

INFORMATION HANDOUT

**For Contract No. 06-487504
At 06-Kings-198-R16.5/R17.2**

**Identified by
Project ID 0600004881**

RAILROAD RELATIONS

Railroad Relations and Insurance Requirements

MATERIALS INFORMATION

Summary of Foundation Recommendation Reports (Bridge No. 45-0099)

EXHIBIT "C"

SECTION 13. RAILROAD RELATIONS AND INSURANCE REQUIREMENTS

13-1.01 GENERAL

The term "Railroad" shall mean the San Joaquin Valley Railroad Company.

It is expected that the Railroad will cooperate with the Contractor to the end that the work may be handled in an efficient manner. However, except for the additional compensation provided for hereinafter for delays in completion of specific unit of work to be performed by the Railroad, and except as provided in Public Contracts Code Section 7102, the Contractor shall have no claim for damages, extension of time, or extra compensation in the event his work is held up by work performed by the Railroad.

The Contractor must understand the Contractor's right to enter Railroad's property is subject to the absolute right of Railroad to cause the Contractor's work on Railroad's property to cease if, in the opinion of Railroad, Contractor's activities create a hazard to Railroad's property, employees, and operations.

The Contractor shall sign and submit to the Railroad the Contractor's Endorsement, in the form attached hereto.

13-1.02 RAILROAD REQUIREMENTS

The Contractor shall notify Mr. Maurice Laperle, Roadmaster, 221 North F Street, Exeter, CA 93221, Telephone (559) 592-1857 and the Engineer, in writing, at least 10 working days before performing any work on, or adjacent to the property or tracks of the Railroad.

The Contractor shall cooperate with the Railroad where work is over or under the tracks, or within the limits of Railroad property, to expedite the work and avoid interference with the operation of railroad equipment.

The Contractor shall comply with the rules and regulations of Railroad or the instructions of its representatives in relation to protecting the tracks and property of Railroad and the traffic moving on such tracks, as well as the wires, signals and other property of Railroad, its tenants or licensees, at and in the vicinity of the work during the period of construction. The responsibility of the Contractor for safe conduct and adequate policing and supervision of its work at the job site shall not be lessened or otherwise affected by the presence at the work site of Railroad representatives, or by the Contractor's compliance with any requests or recommendations made by Railroad representatives.

The Contractor shall perform work to not endanger or interfere with the safe operation of the tracks and property of Railroad and traffic moving on such tracks, as well as wires, signals and other property of Railroad, its tenants or licensees, at or in the vicinity of the work.

The Contractor shall take protective measures to keep railroad facilities, including track ballast, free of sand or debris resulting from his operations. Damage to railroad facilities resulting from Contractor's operations will be repaired or replaced by Railroad and the cost of such repairs or replacement shall be deducted from the Contractor's progress and final pay estimates.

The Contractor shall contact the Railroad's "Call Before You Dig" at least 48 hours prior to commencing work, at 1-800-336-9193 (a 24 hour number) to determine location of fiber optics. If a telecommunications system is buried anywhere on or near railroad property, the Contractor will coordinate with the Railroad and the Telecommunication Company(ies) to arrange for relocation or other protection of the system prior to beginning any work on or near Railroad Property.

The Contractor shall not pile or store any materials nor park any equipment closer than 7.62-meter (25'-0") to the centerline of the nearest track, unless directed by Railroad's representative.

The Contractor shall also abide by the following temporary clearances during the course of construction:

3.66-meter (12'-0") horizontally from centerline of track

6.40-meter (21'-0") vertically above top of rail

The temporary vertical construction clearance above provided will not be permitted until authorized by the Public Utilities Commission. It is anticipated that authorization will be received not later than 15 days after the approval of the contract by the Attorney General. In the event authorization is not received by the time specified, and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of authorization not being received by the said time, State will compensate the Contractor for such delay to the extent provided in Section 8-1.07C, "Payment Adjustments," of the Standard Specifications and not otherwise.

Walkways with railing shall be constructed by Contractor over open excavation areas when in close proximity of tracks, and railings shall not be closer than 2.60-meter (8'-6") horizontally from centerline of the nearest track, if tangent, or 2.90-meter (9'-6") if curved.

Infringement on the above temporary construction clearances by the Contractor's operations shall be submitted to the Railroad by the Engineer, and shall not be undertaken until approved by the Railroad, and until the Engineer has obtained any necessary authorization from any governmental body or bodies having jurisdiction thereover. No extension of time or extra compensation will be allowed in the event the Contractor's work is delayed pending Railroad approval and governmental authorization.

When the temporary vertical clearance is less than 6.86-meter (22'-6") above top of rail, Railroad shall have the option of installing tell-tales or other protective devices Railroad deems necessary for protection of Railroad trainmen or rail traffic.

Four sets of plans, in 279mm x 432mm (11" x 17") format, and two sets of calculations showing details of construction affecting Railroad's tracks and property not included in the contract plans, including but not limited to shoring and falsework, shall be submitted to the Engineer for review prior to submittal to Railroad for final approval. Falsework shall comply with railroad guidelines. Demolition of existing structures shall comply with Railroad guidelines. Shoring shall be designed in accordance with Railroad's shoring requirement of drawing No. 106613 and guidelines for shoring and falsework, latest edition, issued by Railroad's Office of Chief Engineer. Shoring and falsework plans and calculations shall be prepared and signed by a professional civil engineer registered in the State of California. This work shall not be undertaken until such time as the Railroad has given such approval. Review by Railroad may take up to 6 weeks after receipt of all necessary information.

The Contractor shall notify the Engineer in writing, at least 25 calendar days but not more than 40 days in advance of the starting date of installing temporary work with less than permanent clearance at each structure site. The Contractor shall not be permitted to proceed with work across railroad tracks until this requirement has been met. No extension of time or extra compensation will be allowed if the Contractor's work is delayed due to failure to comply with the requirements in this paragraph.

Private crossings at grade over tracks of Railroad for the purpose of hauling earth, rock, paving or other materials will not be permitted. If the Contractor, for the purpose of constructing highway-railway grade separation structures, including construction ramps thereto, desires to move equipment or materials across Railroad's tracks, the Contractor shall first obtain permission from Railroad. Should Railroad approve the crossing, the Contractor shall execute Railroad's form of Contractor's Road Crossing Agreement. By this agreement, the Contractor shall bear the cost of the crossing surface, with warning devices that might be required. The Contractor shall furnish its own employees as flagmen to control movements of vehicles on the private roadway and shall prevent the use of such roadway by unauthorized persons and vehicles.

Blasting will be permitted only when approved by the Railroad.

The Contractor shall, upon completion of the work covered by this contract to be performed by the Contractor upon the premises or over or beneath the tracks of Railroad, promptly remove from the premises of Railroad, Contractor's tools, implements and other materials, whether brought upon said premises by said Contractor or any subcontractor, employee or agent of said Contractor, and cause said premises to be left in a clean and presentable condition.

Under-track pipeline installations shall be constructed in accordance with Railroad's current standards which may be obtained from Railroad. The general guidelines are as follows:

Edges of jacking or boring pit excavations shall be a minimum of 6.10-meter (20 feet) from the centerline of the nearest track.

If the pipe to be installed under the track is 100 mm (4 inches) in diameter or less, the top of the pipe shall be at least 1.067-meter (42 inches) below base of rail.

If the pipe diameter is greater than 100 mm (4 inches) in diameter, it shall be encased and the top of the steel pipe casing shall be at least 1.60-meter (66 inches) below base of rail.

Installation of pipe or conduit under Railroad's tracks shall be done by dry bore and jack method.

Hydraulic jacking or boring will not be permitted.

13-1.03 PROTECTION OF RAILROAD FACILITIES

Upon advance notification of not less than 10 working days by the Contractor, Railroad representatives, conductors, flagmen or watchmen will be provided by Railroad to protect its facilities, property and movements of its trains or engines. Notice shall be made to Maurice Laperle of Railroad at (559) 592-1857. At the time of notification, the Contractor shall provide Railroad with a schedule of dates that flagging services will be needed, as well as times, if outside normal working hours. Subsequent deviation from the schedule shall require 10 working days advance notice from the first affected date. The Railroad will furnish such personnel or other protective devices:

- (a) When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from centerline of any track on which trains may operate, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- (b) For any excavation below elevation of track subgrade if, in the opinion of Railroad's representative, track or other Railroad facilities may be subject to settlement or movement.
- (c) During any clearing, grubbing, grading or blasting in proximity to Railroad which, in the opinion of Railroad's representative, may endanger Railroad facilities or operations.
- (d) During any of Contractor's operations when, in the opinion of Railroad's representatives, Railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines or pipe lines, may be endangered.

The cost of flagging and inspection provided by Railroad during the period of constructing that portion of the project located on or near Railroad property, as deemed necessary for the protection of Railroad's facilities and trains, will be borne by the State for a period of 14 working days beginning on the date work commences on or near property of Railroad. The Contractor shall pay to the State liquidated damages in the sum of \$500 per day for each day in excess of the above 14 working days the Contractor works on or near Railroad property, and which requires flagging protection of Railroad's facilities and trains.

13-1.04 WORK BY RAILROAD

The following work by Railroad will be performed by Railroad forces and is not a part of the work under this contract.

- (a) The Railroad will perform preliminary engineering inspection and flagging as specified in Section 13-1.03, "Protection of Railroad Facilities," of this document.

13-1.05 DELAYS DUE TO WORK BY RAILROAD

No delay due to work by the Railroad is anticipated.

If delays due to work by the Railroad occur, and the Contractor sustains loss which, in the opinion of the Engineer, could not have been avoided by the judicious handling of forces, equipment and plant, the amount of said loss shall be determined as provided in Section 8-1.07, "Delays," of the Standard Specifications.

If a delay due to work by Railroad occurs, an extension of time determined pursuant to the provisions in Section 8-1.10, "Liquidated Damages," of the Standard Specifications will be granted.

13-1.06 LEGAL RELATIONS

The provisions of Section 13-1, "Relations with Railroad Company," and the provisions of Section 13-2, "Railroad Protective Insurance," of this document shall inure directly to the benefit of Railroad.

13-2 RAILROAD PROTECTIVE INSURANCE

In addition to any other form of insurance or bonds required under the terms of the contract and specifications, the Contractor will be required to carry insurance of the kinds and in the amounts hereinafter specified.

Such insurance shall be approved by the Railroad before any work is performed on Railroad's property and shall be carried until all work required to be performed on or adjacent to the Railroad's property under the terms of the contract is satisfactorily completed as determined by the Engineer, and thereafter until all tools, equipment and materials have been removed from Railroad's property and such property is left in a clean and presentable condition.

Full compensation for all premiums which the Contractor is required to pay on all the insurance described hereinafter shall be considered as included in the prices paid for the various items of work to be performed under the contract, and no additional allowance will be made therefor or for additional premiums which may be required by extensions of the policies of insurance.

The following insurance coverage will be required:

(a) **General Liability** insurance providing bodily injury including death, personal injury and property damage coverage with a combined single limit of at least \$2,000,000 each occurrence or claim and an aggregate limit of at least \$4,000,000. This insurance shall contain broad form contractual liability with a separate general aggregate for the project (ISO Form CG 25 03 or equivalent). Exclusions for explosion, collapse and underground hazard shall be removed. Coverage purchased on a claims made form shall provide for at least a two (2) year extended reporting or discovery period if (a) the coverage changes from a claims made form to an occurrence form, (b) there is a lapse/cancellation of coverage, or (c) the succeeding claims made policy retroactive date is different for the expiring policy.

(b) **Automobile Liability** insurance providing bodily injury and property damage coverage with a combined single limit of at least \$2,000,000 each occurrence or claim. This insurance shall cover all motor vehicles including hired and non-owned, and mobile equipment if excluded from coverage under the general public liability insurance.

(c) **Workers' Compensation** insurance covering Contractor's statutory liability under the workers' compensation laws of the state(s) affected by this Agreement, and Employers' Liability. If such insurance will not cover the liability of Contractor in states that require participation in state workers' compensation fund, Contractor shall comply with the laws of such states. If Contractor is self-insured, evidence of state approval must be provided.

(d) **Railroad Protective Liability** insurance naming the Railroad as the insured with a combined

single limit of \$2,000,000 per occurrence with a \$6,000,000 aggregate. The policy shall be broad form coverage for "Physical Damage to Property" (ISO Form CG 00 35 or equivalent) and include pollution arising out of fuels and lubricants brought to the job site (ISO Form CG 28 31 or equivalent). A binder of insurance for Railroad Protective Liability must be submitted to the Railroad and the original policy or a certified duplicate original policy must be forwarded to the Railroad when available.

Contractor and its insurers shall endorse the required insurance policy(ies) to waive their right of subrogation against Railroad. Contractor and its insurers also waive their right of subrogation against Railroad for loss of its owned or leased property or property under its care, custody and control. Contractor's insurance shall be primary with respect to any insurance carried by Railroad. The policy(ies) required under (a) and (b) above shall provide severability of interests and shall name Railroad as an additional insured.

Prior to commencing the Work, Contractor shall furnish to Railroad certificate(s) of insurance evidencing the required coverage and endorsements and upon request, a certified duplicate original of any required policy. The certificate(s) shall contain a provision that obligates the insurance company(ies) issuing such policy(ies) to notify Railroad in writing of any material alteration including any change in the retroactive date in any "claims-made" policies or substantial reduction of aggregate limits, if such limits apply, or any cancellation at least thirty (30) days prior thereto.

The insurance policy(ies) shall be written by a reputable insurance company(ies) acceptable to Railroad or with a current Best's Insurance Guide Rating of B and Class VII or better, and authorized to do business in the state(s) in which the Work is located.

Contractor warrants that this Agreement has been thoroughly reviewed by Contractor's insurance agent(s)/broker(s), who has been instructed by Contractor to procure the insurance coverage required by this Agreement.

If Contractor fails to procure and maintain insurance as required, Railroad may elect to do so at the cost of Contractor.

The fact that insurance is obtained by Contractor shall not be deemed to release or diminish the liability of Contractor, including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railroad shall not be limited by the amount of the required insurance coverage.

CONTRACTOR'S ENDORSEMENT

A. As a condition to entering upon Railroad's right-of-way to perform Work pursuant to this agreement, Licensee's contractor, _____ whose address is _____ (hereinafter "Contractor"), agrees to comply with and be bound by all the terms and provisions of this agreement relating to the Work to be performed and the insurance requirements set forth in Exhibit A-1. Contractor further acknowledges and agrees that the reference to Cal. Gov. Code §14662.5 in Sections 5.b) and 8.b) of Exhibit A to this agreement does not apply to Contractor and in no way limits the indemnities set forth in those provisions, to which Contractor agrees to be bound.

B. Before the Contractor commences any Work, the Contractor will provide the Railroad with (i) a binder of insurance for the Railroad Protective Liability Insurance described in paragraph (d) of Exhibit A-1, hereto attached, and the original policy, or a certified duplicate original policy when available, and (ii) a certificate issued by its insurance carrier providing the other insurance coverage required pursuant to Exhibit A-1 in a policy or policies which contains the following type endorsement:

SAN JOAQUIN VALLEY RAILROAD COMPANY is named as an additional insured with respect to all liabilities arising out of Insured's performance of Work on behalf of the Licensee.

C. All insurance correspondence, binders or originals shall be directed to:

Folder No. _____
San Joaquin Valley Railroad
P.O. Box 937
221 North F Street
Exeter, CA 93221

D. Please note that fiber optic cable may be buried on Railroad's property. **Prior to commencing any work, Contractor agrees to contact Railroad's Telecommunications Operation Center at 1-800-336-9193 to determine if any fiber optic cable is located on Railroad's property on or near the location where the work is to be performed.** If there is, Contractor must comply with the terms and conditions of Section 5 of Exhibit A before commencing any work on Railroad's property.

E. **Contractor agrees to also contact Railroad's Manager-Track Maintenance at (559) 592-1857 at least 48 hours prior to working on Railroad's property in order for Railroad to coordinate the Contractor's work with Railroad's operations and to make arrangements for flagging protection (if applicable).**

This endorsement shall be completed and directed to:

Mr. Maurice LaPerle
P.O. Box 937
221 North F Street
Exeter, CA 93221
(559) 592-1857

CONTRACTOR (print name on above line)

By: _____

Title: _____

Memorandum

*Flex your power!
Be energy efficient!*

To: DAN ADAMS, CHIEF
Bridge Design Branch 10
Office of Bridge Design Central
Structure Design
Division of Engineering Services MS#9-4/8I

Attention: Tracy Sanderson

Date: March 22, 2011

File: 06-KIN-198
PM R16.92
06-487501
Project No.0600000488
12th Ave. OC (Widening)
Bridge No. 45-0099

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

Subject: Foundation Report

1.0 Scope of Work

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this Foundation Report (FR) for the proposed 12th Avenue OC (Widening), Bridge Number 45-0099 located in the City of Hanford in Kings County. The purpose of this report is to document and discuss site subsurface geotechnical conditions, and to provide geotechnical recommendations for design and construction of the project.

To prepare this report, OGDN

1. Review the following documents:

- Planning Study, 12th Avenue OC (Widen), Bridge No. 45-0099, Sheets 1 of 2 and 2 of 2, April 2008
- Original Report, 12th Avenue Overcrossing, Bridge No. 45-99, 6-KIN-198-R16.9, June 26, 1985
- As-built General Plan, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985
- As-built Foundation Plan, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985

- As-built Pile Details – Class 45 & Class 70, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985
- As-built Abutment Details, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985
- As-built Bent Details, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985
- As-built Log of Test Borings, 12th Avenue Overcrossing, Bridge No. 45-99, Contract No. 06-178204, March 7, 1985
- Geologic Map of California – Fresno Sheet, Scale 1: 250,000, California Division of Mines and Geology, 1965
- Soil Survey of Kings County California, United State Department of Agriculture, September, 1986
- 2007 Caltrans Deterministic PGA Map Fault Identifications (FID) Shown, September 2007
- Seismic Design Criteria, Version 1.5, Caltrans, August 2009
- Groundwater Level Data, Wells 18S21E26P001M, 18S22E31E001M, 19S21E01B002M, and 19S21E02F001M, Department of Water Resources

OGDN also

2. Performed a subsurface exploration consisting of drilling two rotary wash soil test borings to depths of 65 feet and 100 feet below the existing ground surface at the project site on March 1 and 2, 2011,
3. Performed engineering and seismic analyses, and
4. Prepared this report.

2.0 Project Description

12th Avenue OC is located on State Route 198 at PM R16.9. The existing bridge was built in 1985. The bridge is generally in a north/south alignment with a skew of about 11 degree. Currently, the bridge consists of two 12-foot travel lanes, one 8-foot shoulder, and one 6-foot sidewalk/barrier at each direction (north/south).

The proposed project will widen the existing 12th Avenue OC to alleviate traffic congestion and improve traffic operation at the interchange. After the widening, the

bridge will consist of three southbound lanes, two northbound lanes, one northbound left turn lane to the west bound of State Route 198, and standard shoulders and sidewalks in both directions. Class 200 driven pile foundation and spread footing foundation have been considered to support the bridge widening at bent and abutments, respectively. Design loads of the foundations have been provided to us and are shown in the table below.

Table 1 Spread Footing Design Data

Spread Footings						
Location	Design Method	Bottom of Footing Elevation (ft)	Minimum Footing Width (ft)	Required Bearing (tsf)		Controlling Load Group
				q _{all}	q _n	
Abut 1, Left	WSD	242	5.00	1.71	N/A	N/A
Abut 1, Right				1.91		
Abut 3, Left		241		1.71		
Abut 3, Right				1.91		

Table 2 Bent Foundation Design Data

Foundation Design Data Sheet								
Support No.	Design Method	Pile Type	Finish Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)*	Number of Piles Per Support
					B	L		
Bent 2 Left and Right	LRFD	Class 200	233.25	227.25	12	15	1 or 2	12

* Based on CALTRANS' current practice, the total permissible settlement is one inch for structures with continuous spans or multi-column bents and two inches for simple span structures.

Table 3 Bent Foundation Design Data

Foundation Design Data Sheet											
Support No.	Service-I Limit State (kips)			Strength Limit State (kips)				Extreme Event Limit States (kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile		Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Bent 2 Left, Right	940	140	800	200	200	0	0	800	340	0	200

A combined retaining wall consisting of a tieback wall in the middle section and standard Type 1 retaining walls at both ends will be constructed at Abutment 1 (South) embankment to accommodate an eastbound loop on a ramp/merge lane. The height of the tieback wall is to be about 17 feet and the heights of the Type 1 retaining walls vary from 8 to 16 feet.

3.0 Site Investigation

Two soil test borings were performed at the site on March 1 and 2, 2011. Boring R-11-001 was performed at about 300 feet west of the existing bridge and about 8 feet south of the edge of pavement (EP) of eastbound Highway 198. Boring R-11-001 was extended to a depth of 100 feet below the existing ground surface. Boring R-11-002 was performed at about 145 feet east of the bridge and about 8 feet south of the EP of eastbound Highway 198. Boring R-11-002 was extended to a depth of 65 feet below the existing ground surface. The borings were advanced using the rotary wash method coupled with the Standard Penetration Testing (SPT) and the standard split spoon sampling. The boreholes were backfilled with soil cuttings.

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

4.0 Topography and Geology

4.1 Topography

The terrain in the areas surrounding the project site is generally flat. The ground surface elevations range approximately from 245 feet to 247 feet above Mean Sea Level (MSL). A majority of the land is used for agriculture purposes. There are commercial and residential developments along 12th Ave on both the north and the south sides of the State Route 198.

4.2 Geology

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

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

5.0 Subsurface Conditions

5.1 Soil Conditions

Based on the results of soil test borings B-11-001 and R-11-002, as well as the As-Built LOTBs, the subsurface materials at the site consist predominantly of sands, silts and their mixtures. The materials extend to the maximum depths explored by the borings of 100 feet. Interbedded layers of clays were encountered at depths of approximately 33 to 37 feet and 48 to 58 feet in boring R-11-002. The Standard Penetration Test (SPT) resistance values recorded in these materials range from 5 to over 57 blows per foot (bpf), indicating that the materials exhibit very loose to very dense apparent densities.

Rock was not encountered by the borings at the site.

5.2 Groundwater Conditions

Groundwater was measured at a depth of 14½ feet in boring R-11-002 at the time when the boring was completed. Groundwater was documented at depths of 27 and 28 feet in the As-Built LOTBs.

Data recorded in three water wells of the Department of Water Resources in between February 1962 and February 2010 were also selected to represent the groundwater levels at the site. The data is provided in the following table.

Table 4 Groundwater Data Recorded in State Wells

Well No.	Well Location		Groundwater Elev. (ft)	Measurement Date
	Northing	Easting		
18S21E34B002M	36.3239	119.6735	70.0 – 226.8	Feb. 1968 – Feb. 2010
18S21E34F001M	36.3225	119.6829	214.9 – 230.8	Feb. 1962 – Feb. 1978
18S21E34R001M	36.3142	119.6774	205.0 – 228.0	Oct. 1947 – Feb. 1960

Based on the bottom elevations of the proposed abutment footings of 241 and 242 feet and the bottom elevation of the proposed bent cap of 227.25 feet, the data shown in the above table indicate that the groundwater levels range from about 70 feet below the structure to about 3 feet above the structure.

Based on the groundwater information recorded in the LOTBs and As-Built LOTBs, a groundwater level of about 15 feet below the existing ground surface, corresponding to an elevation of 225 feet is recommended for use in design of the project at the site.

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

5.3 Corrosion Evaluation

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

6.0 Seismicity and Seismic Hazards

Based on the Caltrans 2009 Seismic Design Procedure (SDP), the nearest active fault to the site is the Great Valley fault 14 (Fault ID No. 37) with a maximum magnitude (Mmax) of 6.4, which is located southwest of the bridge site. The rupture distance to the fault plane from the bridge site is estimated to be about 28 miles. The fault is identified as a reverse fault with a dip direction of 15 degrees (Deg) west.

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

Using the above estimated Vs30, the spectral acceleration (SA) generated from the fault is less than the statewide minimum, which is again less than the probabilistic spectral acceleration obtained from the "USGS 2008 Interactive Deaggregation (Beta)" web site. The probabilistic method is based on a 5% probability of exceedance in 50 years, which corresponds to a return period of 975 years. Therefore, the recommended design Acceleration Response Spectrum (ARS) curve is based on the result of the probabilistic approach. The design ARS curve with an estimated peak ground acceleration of 0.28g is attached in Appendix of this report.

Our office also performed a liquefaction analysis. The results indicate minimum potential for liquefaction during earthquakes.

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

7.0 As-Built Foundation Data

The existing 12th Avenue OC is a two-span, 147-foot-long, reinforced concrete (RC) box girder structure supported on RC columns bent and open end diaphragm abutments. The bent is founded on Class 70 Alternative “X”, driven, precast and prestressed, concrete piles with a design load of 70 tons. The abutments are founded on spread footings.

8.0 Foundation Recommendations

8.1 Spread Footing Foundations for Abutments 1 and 3

Based on the subsurface conditions at the site, spread footing foundation is suitable to support the proposed bridge Abutments 1 and 3. Spread footing data recommendations are presented in the following tables.

Table 5 Foundation Recommendations for Abutments 1 & 3

Support Location	Footing Size (ft)		Bottom of Footing Elevation (ft)	Minimum footing Embedment Depth (ft)	Total Permissible Support Settlement (in)	WSD (Service I Limit State Load Combination)		LRFD		
	B	L				Permissible Gross Contact Stress (tsf)	Allowable Gross Bearing Capacity (tsf)	Service	Strength $\Phi = 0.45$	Extreme Event $\Phi = 1.0$
Abut 1L	5	n/a	242	5	1.0	2.0	2.5	n/a	n/a	n/a
Abut 1R	5	n/a	241	5	1.0	2.0	2.5	n/a	n/a	n/a
Abut 3L	5	n/a	242	5	1.0	2.0	2.5	n/a	n/a	n/a
Abut 3R	5	n/a	241	5	1.0	2.0	2.5	n/a	n/a	n/a

Notes:

1. Recommendations are based on the foundation geometry and the load data provided by Structure Design (SD).
2. Recommendations are based on Working Stress Design (WSD) methodology.

Table 6 Abutments 1 & 3 Spread Footing Data Table

Support Location	Working Stress Design (WSD)		Load and Resistance Factor Design (LRFD)		
	Permissible Gross Contact Stress (tsf)	Allowable Gross Bearing Capacity (tsf)	Service Permissible Net Contact Stress (tsf)	Strength Factored Gross Nominal Bearing Resistance (tsf)	Extreme Event Factored Gross Nominal Bearing Resistance (tsf)
Abut 1	2.0	2.5	n/a	n/a	n/a
Abut 3	2.0	2.5	n/a	n/a	n/a

Notes:

1. Recommendations are based on Working Stress Design (WSD) methodology.

8.2 Class 200 Driven Piles for Bent 2

Based on the subsurface conditions at the site, Class 200 driven pile foundation is suitable to support the proposed bridge Bent 2. Pile data recommendations are presented in the following tables.

Table 7 Foundation Recommendations For Bent 2

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State Load Per Support (kips)		Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
			Total	Permanent	Comp. $\Phi=0.7$	Tens. $\Phi=0.7$	Comp. $\Phi=1.0$	Tens. $\Phi=1.0$		
Bent 2, left & Right	Class 200 Alt. X	227.25	940	800	200	0	340	200	a-I (164.5) a-II (155.5) b-II (172.5)	155.5

Notes:

1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the load data provided by SD.
2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State. A resistance factor of 1.0 is used to calculate the available geotechnical resistance in Extreme Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Limit), and (b-II) Tension (Extreme Limit).
4. The Design Tip Elevation controlled by settlement is not applicable.

5. The Design Tip Elevation controlled by lateral load is typically provided by SD.
6. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 8 Bent 2 Pile Data Table

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Bent	Class 200 Alternative X	340	200	164.5 a-I 155.5 a-II 172.5 b-II	155.5

Notes:

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

8.3 Type 1 Retaining Walls

The proposed retaining wall consists of Standard Type 1 retaining walls. At the eastern end, the Type 1 retaining wall is to be 48 feet long and 8 to 16 feet high. At the western end, the Type 1 retaining wall is to be 36 feet long and 10 to 16 feet high. Based on subsurface conditions at the site and Caltrans 2006 Standard Plan B3-1, *Retaining Wall Type 1 H=4' through 30'*, the site is suitable for the proposed Type 1 retaining wall.

8.4 Tieback Retaining Wall

The 116 feet middle section of the proposed retaining wall will be tieback wall. Design details for the tieback wall have not been made available at this time. We understand that the wall will be about 17 feet high. The following soil parameters are recommended for design of the tieback wall at the site. Further analyses, including a global stability analysis, can be provided with the provision of final design details of the tieback wall.

Internal Friction Angle: 30 Degree (°)

Unit Weight: 120 Pounds per cubic foot (pcf)

In accordance with Caltrans MTD 5-12 (August 1990), the unbonded length of the tieback should be extended beyond the soil failure plane and should be no shorter than 15 feet measured from the inner edge of the existing footing. As such, some of the tiebacks will extend into the foundation soils supporting the existing abutment footing. We recommend that abutment footing be evaluated with the information of the final tieback wall design. The existing footing should be monitored for both horizontal and vertical movement during the construction of the tieback wall. In addition, when multiple tiebacks are to be used, to prevent a circular slip plane from developing bottom up in the wall, the lower tiebacks are recommended be lengthened such that tiebacks at various levels may be designed with the same length.

9.0 Construction Considerations

9.1 Abutment Spread Footing Foundations

Footing excavation shall be inspected by the engineer prior to the placement of concrete. Loose materials present at the site and may be encountered in the footing excavations. If encountered, these materials will need to be replaced with structure backfill in accordance with Caltrans Standard Specification.

9.2 Bent – Class 200 Driven Pile Foundation

Due to silty nature of the subsurface soils at the site and the presence of groundwater, a phenomenon called “soil set-up” may develop during pile driving, in which the dissipation of excess pore pressure developed in saturated fine-grained soils during pile driving increases the soil effective stresses and thus the pile capacity during, and often in a period of time after pile driving. If such, “re-strike” in one or two days after the initial driving maybe be applicable to verify the actual pile capacity in term of driving criteria (blow counts).

9.3 Type 1 Retaining Wall

Retaining wall footing excavation shall be inspected by the engineer prior to the placement of concrete. Loose materials present at the site and may be encountered in the footing excavations. If encountered, these materials will need to be replaced with structure backfill in accordance with Caltrans Standard Specification.

9.4 Tieback Wall

The proposed tieback wall is to be constructed by cutting the existing embankment slope. Considerations should be given to details in construction sequence such that the maximum allowable level of excavation below each tieback level could be specified to prevent over-excavation which could result in overstressing of the preceding tiebacks and settlement of the existing abutment footing. Generally, the maximum allowable level of excavation is set to equal to the spacing between tieback levels but no greater than 5 feet.

Due to close proximity, some of the tiebacks may extend beneath the existing abutment footing. To prevent the footing from settling due to caving of the drilled tieback hole, these tiebacks shall be installed in drilled holes advanced with drill casing. Drill casing shall be removed during grouting.

9.0 Disclaimer and Contact Information

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

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

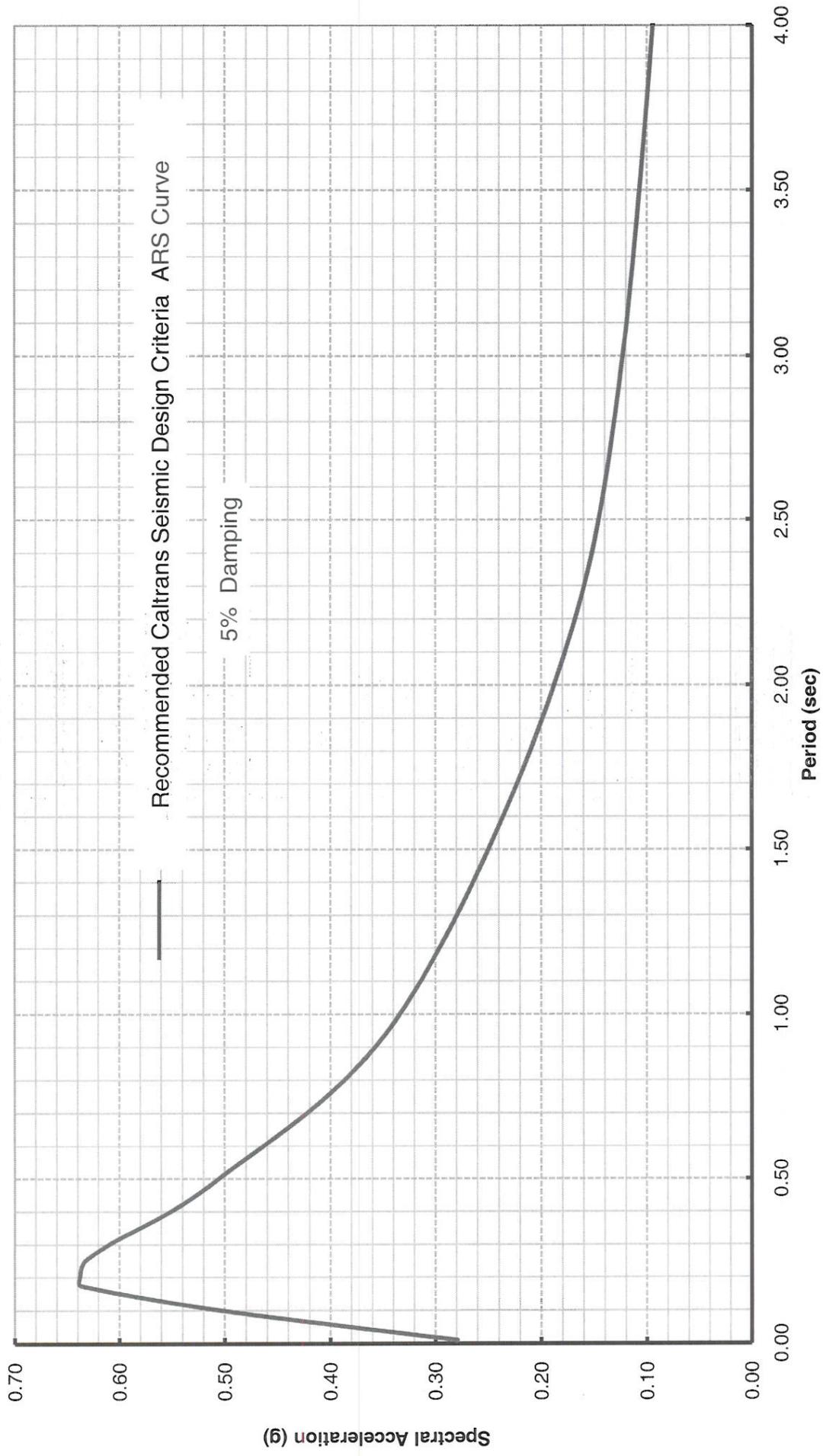


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Structure Construction, R.E. Pending File
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ATTACHMENT

Figure 1, Recommended Acceleration Response Spectrum



DEPARTMENT OF TRANSPORTATION
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North
 (OGDN)

PROJECT NO.	0600000488
/EA:	/06-487501
DATE:	3/21/2011

06-KIN-198 PM R16.92
 12th Avenue OC (Br. No. 45-0099)

Recommended Acceleration Response Spectrum