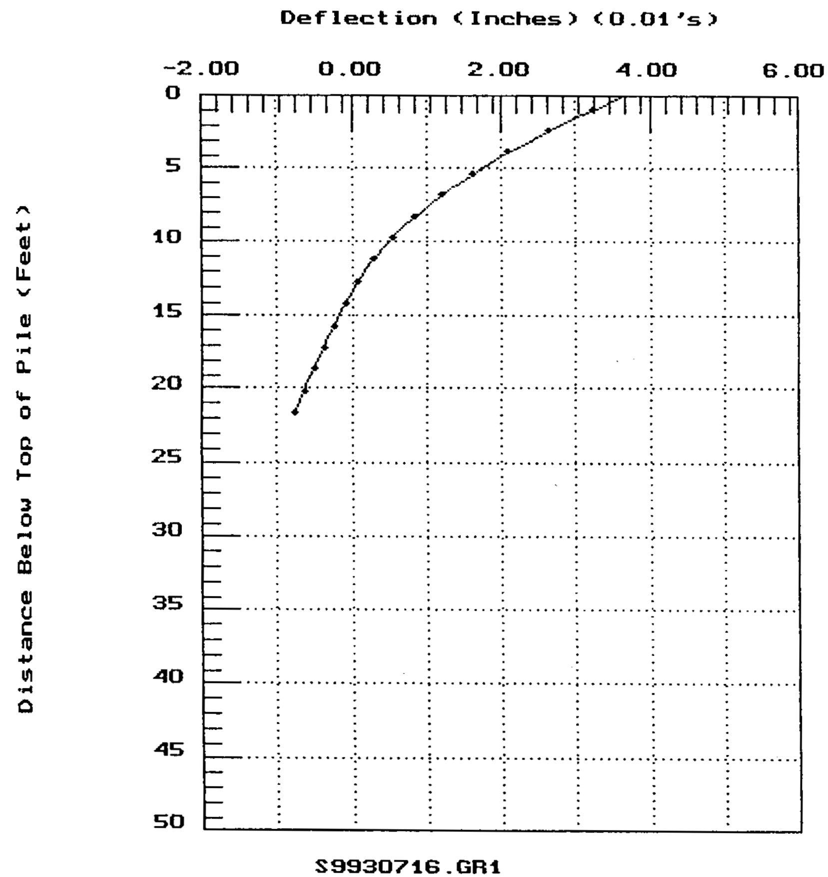
$$\text{Vertical pile capacity} = \frac{0.55 \times 5 \times \pi \times 3000 \times 18.5'}{2 \times 1000}$$

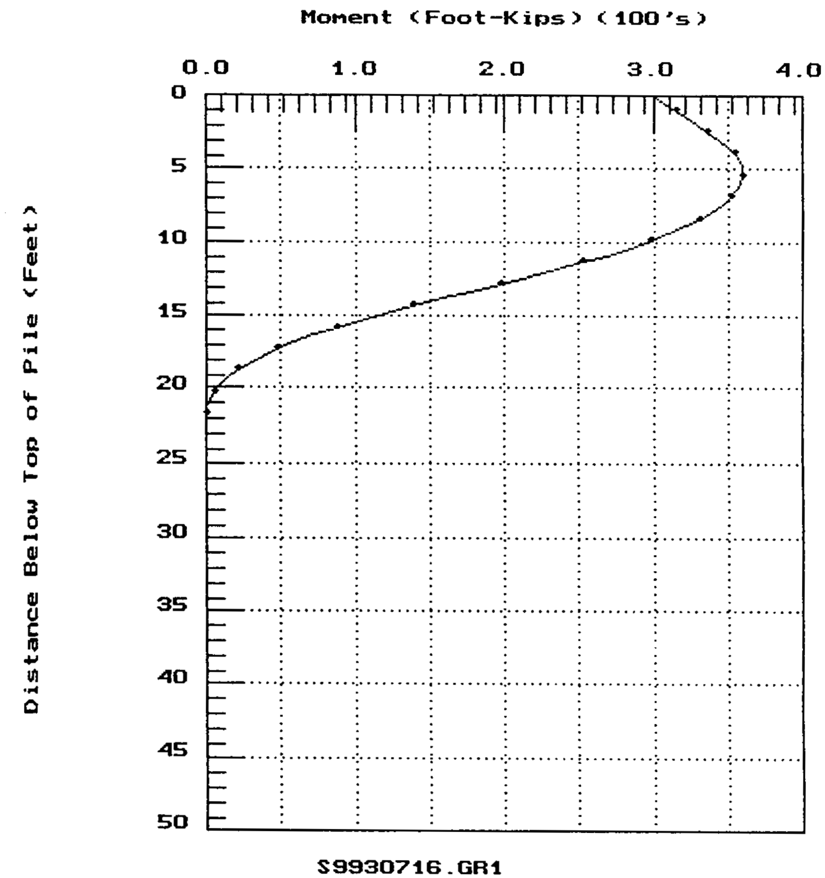
$$= \underline{\underline{239.7 \text{ kips}}} \quad > 9.5 \text{ kips}$$

SR 99 Chico Auxiliary Lane OH 3-07(Sta. 16+93, 60-inch Dia. CIDH Pile) (Free Hea

```
   1      1      0      0      0
  44      2    36.0      264.0      0.0
   0.0    60.0       636200.00          2827          3600000
 264.0    60.0       636200.00          2827          3600000
   2      4      4      0      2
   3    36.0   222.0      1000.0 1000.0
   3   222.0   354.0       500.0  500.0
  36.0    0.072
 222.0    0.072
 222.0    0.069
 354.0    0.069
  36.0   20.83      0.0   0.005
 222.0   20.83      0.0   0.005
 222.0    8.68      0.0   0.007
 354.0    8.68      0.0   0.007
  36.0   0.6  1
 354.0   0.6  1
   0     1    1
   1
   1   1.48D+04  3.57D+06  9.48D+03
   0
   1     1     0
 200   1.00D-5   100.0
```





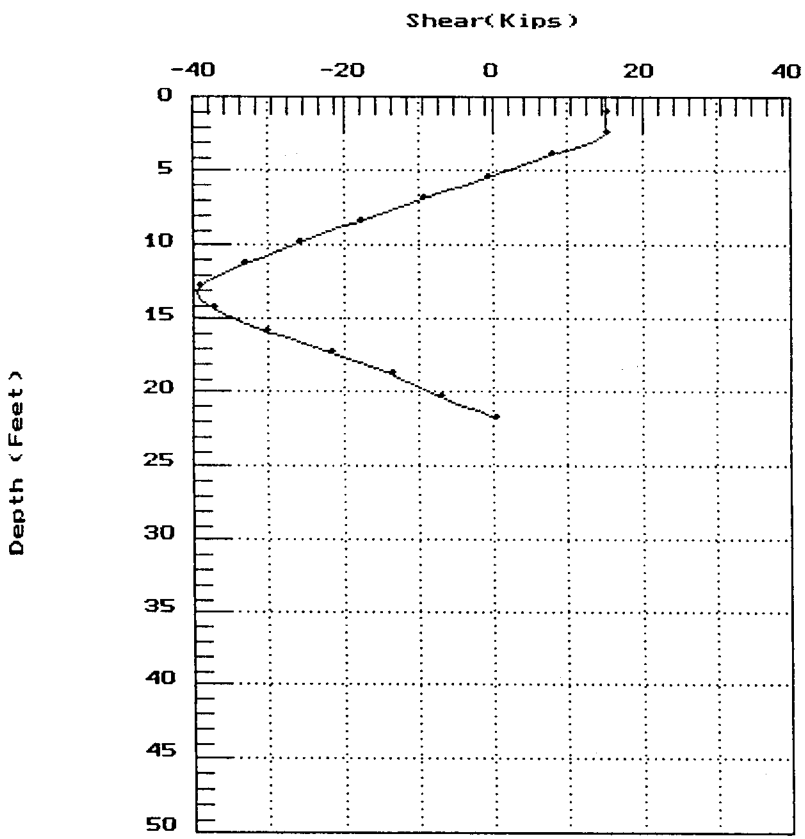


Overhead Sign 3-07 (Station 16+93)

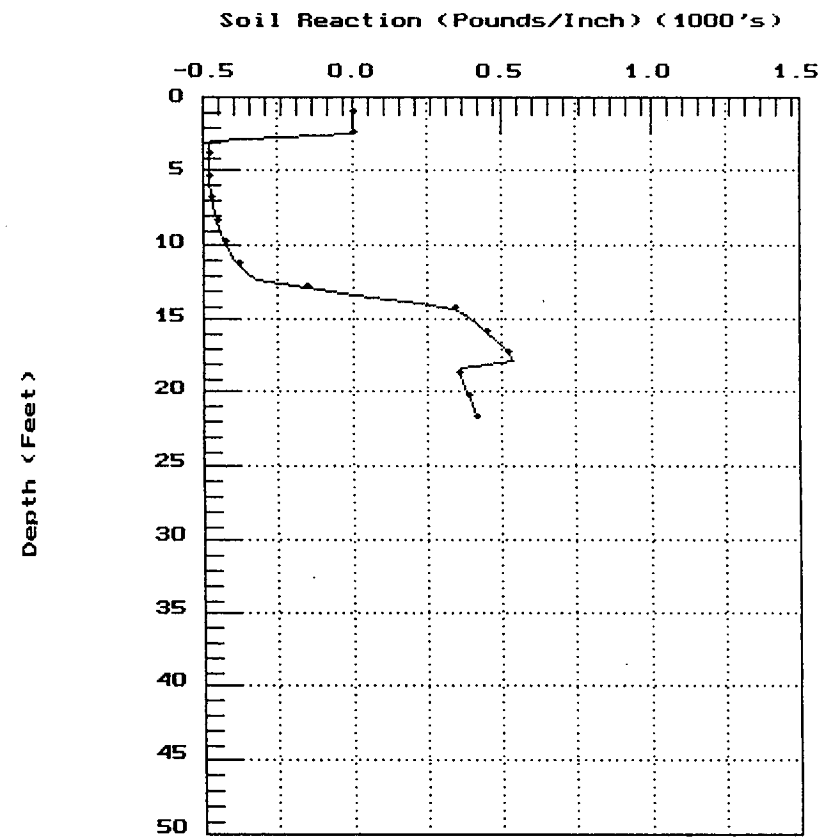
→ Free Head Shear 14.8 k

Moment 357 kip-ft

Chico SR 99 Auxiliary Lane Project



S9930716.GR1

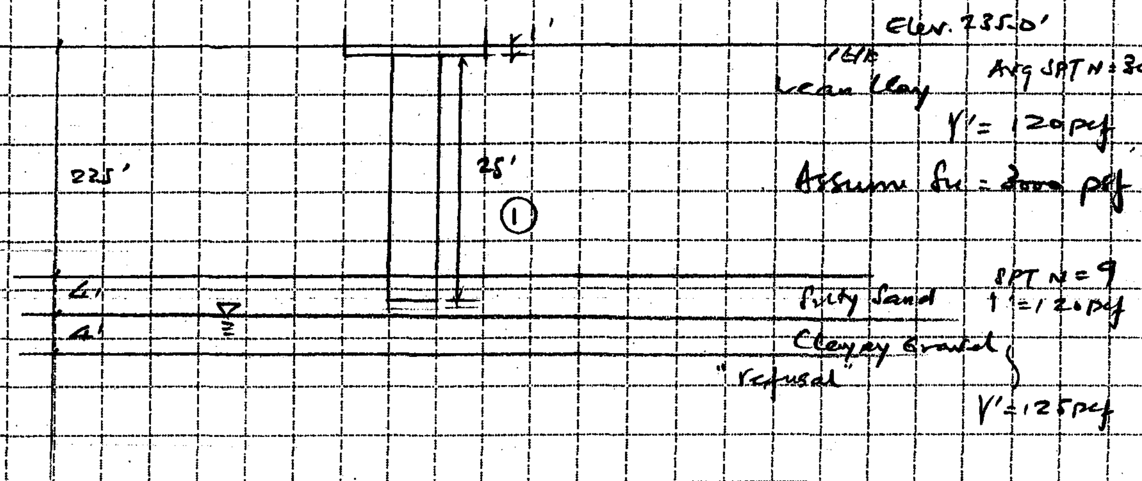


S9930716.GR1

PARIKH
Practicing in the Geosciences

JOB Chico SR 99 Auxiliary Lane Project
SHEET NO ______ OF ______
CALCULATED BY A Lam DATE 9/2008
CHECKED BY ______ DATE ______
SCALE ______

Overhead Sign 2-07 (Station 23+00) (Boring SW-16) Post Type VIII Foundation Depth: 25 feet



Overhead Sign 2-07 (Station 23+00)

Pile Torsional Capacity (5' d and 25 feet long CIDH piles)

$$T_{all} = \frac{0.55 \times 5 \times \pi \times 3000 \times 21.5 \times 2.5}{2 \times 1000}$$

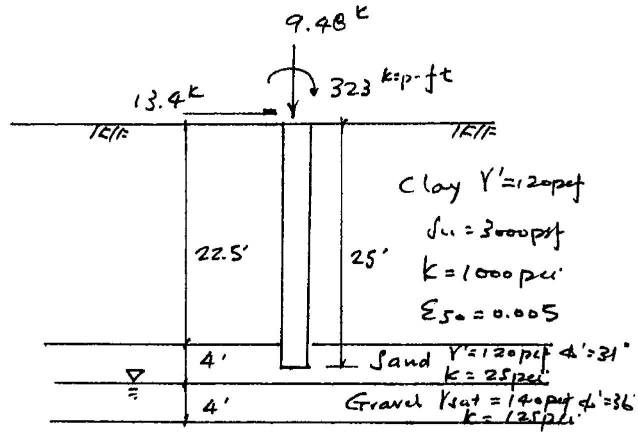
$$= \underline{\underline{696.5}} \text{ kip-ft} \qquad > 242.5 \text{ kip-ft}$$

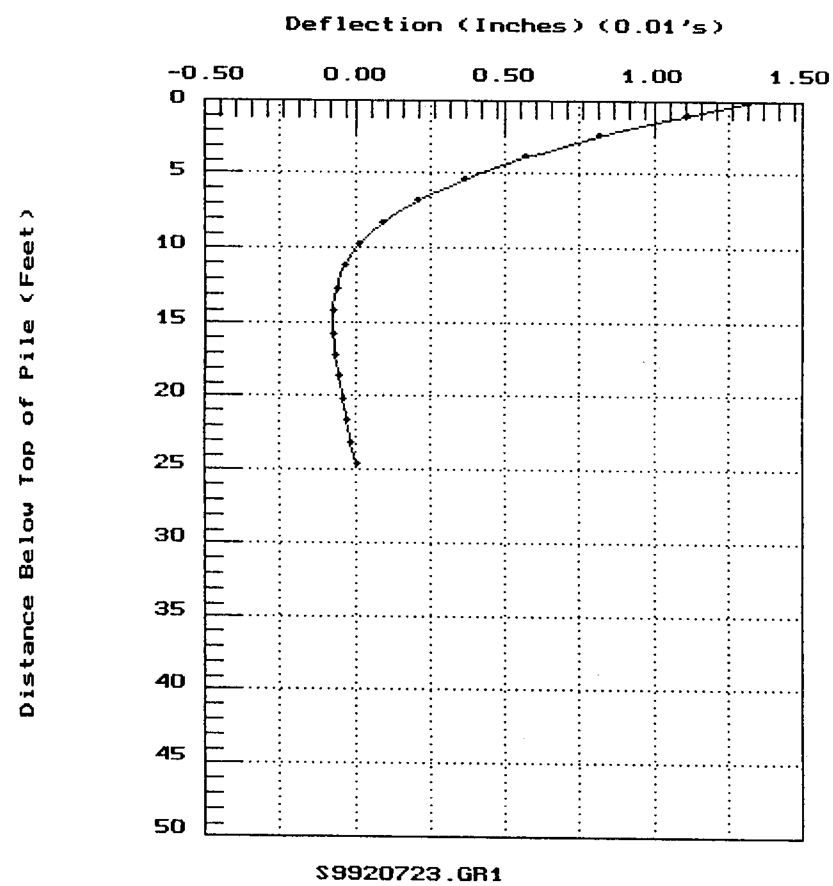
Vertical Pile Capacity

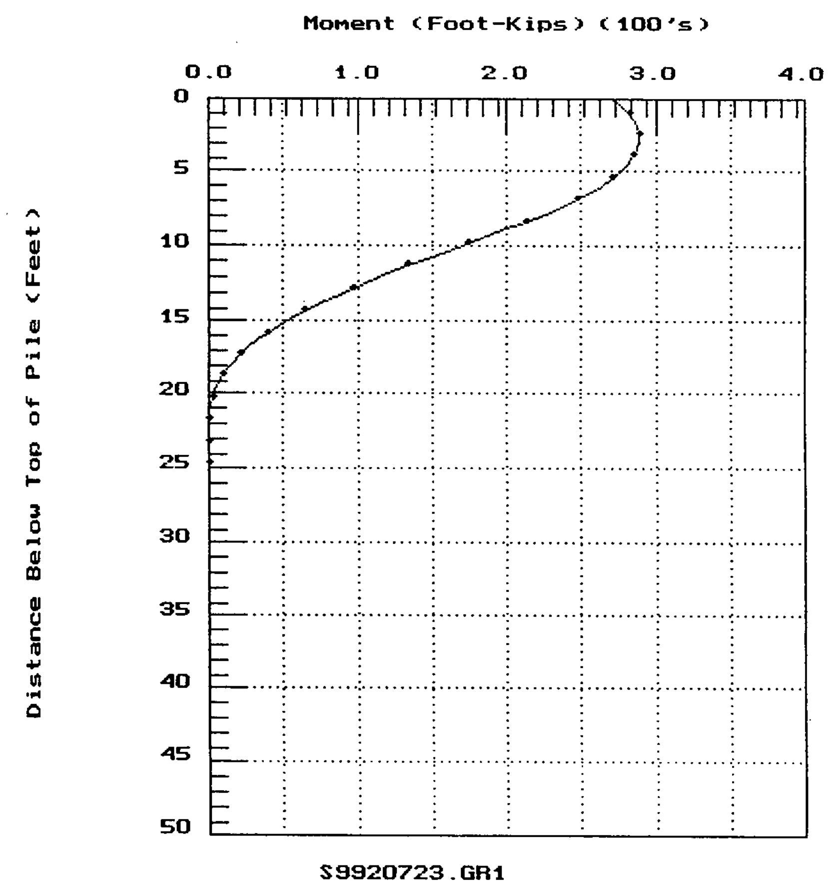
$$Q_{all} = \frac{0.55 \times 5 \times \pi \times 3000 \times 21.5}{2 \times 1000}$$

$$= \underline{278.6} \text{ kips} \qquad 8.3 \text{ kips}$$

```
SR 99 Chico Auxiliary Lane OH 2-07(Sta. 23+00, 60-inch Dia. CIDH Pile) (Free Hea
    1      1      0      0      0
   50      2      0.0      300.0      0.0
   0.0     60.0        636200.00            .2827            3600000
 300.0     60.0        636200.00             2827            3600000
    3      6       6      0      2
    3      0.0    270.0       1000.0  1000.0
    4    270.0    318.0         25.0    25.0
    4    318.0    366.0        125.0   125.0
   0.0     0.069
 270.0     0.069
 270.0     0.069
 318.0     0.069
 318.0     0.045
 366.0     0.045
   0.0    20.83      0.0    0.005
 270.0    20.83      0.0    0.005
 270.0     0.00     31.0    0.000
 318.0     0.00     31.0    0.000
 318.0     0.00     36.0    0.000
 366.0     0.00     36.0    0.000
   0.0     0.6   1
 366.0     0.6   1
    0      1     1
    1
    1    1.48D+04   3.57D+06   9.48D+03
    0
    1      1      0
  200    1.00D-5    100.0
```





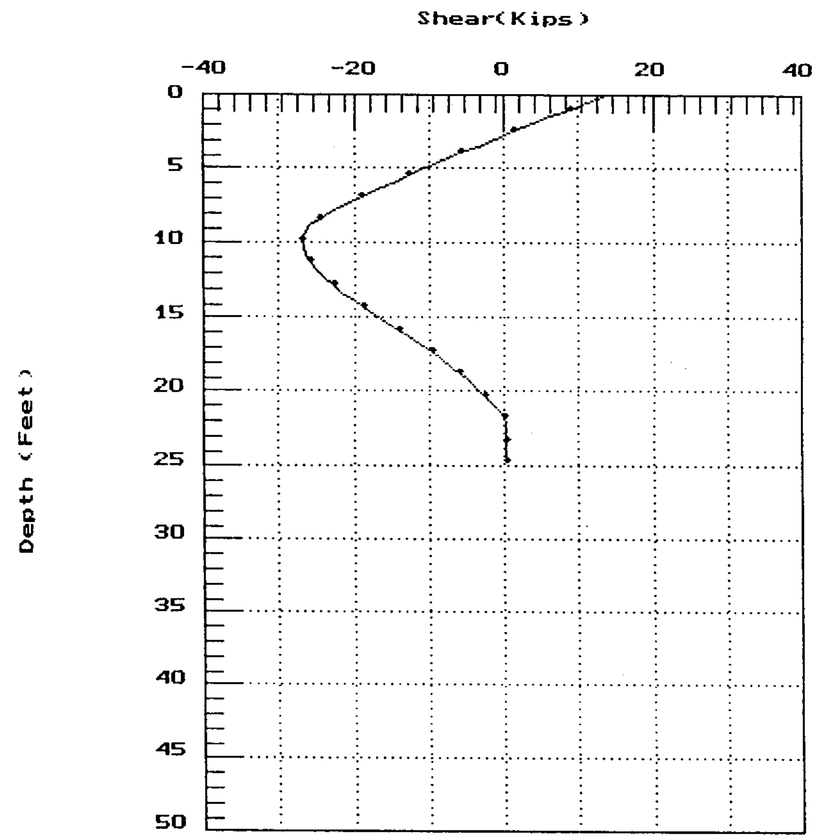


Overhead Sign 2-07 (Station 23+00)

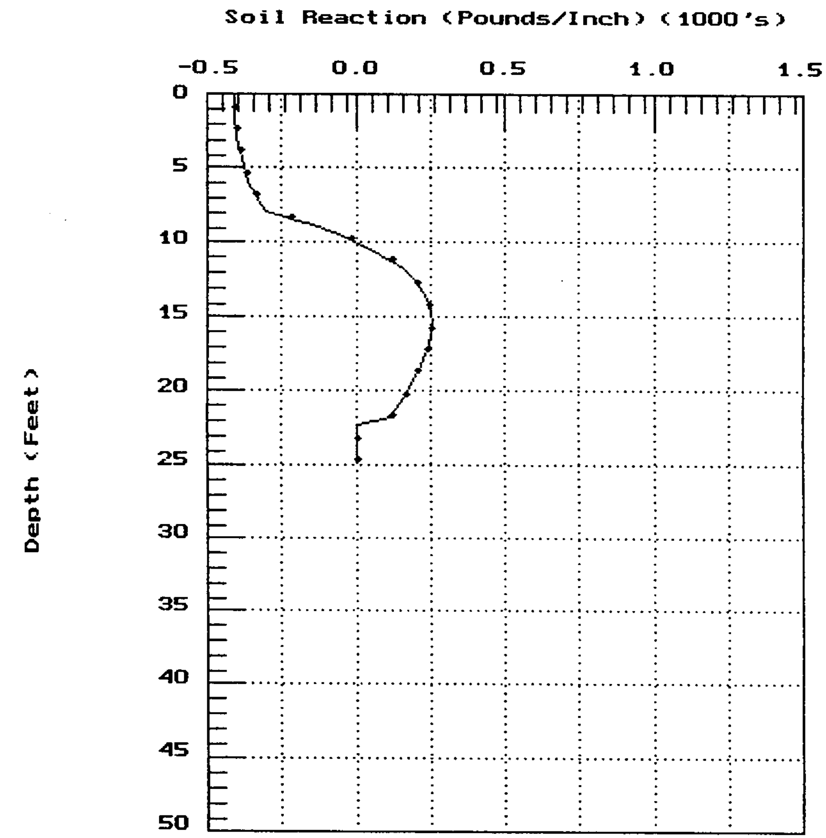
→ Free Head Shear 14.8^K

Moment 323 kip-ft

Chico SR 99 Auxiliary Lane Project



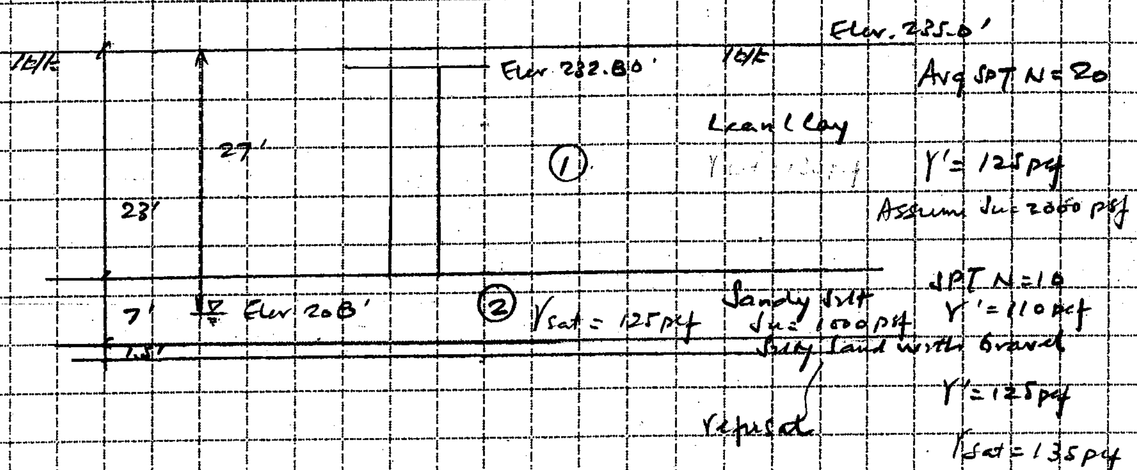
S9920723.GR1



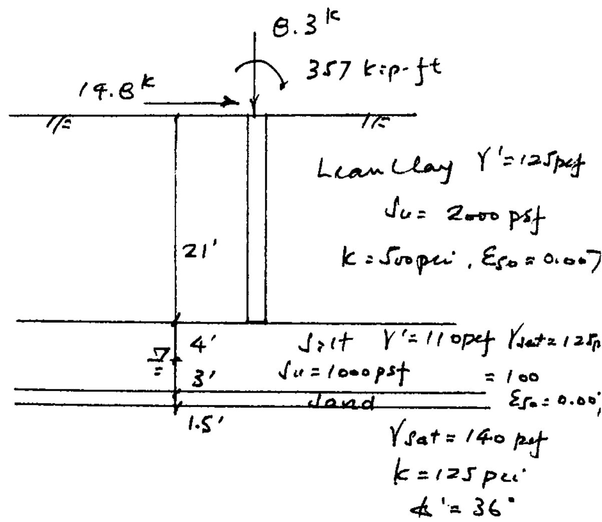
S9920723.GR1

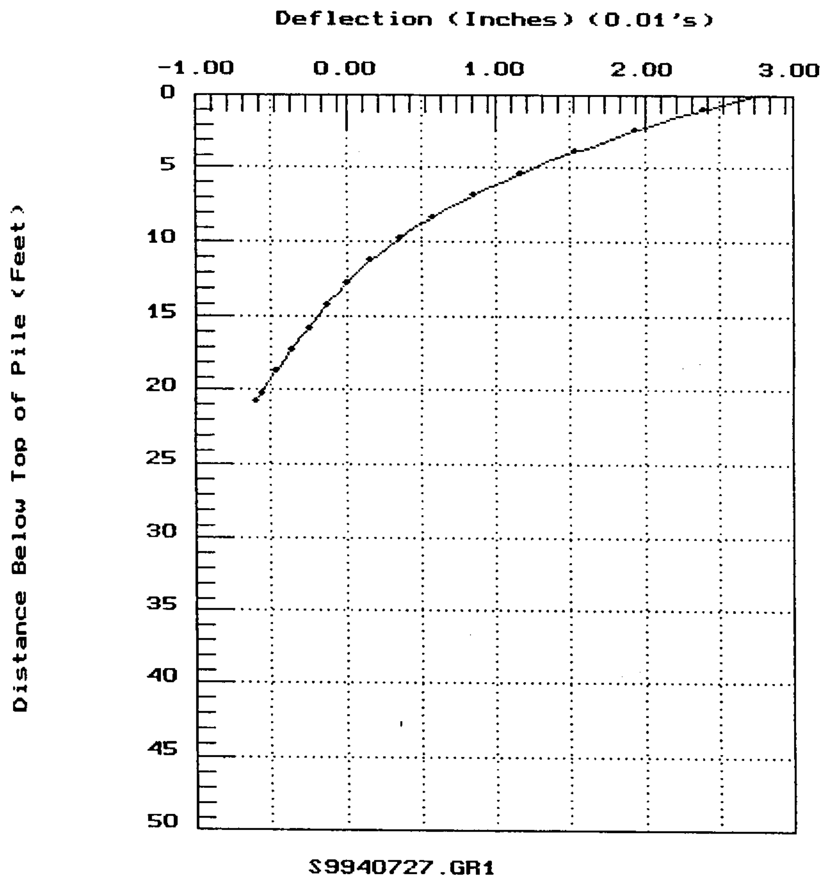
JOB Chico SR99 Auxiliary Lane Project
SHEET NO ______ OF ______
CALCULATED BY A Lam DATE 9/2008
CHECKED BY ______ DATE ______
SCALE ______

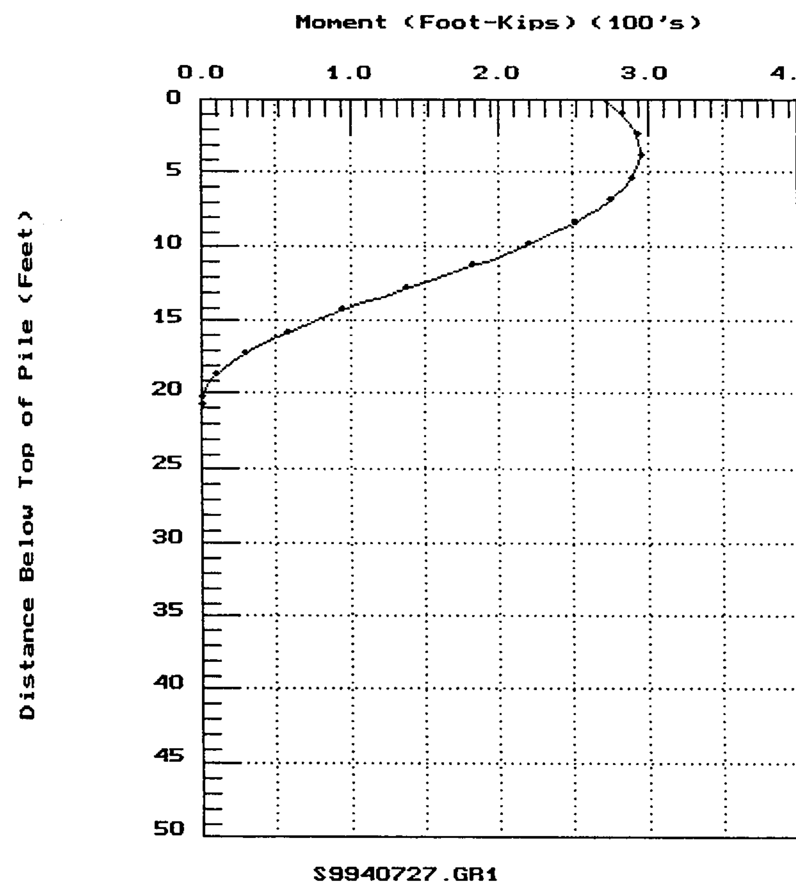
Overhead Sign 4-07 (Station 27+34.90) (Boring SW-8) Post Type VIII Foundation Depth - 21 feet



```
SR 99 Chico Auxiliary Lane OH 4-07(Sta. 27+34.90, 60-inch Dia. CIDH Pile) (Free
    1      1      0      0      0
   42      2    0.0      252.0      0.0
    0.0    60.0        636200.00          2827          3600000
  252.0    60.0        636200.00          2827          3600000
    3      8      6      0      2
    3      0.0    252.0       500.0   500.0
    3    252.0    336.0       100.0   100.0
    4    336.0    354.0       125.0   125.0
    0.0     0.072
  252.0     0.072
  252.0     0.064
  300.0     0.064
  300.0     0.036
  336.0     0.036
  336.0     0.045
  354.0     0.045
    0.0   13.89      0.0    0.007
  252.0   12.89      0.0    0.007
  252.0    6.94      0.0    0.000
  336.0    6.94      0.0    0.000
  336.0    0.00     36.0    0.000
  354.0    0.00     36.0    0.000
    0.0   0.6   1
  354.0   0.6   1
    0     1     1
    1
    1    1.48D+04   3.57D+06   9.48D+03
    0
    1     1      0
  200    1.00D-5    100.0
```





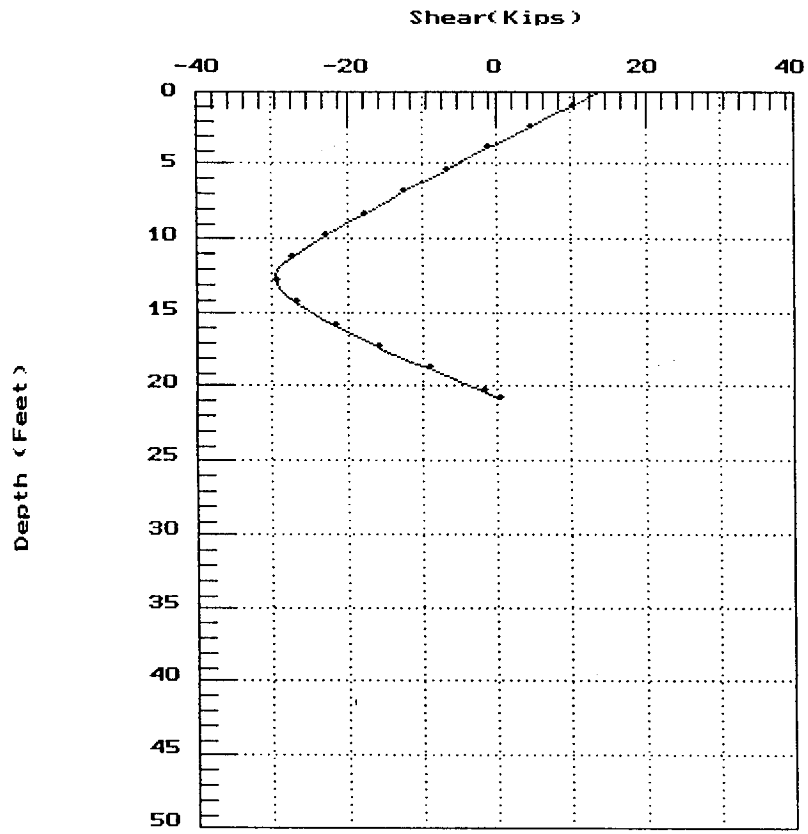


Overhead Sign 4-07 (Station 27+34.90)

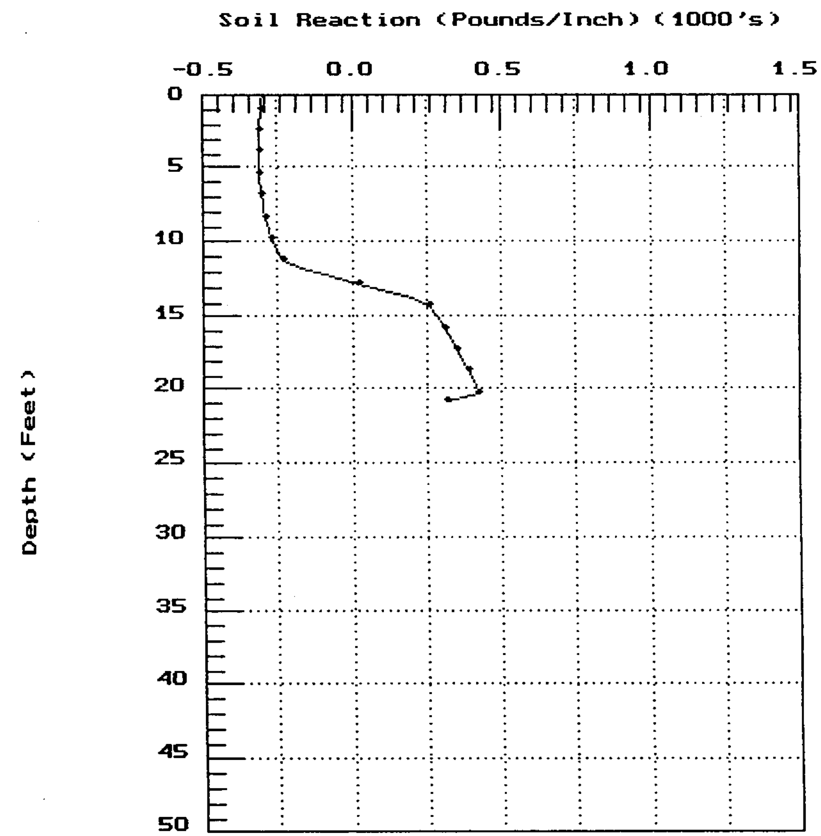
→ Free Head Shear 14.8k

Moment 357 kip-ft

Chico SR99 Auxiliary Lane Project



S9940727.GR1



S9940727.GR1

STRUCTURAL PAVEMENT DESIGN

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	State Route 99 (Auxiliary Lane)	DATE :	2/4/2009

Traffic Index (TI) (20-Year)	=	12.5	
R-value of Aggregate Base (Class 2) (R_{AB})	=	78	
R-value of Aggregate Subbase (Class 2) (R_{AS})	=	50	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF HMA/AB (CLASS 2)

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	3.40	
b) Required GE of HMA = 0.0032 (TI)(100-R_{AB})	=	0.88	
c) Add 0.2 foot as safety factor to determine total GE for HMA	=	1.08	
d) Actual thickness of HMA (t_{HMA})	=	$\boxed{0.65}$	(Table 633.1)
e) GE of actual thicknss of HMA	=	1.09	(Table 633.1)
f) Required GE of AB (Class 2) (step a - step e)	=	2.31	
g) Actual thickness of AB (Class 2) ($t_{AB\ (CLASS\ 2)}$)	=	$\boxed{2.10}$	(Table 633.1)
h) GE of actual thickness of AB (Class 2)	=	2.31	(Table 633.1)

The structural section:

0.65 ft HMA
2.10 ft AB (Class 2)

2.75 ft

C:202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI12.5HMAABRV15 (English) (Caltrans)

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	State Route 99 (Auxiliary Lane)	DATE :	1/29/2009

Traffic Index (TI) (20-Year)	=	12.5	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF FULL HMA

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	3.40	
b) Add 0.1 foot as safety factor to determine total GE for HMA	=	3.50	
c) Actual thickness of HMA (t_{HMA})	=	$\boxed{1.60}$	(Table 633.1)
d) GE of actual thicknss of HMA	=	3.63	(Table 633.1)

The structural section:

1.60 ft HMA

1.60 ft

C:Project Files\202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI12.5HMARV15(English) (Caltrans)

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	SR 99 (Inside Lane)	DATE :	2/4/2009

Traffic Index (TI) (20-Year)	=	10.5	
R-value of Aggregate Base (Class 2) (R_{AB})	=	78	
R-value of Aggregate Subbase (Class 2) (R_{AS})	=	50	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF HMA/AB (CLASS 2)

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	2.86	
b) Required GE of HMA = 0.0032 (TI)(100-R_{AB})	=	0.74	
c) Add 0.2 foot as safety factor to determine total GE for HMA	=	0.94	
d) Actual thickness of HMA (t_{HMA})	=	$\boxed{0.55}$	(Table 633.1)
e) GE of actual thicknss of HMA	=	0.95	(Table 633.1)
f) Required GE of AB (Class 2) (step a - step e)	=	1.91	
g) Actual thickness of AB (Class 2) ($t_{AB\ (CLASS\ 2)}$)	=	$\boxed{1.75}$	(Table 633.1)
h) GE of actual thickness of AB (Class 2)	=	1.93	(Table 633.1)

The structural section:

0.55 ft HMA
1.75 ft AB (Class 2)

2.30 ft

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	SR 99 (Inside Lane)	DATE :	1/29/2009

Traffic Index (TI) (20-Year)	=	10.5	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF FULL HMA

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	2.86	
b) Add 0.1 foot as safety factor to determine total GE for HMA	=	2.96	
c) Actual thickness of HMA (t_{HMA})	=	1.30	(from Table 633.1)
d) GE of actual thicknss of HMA	=	2.99	(from Table 633.1)

The structural section:

1.30 ft HMA

C:Project Files\202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI10.5HMARV15(English)(Caltrans)

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	Ramps	DATE :	1/29/2009

Traffic Index (TI) (20-Year)	=	11.5	
R-value of Aggregate Base (Class 2) (R_{AB})	=	78	
R-value of Aggregate Subbase (Class 2) (R_{AS})	=	50	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF HMA/AB (CLASS 2)

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	3.13	
b) Required GE of HMA = 0.0032 (TI)(100-R_{AB})	=	0.81	
c) Add 0.2 foot as safety factor to determine total GE for HMA	=	1.01	
d) Actual thickness of HMA (t_{HMA})	=	0.65	(Table 633.1)
e) GE of actual thicknss of HMA	=	1.14	(Table 633.1)
f) Required GE of AB (Class 2) (step a - step e)	=	1.99	
g) Actual thickness of AB (Class 2) ($t_{AB\ (CLASS\ 2)}$)	=	1.80	(Table 633.1)
h) GE of actual thickness of AB (Class 2)	=	1.98	(Table 633.1)

The structural section:

0.65 ft HMA
1.80 ft AB (Class 2)

2.45 ft

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	Ramps	DATE :	1/29/2009

Traffic Index (TI) (20-Year)	=	11.5	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF FULL HMA

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	3.13	
b) Add 0.1 foot as safety factor to determine total GE for HMA	=	3.23	
c) Actual thickness of HMA (t_{HMA})	=	$\boxed{1.45}$	(Table 633.1)
d) GE of actual thicknss of HMA	=	3.32	(Table 633.1)

The structural section:

1.45 ft HMA

C:Project Files\202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI11.5HMARV15(English) (Caltrans)

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	East 1st Avenue	DATE :	2/4/2009

Traffic Index (TI) (20-Year)	=	10	
R-value of Aggregate Base (Class 2) (R_{AB})	=	78	
R-value of Aggregate Subbase (Class 2) (R_{AS})	=	50	
R-value of Basement Soil (R_{SUB})	=	15	

STRUCTURAL SECTION CONSISTS OF HMA/AB (CLASS 2)

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	2.72	
b) Required GE of HMA = 0.0032 (TI)(100-R_{AB})	=	0.70	
c) Add 0.2 foot as safety factor to determine total GE for HMA	=	0.90	
d) Actual thickness of HMA (t_{HMA})	=	$\boxed{0.50}$	(Table 633.1)
e) GE of actual thicknss of HMA	=	0.90	(Table 633.1)
f) Required GE of AB (Class 2) (step a - step e)	=	1.82	
g) Actual thickness of AB (Class 2) ($t_{AB\ (CLASS\ 2)}$)	=	$\boxed{1.65}$	(Table 633.1)
h) GE of actual thickness of AB (Class 2)	=	1.82	(Table 633.1)

The structural section:

0.50 ft HMA
1.65 ft AB (Class 2)

2.15 ft

C:202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI10HMAABRV15 (English) (Caltrans)

PAVEMENT DESIGN (ENGLISH)

PROJECT:	Chico SR 99 Auxiliary Lane Project	JOB NO.:	202101.GDR
LOCATION :	East 1st Avenue	DATE :	1/29/2009

Traffic Index (TI) (20-Year)	=	10	
R-value of Basement Soil (R_{SUB})	=	30	

STRUCTURAL SECTION CONSISTS OF FULL HMA

a) Total required GE = 0.0032 (TI)(100-R_{SUB})	=	2.24	
b) Add 0.1 foot as safety factor to determine total GE for HMA	=	2.34	
c) Actual thickness of HMA (t_{HMA})	=	$\boxed{1.05}$	(from Table 633.1)
d) GE of actual thicknss of HMA	=	2.36	(from Table 633.1)

The structural section:

1.05 ft HMA

C:Project Files\202101\GDR#2\Pavement Design\Chico SR99 Auxiliary Lane 20YearsLifeTI10HMARV30(English)(Caltrans)

Table 633.1
Gravel Equivalents of Structural Layers (ft)

Actual HMA Thickness	HMA(1),(2)											Base and Subbase					
	Traffic Index (TI)																
	5.0 & below	5.5 6.0	6.5 7.0	7.5 8.0	8.5 9.0	9.5 10.0	10.5 11.0	11.5 12.0	12.5 13.0	13.5 14.0	14.5 15.0	HMAB; LCB	CTPB; CTB (Cl. A)	ATPB	CTB (Cl. B)	AB	AS
	G_f (varies with TI and HMA thickness greater than 0.5 ft)											G_f (constant)					
(ft)	2.54	2.32	2.14	2.01	1.89	1.79	1.71	1.64	1.57	1.52	1.46	1.9	1.7	1.4	1.2	1.1	1.0
0.10	0.25	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	--	--	--	--	--	--
0.15	0.38	0.35	0.32	0.30	0.28	0.27	0.26	0.25	0.24	0.23	0.22	--	--	--	--	--	--
0.20	[illegible]	0.46	0.43	0.40	0.38	0.36	0.34	0.33	0.31	0.30	0.29		-	--		--	--
0.25	0.63	0.58	0.54	0.50	0.47	0.45	0.43	0.41	0.39	0.38	0.37	--	--	0.35	--	--	--
0.30	0.76	0.69	0.64	0.60	0.57	0.54	0.51	0.49	0.47	0.45	0.44	--	--	0.42	--	--	--
0.35	0.89	0.81	0.75	0.70	0.66	0.63	0.60	0.57	0.55	0.53	0.51	0.67	0.60	0.49	0.42	0.39	0.35
0.40	1.01	0.93	0.86	0.80	0.76	0.72	0.68	0.65	0.63	0.61	0.59	0.76	0.68	0.56	0.48	0.44	0.40
0.45	1.14	1.04	0.96	0.90	0.85	0.81	0.77	0.74	0.71	0.68	0.66	0.86	0.77	0.63	0.54	0.50	0.45
0.50	1.27	1.16	1.07	1.00	0.94	0.90	0.85	0.82	0.79	0.76	0.73	0.95	0.85	0.70	0.60	0.55	0.50
0.55	1.41	1.29	1.19	1.12	1.05	1.00	0.95	0.91	0.87	0.84	0.81	1.05	0.94	0.77	0.66	0.61	0.55
0.60	1.58	1.45	1.34	1.25	1.18	1.12	1.07	1.02	0.98	0.95	0.91	1.14	1.02	0.84	0.72	0.66	0.60
0.65	1.76	1.61	1.49	1.39	1.31	1.25	1.19	1.14	1.09	1.05	1.02	1.24	1.11	0.91	0.78	0.72	0.65
0.70	--	1.78	1.64	1.54	1.45	1.38	1.31	1.26	1.21	1.16	1.12	1.33	1.19	--	0.84	0.77	0.70
0.75	--	1.95	1.80	1.69	1.59	1.51	1.44	1.38	1.32	1.27	1.23	1.43	1.28	--	0.90	0.83	0.75
0.80	--	2.12	1.96	1.84	1.73	1.64	1.57	1.50	1.44	1.39	1.34	1.52	1.36	--	0.96	0.88	0.80
0.85	--	--	2.13	1.99	1.88	1.78	1.70	1.63	1.56	1.51	1.46	1.62	1.45	--	1.02	0.94	0.85
0.90	--	--	2.30	2.15	2.03	1.92	1.83	1.76	1.69	1.63	1.57	1.71	1.53	--	1.08	0.99	0.90
0.95	--	--	--	2.31	2.18	2.07	1.97	1.89	1.81	1.75	1.69	1.81	1.62	--	1.14	1.05	0.95
1.00	--	--	--	2.47	2.33	2.21	2.11	2.02	1.94	1.87	1.81	1.90	1.70	--	1.20	1.10	1.00
1.05	--	--	--	2.64	2.49	2.36	2.25	2.16	2.07	2.00	1.93	2.00	1.79	--	1.26	1.16	1.05
1.10	--	--	--	--	2.65	2.51	2.40	2.29	2.20	2.12	2.05	--	--	--	--	--	--
1.15	--	--	--	--	2.81	2.67	2.54	2.43	2.34	2.25	2.18	--	--	--	--	--	--
1.20	--	--	--	--	2.98	2.82	2.69	2.58	2.48	2.39	2.30	--	--	--	--	--	--
1.25	--	--	--	--	--	2.98	2.84	2.72	2.61	2.52	2.43	--	--	--	--	--	--
1.30	--	--	--	--	--	3.14	2.99	2.87	2.75	2.65	2.56	--	--	--	--	--	--
1.35	--	--	--	--	--	3.30	3.15	3.01	2.90	2.79	2.70	--	--	--	--	--	--
1.40	--	--	--	--	--	--	3.31	3.16	3.04	2.93	2.83	--	--	--	--	--	--
1.45	--	--	--	--	--	--	3.46	3.32	3.19	3.07	2.97	--	--	--	--	--	--
1.50	--	--	--	--	--	--	3.62	3.47	3.33	3.21	3.10	--	--	--	--	--	--
1.55	--	--	--	--	--	--	--	3.62	3.48	3.36	3.24	--	--	--	--	--	--
1.60	--	--	--	--	--	--	--	3.78	3.63	3.50	3.38	--	--	--	--	--	--
1.65	--	--	--	--	--	--	--	3.94	3.79	3.65	3.52	--	--	--	--	--	--
1.70	--	--	--	--	--	--	--	--	3.94	3.80	3.67	--	--	--	--	--	--
1.75	--	--	--	--	--	--	--	--	4.09	3.95	3.81	--	--	--	--	--	--
1.80	--	--	--	--	--	--	--	--	4.25	4.10	3.96	--	--	--	--	--	--
1.85	--	--	--	--		--	--	--	--	4.25	4.10	--		--	--		--
1.90	--	--	--	--	--	--	--	--	--	4.40	4.25	--	--	--	--	--	--
1.95	--	--	--	--	--	--	--	--	--	4.56	4.40	--	--	--	--	--	--
2.00	--	--	--	--	--	--	--	--	--	--	4.55	--	--	--	--	--	--

Notes:

(1) Open Graded Friction Course (conventional and rubberized) is a non-structural wearing course and provides no structural value.

(2) Top portion of HMA surface layer (maximum 0.20 ft.) may be replaced with equivalent RAC-G thickness. See Topic 631.3 for additional details.

APPENDIX D

Electronic Comment Form

65% PS&E Review

Date: 10/2/08

03-BUT-99, R32.4/R33.3:
03-3A0421:

Comment By: Charles Volbrecht
Functional Unit: 317
Phone Number: 530-740-4923

- If you **plan comments, either** scan and e-mail or send by mail.
- Please cc your comments to the Project Engineer.

Plan Sheet/OR/ Section/Paragraph	Comments	Resolved
Typicals	AB and AS needs to be Class 2.	
X-1	Structural section not adequate for given TI on SR 99. We usually don't put HMA-A over LCB. Is LCB being placed due to the adjacent concrete barrier? Is LCB part of the concrete barrier structure? Please clarify. If not, recommend to calculate an adequate HMA-A over AB section for given TI. Project is not long enough to utilize AS for mainline.	
X-2	Structural Section for NB Ramp does not match structural section from Pavement Design calcs in the given Materials Report. Project is not long enough to utilize AS for the ramp. Recommend to calculate an adequate HMA-A over AB section for Heavy Traffic Ramp TI.	
Typicals	Typicals do not match the structural section recommendation in the given Materials Report.	
C-15	AS needs to be Class2.	
TH-12	Shoulder detour adequate, but indicate on typicals that 0.25 to 0.12' AC is existing and that AB will be hit when 0.35' is removed.	

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Geotechnical ■
Environmental ■
Materials Testing ■
Construction Inspection ■

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.GDR
December 24, 2009

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 1 to GEOTCHNICAL DESIGN AND MATERIALS REPORT, Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 32.4-33.28 EA 03-3A0421

Ref: 1. Geotechnical Design and Materials Report dated February 2009

Dear Ms. Carolyn Davis:

The following are the changes made to the Geotechnical Design and Materials Report dated February. This addendum addresses the change in a) The extent of Retaining Wall No. 1 with the recommended foundation subgrade elevation; b) Revised "Pile Data Table "of Retaining Wall No. 2 due to the change in the nominal resistance in compression and tension; and c) Pile design for the 24-inch diameter Cast-In-Drilled-Hole (CIDH) concrete pile supporting soundwall of Retaining Wall No. 4 is included.

Item 1: Page 26, 4th Paragraph "foundation subgrade elevation is recommended to be +212.5 feet or lower."

Change to "foundation subgrade elevation is recommended to be +212.5 feet or lower from "NBON" Line Station 558+48 to Station 561+45 (Station of Boring RW-21).

Item 2: Page 27, 1st Paragraph "The 16-inch CIDH concrete piles may be designed for maximum factored axial load of 113 kips to the indicated pile tip elevations."

Change to "The 16-inch CIDH concrete piles may be designed for maximum factored axial load of 105 kips and 123 kips to the indicated pile tip elevations."

Item 3: The maximum factored (LFD) axial load, nominal resistance, design tip elevation and specified tip elevation of "Table 4: Pile Data Table" have been revised.

Item 4: Page 29, 1st Paragraph "This wall is to support the East 1st Avenue southbound on-ramp to SR 99."

Change to "This wall is to support the East 1st Avenue southbound on-ramp to SR 99. MSE wall is preferred, instead of retaining wall supported on piles, according to the designer.""

Item 5: Page 30, a new section with the heading "Retaining Wall No. 4 – Soundwall supported on CIDH piles" is added.

Copies of the excerpt of the Geotechnical Design and Materials Report with the relevant changes are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

Gary Parikh, G.E. 666
Project Manager

S: On-going\2002\202101\Geotechnical Design and Materials Report dated February 2009 Addendum #1

loose to medium dense sand/gravel/soft silt, underlain by very dense sand/gravel, underlain by medium dense sands/gravel/very stiff clays. No groundwater was encountered during drilling in March 2008.

Mechanically Stabilized Earth (MSE) Wall is proposed for the northbound on-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

Based on the subsurface soil conditions as indicated in Boring RW-21, foundation subgrade elevation is recommended to be +212.5 feet or lower from "NBON" Line Station 558+48 to Station 561+45 (Station of Boring RW-21). The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans "Bridge Design Aids". However, based on our analyses, the pressure exerted on the foundation soils should be limited to 4.0 Ksf.

- **Retaining Wall No. 2 SR 99 NB - "D" Line, 27+52.83 to 28+52.01**

This wall is to support the SR 99 northbound off-ramp. This retaining wall also supports the soundwall. The anticipated total wall length is 100 feet with a maximum height of 12 feet. Based on the boring data (08-SW-8 and 08-PLM-1) in the vicinity of the proposed wall, the subsurface soil material generally consists of stiff to very stiff clays, underlain by firm clay, underlain by medium dense to dense gravel. No groundwater was encountered during drilling in March 2008.

Based on the boring data, loading conditions and discussions with the designer, 16-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are recommended to support the retaining wall.

The 16-inch CIDH concrete piles may be designed for maximum factored axial load of 105 kips and 123 kips to the indicated pile tip elevations. According to the designer, the "planned pile cap/footing bottom" elevations are +221 feet and +225 feet.

The design tip elevations, specified tip elevations and allowable design capacities of the piles are summarized in the Table 4 "Pile Data Table" below.

TABLE 4: PILE DATA TABLE

Bottom of Pile Cap Footing Elevation (ft)	Pile Type	Maximum Factored (LFD) Axial Load	Nominal Resistance		Design Tip Elev.[1] (ft)	Specified Tip Elev. (ft)
			Compression	Tension		
221.0	16-inch CIDH	105 k	140 k	43	193.5 (1), 195.5 (2)	193.5
225.0	16-inch CIDH	123 k	164 k	35	194.5 (1), 202.5 (2)	194.5

Design tip elevations are controlled by the following demands: (1) compression and (2) lateral load.

Only skin friction was considered in the pile capacity calculations. Based on Table 4, the pile tip elevations are controlled by the compression demand on the pile.

The design tip elevations and specified tip elevations are based on the "planned pile cap footing bottom" elevations provided by the designer. In the event that the "planned pile cap footing bottom" elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity.

Construction Considerations for the CIDH Piles

Caltrans standard specifications for "Cast-in-Place Concrete Piling" should be used for the construction of CIDH concrete piles. Due to presence of sand and gravel and cobbles, raveling or caving may be expected if groundwater is encountered during pile installation, which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. Relatively

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 2.75 Ksf.

- **Retaining Wall No. 4 East 1st Avenue SB On-Ramp - "SBON" Line, 29+70.49 to 36+00**

This wall is to support the East 1st Avenue southbound on-ramp to SR 99. MSE wall is preferred, instead of retaining wall supported on piles, according to the designer. The anticipated total wall length is about 629.5 feet with a maximum height of 18 feet. This retaining wall also supports the soundwall. Based on the boring data (08-RW/SW-9 and 08-RW/SW-10) in the vicinity of the proposed wall, the soil material at the anticipated footing subgrade generally consists of loose silty sand/very stiff lean clay, underlain by very dense poorly graded sand, underlain by medium dense sands/very stiff to hard lean clay in Boring RW/SW-9 and soft to firm lean clays in Boring RW/SW-10. Groundwater was encountered during drilling in March 2008 at the elevations between Elev. +212 feet and +215 feet (between 5 feet to 10 feet below existing ground surface).

MSE Wall is proposed for the East 1st Avenue southbound on-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 3.0 Ksf.

- **Retaining Wall No. 4 - Soundwall supported on CIDH piles**

Based on the boring data, loading conditions and discussions with the designer, 24-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are recommended to support the soundwall.

The 24-inch CIDH concrete piles may be designed for maximum factored axial load of 48.9 kips to the indicated pile tip elevations. According to the designer, the "pile cut-off" elevations ranged from +217.9 feet to +233.1 feet.

The design tip elevations, specified tip elevations and allowable design capacities of the piles are summarized in the Table 5 "Pile Data Table" below.

TABLE 5: PILE DATA TABLE

Pile Cut-off Elevation (ft)	Pile Type	Maximum Factored (LFD) Axial Load	Nominal Resistance		Design Tip Elev.(1) (ft)	Specified Tip Elev. (ft)
			Compression	Tension		
217.9	24-inch CIDH	48.9 k	65.2 k	43.1	200.5 (1), 196.5 (2)	196.5
233.1	24-inch CIDH	48.9 k	65.2 k	43.1	211.0 (1), 209.0 (2)	209.0

Design tip elevations are controlled by the following demands: (1) compression and (2) Tension (3) lateral load.

Only skin friction was considered in the pile capacity calculations. Based on Table 5, the pile tip elevations are controlled by the tension demand on the pile.

The design tip elevations and specified tip elevations are based on the "pile cut-off" elevations provided by the designer. In the event that the "pile cut-off" elevations are changed, the design pile tip elevations may have to be revised accordingly.

The pile design (both vertical and lateral) and consideration for the construction of CIDH piles are the same as those for the Retaining Wall No. 2 described above.

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.GDR
January 18, 2010

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 2 to GEOTCHNICAL DESIGN AND MATERIALS REPORT, Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 32.4-33.28 EA 03-3A0421

Ref: 1. Geotechnical Design and Materials Report dated February 2009
2. Addendum No. 1 to Geotechnical Design and Materials Report dated December 24, 2009

Dear Ms. Carolyn Davis:

The following are the changes made to the Geotechnical Design and Materials Report dated February 2009. This addendum addresses the change in a) Change in the pile type supporting Retaining Wall No. 2 and b) Revised "Pile Data Table "of Retaining Wall No. 4 due to the change in the nominal resistance in compression and tension.

Item 1: Page 27, 1st Paragraph "The 16-inch CIDH concrete piles may be designed for maximum factored axial load of 105 kips and 123 kips to the indicated pile tip elevations."

Change to "The Standard Steel H-piles may be designed for maximum factored axial load of 105 kips and 123 kips to the indicated pile tip elevations."

Item 2: The pile type, design tip elevation and specified tip elevation of "Table 4: Pile Data Table" have been revised.

Item 3: The paragraph "*Construction Consideration for the CIDH Piles*" is deleted.

Item 4: Paragraphs to address pile driving in dense sand/gravel layers and monitoring of noise and vibration during construction, starting from Page 27, 6th Paragraph "Due to the variable consistencies of the dense to very dense sand/gravel layer,

……..The geotechnical engineer should be consulted for any unanticipated pile driving conditions." is added.

Item 5: Page 28, 2nd Paragraph "Lateral pile analyses were performed for the 16-inch diameter CIDH concrete piles under seismic loading conditions using the L-PILE program."

Change to Page 28, 5th Paragraph "Lateral pile analyses were performed for the Standard Steel H-piles under seismic loading conditions using the L-PILE program."

Item 6: Page 30, 3rd Paragraph "The 24-inch CIDH concrete piles may be designed for maximum factored axial load of 48.9 kips to the indicated pile tip elevations."

Change to Page 30, 5th Paragraph "The 24-inch CIDH concrete piles may be designed for maximum factored axial load of 43.5 kips to the indicated pile tip elevations."

Item 7: The maximum factored (LFD) axial load, nominal resistance, design tip elevation and specified tip elevation of "Table 5: Pile Data Table" have been revised.

Item 8: Note (ii) have been added below Table 5: Pile Data Table.

Item 9: Page 31, 3rd Paragraph "The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity." have been added.

Item 10: Page 30, 7th Paragraph "The pile design (both vertical and lateral) and consideration for the construction of CIDH piles are the same as those for the Retaining Wall No. 2 described above."

Change to Page 31, 4th Paragraph "The lateral pile design is the same as that for Retaining Wall No. 2 described above."

Item 11: Page 31, 5th Paragraph "*Construction Consideration for the CIDH Piles*" is added.

Copies of Pages 26 through 31 of the excerpt of the Geotechnical Design and Materials Report with the relevant changes are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

Attachment: Page 27 through 31 of Geotechnical Design and Materials Report – Chico SR 99 Auxiliary Lane Project, Chico, California

S: On-going\2002\202101\Geotechnical Design and Materials Report dated February 2009 Addendum #2

The Standard Steel H-piles may be designed for maximum factored axial load of 105 kips and 123 kips to the indicated pile tip elevations. According to the designer, the "planned pile cap/footing bottom" elevations are +221 feet and +225 feet.

The design tip elevations, specified tip elevations and allowable design capacities of the piles are summarized in the Table 4 "Pile Data Table" below.

TABLE 4: PILE DATA TABLE

Bottom of Pile Cap Footing Elevation (ft)	Pile Type	Maximum Factored (LFD) Axial Load	Nominal Resistance		Design Tip Elev.(1) (ft)	Specified Tip Elev. (ft)
			Compression	Tension		
221.0	HP 14x89	105 k	140 k	43	194.5 (1), 207.5 (2), 195.0 (3)	194.5
225.0	HP 14x89	123 k	164 k	35	199.0 (1), 215.0 (2), 200.0 (3)	199.5

Design tip elevations are controlled by the following demands: (1) compression, (2) Tension and (3) Lateral.

Only skin friction was considered in the pile capacity calculations. Based on Table 4, the pile tip elevations are controlled by the compression demand on the pile.

The design tip elevations and specified tip elevations are based on the "planned pile cap footing bottom" elevations provided by the designer. In the event that the "planned pile cap footing bottom" elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity.

Due to the variable consistencies of the dense to very dense sand/gravel layers, hard driving conditions should be anticipated. We therefore recommended that driving shoe be used for the pile driving. We recommend that the piles be driven to the specified elevations. It is anticipated that the pile capacity will develop after driving as a result of soil "freeze" and dissipation of excess pore water pressures. The gain of pile capacity after initial driving may be evaluated based on "re-striking" after 24-hour (minimum) set-up.

According to the designer, there are few residential houses in the vicinity of the project site. There is no historical building in the vicinity of the project site. The following mitigation measures can be considered (not limited to) if noise and vibration is a concern during pile driving:

- Provide schedule of pile driving with restricted times;
- Monitor noise and vibration. Commonly used noise descriptors such as A-Weighting (dBA), Equivalent Sound Level (Leq) and Statistical Descriptors can be considered. Peak Particle Velocity (PPV) is appropriate for evaluating vibration associated with pile driving;

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity after re-striking. Typical applications include capacity evaluation (for both during driving and re-striking). The geotechnical engineer should be consulted for any unanticipated pile driving conditions.

Lateral Design for Piles

Lateral pile analyses were performed for the Standard Steel H-piles under seismic loading conditions using the L-PILE program. A "p-y Curve Modification Factor" of 0.6 was adopted in the lateral pile analyses for pile spacing of 3 times the pile diameter. The results of lateral pile analyses, with the plots of the pile deflection, moment, shear and soil reaction along the pile length are included in the Appendix C.

- **Retaining Wall No. 3 SR 32 SB Off-Ramp - "SBOFF" Line, 561+00 to 565+98.89**

This wall is to support the SR 32 southbound off-ramp from SR 99. The anticipated total wall length is about 500 feet with a maximum height of 16 feet.

Based on the boring data (08-RW-1 and 08-RW-2) in the vicinity of the proposed wall, the subsurface soil materials at the anticipated footing subgrade generally consists of stiff to very stiff lean clay, underlain by loose to medium dense sands, underlain by very dense gravels, underlain by very stiff clay/medium dense gravel. No groundwater was encountered during drilling in March 2008.

MSE Wall is proposed for the southbound off-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 2.75 Ksf.

- **Retaining Wall No. 4 East 1st Avenue SB On-Ramp - "SBON" Line, 29+70.49 to 36+00**

This wall is to support the East 1st Avenue southbound on-ramp to SR 99. MSE wall is preferred, instead of retaining wall supported on piles, according to the designer. The anticipated total wall length is about 629.5 feet with a maximum height of 18 feet. This retaining wall also supports the soundwall. Based on the boring data (08-RW/SW-9 and 08-RW/SW-10) in the vicinity of the proposed wall, the soil material at the anticipated footing subgrade generally consists of loose silty sand/very stiff lean clay, underlain by very dense poorly graded sand, underlain by medium dense sands/very stiff to hard lean clay in Boring RW/SW-9 and soft to firm lean clays in Boring RW/SW-10. Groundwater was encountered during drilling in March 2008 at the elevations between Elev. +212 feet and +215 feet (between 5 feet to 10 feet below existing ground surface).

MSE Wall is proposed for the East 1st Avenue southbound on-ramp. In our opinion, Standard Caltrans Type MSE wall can be used for this location. The following parameters are recommended for the retaining wall design:

Loading Condition = 1
Friction Angle = 34 degrees (backfill)
Soil Unit Weight= 125 lb/ft^3

The recommended minimum base width for the MSE wall will vary with the height of the embankment and should be in accordance with the Caltrans 'Bridge Design Aids". However, based on our analyses and the foundation subgrade elevation of +222.5 feet or lower, the pressure exerted on the foundation soils should be limited to 3.0 Ksf.

- **Retaining Wall No. 4 - Soundwall supported on CIDH piles**

  Based on the boring data, loading conditions and discussions with the designer, 24-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are recommended to support the soundwall.

  The 24-inch CIDH concrete piles may be designed for maximum factored axial load of 43.5 kips to the indicated pile tip elevations. According to the designer, the "pile cut-off" elevations ranged from +217.9 feet to +233.1 feet.

  The design tip elevations, specified tip elevations and allowable design capacities of the piles are summarized in the Table 5 "Pile Data Table" below.

TABLE 5: PILE DATA TABLE

Pile Cut-off Elevation (ft)	Pile Type	Maximum Factored (LFD) Axial Load	Nominal Resistance		Design Tip Elev.(1) (ft)	Specified Tip Elev.(ii) (ft)
			Compression	Tension		
217.9	24-inch CIDH	43.5 k	58.0 k	25.0	200.9 (1), 202.9 (2), 200.9 (3)	195.9
233.1	24-inch CIDH	43.5 k	58.0 k	25.0	211.1 (1), 211.1 (2), 211.1 (3)	211.1

Note:

(i) Design tip elevations are controlled by the following demands: (1) compression and (2) Tension and (3) lateral load.

(ii) According to the designer, all piles along the length of the retaining wall are of the same length (22 feet) and the specified pile tip elevation varies with the pile cut-off elevation along the length of the retaining wall.

Only skin friction was considered in the pile capacity calculations. Based on Table 5, the pile tip elevations are controlled by the tension demand on the pile.

The design tip elevations and specified tip elevations are based on the "pile cut-off" elevations provided by the designer. In the event that the "pile cut-off" elevations are changed, the design pile tip elevations may have to be revised accordingly.

The piles should not be spaced closer than 3 times the pile diameter measured center-to-center. For piles spaced at center-to-center distance greater than or equal to 3 times the pile diameter, there is no group effect for pile vertical capacity.

The lateral pile design is the same as that for Retaining Wall No. 2 described above.

Construction Considerations for the CIDH Piles

Caltrans standard specifications for "Cast-in-Place Concrete Piling" should be used for the construction of CIDH concrete piles. Due to presence of sand and gravel and cobbles, raveling or caving may be expected if groundwater is encountered during pile installation, which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. Relatively difficult drilling conditions are expected for drilling into the gravelly and sandy layers. It is prudent to make the contractor aware of these conditions so that appropriate steps can be taken to comply with the standards and to maintain the integrity of the CIDH concrete piles. The CIDH holes are not expected to remain open without implementation of appropriate measures. Temporary steel casing and/or slurry displacement method of construction may be required to maintain the integrity of the piles. Caltrans Standard Specifications and SSPs should be used for such construction and quality assurance procedures. All pile excavations should be observed by the Geotechnical Engineer prior to the placement of reinforcement and concrete so that if conditions differ from those anticipated, appropriate recommendations can be made.

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Environmental ▪
Materials Testing ▪
Construction Inspection ▪

Quincy Engineering, Inc.
3247 Ramos Circle
Sacramento, CA 95287-2512

Job No: 202101.GDR
February 9, 2010

Attn: Ms. Carolyn Davis

Sub: ADDENDUM NO. 3 to GEOTCHNICAL DESIGN AND MATERIALS REPORT, Chico-99 Auxiliary Lane Project, Chico, California
03-BUT-99 PM 32.4-33.28 EA 03-3A0421

Ref:
1. Geotechnical Design and Materials Report dated February 2009
2. Addendum No. 1 to Geotechnical Design and Materials Report dated December 24, 2009
3. Addendum No. 2 to Geotechnical Design and Materials Report dated January 18, 2010

Dear Ms. Carolyn Davis:

The following are the changes made to the Geotechnical Design and Materials Report dated February 2009 in response to Caltrans review comments dated January 20, 2010. This addendum addresses a) Change in approximate ground elevation and approximate groundwater elevation of Borings RW/SW-9 and RW/SW-10 in Table 1B; b) procedures and practices followed by the engineer to log the borings discussed in Section 5.1; c) Change in the LOTB with the border and soil legends consistent with the "Soil & Rock Logging, Classification, and Presentation Manual" (June 2007); d) QC/QA documentation and procedures and d) "Groundwater Elevation Contours" is included.

Item 1: Section 5.1 Page 14, 7th Paragraph is modified to include the procedures for logging and soil classifications according to Caltrans manual.

Item 2: "Approximate Ground Elevation" and "Approximate Groundwater Elevation" of Borings RW/SW-9 and RW/SW-10 in Table 1B have been changed.

Item 3: The border and soil legends of the LOTB sheets are prepared according to Caltrans "Soil & Rock Logging, Classification, and Presentation Manual" (June 2007).

Item 4: Page 19, Section 7.2 "Subsurface Soil Conditions", "Groundwater was encountered in some of the borings at depths between 5 feet and 29 feet (between Elev. +199 feet and Elev. +215 feet) as……..".

Changed to "Groundwater was encountered in some of the borings at depths between 5 feet and 29 feet (between Elev. +199 feet and Elev. +210 feet) as……..".

Item 5: Page 20, Section 7.3.2 "Groundwater", a paragraph "Copy of "Groundwater Elevation Contours" prepared by ……" is added.

Item 6: The original and copy of the "Log of Test Boring (LOTB) Sheet Checklist" will be sent to Caltrans for filing according to Caltrans' policy.

Copies of the excerpt of the Geotechnical Design and Materials Report with the relevant changes and "LOTB Sheet Checklist" are attached.

Sincerely,
PARIKH CONSULTANTS, INC.

Alston Lam, P.E., G.E. 2605
Project Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

Attachment: Excerpts of Geotechnical Design and Materials Report – Chico SR 99 Auxiliary Lane Project, Chico, California
LOTB Sheet Checklist

S: On-going\2002\202101\Geotechnical Design and Materials Report dated February 2010 Addendum #3

- Eight borings (BID-1 through BID-6 and PLM-1 and PLM-2) were drilled to the depths between 60 feet and 70 feet. These borings were drilled for the design of outside and median widening of Bidwell Park Viaduct and Palmetto Avenue UC.
- Sixteen borings (Borings RW-1 through RW-21, except Borings RW-3, SW-12, SW-13, SW-14 and SW-19 which were deleted and not used) were drilled to the depths between 28 feet and 50 feet for the design of retaining walls, retaining wall supporting soundwall and soundwalls.
- Bulk samples collected from Borings SW-16 and SW-18 were tested for the R-Value for the structural pavement design.

The approximate locations of these borings are shown on the attached Site Plans (Plates 2A and 2B). The as-built Log of Test Borings (LOTB) of the Bidwell Park Viaduct and Palmetto Avenue UC are included in Appendix A.

All the soil borings were drilled with truck-mounted and track-mounted drill rigs using an 8-inch diameter hollow stem auger drilling method.

The borings were drilled under the technical supervision of our engineer, who classified and continuously logged the soils encountered during drilling and supervised the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples were obtained during drilling by driving a 2.5-inch Inside Diameter (I.D.) Modified California sampler or a 1.375-inch I.D. Standard Penetration Test sampler into the subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the LOTB, Appendix A. The boring locations and stations are summarized in Table 1 below.

The descriptions of the soil materials encountered in the exploratory borings and relevant boring information are presented in the LOTB attached in Appendix A. The logging and soil classifications were according to the procedures presented in the "Soil and Rock Logging, Classifications, and Presentation Manual" (June 2007) (Ref. 8). The original and copy of QC/QA documentation (LOTB Sheet Quality Control

Checklist) should be sent to Caltrans for filing according to the quality control checklist.

The laboratory test methods and results are presented in Appendix B. The logs presented in Appendix A were prepared from the field logs which were edited after visual re-examination of the soil samples in the laboratory and results of classification tests on selected soil samples as indicated on the LOTB.

TABLE 1A: SUMMARY OF BORINGS (FOR PAVEMENT DESIGN AND ROADWAY)

Boring No.	Station (ft)	Offset (ft)	Boring Depth (ft)	Approx. Ground Elev. (ft)	Approx. Groundwater Elev. (ft)	Soil Description
SW-16	"D" Line 23+00	38 Rt.	30.5	235.0	-	Lean Clay with Gravel
SW-18	"D" Line 17+06	40 Rt.	30.0	235.0	-	Lean Clay with Gravel

Note: No groundwater was encountered in the above borings.

TABLE 1B: SUMMARY OF BORINGS (FOR RETAINING WALLS and SOUNDWALLS)

Boring No.	Station (ft)	Offset (ft)	Boring Depth (ft)	Approx. Ground Elev. (ft)	Approximate. Groundwater Elev. (ft)
RW-1	"SBOFF" Line 562+01	34 Lt.	51.5	223.0	-
RW-2	"SBOFF" Line 565+09	32 Lt.	51.5	228.0	199.0
SW-4	" D" Line 14+35	38 Lt.	31.0	234.0	205.0
SW-5	" D" Line 17+75	40 Lt.	28.0	234.0	-
SW-6	" D" Line 21+00	38 Lt.	31.0	235.0	-
SW-7	" D" Line 23+85	30 Lt.	31.0	235.0	-
SW-8	" D" Line 27+20	41 Lt.	31.0	235.0	-
RW/SW-9	"SBON" Line 31+99	38 Lt.	50.0	215.0	205.0
RW/SW-10	"SBON" Line 34+93	38 Lt.	48.0	215.0	210.0
SW-11	"SBON" Line 38+27	40 Lt.	32.0	215.0	205.0
SW-15	" D" Line 25+75	39 Rt.	31.0	234.0	-
SW-16	" D" Line 23+00	38 Rt.	30.5	235.0	-
SW-17	" D" Line 19+35	38 Rt.	30.0	235.0	-
SW-18	" D" Line 17+06	40 Rt.	30.0	235.0	-
RW-20A	"NBON" Line 565+05	31 Rt.	50.0	220.0	-
RW-21	"NBON" Line 561+95	39 Rt.	50.0	216.0	-

and vegetation and appear to be in an acceptable condition. Based on the field review, no slope instability was observed.

7.2 Subsurface Soil Conditions

Based on the available boring information, the embankment fill is comprised mainly of stiff to hard sandy lean clay/lean clay/lean clay with gravel. Medium dense to dense silty/clayey gravels were encountered underneath the clay in Boring SW-5. The native soils underneath the embankment fill generally consist of 3 to 30 feet of firm to very stiff lean clay/ silt and/or loose to medium dense clayey sand/silty sand/poorly graded sand, underlain by 5 to 40 feet of very dense sand and gravel. Stiff to hard lean clays were encountered at greater depths interbedded with medium dense to very dense sand and gravel (except the soft to firm lean clay and loose sand layers encountered in Borings RW/SW-10, BID-1, BID-2 and BID-5). Bedrock was not encountered during the field exploration program. The results of the field exploration in March 2008 are in general agreement with the as-built LOTB.

Groundwater was encountered in some of the borings at depths between 5 feet and 29 feet (between Elev. +199 feet and Elev. +210 feet) as shown in Tables 1B and 1C. Groundwater conditions at the project site are described in Section 7.3.2.

Detailed descriptions of the materials encountered in the exploratory borings are presented in the LOTB in Appendix A. It should be noted that these descriptions and related information depict subsurface conditions only at the locations indicated and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock, general subsurface conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational, and relatively minor changes in soil types within a stratum may not be noted due to field limitations. Also, the passage of time may result in a change in the soil conditions at the locations due to environmental changes.

7.3 Water

7.3.1 Surface Water

The terrain at the project site gently slopes towards the west, and the surface water /drainage sheet flows towards the west.

7.3.1.1 Scour

Scour analyses included in the hydraulic study shows pier scour is anticipated to be generally minimal (except at Piers 4 and 5), as majority of the piers are located away from the low flow channel. Big Chico Creek has a low flow rate and existing piers appear to have minor scour issues.

The estimated total scour is 6 feet (contraction scour of 0.5 feet and local scour of 5.5 feet) at Piers 4 and 5 according to the designer. The scour elevation was assumed to be +209 feet in the calculations of bearing capacity at Piers 4 and 5. Riprap will be provided at Piers 4 and 5 for scour protection.

7.3.1.2 Erosion

The existing slopes have established landscaping to help control erosion. The subject was considered and was determined to be not applicable for the project. It is recommended that construction of the proposed project be undertaken during the dry season.

7.3.2 Groundwater

Groundwater was encountered between the depths of 5 feet and 29 feet (between Elev. +199.0 feet and Elev. +210 feet) in the borings as shown in Tables 1B and 1C during field exploration in March 2008.

Copy of "Groundwater Elevation Contours" prepared by Broadbent & Associates, Inc. for County of Butte is included in Appendix A for information. The groundwater elevations were measured from the monitoring wells.

It is anticipated that groundwater level will vary with the passage of time due to seasonal groundwater fluctuations, surface and subsurface flow, ground surface run-off, water level in the adjacent Big Chico Creek and/or other creeks in the area, as well as other environmental factors that may not be present at the time of our investigation.

7.4 Project Site Seismicity

7.4.1 Ground Motions

The project site is located in a seismically active part of northern California. Two primary fault systems exist in the vicinity of Butte County. These faults may cause moderate ground-shaking at the project site. The Fault Map, Plate 4 presents the locations of the fault systems relative to the project site.

Maximum credible earthquake magnitudes for some of the major faults in the area determined by Mualchin (California Seismic Hazard Map 1996) and peak rock accelerations are summarized in Table 2 below. These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

TABLE 2:EARTHQUAKE DATA

Fault	Estimated Distance from Project Site (Mile)	Maximum Credible Earthquake (MCE)	Peak Bedrock Acceleration (PBA) (g)	Peak Ground Acceleration (PGA) (g)
Bear Mountain Fault Zone (Normal)	22.2	6.5	0.2	0.3
Green Valley Fault 1 (Reverse)	26.2	6.7	0.2	0.3

7.4.2 Ground Rupture

Since no active faults pass through the site, the potential for fault rupture is low.

REFERENCES

1. California Department of Transportation, May 2006, Standard Plans.

2. California Department of Transportation, May 2006, Standard Specifications, Sections 1 through 95.

3. California Department of Transportation, Highway Design Manual, June 2006.

4. D.S. Harwood, E. J. Helley and M.P. Doukas, 1981, "Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California, 1981; Scale 1:62,500; USGS Map I-1238).

5. Mualchin, L., 1996, The Caltrans California Seismic Hazard Map.

6. National Research Council, Washington, DC, 1985, Liquefaction of Soils during Earthquakes, PB86-163110, November 1985.

7. "Geotechnical Engineering Investigation Report for State Route 99 Auxiliary Lane Project Phase 1 – East 1st Avenue Northbound Off-Ramp" July 2006, PARIKH Consultants, Inc.

8. State of California Department of Transportation Division of Engineering Services Geotechnical Services "Soil and Rock Logging, Classification, and Presentation Manual", June 2007.

9. Broadbent & Associates, Inc. "First Quarter 2008 Ground-water Monitoring Report, Chico Urban Area Nitrate Compliance Program", May 12, 2008

Broadbent & Associates, Inc.
1324 Mangrove Ave., Suite 212
Chico, CA 95926
Voice (530) 566-1400
Fax (530) 566-1401

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

12 May 2008

Project No. 07-08-112-003

County of Butte
Public Health Department
Environmental Health Division
202 Mira Loma Drive
Oroville, California 95965

Attn: Mr. Vance Severin, Deputy Director

RE: FIRST QUARTER 2008 GROUND-WATER MONITORING REPORT
CHICO URBAN AREA NITRATE COMPLIANCE PROGRAM

Dear Mr. Severin:

Broadbent & Associates, Inc. (BAI) is pleased to submit this *First Quarter 2008 Ground-Water Monitoring Report* for the Chico Urban Area Nitrate Compliance Program. This report includes a description of field activities and analytical results associated with First Quarter 2008 ground-water monitoring conducted to support Butte County's Chico Urban Area Nitrate Compliance Program.

Should you have questions or require additional information, please do not hesitate to contact us at (530) 566-1400.

Sincerely,
BROADBENT & ASSOCIATES, INC.

Jason Duda

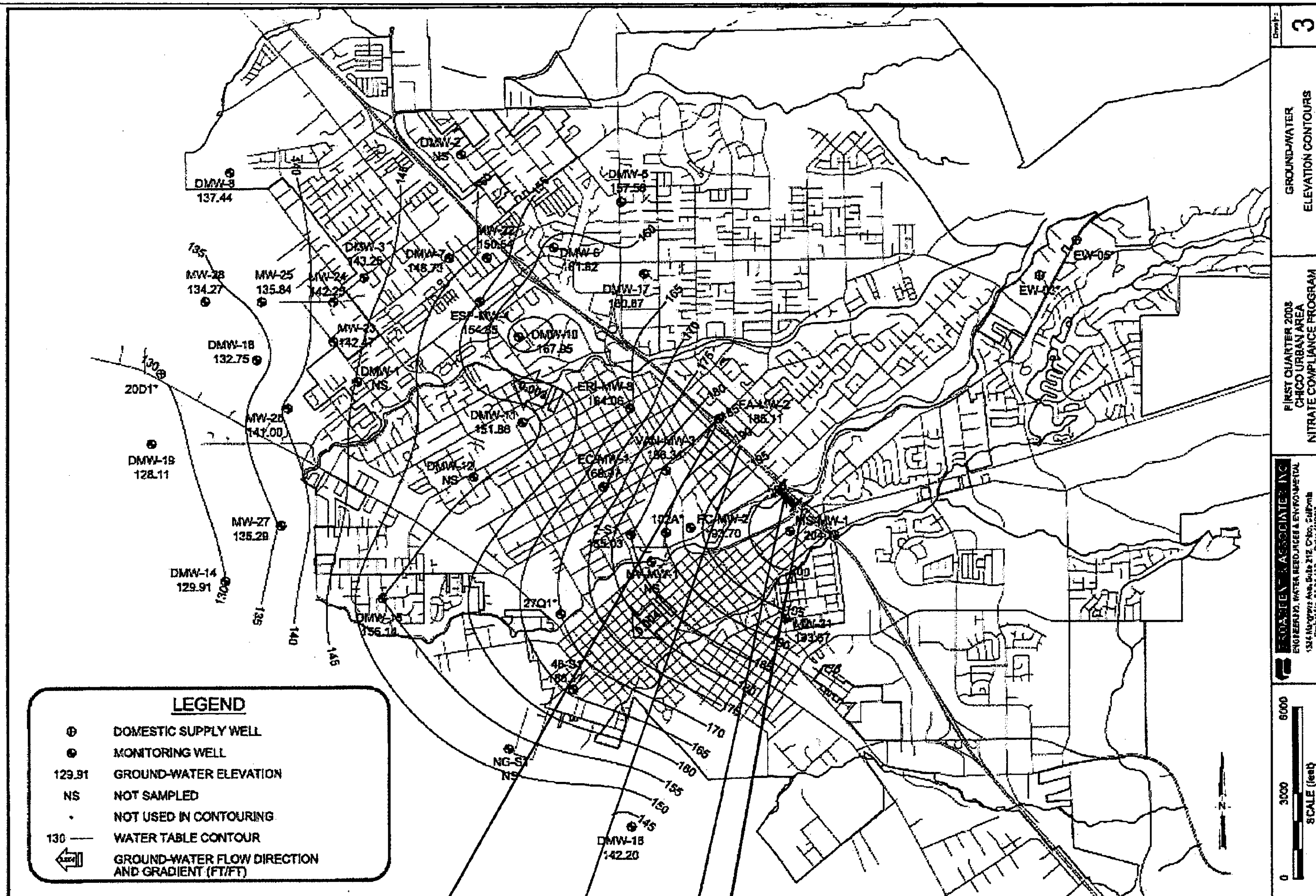
Jason Duda
Project Scientist

Thomas A. Venus

Tom Venus, PE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
THOMAS A. VENUS
No. 54898
Expires 12-31-09
CIVIL
STATE OF CALIFORNIA

Attachment



End
Project

Palmetto

Begin project

Bidwell

41

Caltrans

Log of Test Boring (LOTB) Sheet Checklist

This checklist shall be used by the *checker* in his/her evaluation of a LOTB sheet's conformance with the Caltrans *Soil & Rock Logging, Classification, and Presentation Manual,* and other applicable standards. To facilitate a quality check, the checker shall be provided with the draft final LOTB sheets, pertinent laboratory test results, copies of approved *Request for Exceptions*, and the field logs. This checklist is not comprehensive and does not attempt to account for all logging and presentation standards. As such, the checker must be familiar with the entire manual in order to successfully perform a quality check. **One checklist shall be completed per LOTB plan sheet. One signature sheet may be used for each structure (Bridge No.).**

Project Information

Dist – EA: 3A0421 County: But Route: 99 PM: ____

Bridge No.: ________________

Sheet Title: Chico SR99 Auxiliary Lane Project

Revision Date: 1/7/10

Are there approved exceptions to the manual? ☐Yes ☑No (attach, if yes)

General

	Yes	No	N/A	
1.1	☑	☐	☐	Does the Plan View meet the requirements of Sec 5.2.3.3?
1.2	☑	☐		Does the Border meet the requirements of Sec 5.2.3.1 and Sec 5.2.3.2?
1.3	☑	☐	☐	Are the Notes clear and do they meet the requirements of Sec 5.2.2?
1.4	☐	☐	☑	If As-Built LOTB, does it meet the requirements of Sec 5.2.4?
1.5	☑	☐		Is the soil legend sheet attached and properly labeled?
1.6	☐	☐	☑	If rock is presented, is the rock legend attached and properly labeled?
1.7	☐	☐	☑	If approved "Exception to Policy" form is attached, does the LOTB meet the requirements of the approved exceptions?

Elevation View

	Yes	No	
2.1	☑	☐	Are the Hole Identifications correct? (Sec 2.3) (Sec. 5.2.3.4)
2.2	☑	☐	Are the location descriptions correct?
2.3	☑	☐	Are the holes located properly on the profile?
2.4	☑	☐	Is the elevation scale correct? (Sec 5.2.3.4)
2.5	☑	☐	Is the top of hole elevation presented and correct? (Sec 5.2.3.4)

Log of Test Boring (LOTB) Sheet Checklist

Bridge No.: ______________ Sheet Title: Chico SR99 Aux. Lane Project

	Yes	No	N/A	
2.6	☑	☐		Is the correct hole diameter presented in the correct Borehole Symbol? (Sec 5.2.5.6)
2.7	☑	☐		Does the stationing match the profile view?
2.8	☑	☐		Are the Boring Date and Termination Elevation presented at the bottom of each boring log? (Sec 5.2.3.4)
2.9	☑	☐	☐	If SPT tests were performed, is the correct hammer efficiency reported at the bottom of each borehole?
2.10	☑	☐	☐	Are lab tests reported at the correct elevations? (Sec 5.2.5.2)
2.11	☑	☐	☐	Are SPT blow counts reported at the correct elevations? (Sec 5.2.5.2)
2.12	☑	☐	☐	Is the groundwater presented at the correct elevation? (Sec 5.2.5.2)
2.13	☑	☐		Are the soil/rock layers and graphics presented correctly? (Sec 4, Sec 5.2.5.7)
2.14	☑	☐		Are the required descriptors presented and in the correct order? (Sec 2.4.1, Sec 2.5.1)
2.15	☑	☐		Are the descriptors presented consistent with those allowed in the manual?
2.16	☑	☐		Are the soil identifications consistent with the field observations? (Sec 2)
2.17	☑	☐		Are the soil classifications consistent with reported lab test results? (Sec 3)
2.18	☑	☐	☐	Are the consistency descriptors consistent with field observations and/or lab test results? (Sec 2.4.3, Sec 3.2.3)
2.19	☑	☐	☐	Are the apparent density descriptors consistent with the SPT results and hammer efficiency? (Sec 2.4.4)
2.20	☐	☐	☑	Are % recovery (REC) and rock quality designation (RQD) presented at the required elevations?
2.21	☐	☐	☑	Is rock strength presented where lab tests are reported? (Sec 3.3.1)
2.22	☑	☐	☐	Considering the field observations, are lab test results properly applied to the descriptors within a layer per Sec 4.3?
2.23	☑	☐		Are the presentations consistent with the rules presented in Sec 4?
2.24	☑	☐		Are the presentations consistent with the rules presented in Sec 5?

Log of Test Boring (LOTB) Sheet Checklist

List all variances identified during initial review of the LOTB sheet and steps needed to resolve the discrepancy (include item number). Also note any recommendations for revisions to the manual or procedures that might reduce or eliminate similar errors in the future.

Overhead Sign 4-07 (Station 27+34.90)

Pile Torsional Capacity: 5 ft ⌀ and 21 feet long CIDH piles

$$T_{all}\ ① = \frac{0.55 \times 5 \times \pi \times (2000 \times 21) \times 2.5}{2 \times 1000}$$

$$= \underline{\underline{453.6 \text{ kip-ft}}} \quad > 242.5 \text{ kip-ft}$$

Vertical Pile Capacity

$$Q_{all} = \frac{0.55 \times 5 \times \pi \times 2000 \times 21}{2 \times 1000}$$

$$= \underline{181.4 \text{ kips}} > 8.3 \text{ kips}$$

Log of Test Boring QC/QA Signature Sheet

Dist – EA: 3A0421 Bridge No.: ____________

Sheet Titles:

I, the undersigned on the date following my signature, hereby certify that I have performed a quality check of the referenced LOTB sheets and that the referenced LOTB sheets comply with the Caltrans *Soil and Rock Logging, Classification and Presentation Manual (June 2007)* and related policy and standards.

Lam Tran — Staff Engineer

Checker (Print) — Title

[signature] — 1/6/10

Checker (Signature) — Date

I, the undersigned on the date following my signature, hereby certify that the referenced LOTB sheets comply with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance Documentation on LOTB Sheets", dated July 1, 2007.

ALSTON LAM — ASSOCIATE

Functional Supervisor (Print) — Title

[signature] — 2/1/2010

Functional Supervisor (Signature) — Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Geotechnical Services Corporate Unit (Mark Willian))