FOR CONTRACT NO.: 06-0G8304

INFORMATION HANDOUT

AGREEMENTS

US DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICES
date June 17, 2011

MATERIALS INFORMATION

Foundation Report for Pacheco Road UC (Widen)
(Bridge No. 50-0241R/L)

Foundation Report for South Bakersfield OH (Widen)
(Bridge No. 50-0242R/L)

ROUTE: 99-Ker-17.0/22.1(PM)

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:
81420-2011-I-0401-1

JUN 17 2011

Mr. Zachary Parker
Branch Chief, Central Region Biology
California Department of Transportation, District 6
855 M Street, Suite 200
Fresno, California 93721

Subject: Informal Consultation on the State Route 99 South Improvement Project in Kern County, California (California Department of Transportation EA 0G8300, 06-KER-99-PM 17.0/22.1)

Dear Mr. Parker:

This is the U.S. Fish and Wildlife Service's (Service) response to the California Department of Transportation's (Caltrans) request for concurrence on the proposed State Route 99 South Improvement Project (project) in Kern County, California. Your letter, dated March 11, 2011, was received in this office on March 14, 2011. At issue are the effects of this proposed project on the federally-endangered San Joaquin kit fox (*Vulpes macrotis mutica*). Caltrans has determined that the proposed project may affect, but is not likely to adversely affect the San Joaquin kit fox, and requests concurrence with this determination. This response was prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The findings and recommendations of this letter are based on: (1) Caltrans' initial March 11, 2011, letter requesting concurrence; (2) the accompanying February 2011, *State Route 99 South Improvement Natural Environment Study* (NES); (3) electronic-mail (e-mail) and telephone correspondence between the Service and Caltrans between March and May 2011; and (4) other information available to the Service.

Project Description

Caltrans proposes to improve an approximately 5.1 mile (mi) segment of State Route (SR) 99 between the SR 119 interchange and the Wilson Road Overcrossing from post mile (PM) 17.0 to 22.1, located within the southern portion of the City of Bakersfield in Kern County. SR 99 currently exists as a six-lane highway in this area; the improvements will involve widening it to an eight-lane highway following the construction, in the median, of two additional 12 foot (ft.)

Continuously Reinforced Concrete Pavement (CRCP) lanes, one in each travel direction, and two 10 ft. inside-shoulders, also one in each travel direction. The current thrie beam barrier present in the median will be replaced with a concrete barrier bearing modified Type S wildlife passageway openings (See Proposed Avoidance and Minimization Measure #7). The project also proposes to widen two bridge structures within its limits, the Pacheco Road Undercrossing and the South Bakersfield Overhead.

According to the NES, no new right-of-way (ROW) will be required to complete the project and with the exception of the widening of the two bridge structures which will require the expansion of existing abutments and the addition of columns within the ROW, all proposed work will be contained within the median.

Several large Eucalyptus trees are present along SR 99 within the ROW; however, no tree removal is anticipated.

Potential staging areas likely will be located within the median. There are also two interchange loops within the project limits at Panama Lane and White Lane, which the contractor could use for staging. However, if no areas within the ROW are available for use, the contractor will have to secure its own appropriate site outside of the ROW.

As the project site is flat, the use of fill material is not anticipated. There will not be any anticipated utility relocations.

Though contingent on certain factors such as weather conditions and the presence of fog, construction is anticipated to begin between January and March 2013, and continue through October 2013.

Caltrans seeks to improve the level of service operation (LOS) for this segment of SR 99 in order to relieve traffic congestion and improve traffic operations and circulation; notably, by maintaining a LOS "D" or better (minimal delays and an operating speed of 62 miles per hour (mph)) throughout the design period to 2025, and a LOS "E" or better to 2030 (some significant delays and an operating speed of 53 mph).

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area consists of the 5.1 mi segment of SR 99 hardscape, the parallel median space within which inside lane and shoulder widening activities will occur, and the ROW, consisting of ruderal/disturbed land (e.g. paved and dirt roads, open lots, roadside areas, and vehicle pullouts), in which the abutments and columns of two existing bridge structures will be widened, and potential staging and access areas will be located.

Proposed Avoidance and Minimization Measures

According to the NES and further discussion with Caltrans, Caltrans proposes to implement the following measures to minimize and avoid impacts specifically to the San Joaquin kit fox, as well as to other sensitive biological resources and species.

General Construction Best Management Practices (BMPs):

1. Erosion control measures will be designed to prevent the spread of invasive plant species.
    a. Construction equipment will be cleaned before mobilizing to the project site and before leaving the site to prevent the transport of invasive species on- or off-site.
    b. Although no fill is anticipated, any excess excavated materials generated from construction will be properly disposed of at a suitable location that has been cleared by a Service-approved biologist to ensure that the activity will not adversely affect the San Joaquin kit fox.

Migratory Birds:

1. Migratory bird special provisions will be included in the construction contract.
    a. If construction activities take place within the nesting season (approximately February 15 – September 1), preconstruction surveys will be conducted to ensure migratory birds and nests will not be affected. If individuals are located or active nests are found, the California Department of Fish and Game (CDFG) and the Service will be notified and no work will be permitted to occur within a 100 ft. radius until the young have fledged.
        i. If necessary, and prior to the beginning of the nesting season, exclusion techniques will be used to prevent migratory species from nesting on the Pacheco Road Undercrossing and South Bakersfield Overhead structures.
    b. A preconstruction survey will be conducted no more than 30 days prior to ground disturbance for active burrowing owl burrows. If an individual is located, the CDFG will be consulted and either the construction schedule will be altered or appropriate buffer zones created to ensure the species is not disturbed.

San Joaquin kit fox:

1. Pre-construction surveys within the project limits will be conducted no more than 30 calendar days prior to the start of construction in accordance with the Service's revised 2011 *Standard Measures for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance Construction and Operation Requirements*.
    a. To ensure no San Joaquin kit foxes are injured or killed by construction activities, a potential den found on the Pacheco Road Undercrossing abutment will be

monitored (documented in the NES); upon confirmation of inactivity, it will be blocked so that no individuals move into the den during project work. The temporary obstruction will then be removed following the completion of construction.

2. An employee education program will be conducted by a Service-approved biologist for all construction personnel prior to the beginning of construction; the program will consist of a description of the San Joaquin kit fox and its habitat needs, the status of the species and its protection under the Act, the conservation measures taken to reduce and avoid impacts to the species, and the penalties for not complying with biological minimization requirements. Training will be repeated for all new personnel before they access the project site.

3. Project-related vehicles will observe a 20 mile-per-hour speed limit in all project areas. Vehicle travel will be limited to established roadways except for new lane construction within the median.

4. Since the San Joaquin kit fox is most active at night, the majority of work will occur during the day, with the exception of k-rail placement and lane striping as limited activities requiring lane closure to be conducted at night for personnel and driver safety.

    a. If it becomes necessary for safety purposes to conduct the demolition of the Pacheco Road Undercrossing at night, a Service-approved biologist will be on-site during staging and demolition activities to monitor the potential San Joaquin kit fox den on the abutment.

5. All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at least once a day from the entire project site in order to reduce the potential for attracting scavengers and predator species.

6. No firearms will be allowed on-site; nor will any pets be permitted on-site in order to prevent harassment to the San Joaquin kit fox or destruction of dens.

7. Modified S-Type semicircular wildlife passageways will be installed in the concrete median barrier at prescribed intervals of 150 - 200 ft. along its alignment in order to maintain road permeability and potential species movement. These openings will have a radius of nine inches so as to allow the San Joaquin kit fox and other wildlife species ample space to maneuver through.

8. To prevent the inadvertent entrapment of the San Joaquin kit fox or other species during construction, all excavated, steep-walled holes or trenches more than two ft. deep will be covered at the close of each work day or provided with escape ramps constructed of fill or wooden planks. Prior to any holes or trenches being filled, they will be thoroughly inspected for trapped individuals. Since the San Joaquin kit fox is also attracted to den-like structures such as pipes and may enter them becoming trapped or injured, all construction pipes, culverts, or similar structures with a diameter of four inches or greater

stored on-site will also be inspected for the San Joaquin kit fox prior to the structures being buried, capped, or moved. If a San Joaquin kit fox is discovered, that section of pipe will not be moved until the Service and the CDFG have been consulted and the San Joaquin kit fox is allowed to leave without harassment.

9. If a San Joaquin kit fox den is discovered during construction, all work activity within a 150 ft. radius of the den will be halted and the Resident Engineer will be notified immediately. The Service and the CDFG will be contacted for guidance as soon as possible.

10. A representative will be appointed by Caltrans who will be the contact source for any employee or contractor who inadvertently kills or injures a San Joaquin kit fox or who finds a dead, injured, or entrapped individual. The representative will be identified during the employee education program. If an individual is found, all construction activity within a 150 ft. radius of the San Joaquin kit fox will cease and the representative will be contacted immediately. Both the Service and the CDFG will be contacted within three working days of such incidents.

Determination

Caltrans has determined that the proposed project is unlikely to adversely affect the San Joaquin kit fox. With the exception of the abutment widening and column placement at the Pacheco Road Underpass and South Bakersfield Overhead bridges, project activities mainly fall within the boundaries of the inside median of the highway and within the disturbed ROW. According to the California Natural Diversity Database (CNDDB, 2011)[1], there are 14 records of the San Joaquin kit fox within the Gosford United States Geological Survey 7.5-minute quadrangle. Two observations dating from 2004 and 2006 are located within approximately 1.5 mi of the approximate center point of the action area; seven observations (five recorded since 2004 plus two historical records from 1975) are situated within approximately 5.5 mi of the approximate center point of the action area, encircling the site.

Despite the abundance of industrial, commercial, and residential land uses surrounding the action area, the San Joaquin kit fox is known to inhabit and utilize adjacent lands. There is also some non-native grassland habitat found adjacent to the action area limits as well. Considering the distribution of previously recorded San Joaquin kit fox observations around the action area, it is likely that the species can make use of movement corridors and is able to cross potential barriers like the highway.

The action area itself, however, is unlikely to provide suitable foraging habitat for the species. It may provide minimally suitable denning habitat in the area by the Pacheco Road Undercrossing abutments, since a potential den was observed on the northeast abutment. This den was discovered and monitored by Caltrans biologists on January 31, 2011. Located on a steep slope, it consisted of four entrances that potentially could have been used by the San Joaquin kit fox.

[1] California Natural Diversity Database (CNDDB). 2011. Natural Heritage Division, California Department of Fish and Game. RareFind 4. Accessed March 30, 2011. Sacramento, California.

Three of these entrances were deemed inactive, since there were cobwebs and debris covering the openings but the remaining entrance appeared to be clear and was keyhole-shaped, a typical characteristic of San Joaquin kit fox dens. The biologists set up two Moultrie® digital game cameras to try to confirm potential den activity; cameras were in place prior to dusk and were left in-situ for approximately five hours. One camera was set up near the entrance of the active entrance while the other was setup at the toe of the abutment where several canid tracks were observed. No San Joaquin kit fox were observed and neither were any other species other than a feral cat.

According to information provided in the NES, the soil within the Caltrans ROW is not particularly friable, but is compacted; the limited vegetation present is routinely disturbed by disking, mowing and spraying for weed control. Similarly, the soil within the inside median is also compacted and dense stands of oleander shrubs (*Nerium oleander*) are grouped within the limits of the guardrails. While the existing median barrier allows the San Joaquin kit fox and other wildlife to potentially pass across the highway at any point that is not obscured physically or visually by the oleander shrubs, the proposed concrete median barrier will present a solid obstruction. It is possible that the proposed concrete design may create a barrier effect and lead to greater exposure to vehicular contact over longer periods of time for those species attempting to cross the highway. However, Caltrans' proposed installation of the modified semi-circular wildlife passageways, with expanded nine inch radial openings (increased from the more typical six inch radial opening design) placed at 150 - 200 ft. intervals along the median, will greatly aid in maintaining the permeability of this segment of highway.

Given the relatively small-scale scope of work, its confinement to the inside median and existing outer ROW areas, and the existing habitat conditions, along with the implementation of the proposed conservation measures, potential adverse effects to the San Joaquin kit fox will be reduced to an insignificant and discountable level. Caltrans has determined that despite the proposed abutment work near the potential den site and the temporary disturbance to ruderal land used as staging and access, the project ultimately will not decrease the amount of available San Joaquin kit fox habitat or the number or range of the species. Also, other than the West Branch Canal that connects to the Kern Island Canal and which runs under SR 99 just north of the Pacheco Road Undercrossing, no other water features are situated within the action area. The Kern River is located approximately three miles to the north of the action area's northern limits. Since no water features will be affected by project activities, no changes to drainage infrastructure, which may be used by the San Joaquin kit fox, are anticipated.

After reviewing the 2011 NES and other information sources, and discussing project aspects with Caltrans, the Service concurs with the determination that the proposed project is not likely to adversely affect the San Joaquin kit fox.

Closing Statement

This concludes the Service's review of the proposed SR 99 South Improvement Project and its consideration of the project's effects to the species. No further coordination with the Service under the Act is necessary at this time. Please note, however, that take of listed species is not

exempted from the prohibitions described under section 9 of the Act. We concur that the project as proposed is not likely to result in take, but if conditions change so that the project may adversely affect listed species, initiation of formal consultation, as provided in 50 CFR § 402.14, is required.

Please contact Jen Schofield or Thomas Leeman, San Joaquin Valley Division Chief, at (916) 414-6600 if you have any questions regarding this letter.

Sincerely,

Daniel Russell

Daniel Russell
Deputy Assistant Field Supervisor

cc:
Ms. Annee Ferranti, CDFG, Fresno, California

State of California

Memorandum

Business, Transportation and Housing Agency

Flex your power!
Be energy efficient!

To: GUDMUND SETBERG, CHIEF
Bridge Design Branch 2
Office of Bridge Design North
Structure Design
Division of Engineering Services

Attn: Nghia Nguyen

Date: July 20, 2011

File: 06-KER-99 PM 20.6
06-0G8301
Project No.0600020165
Pacheco Road UC (Widen)
Bridge No. 50-0241 R/L

From: **DEPARTMENT OF TRANSPORTATION**
Division of Engineering Services
Geotechnical Services
Geotechnical Design - North

Subject: Foundation Report for Pacheco Road UC

Scope of Work

Per you requested, dated April 11, 2011, the Office of Geotechnical Design North (OGDN) has prepared a Foundation Report (FR) for the proposed Pacheco Road Undercrossing (UC) Median Widening (Bridge No. 50-0241 R/L) project. This structure is located on Highway 99 in Bakersfield in Kern County (PM 20.6). The purpose of this memo is to provide relevant information regarding the subsurface conditions of the proposed site, geotechnical design recommendations, and construction considerations.

Pertinent Reports and Investigation

In preparation of this report, the following documents were reviewed:

- Request for Final Foundation Recommendations, dated April 11, 2011;
- Planning Study, Pacheco UC (Widen), 06-KER-99-PM13.4/22.6, Oct. 19, 2007;
- Preliminary Foundation Report for Pacheco Road UC, Jun. 22, 2011;
- As-Built Log of Test Borings, Pacheco Road UC, Bridge No. 50-241R/L, Contract No. 61-6V13C5, July 18, 1960;
- As-Built General Plan, Pacheco Road UC, Bridge No. 50-241R/L, Contract No. 61-6V13C5, July 18, 1960;
- As-Built Foundation Plan, Pacheco Road UC, Bridge No. 50-241R/L, Contract No. 61-6V13C5, July 18, 1960;
- As-Built Log of Test Borings , Pacheco Road UC (Widen), Bridge No. 50-241R/L, Contract No. 06-245604, June 29, 1987;

- As-Built General Plan , Pacheco Road UC (Widen), Bridge No. 50-241R/L, Contract No. 06-245604, June 29, 1987;
- As-Built Foundation Plan, Pacheco Road UC (Widen), Bridge No. 50-241R/L, Contract No. 06-245604, June 29, 1987;
- Geologic Map of California – Bakersfield Sheet, Scale 1: 250,000, California Department of Conservation, 1964;
- Geotechnical Services Design Manual, Version 1.1, August 2009;
- Groundwater Level Data Wells 30S27E23A001M, 30S27E23R001M, 30S27E23C001M, 30S27E24H001M, 30S27E13F001M, and 30S27E13K001M, Department of Water Resources.

Project Description

The original bridges (left and right structures) were built in 1962. The structures were founded on 16-inch diameter Cast-in-drilled-hole (CIDH) piles for abutments and bents. Both the left and right bridges were first widened for 17.8 ft in 1989 on the inside median. The widened structures were also founded on 16-inch diameter CIDH pile for abutments and bents. After the first widening, the gap between the left and right bridges was approximately 24 ft.

The project proposes to widen the existing bridges a second time by closing the gap between the two bridges with one new bridge. Based on the Planning Study plan prepared by Parsons, the proposed widening structure is 24 ft wide, with 12-ft additional width for each direction. The proposed structure will be a cast-in-place (CIP) reinforced concrete (RC) T-girder structure supported on 4 ft by 2.5 ft rectangular reinforced concrete columns. In order to match the exiting foundation type, CIDH piles with a diameter of 16 or 24 inches have been proposed by as foundations for the abutments and the bents.

Table 1 and 2 below show foundation data and load demand information provided by Structure Design (SD).

Table 1 Foundation Design Data Sheet

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	Number of Piles per Support
					B	L		
Abut 1	WSD	16" or 24" CIDH	384	383.4	Diaphragm Abut.		1	4
Bent 2	LRFD	16" CIDH	370	365.25	9	6	1	6
Bent 3	LRFD	16" CIDH	370	365.25	9	6	1	6
Abut 4	WSD	16" or 24" CIDH	388	388.2	Diaphragm Abut.		1	4

Table 2 Foundation Design Loads

Support	Service-I Limit State (Kips)			Strength Limit State (Kips)				Extreme Event Limit State (Kip)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	294	74	136	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	374	N/A	240	646	108	0	0	728	171	260	43
Bent 3	383	N/A	254	680	113	0	0	740	173	243	41
Abut 4	330	83	159	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Field Investigation and Testing Program

Since there is sufficient data provided by the as-built Log of Test Borings (LOTB's) of the existing bridges and because of time constraint, the site was evaluated based on subsurface information provided by as-built LOTB's and therefore no additional field investigation and testing were performed.

Laboratory Testing Program

A soil sample was taken beneath the bridge on April 20, 2011 for corrosion tests. See Section "Corrosion" below for results.

Site Geology and Subsurface Conditions

Topography

The proposed site is located in the Great Valley geomorphic province of California on the western side of the Sierra Nevada Mountain Range and the east of the Coastal Mountain Range. The flat terrain is typical for the valley region. The ground elevation is approximately 369 feet.

Geology

The California Department of Conservation, Division of Mines and Geology, Geologic Map of California, Bakersfield Sheet, 1964 was used to determine the geologic formations of the project area. The project locations are mapped as being in an area of Pleistocene Non-marine Recent Alluvial Fan Deposit (Q_f).

Subsurface Conditions

According to the as-built LOTB of the exiting left and right bridges, the subsurface materials predominately consist of dense sandy materials with interbedded layers of thin clay lenses. Gravel was found 50 ft below ground surface.

Bedrock was not encountered during subsurface exploration to the maximum depth explored of 60 ft from the existing ground.

Groundwater

According to as-built LOTB, dated 1960 and 1987, groundwater was not encountered during exploration. The State Department of Water Resources (DWR) has monitored groundwater level wells across California for decades. Data from six nearby monitoring wells are selected and used. Based on data obtained from the monitoring wells, the average groundwater elevations measured for these 6 wells are 220, 230, 246, 281, 290, and 295 ft. These elevations correspond to groundwater depths of 149, 134, 125, 93, 77, and 80 ft, respectively. Data in all six wells shows that groundwater level has been dropping through time, and there was an apparent decrease in groundwater level in the year 1962. Groundwater conditions will vary according to variations in rainfall, well pumping, and construction activities.

For design purposes, groundwater was taken as 100 ft deep from ground surface which corresponds to approximate groundwater elevation of 270 ft.

Scour

Since the proposed structure does not cross over any waterway, scour is not an issue regarding the proposed structure.

Corrosion

The minimum resistivity of the tested soil sample was 1964 ohm-cm and the pH was tested as 7.74. In order for the site to be non-corrosive, the minimum resistivity must be 1000 ohm-cm or greater and the pH must be between 5.5 and 10.0. Since the minimum resistivity is tested to be above 1000 ohm-cm, testing for chloride and sulfate contents are not needed, and therefore, not tested. According to the results from laboratory testing, the site is not anticipated to be corrosive for foundation element.

Seismic Recommendations

In accordance with Caltrans 2009 Seismic Design Procedure, the nearest active fault to the site is the White Wolf Fault (Fault ID No. 103) with a maximum magnitude, M_{max}, of 7.3. The fault is identified as a left lateral strike slip fault. The rupture distance from the project location to the fault is about 13.1 mi (21.1 km).

Based on as-built LOTB, the estimated shear wave velocity (Vs_{30}) using SPT blow counts and the correlation formulas is 980 ft/s (300 m/s). Using the estimated Vs_{30}, the ground motion generated from the nearest active fault is less than the statewide minimum requirement and the probabilistic method. Furthermore, the comparison between the minimum ground motion and the probabilistic method showed higher spectral acceleration from the latter method. Therefore, the attached Acceleration Response Spectrum curve is based on the USGS 5% probability of exceedance in 50 years (corresponding to a 975-year return period). The peak ground acceleration is 0.39g.

Liquefaction

Based on the relatively high apparent density and deep ground water, the potential for liquefaction at the proposed site is low.

Surface Rupture

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

As-Built Foundation Data

The original structures of the Pacheco Road UC were first built in 1962. The bridges were founded on 16-in diameter CIDH piles for both abutments and bents. A design load of 45 tons per pile was recommended for all supports. Pile tip elevations for all piles are within one foot of 340.0 ft.

Both left and right structures were widened on the inside in 1989. The widening structures were, again, founded on 16-in diameter CIDH piles for both abutments and bents. The design load for abutment piles was 45 tons and the design load for bent piles was 70 tons. Pile Tip elevations were 340.0 ft for the abutments and 335.0 ft for the bents.

Foundation Recommendations

16-inch diameter CIDH piles were selected for the bents, and 16- or 24-inch diameter CIDH piles were selected for the abutments at the Type Selection meeting on May 18, 2011. At the request of Structure Design, design tip elevations for both 16- and 24-inch diameter CIDH piles are provided for the abutments (See Tables 3 and 4). The structure designer will make the final selection of pile size to be used for the abutments based on design constraints. Based on the guidance that CIDH pile length should be limited to 30 times the pile diameter for constructability purposes, 24-inch diameter CIDH piles for abutments are preferred by GS. Geotechnical capacities are derived using the β-method (O'Neil and Reese, 1999) which is recommended by AASHTO LRFD Bridge Design Specifications (2007). End bearing was neglected completely when analyzing pile capacities. Only skin friction was utilized for pile capacity calculations. For the abutments, capacity derived from the embankment region is also neglected. Recommendations for the abutments and bents are given below.

Table 3 Foundation Recommendations for Abutments Using 16-Inch CIDH

Support	Pile Type	Cut-off Elevation (ft)	LRFD Service Limit State Load Per Support (kips)		LRFD Service-I Limit State Total Load (kips) Per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	16" CIDH	383.4	294	136	74	150	344 (a)	344
Abut 4	16" CIDH	388.2	330	159	83	170	343 (a)	343

Table 4 Foundation Recommendations for Abutments Using 24-Inch CIDH

Support	Pile Type	Cut-off Elevation (ft)	LRFD Service Limit State Load Per Support (kips)		LRFD Service-I Limit State Total Load (kips) Per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	383.4	294	136	74	150	349 (a)	349
Abut 4	24" CIDH	388.2	330	159	83	170	348 (a)	348

Notes:
1. Recommendations are based on Working Stress Design (WSD) for abutment and the referenced foundation load data provided by SD.
2. The Design Tip Elevations recommended herein are controlled by: (a) Compression, (c) Settlement, and (d) Lateral Load, respectively.
3. Design Tip Elevations controlled by Settlement is not applicable.
4. The Design Tip Elevation controlled by lateral load is typically provided by SD.
5. The Specified Tip Elevation shall not be raised if controlled by lateral load.

Table 5 Foundation Recommendations for Bents

Support	Pile Type	Cut-off Elevation (ft)	Service-1 Limit State Load Per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kip)				Design Tip Elevation (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
					Comp.	Tens.	Comp.	Tens.		
					φ=0.7	φ=0.7	φ=1.0	φ=1.0		
Bent 2	16" CIDH	365.25	374	1	108	0	171	43	339.25 (a-I) 337.25 (a-II) 349.25 (b-II)	337
Bent 3	16" CIDH	365.25	383	1	113	0	173	41	338.25 (a-I) 337.25 (a-II) 349.25 (b-II)	337

Notes:
1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the referenced foundation load data provided by SD.

2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit), (c) Settlement, and (d) Lateral Load, respectively.
4. Design Tip Elevations controlled by Tension in strength limit is not applicable.
5. Design Tip Elevations controlled by Settlement is not applicable.
6. The Design Tip Elevation controlled by lateral load is typically provided by SD.
7. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 6 Pile Data Table

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abut. 1	16" CIDH	150	0	344 (a)	344
	24" CIDH			349 (a)	349
Bent 2	16" CIDH	180	50	339.25 (a-I) 337.25 (a-II) 349.25 (b-II)	337
Bent 3	16" CIDH	180	50	338.25 (a-I) 337.25 (a-II) 349.25 (b-II)	337
Abut. 4	16" CIDH	170	0	343 (a)	343
	24" CIDH			348 (a)	348

Notes:
1. Design tip elevations for Abutments are controlled by compression.
2. Design tip for Bents are controlled by compression and tension.

Construction Considerations

1. Groundwater is not expected during CIDH piles construction.
2. All earthwork shall follow Section 19 of the Caltrans Standard Specifications.
3. Sandy materials exist within the site. Temporary casing may be used for CIDH pile construction if caving occurs. If temporary casing is used during installation of CIDH

concrete piles, it shall be removed while the concrete is being placed in order to develop the required pile capacity.

Project Information

Standard Special Provision S5-280, "Project Information", discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:
LOTB for Pacheco Road UC (Widen), dated TBD.

Data and information included in the Information Handout provided to the bidders and contractors are:

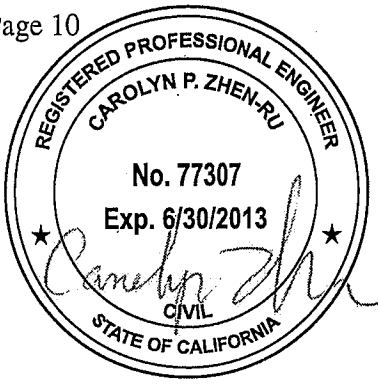
Foundation Report for Pacheco Road UC (Widen), dated July 20, 2011.

Data and information available for inspection at the District Office:
None.

Data and information available for inspection at the Transportation Laboratory are:
None.

A full-sized Log of Test Boring (LOTB) which is to be incorporated in the project plans has been prepared by Geotechnical Services, Office of Geotechnical Support Branch D – Contracts, Graphics & Records. Mrs. Irma Gamarra-Remmen of the Contracts, Graphic & Records branch may be contacted directly for information on the LOTB.

If you have any questions, please call me, Carolyn Zhen-Ru, at (916) 227-1055 or my supervisor, John Huang, at (916) 227-1037.



CAROLYN ZHEN-RU, P.E.
Transportation Engineer, Civil
Office of Geotechnical Design – North
Branch E

JOHN HUANG, P.E.
Senior Materials and Research Engineer
Office of Geotechnical Design – North
Branch E

C: District Project Manager, Paul Pineda,
GS Corporate, Mark Willian
Structure Construction RE Pending File
DES Office Engineer, Office of PS&E, [to be assigned]
District Materials Engineer, Ted Mooradian

Appendix:
Recommended Acceleration Response Spectrum

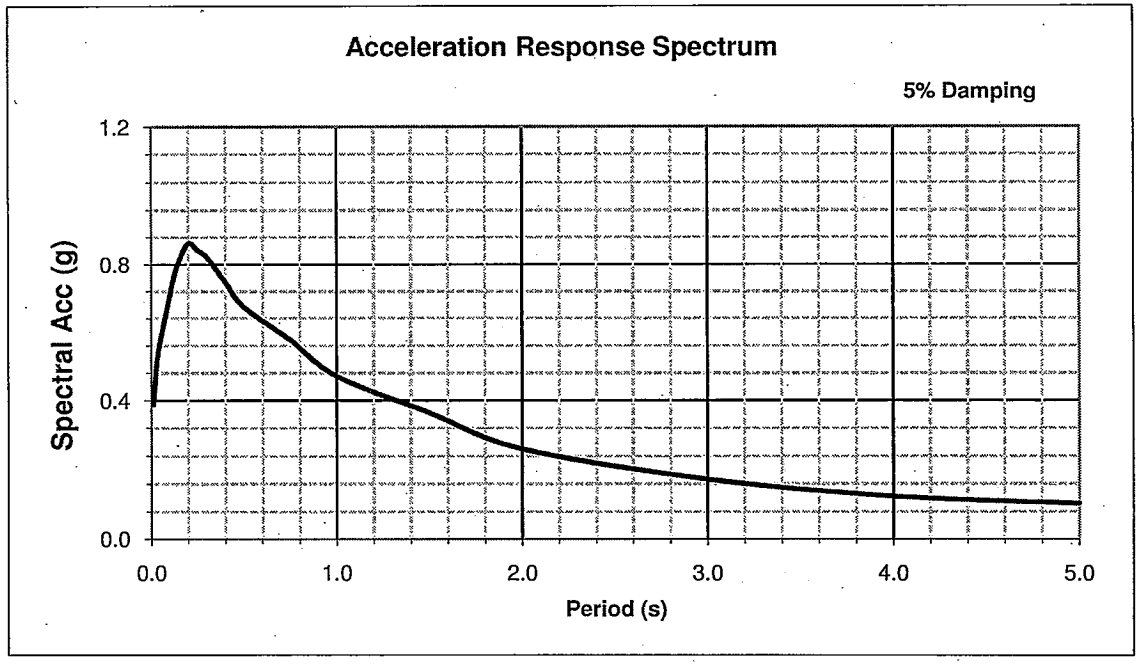
Pacheco Road UC (Widen)

Bridge No. 50-0241 R/L
EFIS 0600020165

Latitude 35.3104
Longitude -119.0340

Control **Probabilistic**

Period (s)	Sa(g)
0.010	0.387
0.020	0.451
0.030	0.515
0.050	0.579
0.075	0.643
0.100	0.707
0.120	0.759
0.150	0.811
0.200	0.863
0.250	0.843
0.300	0.823
0.400	0.748
0.500	0.674
0.750	0.577
1.000	0.471
1.500	0.364
2.000	0.260
3.000	0.174
4.000	0.125
5.000	0.103



Deterministic Procedure Data

Fault	White Wolf fault	
Fault ID	103	
Style	LLSS	
Mmax	7.3	
Dip	75	deg
Z_{TOR}	0	km

R_{rup}	21.1	km
R_{jb}	21.1	km
R_x	21.1	km
V_{S30}	300	m/s
$Z_{1.0}$	N/A	m
$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is based on 5% probability of exceedance in 50 years (975 years return peroid) probabilitic spectrum.

Final

Design Response Spectrum

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

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

Date: 12/16/11

Pacheco Road UC
Structure Name

06 - Ker - 99 - 20.55
District County Route ~~km~~ Post
M

06-000201650

District Project Development
District Project Engineer

06-0GB301 50-0241 R/C
E.A. Number Structure Number

Foundation Report By: C. Zhen-Ru Dated: 7/6/11

Reviewed By: N. Nguyen (SD) R. Price (GS)

General Plan Dated: 10/3/11 Foundation Plan Dated: 7/6/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

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

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

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

Structure Design Bridge Design Branch No. Geotechnical Services

Rev. 06/02

State of California

Memorandum

Business, Transportation and Housing Agency

Flex your power!
Be energy efficient!

To: GUDMUND SETBERG, CHIEF
Bridge Design Branch 2
Office of Bridge Design North
Structure Design
Division of Engineering Services

Attn: Nghia Nguyen

Date: July 20, 2011

File: 06-KER-99 PM 20.7
06-0G8301
Project No.0600020165
So. Bakersfield OH (Widen)
Bridge No. 50-0242 R/L

From: **DEPARTMENT OF TRANSPORTATION**
Division of Engineering Services
Geotechnical Services
Geotechnical Design - North

Subject: Foundation Report for South Bakersfield OH

Scope of Work

Per you requested, dated April 11, 2011, the Office of Geotechnical Design North (OGDN) has prepared a Foundation Report (FR) for the proposed South Bakersfield Overhead (OH) Median Widening (Bridge No. 50-0242 R/L) project. This structure is located on Highway 99 in Bakersfield in Kern County (PM 20.7). The purpose of this memo is to provide relevant information regarding the subsurface conditions of the proposed site, geotechnical design recommendations, and construction considerations.

Pertinent Reports and Investigation

In preparation of this report, the following documents were reviewed:

- Request for Final Foundation Recommendations, dated April 11, 2011;
- Planning Study, South Bakersfield OH (Widen), 06-KER-99-PM13.4/22.6, April 23, 2010;
- Preliminary Foundation Report for South Bakersfield OH, Dec. 20, 2010;
- As-Built Log of Test Borings, South Bakersfield OH, Bridge No. 50-242R/L, Contract No. 61-6V13C5, July 18, 1960;
- As-Built General Plan, South Bakersfield OH, Bridge No. 50-242R/L, Contract No. 61-6V13C5, July 18, 1960;
- As-Built Foundation Plan, South Bakersfield OH, Bridge No. 50-242R/L, Contract No. 61-6V13C5, July 18, 1960;

- As-Built Log of Test Borings , Bakersfield OH (Widen), Bridge No. 50-242R/L, Contract No. 06-245604, July 19, 1989;
- As-Built General Plan , Bakersfield OH (Widen), Bridge No. 50-242R/L Contract No. 06-245604, July 19, 1989;
- As-Built Foundation Plan, Bakersfield OH (Widen), Bridge No. 50-242R/L Contract No. 06-245604, July 19, 1989;
- Geologic Map of California – Bakersfield Sheet, Scale 1: 250,000, California Department of Conservation, 1964;
- Geotechnical Services Design Manual, Version 1.1, August 2009;

Project Description

The original bridges (left and right structures) were built in 1962. The structures were founded on 16-inch diameter Cast-in-drilled-hole (CIDH) piles for abutments and bents. Both the left and right bridges were first widened for 17.8 ft in 1989 on the inside median. The widened structures were also founded on 16-inch diameter CIDH pile for abutments and bents. After the first widening, the gap between the left and right bridges was approximately 22 ft.

The project proposes to widen the existing bridges a second time by closing the gap between the two bridges with one new bridge. The proposed widening structure is 24 ft wide, with 12-ft additional width for each direction. The proposed structure will be a cast-in-place (CIP) reinforced concrete (RC) T-girder structure. In order to match the exiting foundation type, CIDH piles with a diameter of 16- or 24- inch have been proposed by as foundations for the abutments and the bents.

Table 1 and 2 below show foundation data and load demand information provided by Structure Design (SD).

Table 1 Foundation Design Data Sheet

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-Off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	Number of Piles per Support
					B	L		
Abut 1	WSD	16" or 24" CIDH	397	395.4	Diaphragm Abut.		1	4
Bent 2	LRFD	16" CIDH	370	365.25	9	6	1	6
Bent 3	LRFD	16" CIDH	370	365.25	9	6	1	6
Abut 4	WSD	16" or 24" CIDH	398.8	397.3	Diaphragm Abut.		1	4

Table 2 Foundation Design Loads

Support	Service-I Limit State (Kips)			Strength Limit State				Extreme Event Limit State			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	333	83	168	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	410	N/A	257	661	110	0	0	723	160	223	60
Bent 3	421	N/A	260	666	111	0	0	725	159	219	59
Abut 4	337	84	170	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Field Investigation and Testing Program

Since there is sufficient data provided by the as-built Log of Test Borings (LOTB's) of the existing bridges and because of time constraint, the site was evaluated based on subsurface information provided by as-built LOTB's and therefore no additional field investigation and testing were performed.

Laboratory Testing Program

A soil sample was taken beneath the bridge on April 20, 2011 for corrosion tests. See Section "Corrosion" below for results.

Site Geology and Subsurface Conditions

Topography

The proposed site is located in the Great Valley geomorphic province of California on the western side of the Sierra Nevada Mountain Range and the east of the Coastal Mountain Range. The flat terrain is typical for the valley region. The ground elevation is approximately 370 feet.

Geology

The California Department of Conservation, Division of Mines and Geology, Geologic Map of California, Bakersfield Sheet, 1964 was used to determine the geologic formations of the project area. The project locations are mapped as being in an area of Pleistocene Non-marine Recent Alluvial Fan Deposit (Q_f).

Subsurface Conditions

According to the as-built LOTB of the exiting left and right bridges, the subsurface materials predominately consist of very loose to very dense sand with silt. Gravels were found 50 ft below ground surface. The maximum depth explored during subsurface investigation in 1959 was 55 ft.

Bedrock was not encountered during subsurface exploration to the maximum depth explored of 55 ft from the existing ground.

Groundwater

According to as-built LOTB, dated 1960 and 1987, groundwater was not encountered during exploration. The State Department of Water Resources (DWR) has monitored groundwater level wells across California for decades. Data from six nearby monitoring wells are selected and used. Based on data obtained from the monitoring wells, the average groundwater elevations measured for these 6 wells are 220, 230, 246, 281, 290, and 295 ft. These elevations correspond to groundwater depths of 149, 134, 125, 93, 77, and 80 ft, respectively. Data in all six wells shows that groundwater level has been dropping through time, and there was an apparent decrease in

groundwater level in the year 1962. Groundwater conditions will vary according to variations in rainfall, well pumping, and construction activities.

For design purposes, groundwater was taken as 100 ft deep from ground surface which corresponds to approximate groundwater elevation of 270 ft.

Scour

Since the proposed structure does not cross over any waterway, scour is not an issue regarding the proposed structure.

Corrosion

The minimum resistivity of the tested soil sample was 1515 ohm-cm and the pH was tested as 7.79. In order for the site to be non-corrosive, the minimum resistivity must be 1000 ohm-cm or greater and the pH must be between 5.5 and 10.0. Since the minimum resistivity is tested to be above 1000 ohm-cm, testing for chloride and sulfate contents are not needed, and therefore, not tested. According to the results from laboratory testing, the site is not anticipated to be corrosive for foundation element.

Seismic Recommendations

In accordance with Caltrans 2009 Seismic Design Procedure, the nearest active fault to the site is the White Wolf Fault (Fault ID No. 103) with a maximum magnitude, M_{max}, of 7.3. The fault is identified as a left lateral strike slip fault. The rupture distance from the project location to the fault is about 13.2 mi (21.3 km).

Based on as-built LOTB, the estimated shear wave velocity (Vs_{30}) using SPT blow counts and the correlation formulas is 1020 ft/s (311 m/s). Using the estimated Vs_{30}, the ground motion generated from the nearest active fault is less than the statewide minimum requirement and the probabilistic method. Furthermore, the comparison between the minimum ground motion and the probabilistic method showed higher spectral acceleration from the latter method. Therefore, the attached Acceleration Response Spectrum curve is based on the USGS 5% probability of exceedance in 50 years (corresponding to a 975-year return period). The peak ground acceleration is 0.39g.

Liquefaction

Based on the relatively high apparent density and deep ground water, the potential for liquefaction at the proposed site is low.

Surface Rupture

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

As-Built Foundation Data

The original structures of the South Bakersfield OH were first built in 1962. The bridges were founded on 16-in diameter CIDH piles for both abutments and bents. A design load of 45 tons per pile was recommended for all supports. Pile tip elevations for all piles are within one foot of 335.0 ft.

Both left and right structures were widened on the inside in 1989. The widening structures were, again, founded on 16-in diameter CIDH piles for both abutments and bents. The design load for abutment piles was 45 tons and the design load for bent piles was 70 tons. Pile Tip elevations were 335.0 ft for the abutments and 330 ft for the bents.

Foundation Recommendations

16-inch diameter CIDH piles were selected for the bents, and 16- or 24-inch diameter CIDH piles were selected for the abutments at the Type Selection meeting on May 18, 2011. At the request of Structure Design, design tip elevations for both 16- and 24-inch diameter CIDH piles are provided for the abutments (See Tables 3 and 4). The structure designer will make the final selection of pile size to be used for the abutments based on design constraints. Based on the guidance that CIDH pile length should be limited to 30 times the pile diameter for constructability purposes, 24-inch diameter CIDH piles for abutments are preferred by GS. Geotechnical capacities are derived using the β-method (O'Neil and Reese, 1999) which is recommended by AASHTO LRFD Bridge Design Specifications (2007). End bearing was neglected completely when analyzing pile capacities. Only skin friction was utilized for pile capacity calculations. For the abutments, capacity derived from the embankment region is also neglected. Recommendations for the abutments and bents are given below.

Table 3 Foundation Recommendations for Abutments Using 16-Inch CIDH

Support	Pile Type	Cut-off Elevation (ft)	LRFD Service Limit State Load Per Support (kips)		LRFD Service-I Limit State Total Load (kips) Per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	16" CIDH	395.4	333	168	83	170	339 (a)	339
Abut 4	16" CIDH	397.3	337	170	84	170	339 (a)	339

Table 4 Foundation Recommendations for Abutments Using 24-Inch CIDH

Support	Pile Type	Cut-off Elevation (ft)	LRFD Service Limit State Load Per Support (kips)		LRFD Service-I Limit State Total Load (kips) Per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1	24" CIDH	395.4	333	168	83	170	344 (a)	344
Abut 4	24" CIDH	397.3	337	170	84	170	344 (a)	344

Notes:
1. Recommendations are based on Working Stress Design (WSD) for abutment and the referenced foundation load data provided by SD.
2. The Design Tip Elevations recommended herein are controlled by: (a) Compression, (c) Settlement, and (d) Lateral Load, respectively.
3. Design Tip Elevations controlled by Settlement is not applicable.
4. The Design Tip Elevation controlled by lateral load is typically provided by SD.
5. The Specified Tip Elevation shall not be raised if controlled by lateral load.

Table 5 Foundation Recommendations for Bents

Support	Pile Type	Cut-off Elevation (ft)	Service-1 Limit State Load Per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kip)				Design Tip Elevation (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
					Comp.	Tens.	Comp.	Tens.		
					φ=0.7	φ=0.7	φ=1.0	φ=1.0		
Bent 2	16" CIDH	365.25	410	1	110	0	160	60	336.25 (a-I) 334.25 (a-II) 342.25 (b-II)	334
Bent 3	16" CIDH	365.25	421	1	111	0	159	59	335.25 (a-I) 335.25(a-II) 342.25 (b-II)	335

Notes:
1. Recommendations are based on Load Resistance Factor Design (LRFD) for bent and the referenced foundation load data provided by SD.

2. A resistance factor of 0.7 is used to calculate the available geotechnical resistance in Strength Limit State.
3. The Design Tip Elevations recommended herein are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit), (c) Settlement, and (d) Lateral Load, respectively.
4. Design Tip Elevations controlled by Tension in strength limit is not applicable.
5. Design Tip Elevations controlled by Settlement is not applicable.
6. The Design Tip Elevation controlled by lateral load is typically provided by SD.
7. The Specified Tip Elevation recommended herein shall not be raised if controlled by lateral load.

Table 6 Pile Data Table

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abut. 1	16" CIDH	170	0	339 (a)	339
	24" CIDH			344 (a)	344
Bent 2	16" CIDH	160	60	336.25 (a-I) 334.25 (a-II) 342.25 (b-II)	334
Bent 3	16" CIDH	160	60	335.25 (a-I) 335.25(a-II) 342.25 (b-II)	335
Abut. 4	16" CIDH	170	0	339 (a)	339
	24" CIDH			344 (a)	344

Notes:
1. Design tip elevations for Abutments are controlled by compression.
2. Design tip for Bents are controlled by compression and tension.

Construction Considerations

1. Groundwater is not expected during CIDH piles construction.
2. All earthwork shall follow Section 19 of the Caltrans Standard Specifications.
3. Sandy materials exist within the site. Temporary casing may be used for CIDH pile construction if caving occurs. If temporary casing is used during installation of CIDH concrete piles, it shall be removed while the concrete is being placed in order to develop the required pile capacity.

Project Information

Standard Special Provision S5-280, "Project Information", discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

LOTB for South Bakersfield OH (Widen), dated TBD.

Data and information included in the Information Handout provided to the bidders and contractors are:

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CAROLYN ZHEN-RU, P.E.
Transportation Engineer, Civil
Office of Geotechnical Design – North
Branch E

JOHN HUANG, P.E.
Senior Materials and Research Engineer
Office of Geotechnical Design – North
Branch E

C: District Project Manager, Paul Pineda,
GS Corporate, Mark Willian
Structure Construction RE Pending File
DES Office Engineer, Office of PS&E, [To be assigned]
District Materials Engineer, Ted Mooradian

Appendix:
Recommended Acceleration Response Spectrum

South Bakersfield OH (Widen)

Bridge No. 50-0242 R/L
EFIS 0600020165

Latitude 35.3117
Longitude -119.0346

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Period (s)	Sa(g)
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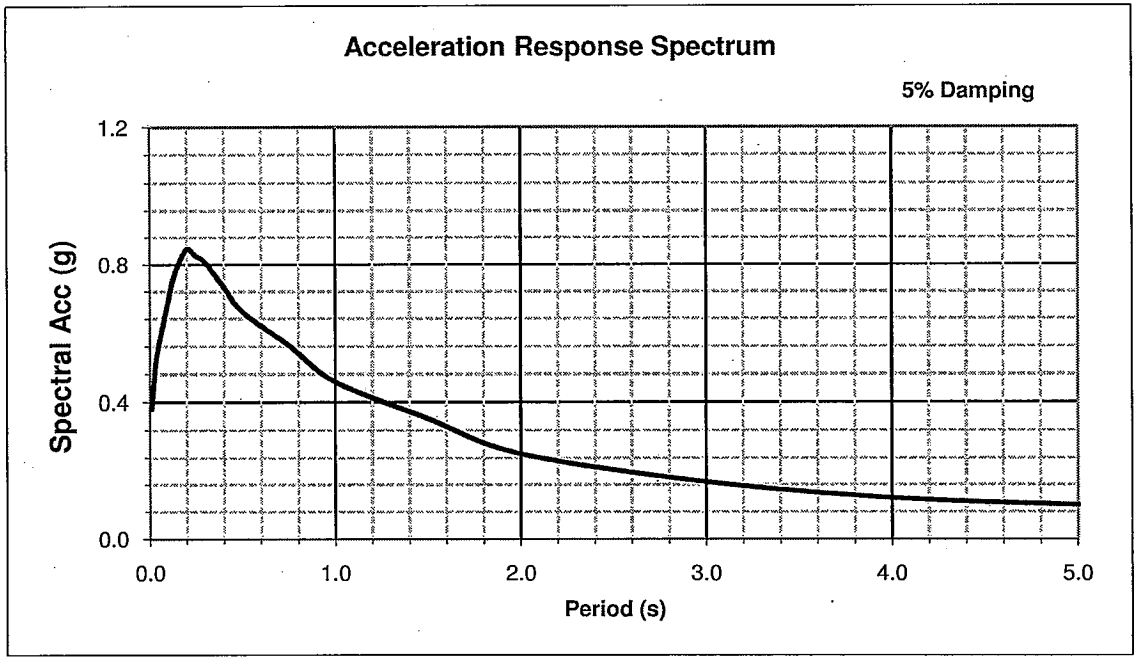
0.030	0.506
0.050	0.569
0.075	0.632
0.100	0.694
0.120	0.745
0.150	0.795
0.200	0.845
0.250	0.826
0.300	0.806
0.400	0.733
0.500	0.661
0.750	0.563
1.000	0.458
1.500	0.354
2.000	0.252
3.000	0.169
4.000	0.121
5.000	0.100



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Final

Design Response Spectrum

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: **Structure Design**
1. Design
2. R.E. Pending File
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4. File

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

Date: 12/16/11

S.R. Bakersfield Sp 99
Structure Name

06 - Ker - 99 - 20.05
District County Route km-Post

06-000201650
06-0G8301 50-0242 R/L
E.A. Number Structure Number

District Project Development
District Project Engineer

Foundation Report By: C. Zhan-Ru Dated: 7/20/11

Reviewed By: N. Nguyen (SD) R. Price (GS)

General Plan Dated: 11/28/11 Foundation Plan Dated: 7/6/11

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- / Pile Types and Design Loads
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- / Predrilling
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Z Chuah Nguyen 02
Structure Design / Bridge Design Branch No.

Geotechnical Services

Rev. 06/02