

INFORMATION HANDOUT

MATERIAL INFORMATION

1. Foundation Report for Duck Slough Overflow Bridge

Bridge No. 39-0244L/R
dated June 26, 2009

2. Foundation Report for Duck Slough Overflow Bridge (East Frontage Road)

Bridge No. 39C0377
dated June 26, 2009

3. Foundation Report for Duck Slough Bridge

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dated June 26, 2009

4. Foundation Report for Mariposa Creek Bridge

Bridge No. 39-0245L/R
dated June 26, 2009

5. Foundation Report for Mariposa Creek Bridge (East Frontage Road)

Bridge No. 39C0379
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6. Foundation Report for Deadman Creek Bridge (East Frontage Road)

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7. Foundation Report for Deadman Creek Bridge

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8. Foundation Report for Duck Slough Bridge (East Frontage Road)

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dated June 26, 2009

10. Geotechnical Design Report - Infiltration Basins

dated May 20, 2003

11. Addendum to Geotechnical Design Report

dated April 13, 2009

12. Supplemental Recommendations for Geotechnical Design Report

dated June 12, 2009

PERMITS

**13. United States Fish and Wildlife Service -
Biological and Conference Opinion**

dated February 6, 2006

14. California Regional Water Quality Control Board, 401 Certification

dated August 28, 2009

15. Department of Fish and Game Agreement

(1602 Permit)

16. United States Army Corps of Engineers Permit

(Department of the Army)

dated March 8, 2011

17. Central Valley Flood Protection Board Permit

Duck Slough

dated May 18, 2011

18. Central Valley Flood Protection Board Permit

Mariposa Creek

dated December 13, 2010

M e m o r a n d u m

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 9.86
EA: 10-415701
Duck Slough Overflow
Bridge
Bridge No. 39-0244L/R

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Duck Slough Overflow Bridge (Br. No. 39-0244L/R). This report is based on a foundation investigation performed in May 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridges will be 160 feet long and approximately 59 feet wide. The new bridges will be four-span, cast-in-place, and reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes three 4-inch diameter mud rotary borings and four cone penetrometer test (CPT) borings. In general, soils underlying the site consisting of medium dense sand, silt and clay were encountered from the existing ground surface extending to an elevation of approximately 123 feet. A layer of hard elastic silt was encountered from elevations of 123 feet to 113 feet, and medium dense to dense sand, silt and stiff to hard cohesive soil were encountered from an elevation of approximately 113 feet to the bottom of the borings. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

Ground water was measured at an elevation of 161.5 feet in test boring R-08-001 on May 19, 2008 and 169.0 feet in test boring CPT-08-001 on May 21, 2008 during the recent investigation. Based on the "As-Built" LOTB's for the nearby existing Duck Slough Overflow Bridge (Br. No. 39-0005L/R), ground water was measured at elevations between 175.1 and 177.0 feet during July and October 1984.

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report" and was found not to be susceptible to scour conditions.

CORROSION EVALUATION

Representative samples taken during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001	0-5	9.72	683	57	535
R-08-002	55-56	7.77	2355	N/A	N/A

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16-inch diameter Cast-in-Steel-Shell (CISS) NPS Piles with a 0.5 inch pile wall thickness were selected to support the proposed bridge piers. Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	180.85	N/A	N/A	90	180	+149.0 (a)	+149.0	180
Abut 5	Class 90	181.35	N/A	N/A	90	180	+149.0 (a)	+149.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundations Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280
Pier 3	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280
Pier 4	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Event).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

**Table 4. Pile Data Table for the Proposed Duck Slough Overflow Bridge
 (Bridge No. 39-0244L/R)**

PILE DATA TABLE (BR. # 39-0244L/R)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+149.0 ^(a)	+149.0	180
Pier 2	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Pier 3	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Pier 4	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Abut 5	Class 90	180	0	+149.0 ^(a)	+149.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. The Contractor should note that the plans show large trees (diameter approximately up to 11.8 feet) in the vicinity of the proposed pile foundations. The Contractor should be aware that large buried roots from these trees may cause difficult pile driving or refusal. With the Engineer's approval, a pilot hole (not more than 12" in diameter) may be drilled to assist the pile drilling at the bent locations. The depth of the pilot hole should not extend 15 feet from the original ground surface.
3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions S5-280, "Project Information," discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid

Mr. Gary Blakesley
June 26, 2009
Page 6

Duck Slough Overflow Bridge
Bridge No. 39-0244L/R
EA 10-415701

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:

A. *Log of Test Borings for Duck Slough Overflow Bridge, Bridge Number 39-0244L/R.*

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

A. *Foundation Report for Duck Slough Overflow Bridge, Bridge Number 39-0244L/R, dated June 26, 2009.*

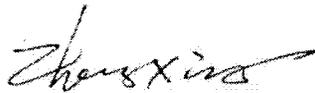
Data and Information available for inspection at the District Office:

None.

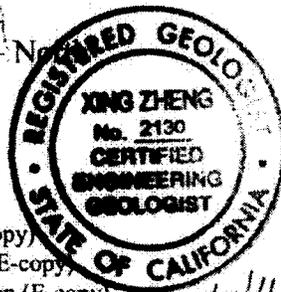
Data and information available for inspection at the Transportation Laboratory:

None.

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.



Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH – Steve Ng (E-copy)



Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North



Duck Slough Overflow Bridge
Bridge No. 39-0244L/R
EA 10-415701

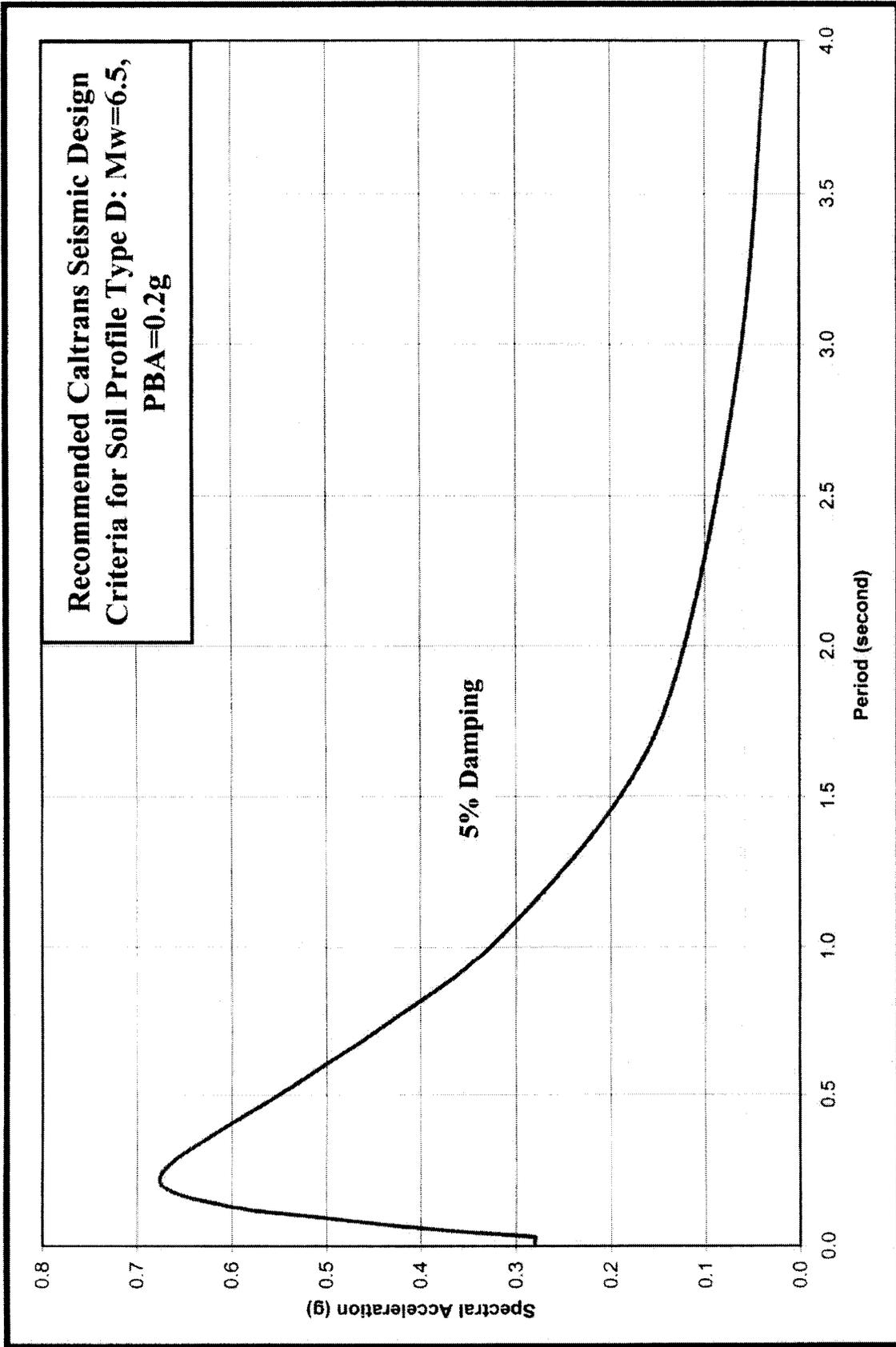


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Date: June 26, 2009

File: 10-MER-99-PM 9.88
EA: 10-415701
Duck Slough Overflow Bridge
(East Frontage Road)
Bridge No. 39C-0377

Attention: Mr. Grant Schuster

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Duck Slough Overflow Bridge (Frontage Road), Br. No. 39C-0377. This report is based on a foundation investigation performed in May 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridge will be 160 feet long and approximately 43 feet wide. The new bridge will be a four-span, cast-in-place, reinforced concrete slab structure.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes four cone penetrometer test (CPT) borings. Based on 2008 field investigation and the Log of Test Borings (LOTBs) from

the nearby Duck Slough Overflow Bridges (Br. No. 39-0244L/R), soils underlying the site, in general, consisting of medium dense sand, silt and clay were encountered from the existing ground surface extending to an elevation of approximately 123 feet. A layer of hard elastic silt was encountered from elevations of 123 feet to 113 feet, and medium dense to dense sand, silt and stiff to hard cohesive soil were encountered from an elevation of approximately 113 feet to the bottom of the borings. Please refer to the LOTBs for details.

GROUND WATER

Ground water was measured at an elevation of 169.0 feet in boring CPT-08-001 and 168.1 feet in boring CPT-08-002b on May 21, 2008 during the recent investigation. Based on the "As-Built" LOTB's for the nearby existing Duck Slough Overflow Bridge (Br. No. 39-0005L/R), ground water was measured at elevations between 175.1 and 177.0 feet during July and October 1984.

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report" and was found not to be susceptible to scour conditions.

CORROSION EVALUATION

Representative samples taken from the nearby Duck Slough Overflow Bridges (Br. No. 39-0244L/R) during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001*	0-5	9.72	683	57	535
R-08-002*	55-56	7.77	2355	N/A	N/A

* Sample from the new Duck Slough Overflow Bridges (Br. No. 39-0244L/R) site.

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16-inch diameter Cast-in-Steel-Shell (CISS) NPS piles with a 0.5- inch wall thickness were selected to support the proposed bridge piers. Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	180.25	N/A	N/A	90	180	+149.0 (a)	+149.0	180
Abut 5	Class 90	179.55	N/A	N/A	90	180	+149.0 (a)	+149.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundations Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280
Pier 3	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280
Pier 4	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+121.0 (a-I) +121.0 (a-II)	+121.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Event).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Duck Slough Overflow Bridge (Frontage Road) Bridge No. 39C-0377

PILE DATA TABLE (BR. # 39C-0377)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+149.0 ^(a)	+149.0	180
Pier 2	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Pier 3	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Pier 4	CISS NPS 16x0.5	280	0	+121.0 ^(a)	+121.0	280
Abut 5	Class 90	180	0	+149.0 ^(a)	+149.0	180

- Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

- A. *Log of Test Borings for Duck Slough Overflow Bridge (Frontage Road), Bridge Number 39C-0377.*

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

- A. *Foundation Report for Duck Slough Overflow Bridge (Frontage Road), Bridge Number 39C-0377, dated June 26, 2009.*

Data and information available for inspection at the District Office:

None.

Data and information available for inspection at the Transportation Laboratory:

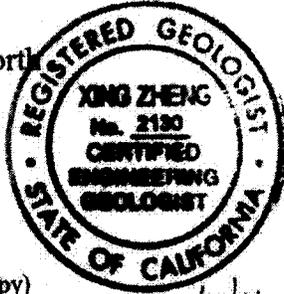
None.

Mr. Gary Blakesley
June 26, 2009
Page 6

Duck Slough Overflow Bridge (East Frontage Road)
Bridge No. 39C-0377
EA 10-415701

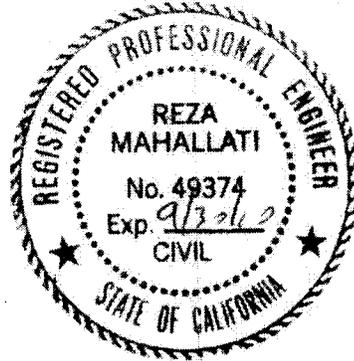
If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.

Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH– Steve Ng (E-copy)

Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North



Duck Slough Overflow Bridge (East Frontage Road)
Bridge No. 39C-0377
EA 10-415701

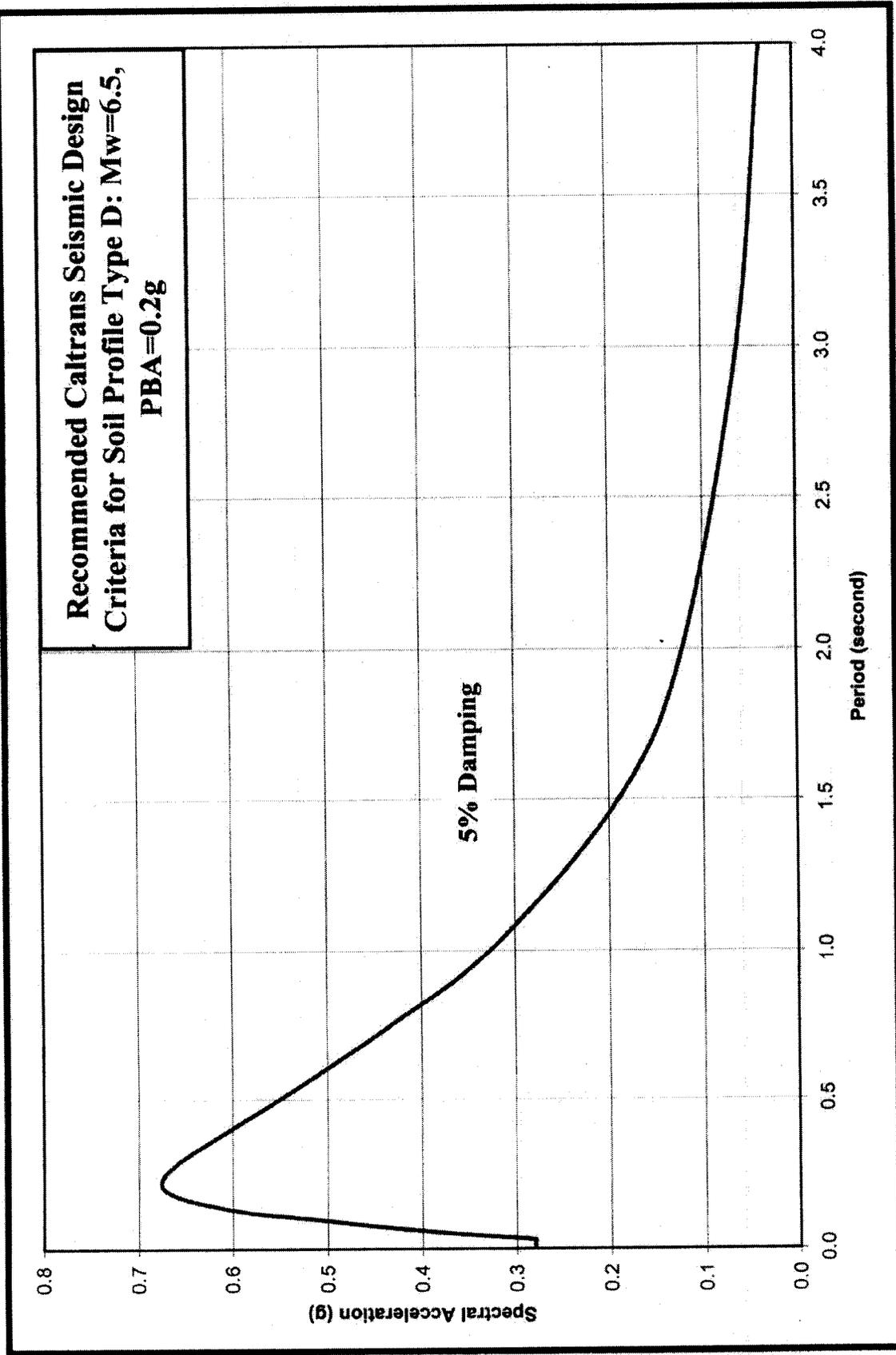


Figure 1. Acceleration Response Spectrum Recommended for Design

M e m o r a n d u m

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 9.43
EA: 10-415701
Duck Slough Bridge
Bridge No. 39-0243L/R

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Duck Slough Bridge (left and right, Br. No. 39-0243L/R). This report is based on a foundation investigation performed in April and May, 2008 by this Office, the General Plan (GP) dated and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed left bridge will be 94 feet long and approximately 59 feet wide and the right bridge will be 88 feet long and approximately 59 feet wide. The new bridges will be two-span cast-in-place reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the project includes two 4-inch diameter mud rotary soil test borings and two cone penetrometer test (CPT) borings. In general, soils consisting of medium dense sand and silt, and stiff to hard silt and clay were encountered from the existing ground surface extending to an elevation of approximately 128 feet. A layer of very stiff to hard elastic silt was encountered from an elevation of approximately 128 feet to 108 feet, and medium dense to dense sand, silt, and stiff to hard cohesive soil were encountered below this layer extending to the bottom of the borings. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

A temporary piezometer was installed in boring R-08-002 in April 2008, and ground water was measured at an elevation of 161.5 feet on May 19, 2008 and 165 feet on June 2, 2008. Ground water was also measured at an elevation 167.4 feet in boring CPT-08-001 on May 20, 2008. Based on the "As-Built" LOTB's for the original bridge, ground water was measured at an elevation of 169.1 on July 18, 1984.

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report", and was found not to be susceptible to scour conditions.

CORROSION EVALUATION

Representative samples taken during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001	0-4	7.41	1796	N/A	N/A
R-08-001	46.5-50.0	7.22	2036	N/A	N/A
R-08-002	60.0-61.5	7.53	1423	N/A	N/A

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water

sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16-inch diameter Cast-in-Steel-Shell (CISS) NPS piles with a 0.5-inch wall thickness were selected to support the proposed bridge pier. Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments
Abutment Foundations Design Recommendations

Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	186.05	N/A	N/A	90	180	142.0 (a)	142.0	180
Abut 3	Class 90	185.85	N/A	N/A	90	180	142.0 (a)	142.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevations for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per pile	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips) Per Pile				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+110.0 (a-I) +110.0 (a-II)	+110.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
- 2) Design tip elevations for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Duck Slough Bridge (Br. No. 39-0004L/R)

PILE DATA TABLE (BR. # 39-0244L/R)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driven Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+142.0 ^(a)	+142.0	180
Pier 2	CISS NPS 16x0.5	280	0	+110.0 ^(a)	+110.0	280
Abut 3	Class 90	180	0	+142.0 ^(a)	+142.0	180

- Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavations.
2. The Contractor should be aware that roots remaining in the ground may cause difficult pile driving or refusal.

3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

A. Log of Test Borings for Duck Slough Bridge (Left and Right), Bridge Number 39-0243L/R.

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

A. Foundation Report for Duck Slo26, 2009.

Data and information available for inspection at the District Office:

None.

Data and information available for inspection at the Transportation Laboratory:

None.

Mr. Gary Blakesley
June 26, 2009
Page 6

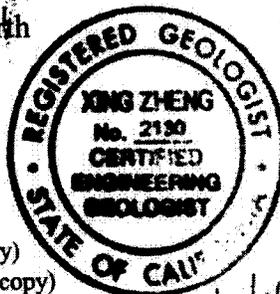
Duck Slough Bridge
Bridge No. 39-0243L/R
EA 10-415701

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.


Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North


Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH – Steve Ng (E-copy)



exp. 3/31/11



Duck Slough Bridge
Bridge No. 39-0243L/R
EA 10-415701

Recommended Caltrans Seismic Design
Criteria for Soil Profile Type D: $M_w=6.5$,
 $PBA=0.2g$

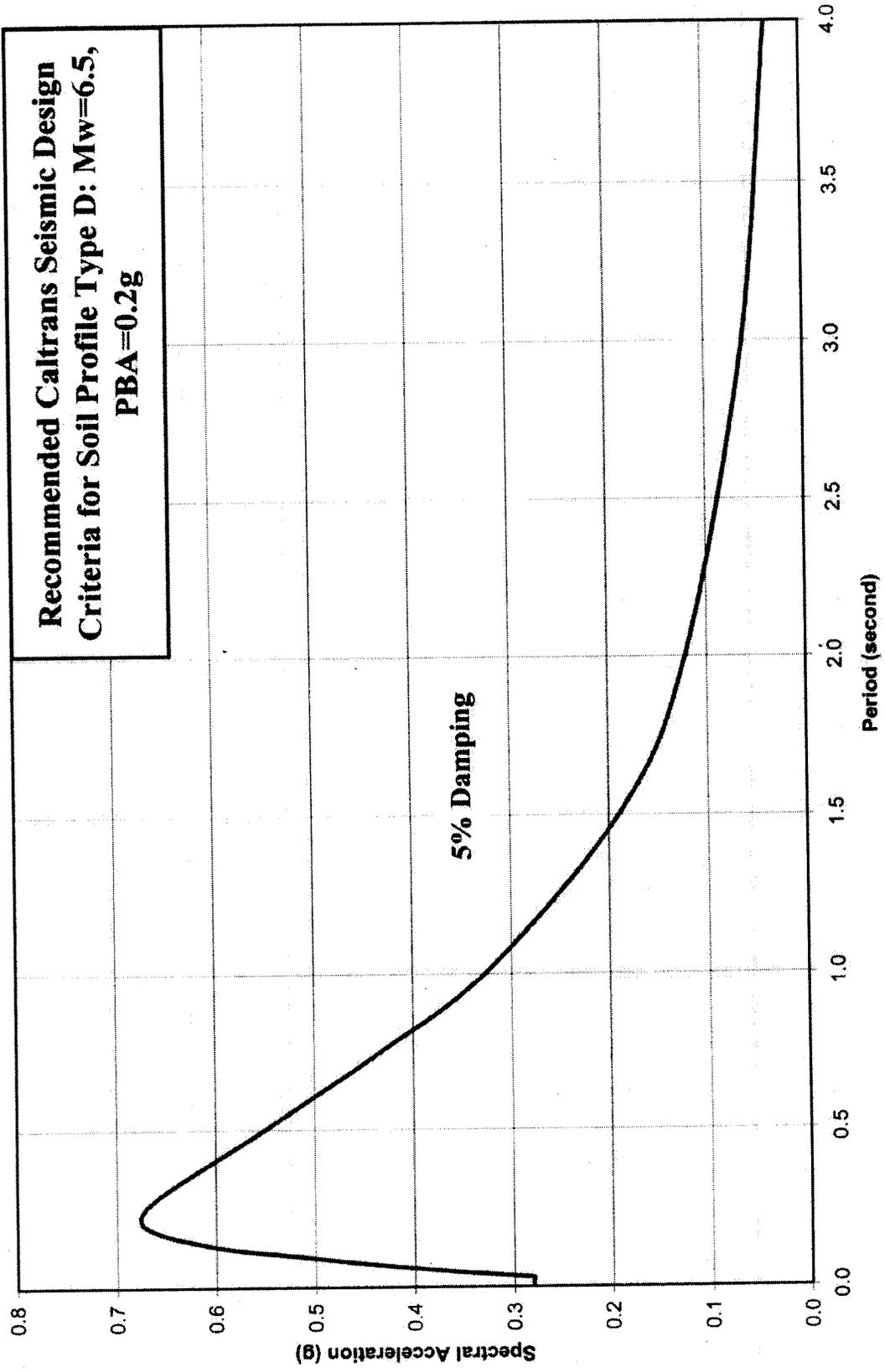


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 9.35
EA: 10-415701
Mariposa Creek Bridge
Bridge No. 39-0245L/R

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Mariposa Creek Bridges (left and right, Br. No. 39-0245L/R). This report is based on a foundation investigation performed in September 2008 by this Office, and the General (GP) and Foundation (FP) Plans provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP dated April 18, 2008, the proposed bridges will be 76 feet long and approximately 59 feet wide. The new bridge will be 2-span, cast-in-place, and reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes one 4-inch diameter mud rotary boring. The soil underlying the site consists of clayey to sandy silt ranging in density from loose to medium dense. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

Ground water was not measured during 2008 field investigation. Based on the "As-Built" LOTB's and the "Foundation Investigation" report dated October 24, 1984 for the nearby existing bridge (Br. No. 39-0081L/R), ground water was measured at an elevation of 179.5 feet in July 1984.

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report" and was found not to be susceptible to scour conditions.

Mariposa Creek is occupied by an orchard and the average ground surface elevation is approximately 183.0 feet based on the FP dated April 21, 2008. The bottom elevation of Mariposa Creek channel under the existing Mariposa Creek Bridge is about 180 feet. We assume the final elevation of Mariposa Creek under the proposed new bridge will be 180 feet. According to the "Final Hydraulics Report", the potential scour will not be beyond this elevation.

CORROSION EVALUATION

Based on the laboratory corrosion test results of the nearby Duck Slough Bridges (Br. No. 39-0243L/R/S), this site is not corrosive to foundation elements.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16-inch diameter Cast-in-Steel-Shell (CISS) NPS piles with a 0.5-inch wall thickness were selected to support the proposed bridge pier. Tables 2 and 3 list the recommended tip elevations and required driving resistance for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	187.05	N/A	N/A	90	180	145.0 (a)	145.0	180
Abut 3	Class 90	187.05	N/A	N/A	90	180	145.0 (a)	145.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+125.0 (a-I) +125.0 (a-II)	+125.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Mariposa Creek Bridge (Br. No. 39-0245L/R)

PILE DATA TABLE (BR. # 39-0245L/R)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+145.0 ^(a)	+145.0	180
Pier 2	CISS NPS 16x0.5	280	0	+125.0 ^(a)	+125.0	280
Abut 3	Class 90	180	0	+145.0 ^(a)	+145.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. The Contractor should be aware that roots remaining in the ground may cause difficult pile driving or refusal.

3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

- A. Log of Test Borings for Mariposa Creek Bridge, Bridge 39-0081L/R.*

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

- A. Foundation Report for Mariposa Creek Bridge (Left and Right), Bridge Number 39-0081L/R, dated June 26, 2009.*

Data and information available for inspection at the District Office:

None.

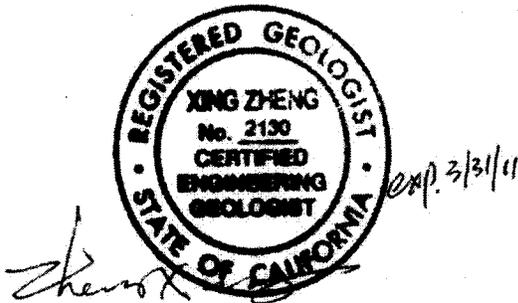
Data and information available for inspection at the Transportation Laboratory:

None.

Mr. Gary Blakesley
June 10, 2009
Page 6

Mariposa Creek Bridge
Bridge No. 39-0245L/R
EA 10-415701

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.



Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH– Steve Ng (E-copy)

Mariposa Creek Bridge
Bridge No. 39-0245L/R
EA 10-415701

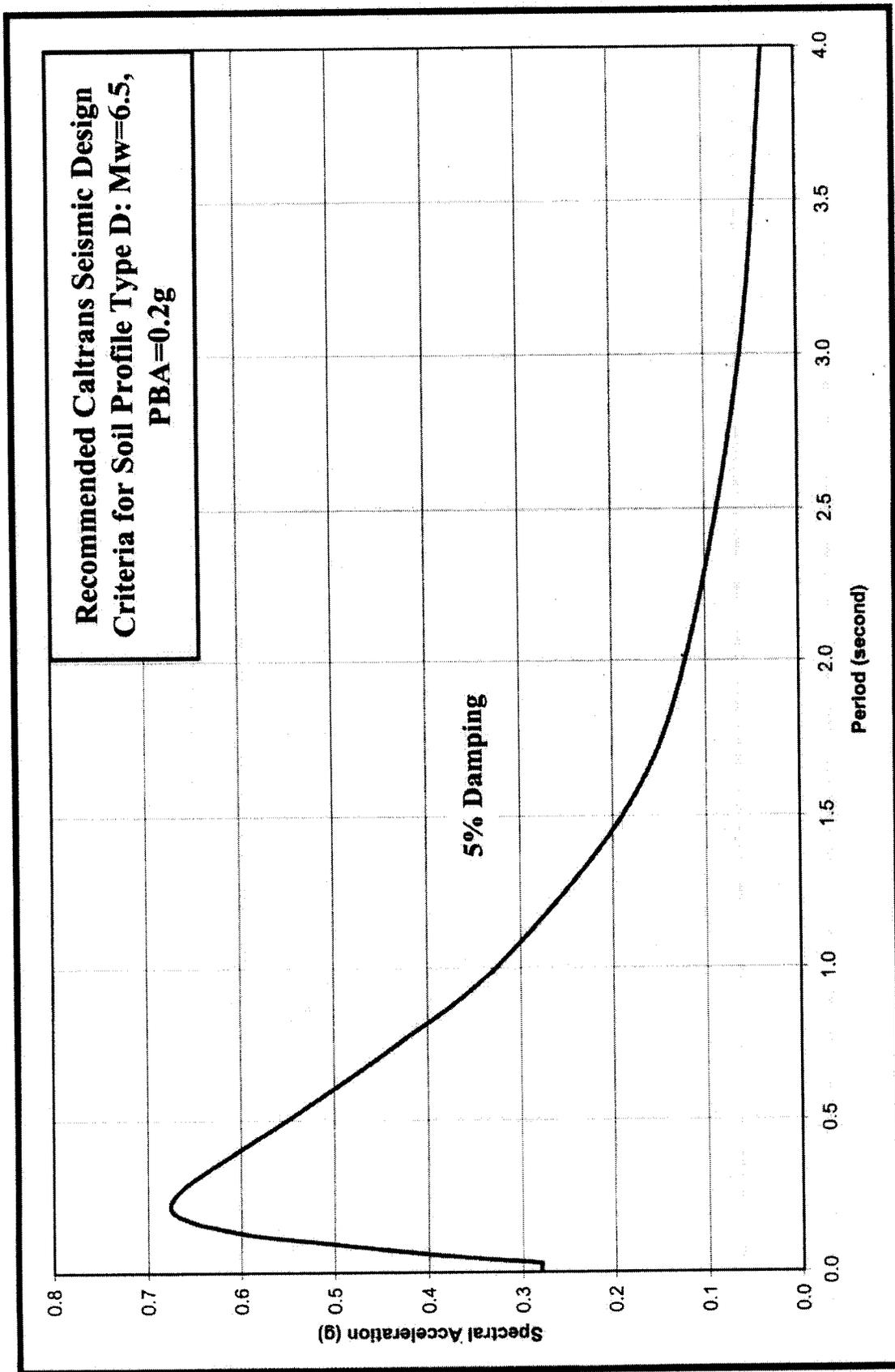


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 9.35
EA: 10-415701
Mariposa Creek Bridge
(East Frontage Road)
Bridge No. 39C-0379

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Mariposa Creek Bridge (Frontage Road) Br. No. 39C-0379. This report is based on a foundation investigation performed in September 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridge will be 76 feet long and approximately 43 feet wide. The new bridge will be two-span, cast-in-place, and reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

Due to the access difficulty, no soil test boring was drilled at this bridge site during the 2008 field foundation investigation. One 4-inch diameter mud rotary boring was located next to this bridge at the proposed new Mariposa Creek Bridges (Br. No. 39-0245L/R) site (approximately 225 feet from "FRC" line). Based on that soil boring, the soil underlying the site consists of clayey to sandy silt ranging in density from loose to medium dense. Please refer to the Log of Test Boring (LOTB) for the proposed new Mariposa Creek Bridges (Br. No. 39-0245L/R) for details.

GROUND WATER

Ground water was not measured during 2008 field investigation. Based on the "As-Built" LOTB's and the "Foundation Investigation" report dated October 24, 1984 for the nearby existing bridge (Br. No. 39-0081L/R), ground water was measured at an elevation of 179.5 feet in July 1984.

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report" and was found not to be susceptible to scour conditions.

Mariposa Creek is occupied by an orchard and the average ground surface elevation is approximately 183.0 feet based on the FP dated April 21, 2008. The bottom elevation of Mariposa Creek channel under the existing Mariposa Creek Bridge is about 180 feet. We assume that the elevation of Mariposa Creek under the proposed new bridge will be 180 feet. According to the "Final Hydraulics Report", the potential scour will not be deeper than this elevation.

CORROSION EVALUATION

Based on the laboratory corrosion test results of the nearby Duck Slough Bridges (Br. No. 39-0243L/R), this site is not corrosive to foundation elements.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak

bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and addition information obtained from the Office of Structure Design, Class 90 piles were selected to support the proposed bridge abutments and 16 inch diameter Cast-in-Steel-Shell (CISS) NPS piles with a 0.5-inch wall thickness were selected to support the proposed bridge pier. Tables 2 and 3 list the recommended tip elevations and required driving resistance for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	184.5	N/A	N/A	90	180	145.0 (a)	145.0	180
Abut 3	Class 90	184.5	N/A	N/A	90	180	145.0 (a)	145.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	PP 16x0.5	N/A	N/A	1	200	0	280	0	+125.0 (a-I) +125.0 (a-II)	+125.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Mariposa Creek Bridge (Frontage Road) (Br. No. 39C-0379)

PILE DATA TABLE (BR. # 39C-0379)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+145.0 ^(a)	+145.0	180
Pier 2	PP16x0.5	280	0	+125.0 ^(a)	+125.0	280
Abut 3	Class 90	180	0	+145.0 ^(a)	+145.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression.

- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. The Contractor should be aware that roots remaining in the ground may cause difficult pile driving or refusal.

3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

- A. *Log of Test Borings for Mariposa Creek Bridge (Frontage Road),
Br. No. 39C-0379.*

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

- A. *Foundation Report for Mariposa Creek Bridge (Frontage Road),
Br. No. 39C-0379, dated June 26, 2009.*

Data and information available for inspection at the District Office:

None.

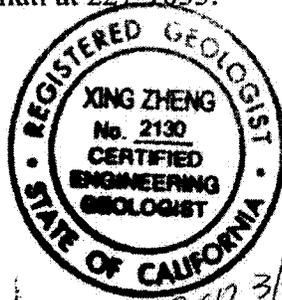
Data and information available for inspection at the Transportation Laboratory:

None.

Mr. Gary Blakesley
June 26, 2009
Page 6

Mariposa Creek Bridge (East Frontage Road)
Bridge No. 39C-0379
EA 10-415701

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.



Xing Zheng

exp. 3/31/11

Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



Reza

Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH– Steve Ng (E-copy)

Mariposa Creek Bridge (East Frontage Road)
Bridge No. 39C-0379
EA 10-415701

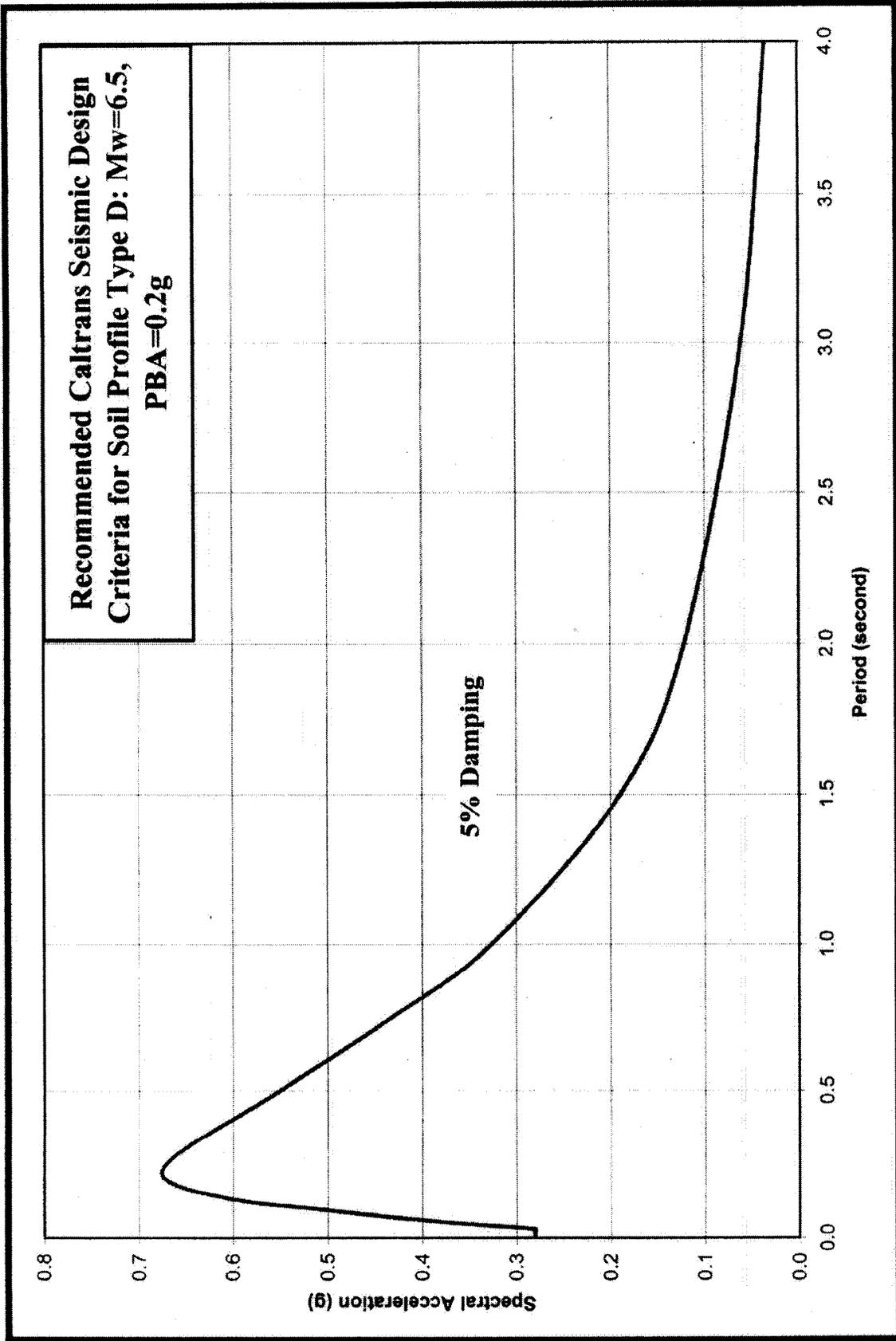


Figure 1. Acceleration Response Spectrum Recommended for Design

M e m o r a n d u m

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Date: June 26, 2009

File: 10-MER-99-PM 5.22
EA: 10-415701
Deadman Creek Bridge
(East Frontage Road)
Bridge No. 39C-0373

Attention: Mr. Grant Schuster

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Deadman Creek Bridge (East Frontage Road), Br. No. 39C-373. This report is based on a foundation investigation performed in April and May 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridge will be approximately 76 feet long and 43 feet wide. The new bridges will be two-span cast-in-place reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes one 4-inch diameter mud rotary borings and six cone penetrometer test (CPT) borings. From the existing ground surface (approximate elevation 201 feet) to an elevation of approximately 186 feet, the soils primarily consist of sandy lean clay and silty sand. From an elevation of approximately 186 feet to 147 feet, the soils consist of medium dense to dense sand layers and gravel layers with some cobbles. Very stiff to hard elastic silt, with some stiff sections was encountered between elevations of approximately 147 feet to 126 feet. A layer of medium dense sandy silt was encountered from an elevation of approximately 126 feet to the bottom of the borings. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

Ground water was not measured in boring R-08-001, and not encountered in all CPT borings during recent field investigation. Based on the "As-Built" LOTB's for the existing Deadman Creek Bridges (Br. No. 39-0004L/R), ground water was measured at an elevation of 160.6 feet on July 18, 1984. Ground water was measured at an elevation of 154 feet on June 2, 2008 in boring R-08-001 for the new Deadman Creek Bridges (Br. No. 39-0242L/R).

SCOUR EVALUATION

Based on the "Final Hydraulics Report" by the Office of Structure Hydraulics, scour is not an issue.

The proposed new bridges will be designed to cross over the realigned creek channel. We assume the bottom elevation of the realigned channel for the new bridge will match the bottom elevation of the existing channel, which is approximately 197 feet. According to the "Final Hydraulics Report", potential scour will not be beyond this elevation.

CORROSION EVALUATION

Representative samples taken during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-002*	0-5	9.15	1392	N/A	N/A
R-08-002*	55-56	7.77	2355	N/A	N/A
R-08-001	0-5	8.28	1766	N/A	N/A

* Sample from the new Deadman Creek Bridges (Bridge No. 39-0242L/R) site.

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16" diameter Cast-in-Steel-Shell (CISS) NPS piles with 0.5" wall thickness were selected to support the proposed bridge pier, (see Table 2 and Table 3). Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation ⁵ (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	203.95	N/A	N/A	90	180	168.0 ^(a)	168.0	180
Abut 3	Class 90	203.95	N/A	N/A	90	180	168.0 ^(a)	168.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Piers

Pier Foundations Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+139.0 (a-I) +139.0 (a-II)	+139.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Event).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Deadman Creek Bridge (East Frontage Road), Bridge No. 39C-0373

PILE DATA TABLE (BR. # 39C-0373)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+168.0 ^(a)	+168.0	180
Pier 2	CISS NPS 16x0.5	280	0	+139.0 ^(a)	+139.0	280
Abut 3	Class 90	180	0	+168.0 ^(a)	+168.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Construction Considerations

1. Ground water will not be encountered during the abutment footing excavation.
2. Difficult pile driving may be encountered due to gravel and cobble layers.
3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

Project Information

Standard Special Provisions 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.

Mr. Gary Blakesley
June 26, 2009
Page 6

Deadman Creek Bridge (East Frontage Road)
Bridge No. 39C-0373
EA 10-415701

Data and information attached with the project plans are:

A. Log of Test Borings for Deadman Creek Bridge (Frontage Road), Bridge Number 39C-0373.

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

A. Foundation Report for Deadman Creek Bridge (Frontage Road), Bridge Number 39C-0373, dated June 26, 2009.

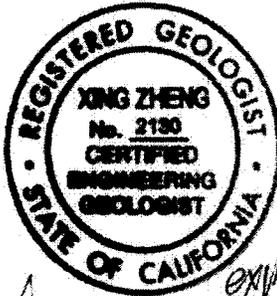
Data and Information available for inspection at the District Office:

None.

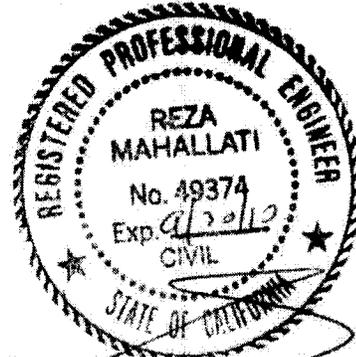
Data and information available for inspection at the Transportation Laboratory:

None.

If you have any questions regarding this report, please contact Xing Zheng at 916-227-1036 or Reza Mahallati at 916-227-1033.



Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH – Steve Ng (E-copy)

Deadman Creek Bridge (East Frontage Road)
Bridge No. 39C-0373
EA: 10-415701

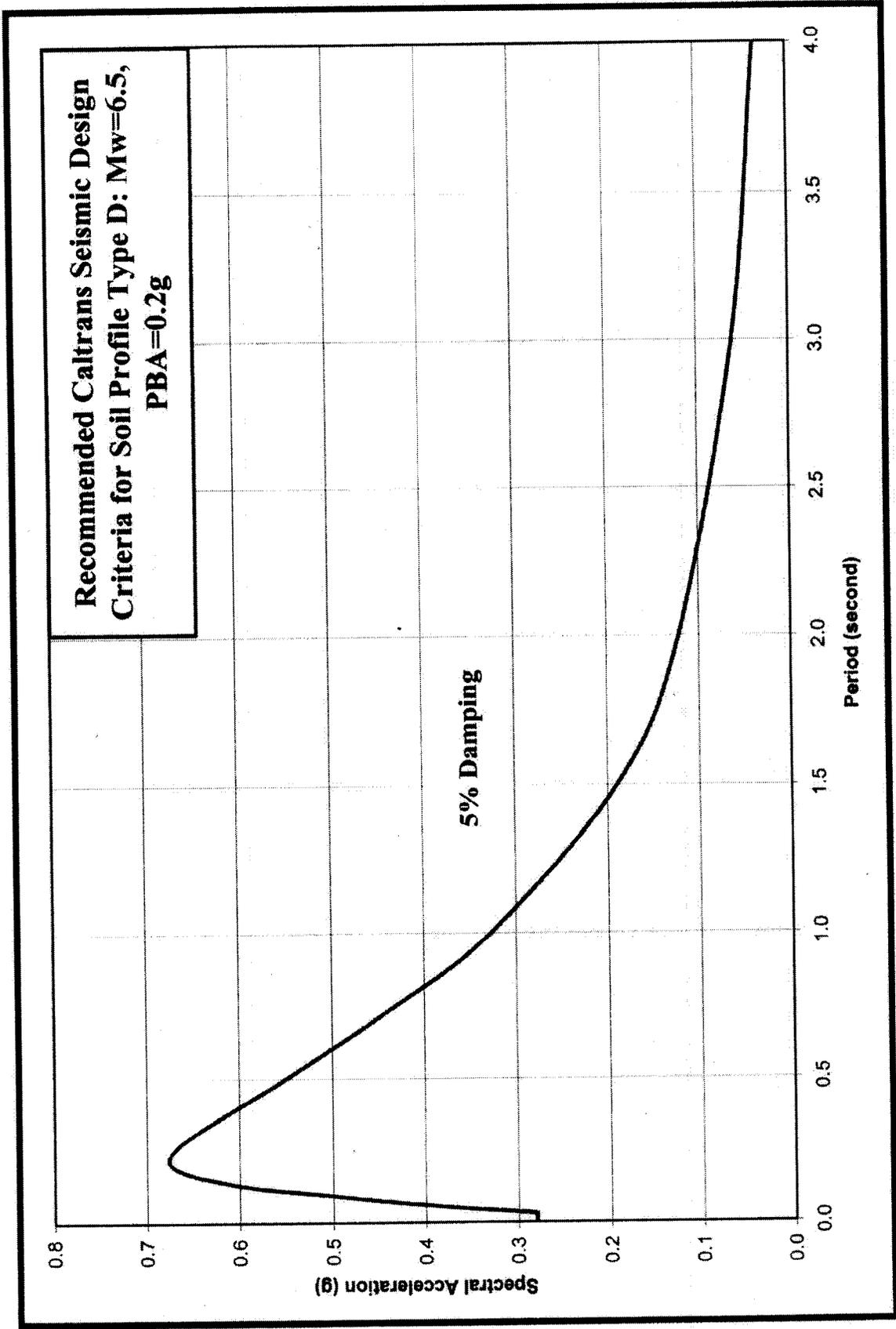


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 5.22
EA: 10-415701
Deadman Creek Bridge
Bridge No. 39-0242L/R

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Deadman Creek Bridge (Br. No. 39-0242L/R). This report is based on a foundation investigation performed in April and May 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed left and right bridges will be 76 feet long and 59 feet wide. The new bridges will be two-span cast-in-place reinforced concrete slab structures.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes two 4-inch diameter mud rotary borings and 3 cone penetrometer test (CPT) borings. From the existing ground

surface (approximate elevation 201 feet) to an elevation of approximately 186 feet, the soils primarily consist of clay and silty sand. From an elevation of approximately 186 feet to 147 feet, the soils consist of medium dense to dense fine-grained sand layers and gravel layers with some cobbles. Very stiff to hard elastic silt, with some stiff sections was encountered between elevations of approximately 147 feet to 126 feet. Layers of medium dense sand, sandy silt, clay, and silt were encountered from an elevation of approximately 126 feet to the bottom of the borings. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

A temporary piezometer was installed in boring R-08-001 in April 2008, and ground water was measured at an elevation of 154 feet on June 2, 2008. Ground water was also encountered in two CPT borings at elevation 152.7 feet and 155.0 feet respectively. Based on the "As-Built" LOTB's for the existing Deadman Creek Bridges (Br. No. 39-0004L/R), ground water was measured at an elevation of 160.6 feet on July 18, 1984.

SCOUR EVALUATION

Based on the "Final Hydraulics Report" by the Office of Structure Hydraulics, scour is not an issue.

The proposed new bridges will be designed to cross over the realigned creek channel. We assume the bottom elevation of the realigned channel for the new bridges will match the bottom elevation of the existing channel, which is approximately 197 feet. According to the "Final Hydraulic Reports", potential scour will not be beyond this elevation.

CORROSION EVALUATION

Representative samples taken during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-002	0-5	9.15	1392	N/A	N/A
R-08-002	55-56	7.77	2355	N/A	N/A
R-08-001*	0-5	8.28	1766	N/A	N/A

* Sample from the new Deadman Creek Bridges (East Frontage Road), Bridge No. 39-0242S.

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16" diameter Cast-in-Steel-Shell (CISS) NPS piles with 0.5" wall thickness are selected to support the proposed bridge pier, (see Table 2 and Table 3). Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation ¹ (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	203.95	N/A	N/A	90	180	168.0 ^(a)	168.0	180
Abut 3	Class 90	203.95	N/A	N/A	90	180	168.0 ^(a)	168.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

**Table 3
 Foundation Recommendations for Piers**

Pier Foundations Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips) Per Pile
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	+139.0 (a-I) +139.0 (a-II)	+139.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Event).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

**Table 4. Pile Data Table for the Proposed Deadman Creek Bridge
 (Bridge No. 39-0242L/R)**

PILE DATA TABLE (BR. # 39-0242L/R)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+168.0 ^(a)	+168.0	180
Pier 2	CISS NPS 16x0.5	280	0	+139.0 ^(a)	+139.0	280
Abut 3	Class 90	180	0	+168.0 ^(a)	+168.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression.
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. Difficult pile driving may be encountered due to gravel and cobble layers.
3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

Project Information

Standard Special Provisions 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:

- A. Log of Test Borings for Deadman Creek Bridge (Left and Right), Bridge Number 39-0242L/R.

Mr. Gary Blakesley
June 26, 2009
Page 6

Deadman Creek Bridge
Bridge No. 39-0242L/R
EA 10-415701

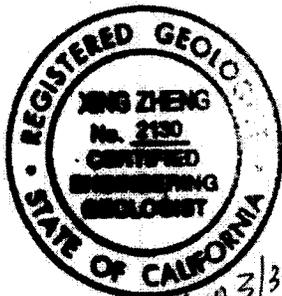
Data and Information included in the Information Handout provided to the bidders and Contractors are:

A. Foundation Report for Deadman Creek Bridge (Left and Right), Bridge Number 39-0242L/R, dated June 26, 2009.

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

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

If you have any questions regarding this report, please contact Xing Zheng at 916-227-1036 or Reza Mahallati at 916-227-1033.



Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH – Steve Ng (E-copy)

Deadman Creek Bridge
Bridge No. 39-0242L/R
EA 10-415701

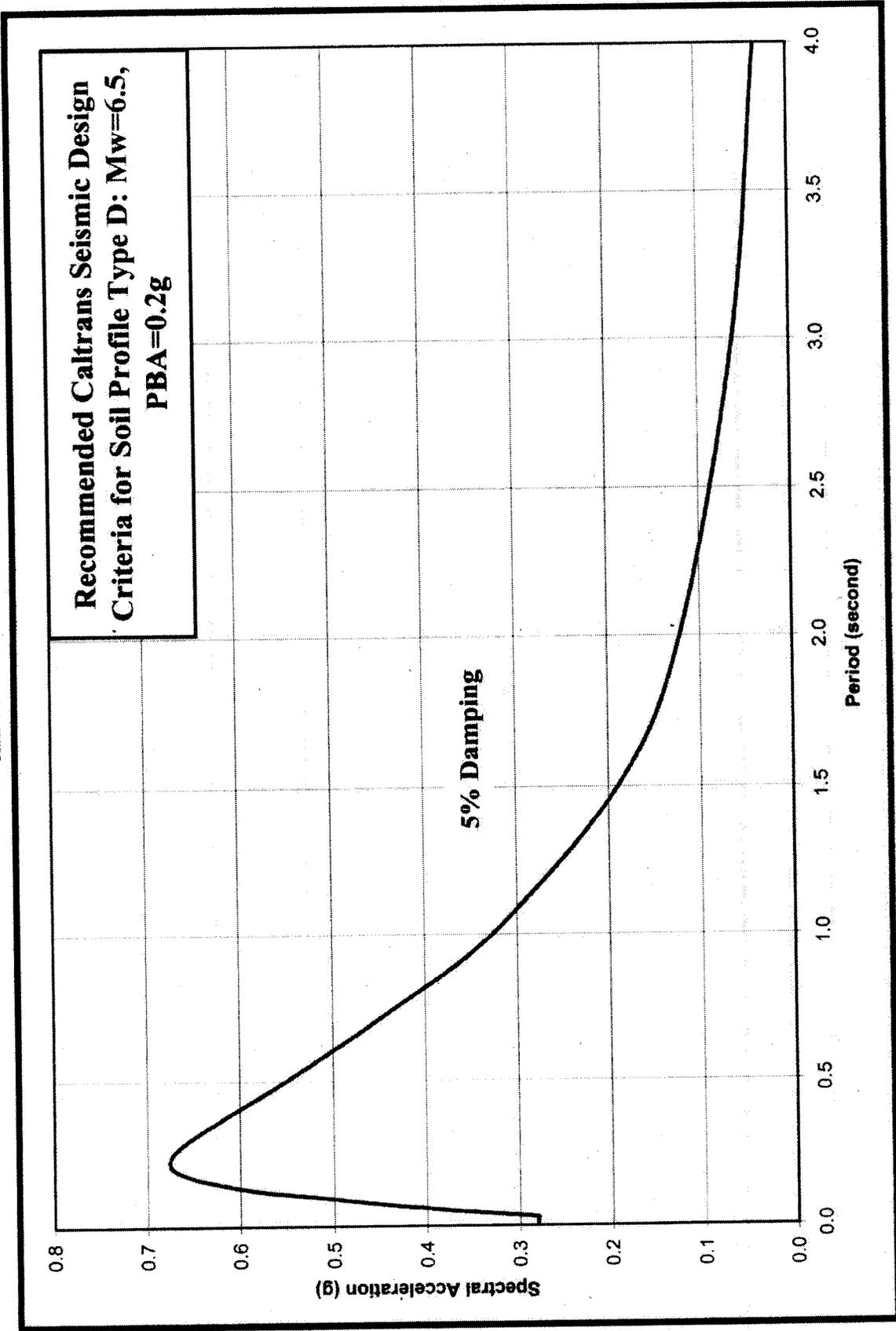


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 9.43
EA: 10-415701
Duck Slough Bridge
(East Frontage Road)
Bridge No. 39C-0375

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Duck Slough Frontage Road Bridge (Br. No. 39C-0375). This report is based on a foundation investigation performed in April and May 2008 by this Office, the General Plan (GP) dated and the Foundation Plan (FP) provided by the Office of Structure design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridge will be 82 feet long and approximately 43 feet wide. The new bridge will be a two-span cast-in-place reinforced concrete slab structure.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes one 4-inch diameter mud rotary boring and three cone penetrometer test (CPT) borings. Soils consisting of medium dense sand, silt, and clay were encountered from the existing ground surface and extending to an elevation of approximately 123 feet. A layer of hard elastic silt was encountered from an elevation of 123 feet to 113 feet, and medium dense sand and silt were encountered from an elevation of approximately 113 feet to the bottom of the borings. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

Ground water was not measured in boring R-08-001, and not encountered in all CPT borings during recent field investigation. Based on the "As-Built" LOTB's for the existing Duck Slough bridges (Br. No. 39-0004L/R), ground water was measured at an elevation of 169.1 feet on July 18, 1984. Ground water was measured at an elevation of approximately 161.5 feet on May 19, 2008 and 165 feet on June 2, 2008 in boring R-08-002 for the new Duck Slough Bridge (Br. No. 39-243L/R).

SCOUR EVALUATION

The project has been evaluated by the Office of Structure Hydraulics in the "Final Hydraulics Report, and was found not to be susceptible to scour conditions.

CORROSION EVALUATION

Representative samples taken from the nearby Duck Slough Bridges (Br. No. 39-0244L/R) during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001*	0-4	7.41	1796	N/A	N/A
R-08-001*	46.5-50.0	7.22	2036	N/A	N/A
R-08-002*	60.0-61.5	7.53	1423	N/A	N/A

* Sample from new Duck Slough Bridge (Br. No. 39-0244L/R) site.

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water

sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Deadman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18.6 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent foundation investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and 16-inch diameter Cast-in-Steel-Shell (CISS) NPS piles with a 0.5-inch wall thickness were selected to support the proposed bridge pier. Tables 2 and 3 list the recommended tip elevations and required driving resistances for these piles.

Table 2. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations⁽¹⁾									
Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile	Nominal Resistance (kips)	Design Tip Elevations ⁽²⁾ (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	185.15	N/A	N/A	90	180	142.0 (a)	142.0	180
Abut 3	Class 90	184.85	N/A	N/A	90	180	142.0(a)	142.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Pier

Pier Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Pier 2	CISS NPS 16x0.5	N/A	N/A	1	200	0	280	0	110.0 (a-I)	110.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit) and (a-II) Compression (Extreme Limit).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

**Table 4. Pile Data Table for the Proposed Duck Slough Bridge (Frontage Road)
 Bridge No. 39C-0375**

PILE DATA TABLE (BR. # 39C-0375)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+142.0 ^(a)	+142.0	180
Pier 2	CISS NPS 16x0.5	280	0	+110.0 ^(a)	+110.0	280
Abut 3	Class 90	180	0	+142.0 ^(a)	+142.0	180

Notes: 1) Design tip elevations are controlled by (a) Compression
 2) Design tip elevation for Lateral Load will be provided by Structure Design.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the abutment footing excavation.
2. The Contractor should aware that roots remaining in the ground may cause pile driving difficult or refusal.
3. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, a pile re-strike may be necessary after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

Mr. Gary Blakesley
June 26, 2009
Page 6

Duck Slough Bridge (East Frontage Road)
Bridge No. 39C-0375
EA 10-415701

A. Log of Test Borings for Duck Slough Bridge (Frontage Road), Bridge Number 39C-0375.

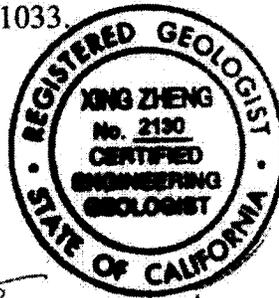
Data and Information included in the Information Handout provided to the bidders and contractors are:

A. Foundation Report for Duck Slough Bridge (Frontage Road), Bridge Number 39C-0375, dated June 26, 2009.

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

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

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.



Xing Zheng

Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North

3/31/11



Reza Mahallati

Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH – Steve Ng (E-copy)

Duck Slough Bridge (East Frontage Road)
Bridge No. 39C-0375
EA 10-415701

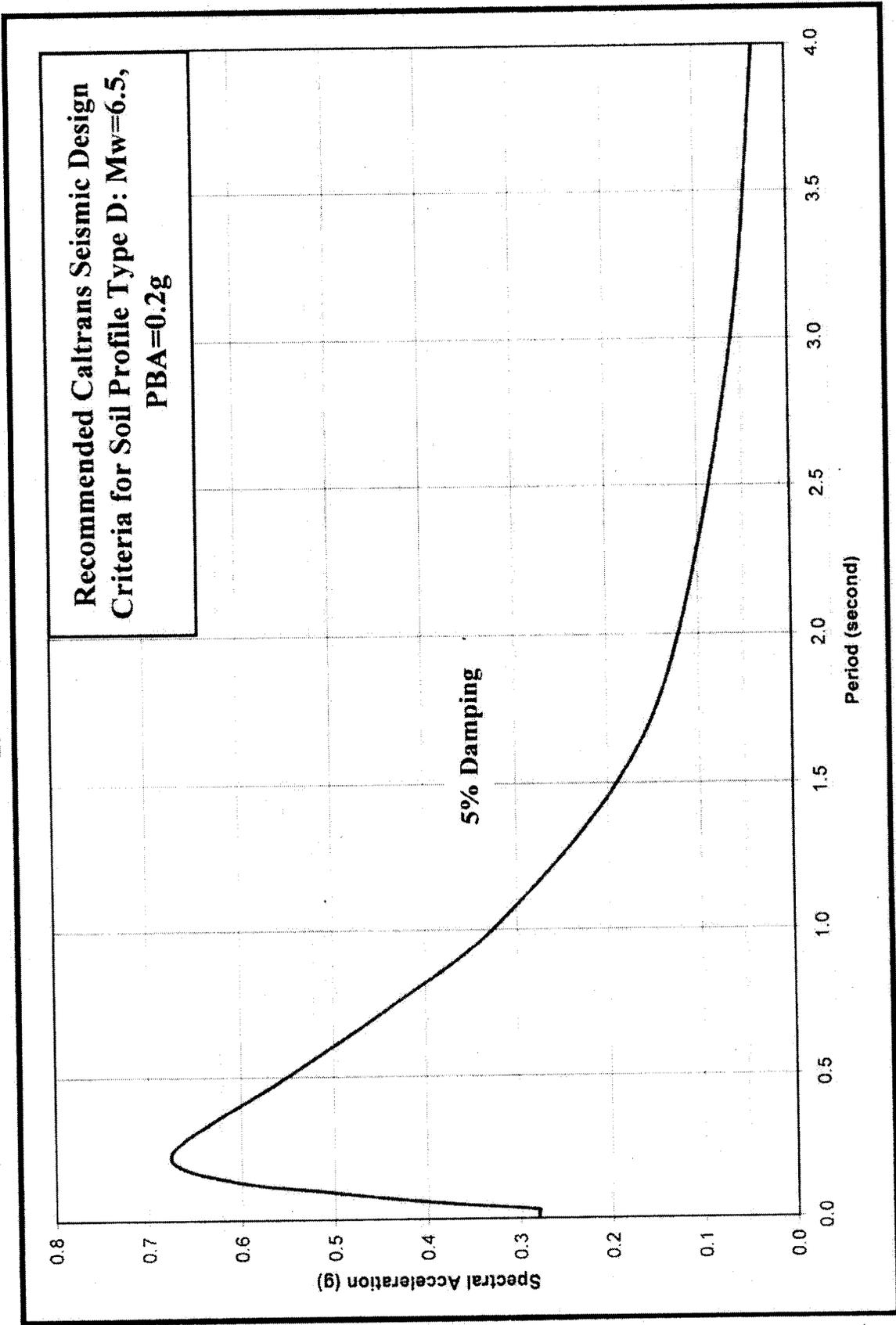


Figure 1. Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. GARY BLAKESLEY
Branch Chief
Bridge Design Branch 5
Office of Bridge Design North

Attention: Mr. Grant Schuster

Date: June 26, 2009

File: 10-MER-99-PM 6.89
EA: 10-415701
Le Grand Overcrossing
Bridge No. 39-0233

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

Subject: Foundation Report

Per your request, the Office of Geotechnical Design-North (OGD-N) has prepared this Foundation Report for the proposed new Le Grand Overcrossing (Br. No. 39-0233). This report is based on a foundation investigation performed in April and May 2008 by this Office, the General Plan (GP) and the Foundation Plan (FP) provided by the Office of Structure Design (OSD). We also reviewed and evaluated the bridge files for the nearby existing structures.

Based on the GP, the proposed bridges will be 314.3 feet long and approximately 43 feet wide. The new bridge will be a two-span cast-in-place prestressed concrete box girder structure.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is located in the northern portion of the San Joaquin Valley and is surrounded by farmland. The site is within the Great Valley geomorphic province of California. The Geologic Map of the San Francisco-San Jose Quadrangle, California, scale 1:250,000, compiled by D.L. Wagner, E.J. Bortugno and R.D. McJunkin, published in 1991 by the California Geological Survey (formerly the Division of Mines and Geology), indicates the site is underlain by the Pleistocene Modesto (Qm) and Riverbank (Qr) Formations.

The project site is underlain by alluvium, flood plain deposits, lake and marsh deposits.

The 2008 geotechnical field investigation for the site includes five 4-inch diameter mud rotary borings and two cone penetrometer test (CPT) borings. The soils underlying the site consist primarily of medium dense to dense sand, silt, and stiff to hard silt and clay. Please refer to the Logs of Test Borings (LOTB's) for details.

GROUND WATER

A temporary piezometer was installed in boring R-08-004 in May 2008, and ground water was measured at an elevation of 154 feet on June 2, 2008. Ground water was also measured at an elevation 135.5 feet in boring CPT-08-001 on May 16, 2008.

SCOUR EVALUATION

Scour is not an issue at this site because the bridge is not in a water course.

CORROSION EVALUATION

Representative samples taken during the recent foundation investigation were tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 1 presents the summary of results.

Table 1. Corrosion Test Summary

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001	0-5	8.04	2881	---	---
R-08-001	31.5	7.79	1744	---	---

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water sample taken at the site: Chloride concentration is greater than or equal 500 ppm, sulfate concentration is greater than or equal 2000 ppm, or the pH is 5.5 or less.

SEISMICITY

Based on the Caltrans California Seismic Hazard Map (CSHM) dated 1996, the controlling fault for the project is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault with a maximum credible earthquake moment magnitude of $M_w=6.5$. This fault is located approximately 18 miles northeast of the site. Based on the CSHM, the peak bedrock acceleration (PBA) is estimated to be 0.2g. A Caltrans Seismic Design Criteria Acceleration Response Spectrum curve corresponding to soil profile Type D is recommended for design (Figure 1).

Liquefaction analysis based on the recent geotechnical investigation indicates liquefaction potential should be considered minimal.

There is no known active fault crossing the project site, therefore, the potential for surface rupture at the site is considered insignificant.

FOUNDATION RECOMMENDATIONS

Based on the recent geotechnical investigation and discussion with OSD, Class 90 piles were selected to support the proposed bridge abutments and Class 140 piles were selected to support the proposed bridge bent. Tables 2 and 3 list the recommended tip elevations and required driving resistance for these piles.

Table 2. Abutment Foundation Design Recommendations

Support Location	Pile Type	Cut-off Elevation (ft)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load per Pile (kips)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1	Class 90	209.30	1210	766	90	180	+159.0 ^(a)	+159.0	180
Abut 3	Class 90	209.30	1210	766	90	180	+159.0 ^(a)	+159.0	180

Notes:

- 1) Design tip elevations are controlled by (a) Compression.
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 3. Foundation Recommendations for Bent

Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load Per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. $\phi=0.7$	Tension $\phi=0.7$	Comp. $\phi=1.0$	Tension $\phi=1.0$			
Bent 2	Class 140	189.40	3700	1	200	98	280	0	+140.0 (a-I) +140.0 (a-II) +130 (b)	+130.0	280

Notes:

- 1) Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event) and (b) Tension (Strength Limit).
- 2) Design tip elevation for Lateral Load will be provided by Structure Design.

Table 4. Pile Data Table for the Proposed Le Grand Overcrossing (Bridge No. 39-0233)

PILE DATA TABLE (BR. # 39-0233)						
Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driven Resistance (kips)
		Compression	Tension			
Abut 1	Class 90	180	0	+159.0 ^(a)	+159.0	180
Bent 2	Class 140	280	140	+140.0 ^(a) +130.0 ^(b)	+130.0	280
Abut 3	Class 90	180	0	+159.0 ^(a)	+159.0	180

- Notes:
- 1) Design tip elevations are controlled by (a) Compression and (b) Tension.
 - 2) Design tip elevation for Lateral Load will be provided by Structure Design.
 - 3) The specified tip elevation shall not be raised above the tension controlled tip elevation.

CONSTRUCTION CONSIDERATIONS

1. Ground water will not be encountered during the footing excavation.
2. Approximately 30 feet of fill material will be placed on the existing ground to build the approach embankment. Prior to installing piles, a 90-day waiting period following the completion of embankment construction is recommended. We recommend settlement to be monitored using settlement platforms.
3. Predrilled holes in the abutment areas should not be drilled deeper than elevation 194 feet.
4. If piles reach the specified pile tip elevations and the required nominal driving resistances are not achieved based on Caltrans Standard Specifications 49-1.08, the piles may be restruck after a minimum set-up period of 24 hours.

PROJECT INFORMATION

Standard Special Provisions 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:

A. Log of Test Borings for Le Grand Overcrossing, Bridge Number 39-0233.

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

A. Foundation Report for Le Grand Overcrossing, Bridge Number 39-0233, dated June 26, 2009.

Data and information available for inspection at the District Office:

None.

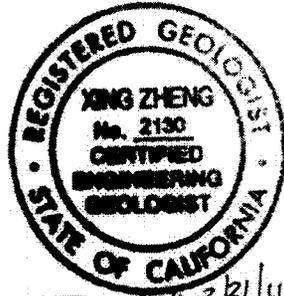
Data and information available for inspection at the Transportation Laboratory:

None.

Mr. Gary Blakesley
June 26, 2009
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Le Grand Overcrossing
Bridge No. 39-0233
EA 10-415701

If you have any questions regarding this report, please contact Xing Zheng at 227-1036 or Reza Mahallati at 227-1033.



Xing Zheng exp. 3/31/11

Xing Zheng, C.E.G. No. 2130
Engineering Geologist
Geotechnical Design – North



Reza Mahallati

Reza Mahallati, P.E. No. 49374
Senior Materials and Research Engineer
Geotechnical Design – North

cc: Reid Buell
GDN File
GS File Room
R.E. Pending
Structures OE (E-copy)
PCE – Peggy Lim (E-copy)
DME – Dave Dhillon (E-copy)
OSH– Steve Ng (E-copy)

Le Grand Overcrossing
Bridge No. 39-0233
EA 10-415701

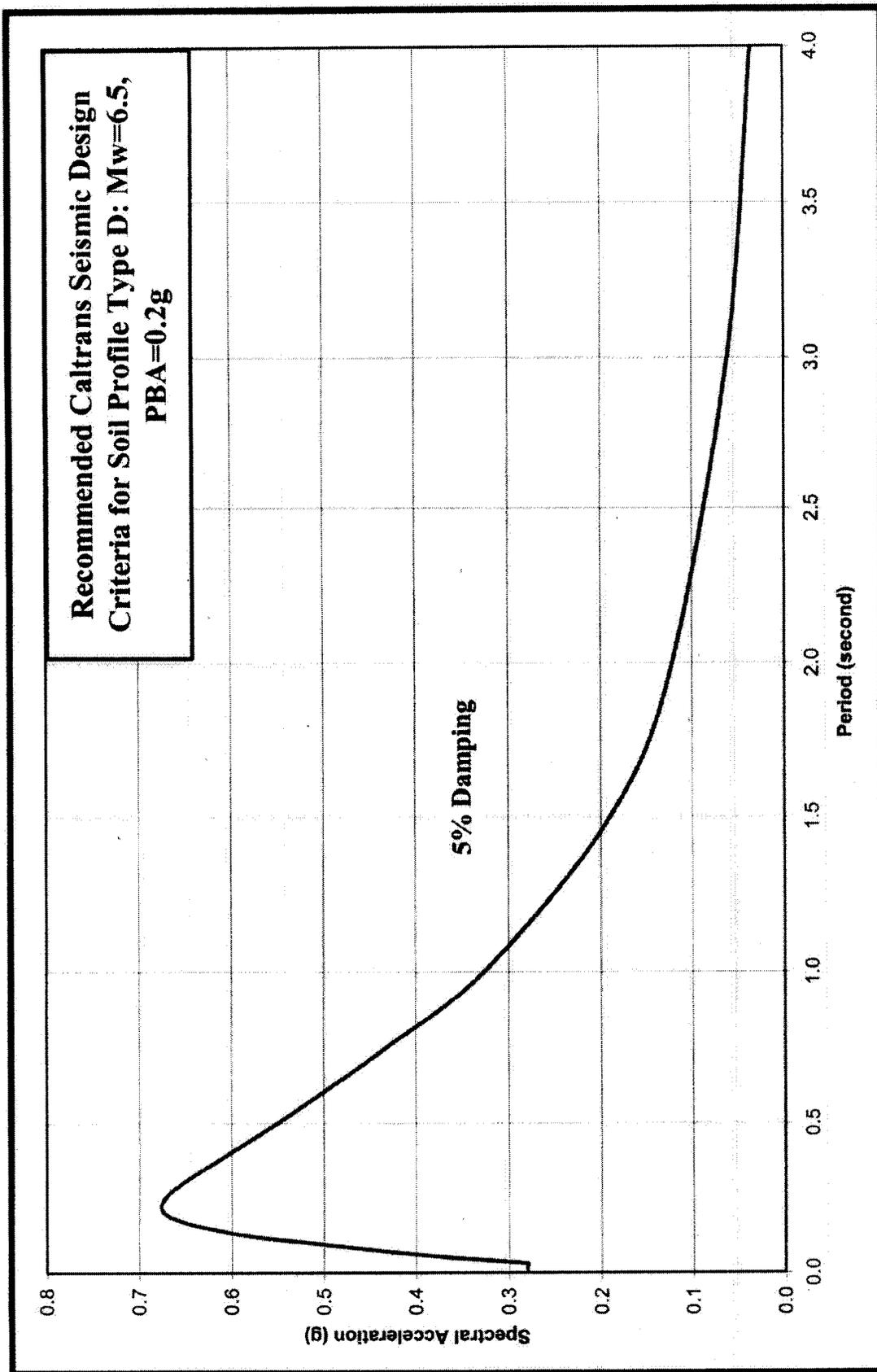


Figure 1.- Acceleration Response Spectrum Recommended for Design

Memorandum

*Flex your power!
Be energy efficient!*

To: **MR. ROBERTO BANDA**
Central Region, Design II-Branch N
Project Development

Attention: Mr. Jason Castillo

Date: May 20, 2003

File: 10-Mer-99-KP7.4/16.9
10-415700
Arboleda Dr Freeway

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

Subject: Geotechnical Design Report – Infiltration Basins

1. Introduction

Per your request, we are providing geotechnical design recommendations addressing five infiltration basins proposed on a segment of State Highway 99 at KP 7.4 to 16.9 (PM 4.6 to 10.5) in the Merced County, California. District 10 Project Development is proposing to convert Route 99 from the existing four-lane expressway to a six-lane freeway from Buchanan Hollow Road to McHenry Road. The purpose of this report is to document subsurface geotechnical conditions, to provide engineering assessments of the borrow material and to recommend design and construction criteria for the proposed basins.

2. Pertinent Reports and Investigations

The following is a list of documents, reports and maps that were utilized in preparing this report.

- Memorandum dated October 24, 2003 “Basin Sub-surface Investigation” from Mr. Roberto Banda, Senior, Central Region, Design II-Branch N and its attachments for Structural Section Recommendations prepared by District 10 Material Branch.
- Memorandum dated March 4, 2002 “Request for Investigation of Local Material Source for Possible Embankment/Fill Material” from Mr. Roberto Banda, Central Region, Design II-Branch N, addressed to Mr. Dave Whaling, Materials Branch.

- Preliminary Geotechnical Report dated August 15, 2001 prepared by Melenie J. Spahn, Office of Geotechnical Design South.
- Geologic Map of California, the San Francisco-San Jose Quadrangle published 1991.
- California Seismic Hazard Map prepared by Lalliana Mualchin, Caltrans Engineering Seismologist, dated 1996.
- Statewide Storm Water Quality Practice Guidelines, Appendix D to the Statewide Storm Water Management Plan (CTSW-RT-00-017) prepared by Caltrans.

3. Existing Facilities and Proposed Improvements

Within this segment, Highway 99 is currently a four-lane conventional expressway paved with asphalt concrete, built on fill, and aligned in a general north/south direction. It is located both inside and outside of a suburban environment and across active agricultural lands. There are several intersections controlled by stop signs within the project area. The existing alignment is constructed on minimal fills placed on relatively flat terrain. There are no significant cuts within the area. (See Location Map attached, Plate 1.)

A new alignment is proposed for a six-lane freeway, which will require approximately 1,375,000 cubic meters of import borrow to raise the mainline elevation from 1 to 3 meters above the existing northbound lanes to accommodate a 100-year flood event. Five large on-site borrow pits, which will also serve as infiltration or detention basins for storm water are planned to supply the needed fill material. A new interchange will be constructed in the vicinity of Le Grand Road.

This report addresses the geotechnical issues associated with the construction of the basins and assessment of the local borrow material. Geotechnical considerations for the structure foundations are not addressed in this report.

4. Physical Setting

4.1. Climate

The climatic conditions at the project site are considered temperate with moderate winters and hot summers. Based on the climatic data available for the period between July 1948 and December 2001, average daily minimum temperature ranges from 1.9°

C in December to 15.7° C in July while the average daily maximum temperature ranges from 12.9° C in January to 36.1° C in July.

Nearly 80% of the total annual rainfall falls during the months of November through March. Strong winds and dust storms can occur anytime during the year. Table 1 presents the climatic summary for the Merced Municipal station. Yearly updates are available from the western Regional Climate Center (WRCC) web site.

Table 1: Average Monthly Climate Summary, Merced Municipal ARPT, California, Period of Record: 7/1/1948 to 12/31/2001

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave. Max. Temp °C	12.9	16.8	19.8	24.2	28.5	32.7	36.1	35.2	32.6	27.1	18.9	12.9	24.8
Ave. Min. Temp °C	2.4	3.9	5.3	7.1	10.3	13.3	15.7	14.9	12.8	8.7	4.6	1.9	8.4
Ave. Total Precipitation mm	63.3	55.1	50.0	27.7	10.9	2.3	0.5	0.8	4.3	16.5	38.6	44.7	314.7

Source: Western Regional Climate Center, "<http://www.wrcc.dri.edu>"

4.2. Topography and Drainage

According to the topographic map of the project region (<http://www.topozone.com/>), as well as visual observations during our site reconnaissance, the topography within the project area is relatively flat with no hills. Within the project boundaries, the ground elevation ascends gradually from the north-end to the south-end by 6 m. The elevations in the area are about 55 m on northern side and 61 m on southern side. Storm water drains off both sides of the existing highway and infiltrates into the surrounding soils. Water flows through the project area in Deadman Creek, Mariposa Creek, Duck Slough and Duck Slough Overflow. Man-made drainage facilities such as canals, farming structures and private irrigation pipelines are present throughout the project area. (See Topographic Map attached, Plate 2.)

4.3. Geology

The site is situated in the San Joaquin Valley within the Great Valley geomorphic province of California. This province is a large northwest trending valley bounded by the Sierra Nevada province to the east and south, the Klamath Mountains to the north, the Cascade Range province to the northeast, and the Coast Ranges province to the west. The Geologic Map of San Francisco-San Jose quadrangle sheet, California, 1991 published by CDMG, indicates that the site is underlain by Quaternary Modesto-Riverbank formations, which were deposited as fan deposits (gravel, sand, silt and clay) eroded from the Sierra Nevada.

Based on our field investigations, the subsurface materials encountered consist of stiff to very hard combinations of micaceous silt, clay and sand. In general, the materials are more cohesive than non-cohesive. Although the geologic mapping indicates that gravel would be present, we did not encounter gravel in the borings performed. The Regional Geologic Map is attached as **Plate 3**.

4.4. Seismicity

Based upon the Department's California Seismic Hazard Map, dated 1996, the controlling fault is the Prairie Creek-Spenceville-Dentman fault (PSD, Normal) with a maximum credible earthquake moment magnitude of $M_w=6.5$. The PSD is located about 30 kilometers northeast of the site. The Peak Horizontal Bedrock Acceleration, based on the above-mentioned map, is estimated to be 0.2g at the site. 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. Based on the soil information obtained in the field investigation, Soil Profile Type "D" is recommended for design. (See Seismic Hazard Map attached, **Plate 4**.)

5. Groundwater

Groundwater in the project area originates from infiltration of creek/canal water, irrigation (pumped) water and rainwater through the alluvial fans. Groundwater elevations were measured in each boring performed and are presented on the corresponding boring logs. To measure long-term groundwater fluctuations at the site we installed six monitoring wells during our geotechnical investigation as noted in Table 2.

Ground surface elevations are referenced to the contours and benchmarks shown on Plate 2. Our Office will continue to monitor the groundwater levels in each of the monitoring wells at approximate one-month intervals.

Table 2: Groundwater Conditions at Monitoring Wells

Basin Location	Boring No.	Date Measured	Boring Depth Drilled (m)	Approximate Ground Elevation (m)	Approximate Groundwater Elevation (m)
Basin 1	B 1-1	3/11/03	18.75	59.13	Not Encountered
	B 1-5	3/19/03	18.75	59.13	43.63
Basin 3	B 3-2	3/19/03	15.70	56.39	49.59
Basin 4	B 4-1	3/20/03	15.70	54.86	49.83
	B 4-3	3/26/03	14.17	54.86	51.16
Basin 7	B 7-1	3/19/03	18.75	57.91	44.96

The shallowest ground water levels were measured at 4 to 5 meters below the ground surface in Basins 3 and 4. Both of these proposed basins are close to Mariposa Creek and Duck Slough.

6. Subsurface Investigation Program

We performed our subsurface exploration program from March 10, 2003 to March 20, 2003. Sixteen borings were drilled to depths up to 18.75 m below the existing ground surface. Table 3 presents the locations of the sixteen borings performed. Plates 5 and 6 show the approximate locations of borings.

The borings were drilled using a trailer-mounted "Mobile Drill" rig and advanced using a 150-mm diameter hollow stem auger. Soil samples were recovered from these borings by driving a 35-mm ID split spoon sampler into the subsurface with 63.5-kg safety hammer dropped 762-mm. The number of hammer blows required to drive the sampler the last 300-mm into the soil formation was recorded and is presented on the boring logs. Samples recovered from the split spoon sampler were used to classify the soil types. Bulk samples of loose material were randomly collected using canvas bags at depths of 0-1m, 1.5-3m and 3-4.5m. The logs of the 16 borings and the associated legends are attached as Appendix I (Sheet 1 through 19A). There were nine percolation tests performed and six monitoring wells installed as shown in Table 3.

Table 3: Summary of Borings

Basin	Boring	Station (Mainline)	Offset (m)	Elevation (m)	Depth (m)	Remarks
Basin 1	B 1-1	122+20	70-m Left	± 59.13	18.75	Monitoring Well
	B 1-2	124+70	90-m Left	± 59.13	5.03	Percolation Test
	B 1-3	128+30	125-m Left	± 59.13	5.03	Percolation Test
	B 1-4	132+70	235-m Left	± 59.13	5.03	Percolation Test
	B 1-5	136+30	235-m Left	± 59.13	18.75	Monitoring Well
Basin 2	B 2-1	141+10	170-m Left	± 58.82	5.03	Percolation Test
	B 2-2	143+60	80-m Left	± 58.82	18.75	No groundwater
	B 2-3	146+50	100-m Left	± 58.82	5.03	Percolation Test
Basin 7	B 7-1	158+70	160-m Right	± 57.91	18.75	Monitoring Well
	B 7-2	159+20	120-m Right	± 57.91	5.03	Percolation Test
Basin 3	B 3-1	170+60	130-m Right	± 56.39	5.03	Percolation Test
	B 3-2	174+80	410-m Right	± 56.39	15.7	Monitoring Well
	B 3-3	178+30	100-m Right	± 56.39	5.03	Percolation Test
Basin 4	B 4-1	179+10	110-m Right	± 54.86	15.7	Monitoring Well
	B 4-2	181+30	380-m Right	± 54.86	5.03	Percolation Test
	B 4-3	183+20	80-m Right	± 54.86	14.17	Monitoring Well

7. Laboratory Testing

The following laboratory tests were performed on selected samples obtained from the borings.

- Unit Weight- CTM 212
- Moisture Content- CTM 226
- Mechanical Analysis- CTM 203
- Atterberg Limit- CTM 204
- Triaxial- UU – CTM 230
- Direct Shear- CTM 222
- Compaction Curve- CTM 216
- R-Value- CTM 301
- Corrosion- CTM 201/202/417/422/643

The referenced tests were used to assist in classifying the soil encountered. The results of the tests are presented on the boring logs at the corresponding sample locations. The test results are also summarized in Table 4. Plate 7 is a compendium of the results of grain size analyses of five samples listed in Table 4.

Table 4: Summary of Laboratory Tests

Location	Boring	Dry Density KN/m ³	Moisture Content %	Atterberg		Triaxial- UU	Direct Shear		Relative Compaction		Classification Test	R-Value
				LL	PI	Undrained Shear Strength (Su) kPa	C kPa	ϕ	γ_{max} kN/m ³	OMC %		
Basin 1	B 1-2-2	-	-	-	-	-	-	-	-	-	-	41
	B 1-3-4	18	16	-	-	-	-	-	-	-	-	-
	B 1-4-6	-	-	24	2	454	36	37	19	12	Y	-
Basin 2	B 2-1-2	-	-	24	5	567	-	-	20	11	Y	-
	B 2-2-4	16	20	-	-	-	-	-	-	-	-	-
	B 2-2-6	-	-	-	-	-	-	-	-	-	-	31
Basin 7	B 7-2-4	17	15	-	-	-	-	-	-	-	-	-
	B 7-2-6	-	-	30	9	594	0	28	19	13	Y	-
	B 7-2-8	-	-	-	-	-	-	-	-	-	-	29
Basin 3	B 3-1-4	17	19	-	-	-	-	-	-	-	-	-
	B 3-1-6	-	-	-	-	-	-	-	-	-	-	13
	B 3-1-8	-	-	33	13	673	-	-	19	11	Y	-
Basin 4	B 4-2-4	19	12	-	-	-	-	-	-	-	-	-
	B 4-2-6	-	-	-	-	-	-	-	-	-	-	26
	B 4-3-6	-	-	29	9	674	13	38	19	13	Y	-

8. Corrosion

Chemical tests were performed to determine the corrosion potential of the soil. The results from the corrosion testing are included in Table 5 below:

Table 5: Corrosion Test Results

Location	Boring	Sample Depth (m)	PH	Resistivity (ohm-cm)	Sulfate Content (PPM)	Chloride Content (PPM)	Years to Perforation for an 18-gage galvanized steel culvert
Basin 1	B 1-3-6	1.5- 3	7.34	2200	N/A	N/A	34
Basin 2	B 2-1-7	1.5- 3	8.45	2800	N/A	N/A	38
Basin 3	B 3-2-6	1.5- 3	8.00	1500	N/A	N/A	29
Basin 4	B 4-1-6	1.5- 3	8.73	1800	N/A	N/A	32
Basin 7	B 7-1-6	1.5- 3	8.27	1600	N/A	N/A	30
Corrosive if			<5.5	<1000	>2000	>500	

MR. ROBERTO BANDA

May 20, 2003

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Caltrans currently defines a corrosive area as an area where the soil and/or water contains more than 500 PPM of chlorides, or more than 2000 PPM of sulfates, or has a minimum resistivity of less than 1000 ohm-centimeters, or has a pH of 5.5 or less. With the exception of MSE Walls, chloride and sulfate tests (CTM 422 and CTM 417) are not required (N/A) if the minimum resistivity is greater than 1,000 ohm-cm.

The test results are consistent for soils present in the project area and within the non-corrosive limits established by the Department. Consequently, the soil should be considered non-corrosive with respect to pH and resistivity.

9. Percolation Testing

Nine percolation tests were performed between March 13 and 26, 2003. The tests were performed in drilled holes advanced to a depth of 5.0 meters. To prepare each hole for testing, a perforated plastic pipe (O.D 48.3mm/ID 36.8mm) between 1.5-m and 4.5-m in length was centered in the hole and select gravel backfill was placed in the resulting annulus.

The tests were performed by first presoaking the test holes overnight, and then filling the holes with relatively clean water. The rate of water level drop was monitored until stabilized percolation rates were obtained. The measured percolation rates are presented in Table 6.

We note that the State Storm Water Quality Practice Guidelines defines a *minimum acceptable infiltration rate* of 12.7 mm/hour and a *maximum allowable infiltration rate* of 63.5 mm/hr. In addition, the guidelines require a 3-meter minimum separation between the bottom of an infiltration basin and the highest groundwater elevation.

Table 6: Summary of Percolation Rates

Boring	Station (m)	Distance from CL (m)	Average Percolation Rate				Date Tested
			gal/ft ² /day	l/m ² /day	mm/hour	inch/hour	
B 1-2	122+20	70-m Left	4.0	165	6.9	0.3	3/13/03
B 1-3	128+30	150-m Left	3.7	150	6.2	0.3	3/13/03
B 1-4	132+70	235-m Left	1.6	66	2.8	0.1	3/26/03
B 2-1	141+10	170-m Left	12.7	519	21.6	0.9	3/13/03
B 2-3	146+50	100-m Left	2.5	101	4.2	0.2	3/19/03
B 3-1	170+60	130-m Right	10.1	411	17.2	0.7	3/20/03
B 3-3	178+30	100-m Right	11.8	482	20.1	0.8	3/19/03
B 4-2	181+30	380-m Right	66.7	2720	113.3	4.5	3/20/03
B 7-2	159+20	120-m Right	35.7	1456	60.7	2.4	3/20/03

We note that relatively clean water was used to perform the test above. However, highway runoff water will likely contain silt, clay, oil and/or other materials that would eventually decrease the percolation rates.

10. Geotechnical Recommendations

Due to the nature of this investigation, the geotechnical considerations discussed in this section are generally limited to infiltration basin design and borrow material assessment for embankment construction. It is our understanding that the District would like to construct basins that are 4 to 5 meters in depth. The side slope ratio of 1:6 (V:H) proposed by the District is acceptable at all basin locations. We recommend a grading factor of 90±5 percent be used for material quantity estimates.

In general, the combined percentage of silt and clay (passing #200 sieve) of the soils encountered exceeds 50 percent and thus is not recommended for infiltration. However, some percolation tests performed resulted in percolation rates greater than the 12.7 mm/hr minimum allowable. The borings revealed sand layers in some of the borings that would significantly increase infiltration. As such, infiltration basins may be constructed at the locations recommended below with the understanding that slow (and variable) infiltration rates will be experienced.

The following paragraphs discuss our observations and recommendations for each of the 5 proposed basins:

Basin 1

The soil present in Basin 1 consists of cohesive soils (stiff to very stiff, dry, sandy silt and clayey silt) with percolation rates ranging between 2.8 to 6.9 mm/hour, which is defined as slow to moderately slow. It is noted that the infiltration rates are significantly less than the minimum acceptable rate of 12.7 mm/hour as stated in the Statewide Storm Water Quality Practice Guidelines. Hence, it is our opinion that a basin constructed at this location will serve more as a detention basin than an infiltration basin. Based on our observations and laboratory testing, the excavated material (upper 5 meters) can be used for the planned embankment construction. It is our understanding that the District 10 Materials Branch has proposed a "Design R-Value" of 5 for the borrow material at all basin locations. The average R-value of the three tests performed by the District and the one test performed by this Office at Basin 1 is 41.

Basin 2

Although the soil present in Basin 2 is similar to Basin 1 (stiff to very stiff, dry, sandy silt and clayey silt), higher percolation rates were measured. The measured infiltration rate of 21.6 mm/hr exceeds the minimum acceptable rate 12.7 mm/hour as stated in the State Storm Water Quality Practice Guidelines. As such, Basin 2 would be used as an infiltration basin. The average R-value of the two tests performed by the District and the one test performed by this Office at Basin 2 is 33.

Boring B 2-3 was performed in the vicinity of a planned small basin or drainage ditch. The soil encountered in Boring B 2-3 consists of firm to hard clayey silt and sandy silt with a low permeability. Groundwater was not encountered in the boring which was terminated at a depth of 5 meters. It is our opinion, however, that the groundwater level is very deep and would not affect the planned construction activities.

Basin 3

The soil present in Basin 3 consists of very stiff to hard clayey to sandy silt. The average measured percolation rate of 18.6 mm/hr exceeds the minimum acceptable rate of 12.7

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May 20, 2003

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mm/hour as stated in the Statewide Storm Water Quality Practice Guidelines. However, the groundwater was measured at a depth of approximately 6 meters below the ground surface. As such, the maximum depth of basin should be 3 meters. The average R-value of the three tests performed by the District and the one test performed by this Office at Basin 3 is 10.

Basin 4

The soil present in Basin 4 consists of very stiff to hard clayey to sandy silt. The measured percolation rate of 113 mm/hr exceeds the maximum allowable rate of 63.5 mm/hour as stated in the Statewide Storm Water Quality Practice Guidelines. As such, a basin constructed at this location could not be used for infiltration purposes without modification. Additionally, the groundwater was measured at a depth of approximately 3.7 meters below the ground surface. As such, an infiltration basin cannot be constructed as a 3-meter minimum separation between the basin invert and groundwater surface is required. The average R-value of the one test performed by the District and the one test performed by this Office at Basin 4 is 18.

Basin 7

Basin 7 is located between Basins 2 and 3. The soil present consists of very stiff, dry, friable clayey silt and sandy silt, which is similar to the material present in Basin 2. The percolation rate of 60 mm/hr obtained during the test exceeds the minimum acceptable rate 12.7 mm/hour as stated in the State Storm Water Quality Practice Guidelines. Groundwater was encountered at 13 meters below the ground surface. As such, Basin 7 may be constructed as an infiltration basin. An R-value of 29 was obtained from the one test performed by this Office at Basin 7.

Embankments

It is our understanding that embankment heights between 1 and 3 meters are planned for the mainline. As the embankments will be constructed using fine-grained material side slope ratios of 1:4 (V:H) or flatter are recommended. Embankments should be constructed conformance with Section 19-6 "Embankment Construction" of the Caltrans Standard Specifications, July 1999. As most of the borrow material is fine-grained,

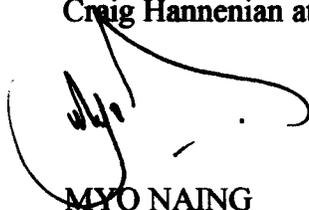
successful embankment construction during the wet winter months is questionable. We recommend that earthwork be suspended during these months.

11. Construction Considerations

As the materials encountered are mostly stiff to hard in consistency, it is anticipated that little settlement will occur during construction. Therefore, a settlement period is not recommended for the main line embankments. Settlement periods for structure approach fills will be addressed in the foundation report(s).

The Relative Compaction (CTM 216) tests performed on soil obtained from bag samples at shallow depths indicated that the samples could be compacted to maximum dry densities of 19 to 20 kN/m³ (120 and 125 pcf) at optimum moisture contents of 11 to 13%. In general, the in-situ moisture contents are greater than optimum so the soils excavated may need to be dried before used as embankment material.

If you have any questions or comments, please call Myo Naing at (916) 227-7233 or Craig Hannenian at (916) 227-7237.



MYO NAING
Engineering Geologist
Geotechnical Design - North



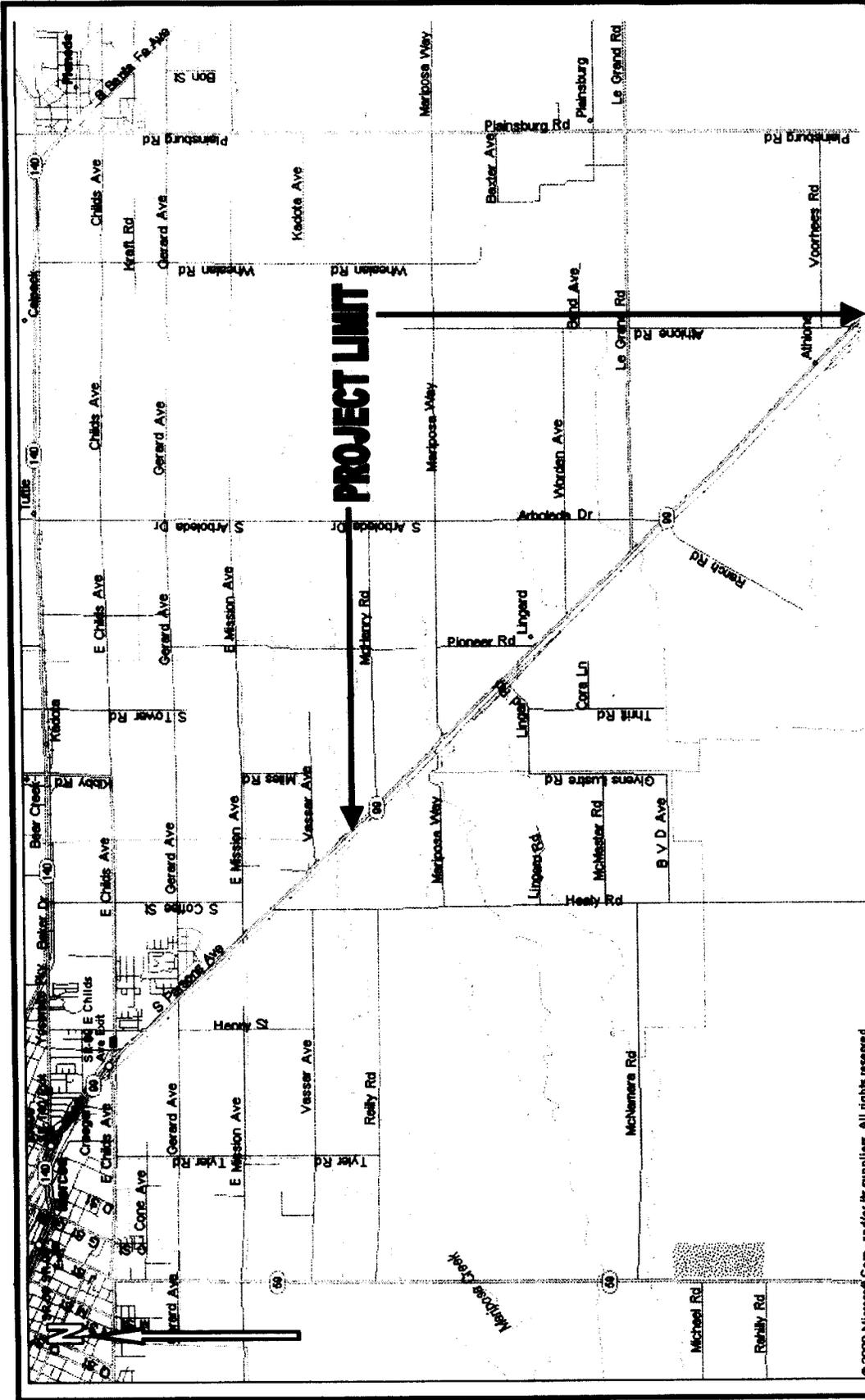
CRAIG HANNENIAN
Senior Materials & Research Engineer
Geotechnical Design - North

Attachments:

- Plates 1 to 7
- Appendix I

c: RoyBibbens
DaveDhillon
GDN 02





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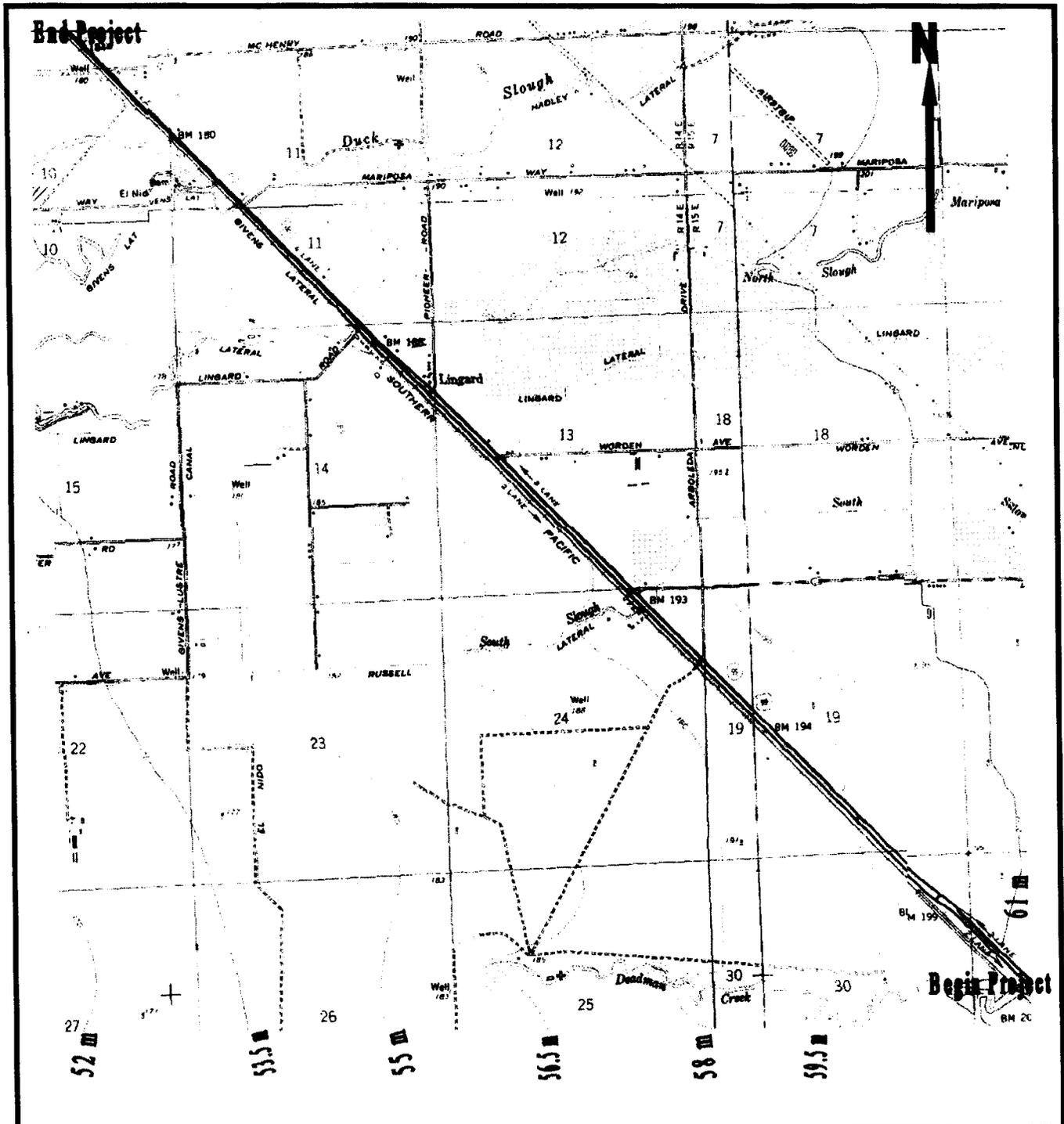
EA: 10-415700

May 2003

LOCATION MAP
 ARBOLEDA DR. FREEWAY

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

Plate 1



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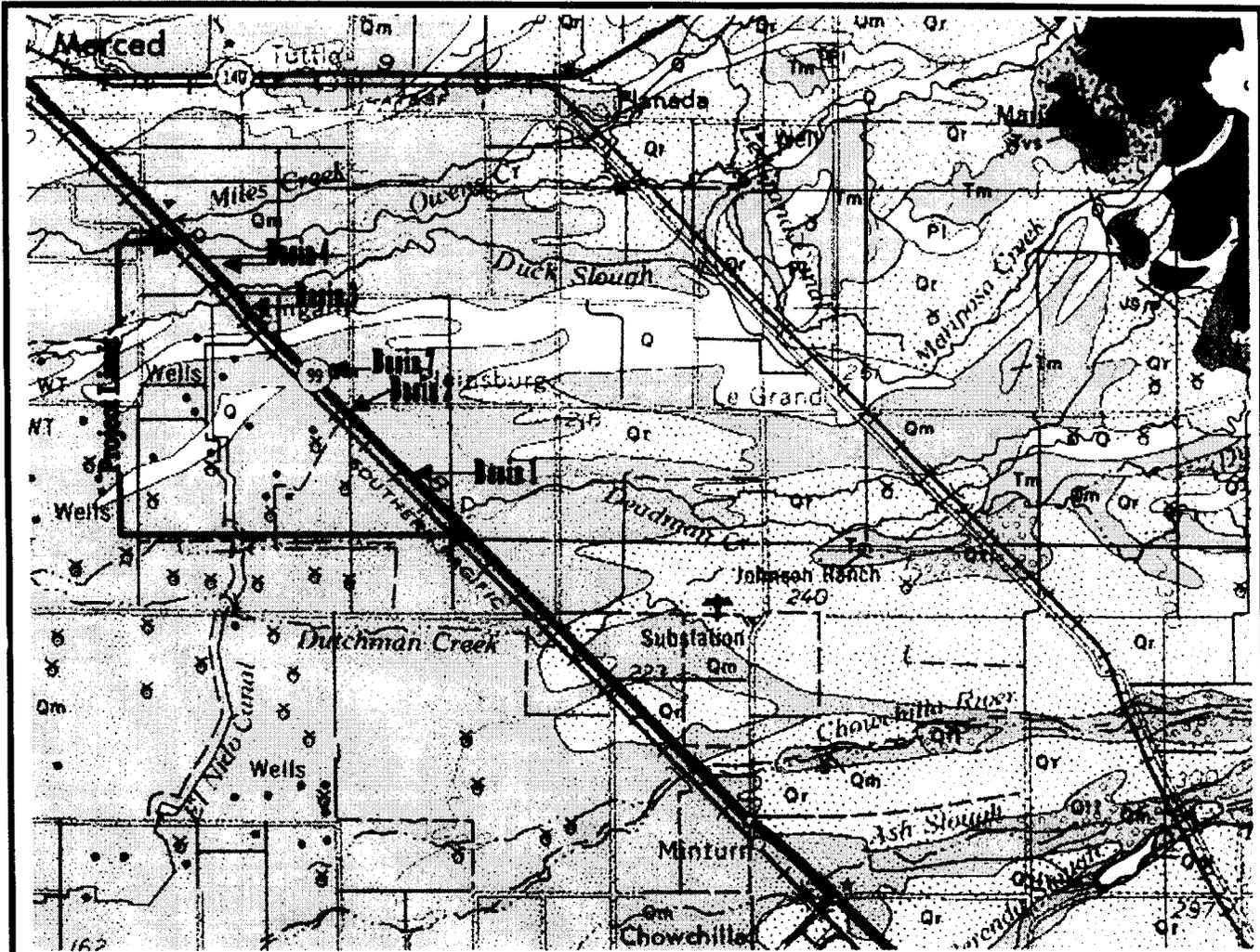
EA: 10-415700

Date: May 2003

TOPOGRAPHIC MAP
 ARBOLEDA DR. FREEWAY

10-MER-99-KP 7.4/16.9
 GEOTECHNICAL DESIGN REPORT

Plate 2



Legend

	Alluvium		Modesto Formation
	Modesto-Riverbank Formations		Riverbank Formation
	Older alluvium		Los Banos Alluvium
	Tule Lake Formation		North Merced Gravel
	Tulare Formation		
	Meherten Formation		
	June Formation		
	Granite rocks		
	Dioritic rocks		
	Gabbroic rocks		
	Ultramafic rock		
	Salt Springs and Merced Falls Slates		

Reference:
REGIONAL GEOLOGIC MAP OF THE SAN FRANCISCO-SAN JOSE QUADRANGLE PUBLISHED 1991
 COMPILED BY D.L. WAGNER,
 E.J. BORTUGNO and R.D. McJUNKIN
 (CDMG)(Map No. 5A)

Not To Scale



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 May 2003

Regional Geologic Map
 ARBOLEDA DR FREEWAY

10-MER-99-KP 7.4/ 16.9
GEOTECHNICAL DESIGN REPORT

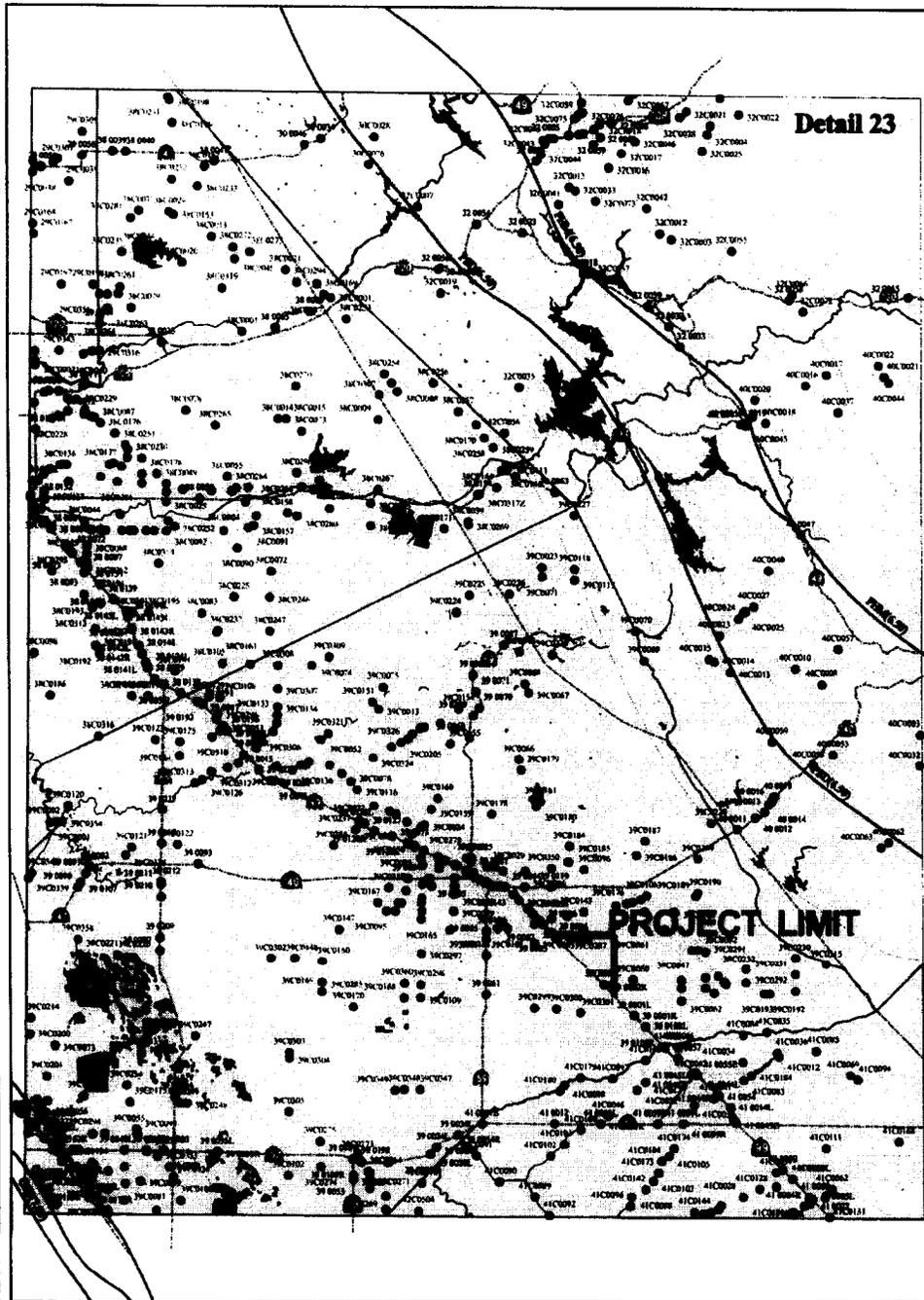
Plate 3

CALIFORNIA SEISMIC HAZARD MAP 1996 - DETAIL 23

BASED ON MAXIMUM CREDIBLE EARTHQUAKES (MCE)

OFFICE OF EARTHQUAKE ENGINEERING AND DESIGN SUPPORT
RAY ZELINSKI, CHIEF

BY
LALLIANA MUALCHIN
ENGINEERING SEISMOLOGIST
(GIS by Marton A. Foster & Ke Zhou)



- LEGEND:**
- Sbridge-23.shp
 - Lcbridge-23.shp
 - 0.6g Buffer
 - 0.5g Buffer
 - 0.4g Buffer
 - 0.3g Buffer
 - 0.2g Buffer
 - Faults-23.shp
 - Sbrwy-23.shp
 - Hydro_23.shp
 - Index-23.shp
 - Crtydata23.shp

SCALE

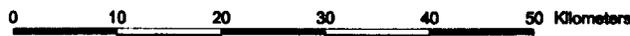
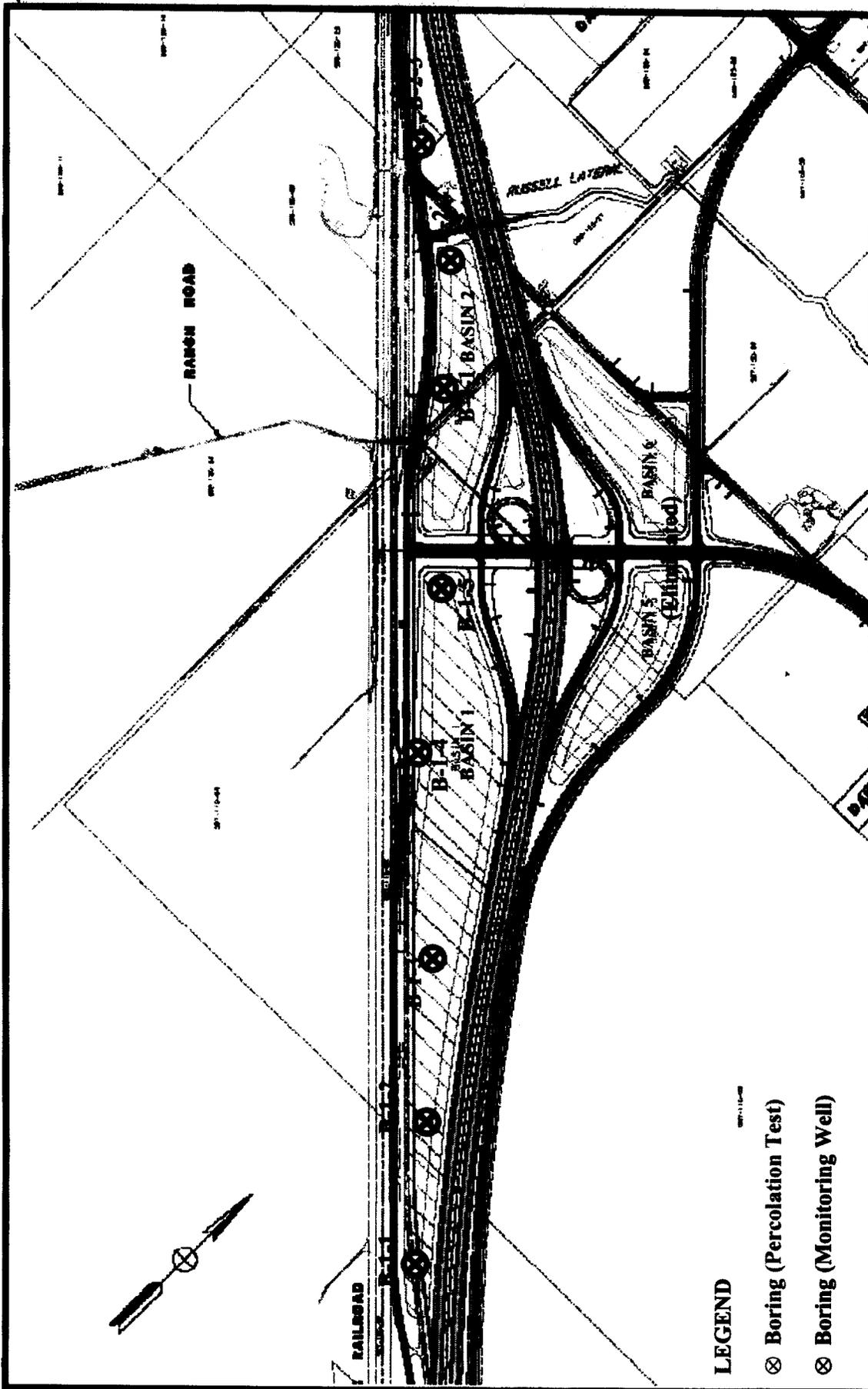
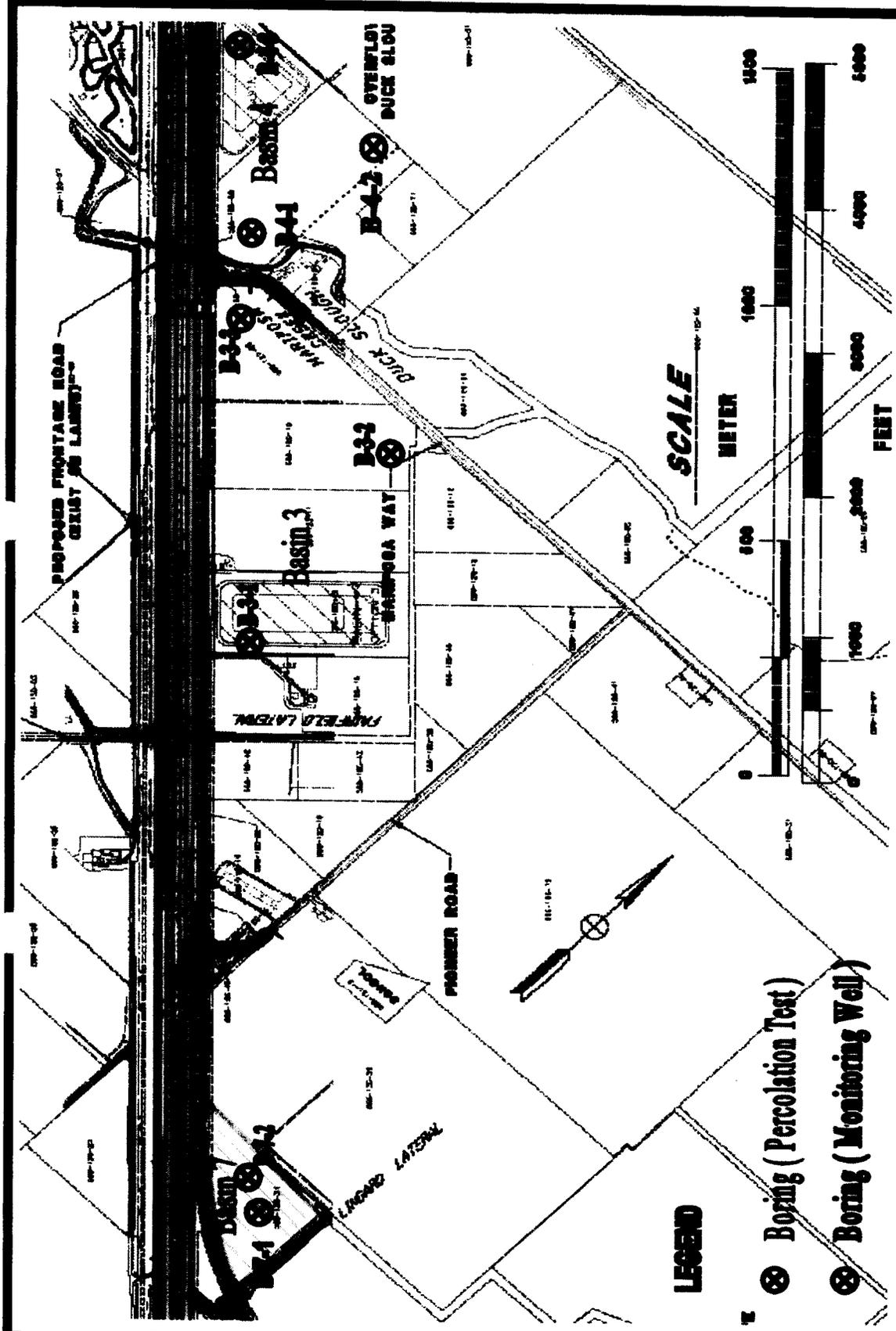


PLATE 4



CALTRANS Division of Engineering Services Geotechnical Services Geotechnical Design North	EA: 10-415700	LOCATION OF BORINGS ARBOLEDA DR. FREEWAY (Basin 1 and 2)
	May 2002	
10-MER-99-KP 7.4/16.9 GEOTECHNICAL DESIGN REPORT		Plate 5





LEGEND

- ⊗ Boring (Percolation Test)
- ⊙ Boring (Monitoring Well)



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 Geotechnical Services
 Geotechnical Design North

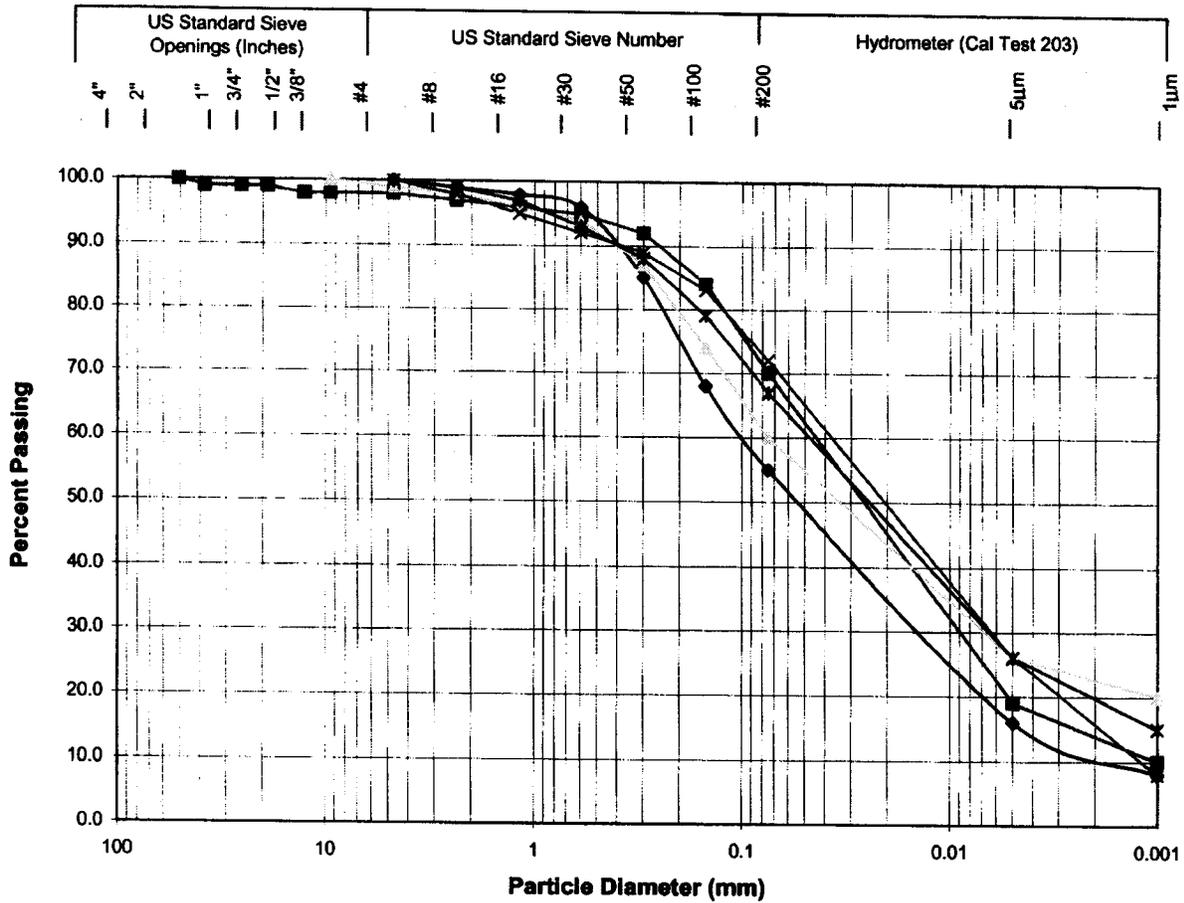
EA: 10-415700
 May 2003

LOCATION OF BORINGS
 ARBOLEDA DR. FREEWAY (Basin 3, 4,7)

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

Plate 6

Gradation Analysis Test Results



GRAVELS		SANDS			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

Sample ID: B 1-4-6 B 2-1-2 B 3-1-8 B 4-3-6 B 7-2-6



Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design North

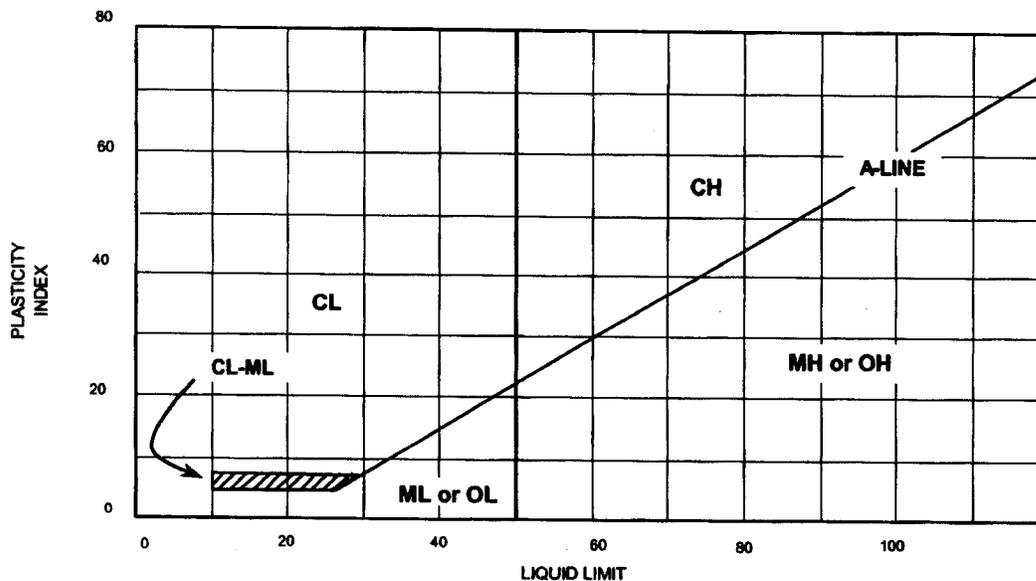
Project:	ARBOLEDA DR FREEWAY
EA:	10-415700
D.-Co.-Rt.-:	10-MER-99-KP7.4/16.9
Plate 7	

Appendix I
(Logs of Borings)

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			SYMBOLS	TYPICAL NAMES		
COARSE-GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES	
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES	
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES	
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES	
	SANDS Over 50% < #4 sieve	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS	
			SP		POORLY GRADED SANDS, GRAVELLY SANDS	
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES	
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES	
			SILTS AND CLAYS Liquid limit < 50	ML		INORGANIC SILTS, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS
SILTS AND CLAYS Liquid limit > 50	OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY			
	MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS			
	CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS			
	OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS			
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS	

PLASTICITY CHART
(USED FOR CLASSIFICATION OF FINE-GRAINED SOILS)



U.S. STANDARD
SIEVE

SOIL GRAIN SIZE

	12"	3"	3/4"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE			
SOIL GRAIN SIZE (in mm)	300	75	19	4.75	2.0	0.425	0.075	0.005	



Caltrans
Engineering Service Center
Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700
Date: May-03

**SOIL CLASSIFICATION
SYSTEM**

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.
1

SYMBOLS

	SANDSTONE
	CLAYSTONE
	SILTSTONE
	MUDSTONE
	SHALE

	INTRUSIVE
	ULTRAMAFIC
	GREENSTONE
	SCHIST
	GRANITIC

	VOLCANIC
	TUFF
	CONGLOMERATE
	BRECCIA
	METAMORPHIC (general)

DESCRIPTIVE TERMINOLOGY

DEGREE OF WEATHERING

Descriptor	Criteria
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 25.4 mm into rock.
Moderately weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Intensely weathered	Rock mass is more than 50% decomposed. Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock "fabric" may be evident. May be reduced to soil with hand pressure.

FRACTURING & FOLIATION (BEDDING)

Fracturing Descriptor*	Foliation (Bedding) Descriptor	Thickness/Spacing Criteria
Unfractured	Massive	None observed
		Greater than 3m
Very slightly fractured	Very thickly foliated	Between 1m and 3m
		Slightly fractured
Moderately fractured	Moderately foliated	Between 100mm and 300mm
Intensely fractured	Thinly foliated	Between 30mm to 100 mm
Very intensely fractured	Very thinly foliated	Between 10mm to 30 mm
	Laminated (or intensely foliated)	Less than 10mm (3/8")

*Note: Spacing criteria for fracturing can refer to general or average recovery length of core measured along core axis; For other exposures, the criteria is distance measured between fracture (size of blocks).

RELATIVE HARDNESS

Descriptor	Criteria
Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.
Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
Moderately Hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
Moderately Soft	Can be grooved 2 mm (1/16") deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.



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EA: 10-415700

Date: May-03

**ROCK CLASSIFICATION
SYSTEM**

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.

2

SAMPLING DATA

TYPE

	25 mm (1") O.D. Caltrans One Inch Sampler (NT)		25 mm (1") O.D. Caltrans One Inch Sampler (LT)
	51 mm (2") O.D. Standard Penetration Test Sampler (NT)		51 mm (2") O.D. Standard Penetration Test Sampler (LT)
	64 mm (2.5") O.D. Modified California Sampler (NT)		64 mm (2.5") O.D. Modified California Sampler (LT)
	76 mm (3") O.D. California Sampler (NT)		76 mm (3") O.D. California Sampler (LT)
	Shelby Tube (NT)		Shelby Tube (LT)
	NQ Size (2.0" ID) Core Barrel (NT)		NQ Size Core Barrel (LT)
	HQ Size (2.5" ID) Core Barrel (NT)		HQ Size Core Barrel (LT)
	Bulk Sample Collected from Cuttings (NT)		Bulk Sample Collected from Cuttings (LT)

Note: LT=lab testing performed on sample; NT= no lab testing performed on sample

DRIVING DATA

23	23 blows drove sampler 305mm, after initial 152mm of seating
68/203(8)	68 blows drove sampler 203mm (8"), after initial 152mm of seating
*50/76(3)	50 blows drove sampler 76mm (3") during seating interval (Note: To avoid damage to sampling tools, driving is limited to 50 blows per 152mm interval)
PUSH	Sampler pushed under static load
20@150	20 seconds time @ an average pressure of 150 psi to descend depth interval of 305 mm (1 ft) (Note: ## indicates no reading obtained)
NR	Indicates no recovery of material in sampler for entire drive

OTHER SYMBOLS

	Water level encountered while drilling (Time/Date)		Strata boundary inferred without visual confirmation (i.e. no sample or boring cuttings retrieval)
	Water level measured in hole after drilling (Time/Date)		
	Seepage from sidewall noted		

TESTING

CONS	Consolidation (Cal Test 219)	L _r	Recovery Ratio (rock cores only)
UU	Uncons. Undrained Triaxial (Cal Test 230)	RQD	Rock Quality Designation (%)
CU	Cons. Undrained Triaxial (Cal Test 230)	CP	Compaction Test (Cal Test 216)
DS	Cons. Drained Direct Shear (ASTM D3080)	PERM	Permeability (Cal Test 220)
UCC	Unconfined Compression (Cal Test 221)	COR	Corrosivity Testing (Cal Test 532/643)
LL	Liquid Limit-% (Cal Test 204)	GRAD	Gradation Analysis (Cal Tests 202/203)
PI	Plasticity Index (Cal Test 204)	EP	Expansion Pressure Test (Cal Test 354)
PP	Pocket Penetrometer	TORV	Pocket Torvane Test
S _u	Undrained Shear Strength: From UU, or one-half the unconfined compressive strength per UCC or PP; Intended as a guideline only and does not address clay content or draining characteristics of material.		Dip Angle

GENERAL NOTES

1. Logs represent general subsurface conditions observed at the point of exploration on the date indicated.
2. In general, USCS designations presented on logs were established by visual methods only; Therefore, actual designations (based on laboratory tests) may vary.
3. No warranty is provided as to the continuity of soil conditions between individual sample locations.
4. Lines separating strata on the logs represent approximate boundaries only; actual transitions may be gradual.



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North

EA: 10-415700

Date: May-03

BORING LOG LEGEND

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.

3

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/11/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 122+20, Proposed (STA:KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 70 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS		
59.13				SANDY SILT, stiff, dry, olive gray	MH	○	1-1-1	11					Piezometer installed Screen at 12.2- 18.3 m 38.1 mm ID PVC		
				- hard, dry, presence of plant roots	MH	○	1-1-2	31							
57.91	1.22	4			- very stiff, dry, low plasticity, light brown	MH	○	1-1-3	16						
				CLAYEY SILT, very stiff, dry, low plasticity, light brown	ML	○	1-1-4	16							
56.69	2.44	8			- very stiff	ML	○	1-1-5	30						
					- very stiff	ML	○	1-1-6	28						
54.25	4.88	16			SILTY SAND, fine to medium grained, medium dense, dry, yellowish brown	SM	○	1-1-7							Bulk sample at 3-4.5 m
						SM	○	1-1-8	25						
53.03	6.10	20			- dense, light gray	SM	○	1-1-9	48						
					- fine grained, poorly graded, medium dense, light gray	SM	○	1-1-10	25						
51.81	7.32	24													
50.60	8.53	28			CLAYEY SILT, very stiff, low plasticity, dry micaceous, light brown	ML									
				- very stiff, light brown	ML	○	1-1-11	16							
49.38	9.75	32													
				- damp to moist, micaceous	ML	○	1-1-12	23							
48.16	10.97	36													
				SILTY CLAY, very stiff, micaceous, moist, greenish gray	CL										
46.94	12.19	40													



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Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700
Date: May-03

LOG OF BORING NO. B1-1

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT
SHEET NO. 4

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/11/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 53+30, Escalon- (STA;KP;PM): Bellota Rd.		APPROX. DISTANCE FROM Approx. 3 m ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
45.72	13.41	44		SILTY CLAY, very stiff, micaceous, moist, greenish gray	CL	O	1-1-13	17					Piezometer installed Screen at 12.2- 18.3 m 38.1 mm ID PVC
44.50	14.63	48		SILTY SAND, fine to medium grained with little coarse sand, poorly graded, very dense, moist, light brown - excess of medium grained, dense	SM	O	1-1-14	70					
43.28	15.85	52		CLAYEY SILT, hard, damp, low plasticity, friable light gray - hard, friable, light gray		O	1-1-15	47					
42.06	17.07	56		CLAYEY SILT, hard, damp, low plasticity, friable light gray - hard, friable, light gray		O	1-1-16	44					
40.84	18.29	60		CLAYEY SILT, hard, damp, low plasticity, friable light gray - very stiff		O	1-1-17	21					
40.38	18.75	61.5		Bottom of Boring @ 18.75 m No groundwater encountered at time of boring									



Engineering Service Center
Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700
Date: May-03

LOG OF BORING NO. B1-1

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.
4A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/11/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 124+70, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 90 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
59.13				CLAYEY SILT, firm, low plasticity, damp to moist, olive gray	ML	○	1-2-1	8					Percolation test performed Bulk samples at 0-1 m R-value 41 at 1-2-2 Bulk sample at 1.5-3 m Bulk sample at 3-4.5 m
				CLAYEY TO SANDY SILT, stiff, dry, light brown	ML/MH	○	1-2-2						
57.91	1.22	4				ML/MH	○	1-2-3	12				
						ML/MH	○	1-2-4	13				
					SANDY SILT, stiff, dry, light brown	MH	○	1-2-5	12				
56.69	2.44	8			- very stiff, dry	MH	○	1-2-6	21				
								1-2-7					
55.47	3.66	12			SILTY SAND medium dense, dry, poorly graded, light brown	SM	○	1-2-8	25				
								1-2-9					
54.25	4.88	16			CLAYEY TO SANDY SILT, very stiff, dry, light brown	ML/MH	○	1-2-10	22				
54.10	5.03	16.5		Bottom of Boring @ 5.03 m No groundwater encountered at time of boring									

 <p>Engineering Service Center Division of Geotechnical Services Office of Geotechnical Design - North</p>	EA: 10-415700	LOG OF BORING NO. B1-2
	Date: May-03	
	10-MER-99-KP 7.4/16.9	
GEOTECHNICAL DESIGN REPORT		

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-3
BORING DIAMETER: 125 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/11/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 128+30, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 125 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
59.13				CLAYEY SILT, soft, damp, dark gray	ML	○	1-3-1	3					Percolation test performed
57.91	1.22	4		SANDY SILT, stiff, dry, dark gray	MH	○	1-3-2	14					
				- very stiff, light brown	MH	○	1-3-3	17					
				- hard, light brown	MH	▣	1-3-4	49	16	18			50mm Brass Tube samples
56.69	2.44	8			MH	○	1-3-5	41					
				- hard, low plasticity, light brown	MH	○	1-3-6						Bulk sample at 1.5-3 m
55.47	3.66	12			MH	○	1-3-7	37					
				- stiff, low plasticity, light brown	MH	○	1-3-8						Bulk sample at 3-4.5 m
54.25	4.88	16					1-3-9	9					
54.10	5.03	16.5		Bottom of Boring @ 5.03 m No groundwater encountered at time of boring									

 <p>Engineering Service Center Division of Geotechnical Services Office of Geotechnical Design - North</p>	EA: 10-415700	LOG OF BORING NO. B1-3
	Date: May-03	
	10-MER-99-KP 7.4/16.9	
GEOTECHNICAL DESIGN REPORT		

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-4
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/20/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 132+70, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 235 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
59.13				CLAYEY SILT, firm, low plasticity, damp, dark gray	ML	O	1-4-1	6					Percolation test performed	
				- hard, light gray	ML	O	1-4-2	38						
57.91	1.22	4		SANDY SILT, hard, dry, light brown	MH	O	1-4-3	+ 50						
				- hard, dry, light brown	MH	Z	1-4-4	+ 50					50mm Brass Tube samples	
56.69	2.44	8		- hard, friable	MH	O	1-4-5	39						
							1-4-6					2.0	454	Bulk sample at 1.5-3 m
55.47	3.66	12		CLAYEY SILT, very stiff, friable, dry, light brown	ML	O	1-4-7	23						
							1-4-8							Bulk sample at 3-4.5 m
54.25	4.88	16			ML	O	1-4-9	27						
54.10	5.03	16.5		SANDY SILT, very stiff, dry, light brown	MH									
				Bottom of Boring @ 5.03 m No groundwater encountered at time of boring										



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GEOTECHNICAL DESIGN REPORT	SHEET NO. 7

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-5
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 15.5 m (3/19/03)	DATE PERFORMED: 3/10/03 to 3/11/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 136+30, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 235 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
59.13				SANDY SILT, firm, damp to moist, dark gray	MH	○	1-5-1	7					Piezometer installed -Screen at 12.2- 18.3 m -38 mm ID PVC Bulk sample at 3-4.5 m
				- stiff, light gray	MH	○	1-5-2	10					
57.91	1.22	4			- stiff, dry	MH	○	1-5-3	13				
				SILTY SAND, fine grained, medium dense, poorly graded, light brown	SM	○	1-5-4	29					
56.69	2.44	8			- very dense, light brown		○	1-5-5	+50				
					- loose, light brown		○	1-5-6	7				
55.47	3.66	12			CLAYEY SILT, stiff, damp to moist, light brown	ML							
								1-5-7					
54.25	4.88	16			- stiff, moist, light brown	ML	○	1-5-8	11				
				SANDY SILT, very stiff, friable, light brown	MH								
53.03	6.10	20				MH	○	1-5-9	29				
				SILTY SAND, medium dense, fine to coarse grained light brown	SM								
51.81	7.32	24			SM	○	1-5-10	22					
50.60	8.53	28											
49.38	9.75	32		-dense, fine grained, poorly graded light brown	SM	○	1-5-11	33					
48.16	10.97	36		- medium dense, moist, light gray	SM	○	1-5-12	21					
			SILTY CLAY, hard, low plasticity, moist, light gray	CL									
46.94	12.19	40											



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SHEET NO.
8

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 59.13 m (approximate)	LOG I.D. Boring No. B1-5
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 15.5 m (3/19/03)	DATE PERFORMED: 3/10/03 to 3/11/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 136+30, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 235 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
45.72	13.41	44		SILTY CLAY, hard, low plasticity, moist, light gray	CL	O	1-5-13	37					Piezometer installed -Screen at 12.2- 18.3 m -38 mm ID PVC
44.50	14.63	48		CLAYEY SILT, trace of fine sand, very stiff, damp to moist, light gray	ML	O	1-5-14	22					
43.63	15.50			SILTY SAND, dense, fine grained, poorly graded, moist, light gray	SM	O	1-5-15	40					
43.28	15.85	52		SILTY SAND, fine to medium grained, dense, wet light brown		O	1-5-16	35					
40.84	18.29	60		CLAYEY SILT, very stiff, low plasticity, light brown		O	1-5-17	24					
40.38	18.75	61.5		Bottom of Boring @ 18.75 m									



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SHEET NO.

8A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 58.82 m (approximate)	LOG I.D. Boring No. B 2-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/12/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 141+10, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 170 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
58.82				CLAYEY SILT, soft, low plasticity, dry, dark gray	ML	○	2-1-1	4				567	Percolation test performed Bulk sample at 0-1 m	
							○	2-1-2						
							○	2-1-3	7					
57.60	1.22	4			-w/ trace of fine sand, stiff, dry, olive gray	ML	○	2-1-4	12					
					- very hard, dry, dark gray	ML	□	2-1-5	+ 50					50mm Brass Tube samples
56.38	2.44	8			SANDY SILT, hard, dry, light brown	MH	○	2-1-6	+ 50					
							○	2-1-7						Bulk sample at 1.5-3 m
							○	2-1-8	40					
55.16	3.66	12					○	2-1-9						Bulk sample at 3-4.5 m
							○	2-1-10	33					
53.94	4.88	16		SILTY SAND, fine to medium grained, dense, light brown	SM	○								
53.79	5.03	16.5		Bottom of Boring @ 5.03 m No groundwater encountered at time of boring										



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GEOTECHNICAL DESIGN REPORT

SHEET NO. 9

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 58.82 m (approximate)	LOG I.D. Boring No. B2-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: Not encountered	DATE PERFORMED: 3/12/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 143+60, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 80 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
58.82				CLAYEY SILT, very soft, dark gray	ML	○	2-2-1	2					No Piezometer installed due to absence of water	
				- firm, low plasticity, dark gray		○	2-2-2	7						
57.60	1.22	4				○	2-2-3	14						
					SANDY SILT, stiff, dry, light brown	MH	▴	2-2-4	27	20	16			2" Brass Tube samples
56.38	2.44	8			- very hard, dry, light brown	MH	○	2-2-5	+50					
					SILTY SAND, medium dense, fine to medium grained, dry, light brown	SM	○	2-2-6 2-2-7	14					Bulk sample at 1.5-3 m R-value 31 at 2-2-6
55.16	3.66	12												
53.94	4.88	16			SANDY SILT, stiff, friable, dry, light brown	MH	○	2-2-8	12					
					very stiff, dry, light brown	MH	○	2-2-9	24					
51.50	7.32	24			hard, dry, friable, light brown	MH	○	2-2-10	+50					
50.29	8.53	28			very hard, dry	MH	○	2-2-11	+50					
49.07	9.75	32			CLAYEY SILT, very stiff, friable, dry, light brown	ML								
47.85	10.97	36			ML	○	2-2-12	30						
46.63	12.19	40												



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 GEOTECHNICAL DESIGN REPORT

SHEET NO.
 10

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 58.82 m (approximate)	LOG I.D. Boring No. B2-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: Not encountered	DATE PERFORMED: 3/10/03 to 3/11/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 143+60, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 80 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
45.41	13.41	44		SILTY SAND, fine to medium grained, dry, medium dense, light brown	SM	O	2-2-13	23						
							O	2-2-14	20					
44.19	14.63	48		SILTY CLAY, very stiff, low plasticity, friable light gray	CL		O	2-2-15	19					
				very stiff			O	2-2-16	15					
42.97	15.85	52		stiff, light gray			O	2-2-17	33					
41.75	17.07	56		hard, dry, friable, light brown										
40.53	18.29	60												
40.07	18.75	61.5		Bottom of Boring @ 18.75 m No groundwater encountered at time of boring										



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SHEET NO.
 10A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 58.82 m (approximate)	LOG I.D. Boring No. B 2-3
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/12/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 148+50, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 100 m Left ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY KN/m^3	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
58.82				SILTY SAND w/ rock chips(fills), loose, dry, dark gray	SM	O	2-2-1	4					Percolation test performed Bulk sample at 3-4.5 m
57.60	1.22	4		CLAYEY SILT, firm, low plasticity, dry, dark gray	ML	O	2-2-2	6					
				-w/ trace of fine sand, stiff, dry, dark gray	ML	O	2-2-3	11					
				-stiff, slight plasticity, dark gray	ML	O	2-2-4	15					
56.38	2.44	8		SANDY SILT, hard, dry, light brown	MH	O	2-2-5	+ 50					
					MH	O	2-2-6	47					
55.16	3.66	12											
53.94	4.88	16			MH	O	2-2-7						
53.79	5.03	16.5					2-2-8	12					
				Bottom of Boring @ 5.03 m No groundwater encountered at time of boring									



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GEOTECHNICAL DESIGN REPORT	SHEET NO. 11

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 57.91 m (approximate)	LOG I.D. Boring No. B7-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 12.95 m (3/19/03)	DATE PERFORMED: 3/13/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 158+70, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 160 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
57.91				CLAYEY SILT, soft, low plasticity, dark gray	ML	○	7-1-1	5					Piezometer installed -Screen bet. 12.2 & 18.3m -38 mm ID PVC Bulk sample at 1.5-3 m
				- very stiff, dark gray	ML	○	7-1-2	21					
56.69	1.22	4		-w/ trace of fine sand, hard, low plasticity, dry, light brown	ML	○	7-1-3	33					
				- dry, light brown	ML	○	7-1-4	43					
					ML	○	7-1-5	32					
55.47	2.44	8		- dry, light brown	ML	○	7-1-6						
						○	7-1-7	33					
54.25	3.66	12		SANDY SILT, hard, very slight plasticity, dry, light brown	MH	○							
				CLAYEY SILT, hard, dry, friable, light brown	ML								
53.03	4.88	16			ML	○	7-1-8	36					
				SANDY SILT, hard, dry, low plasticity, light brown	MH								
51.81	6.10	20			MH	○	7-1-9	36					
			CLAYEY SILT, micaceous, hard, dry, friable, light brown	ML									
50.59	7.32	24		ML	○	7-1-10	45						
			hard, dry, light brown										
49.38	8.53	28											
			hard, dry, light brown	ML	○	7-1-11	39						
48.16	9.75	32											
46.94	10.97	36	SANDY SILT, very stiff, micaceous, dry, moist light brown	MH	○	7-1-12	25						
45.72	12.19	40											



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GEOTECHNICAL DESIGN REPORT	SHEET NO. 12

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 57.91 m (approximate)	LOG I.D. Boring No. B7-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 12.95 m (3/19/03)	DATE PERFORMED: 3/13/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 158+70, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 160 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
44.96	12.95	44		SILTY SAND, fine grained, moist, medium dense, poorly graded, light brown - wet, micaceous, light gray	SM	O	7-1-13	16					
44.50	13.41	44		- dense, micaceous, wet, poorly graded, light gray	SM	O	7-1-14	35					
43.28	14.63	48		- medium dense, light gray		O	7-1-15	22					
42.06	15.85	52											
40.84	17.07	56		SAND, fine to medium grained, excess of fine, poorly graded, medium dense, light gray	SP								
39.82	18.29	60		-medium dense, water bearing sand	SP	O	7-1-16	23					
39.16	18.75	61.5			SP	O	2-2-17	21					
				Bottom of Boring @ 18.75 m									



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SHEET NO.
 12A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 57.91 m (approximate)	LOG I.D. Boring No. B 7-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/19/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 159+20, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 120 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
57.91				CLAYEY SILT, firm, low plasticity, dry, dark gray	ML	○	7-2-1	6					Percolation test performed	
				- very stiff, dry, light gray	ML	○	7-2-2	30						
56.69	1.22	4			- hard, dry, friable, light gray	ML	○	7-2-3	21					
						ML	◐	7-2-4	+ 50	15	17		50mm Brass Tube samples	
55.47	2.44	8			SANDY SILT, very stiff, dry, light brown	MH	○	7-2-5	21					
					- very stiff, dry, light brown	MH	○	7-2-6				9.0	594	Bulk samples at 1.5-3 m
54.25	3.66	12				MH	○	7-2-7	26					
53.03	4.88	16			- very stiff, dry, light brown		○	7-2-8						Bulk samples at 3-4.5 m
52.88	5.03	16.5					○	7-2-9	30					R-value 29 at 7-2-8
				Bottom of Boring @ 5.03 m No groundwater encountered at time of boring										



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GEOTECHNICAL DESIGN REPORT

SHEET NO.
13

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 56.39 m (approximate)	LOG I.D. Boring No. B 3-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/17/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 170+60, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 130 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
56.39				SILTY CLAY, firm, slight plasticity, moist, dark gray - hard, light gray	CL	○	3-1-1	7					Percolation test performed	
							○	3-1-2	36					
55.17	1.22	4			CLAYEY SILT, hard, dry, friable, light gray - hard, dry, friable, light gray	ML	○	3-1-3	45					
						ML	◐	3-1-4	+ 50	19	17			50mm Brass Tube samples
53.95	2.44	8			- hard, light brown	ML	○	3-1-5	47					
						ML	○	3-1-6						Bulk samples at 1.5-3 m R-value 13 at 3-1-6
52.73	3.66	12			- presence of fine sand, stiff light brown	ML	○	3-1-7	15					
						ML	◐	3-1-8				13.0	673	Bulk samples at 3-4.5 m
51.51	4.88	16			- very stiff, dry, light brown	ML	○	3-1-9	23					
51.36	5.03	16.5		Bottom of Boring @ 5.03 m No groundwater encountered at time of boring										



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SHEET NO.
14

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 56.39 m (approximate)	LOG I.D. Boring No. B3-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 6.80 m (3/19/03)	DATE PERFORMED: 3/18/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 174+80, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 410 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
56.39				CLAYEY SILT, very stiff, slight plasticity, moist, dark gray	ML	○	3-2-1	17					Piezometer installed
				- very stiff, dark gray	ML	○	3-2-2	26					-Screen bet. 6.1 & 15.24m
55.17	1.22	4		- hard, light gray	ML	○	3-2-3	+50					-38 mm ID PVC
				- hard, light gray	ML	□	3-2-4	+50					50mm Brass Tube samples
53.95	2.44	8		CLAYEY to SANDY SILT, hard, friable, light brown	ML/MH	○	3-2-5	+50					Bulk samples at 1.5-3 m
				SANDY SILT, very stiff, dry, friable, light brown	MH	○	3-2-6	24					
52.73	3.66	12					3-2-7	24					
				very stiff, dry, friable, light brown	MH	○	3-2-8	22					Bulk samples at 3-4.5 m
51.51	4.88	16					3-2-9	22					
50.29	6.10	20		CLAYEY SILT, very stiff, low plasticity, friable, moist, light brown	ML	○	3-2-10	24					
49.59	6.80	24											
49.07	7.32	24		SILTY SAND, fine to medium grained, medium dense, wet, light brown	SM	○	3-2-11	14					
				- very dense, poorly graded, light brown	SM	○	3-2-12	+50					
47.86	8.53	28											
46.64	9.75	32					3-2-13	45					
45.42	10.97	36		CLAYEY SILT, hard, slight plasticity, light brown	ML	○							
44.20	12.19	40											



Engineering Service Center
 Division of Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-415700

Date: May-03

LOG OF BORING NO. B3-2

10-MER-99-KP 7.4/16.9
 GEOTECHNICAL DESIGN REPORT

SHEET NO.

15

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 56.39 m (approximate)	LOG I.D. Boring No. B3-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 6.80 m (3/19/03)	DATE PERFORMED: 3/13/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 174+80, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 410 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY KN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
42.98	13.41	44	[Vertical scale with tick marks]	CLAYEY SILT, hard, slight plasticity, light brown	ML	○	3-2-14	48					
				- very stiff	ML	○	3-2-15	20					
41.76	14.63	48		- hard	ML	○	3-2-16	34					
40.69	15.70	51.5		Bottom of Boring @ 15.70 m									



Engineering Service Center
 Division of Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-415700	LOG OF BORING NO. B3-2
Date: May-03	
10-MER-99-KP 7.4/16.9	
GEOTECHNICAL DESIGN REPORT	SHEET NO. 15A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 56.39 m (approximate)	LOG I.D. Boring No. B 3-3
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: not encountered	DATE PERFORMED: 3/17/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 178+30, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 100 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
56.39				CLAYEY SILT, stiff, slight plasticity, moist, dark gray	ML	○	3-3-1	12					Percolation test performed
				- stiff, dark gray	ML	○	3-3-2	16					
55.17	1.22	4		- very stiff, light gray	ML	○	3-3-3	23					
				- very hard, friable	ML	□	3-3-4	+ 50					50mm Brass Tube samples
53.95	2.44	8		- hard, friable	ML	○	3-3-5	+ 50					
				- hard, light brown	ML	○	3-3-6						Bulk samples at 1.5-3 m
52.73	3.66	12			ML	○	3-3-7	43					
51.51	4.88	16			ML	○	3-3-8						Bulk samples at 3-4.5 m
51.36	5.03	16.5			ML	○	3-3-9	40					
				Bottom of Boring @ 5.03 m No groundwater encountered at time of boring									



Engineering Service Center
Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700
Date: May-03

LOG OF BORING NO. B3-3

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.
16

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 54.86 m (approximate)	LOG I.D. Boring No. B4-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 5.03 m (3/20/03)	DATE PERFORMED: 3/18/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 179+10, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 110 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
54.86				CLAYEY SILT, stiff, low plasticity, dark gray	ML	○	4-1-1	13					Piezometer installed -Screen bet. 6.1 & 15.24m -38 mm ID PVC 50mm Brass Tube samples Bulk samples at 1.5-3 m Bulk samples at 3-4.5 m No SPT at 10.7m due to drilling downhole problem, resolved & continued drilling
				- stiff, dark gray	ML	○	4-1-2	13					
53.64	1.22	4		- firm, light brown	ML	○	4-1-3	8					
				- stiff, light brown	ML	○	4-1-4	13					
52.42	2.44	8		SANDY SILT, firm, friable, light brown	MH	○	4-1-5	7					
						○	4-1-6						
51.20	3.66	12		CLAYEY SILT, very stiff, low plasticity, friable, light brown	ML	○	4-1-7	16					
							4-1-8						
49.98	4.88	16		- stiff, moist, light brown	ML	○	4-1-9	15					
49.83	5.03												
48.76	6.10	20		- stiff, slight plasticity, wet, light brown	ML	○	4-1-10	10					
47.54	7.32	24											
				CLAYEY to SANDY SILT, hard, wet, light brown		○	4-1-11	43					
46.33	8.53	28											
				- stiff, light brown		○	4-1-12	9					
45.11	9.75	32											
43.89	10.97	36		- wet, light brown									
42.67	12.19	40											



Engineering Service Center
Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700
Date: May-03

LOG OF BORING NO. B4-1

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.
17

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 54.86 m (approximate)	LOG I.D. Boring No. B4-1
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 5.03 m (3/20/03)	DATE PERFORMED: 3/18/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 179+10, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 110 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
41.45	13.41	44		SILTY SAND, fine to medium grained, dense, poorly graded, light brown	SM	○	4-1-13	41					
				- dense, light brown	SM	○	4-1-14	45					
40.23	14.63	48		CLAYEY SILT, very stiff, light brown	ML	○	4-1-15	24					
39.16	15.70	51.5		Bottom of Boring @ 15.70 m									



Engineering Service Center
 Division of Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-415700

Date: May-03

LOG OF BORING NO. B4-1

10-MER-99-KP 7.4/16.9

GEOTECHNICAL DESIGN REPORT

SHEET NO.

17A

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 54.86 m (approximate)	LOG I.D. Boring No. B 4-2
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 5.00 m	DATE PERFORMED: 3/19/2003
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 181+30, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 380 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS	
54.86				CLAYEY SILT, stiff, slight plasticity, dark gray	ML		4-2-1	10					Percolation test performed	
				- hard, dry, low plasticity, light brown				4-2-2	34					
53.64	1.22	4		- hard, friable, dry, light brown				4-2-3	+50					
				SANDY SILT, hard, dry, friable, light brown	MH		4-2-4	+50	12	19			50mm Brass Tube samples	
				- very hard, dry, light brown	MH		4-2-5	+50						
52.42	2.44	8					4-2-6						Bulk samples at 1.5-3 m	
				- hard, consist of lime bands light brown	MH		4-2-7	35					R-value 26 at 4-2-6	
51.20	3.66	12					4-2-8						Bulk samples at 3-4.5 m	
				- moist at 4.3 m	MH		4-2-9	18						
49.98	4.88	16		CLAYEY SILT, very stiff, slight plasticity, wet, light brown	ML									
49.83	5.03	16.5		Bottom of Boring @ 5.03 m										



Engineering Service Center
 Division of Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-415700	LOG OF BORING NO. B4-2
Date: May-03	
10-MER-99-KP 7.4/16.9	SHEET NO.
GEOTECHNICAL DESIGN REPORT	18

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 54.86 m (approximate)	LOG I.D. Boring No. B4-3
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 3.7 m (3/26/03)	DATE PERFORMED: 3/19/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 183+20, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 80 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
54.86				CLAYEY SILT, firm, moist, slight plasticity, dark gray	ML	○	4-3-1	7					Piezometer installed -Screen bet. 6.1 & 15.24m -38 mm ID PVC
				- very stiff, dark gray	ML	○	4-3-2	19					
53.64	1.22	4		- hard	ML	○	4-3-3	+50					
				SANDY SILT, hard, dry, friable, light brown	MH	△	4-3-4	+50					50mm Brass Tube samples
52.42	2.44	8		- hard, dry, light brown	MH	○	4-3-5	+50					
				CLAYEY SILT, very stiff, low plasticity, moist, light gray	ML	○	4-3-6				9.0	674	Bulk samples at 1.5-3 m
51.20	3.66	12					4-3-7	19					
51.16	3.70						4-3-8						
49.98	4.88	16		- wet, light gray	ML	○	4-3-9	19					Bulk samples at 3-4.5 m
							4-3-10	6					
48.76	6.10	20		SILTY SAND, loose, wet, poorly graded, light brown	SM	○							
				CLAYEY SILT, very stiff, low plasticity, light brown	ML								
47.54	7.32	24			ML	○	4-3-11	17					
				- very stiff									
46.33	8.53	28			ML	○	4-3-12	15					
				- w/ trace of fine sand, light brown									
45.11	9.75	32											
43.89	10.97	36			SM	○	4-3-13	34					
				SILTY SAND, fine to medium grained, medium dense, light brown									
42.67	12.19	40											



Engineering Service Center
Division of Geotechnical Services
Office of Geotechnical Design - North

EA: 10-415700

Date: May-03

LOG OF BORING NO. B4-3

10-MER-99-KP 7.4/16.9
GEOTECHNICAL DESIGN REPORT

SHEET NO.

19

DRILL RIG: Mobile Drill	GROUND SURFACE ELEVATION: 54.86 m (approximate)	LOG I.D. Boring No. B4-3
BORING DIAMETER: 150 mm	DEPTH TO GROUND WATER: 3.7 m (3/26/03)	DATE PERFORMED: 3/19/03
DRILLING METHOD: Hollow Stem Auger	SAMPLING METHOD: Standard Split Spoon Sampler & Modified California Sampler	LOGGED BY: M.Naing
APPROXIMATE BORING LOCATION Station 183+20, Proposed (STA;KP;PM): Mainline FWY 99		APPROX. DISTANCE FROM Approx. 80 m Right ROADWAY CL:

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLER	SAMPLE NO.	BLOW COUNTS	MOISTURE CONTENT %	DRY DENSITY kN/m ³	PLASTIC INDEX %	Undrained Shear Strength kPa	ADDITIONAL COMMENTS AND TESTS
41.45	13.41	44		SILTY SAND, fine to medium grained, medium dense, wet, poorly graded, light brown	SM	○	4-3-14	29					
40.69	14.17	46.5		- very dense, light brown	SM	○	4-3-15	+50					
				Bottom of Boring @ 14.17 m									



Engineering Service Center
 Division of Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-415700
 Date: May-03

LOG OF BORING NO. B4-3

10-MER-99-KP 7.4/16.9
 GEOTECHNICAL DESIGN REPORT

SHEET NO.
 19A

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. ROBERTO BANDA
Central Region, Design II - Branch N
Project Development

Date: April 13, 2009

File: 10-Mer-99-KP 7.4/16.9
10-415701
Arboleda Dr Freeway

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

Subject: Addendum to Geotechnical Design Report

The following paragraph contained in the Geotechnical Recommendations, Embankments section of the Geotechnical Design Report dated May 20, 2003,

“As most of the borrow material is fine-grained, successful embankment construction during the wet winter months is questionable. We recommend that earthwork be suspended during these months.”

is amended to read the following,

“As most of the borrow material is fine-grained sand and silt, successful embankment construction during the wet winter months may be difficult, as saturated fine-grained soils are prone to erosion and flow. The contractor should provide measures to protect the embankment during construction in rainy conditions.”

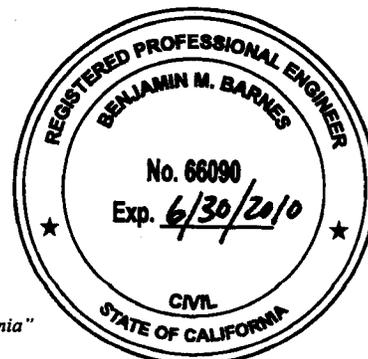
The intent was not to limit the contractor's work, but to alert the contractor to the type of material to be used in the embankment construction and the issues that may arise during rainy conditions.

If you have any questions or comments, please contact Ben Barnes at (916) 227-1039.



BENJAMIN M. BARNES, PE
Transportation Engineer
Geotechnical Design - North

c: Qiang Huang, GDN File, GS File Room



Memorandum

*Flex your power!
Be energy efficient!*

To: MR. ROBERTO BANDA
Central Region, Design II-Branch N
Project Development

Attention: Mr. Gilberto Baca
Project Engineer

Date: June 12, 2009

File: 10-MER-99 KP 7.4/16.9
(PM 4.6/10.5)
10-415701
Arboleda Freeway

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

Subject: Supplemental Recommendations for Geotechnical Design Report

Introduction

Per your request, we are providing supplemental recommendations for the Geotechnical Design Report (GDR) dated May 20, 2003 for proposed improvements to State Route 99 between KP 7.4 and 16.9 (PM 4.6 and 10.5), located in Merced County, California.

District 10 Design has requested additional foundation recommendations for four overhead signs and two changeable message signs to be constructed within the project limits. Pertinent information for the proposed signs is shown in Tables 1 and 2.

Table 1. Proposed Overhead Signs

Overhead Sign Designation	STA	Approx PM	Sign Type	Post Type	CIDH Pile Diameter (in)	CIDH Pile Depth (ft)
A	154+43	5.63	Cantilever	V	54	19
B	203+00	6.55	Cantilever	V	54	19
C	241+30	7.28	Cantilever	V	54	19
D	294+10	8.28	Cantilever	V	54	19

Table 2. Proposed Changeable Message Signs

CMS Designation	STA	Approx PM	Sign Type	Model	CIDH Pile Diameter (in)	CIDH Pile Depth (ft)
1	136+35.1	5.29	Cantilever	500	60	22
2	354+85.5	9.43	Cantilever	500	60	22

Existing bridge structures within the project limits are shown in Table 3.

Table 3. Existing Bridge Structures

Structure Name	Bridge No.	PM
Deadman Creek Bridge	39-0002	5.22
Mariposa Creek Bridge	39-0081	9.35
Duck Slough Bridge	39-0004	9.43
Duck Slough Overflow	39-0005	9.86

Subsurface Conditions

Due to time constraints, a subsurface investigation was not conducted at the sign locations. Borings completed in support of the original GDR and the As-Built Log of Test Borings for the existing bridge structures were reviewed to determine subsurface conditions. Therefore, subsurface conditions may deviate from those extrapolated based on the previous investigations.

Based upon our review, the subsurface material consists of interbedded layers of silty sand, clayey to sandy silt, and silty to sandy clay. Densities varied from medium dense to very dense. Groundwater was encountered at a depth of 40 to 60 feet at the south end of the project and at a depth of 7 to 22 feet at the north end of the project.

Groundwater conditions can be expected to fluctuate in response to seasons, storm events, and other factors. Localized saturated conditions or perched groundwater conditions near the ground surface should be anticipated during and following periods of heavy precipitation.

Geotechnical Recommendations

Overhead Signs

The proposed overhead signs are to be founded upon Standard Plan CIDH piles with a pile diameter of 54 inches and a pile length of 19 feet. Based upon a review of the project plans and cross sections, borings completed in support of the original GDR, and the

LOTB for the existing bridge structures within the project limits, it is the opinion of this Office that the existing foundation soils are adequate for support of the overhead signs. As stated above, groundwater at the north end of the project was encountered at a depth of 7 to 22 feet, which is in the vicinity of Sign D. Therefore, construction of the CIDH pile using the wet method should be included in the specifications for Sign D.

Changeable Message Signs

The proposed changeable message signs are to be founded upon Standard Plan CIDH piles with a pile diameter of 60 inches and a pile length of 22 feet. Based upon a review of the project plans and cross sections, borings completed in support of the original GDR, and the LOTB for the existing bridge structures within the project limits, it is the opinion of this Office that the existing foundation soils are adequate for support of the changeable message signs. Groundwater at the north end of the project was encountered at a depth of 7 to 22 feet, which is in the vicinity of CMS 2. CMS 1 is located just north of Deadman Creek, where the groundwater level could be higher than measured in the borings. Therefore, construction of the CIDH piles using the wet method should be included in the specifications for both CMS 1 and CMS 2.

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:

- A. None

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

- A. *Supplemental Recommendations to Geotechnical Design Report for EA 10-415701, dated 6/12/2009.*

Data and Information available for inspection at the District Office:

A. None

Data and Information available for inspection at the Transportation Laboratory are:

A. None

The information contained in this report is applicable to the proposed sites of the signs and may not be valid outside of these locations. If changes in the positions of the signs are proposed, this Office should be consulted to provide supplementary recommendations, if necessary. If you have any questions or comments, please contact Ben Barnes at (916) 227-1039.



BENJAMIN M. BARNES, P.E.
Transportation Engineer – Civil
Geotechnical Design – North



c: Qiang Huang,
GDN File
GS File Room



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:
 1-1-03-F-0224

FEB 6 2006

Mr. Gene K. Fong
 Federal Highway Administration
 U.S. Department of Transportation
 650 Capitol Mall Room 4-100
 Sacramento, California 95814

Subject: Biological and Conference Opinion on Plainsburg/Arboleda State Route 99
 Project in Merced County, California

Dear Mr. Fong:

This is the U.S. Fish and Wildlife Service's (Service) biological and conference opinion on the Plainsburg/Arboleda State Route 99 Project in Merced County, California. Your June 12, 2003, request for formal consultation was received in this office on June 13, 2003. At issue are the effects of this proposed project on the endangered San Joaquin kit fox (*Vulpes macrotis mutica*) (kit fox) and the candidate species mountain plover (*Charadrius montanus*). This biological and conference opinion was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act).

We have also considered relevant information about the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB) that may be affected by the proposed project. Based on the avoidance and minimization measures proposed in the Biological Assessment and subsequent correspondence with the Service, we have determined that the proposed project is not likely to adversely affect the federally listed species VELB.

This biological opinion is based on: (1) *Biological Assessment Plainsburg/Arboleda Freeway Project State Route 99, Merced County, California Chowchilla River to McHenry Road* dated April 2003 (biological assessment), that was prepared by the California Department of Transportation (Caltrans); (2) a letter from the Service to the Federal Highway Administration (FHWA) dated July 11, 2003 requesting additional information; (3) a letter from the FHWA to the Service dated August 7, 2003, that was received by this Field Office on August 8, 2003; (4) a letter from the Federal Highway Administration to the Service dated November 14, 2003, that was received in this office on November 18, 2003; (5) a telephone conversation between Shannon Holbrook of the Service and Geoff Gray of the Caltrans and (6) other information available to the Service.

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Consultation History

December 20, 2001. A meeting was held between FHWA, Caltrans and Brian Cypher of ESRP to discuss use of agricultural fields by kit fox and kit fox presence in the Merced area.

January 8, 2002. A meeting was held between FHWA, Caltrans and Dr. Patrick Kelly and Curt Uptain of ESRP to discuss goals of the recovery plan for the kit fox in the Merced region.

February 7, 2002. A Kit Fox Planning and Conservation Recovery Team (KFPACT) meeting was held which included FHWA, Caltrans, Karen Harvey of the Service and Brian Cypher of ESRP. This project was discussed.

June 3, 2002. A meeting was held between FHWA, Caltrans and Kim Forrest, Refuge Manager, San Luis National Wildlife Refuge Complex, Los Banos to discuss the kit fox corridor enhancement project.

August 1, 2002. A site visit was conducted with Karen Harvey and Susan Jones of the Service.

April 1, 2003. A KFPACT meeting was held between FHWA, Caltrans, Sheila Larson and Karen Harvey of the Service, Dr. Brian Cypher of ESRP and Steven Juarez of California Department of Fish and Game to discuss proposed project design and mitigation options.

June 12, 2003. The FHWA sent a letter to the Service requesting initiation of formal Section 7 consultation for the Plainsburg/Arboleda State Hwy 99 Project. The Service also received the *Biological Assessment Plainsburg/Arboleda Freeway Project State Route 99, Merced County, California Chowchilla River to McHenry Road.*

July 11, 2003. The Service sent a letter to the FHWA requesting additional information.

August 7, 2003. The FHWA sent a letter to the Service responding to the request for additional information.

September 17, 2003. An informal meeting was held in Fresno between the Service and Caltrans to discuss the project and compensation features.

October 9, 2003. Electronic mail was sent from Geoffrey Gray of Caltrans to Karen Harvey of the Service concerning VELB avoidance information.

November 18, 2003. The FHWA sent a letter to the Service requesting a response to their August 7, 2003 letter and issuance of a biological opinion.

October 14, 2005. Shannon Holbrook of the Service contacted Geoffrey Gray of Caltrans to discuss the project.

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October 17, 2005. Electronic mail was sent from Geoffrey Gray of Caltrans to Shannon Holbrook of the Service providing an electronic copy of the Biological Assessment.

Description of the Proposed Action

FHWA, in cooperation with the Caltrans proposes to convert a 10.5 mile (16.9 km) section of State Route 99 (SR-99) between the Madera/Merced County line and McHenry Road from a four-lane expressway to a six-lane divided freeway (Figure 1). This would occur upon an acquired right-of-way area that can ultimately accommodate eight lanes with a median that ranges between 69-85 ft. (21-25.8 m). A 0.65 mile (1.04 km) median barrier is proposed in the transition zone near the Chowchilla River (Postmile (PM) 0.0 – 0.65 / Kilopost (KP) 0.0 – 1.04).

Current northbound SR-99 would be excavated down to original ground (OG) level, including the removal of all pavement, fill material, and northbound bridges. The proposed freeway would be realigned to the east in order to avoid crossing the Union Pacific railroad and to facilitate the construction of two full interchanges at Plainsburg Road/Sandy Mush Road (southern interchange - project EA 10-415800) and at Arboleda Drive/Le Grand Road (northern interchange - project EA 10-415700) (Appendix C, Caltrans 2003). In order to provide access to SR-99 via the interchanges, existing SR-99 southbound lanes would be resurfaced and designated as a western frontage road while a new frontage road would be constructed east of the proposed freeway.

The new freeway alignment would be constructed at a higher elevation than current SR-99 in order to provide increased protection against 100-year flood events. The required fill material to raise the alignment would be obtained through the excavation of basins within acquired right of way areas.

A preferred alternative has not been selected. Alternative alignment 1B PM 0.0 – 4.6 / KP 0.0 – 7.4 facilitates the southern interchange (EA 415800) while alternative alignment 2 (PM 4.3 – 10.5 / KP 6.9 – 16.9) provides access to the northern interchange (EA 415700) (Appendix C, of Caltrans 2003).

The purpose of the proposed project is to improve SR-99 in accordance with regional transportation plans. In addition, modernized freeway design would eliminate non-standard merge and diverge weaving areas, upgrade non-standard shoulder widths, and significantly improve safety and operating conditions in a region where dense fog is prevalent.

Total acreage studied within the project's potential impact area (PIA) is approximately 2,592 acres. However, project construction is expected to permanently modify approximately 712 acres, which includes the freeway alignment and shoulders, all Caltrans right of way including median, new frontage roads and shoulders, and basins.

According to the biological assessment, parcel utilization surveys conducted in 2001 showed that 97% of the project footprint is utilized for intensive agricultural production. Land use within this acreage as of 2001 includes alfalfa (35.5% / 253 acres), vineyards (29.1% / 207 acres), orchard crops (23.1% / 165 acres), row crops (9.4% / 67 acres), rural residences (1.6% / 12 acres), and ruderal areas (1.3% / 9 acres). Local farmers rotate crops on a regular basis, so these percentages represent

temporally limited data on regional land use. Most non-cultivated plants within the potential impact area are planted ornamentals serving as landscape enhancement on residential parcels or trees and shrubs planted on the periphery of some agricultural lands. Native vegetation is mainly restricted to the narrow banks of local channelized streams (utilized as irrigation canals) and one adjacent wetland.

Proposed Avoidance and Minimization Measures

According to the biological assessment, the Caltrans will implement the following actions:

1. Preconstruction surveys would be conducted prior to ground disturbance to locate potential kit fox dens within the PIA.
2. San Joaquin kit fox special provisions would be included in the construction contract and implemented by the Caltrans subcontractor.
 - A. Entrance into areas within the right of way not required for construction activities shall be restricted to the highway and associated paved or graded shoulders. Staging, parking, storage and other project related use areas shall be clearly marked on the ground.
 - B. Project-related traffic shall observe a 32 kilometer per hour speed limit except on roads or highways open for public use.
 - C. At the end of each working day, the Contractor shall take measures to prevent the entrapment of kit foxes in all excavated, steep-walled holes or trenches more than 0.6-(meter) deep. Such measures shall include covering excavations with plywood or providing dirt or plank escape ramps from the trenches.
 - D. The Contractor shall inspect all pipes and culverts with a diameter greater than or equal to 100 mm before burying, capping, or other use. If a kit fox is discovered during this inspection, the pipe or culvert shall not be disturbed (other than to move it to a safe location if necessary) until after the fox has escaped.
 - E. The Contractor shall immediately notify the Engineer if a dead, injured or entrapped kit fox is found. Work in the immediate area may be temporarily halted while the State's Biologist at the direction of the Engineer consults with the California Department of Fish and Game and the US Fish and Wildlife Service. Any entrapped kit fox shall be permitted to escape. The disposition of any carcasses or recovering animals shall be coordinated through the Engineer.
 - F. If a kit fox den is discovered, all construction activity within a 46 m radius of the den will be halted while the State consults with the U.S. Fish and Wildlife Service and California Department of Fish and Game. An Environmental Sensitive Area will be established around the den and entry into the area will be restricted.
 - G. The Contractor shall provide closed garbage containers where food-related trash is generated, and garbage shall be disposed of daily.
 - H. Pets are prohibited on work site.

State Route 99 / Plainsburg Road / Arboleda Drive Freeway Project

E.A. 10-415700 / 415800

P.M. 0.0/10.5 K.P. 0.0/16.9

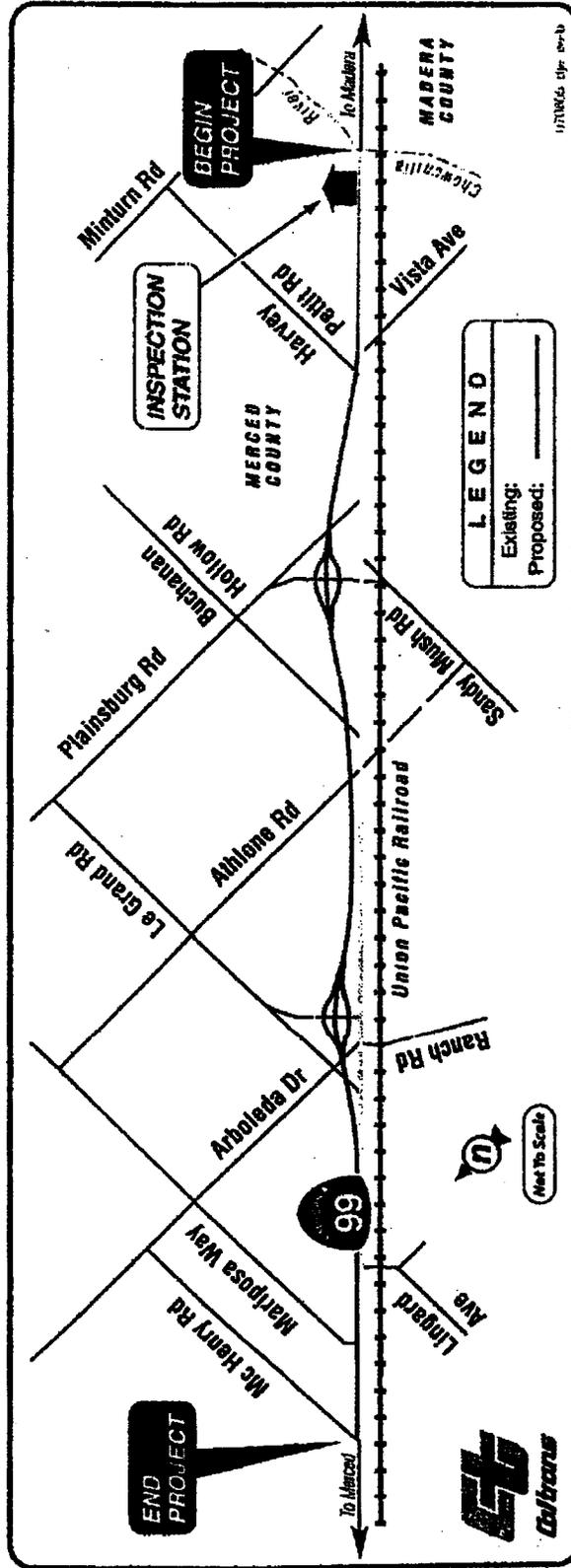


Figure 1-2 Project Location Map

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3. Bridges would be constructed with increased vertical clearance over six local streams and overflow areas providing enhanced crossing potential at these locations for kit foxes (Appendix C, Caltrans 2003).
4. At bridge locations, the ROW fence would be designed to direct animals under the alignment by attaching the fence directly to bridge footings. To facilitate kit fox passage, open space within the Caltrans ROW near stream banks or overflow areas would be kept free of vegetation through use of gravel, concrete slurry, or other material. As there are no final designs proposed yet, Caltrans will obtain Service approval for the final design of the footings and fence.
5. Under the entire ROW fence, a suitable material would be buried and/or placed to discourage kit foxes and other canids from digging under the ROW fence and entering trafficked areas.
6. Two large box culverts would be constructed under the proposed alignment along the Sandy Mush Road kit fox corridor. These culverts would serve as additional crossing features specific to kit fox measuring approximately 6 feet high x 10 feet wide x 240 feet long (Appendix K, Caltrans 2003). The bottom of these culverts would be approximately 12 inches above OG and would not carry water during normal precipitation events. For each box culvert, four sections of corrugated metal pipe (CMP), 20 feet long and 10 inches in diameter, would be anchored at equal intervals on the culvert floors. The openings of both ends of all CMPs would be narrowed to a 4-6 inch diameter. Kit foxes would gain temporary refuge opportunity within the CMPs in the event they find themselves in a culvert with a larger predator.
7. Right of way fence gaps, 4-6 inches high and approximately 60 feet wide, would be provided at the bottom of the ROW fence in front of the culvert entrances (Appendix K, Caltrans 2003). A concrete slab, slurry, gravel, or other material, six feet wide, would be placed under the gaps to prevent vegetation growth from obscuring them and to prevent enlargement of the gaps via burrowing. Right of way areas between the ROW fence and the box culvert entrances would be kept vegetation free through use of similar materials.
8. Two overpasses would be constructed over the proposed alignment - one at Plainsburg Road and one at Arboleda Road (Appendix C of Caltrans 2003). Traffic volumes would be relatively low on these overpasses, and they would provide two additional locations kit foxes could utilize to cross SR-99.
9. Conservation easements would be pursued for five proposed buffer areas (40 acres each) on adjacent parcels in front of the entrances of the two box culverts and east of the proposed bridge at Deadman Creek (totaling approximately 200 acres) (Appendix C, Caltrans 2003). The easements would be obtained from willing sellers; any acreage required but not obtained via a willing seller would be procured off-site via conservation easements and/or purchases, the preferable location(s) of which would be consistent with the Sandy-Mush kit fox corridor as identified in the Service Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998) (Recovery Plan). The use of condemnation to obtain easements would be pursued only in the case of demonstrated and defensible necessity. The proposed buffer areas are within the approved expansion boundary for the Grasslands Wildlife Management area, therefore, the

easement would be in the name of the Service (National Wildlife Refuge), who would be responsible for perpetual monitoring. Development within these parcels would be prevented, allowing the areas immediately adjacent to the crossings to remain open to kit fox passage in perpetuity. Union Pacific Railroad property, comprising 56 acres of open grassland, is located west of the proposed Deadman Creek Bridge (Appendix C, Caltrans 2003). Development is not expected to occur on this parcel.

10. Large areas within the Caltrans ROW will be the source of fill material (Appendix C, Caltrans 2003). A total of 13 areas, totaling 265 acres, are under consideration for basin creation/subsequent use. These areas would not be intended for use as drainage basins and would not be expected to hold large amounts of water. However, in the larger basins, earthen check dams would be created in several locations to provide animals with elevated dry routes across the basins floors during rain events. The basins would also be seeded with native plants after fill material has been obtained.
11. Of the 13 areas under consideration in #10 above, up to six basins (#3, #6, #8, #9, #10, #11), totaling up to 201 acres, would be relinquished to the Service (Appendix C, Caltrans 2003). It is anticipated that these areas would provide substantial foraging habitat not only for kit fox but other species in the area such as the burrowing owl and Swainson's hawk. Furthermore, such ownership of these basin areas would prevent future urban development from blocking the Sandy Mush Road corridor adjacent to the new alignment. The remaining seven basins, totaling 64 acres, would be retained within the Caltrans ROW, allowing for the perpetual protection of this acreage along State Route 99 (SR 99) as well.
12. The project alignment footprint (excluding basins) would include approximately 437 acres of agricultural land (alfalfa 156 acres, vineyard 129 acres, orchard 87 acres, annual row crop 56 acres, and ruderal areas 9 ac.). The unsuitability of these lands as valuable kit fox denning and foraging habitat is described as follows:
 - Annual row crops are plowed frequently, flood irrigated, and treated with pesticides, herbicides, and fertilizers. The value of annual row crops as kit fox foraging and denning habitat is low to none;
 - Vineyards are flood irrigated and treated with pesticides, herbicides, and fertilizers. The vegetative understory is sterile. Very little to no foraging and denning opportunity exists for kit foxes;
 - Orchards are flood irrigated and treated with pesticides, herbicides, and fertilizers. The vegetative understory is relatively sterile. Orchards provide very little opportunity for foraging and denning for kit foxes. However, kit foxes are known to utilize orchards as cover and limited forage for short periods of time;
 - Alfalfa fields are flood irrigated and treated with pesticides, herbicides, and fertilizers. Although alfalfa fields are not plowed every year, they are subject to mechanical harvesting several times per growing season. Because rodents can be relatively abundant in alfalfa fields, kit foxes may utilize alfalfa for some foraging, but the value of these areas as cover and/or denning habitat is little to none. In addition, kit fox predators, namely coyotes, were

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observed in proportionally greater numbers in alfalfa fields during two USFWS-protocol kit fox spotlighting surveys in the local region;

- Ruderal areas can provide some foraging and denning opportunity for kit foxes if disturbance is low and edge effect is minimal due to large parcel size. However, the ruderal areas within the potential impact area are very small and fragmented, located next to residential areas, or on road shoulders.

Following the above line of reasoning, Caltrans proposes to compensate for the removal of agricultural land, not because it qualifies as essential kit fox denning and foraging habitat, but in order to compensate for the role it serves as open space for recovery of potential kit fox east-west corridor movement as identified in the Service Recovery Plan for Upland Species. Caltrans proposes to relinquish up to 401 acres to the Service in the form of buffer easements (#9) and basin areas (#11) to enhance kit fox corridor movement.

13. An endowment would be established by Caltrans for the perpetual maintenance and monitoring of the basin acreage (201 acres). Regarding the five buffer areas (200 acres), an endowment is not anticipated should the easement allow for land use to remain in agriculture.

No kit fox mortality is expected to result from project construction. Kit fox crossing locations would include a project-wide total of six bridges, two culverts, and two overpasses. Right of way fences would help to prevent entry of kit foxes into trafficked areas and direct them toward safer crossing points. Up to 401 acres (200 buffer acres plus 201 basin acres) would be relinquished to the Service to maintain as foraging/denning/migration habitat and to prevent urbanization from blocking the Sandy Mush Road kit fox corridor.

Status of the Species

San Joaquin Kit Fox

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (Service 1967) and was listed by the State of California as a threatened species on June 27, 1971. *The Recovery Plan for Upland Species of the San Joaquin Valley, California* (Recovery Plan) includes this canine (Service 1998).

In the San Joaquin Valley before 1930, the range of the San Joaquin kit fox extended from southern Kern County north to Tracy, San Joaquin County, on the west side, and near La Grange, Stanislaus County, on the east side (Grinnell *et al.* 1937; Service 1998). Historically, this species occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland. San Joaquin kit foxes also exhibit a capacity to utilize habitats that have been altered by man. The animals are present in many oil fields, grazed pasturelands, and "wind farms" (Cypher 2000). Kit foxes can inhabit the margins and fallow lands near irrigated row crops, orchards, and vineyards, and may forage occasionally in these agricultural areas (Service 1998). The San Joaquin kit fox seems to prefer more gentle terrain

and decreases in abundance as terrain ruggedness increases (Grinnell *et al.* 1937; Morrell 1972; Warrick and Cypher 1998).

The kit fox is often associated with open grasslands, which form large contiguous blocks within the eastern portions of the range of the animal. The listed canine also utilizes oak savanna and some types of agriculture (e.g. orchards and alfalfa), although the long-term suitability of these habitats is unknown (Jensen 1972; Service 1998). In eastern Merced County, the lands between the urban corridor along Highway 99 and the open grasslands to the east are a mixture of orchards and annual crops, mostly alfalfa. Orchards occur in large contiguous blocks in the northwest portions of the study area and at scattered locations in the southwest portions. Orchards sometimes support prey species if the grounds are not manicured; however, denning potential is typically low and kit foxes can be more susceptible to coyotes predation within the orchards (Orloff 2000). Alfalfa fields provide an excellent prey base (Woodbridge 1987; Young 1989), and berms adjacent to alfalfa fields sometimes provide good denning habitat (Orloff 2000). Kit foxes often den adjacent to, and forage within, agricultural areas (Bell 1994; Scott-Graham 1994). Although agricultural areas are not traditional kit fox habitat and are often highly fragmented, they can offer sufficient prey resources and denning potential to support small numbers of kit foxes.

Adult San Joaquin kit foxes are usually solitary during late summer and fall. In September and October, adult females begin to excavate and enlarge natal dens (Morrell 1972), and adult males join the females in October or November (Morrell 1972). Typically, pups are born between February and late March following a gestation period of 49 to 55 days (Egoscue 1962; Morrell 1972; Spiegel and Tom 1996; Service 1998). Mean litter sizes reported for San Joaquin kit foxes include 2.0 on the Carrizo Plain (White and Ralls 1993), 3.0 at Camp Roberts (Spencer *et al.* 1992), 3.7 in the Lokern area (Spiegel and Tom 1996), and 3.8 at the Naval Petroleum Reserve (Cypher *et al.* 2000). Pups appear above ground at about age 3-4 weeks, and are weaned at age 6-8 weeks. Reproductive rates, the proportion of females bearing young, of adult San Joaquin kit foxes vary annually with environmental conditions, particularly food availability. Annual rates range from 0-100%, and reported mean rates include 61% at the Naval Petroleum Reserve (Cypher *et al.* 2000), 64% in the Lokern area (Spiegel and Tom 1996), and 32% at Camp Roberts (Spencer *et al.* 1992). Although some yearling female kit foxes will produce young, most do not reproduce until age 2 years (Spencer *et al.* 1992; Spiegel and Tom 1996; Cypher *et al.* 2000). Some young of both sexes, but particularly females may delay dispersal, and may assist their parents in raising in the following year's litter of pups (Spiegel and Tom 1996). The young kit foxes begin to forage for themselves at about four to five months of age (Koopman *et al.* 2000; Morell 1972).

Although most young kit foxes disperse less than 5 miles (Scrivner *et al.* 1987a), dispersal distances of up to 76.3 miles have been documented for the San Joaquin kit fox (Scrivner *et al.* 1993; Service 1998). Dispersal can be through disturbed habitats, including agricultural fields, and across highways and aqueducts. The age at dispersal ranges from 4-32 months (Cypher 2000). Among juvenile kit foxes surviving to July 1 at the Naval Petroleum Reserve, 49% of the males dispersed from natal home ranges while 24% of the females dispersed (Koopman *et al.* 2000). Among dispersing kit foxes, 87% did so during their first year of age. Most, 65.2%, of

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the dispersing juveniles at the Naval Petroleum Reserve died within 10 days of leaving their natal home den (Koopman *et al.* 2000). Some kit foxes delay dispersal and may inherit their natal home range.

Kit foxes are reputed to be poor diggers, and their dens are usually located in areas with loose-textured, friable soils (Morrell 1972; O'Farrell 1983). However, the depth and complexity of their dens suggest that they possess good digging abilities, and kit fox dens have been observed on a variety of soil types (Service 1998). Some studies have suggested that where hardpan layers predominate, kit foxes create their dens by enlarging the burrows of California ground squirrels (*Spermophilus beecheyi*) or badgers (*Taxidea taxus*) (Jensen 1972; Morrell 1972; Orloff *et al.* 1986). In parts of their range, particularly in the foothills, kit foxes often use ground squirrel burrows for dens (Orloff *et al.* 1986). Kit fox dens are commonly located on flat terrain or on the lower slopes of hills. About 77 percent of all kit fox dens are at or below midslope (O'Farrell 1983), with the average slope at den sites ranging from 0 to 22 degrees (California Department of Fish and Game 1980; O'Farrell 1983; Orloff *et al.* 1986). Natal and pupping dens are generally found in flatter terrain. Common locations for dens include washes, drainages, and roadside berms. Kit foxes also commonly den in human-made structures such as culverts and pipes (O'Farrell 1983; Spiegel *et al.* 1996a).

Natal and pupping dens may include from two to 18 entrances and are usually larger than dens that are not used for reproduction (O'Farrell *et al.* 1980; O'Farrell and McCue 1981). Natal dens may be reused in subsequent years (Egoscue 1962). It has been speculated that natal dens are located in the same location as ancestral breeding sites (O'Farrell 1983). Active natal dens are generally 1.2 to 2 miles from the dens of other mated kit fox pairs (Egoscue 1962; O'Farrell and Gilbertson 1979). Natal and pupping dens usually can be identified by the presence of scat, prey remains, matted vegetation, and mounds of excavated soil (i.e. ramps) outside the dens (O'Farrell 1983). However, some active dens in areas outside the valley floor often do not show evidence of use (Orloff *et al.* 1986). During telemetry studies of kit foxes in the northern portion of their range, 70 percent of the dens that were known to be active showed no sign of use (e.g., tracks, scats, ramps, or prey remains) (Orloff *et al.* 1986). In another more recent study in the Coast Range, 79 percent of active kit fox dens lacked evidence of recent use other than signs of recent excavation (Jones and Stokes Associates 1997).

A kit fox can use more than 100 dens throughout its home range, although on average, an animal will use approximately 12 dens a year for shelter and escape cover (Cypher *et al.* 2001). Kit foxes typically use individual dens for only brief periods, often for only one day before moving to another den (Ralls *et al.* 1990). Possible reasons for changing dens include infestation by ectoparasites, local depletion of prey, or avoidance of coyotes (*Canis latrans*). Kit foxes tend to use dens that are located in the same general area, and clusters of dens can be surrounded by hundreds of hectares of similar habitat devoid of other dens (Egoscue 1962). In the southern San Joaquin Valley, kit foxes were found to use up to 39 dens within a denning range of 320 to 482 acres (Morrell 1972). An average den density of one den per 69 to 92 acres was reported by O'Farrell (1984) in the southern San Joaquin Valley.

Dens are used by kit foxes for temperature regulation, shelter from adverse environmental conditions, and escape from predators. Kit foxes excavate their own dens, use those constructed by other animals, and use human-made structures (culverts, abandoned pipelines, and banks in sumps or roadbeds). Kit foxes often change dens and may use many dens throughout the year; however, evidence that a den is being used by kit foxes may be absent. San Joaquin kit foxes have multiple dens within their home range and individual animals have been reported to use up to 70 different dens (Hall 1983). At the Naval Petroleum Reserve, individual kit foxes used an average of 11.8 dens per year (Koopman *et al.* 1998). Den switching by the San Joaquin kit fox may be a function of predator avoidance, local food availability, or external parasite infestations (e.g., fleas) in dens (Egoscue 1956).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of potential prey. In the portion of their geographic range that includes Merced County, known prey species of the kit fox include white-footed mice (*Peromyscus* spp.), insects, California ground squirrels, kangaroo rats (*Dipodomys* spp.), San Joaquin antelope squirrels, black-tailed hares (*Lepus californicus*), and chukar (*Alectoris chukar*) (Jensen 1972, Archon 1992), listed in approximate proportion of occurrence in fecal samples. Kit foxes also prey on desert cottontails (*Sylvilagus audubonii*), ground-nesting birds, and pocket mice (*Perognathus* spp.).

The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar. Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts, which are quite common in semi-arid, central California. Competition for resources between coyotes and kit foxes may result in kit fox mortalities. Coyote-related injuries accounted for 50-87 per cent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992; Standley *et al.* 1992). San Joaquin kit foxes are primarily nocturnal, although individuals are occasionally observed resting or playing (mostly pups) near their dens during the day (Grinnell *et al.* 1937). Kit foxes occupy home ranges that vary in size from 1.7 to 4.5 square miles (White and Ralls 1993). A mated pair of kit foxes and their current litter of pups usually occupy each home range. Other adults, usually offspring from previous litters, also may be present (Koopman *et al.* 2000), but individuals often move independently within their home range (Cypher 2000). Average distances traveled each night range from 5.8 to 9.1 miles and are greatest during the breeding season (Cypher 2000).

Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring (White and Ralls 1993, Spiegel 1996, White and Garrott 1997). This territorial spacing behavior eventually limits the number of foxes that can inhabit an area owing to shortages of available space and per capita prey. Hence, as habitat is fragmented or destroyed, the carrying capacity of an area is reduced and a larger proportion of the population is forced to disperse. Increased dispersal generally leads to lower survival rates and, in turn, decreased abundance because greater than 65 percent of dispersing juvenile foxes die within 10 days of leaving their natal range (Koopman *et al.* 2000).

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Estimates of fox density vary greatly throughout its range, and have been reported as high as 1.3 animals per square mile in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 1.86 animals per square mile in the early 1980s to 0.03 animals per square mile in 1991 (Service 1998). Kit fox home ranges vary in size from approximately 1 to 12 square miles (Spiegel *et al.* 1996b; Service 1998). Knapp (1978) estimated that a home range in agricultural areas is approximately 1 square mile. Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel *et al.* 1996b).

Mean annual survival rates reported for adult San Joaquin kit foxes include 0.44 at the Naval Petroleum Reserve (Cypher *et al.* 2000), 0.53 at Camp Roberts (Standley *et al.* 1992), 0.56 at the Lokern area (Spiegel and Disney 1996), and 0.60 on the Carrizo Plain (Ralls and White 1995). However, survival rates widely vary among years (Spiegel and Disney 1996; Cypher *et al.* 2000).

Mean survival rates for juvenile San Joaquin kit foxes (<1 year old) are lower than rates for adults. Survival to age 1 year was 0.14 at the Naval Petroleum Reserve (Cypher *et al.* 2000), 0.20 at Camp Roberts (Standley *et al.* 1992), and 0.21 on the Carrizo Plain (Ralls and White 1995). For both adults and juveniles, survival rates of males and females are similar. San Joaquin kit foxes may live to ten years in captivity (McGrew 1979) and 8 years in the wild (Berry *et al.* 1987), but most kit foxes do not live past 2-3 years of age.

The status (i.e., distribution, abundance) of the kit fox has decreased since its listing in 1967. This trend is reasonably certain to continue into the foreseeable future unless measures to protect, sustain, and restore suitable habitats, and alleviate other threats to their survival and recovery, are implemented. Threats that are seriously affecting kit foxes are described in further detail in the following paragraphs.

Loss of Habitat

Less than 20 percent of the habitat within the historical range of the kit fox remained when the subspecies was listed as federally-endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s with the Arkansas Reclamation Act. By the 1930's, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell *et al.* 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970, Jensen 1972; Morrell 1972, 1975). Approximately one-half of the natural communities in the San Joaquin Valley were tilled or developed by 1958 (Service 1980).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (Service 1995a). Approximately 1.97 million acres of habitat, or about 66,000 acres per year, were converted in the San Joaquin region between 1950 and 1980 (California Department of Forestry and Fire Protection 1988). The counties specifically noted as having the highest wildland conversion rates included Kern, Tulare, Kings and Fresno, all of which are occupied by kit foxes.

From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970).

By 1979, only approximately 370,000 acres out of a total of approximately 8.5 million acres on the San Joaquin Valley floor remained as non-developed land (Williams 1985, Service 1980). Data from the CDFG (1985) and Service file information indicate that between 1977 and 1988, essential habitat for the blunt-nosed leopard lizard, a species that occupies habitat that is also suitable for kit foxes, declined by about 80 percent – from 311,680 acres to 63,060 acres, an average of about 22,000 acres per year (Biological Opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000). Virtually all of the documented loss of essential habitat was the result of conversion to irrigated agriculture.

During 1990 to 1996, a gross total of approximately 71,500 acres of habitat were converted to farmland in 30 counties (total area 23.1 million acres) within the Conservation Program Focus area of the Central Valley Project. This figure includes 42,520 acres of grazing land and 28,854 acres of “other” land, which is predominantly comprised of native habitat. During this same time period, approximately 101,700 acres were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres of farmland, 20,476 acres of grazing land, and 31,366 acres of “other” land, which is predominantly comprised of native habitat. Because these assessments included a substantial portion of the Central Valley and adjacent foothills, they provide the best scientific and commercial information currently available regarding the patterns and trends of land conversion within the kit fox’s geographic range.

In summary, more than one million acres of suitable habitat for kit foxes have been converted to agricultural, municipal, or industrial uses since the listing of the kit fox. In contrast, less than 500,000 acres have been preserved or are subject to community-level conservation efforts designed, at least in part, to further the conservation of the kit fox (Service 1998).

Land conversions contribute to declines in kit fox abundance through direct and indirect mortalities, displacement, reduction of prey populations and denning sites, changes in the distribution and abundance of larger canids that compete with kit foxes for resources, and reductions in carrying capacity. Kit foxes may be buried in their dens during land conversion activities (C. Van Horn, Endangered Species Recovery Program, Bakersfield, personal communication to S. Jones, Fish and Wildlife Service, Sacramento, 2000), or permanently displaced from areas where structures are erected or the land is intensively irrigated (Jensen 1972, Morrell 1975). Furthermore, even moderate fragmentation or loss of habitat may significantly impact the abundance and distribution of kit foxes. Capture rates of kit foxes at the Naval Petroleum Reserve in Elk Hills were negatively associated with the extent of oil-field development after 1987 (Warrick and Cypher 1998). Likewise, the California Energy Commission found that the relative abundance of kit foxes was lower in oil-developed habitat than in nearby undeveloped habitat on the Lokern (Spiegel 1996). Researchers from both studies inferred that the most significant effect of oil development was the lowered carrying capacity for populations of both foxes and their prey species owing to the changes in habitat characteristics or the loss and fragmentation of habitat (Spiegel 1996, Warrick and Cypher 1998).

Dens are essential for the survival and reproduction of kit foxes that use them year-round for shelter and escape, and in the spring for rearing young. Hence, kit foxes generally have dozens of dens scattered throughout their territories. However, land conversion reduces the number of typical earthen dens available to kit foxes. For example, the average density of typical, earthen kit fox dens at the Naval Hills Petroleum Reserve was negatively correlated with the intensity of petroleum development (Zoellick *et al.* 1987), and almost 20 percent of the dens in developed areas were found to be in well casings, culverts, abandoned pipelines, oil well cellars, or in the banks of sumps or roads (Service 1983). These results are important because the California Energy Commission found that, even though kit foxes frequently used pipes and culverts as dens in oil-developed areas of western Kern County, only earthen dens were used to birth and wean pups (Spiegel 1996). Similarly, kit foxes in Bakersfield use atypical dens, but have only been found to rear pups in earthen dens (P. Kelly, Endangered Species Recovery Program, Fresno, personal communication to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Hence, the fragmentation of habitat and destruction of earthen dens could adversely affect the reproductive success of kit foxes. Furthermore, the destruction of earthen dens may also affect kit fox survival by reducing the number and distribution of escape refuges from predators. Land conversions and associated human activities can lead to widespread changes in the availability and composition of mammalian prey for kit foxes. For example, oil field disturbances in western Kern County have resulted in shifts in the small mammal community from the primarily granivorous species that are the staple prey of kit foxes (Spiegel 1996), to species adapted to early successional stages and disturbed areas (e.g., California ground squirrels)(Spiegel 1996). Because more than 70 percent of the diets of kit foxes usually consist of abundant leporids (*Lepus*, *Sylvilagus*) and rodents (e. g., *Dipodomys* spp.), and kit foxes often continue to feed on their staple prey during ephemeral periods of prey scarcity, such changes in the availability and selection of foraging sites by kit foxes could influence their reproductive rates, which are strongly influenced by food supply and decrease during periods of prey scarcity (White and Garrott 1997, 1999).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random) events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998). Similarly, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results. Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, many small populations will eventually lose out and go extinct when faced with these stochastic risks (Caughley and Gunn 1995).

Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity. This expansion is reasonably certain to increase in the near future

owing to market-driven increases in the price of oil. The cumulative and long-term effects of oil extraction activities on kit fox populations are not fully known, but recent studies indicate that moderate- to high-density oil fields may contribute to a decrease in carrying capacity for kit foxes owing to habitat loss or changes in habitat characteristics (Spiegel 1996, Warrick and Cypher 1998). There are no limiting factors or regulations that are likely to retard the development of additional oil fields. Hence, it is reasonably certain that development will continue to destroy and fragment kit fox habitat into the foreseeable future.

Competitive Interactions with Other Canids

Several species prey upon San Joaquin kit foxes. Predators (such as coyotes, bobcats, non-native red foxes, badgers, and golden eagles [*Aquila chrysaetos*]) will kill kit foxes. Badgers, coyotes, and red foxes also may compete for den sites (Service 1998). The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar (Cypher and Spencer 1998). Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts (which are quite common in semi-arid, central California). Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources.

Coyotes occur in most areas with abundant populations of kit foxes and, during the past few decades, coyote abundance has increased in many areas owing to a decrease in ranching operations, favorable landscape changes, and reduced control efforts (Orloff *et al.* 1986, Cypher and Scrivner 1992, White and Ralls 1993, White *et al.* 1995). Coyotes may attempt to lessen resource competition with kit foxes by killing them. Coyote-related injuries accounted for 50-87 percent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992, Standley *et al.* 1992, Ralls and White 1995, Spiegel 1996). Coyote-related deaths of adult foxes appear to be largely additive (i.e., in addition to deaths caused by other mortality factors such as disease and starvation) rather than compensatory (i.e., tending to replace deaths due to other mortality factors; White and Garrott 1997). Hence, the survival rates of adult foxes decrease significantly as the proportion of mortalities caused by coyotes increase (Cypher and Spencer 1998, White and Garrott 1997), and increases in coyote abundance may contribute to significant declines in kit fox abundance (Cypher and Scrivner 1992, Ralls and White 1995, White *et al.* 1996). There is some evidence that the proportion of juvenile foxes killed by coyotes increases as fox density increases (White and Garrott 1999). This density-dependent relationship would provide a feedback mechanism that reduces the amplitude of kit fox population dynamics and keeps foxes at lower densities than they might otherwise attain. In other words, coyote-related mortalities may dampen or prevent fox population growth, and accentuate, hasten, or prolong population declines.

Land-use changes also contributed to the expansion of nonnative red foxes into areas inhabited by kit foxes. Historically, the geographic range of the red fox did not overlap with that of the San Joaquin kit fox. By the 1970's, however, introduced and escaped red foxes had established breeding populations in many areas inhabited by San Joaquin kit foxes (Lewis *et al.* 1993). The larger and more aggressive red foxes are known to kill kit foxes (Ralls and White 1995), and

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could displace them, as has been observed in the arctic when red foxes expanded into the ranges of smaller arctic foxes (Hersteinsson and Macdonald 1982). The increased abundance and distribution of nonnative red foxes will also likely adversely affect the status of kit foxes because they are closer morphologically and taxonomically, and would likely have higher dietary overlap than coyotes; potentially resulting in more intense competition for resources. Two documented deaths of kit foxes due to red foxes have been reported (Ralls and White 1995), and red foxes appear to be displacing kit foxes in the northwestern part of their range (Lewis *et al.* 1993). At Camp Roberts, red foxes have usurped several dens that were used by kit foxes during previous years (California Army National Guard, Camp Roberts Environmental Office, unpubl. data). In fact, opportunistic observations of red foxes in the cantonment area of Camp Roberts have increased 5-fold since 1993, and no kit foxes have been sighted or captured in this area since October 1997. Also, a telemetry study of sympatric red foxes and kit foxes in the Lost Hills area has detected spatial segregation between these species, suggesting that kit foxes may avoid or be excluded from red fox-inhabited areas (P. Kelly, Endangered Species Recovery Program, Fresno, pers. comm. to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Such avoidance would limit the resources available to local populations of kit foxes and possibly result in decreased fox abundance and distribution.

Disease

Wildlife diseases do not appear to be a primary mortality factor that consistently limits kit fox populations throughout their range (McCue and O'Farrell 1988, Standley and McCue 1992). However, central California has a high incidence of wildlife rabies cases (Schultz and Barrett 1991), and high seroprevalences of canine distemper virus and canine parvovirus indicate that kit fox populations have been exposed to these diseases (McCue and O'Farrell 1988; Standley and McCue 1992). Hence, disease outbreaks could potentially cause substantial mortality or contribute to reduced fertility in seropositive females, as was noted in closely-related swift foxes (*Vulpes velox*).

For example, there are some indications that rabies virus may have contributed to a catastrophic decrease in kit fox abundance at Camp Roberts, San Luis Obispo County, California, during the early 1990's. San Luis Obispo County had the highest incidence of wildlife rabies cases in California during 1989 to 1991, and striped skunks (*Mephitis mephitis*) were the primary vector (Barrett 1990, Schultz and Barrett 1991, Reilly and Mangiamele 1992). A rabid skunk was trapped at Camp Roberts during 1989 and two foxes were found dead due to rabies in 1990 (Standley *et al.* 1992). Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. Captures of kit foxes were positively correlated with captures of skunks during 1988 to 1997; suggesting that some factor(s) such as rabies virus was contributing to concurrent decreases in the abundances of these species. Also, captures of kit foxes at Camp Roberts were negatively correlated with the proportion of skunks that were rabid when trapped by County Public Health Department personnel two years previously. These data suggest that a rabies outbreak may have occurred in the skunk population and spread into the fox population. A similar time lag in disease transmission and subsequent population reductions was observed in Ontario, Canada, although in this instance the transmission was from red foxes to striped skunks (Macdonald and Voigt 1985).

Pesticides and Rodenticides

Pesticides and rodenticides pose a threat to kit foxes through direct or secondary poisoning. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes by reducing the abundances of their staple prey species.

For example, the California ground squirrel, which is the staple prey of kit foxes in the northern portion of their range, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff *et al.* 1986).

Kit foxes occupying habitats adjacent to agricultural lands are also likely to come into contact with insecticides applied to crops owing to runoff or aerial drift. Kit foxes could be affected through direct contact with sprays and treated soils, or through consumption of contaminated prey. Data from the California Department of Pesticide Regulation indicate that acephate, aldicarb, azinphos methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, s-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin are used within one mile of kit fox habitat. A wide variety of crops (alfalfa, almonds, apples, apricots, asparagus, avocados, barley, beans, beets, bok choy, broccoli, cantaloupe, carrots, cauliflower, celery, cherries, chestnuts, chicory, Chinese cabbage, Chinese greens, Chinese radish, collards, corn, cotton, cucumbers, eggplants, endive, figs, garlic, grapefruit, grapes, hay, kale, kiwi fruit, kohlrabi, leeks, lemons, lettuce, melons, mustard, nectarines, oats, okra, olives, onions, oranges, parsley, parsnips, peaches, peanuts, pears, peas, pecans, peppers, persimmons, pimentos, pistachios, plums, pomegranates, potatoes, prunes, pumpkins, quinces, radishes, raspberries, rice, safflower, sorghum, spinach, squash, strawberries, sugar beets, sweet potatoes, Swiss chard, tomatoes, walnuts, watermelons, and wheat), as well as buildings, Christmas tree plantations, commercial/industrial areas, greenhouses, nurseries, landscape maintenance, ornamental turf, rangeland, rights of way, and uncultivated agricultural and non-agricultural land, occur in close proximity to San Joaquin kit fox habitat.

Efforts have been underway to reduce the risk of rodenticides to kit foxes (Service 1993). The Federal government began controlling the use of rodenticides in 1972 with a ban of Compound 1080 on Federal lands pursuant to Executive Order. Above-ground application of strychnine within the geographic ranges of listed species was prohibited in 1988. A July 28, 1992, biological opinion regarding the Animal Damage Control (now known as Wildlife Services) Program by the U.S. Department of Agriculture found that this program was likely to jeopardize the continued existence of the kit fox owing to the potential for rodent control activities to take the fox. As a result, several reasonable and prudent measures were implemented, including a ban on the use of M-44 devices, toxicants, and fumigants within the recognized occupied range of the kit fox. Also, the only chemical authorized for use by Wildlife Services within the occupied

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range of the kit fox was zinc phosphide, a compound known to be minimally toxic to kit foxes (Service 1993).

Despite these efforts, the use of other pesticides and rodenticides still pose a significant threat to the kit fox, as evidenced by the death of 2 kit foxes at Camp Roberts in 1992 owing to secondary poisoning from chlorophacinone applied as a rodenticide, (Berry *et al.* 1992, Standley *et al.* 1992). Also, the livers of 3 foxes that were recovered in the City of Bakersfield during 1999 were found to contain detectable residues of the anticoagulant rodenticides chlorophacinone, brodifacoum, and bromadiolone (California Department of Fish and Game 1999).

To date, no specific research has been conducted on the effects of different pesticide or rodent control programs on the kit fox (Service 1998). This lack of information is problematic because Williams (in lit., 1989) documented widespread pesticide use in known kit fox and Fresno kangaroo rat habitat adjoining agricultural lands in Madera County. In a separate report, Williams (in lit., 1989) documented another case of pesticide use near Raisin City, Fresno County, where treated grain was placed within an active Fresno kangaroo rat precinct. Also, farmers have been allowed to place bait on Bureau of Reclamation property to maximize the potential for killing rodents before they entered adjoining fields (Biological Opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000).

A September 22, 1993, biological opinion issued by the Service to the Environmental Protection Agency (EPA) regarding the regulation of pesticide use (31 registered chemicals) through administration of the Federal Insecticide, Fungicide, and Rodenticide Act found that use of the following chemicals would likely jeopardize the continued existence of the kit fox: (1) aluminum and magnesium phosphide fumigants; (2) chlorophacinone anticoagulants; (3) diphacinone anticoagulants; (4) pival anticoagulants; (5) potassium nitrate and sodium nitrate gas cartridges; and (6) sodium cyanide capsules (Service 1993). Reasonable and prudent alternatives to avoid jeopardy included restricting the use of aluminum/magnesium phosphide, potassium/sodium nitrate within the geographic range of the kit fox to qualified individuals, and prohibiting the use of chlorophacinone, diphacinone, pival, and sodium cyanide within the geographic range of the kit fox, with certain exceptions (e.g., agricultural areas that are greater than 1 mile from any kit fox habitat)(Service 1999).

Endangered Species Act Section 9 Violations and Noncompliance with the Terms and Conditions of Existing Biological Opinions

The intentional or unintentional destruction of areas occupied by kit foxes is an issue of serious concern. Section 9 of the Act prohibits the "take" (e.g., harm, harass, pursue, injure, kill) of federally-listed wildlife species. "Harm" (i.e., "take") is further defined to include habitat modification or degradation that kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Congress established two provisions (under sections 7 and 10 of the Act) that allow for the "incidental take" of listed species of wildlife by Federal agencies, non-Federal government agencies, and private interests. Incidental take is defined as "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Such take requires a permit from the Secretary of the Interior that anticipates a specific

level of take for each listed species. If no permit is obtained for the incidental take of listed species, the individuals or entities responsible for these actions could be liable under the enforcement provisions of potential section 9 of the Act if any unauthorized take occurs.

Risk of Chance Extinction Owing to Small Population Size, Isolation, and High Natural Fluctuations in Abundance

Historically, kit foxes may have existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Today's populations exist in an environment drastically different from the historic one, however, and extensive habitat fragmentation will result in geographic isolation, smaller population sizes, and reduced genetic exchange among populations; all of which increase the vulnerability of kit fox populations to extirpation. Populations of kit foxes are extremely susceptible to the risks associated with small population size and isolation because they are characterized by marked instability in population density. For example, the relative abundance of kit foxes at the Naval Petroleum Reserves, California, decreased 10-fold during 1981 to 1983, increased 7-fold during 1991 to 1994, and then decreased 2-fold during 1995 (Cypher and Scrivner 1992, Cypher and Spencer 1998).

Many populations of kit fox are at risk of chance extinction owing to small population size and isolation. This risk has been prominently illustrated during recent, drastic declines in the populations of kit foxes at Camp Roberts and Fort Hunter Liggett. Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. This decrease continued through 1997 when only three kit foxes were captured (White *et al.* 2000). A similar decrease in kit fox abundance occurred at nearby Fort Hunter Liggett, and only 2 kit foxes have been observed on this installation since 1995 (L. Clark, Wildlife Biologist, Fort Hunter Liggett, pers. comm. to P. White, Service, Sacramento, February 15, 2000). It is unlikely that the current low abundances of kit foxes at Camp Roberts and Fort Hunter Liggett will increase substantially in the near future owing to the limited potential for recruitment. The chance of substantial immigration is low because the nearest core population on the Carrizo Plain is distant (greater than 16 miles) and separated from these installations by barriers to kit fox movement such as roads, developments, and irrigated agricultural areas. Also, there is a relatively high abundance of sympatric predators and competitors on these installations that contribute to low survival rates for kit foxes and, as a result, may limit population growth (White *et al.* 2000). Hence, these populations may be on the verge of extinction.

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Historically, kit foxes likely existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to 4 dispersers per generation (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. White, Service, Sacramento, California). This level of genetic dispersal should allow for local adaptation while preventing the loss of any rare alleles. Based on these results, it is likely that northern populations of kit foxes

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were once panmictic (i.e., randomly mating in a genetic sense), or nearly so, with southern populations. In other words, there were no major barriers to dispersal among populations.

Current levels of gene flow also appear to be adequate, however, extensive habitat loss and fragmentation continues to form more or less geographically distinct populations of foxes, which could potentially reduce genetic exchange among them. An increase in inbreeding and the loss of genetic variation could increase the extinction risk for small, isolated populations of kit foxes by interacting with demography to reduce fecundity, juvenile survival, and lifespan (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998).

An area of particular concern is Santa Nella in western Merced County where pending development plans threaten to eliminate the little suitable habitat that remains and provides a dispersal corridor for kit foxes between the northern and southern portions of their range. Preliminary estimates of expected heterozygosity from foxes in this area indicate that this population may already have reduced genetic variation.

Other populations that may be showing the initial signs of genetic isolation are the Lost Hills area and populations in the Salinas-Pajaro River watershed (i.e., Camp Roberts and Fort Hunter Liggett). Preliminary estimates of the mean number of alleles per locus from foxes in these populations indicate that allelic diversity is lower than expected. Although these results may, in part, be due to the small number of foxes sampled in these areas, they may also be indicative of an increase in the amount of inbreeding due to population subdivision (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. J. White, Fish and Wildlife Service, Sacramento, California). Further sampling and analyses are necessary to adequately assess the effects of these potential genetic bottlenecks.

Arid ecosystems systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency, high amplitude fluctuations in the abundance of mammalian prey for kit foxes (Goldingay *et al.* 1997, White and Garrott 1999). Because the reproductive and neonatal survival rates of kit foxes are strongly depressed at low prey densities (White and Ralls 1993; White and Garrott 1997, 1999), periods of prey scarcity owing to drought or excessive rain events can contribute to population crashes and marked instability in the abundance and distribution of kit foxes (White and Garrott 1999). In other words, unpredictable, short-term fluctuations in precipitation and, in turn, prey abundance can generate frequent, rapid decreases in kit fox density that increase the extinction risk for small, isolated populations.

The primary goal of the recovery strategy for kit foxes identified in the Recovery Plan is to establish a complex of interconnected core and satellite populations throughout the species' range. The long-term viability of each of these core and satellite populations depends partly upon periodic dispersal and genetic flow between them. Therefore, kit fox movement corridors between these populations must be preserved and maintained. In the northern range, from the Ciervo Panoche in Fresno County northward, kit fox populations are small and isolated, and have exhibited significant decline. The core populations are the Ciervo Panoche area, the Carrizo Plain area, and the western Kern County population, as shown on Figure 10 (enclosed). Satellite populations are found in the urban Bakersfield area, Porterville/Lake Success area, Creighton

Ranch/Pixley Wildlife Refuge, Allensworth Ecological Reserve, Semitropic/Kern National Wildlife Refuge (NWR), Antelope Plain, eastern Kern grasslands, Pleasant Valley, western Madera County, Santa Nella, Kesterson NWR, and Contra Costa County. Major corridors connecting these population areas are on the east and west side of the San Joaquin Valley, around the bottom of the Valley, and cross-valley corridors in Kern, Fresno, and Merced counties.

In response to the drastic loss of habitat and steadily increasing fragmentation, California Department of Transportation and the Service convened a San Joaquin Kit Fox Conservation and Planning Team to address the rapid decline of kit fox habitat in the northern range, and increasing barriers to kit fox dispersal. Consisting of Federal, State, and local agencies, local land trusts, environmental groups, researchers, and other concerned individuals, the goal of this team was to coordinate agency actions that will recover the species, and troubleshoot threats to San Joaquin kit foxes as they emerge. Between the years 2001-2003, the team addressed connectivity issues at specific points along the west-side corridor north of the Ciervo Panoche core population.

There are recent records of the San Joaquin kit fox in the project area (California Department of Fish and Game 2004). The biological assessment contains data collected by California Department of Transportation biologists who observed San Joaquin kit fox(es) from July 2000 to May 2001 on nine separate occasions within in the project study area. The observations were made near the potential impact area of the project. Suitable foraging habitat for the San Joaquin kit fox in the form of ruderal and agricultural habitat is located within the action area. Given the recent sightings of the listed canine, biology and ecology of the animal, the presence of suitable habitat in the action area, and the fact that San Joaquin kit fox has been documented to move 9 miles or more in a single night, the Service believes that it is reasonable to assume that this species inhabits the action area.

Mountain Plover

The mountain plover was proposed for Federal listing as threatened on February 16, 1999 (64 FR 7587). The mountain plover is about 9 inches in length, and is slightly smaller than the killdeer, both of which are in the plover family (Charadriidae). The mountain plover is drab and brownish in winter, the season when it can be found in California's Central Valley. Breeding occurs in the summer in the western plains states. California lists the mountain plover as a Species of Special Concern.

The mountain plover is associated with shortgrass and shrub-steppe landscapes throughout its breeding and wintering range. Mountain plovers evolved on grasslands populated by large numbers of grazing animals such as the bison, pronghorn, and elk, and inhabited by burrowing animals such as kangaroo rats, badgers, and prairie dogs (Knopf 1996a). These herbivores dominated both the wintering and breeding areas, and their grazing, wallowing, and burrowing activities created and maintained a mosaic of vegetated and bare areas to which the mountain plover became adapted (Dobkin 1994, Knopf 1996a). Unlike most plovers, mountain plovers are rarely found near water. Habitat in its wintering grounds includes open fields, heavily denuded areas, and other open areas. Mountain plovers forage for insects and can be seen running rapidly

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along the ground and suddenly stopping. Although cultivated land is used by plovers, Knopf and Rupert (1995) found that plovers showed a preference for alkali flats, burned grasslands, and grazed annual grasslands to cultivated sites. Mountain plovers spend about five months in wintering habitat, and begin leaving winter habitat about mid-march (Knopf and Rupert 1995, 1996).

In California, mountain plovers use habitat that is also commonly used by the federally listed giant kangaroo rat and blunt-nosed leopard lizard. Mountain plovers also occur on cultivated lands and so farms. However, research in the San Joaquin, California has determined that while mountain plovers are commonly seen on agricultural lands, they actually prefer the remaining natural landscapes to the agricultural lands.

Historical and current distribution: Mountain plovers spend the summer in the Great Plains, and migrate across the Rocky Mountains in both spring and fall. Historically, mountain plovers have been observed wintering in California, Arizona, Texas, Nevada, the coastal islands of San Clemente Island, Santa Rosa Island and the Farallon Islands (Strecker 1912, Swarth 1914, Alcorn 1946, Jurek 1973, Garrett and Dunn 1981, Jorenson and Ferguson 1984). In Mexico, wintering mountain plovers have been spotted in Baja California, Chihuahua, Coahuila, Sonora, Nuevo Leon, and San Luis Potosi (Russell and Lamm 1978).

Winter range of the mountain plover is primarily in the Sacramento, San Joaquin, and Imperial valleys of California and approximately 90 percent of mountain plovers are frequently reported from two areas – the Central Valley west of Highway 99 and south of Sacramento, and the Imperial Valley of southern California. Throughout these areas, sightings occur on agricultural fields and noncultivated sites; noncultivated sites are preferred habitat (Knopf and Rupert 1995). Within the Central Valley, flocks of up to 1,100 birds have been seen recently in Tulare County (Knopf and Rupert 1995). The Carrizo Plain Natural Area in San Luis Obispo County also is recognized as an important wintering site, with wintering birds reliably reported from the west side of the Carrizo Plain Natural Area since 1971 (S. Fitton, in litt., 1992). The Sacramento Valley portion of the Central Valley also provides wintering habitat for flocks of mountain plovers within Solano and Yolo Counties. During the 1998 census, 230 and 187 mountain plovers were observed within each of these counties, respectively (Hunting and Fitton, in press). Wintering populations of plovers in California have been declining (Garrett and Dunn 1981, Andrews and Righter 1992).

Reasons for decline: Breeding Bird Surveys from 1966-1987 show a 61 percent range wide decline in mountain plover populations. Conversions of grassland habitat, agricultural practices (including heavy pesticide use), livestock management practices, and the decline of native herbivores are factors that have likely contributed to the decline of mountain plover populations. In particular, pesticides are applied to mountain plover wintering areas while plovers are present (Knopf 1996b). Secondary effects of pesticides on breeding behavior and reproductive success may also be contributing to the population decline. Shorebird and mountain plover habitat contamination in the San Joaquin valley and the Grasslands Ecological Area has occurred from agricultural drain water used to flood wetlands and resulted in biological accumulation of

selenium sufficient to harm reproduction of shorebirds and other wildlife (Ohlendorf et al. 1987).

Mountain plovers are attracted to sites that are heavily disturbed by grazing and burning. Consequently, mountain plovers are found on sites that are heavily grazed, have been burned to manipulate the vegetative structure and composition, or that have been cultivated in the spring. The most recent data show that the type of implement used for tillage and the timing of tillage are important factors in mountain plover survival on cultivated lands.

Environmental Baseline: Most of the California wintering mountain plovers, principally in the San Joaquin Valley, an area experiencing high rates of human population growth. Today, the mountain plover is considered endangered in Canada, a species of special interest or concern in Montana and Oklahoma, extirpated in North Dakota and South Dakota, on the watch list in Kansas, threatened in Nebraska, and proposed as threatened in California. The U. S. Fish and Wildlife Service is considering listing the mountain plover as endangered or threatened throughout its range. Current population trends estimate mountain plover numbers to be less than 10,000, and the population has declined by at least 50 percent since 1966, according to 30 years of Breeding Bird Survey data, which is the highest rate of decline of any other grassland bird.

On wintering grounds in California, as many as 10,000 mountain plovers were repeatedly counted in the San Joaquin Valley during the 1960's (J. Engler, U.S. Fish and Wildlife Service, in litt., 1992). The 1998 California Bird Census found a total of 2,179 mountain plovers in 10 California counties, including Imperial, Kings, Los Angeles, Monterey, Riverside, San Benito, San Luis Obispo, San Bernardino, Solano, and Yolo Counties (Hunting and Fitton, 1999). Plovers are believed also to winter in portions of Kern County.

Effects of the Proposed Action

San Joaquin kit fox

Limited-value foraging habitat for the San Joaquin kit fox exists within the potential impact area. However, denning habitat or other refugia is not widely available. San Joaquin kit foxes have recently been sighted to the east and west of the PIA, but no evidence exists to date that shows kit foxes are migrating across the valley floor. Large, unplowed grassland habitat blocks are located along Sandy Mush Road west of the proposed project. (Appendix B) These habitat blocks are some of the last remaining in this portion of the Central Valley. For this reason, the USFWS has proposed to recover a kit fox east-west migration corridor identified as a Level 2 recovery priority in the USFWS Recovery Plan for Upland Species (USFWS 1998). Through parcel acquisition and easement agreements with local farmers USFWS plans to provide the kit fox with a patchwork of safe haven parcels that would allow populations on each side of the valley to merge. The proposed Plainsburg/Arboleda Freeway Project would potentially restrict kit fox migration across the valley floor unless appropriate mitigation measures are implemented.

The San Joaquin kit fox will be adversely affected by the construction of the roadway and associated structures on 700 acres of its foraging, denning, and travel corridor habitat. San Joaquin kit foxes inhabiting the project area and surrounding vicinity (for purposes of this

biological opinion the surrounding vicinity is described as 1000 feet outside and adjacent to the project footprint) are likely to be subject to indirect effects including temporary harassment from noise associated with project activities and human presence, and a reduction in natural food sources as a result of habitat disturbance.

The likelihood of direct mortality to San Joaquin kit foxes from either crushing or entombment in dens is low because of avoidance measures included in the project description. San Joaquin kit foxes may be adversely affected by vehicle strikes, and harassment from noise and vibration. The listed canine also may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time foraging, falling into trenches or pits, being shot, being buried after becoming trapped in pipes, injured or killed by pet cats or dogs owned by construction related personnel, poisoned by rodenticides, and injured or killed by predators attracted to construction-related food or trash at the site.

The range-wide habitat loss, fragmentation, and degradation from multiple factors are the primary threat to the survival and recovery of the San Joaquin kit fox (U.S. Fish and Wildlife Service 1998). Approximately 95% of native habitat for the kit fox in the San Joaquin Valley has been destroyed by agricultural, industrial, and urban development (Service 1998). Loss of natural lands continues to occur, further reducing its habitat.

The amount of habitat loss directly attributable to roads has not been calculated. Estimates of the area occupied by roads under the jurisdiction of California Department of Transportation include 3,669 acres for Kern County, 591 acres for Kings County, 1,065 acres for Merced County, and 2,019 acres for Fresno County (Cypher 2000). These estimates are based on a standard lane width of 11.8 feet. Though not all areas included in this estimate are kit fox habitat, the estimates may nonetheless under represent the effects of roads as these totals do not include road shoulders, medians, or associated developments (e.g., interchanges, signs, drain facilities, weigh stations); nor do they include the area occupied by county and city roads. Furthermore, the above totals do not reflect the arrangement or density of San Joaquin Valley roads or the traffic volume on these roads.

The importance of road density to the ecological effects on species is indicated by research coordinated at the national level. The National Academy of Science (NAS) has formed a committee to review the scientific findings pertaining to road density. The NAS committee is focusing on hard-surfaced roads and will assess data and ecological indicators needed to measure effects, including cumulative effects. The NAS committee will produce a conceptual framework for the development of a rapid assessment methodology that transportation and regulatory agencies can use to assess and measure the ecological impact of road density (NAS 2003). The project is being sponsored by the Federal Highways Administration.

Although the effects of road density are unstudied relative to the San Joaquin kit fox, road density appears to adversely affect other diminishing species, for example wolves (*Canis lupis*) and mountain lions (*Felis concolor*). According to Forman *et al.* (2003), wolves in Minnesota, Wisconsin, and Michigan and mountain lions in Utah appear to thrive only where road density is

less than 1.0 mile/square mile. In an examination of radio-collared wolves in Wisconsin, a total of 60% of human-induced mortality occurred at road densities above 1.0 mile/square mile (Wydeven *et al.* 2001). In areas where road density is high, San Joaquin kit fox are likely to be adversely affected by several factors including direct mortality due to vehicle strikes, alteration of behavior patterns due to road and road zone avoidance, road barrier effects which reduce reproductive potential due to the inaccessibility of mates, prey, and shelter. Additionally roads are documented as serving as conduits for invasion by non-native plants and animals as well as the means by which contaminants and toxins are introduced to habitat.

Habitat Fragmentation

The area or diameter of patches enclosed within a network, referred to by Forman *et al.* (2003) as mesh size, is inversely related to road density. As road density increases, mesh size decreases. As the landscape becomes more fragmented, the fragments become progressively smaller (Forman *et al.* 2003). Patches within dense road networks are constrained in terms of ecosystem functioning and are thus degraded. As patches become progressively smaller, they become unsuitable to support the San Joaquin kit fox and its prey.

If a habitat fragment is too small to support a home range, animals may abandon it. Abandonment increases the probability that the animals will be extirpated from each patch. Estimates of home range size for the San Joaquin kit fox vary from 1.7 square miles to 4.5 square miles (White and Ralls 1993). Typically, a mated pair will share a home range. As mesh size becomes smaller, the patches themselves can function as barriers with habitat degraded to the point that it offers little in the way of foraging grounds or refuge from predators. These remnant patches interrupt dispersal corridors and reduce genetic exchange and mating opportunities.

Road density and mesh size are directly related to the total surface area occupied by roads in a given region. On a local scale, the surface area of a road may be the major contributor to adverse effects to San Joaquin kit foxes depending on lane width and kit fox occupation of or dispersal through adjacent habitat.

Direct Mortality

San Joaquin kit fox mortality and injury occurs when the animals attempt to cross roads and are hit by cars, trucks, or motorcycles. The majority of strikes likely occur at night when the animals are most active. Such strikes are usually fatal for an animal the size of a kit fox. If vehicle strikes are sufficiently frequent in a given locality, they could result in reduced kit fox abundance. The death of kit foxes during the December through March breeding season could result in reduced reproductive success. Death of females during gestation or prior to pup weaning could result in the loss of an entire litter of young, and therefore, reduced recruitment of new individuals into the population.

The local and range-wide effects of vehicle strikes on San Joaquin kit foxes have not been adequately assessed. Vehicle strikes appear to occur most frequently where roads transverse areas where kit foxes are abundant. However, the linear quantity of roads in a given area may not

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be directly related to the number of vehicle strikes in a given area. The type of road (e.g., number of lanes) traffic volume, and average speed of vehicles likely all influence the number of vehicle strikes for which San Joaquin kit foxes are at risk. The number of strikes likely increases with road size, traffic volume, and average speed (Clevenger and Waltho 1999). Another factor influencing the number of vehicles striking San Joaquin kit foxes, but for which little data is available, is the frequency with which the animals cross roads and are therefore at risk. The proportion of successful road crossings by these animals likely declines with increasing road size, traffic volume and density, and vehicle speeds. The proportion of San Joaquin kit foxes successfully crossing roads may increase in areas where they obtain more experience crossing roads, such as in and near urban areas.

Occurrences of vehicle strikes involving San Joaquin kit foxes have been well documented, and such strikes occur throughout the range of the species. Sources of kit fox mortality were examined during the period 1980-1995 at the Naval Petroleum Reserves in California in western Kern County (Cypher *et al.* 2000). During this period, 341 adult San Joaquin kit foxes were monitored using radio telemetry, and 225 of these animals were recovered dead. Of these, 20, or 9% were struck and killed by vehicles. During this same period, 184 juvenile (<1 year old) kit foxes were monitored. Of these, 142 were recovered dead and 11 or 8% were killed by vehicles. For both adults and juveniles, vehicle strikes accounted for less than 10% of all San Joaquin kit fox deaths in most years. However, in some years, vehicles accounted for about 20% of deaths. Predators, primarily coyotes and bobcats, were the primary source of mortality at the Naval Petroleum Reserves. In addition, 70 kit foxes, both radio collared and non-collared, were found dead on roads in and around the Naval Petroleum Reserves during the period 1980-1991 (Scrivner *et al.* 1993). Of these, 34 were hit by vehicles on the approximately 1,600 km (990 miles) of roads at the Reserve, and 36 were struck on the approximately 80 km (50 miles) of State and County roads (e.g., State Route 119, Elk Hills Road), where traffic volumes and average vehicle speeds were higher than those on the Reserve.

In other areas of western Kern County, 49 kit foxes were radio-collared in the highly developed Midway-Sunset oil field, and 54 kit foxes were radio-collared in the Lokern Natural Area, a nearby undeveloped area, during the period 1989-1993 (Spiegel and Disney 1996). Of these animals, 60 were recovered dead; 1 (2%) was killed by a vehicle, and it was found in an undeveloped area along the access road adjacent to the California Aqueduct. Though six non-collared kit foxes were killed by vehicles on the access road, predators, primarily coyotes, bobcats, and feral dogs were responsible for most deaths in this study. Forty-one San Joaquin kit foxes were radio-collared and monitored during 1989-1991 on the Carrizo Plain National Monument in eastern San Luis Obispo County (Ralls and White 1995). Twenty-two were found dead; 1 (5%) was attributed to a vehicle strike. At the Camp Roberts National Guard Training Facility in Monterey and San Luis Obispo counties, 94 San Joaquin kit foxes were radio-collared during the period 1988-1992 (Standley *et al.* 1992). Forty-nine were found dead of which two were attributed to vehicle strikes. In western Merced County, 28 San Joaquin kit foxes were radio-collared during the period 1985-1987 (Briden *et al.* 1992). Seventeen were found dead and two (12%) of these deaths were attributed to vehicles.

According to Morrell (1970), "The automobile is by far the major cause of reported San Joaquin kit fox deaths - 128 of 152 deaths reported were caused by automobiles." Morrell acknowledged that the numbers were based on non-radio-collared kit foxes and therefore were biased because road-killed foxes are conspicuous and easily observed compared to animals dying from other causes. Though predators such as coyotes, bobcats, non-native red foxes, and domestic dogs likely constitute a higher source of mortality than vehicle strikes (Service 1998; Cypher 2000), predation as a source of mortality is likely dependent upon local conditions. Where abundance of predators has also been reduced due to road density and loss of habitat, vehicle strikes may present a significant threat to kit fox survival and recovery.

Based on a study of another kit fox subspecies, Egoscue (1962) reported that eight tagged foxes (*Vulpes macrotis nevadensis*) in Utah were killed by vehicles, and five of these were pups. Pups appeared to be more vulnerable to vehicle strikes. Many of the foxes killed were residents that were using dens located near roads. O'Neal *et al.* (1987) examined 23 dead kit foxes in western Utah in 1983. None were killed by vehicles, possibly due to the remoteness of the study site.

The swift fox (*Vulpes velox*) is closely related to the San Joaquin kit fox, and is listed as endangered in Canada. They show numerous ecological similarities with the San Joaquin kit fox. Hines (1980) reported that roads were a major source of swift fox mortality in Nebraska. In Alberta, where the swift fox was extirpated and recently reintroduced, vehicles were responsible for five of 89 (6%) of the foxes found dead (Carbyn *et al.* 1994). Pups appeared to be especially vulnerable, particularly if the natal dens were located near roads (Carbyn 1998). In western Kansas, 41 adults and 24 juvenile swift foxes were radio collared and monitored during 1996-97 on two study sites (Sovada *et al.* 1998). Among the adults, 18 were found dead, but none were killed by vehicles. Among the juveniles, 14 were found dead and four (29%) of these had been struck by vehicles. All seven of the juveniles killed by vehicles were found on the same study site. This study site had 90% more roads compared to the other study site where no foxes were killed by vehicles (78 mi vs. 41 mi). At a remote site in Colorado with few roads and restricted public access, swift foxes were rarely struck by vehicles (Covell 1992; Kitchen *et al.* 1999).

Vehicle-related mortality has significantly affected other listed or rare species. Vehicles caused 49% of the mortality documented among endangered Florida panthers (*Felis concolor coryi*) (Maehr *et al.* 1991). With a remaining population of 20-30 animals, the loss of any to vehicles likely constitutes a significant population effect. Similarly, Tubak in 1999 estimated at least 15% of the remaining 250-300 key deer (*Odocoileus virginianus clavium*) are killed annually by vehicles, and this mortality is considered to be a limiting factor for this endangered species (Service 1985). Mortality from vehicles was the primary source of mortality for endangered ocelots (*Felis pardalis*) in Texas (Tubak 1999), and also contributed to the failure of a lynx (*Lynx lynx*) reintroduction project in New York (Aubrey *et al.* 1999). Rudolph *et al.* (1999) estimated that road-associated mortality may have depressed populations of Louisiana pine snakes (*Pituophis ruthveni*) and timber rattlesnakes (*Crotalus horridus*) by over 50% in eastern Texas, and this mortality may be a primary factor in local extirpations of timber rattlesnakes (Rudolph *et al.* 1998). Mortality from vehicles also is contributing to the reduction in the status of the prairie garter snake (*Thamnophis radix radix*) in Ohio (Dalrymple and Reichenbach 1984), and was a limiting factor in the recovery of the endangered American crocodile (*Crocodylus acutus*) in

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Florida (Kushland 1998). In Florida, threatened Florida scrub-jays (*Aphelocoma coerulescens*) suffered higher mortality in territories near roads, as well as reduced productivity due to vehicle strikes of both breeding adults and young (Mumme *et al.* 1999).

Barrier Effects

Roads constitute barriers to San Joaquin kit fox movements, dispersal, and gene flow. Movements and dispersal corridors are critical to kit fox population dynamics, particularly because the animals currently persist as metapopulations with multiple disjunct population centers. Movement and dispersal corridors are important for alleviating over-crowding and intraspecific competition during years when San Joaquin kit fox abundance is high, and also they are important for facilitating the recolonization of areas where the animal has been extirpated. Movement between population centers maintains gene flow and reduced genetic isolation. Genetically isolated populations are at greater risk of deleterious genetic effects such as inbreeding, genetic drift, and founder effects.

Roads have been documented to act as barriers to a number of species. Bobcats in Wisconsin readily crossed dirt roads, but were reluctant to cross paved roads (Lovallo and Anderson 1996). Lynx also exhibit a reluctance to cross roads (Barnum 1999) as do mountain lions (Van Dyke *et al.* 1986). In a study in North Carolina, the number of road crossings by black bears (*Ursus americanus*) was inversely related to traffic volume, and bears almost never crossed an interstate highway (Brody and Pelton 1989). Endangered Sonoran pronghorn (*Antilocarpa americana*) in Mexico are reluctant to cross a 2-lane highway, and the planned expansion of the road could further restrict movements (Castillo-Sanchez 1999). Many rodents are reluctant to cross roads (Oxley *et al.* 1974). Forman *et al.* (2003) suggests that road crossings are as much about individual behavior as they are about habitat requirements and reports that a four-lane divided highway in Canada served as a complete barrier to adult female grizzly bears (*Ursus arctos*) and a partial filter-barrier for adult male grizzlies.

Roads were found to be significant barriers to gene flow among common frogs (*Rana temporaria*) in Germany and this has resulted in genetic differentiation among populations separated by roads (Reh and Seitz 1990). Similarly, significant genetic subdivision was detected in bank vole (*Clethrionomys glareolus*) populations separated by a 164 foot wide highway in Germany (Gerlach and Musolf 2000). In California, local extinctions of mountain lions have occurred when roads and other developments fragmented habitat in small patches and blocked movement corridors thereby isolating the patches and preventing recolonization (Beier 1993).

Traffic Volume

Traffic volume influences the permeability (the likelihood of crossings) of roads and the probability for mortality due to vehicle strikes. Factors such as the width of the road, the presence of a median with or without Jersey or "K" rail concrete barriers, the velocity of the traffic, the physical nature of the approach and shoulder of the road, and the behavior of the animals attempting to cross determine probabilities for mortality. Clevenger *et al.* (2003) studying roads in Canada found that a low volume road (1,068 to 3,231 vehicles per day) resulted

in higher mortalities of small vertebrate fauna than high volume roads (14,000 to 35,000 vehicles per day). These and other results indicate that the disturbance generated from roads with high traffic volume may deter animal movements onto or across the roadway. Multi-lane roads with high traffic volume may produce the greatest barrier effect to the San Joaquin kit fox.

Knapp (1978) monitored movements of radio-collared San Joaquin kit foxes in the vicinity of Interstate 5, a divided four-lane freeway in Kern County. Many of the foxes used areas within three km (two miles) of the highway, and most exhibited movement and home range patterns that paralleled the highway, but did not cross it. Only on two occasions were animals located on the opposite side of the highway from their primary area of use.

Noise Harassment

Disturbance from the construction of minor transportation projects and from roads and road networks could induce stress in the San Joaquin kit fox which may affect physiological parameters or behavior. The resulting effects could include increased energetic requirements, decreased reproductive output, decreased immunological functions, altered space use patterns, displacement, or possibly death. Observations from a variety of sources and situations suggest that San Joaquin kit foxes may not be significantly affected by disturbance, even when the source is prolonged or continuous (Cypher 2000). However, individual animals may be more affected than others, and it is unknown whether different types of disturbance may result in reduced local abundance.

One type of disturbance that may adversely affect San Joaquin kit foxes is an increase in the ambient noise level. Minor transportation projects may result in an increase in the ambient noise level during and after project construction. Harassment from long-term noise may cause kit foxes to eventually vacate the project site and adjacent areas. Projects that have the effect of enhancing traffic flow or increasing traffic volume have the potential to result in higher associated noise levels. When traffic volume increases up to 1,000 vehicles per day, noise rises to over 50 decibels (dBA). As the speed of traffic flow increases, noise levels increase. Noise levels also increase as a result of increased truck usage. Traffic flow that includes medium to heavy trucks (i.e., six or more tires on two axles to three or more axles) noticeably increases the noise level. A heavy truck passing produces approximately 10 dBA more noise than a passing automobile (Forman *et al.* 2003). Traffic noise likely contributes to San Joaquin kit fox behaviors with regard to road avoidance and decisions as to when and where to attempt road crossings.

No specific research on the physiological effects of noise on San Joaquin kit foxes has been conducted, but a "safe, short-term level" for humans has been determined to be 75 decibels by the National Institutes of Health (NIH) (NIH 1990, Burglund and Lindvall 1995). The mechanisms leading to permanent hearing damage are the same for all mammals (NIH 1990). However, the enlarged pinna and reduced tragi of kit foxes indicate that their hearing is more acute than that of humans (Jameson and Peeters 1988). However, variation in response to intense noise has been found to vary, in humans, by as much as 30 to 50 dBA between individuals (NIH 1990). Similar variation has been found in animal studies as well (NIH 1990).

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Also, younger animals have been shown to be more susceptible to noise-induced hearing loss (NIH 1990). The ability to habituate to noise appears to vary widely between species (U.S. National Park Service 1990). Typical construction machinery produces noise in the range of 75 dBA (arc-welder) to 85 dBA (bulldozer) (Burglund and Lindvall 1995).

Long-term noise levels of 85 dBA are recognized to cause permanent hearing damage in humans (NIH 1990). Noise at the 85 dBA level has been correlated with hypertension in Rhesus monkeys (*Macaca fascicularis*) (Cornman 2001). Increased reproductive failure in laboratory mice (*Mus musculus*) was found to occur after a level of 82-85 dBA for one week (Cornman 2001). However, measurable loss of hearing was found to occur in chinchillas (*Chinchilla laniger*) at a sustained level of 70 dBA (Peters 1965). Hearing loss from motorcycle traffic has been documented for the kangaroo rat (*Dipodomys* species) (Bondello and Brattstrom 1979) and desert kangaroo rats (*Dipodomys deserti*) showed a significant reduction in reaction distance to the sidewinder (*Crotalus cerastes*) after exposure to 95 dBA (Cornman 2001). Other desert mammals appear to sustain the same impacts from noise (Bondello and Brattstrom 1979). Aircraft noise has produced accelerated heart-rates in pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), and elk (*Cervus elaphus*) (MacArthur 1976; Workman *et al.* 1992; all in U.S. National Park Service 1994).

Hearing loss is correlated with distance from the source of the noise. At a level of 110 dBA, guinea pigs (*Cavia porcellus*) suffered long-term hearing loss at distances of 25 and 50 meters, temporary loss at a distance of 100 meters, and no measurable loss at 1,500 meters (Gonzales *et al.* 1970). Over clear (i.e. unobstructed) land as in San Joaquin fox habitat, sound diminishes slightly more quickly at 6 dBA per doubling of distance:

$$(\text{noise at } D) = D_1 - 19.93 [\log (D/D_{\text{land}})],$$

(Komanoff & Shaw 2000). The effects of cumulative noise (α) are computed as the sum of the log of each component, multiplied by a magnitude of 10:

$$\alpha = 10 [\Sigma (\log A + \log B + \log C \dots)],$$

where A, B, C, etc. are individual components of the total ambient noise. Thus, the total synergistic impact from noise will be greater than the sum of the individual components (Komanoff & Shaw 2000).

Contaminants

The presence of roads in an area could result in the introduction of chemical contaminants to the site. Contaminants could be introduced in several ways. Substances used in road building materials or to recondition roads can leach out or wash off roads adjacent to habitat. Vehicle exhaust emissions can include hazardous substances which may concentrate in soils along roads. Heavy metals such as lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron are all emitted in vehicle exhaust (Trombulak and Frissell 2000). Concentrations of

organic pollutants (i.e. dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati *et al.* 1992). Ozone levels are higher in the air near roads (Trombulak and Frissell 2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle may be minute, these substances can accumulate on roads and may be washed into the adjacent environment by runoff during rain storms. An immense variety of substances, including fertilizers, pesticides, and herbicides from vehicles traveling through agricultural zones, could be introduced during accidental spills of materials. Such spills can result from small containers falling off passing vehicles, or from accidents resulting in whole loads being spilled. Large spills may be partially or completely mitigated by clean-up efforts, depending on the substance.

San Joaquin kit foxes using areas adjacent to roads could be exposed to any contaminants that are present at the site. Exposure pathways include inhalation, dermal contact, direct ingestion, ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants may cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. Carcinogenic substances may cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Contaminants also may have the same effect on kit fox prey species. This could result in reduced prey abundance and diminished local carrying capacity for the kit fox.

Little information is available on the effects of contaminants on the San Joaquin kit fox. The effects may be difficult to detect. Morbidity or mortality likely would occur after the animals had left the contaminated site, and more subtle effects such as genetic damage could only be detected through intensive study and monitoring. However, effects have been detected on some occasions. At the Naval Petroleum Reserve, three kit foxes are known to have been killed by drowning in spills of crude oil (Cypher *et al.* 2000). Spiegel and Disney (1996) reported that a kit fox was found covered with crude oil at the Midway-Sunset oil field, and this individual died despite treatment. Other animals, some of which were prey species for the kit fox, were found drowned in crude oil at the Naval Petroleum Reserve (Scrivner *et al.* 1993). Such spills potentially can cause local reductions in the abundance of kit foxes and their prey.

Invasive Species

Construction of roads can facilitate the invasion and establishment by species not native to the area. Disturbance and alteration of habitat adjacent to roads may create favorable conditions for non-native plants and animals. Non-native plants can spread along roadsides and then into adjacent habitat (Gelbard and Harrison 2003). Non-native animals may use modified habitats adjacent to road to disperse into kit fox habitat. These exotic animals could compete with kit foxes for resources such as food or dens, or directly injure or kill kit foxes. Non-native plants and animals may reduce habitat quality for kit foxes or their prey, and reduce the productivity or the local carrying capacity for the kit fox. Introductions of non-native species could cause kit foxes to alter behavioral patterns by avoiding or abandoning areas near roads (Cypher 2000).

Disturbed areas adjacent to roads provide favorable habitat conditions for a number of non-native plant species. Some of these taxa are aggressively invasive and they can alter natural

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communities and potentially affect habitat quality. A problematic species within the range of the San Joaquin kit fox is yellow star thistle (*Centaurea solstitialis*). Dense stands of this plant can form along roadsides and then spread into adjacent habitat. This plant displaces native vegetation, competes with native plants for resources, does not appear to be used by kit fox prey, exhibits dense growth, and may be difficult for kit foxes to move through due its large size (up to 3.3 feet tall), and numerous sharp spines (Cypher 2000). Other species that may disperse along roads and invade adjacent habitat include mustards (*Brassica* spp.) and Russian thistle (*Salsola tragus*) (Tellman 1997).

Disturbed soils and reduced competition from native plants are some of the conditions that facilitate invasion along roads by non-native plant species. Nitrogen from vehicle exhaust is deposited in habitats adjacent to roads, and the resulting enhanced nitrogen levels appear to promote growth of non-native species, particularly non-native grasses (Weiss 1999). These grasses, such as red brome (*Bromus madritensis rubens*) create dense ground cover in the San Joaquin Valley, and this dense cover appears to reduce habitat quality for various small mammal species, such as kangaroo rats, which are an important prey for kit foxes (Goldingay *et al.* 1997, Cypher 2000).

Roads may serve as travel corridors for non-native red foxes. Red foxes can kill San Joaquin kit foxes (Ralls and White 1995, Service 1998), and likely compete with kit foxes for food and dens. Red foxes are considered a threat to the swift fox in Canada (Carbyn 1989). Red foxes are infrequently observed in large blocks of undisturbed habitat within the range of the San Joaquin kit fox, possibly due to the absence of permanent water or the presence of coyotes which prey upon red foxes. Along roads, water availability may be higher due to pooling of precipitation runoff or human development, and coyotes may be less abundant due to the presence of humans. Roads may facilitate movements of red foxes and increase access to kit fox habitat. Non-native red foxes and feral cats (*Felis catus*) are reported to use roads as movement corridors in Australia (Bennett 1991).

Road Effect Zone

Adverse effects to wildlife populations from roads may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this biological opinion (e.g. vehicle-related mortality, habitat degradation, invasive exotic species, etc.). Forman and Deblinger (2000) described the effect as the "road effect" zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 ft on either side of the road for an average total zone width of approximately 1970 feet. However, in places they detected an effect > 0.6 miles from the road. Rudolph *et al.* (1999) detected reduced snake abundance up to 2,790 feet from roads in Texas. They estimated snake abundance out to 2,790 feet, so the effect may have been greater. Extrapolating to a landscape scale, they concluded the effect of roads on snake populations in Texas likely was significant, given that approximately 79% of the land area of Texas is within 1,640 feet of a road.

Effects within the road zone can be subtle. Van der Zande *et al.* (1980) reported that lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*) feeding at 1,575-6,560 feet from

roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep (*Ovis canadensis*) increases near roads (MacArthur *et al.* 1979). Trombulak and Frissell (2000) described another type of road zone effect. Heavy metal concentrations from vehicle exhaust were greatest within 66 feet of roads, but elevated levels of metals in both soil and plants were detected at >660 feet of roads. The road effect zone apparently varies with habitat type and traffic volume. Based on responses by birds, Forman (2000) estimated the effect zone along primary roads at 1,000 feet in woodlands, 1,197 feet in grasslands, and 2,657 feet in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 656 feet. The road effect zone and the San Joaquin kit fox have not been adequately investigated; however, it is possible it exists given the effects of roads on the animal.

Mountain Plover

Limited-value foraging habitat for the mountain plover exists within the potential impact area. No mountain plovers were observed during biological surveys, therefore, no mountain plover mortality is expected to result from project construction. Approximately 67 acres of suitable winter foraging habitat (annual row crops) would be permanently affected by proposed construction activities. Compensation for the San Joaquin kit fox would include land suitable as winter foraging habitat for the mountain plover.

The mountain plover will be adversely affected by the construction of the roadway and associated structures on 67 acres of its foraging habitat. Mountain plover utilizing the habitat as winter foraging areas within the project area and surrounding vicinity are likely to be subject to indirect effects including temporary harassment from noise associated with project activities and human presence, and a reduction in natural food sources as a result of habitat disturbance.

The likelihood of direct mortality to mountain plover from crushing is low because of avoidance measures included in the project description. Mountain plover may be adversely affected by vehicle strikes, and harassment from noise and vibration. This candidate species also may be adversely affected by construction activities in grassland and agricultural areas, or being injured or killed by pet cats or dogs owned by construction related personnel, poisoned by pesticides, and injured or killed by predators attracted to construction-related food or trash at the site.

Cumulative Effects

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

Numerous non-Federal activities continue to eliminate habitat for the San Joaquin kit fox in the action area. Loss and degradation of habitat affecting both animals and plants with or without Service authorization continues as a result of: urbanization; oil and gas development on private lands; road and utility right-of-way management; flood control and water banking projects that

may not be funded, permitted, or constructed by a Federal agency; overgrazing by livestock; and continuing agricultural expansion including the building of new dairies and stockyards. Listed and proposed animal species are also affected by poisoning, shooting, increased predation associated with human development, ground squirrel reduction efforts, mosquito control, and reduction of food sources. Unauthorized take may be occurring, and the Service continues to request re-initiation of projects when project descriptions have changed markedly since the original biological opinion were issued, and Service Law Enforcement continues to investigate potential violations of the Act.

Existing habitat is so fragmented in the San Joaquin Valley that extirpation of certain remaining populations of San Joaquin kit fox appears likely, due to chance fluctuation of small populations, unusual climatic events, the loss of genetic fitness commonly associated with very small populations, and other factors discussed previously. The cumulative effects of these threats pose a significant impediment to the survival and recovery of these species.

San Joaquin kit fox. Several unpermitted projects are likely to sever the north-south kit fox corridor at Patterson on the west side of Stanislaus County in the next year, effectively cutting off kit fox in the Contra Costa/Alameda satellite population north of Patterson from satellite and core populations south of Patterson. The expansion of the urban areas north of Highway 145 in Madera County, north of the City of Fresno, and to the east of the City of Porterville threatens the north-south kit fox corridor on the east side of the valley. Growth around the City of Merced that is induced by the selection of a new University of California campus in that city is threatening to cut off kit fox that inhabit the valley edge north of the City of Merced. Expanding development in the Santa Nella area also threatens the north-south corridor on the west side, although the Service has had initial discussions with some landowners concerning a regional HCP for the area.

The following list provides the names or descriptors of projects in Merced County for which the Service has received limited information. The project descriptions when initially provided to the Service, lacked a Federal nexus and were therefore not considered Federal projects that would be subject to a section 7 consultation under the Act. Some of these projects may eventually become Federal projects whereas others may be abandoned for reasons unknown to the Service. The list therefore provides an example of the projects that are representative of development throughout Merced County. The size of such projects and the habitat loss consequential to each is often unknown; however, some of the projects listed are known to range in size from less than 25 acres to more than 100 acres. If habitat conservation plans were in place in this county or around growing urban areas such as Merced, they would provide a locally-designed mechanism for complying with the Act and for project proponents to make targeted and effective contributions to the survival and recovery of listed species.

Merced County

- Surface mining
- Dairy, new
- Subdivisions, major and minor
- New orchards

As the human population of central California increases, and land continues to be converted to municipal and industrial uses, the amount and quality of habitat suitable for the species considered in this biological opinion will decrease. Between 1970 and 2000, California's total population increased by approximately 71% while the Central Valley's population increased 200%. Of the Sacramento and San Joaquin Valleys within the Central Valley, the San Joaquin Valley had the greater population growth (California Department of Finance (CDF) 2002). Among counties in the San Joaquin Valley, Tulare experienced the least increase percentage in population at 226% from 1940 to 1995, while Stanislaus experienced the greatest increase at 453% during the same period. Also during the period 1940 to 1995, the increase in population for Fresno was 322%; for Kern and Madera: 356% each, for Kings: 227%, for Merced: 322% (CDF 2002). (Information for the valley portions of Mariposa and Tuolumne was unavailable). During the period 1988 to 1998, 82,756 acres in the San Joaquin Valley were converted to urban and built-up land uses (California Department of Conservation 2000). Although not each of the converted acres can be considered habitat, this trend indicates that habitat loss continues to threaten the survival and recovery of listed species.

The cumulative effects of all the future State, Tribal, local, and private actions that are reasonably certain to occur in the action area will continue to have a deleterious effect on the reproduction, numbers, and distribution of the species considered herein. The adverse cumulative effects described in this section serve to magnify the adverse effects of the proposed action and diminish any beneficial effects.

Conclusion

Listed species:

After reviewing the current status of the San Joaquin kit fox, the environmental baseline for the action area, the effects of the proposed Plainsburg/Arboleda State Route 99 Project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the San Joaquin kit fox. No critical habitat has been designated or proposed for this species; therefore, none will be affected.

Proposed species:

After reviewing the current status of the mountain plover, the environmental baseline for the action area, the effects of the proposed Plainsburg/Arboleda State Route 99 Project, and the cumulative effects, it is the Service's conference opinion that the project, as proposed, is not likely to jeopardize the continued existence of the mountain plover. No critical habitat has been designated or proposed for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to

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engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Federal Highway Administration has a continuing duty to regulate the activity covered by this incidental take statement. If the Federal Highway Administration (1) fails to require the California Department of Transportation to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Incidental take of the San Joaquin kit fox and mountain plover is anticipated to occur as a result of the proposed project. However, incidental take will be difficult to detect or quantify for the following reasons: 1) The San Joaquin kit fox lives for a portion of its life in dens or burrows, it has a wide ranging territory, is primarily active at night, is often extremely shy in its behavior around humans, and losses of this animal may be difficult to quantify due to seasonal fluctuations in its numbers; and 2) due to the secretive nature of the mountain plover, losses may be masked by seasonal fluctuations in numbers or other causes, and the species occurs in habitat that makes them difficult to detect. For these reasons, the Service is quantifying take incidental to the proposed action as the number of acres of habitat that will become unsuitable for the San Joaquin kit fox and the mountain plover as a result of the action. Loss of habitat is a reasonable surrogate for expressing the amount or extent of take because it accurately reflects the biological effects to this species. Therefore, the Service estimates that all San Joaquin kit foxes inhabiting 700 acres and all mountain plover inhabitation 67 acres will be subject to take in the form of harm and harassment as a result of the proposed action.

Effect of Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox or the mountain plover. Critical habitat for this species has not been designated or proposed; therefore none will be affected.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effects of the Plainsburg/Arboleda State Route 99 Project on the San Joaquin kit fox and the mountain plover.

1. The California Department of Transportation shall implement conservation measures for the San Joaquin kit fox and the mountain plover to minimize (1) the effects of the loss of habitat that will occur as a result of the project; (2) the potential for harassment, harm, injury, and mortality to the San Joaquin kit fox and mountain plover; and (3) the potential for inadvertent capture or inadvertent capture or entrapment of this listed wildlife species during construction activities.
2. The California Department of Transportation shall ensure their compliance with this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Federal Highway Administration shall ensure the California Department of Transportation complies with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):
 - A. The California Department of Transportation shall minimize the potential for harm or harassment of the San Joaquin kit fox and mountain plover resulting from the project related activities by implementation of the conservation measures as described in the biological assessment and the *Project Description* of this biological opinion.
 - B. The California Department of Transportation shall include Special Provisions that include the avoidance and minimization measures of this biological opinion in the solicitation for bid information. The California Department of Transportation will educate and inform contractors involved in the project as to the requirements of the biological opinion.
 - C. Prior to initiation of any site preparation/construction activities, the California Department of Transportation biologist or Service-approved biologist will conduct an education and training session for all construction personnel. All available individuals who will be involved in the site preparation or construction will be present, including the project representative(s) responsible for reporting take to the Service and the California Department of Fish and Game. Training sessions will be repeated for all new employees before they are allowed to access the project site. Sign up sheets identifying attendees and the contractor/company they represent will

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be provided to the Service with the post-construction compliance report. At a minimum, the training will include a description of the natural history of the San Joaquin kit fox and its habitat and the mountain plover and its habitat. Training will include the general measures that are being implemented to conserve these species as they relate to the project, the penalties for non-compliance, and the boundaries (work area) within which the project must be accomplished. To ensure that employees and contractors understand their roles and responsibilities, training may have to be conducted in languages other than English.

- D. The resident engineer or their designee shall be responsible for implementing these conservation measures and shall be the point of contact for each project.
- E. If borrow material is going to be used for the Plainsburg/Arboleda State Route 99 Project, the California Department of Transportation shall follow the procedures outlined below:
1. California Department of Transportation shall require as part of the construction contract that all contractors comply with the Act in the performance of the work necessary for project completion performed inside and outside the project right-of-way.
 2. California Department of Transportation shall require documentation from the contractor that aggregate, fill, or borrow material provided for each project, if different than the 13 areas addressed in this consultation, was obtained in compliance with the Act. Evidence of compliance with the Act shall be demonstrated by providing the Resident Engineer (RE) any one of the following:
 - a. a letter from the Service stating use of the borrow pit area will not result in the incidental take of listed species;
 - b. an incidental take permit for contractor-related activities issued by the Service pursuant to section 10(a)(1)(B) of the Act;
 - c. a biological opinion or a letter concurring with a "not likely to adversely affect" determination issued by the Service to the Federal agency having jurisdiction over contractor-related activities;
 - d. a letter from the Service concurring with the "no effect" determination for contractor-related activities; or
 - e. Contractor submittal of information to the California Department of Transportation Resident Engineer indicating compliance with the State Mining and Reclamation Act (SMARA) and provide the County land use permits and CEQA clearance.
 - f. If a borrow site that is in compliance with the Act is not available, the California Department of Transportation will either:
 - i. identify/select a site that the Service has concurred with the "no effect" determination, or;

- ii. request reinitiation of formal consultation on the action considered herein based on new information.

- F. The California Department of Transportation biologist shall have oversight over implementation of all the measures described in the *Terms and Conditions* of this biological opinion, and he/she shall have the authority to stop project activities, through communication with the California Department of Transportation Resident Engineer, if any of the requirements associated with these measures are not being fulfilled. If the biologist/construction liaison has requested a stop work order due to take of any of the listed species, the Service and Fish and Game will be notified within one (1) day via email or telephone.

- G. Prior to any ground disturbance, pre-construction surveys shall be conducted for the San Joaquin kit fox. These surveys will consist of walking surveys of the project limits and adjacent areas accessible to the public to determine presence of this species (i.e., kit fox dens and related sign).

- H. Project employees shall be directed to exercise caution when commuting within the habitat of the San Joaquin kit fox. A 20-mile per hour speed limit will be strongly encouraged on unpaved roads within the habitat of this species. Cross-country travel by vehicles will be prohibited, unless authorized by the Service. Project employees shall be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.

- I. A litter control program shall be instituted at each project site. All workers shall ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash from the project area are deposited in covered or closed trash containers. The trash containers shall be removed from the project area at the end of each working day.

- J. No canine or feline pets or firearms (except for Federal, State, or local law enforcement officers and security personnel) shall be permitted on construction sites to avoid harassment or killing or injuring of listed species.

- K. Maintenance and construction excavations greater than 2 feet deep either shall be covered, filled in at the end of each working day, or have earthen escape ramps no greater than 200 feet apart provided to prevent entrapment of the San Joaquin kit fox.

- L. All construction activity shall be confined within the project site, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect habitat areas outside the project site without authorization from the Service.

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- M. The project construction area shall be delineated with high visibility temporary fencing at least five (5) feet in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment onto any sensitive areas during project work activities. Such fencing shall be inspected and maintained daily until completion of the project. The fencing will be removed only when all construction equipment is removed from the site.
- N. Only Service-approved workers holding valid permits issued pursuant to section 10(a)(1)(A) of the Act are allowed to trap or capture the San Joaquin kit fox. Any relocation plan will be approved by the Service prior to release of any kit foxes.
- O. All grindings and asphaltic-concrete waste shall be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert, wash, pond, vernal pool, or stream crossing
- P. Because dusk and dawn are often the times when the San Joaquin kit fox is most actively foraging, all construction activities will cease one half hour before sunset and will not begin prior to one half hour before sunrise. Except when necessary for driver or pedestrian safety, lighting of a project site by artificial lighting during night time hours is prohibited.
- Q. Use of rodenticides and herbicides at the project site shall be utilized in such a manner to prevent primary or secondary poisoning of the San Joaquin kit fox, and the depletion of prey populations on which it depends. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Pesticide Regulation, and other appropriate State and Federal regulations, as well as additional project-related restrictions deemed necessary by the Service or the California Department of Fish and Game.
- R. The following actions shall be taken to minimize the effect on denning San Joaquin kit foxes:
1. Determine the presence of kit fox dens (natural or in pipes and culverts).
 - a. Pre-construction surveys within the project area shall be conducted no more than 30 calendar days prior to the start of construction in accordance with the most current protocols approved by the Service and the California Department of Fish and Game.
 - b. Surveys for dens shall be conducted by qualified biologists with demonstrated experience in identifying San Joaquin kit fox dens.
 2. Protect all San Joaquin kit fox dens to the maximum extent practicable as determined by the on-site biologist.

3. Identify type of den (natal or non-natal) and its status (occupied or unoccupied) based on the current Service guidance (Service 1999). Identify and execute appropriate action(s) regarding notification, buffers, excavation and fill, or seal-off:
 - a. Occupied natal den: if an occupied natal den is visible or encountered within the project limits, or other accessible land, or on publicly accessible land within 1000 feet of the project construction area, the project will be constructed between August 1 and November 30 and the Service shall be contacted immediately, before any project action occurs.
 - b. A buffer or exclusion zone shall be established to protect the physical den and surrounding habitat of unoccupied natal dens and all non-natal dens that can be avoided:
 - i. unoccupied natal dens shall be surrounded with a 200 foot buffer and the Service will be contacted. Occupied and unoccupied non-natal dens shall be surrounded with a 100 foot buffer.
 - ii When occupied dens have been found on or near the project site, ground disturbing activities shall be restricted during the period December 1 to July 31.
 - iii During this period, project activities within 0.3 mi of occupied natal dens are prohibited. Buffer zones shall be delineated with a temporary fence or other suitable barrier that does not prevent dispersal of the fox. Alternately, the project construction area can be delineated with temporary fence, flagging, or other barrier.
- S. Pipes or culverts with a diameter greater than 4 inches shall be capped or taped closed when it is ascertained that no San Joaquin kit fox is present. Any kit fox found in a pipe or culvert shall be allowed to escape unimpeded.
- T. If a natural den cannot be avoided and must be destroyed, the following guidelines shall be followed:
 1. Prior to the destruction of any den, the den shall be monitored for at least 3 consecutive days to determine its current status. Activity at the den shall be monitored by placing tracking medium at the entrance and by standard spotlighting detection techniques. If no kit fox activity is observed during this period, the den shall be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den shall be monitored for at least 5 consecutive days from the time of observation to allow any resident animal to move to another den during its normal activities. Use of

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the den can be discouraged during this period by partially plugging the entrance(s) with soil in such a manner that any resident animal can escape easily. Destruction of the den may begin when, in the judgment of a Service or Service-approved biologist, the animal has moved to a different den. The biologist shall be trained and familiar with kit fox biology. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may be excavated when, in the judgment of the Service-approved biologist, it is temporarily vacant, for example during the animal's normal foraging activities.

2. All dens shall be excavated by hand, by or under the supervision of, a Service-approved biologist.
 3. The den shall be fully excavated and then filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If, at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den shall be resumed. Destruction of the den may be resumed, when in the judgment of the Service-approved biologist, the animal has escaped from the partially destroyed den.
 4. Non-natal dens may be excavated at any time of the year. Natal dens shall be excavated only between August 15 and November 1.
 5. Within ten (10) working days of the completion of earthmoving, California Department of Transportation will replace all excavated kit fox dens with artificial dens on a 2:1 basis. The location and design of the artificial dens will be approved by the Service prior to installation.
- U. Restoration and revegetation work associated with temporary effects shall be done using California endemic plant material from on-site or local sources (i.e., local ecotype). Plant materials from non-local sources shall be allowed only with written authorization from the Service. To the maximum extent practical (i.e., presence of natural lands), topsoil shall be removed, cached, and returned to the site according to successful restoration protocols. Loss of soil from run-off or erosion shall be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of the San Joaquin kit fox.
- V. As described in biological assessment and the *Project Description* of this biological opinion, transfer of surplus lands to a conservatory agency shall be completed by the California Department of Transportation for 201 acres of habitat for the San Joaquin kit fox and mountain plover. The California Department of Transportation shall obtain the written approval of the Service of the agency that will receive the surplus lands.

W. If conservation easements are used by the California Department of Transportation, they shall include, but not be limited to, provisions and responsibilities of the project proponent and the land trust organization approved by the Service for the protection of all habitats set aside including any future transfers of the easements or fee interest that may be anticipated. The easements shall specify the purposes for which it is established (*i.e.*, measures to minimize effects to the San Joaquin kit fox associated with the Plainsburg/Arboleda State Route 99 project). The California Department of Transportation shall provide the Service with a true copy of the recorded conservation easements within thirty (30) calendar days of its recordation. The conservation easements shall be held by a third party approved by the Service. The conservation easement shall include a list of prohibited activities that are inconsistent with the maintenance of the preserve for the listed species including, but not limited to:

1. leveling, grading, landscaping, cultivation, or any other alterations of existing topography for any purposes, including the exploration for, or development of, mineral resources;
2. placement of any new structures on the preserve, including buildings and billboards;
3. discharge, dumping, burning, or storing of rubbish, garbage, grass clippings, dredge material, household chemicals, or any other wastes or fill materials within the preserve;
4. building of any roads or trails within the preserve areas;
5. killing, removal, alteration, or replacement of any existing native vegetation except in Service-approved prescribed burning situations, or as otherwise authorized in writing by the Service;
6. activities that may alter the hydrology of the preserve and the associated watersheds, including but not limited to: excessive pumping of groundwater, manipulation or blockage of natural drainages, inappropriate water application or placement of storm water drains, etc. unless authorized in writing by the Service;
7. incompatible fire protection activities;
8. use of pesticides, herbicides, or rodenticides on the preserve or within the watershed that can contaminate the preserve except as authorized in writing by the Service; and
9. introduction of any exotic species or species not native to the area, including aquatic species, except as approved by the Service.

X. In the event the California Department of Transportation seeks to obtain a conservation easement in lieu of fee title acquisitions for the purposes of satisfying the requirements of the terms and conditions of this biological opinion, the California Department of Transportation shall provide the language of the proposed conservation easements to the Service for prior review and approval. The conservation easements shall include language establishing a right of entry by the Service to determine compliance with the terms and conditions of this biological opinion and the terms of the conservation easements, as well as identifying the

Service as a third party beneficiary with the standing to take whatever legal action is necessary to enforce the terms of this conservation easement. Should the California Department of Transportation make fee title acquisition of lands to satisfy the terms and conditions of this biological opinion, the California Department of Transportation shall encumber such lands with restrictive covenants that provide the same rights to the Service as will be established under the conservation easement described above. Such restrictive covenants shall be provided to the Service for prior review and approval before they are recorded against the conservation lands.

- Y. If the California Department of Transportation plans to acquire fee title or a conservation easement for lands that are not in a Service-approved conservation bank, then at least sixty (60) calendar days prior to the date of initial ground breaking at the proposed Plainsburg/Arboleda State Route 99 project, the California Department of Transportation shall endow a Service-approved fund for monitoring and perpetual management and maintenance of the 201 acres for the San Joaquin kit fox. The principal in the endowment must generate sufficient revenue to fully cover the costs of ongoing operations and management actions as described in the Service-approved management plan and this biological opinion, without the need to make use of the principal to adequately fund such expenditures. Specific actions funded by the endowment shall be addressed in the Service-approved management plan. The California Department of Transportation shall utilize an appropriate third party who has been approved by the Service to determine what amount of money is necessary for an endowment fund to adequately finance the monitoring and perpetual management and maintenance of the preserve for the San Joaquin kit fox.

The California Department of Transportation shall empower the Service to access and expend such funds to implement Service-approved remedial measures in the event the responsible preserve managers fail to adequately implement the Service-approved management plan. The final determination of success or failure of the management plan shall be made solely by the Service. Prior to the date of initial groundbreaking at the Plainsburg/Arboleda State Route 99 project, the California Department of Transportation shall provide the Service with documentation that: (1) funds for the perpetual management and maintenance of the 201 acres for the San Joaquin kit fox have been transferred to the appropriate third party approved by the Service; (2) the third party has accepted the funds and considers them adequate; and (3) that these funds have been deposited in an account (*i.e.*, endowment) that will provide adequate financing for the monitoring and perpetual management and maintenance of the 201 acres for the San Joaquin kit fox.

- Z. If the Refuge Division of the Service becomes the responsible manager of the compensation lands, the endowment amount shall be approved by them.
2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):
- A. If requested, before, during, or upon completion of ground breaking and construction activities, the California Department of Transportation shall allow

access by Service and/or California Department of Fish and Game personnel to the project site to inspect project effects to the San Joaquin kit fox and its habitat.

- B. The California Department of Transportation shall comply with the *Reporting Requirements* of this biological opinion.

Reporting Requirements

1. Before construction starts on a project, the Service shall be provided with the final documents, including but not limited to, recorded conservation easements, PAR analyses, management plans, or proof of purchase of credits. Please see draft guidance from the Service, *Draft Selected Review Criteria for Conservation Banks and Section 7 Off Site Compensation* dated August 4, 2004, or Service guidance that supercedes this document.
2. A post-construction report detailing compliance with the project design criteria described under the *Description of the Proposed Action* section of this biological opinion shall be provided to the Service within 30 calendar days of completion of the project.
3. The California Department of Transportation shall notify the Service via electronic mail and telephone within one (1) working day of the death or injury to a San Joaquin kit fox and/or other listed species that occurs due to project related activities or is observed at the project site. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. In the case of an injured animal, the animal shall be cared for by a licensed veterinarian or other qualified person. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contacts are Chief of the Endangered Species Division (Central Valley) at 916/414-6600, and Scott Heard, Resident Agent-in-Charge of the Service's Law Enforcement Division at 916/414-6660. The California Department of Fish and Game contact is Mr. Ron Schlorff at 916/654-4262.
4. Any contractor or employee who, during routine operations and maintenance activities inadvertently kills or injures a State listed wildlife species shall immediately report the incident to her or his supervisor or representative. The supervisor or representative must contact the California Department of Fish and Game immediately in the case of a dead or injured State listed wildlife species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and

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threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service has developed the following conservation recommendations based, in part, on the Recovery Plan (Service 1998).

1. Sightings of any sensitive animal species should be reported to the California Natural Diversity Database of the California Department of Fish and Game. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.
2. Locate, map, and protect existing populations of the San Joaquin kit fox (Recovery Plan Tasks 2.2.17 and 2.2.24).
3. Protect and create additional habitat for the San Joaquin kit fox in key portions of its range (Recovery Plan Tasks 2.1.19 and 5.1.5).
4. Gather additional data on population responses to environmental variation at representative sites in the San Joaquin kit fox's geographic range (Recovery Plan Tasks 3.2.21 and 3.2.22).
5. Determine appropriate habitat management and compatible land uses for the San Joaquin kit fox (Recovery Plan Task 4.5.7).

In order for the Service to be kept informed of conservation actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any of the conservation recommendations.

REINITIATION NOTICE

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

You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if the mountain plover is listed or critical habitat is designated. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

After listing of the mountain plover or designation of critical habitat and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this conference opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this conference opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the mountain plover or its habitat has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the mountain plover or its habitat may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

If you have any questions concerning this biological opinion on the Plainsburg/Arboleda State Route 99 Project, please contact Susan Jones at the letterhead address or at telephone 916/414-6630.

Sincerely,



for Ken Sanchez
Acting Field Supervisor

cc:

Geoffrey Gray, California Department of Transportation, Fresno, California
Clarence Mayott, California Department of Fish and Game, Fresno, California

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Linda S. Adams
Secretary for
Environmental
Protection

California Regional Water Quality Control Board

Central Valley Region

Karl E. Longley, ScD, P.E., Chair

1685 E Street, Fresno, California 93706
(559) 445-5116 • Fax (559) 445-5910
<http://www.waterboards.ca.gov/centralvalley>



Arnold
Schwarzenegger
Governor

28 August 2009

Tamra Nunes, Project Biologist
California Department of Transportation
2015 E. Shields Avenue, Suite 100
Fresno, CA 93726

ACTION ON REQUEST FOR CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION FOR DISCHARGE OF DREDGED AND/OR FILL MATERIALS ASSOCIATED WITH THE ARBOLEDA FREEWAY PROJECT, MERCED COUNTY

APPLICANT: California Department of Transportation

PROJECT: Refer to Attachment 1 for Project Information

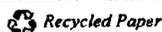
ACTION:

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

WATER QUALITY CERTIFICATION STANDARD CONDITIONS:

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

California Environmental Protection Agency



Control Board (Central Valley Water Board) in writing within 7 days of project completion.

TECHNICAL CONDITIONS (for Certification Action 2):

In addition to the four standard conditions, the California Department of Transportation shall satisfy the following:

1. A finalized Streambed Alteration Agreement must be issued by the California Department of Fish and Game before this project may proceed. A copy of the finalized Streambed Alteration Agreement shall be submitted to the Central Valley Water Board.

CENTRAL VALLEY WATER BOARD CONTACT PERSON:

Bridget Supple, Environmental Scientist
(559) 445-5919
bsupple@waterboards.ca.gov

WATER QUALITY CERTIFICATION:

I hereby issue an order certifying that the proposed discharge from the Arboleda Freeway project will comply with the applicable provisions of Sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Resources Control Board Water Quality Order No. 2003-0017-DWQ; "Statewide General Waste Discharge Requirements For Dredged Or Fill Discharges That Have Received State Water Quality Certification (General WDRs)," which is enclosed.

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigations being completed in strict compliance with the applicant's project description and the attached Project Information Sheet, and (b) compliance with all applicable requirements of the Central Valley Water Board's *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin, Fourth Edition, Revised October 2007*.


for Pamela C. Creedon
Executive Officer

Enclosures: Project Information
Water Quality Order No. 2003-0017-DWQ

cc: **Dave Smith, Chief, Wetlands Regulatory Office, U.S. Environmental Protection Agency,
Region 9, San Francisco**
**Kathleen Dadey, Chief, Sacramento South Branch, Regulatory Unit, Department of the
Army, Corps of Engineers, Sacramento**
**Bill Orme, Water Quality Certification Unit Chief, Division of Water Quality, State Water
Resources Control Board, Sacramento**
**Jeffrey Single, Regional Manager, San Joaquin Valley-Southern Sierra Region,
California Department of Fish and Game, Fresno**

**ATTACHMENT 1
PROJECT INFORMATION**

Application Date: 3 August 2009

Applicant: California Department of Transportation (Caltrans)

Applicant Representatives: Tamra Nunes, Project Biologist

Project Name: Arboleda Freeway

Applicant Number: RN #384; WDID No. 5B24CR

Project Location: 37° 13' 44.70" Latitude, 120° 23' 03.16" Longitude; Section 24 of Township 8 South, Range 44 East, MDB&M.

Project Duration: November 2009 through November 2013

County: Merced

Receiving Water(s) (hydrologic unit): Duck Slough, Mariposa Creek, and Irrigation Laterals (Russell Lateral, Lingard Lateral, and Fairfield Lateral), tributaries to the San Joaquin River; San Joaquin River Hydrologic Basin, San Joaquin Valley Floor Hydrologic Unit, Merced Hydrologic Area (# 535.80); and Deadman Creek, tributary to the San Joaquin River; San Joaquin River Hydrologic Basin, San Joaquin Valley Floor Hydrologic Unit, El Nido-Stevinson Hydrologic Area (# 535.70).

Water Body Type: Creeks, Slough, and Irrigation Laterals

Designated Beneficial Uses: The designated beneficial uses of tributaries to the San Joaquin River between Sack Dam and the mouth of the Merced River are: municipal and domestic supply; agricultural supply; industrial process supply; contact recreation; non-contact water recreation; warm freshwater habitat; migration of aquatic organisms; spawning, reproduction, and/or early development; and wildlife habitat.

Project Description: Convert a section of State Route 99 from a four-lane expressway to a six-lane freeway. The new freeway alignment will be located to the east of the existing expressway. Culverts will be placed in the irrigation laterals. The channel of Deadman Creek will be relocated. New bridges will be constructed over Duck Slough, Mariposa Creek, and Deadman Creek.

Preliminary Water Quality Concerns:

Increased turbidity, deposition of settleable material, and transport of pollutants to the waterways.

Proposed Mitigation To Address Concerns:

Best Management Practices (BMPs) will be implemented during construction. Work will take place in when the channels are expected to be dry. However, if flows are present, a water diversion plan will be implemented. All temporarily affected areas will be restored to pre-project contours and conditions upon completion of work activities.

Fill/Excavation Area:

The project will result in the following permanent and temporary impacts:

	Permanent Impacts	Temporary Impacts
Jurisdictional wetland (Mariposa Creek)	N/A	0.048 acres
Riparian area (Deadman Creek and Duck Slough)	0.379	0.11
Unvegetated streambed of irrigation laterals	0.746 acres	N/A

Dredge Volume (cy):

None

U.S. Army Corps of Engineers Permit:

Caltrans applied for an individual permit on 3 August 2009.

Department of Fish and Game Streambed Alteration Agreement:

Caltrans applied for a Streambed Alteration Agreement on 3 August 2009.

CEQA Compliance:

Caltrans prepared an Environmental Impact Report, and filed it with the State Clearinghouse (No. 2003051094) on 11 January 2006, and filed a Notice of Determination on 28 March 2007.

Compensatory Mitigation:

Caltrans proposes to contribute funds to either the San Luis National Wildlife Refuge for restoration efforts along Deadman Creek downstream from the project area, or to the U.S. Army Corps of Engineers in-lieu fee program.

Application Fee Provided:

Caltrans submitted a fee of \$24,365.00 on 3 August 2009, as required by 23 CCR Section 3833(b)(2)(A).

STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY ORDER NO. 2003 - 0017 - DWQ

**STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR
DREDGED OR FILL DISCHARGES THAT HAVE RECEIVED
STATE WATER QUALITY CERTIFICATION (GENERAL WDRs)**

The State Water Resources Control Board (SWRCB) finds that:

1. Discharges eligible for coverage under these General WDRs are discharges of dredged or fill material that have received State Water Quality Certification (Certification) pursuant to federal Clean Water Act (CWA) section 401.
2. Discharges of dredged or fill material are commonly associated with port development, stream channelization, utility crossing land development, transportation water resource, and flood control projects. Other activities, such as land clearing, may also involve discharges of dredged or fill materials (e.g., soil) into waters of the United States.
3. CWA section 404 establishes a permit program under which the U.S. Army Corps of Engineers (ACOE) regulates the discharge of dredged or fill material into waters of the United States.
4. CWA section 401 requires every applicant for a federal permit or license for an activity that may result in a discharge of pollutants to a water of the United States (including permits under section 404) to obtain Certification that the proposed activity will comply with State water quality standards. In California, Certifications are issued by the Regional Water Quality Control Boards (RWQCB) or for multi-Region discharges, the SWRCB, in accordance with the requirements of California Code of Regulations (CCR) section 3830 et seq. The SWRCB's water quality regulations do not authorize the SWRCB or RWQCBs to waive certification, and therefore, these General WDRs do not apply to any discharge authorized by federal license or permit that was issued based on a determination by the issuing agency that certification has been waived. Certifications are issued by the RWQCB or SWRCB before the ACOE may issue CWA section 404-permits. Any conditions set forth in a Certification become conditions of the federal permit or license if and when it is ultimately issued.
5. Article 4, of Chapter 4 of Division 7 of the California Water Code (CWC), commencing with section 13260(a), requires that any person discharging or proposing to discharge waste, other than to a community sewer system, that could affect the quality of the waters of the State,¹ file a report of waste discharge (ROWD). Pursuant to Article 4, the RWQCBs are required to prescribe waste discharge requirements (WDRs) for any proposed or existing discharge unless WDRs are waived pursuant to CWC section 13269. These General WDRs fulfill the requirements of Article 4 for proposed dredge or fill discharges to waters of the United States that are regulated under the State's CWA section 401 authority.

¹ "Waters of the State" as defined in CWC Section 13050(e)

6. These General WDRs require compliance with all conditions of Certification orders to ensure that water quality standards are met.
7. The U.S. Supreme Court decision of *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) (the *SWANCC* decision) called into question the extent to which certain "isolated" waters are subject to federal jurisdiction. The SWRCB believes that a Certification is a valid and enforceable order of the SWRCB or RWQCBs irrespective of whether the water body in question is subsequently determined not to be federally jurisdictional. Nonetheless, it is the intent of the SWRCB that all Certification conditions be incorporated into these General WDRs and enforceable hereunder even if the federal permit is subsequently deemed invalid because the water is not deemed subject to federal jurisdiction.
8. The beneficial uses for the waters of the State include, but are not limited to, domestic and municipal supply, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other aquatic resources.
9. Projects covered by these General WDRs shall be assessed a fee pursuant to Title 23, CCR section 3833.
10. These General WDRs are exempt from the California Environmental Quality Act (CEQA) because (a) they are not a "project" within the meaning of CEQA, since a "project" results in a direct or indirect physical change in the environment (Title 14, CCR section 15378); and (b) the term "project" does not mean each separate governmental approval (Title 14, CCR section 15378(c)). These WDRs do not authorize any specific project. They recognize that dredge and fill discharges that need a federal license or permit must be regulated under CWA section 401 Certification, pursuant to CWA section 401 and Title 23, CCR section 3855, et seq. Certification and issuance of waste discharge requirements are overlapping regulatory processes, which are both administered by the SWRCB and RWQCBs. Each project subject to Certification requires independent compliance with CEQA and is regulated through the Certification process in the context of its specific characteristics. Any effects on the environment will therefore be as a result of the certification process, not from these General WDRs. (Title 14, CCR section 15061(b)(3)).
11. Potential dischargers and other known interested parties have been notified of the intent to adopt these General WDRs by public hearing notice.
12. All comments pertaining to the proposed discharges have been heard and considered at the November 4, 2003 SWRCB Workshop Session.
13. The RWQCBs retain discretion to impose individual or general WDRs or waivers of WDRs in lieu of these General WDRs whenever they deem it appropriate. Furthermore, these General WDRs are not intended to supersede any existing WDRs or waivers of WDRs issued by a RWQCB.

IT IS HEREBY ORDERED that WDRs are issued to all persons proposing to discharge dredged or fill material to waters of the United States where such discharge is also subject to the water quality certification requirements of CWA section 401 of the federal Clean Water Act (Title 33 United States Code section 1341), and such certification has been issued by the applicable RWQCB or the SWRCB, unless the applicable RWQCB notifies the applicant that its discharge will be regulated through WDRs or waivers of WDRs issued by the RWQCB. In order to meet the provisions contained in Division 7 of CWC and regulations adopted thereunder, dischargers shall comply with the following:

1. Dischargers shall implement all the terms and conditions of the applicable CWA section 401 Certification issued for the discharge. This provision shall apply irrespective of whether the federal license or permit for which the Certification was obtained is subsequently deemed invalid because the water body subject to the discharge has been deemed outside of federal jurisdiction.
2. Dischargers are prohibited from discharging dredged or fill material to waters of the United States without first obtaining Certification from the applicable RWQCB or SWRCB.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 19, 2003.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz
Gary M. Carlton
Nancy H. Sutley

NO: None.

ABSENT: None.

ABSTAIN: None.


Debbie Irvin
Clerk to the Board

AGREEMENT



**California Fish and Game Code Section 1602
Stream Alteration Agreement No. 2009-0107-R4
California Department of Transportation
Deadman Creek, Duck Slough, and Duck Slough
Overflow - Merced County
MER 99 PM 4.6- 10.5 EA 10- 415700**

Parties:

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

**California Department of Transportation
Zachary Parker
2015 East Shields Avenue, Suite 100
Fresno, California 93726**

1 **WHEREAS:**

2

3 1. Ms. Tamra Nunes, representing the California Department of Transportation
4 (referred to as "Caltrans") on August 3, 2009, notified ("Notification" No. 2009-0107-R4)
5 the Department of Fish and Game ("Department") of their intent to divert or obstruct the
6 natural flow of, or change the bed or banks of, or use materials from Deadman Creek,
7 Duck Slough, and Duck Slough Overflow in Merced County, waters over which the
8 Department asserts jurisdiction pursuant to Division 2, Chapter 6 of the California Fish
9 and Game Code.

10

11 2. Caltrans may not commence any activity that is subject to Fish and Game Code
12 Sections 1600 et seq., until the Department has found that such Project shall not
13 substantially adversely affect an existing fish or wildlife resource or until the
14 Department's proposals, or the decisions of a panel of arbitrators, have been
15 incorporated into such projects.

16

17 3. Fish and Game Code Sections 1600 et seq., make provisions for the negotiation of
18 agreements regarding the delineation and definition of appropriate activities, Project
19 modifications and/or specific measures necessary to protect fish and wildlife resources.

20

21 4. The Department has determined that without the protective features identified in
22 this Agreement, the activities proposed in the Notification could substantially adversely
23 affect fish and wildlife.

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 **NOW THEREFORE, IT IS AGREED THAT:**

2

3 1. The receipt of this document ("Agreement"), by Caltrans, satisfies the
4 Department's requirement to notify Caltrans of the existence of an existing fish and
5 wildlife resource that may be substantially adversely affected by the Project that is
6 described in the Notification.

7

8 2. The contents of this Agreement constitute the Department's proposals as to
9 measures necessary to protect fish and wildlife resources, and satisfy the Department's
10 requirement to submit these proposals to Caltrans.

11

12 3. The signature of Caltrans' representative on this Agreement constitutes Caltrans'
13 commitment to incorporate the Department's proposals into the Project that is described
14 in the Notification.

15

16 4. This Agreement does not exempt Caltrans from complying with all other applicable
17 local, State and Federal law, or other legal obligations.

18

19 5. This Agreement, alone, does not constitute or imply the approval or endorsement
20 of a Project, or of specific Project features, by the Department, beyond the
21 Department's limited scope of responsibility, established by Fish and Game Code
22 Sections 1600 et seq. This Agreement does not therefore assure concurrence, by the
23 Department, with the issuance of permits from this or any other agency. Independent
24 review and recommendations shall be provided by the Department as appropriate on
25 those projects where local, State, or Federal permits, or environmental reports are
26 required.

27

28 6. This Agreement does not authorize the "take" (defined in Fish and Game Code
29 Section 86 as hunt, pursue, catch, capture, or kill; or attempt to hunt, pursue, catch,
30 capture, or kill) of State-listed threatened or endangered species. If the Operator, in the
31 performance of the agreed work, discovers the presence of a listed species in the
32 Project work area, work shall stop immediately. Caltrans shall not resume activities
33 authorized by this Agreement until such time as valid "take" permits are obtained from
34 the Department, pursuant to Fish and Game Code Sections 2081(a) and 2081(b), as
35 appropriate.

36

37 7. To the extent that the Provisions of this Agreement provide for the diversion of
38 water, they are agreed to with the understanding that Caltrans possesses the legal right
39 to so divert such water.

40

41 8. To the extent that the Provisions of this Agreement provide for activities that
42 require Caltrans to trespass on another owner's property, they are agreed to with the
43 understanding that Caltrans possesses the legal right to so trespass.

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 9. To the extent that the Provisions of this Agreement provide for activities that are
2 subject to the authority of other public agencies, said activities are agreed to with the
3 understanding that all appropriate permits and authorizations shall be obtained prior to
4 commencing agreed activities.

5
6 10. All Provisions of this Agreement remain in force throughout the term of the
7 Agreement. Any Provision of the Agreement may be amended at any time, provided
8 such amendment is agreed to in writing by both parties. Mutually approved
9 amendments become part of the original Agreement and are subject to all previously
10 negotiated Provisions. The Agreement may be terminated by either party, subject to
11 30 days written notification.

12
13 11. Caltrans shall provide a copy of the Agreement to the Project supervisors and all
14 contractors and subcontractors. Copies of the Agreement shall be available at work
15 sites during all periods of active work and shall be presented to Department personnel
16 upon demand.

17
18 12. Caltrans agrees to provide the Department access to the Project site at any time to
19 ensure compliance with the terms, conditions, and Provisions of this Agreement.

20
21 13. Caltrans and any contractor or subcontractor, working on activities covered by this
22 Agreement, are jointly and separately liable for compliance with the Provisions of this
23 Agreement. Any violation of the Provisions of this Agreement is cause to stop all work
24 immediately until the problem is reconciled. Failure to comply with the Provisions and
25 requirements of this Agreement may result in prosecution.

26
27 14. Caltrans assumes responsibility for the restoration of any fish and wildlife habitat
28 which may be impaired or damaged either directly or, incidental to the Project, as a
29 result of failure to properly implement or complete the mitigation features of this
30 Agreement, or from activities which were not included in the Caltrans' Notification.

31
32 15. It is understood that the Department enters into this Agreement for purposes of
33 establishing protective features for fish and wildlife, in the event that a Project is
34 implemented. The decision to proceed with the Project is the sole responsibility of
35 Caltrans, and is not required by this Agreement. It is agreed that all liability and/or
36 incurred costs, related to or arising out of Caltrans' Project and the fish and wildlife
37 protective conditions of this Agreement, remain the sole responsibility of Caltrans.
38 Caltrans agrees to hold harmless and defend the Department against any related claim
39 made by any party or parties for personal injury or other damage.

40
41 16. The terms, conditions, and Provisions contained herein constitute the limit of
42 activities agreed to and resolved by this Agreement. The signing of this Agreement
43 does not imply that Caltrans is precluded from doing other activities at the site.
44 However, activities not specifically agreed to and resolved by this Agreement are
45 subject to separate notification, pursuant to Fish and Game Code Sections 1600 et seq.

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 **California Environmental Quality Act (CEQA) Compliance:** In approving this
2 Agreement, the Department is independently required to assess the applicability of
3 CEQA. The features of this Agreement shall be considered as part of the overall
4 Project description. Caltrans' concurrence signature on this Agreement serves as
5 confirmation to the Department that the activities that shall be conducted under the
6 terms of this Agreement are consistent with the Project described in Notification
7 No. 2009-0107-R4. This Project is part of the Plainsburg/Arboleda Freeway Project for
8 which Caltrans submitted an Environmental Assessment with Finding of No Significant
9 Impact/Final Environmental Impact Report, State Clearinghouse Number 2003051094.

10
11 The Department, as a CEQA Responsible Agency, shall make findings and submit a
12 Notice of Determination to the State Clearinghouse upon signing this Agreement.

13
14 This Agreement contains a Monitoring and Reporting Program (MRP), to incorporate
15 monitoring and reporting requirements for the activities authorized in this Agreement.

16
17 **Project Location:** The work authorized by this Agreement will occur at three crossings
18 on State Route (SR) 99: 1) Deadman Creek at Post Mile (PM) 5.2 in Section 29 of
19 Township 8 South, Range 15 East in Merced County; 2) Duck Slough at PM 9.4; and
20 3) Duck Slough Overflow at PM 9.8 both in Section 11 of Township 8 South, Range 14
21 East in Merced County (**Figure 1**).

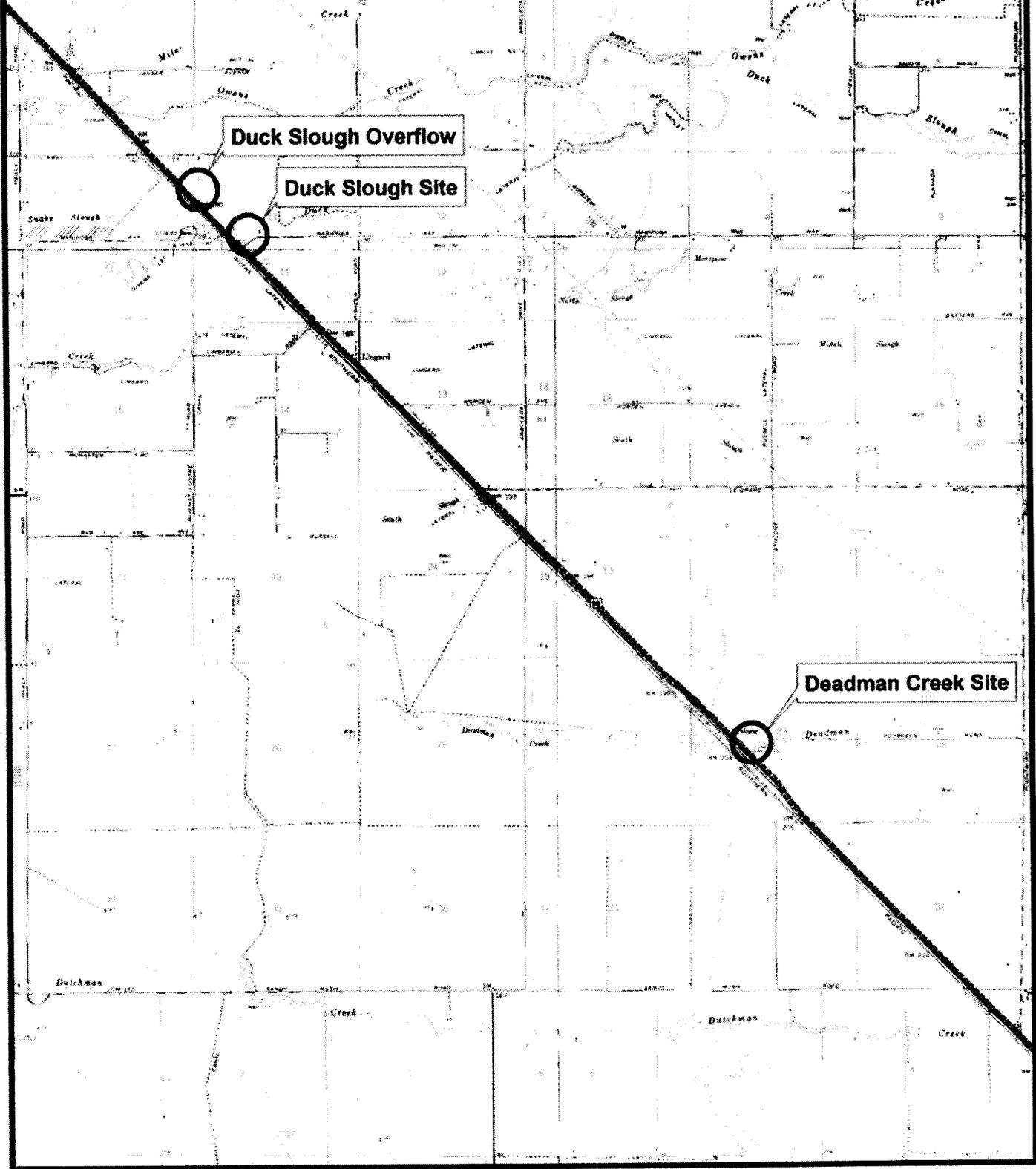
22
23 **Project Description:** Caltrans' Notification includes Fish and Game Notification Form
24 FG2023 and construction plans. The Notification comprises Caltrans' Project
25 description, and it is used as the basis for establishing the protective Provisions that are
26 included in this Agreement. Any changes or additions to the Project as described in the
27 Notification shall require additional consultation and protective Provisions. The
28 Department's concurrence with Caltrans' CEQA Determination is based upon Caltrans'
29 commitment to full implementation of the Provisions of this Agreement. Caltrans has
30 proposed the following scope of work. The bulleted items comprise the activities
31 authorized by this Agreement.

- 32
- 33 • **Deadman Creek (PM 5.22):** The existing concrete double box culvert (24 feet
34 wide by 7 feet high) at SR 99 will be removed from the existing median and
35 northbound lanes. The existing channel (1,100 feet) will be backfilled with dirt and
36 a new channel will be constructed to the north of the existing channel, with two
37 new northbound and southbound bridges (59 feet wide by 76 feet long) supported
38 by 12 concrete piles each. Rock slope protection (RSP) will be used at the bends
39 of the creek to avoid potential scouring of the embankment.
 - 40
 - 41 • **Duck Slough (PM 9.43):** The existing northbound lanes of SR 99 (42 feet wide by
42 75 feet long) will be removed and the southbound lanes will remain intact. Three
43 new bridges will be constructed east of the existing bridge. The new northbound
44 and southbound bridges (60 feet wide by 88 feet long) will be supported by
45 15 concrete piles (16 inches in diameter) and the frontage road bridge (40 feet
46 wide by 82 feet long) will be supported by 10 concrete piles (16 inches in
47 diameter).

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

**2009-0107-R4
Project Locations**

Figure 1
Department of Fish and Game
Conservation Planning GIS
Central Region
USGS Quad



- 1 • Duck Slough Overflow (PM 9.86): The existing northbound lanes of SR 99
2 (44 feet wide by 160 feet long) will be removed and the southbound lanes will
3 remain intact. Three new bridges will be constructed east of the existing bridge.
4 The new northbound and southbound bridges (60 feet wide by 160 feet long) will
5 each be supported by 18 concrete piles (15 inches in diameter; abutments) and
6 36 concrete piles (16 inches in diameter) respectively.
7

8 **Plant and Animal Species of Concern:** This Agreement is intended to avoid,
9 minimize, and mitigate adverse impacts to the fish and wildlife resources that occupy
10 the area of Deadman Creek, Duck Slough, and Duck Slough Overflow, and the
11 immediate adjacent riparian habitat. The protective measures described in this
12 Agreement must be implemented in order to avoid impacts, within the area covered by
13 this Agreement, to the following species: the State threatened Swainson's hawk (*Buteo*
14 *swainsoni*), Federal threatened and State candidate California tiger salamander
15 (*Ambystoma californiense*), Federal endangered and State threatened San Joaquin kit
16 fox (*Vulpes macrotis mutica*), Species of Special Concern Burrowing owl (*Athene*
17 *cunicularia*), Species of Special Concern mountain plover (*Charadrius montanus*),
18 Species of Special Concern Western pond turtle (*Actinemys marmorata*), and Species
19 of Special Concern Yuma myotis (*Myotis yumanensis*), as well as the other birds,
20 mammals, fish, reptiles, amphibians, invertebrates, and plants that comprise the local
21 riparian ecosystem. Departmental files contain lists of species that could be subject to
22 potential generated impacts from this Project.
23

24 PROVISIONS:

25 26 General

27
28 1. The Notification, together with all supporting documents, is hereby incorporated
29 into this Agreement to describe the location and features of the proposed Project.
30 Caltrans agrees that all work shall be done as described in the Notification and
31 supporting documents, incorporating all wildlife resource protection features, mitigation
32 measures, and Provisions as described in this Agreement. Caltrans further agrees to
33 notify the Department of any modifications that need to be made to the Project plans
34 submitted to the Department. At the discretion of the Department, modifications may
35 be deemed minor, requiring an amendment to this Agreement, or substantial, requiring
36 the submission of a new notification application. If the latter is the case, this Agreement
37 becomes null and void. Failure to notify the Department of changes to the original
38 plans or subsequent amendments to this Agreement may result in the Department
39 suspending or canceling this Agreement.
40

41 2. Before the start of construction/work activities covered under this Agreement, all
42 workers shall have received training from Caltrans' staff, or approved alternate trainer,
43 on the content of this Agreement, the resources at stake, and the legal consequences
44 of non-compliance.

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 3. When known, prior to beginning work, Caltrans shall provide a construction/work
2 schedule to the Department (fax to Laura Peterson-Diaz, Environmental Scientist, at
3 (559) 243-4020). Please reference the Agreement number. Caltrans shall also notify
4 the Department upon the completion of the activities covered by this Agreement.

5
6 4. Agreed activities within the bed, bank, or channel may commence any time after
7 the Department has signed this Agreement. This Agreement shall remain in effect for
8 five (5) years beginning on the date signed by the Department. If the Project is not
9 completed prior to the expiration date defined above, Caltrans shall contact the
10 Department to negotiate a new expiration date and any new requirements.

11
12 Flagging/Fencing

13
14 5. Within the riparian corridor, Caltrans shall identify the upstream and downstream
15 limits of the minimum work area required, access routes, the Project footprint, plus all
16 Environmentally Sensitive Areas (ESA). These boundaries shall be defined by the
17 Caltrans' Project engineer and biologist and flagged/fenced prior to the beginning of
18 construction. These limits shall not extend beyond Caltrans' right-of-way and/or the
19 construction easement, and shall be confined to the minimal area needed to
20 accomplish the proposed work. Flagging/fencing shall be maintained in good repair for
21 the duration of the Project.

22
23 Wildlife

24
25 6. An approved biologist shall perform general wildlife surveys of the Project area
26 (including access routes and storage areas) prior to Project construction start with
27 particular attention to evidence of the presence of the species listed above and shall
28 report any possible adverse affect to fish and wildlife resources not originally reported.
29 If the survey shows presence of any wildlife species which could be impacted, Caltrans
30 shall contact the Department and mitigation, specific to each incident, shall be
31 developed. If any State- or Federal-listed threatened or endangered species are found
32 within the proposed work area or could be impacted by the work proposed, a new
33 Agreement and/or a 2081(b) State Incidental Take Permit may be necessary and a new
34 CEQA analysis may need to be conducted, before work can begin.

35
36 7. If work is done between March 1 and September 1, then in order to protect nesting
37 birds, Caltrans' biologist shall make a survey for nesting activity in and adjacent to the
38 defined "work area", before construction begins. If any nesting activity is observed,
39 (including cavity nesting), the nests and trees shall not be damaged or removed until
40 the young have fledged and left the nest. Caltrans shall obtain Department approval
41 prior to damaging or removing nesting trees.

42
43 8. Raptors: Survey for nesting activity of raptors, including Swainson's hawks, within
44 0.25 miles (extend to 0.5 miles in suitable riparian habitat) of the construction site.
45 Surveys shall be conducted at appropriate nesting times and concentrate on mature

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 trees. If any active nests are observed, these nests and nest trees shall be designated
2 an ESA and protected (while occupied) with a minimum 500-foot buffer during Project
3 construction. Caltrans shall also consult with the Department for any further
4 requirements.

5

6 9. Burrowing owls: If any ground-disturbing activities will occur during the burrowing
7 owl nesting season (approximately February 1 through August 31), the Department
8 recommends that a pre-construction site survey be conducted by a qualified biologist
9 no more than 30 days before the onset of any ground-disturbing activities. If signs
10 (i.e., pellets, feathers, tracks, or scat) of burrowing owls are observed at burrow
11 entrances within 300 feet of the defined work area, a qualified biologist shall perform a
12 Phase III Burrowing Owl Survey, as described in the 1997 California Burrowing Owl
13 Consortium's Survey Protocol and Mitigation Guidelines.

14

15 The Department's Staff Report on Burrowing Owl Mitigation (CDFG 1995) recommends
16 that impacts to occupied burrows be avoided by implementation of a no-construction
17 buffer zone of a minimum distance of 250 feet, unless a qualified biologist approved by
18 the Department verifies through non-invasive methods that either: 1) the birds have not
19 begun egg laying and incubation; or 2) that juveniles from the occupied burrows are
20 foraging independently and are capable of independent survival. Failure to implement
21 this buffer zone could cause adult burrowing owls to abandon the nest, cause eggs or
22 young to be directly impacted (crushed), and/or result in reproductive failure.

23

24 If burrowing owls occupy the site, during the non-breeding season, a passive relocation
25 effort may be instituted.

26

27 10. Swallows: If Caltrans cannot avoid work on the bridges where there is the
28 potential it would disturb nesting swallows (February 15 through August 15), then prior
29 to February 1, of each year, Caltrans shall remove all existing inactive nests which
30 would be destroyed by the Project. Caltrans shall continue to discourage new nest
31 building in places where they would be disturbed, using methods developed in
32 consultation with the Caltrans District Biologist and the Department. Prior to nesting
33 season, a swallow exclusion device, with visual warnings for the birds to prevent
34 entanglement, must be installed. Where disturbance shall occur, nesting must be
35 discouraged throughout the nesting season.

36

37 11. Bats: No bats shall be disturbed without specific notice to and consultation with
38 the Department. Pre-construction surveys by a qualified biologist shall be performed to
39 determine if bat species are utilizing the bridge for roosting. If bats are using the
40 existing bridge as a roosting site, exclusion of these bats shall take place a minimum of
41 four (4) weeks prior to construction. If after four (4) weeks exclusion measures are
42 unsuccessful and bat species still utilize the bridge for roosting, Caltrans shall contact
43 the Department and mitigation shall be developed in consultation with the Department.

1 12. San Joaquin kit fox (SJKF): Per the United States Fish and Wildlife Service
2 Biological Opinion and a response to the Department's February 21, 2006 comment
3 letter on the Plainsburg/Arboleda Freeway Project (response dated May 15, 2006),
4 Caltrans will mitigate for loss of potential SJKF habitat. The total mitigation required for
5 both segments is two SJKF-specific culvert crossings and 200 acres of land to be
6 protected in perpetuity. For this Project (the Arboleda Segment), one of the culverts will
7 be built just south of the Le Grand/Arboleda interchange and 120 acres will be
8 protected within six (6) months of completion of the Project.

9
10 13. If any wildlife is encountered during the course of construction, said wildlife shall
11 be allowed to leave the construction area unharmed.

12 13 Vegetation

14
15 14. For this Project, 1,530 linear feet of riparian vegetation (including both native and
16 non-native species) will be permanently impacted as a result of planned construction
17 activities. Non-native trees to be removed include 535 tree of heaven (*Ailanthus*
18 *altissima*), approximately 125 blue gum eucalyptus (*Eucalyptus globules*),
19 approximately 75 edible fig (*Ficus carica*) and 2 weeping willows (*Salix babylonica*).
20 In addition to the smaller vegetation and non-native trees, the Project will remove
21 56 cottonwood (*Populus fremontii*), 30 California black walnut (*Juglans californicus v.*
22 *hindsii*), 2 Goodding's willow (*Salix gooddingii*), 4 arroyo willow (*Salix lasiolepis*), 4 red
23 willow (*Salix laevigata*), 4 willow (*Salix sp.*), 2 valley oak (*Quercus lobata*) and 1 Oregon
24 Ash (*Fraxinus latifolia*). Any native riparian trees or shrubs with trunks greater than or
25 equal to four (4) inches in diameter at breast height (DBH), removed during Project
26 activities, shall be mitigated for by implementation of a Revegetation Plan described
27 under Restoration below.

28
29 15. Precautions shall be taken to avoid any other damage to vegetation by people or
30 equipment for the duration of the Project.

31 32 Vehicles

33
34 16. Construction vehicles and equipment will need access to the stream banks and
35 bed for this Project. All other areas adjacent to the work site shall be considered an
36 ESA and shall remain off-limits to construction equipment.

37 38 Pollution

39
40 17. Caltrans and all contractors and subcontractors shall be subject to the pollution
41 protective and other features of Department of Transportation Standard Specifications
42 Section 7-1.01G and Fish and Game Code Sections 5650 and 12015.

43
44 18. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents
45 shall be located outside of the stream channel and banks. Any equipment or vehicles
46 driven and/or operated within or adjacent to the channel shall be checked and

1 maintained daily to prevent leaks of materials that, if introduced to water, could be
2 deleterious to aquatic life. If a spill should occur, cleanup shall begin immediately. The
3 Department shall be notified as soon as possible by Caltrans and shall be consulted
4 regarding further cleanup procedures.

5

6 19. Raw cement, concrete or washings thereof, asphalt, paint or other coating
7 material, oil or other petroleum products, or any other substances which could be
8 hazardous to fish or wildlife resulting from or disturbed by Project-related activities, shall
9 be prevented from contaminating the soil and/or entering the stream channel.

10 Erosion

11

12 20. All disturbed soils shall be stabilized to reduce erosion potential, both during and
13 following construction. Erosion control Best Management Practices (BMPs) shall be
14 applied to all disturbed areas.

15

16 Fill/Spoil

17

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

23

24 22. Spoil storage sites shall not be located within the stream, or where spoil could be
25 washed into the stream, or where it shall cover vegetation.

26

27 Restoration

28

29 23. Excess material must be removed from the Project site, pursuant to Department of
30 Transportation Standard Specifications Section 7-1.13.

31

32 24. Caltrans shall make the final contour of the site match the adjacent slope of the
33 land and provide the appropriate surface water drainage. All areas subject to
34 temporary ground disturbance, including storage and staging areas, temporary roads,
35 pipeline corridors, etc., shall be recontoured, if necessary, and revegetated to promote
36 restoration of the area.

37

38 25. Caltrans shall implement any and all restoration activities proposed in its
39 Notification. Where proposed restoration is not consistent with this Provision, Caltrans
40 shall incorporate the restoration guidelines below and submit a revised mitigation plan
41 to the Department for written approval prior to commencement of the proposed work.
42 Caltrans shall submit a Revegetation Plan that includes the following:

43

- 44 • Compensation for removed shrubs and trees by:

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

- 1 ○ Identifying species damaged or removed during Project activities. Native
2 riparian trees and shrubs (e.g., willow, cottonwood, sycamore, etc.) between
3 four (4) to 25-inches DBH shall be replaced in-kind at a ratio of 3:1, and trees
4 greater than 25-inches DBH shall be replaced at a ratio of 10:1.
5
6 ○ Describing, when, where, and how replacement shrubs and trees will be
7 planted.
8 ▪ "When" should be the first suitable season after construction is
9 complete.
10
11 ▪ "Where" should be on-site and may be both north and south of the
12 bridge.
13
14 ▪ "How" shall include measures to be implemented (i.e., planting layout
15 design with sufficient space appropriate for each species, irrigation
16 methods, weed management and maintenance and replanting if
17 necessary) to ensure a minimum of 70 percent survivorship for
18 three (3) years, after the last planting, (i.e., if up to 30 percent of any
19 of the species are at risk of not surviving and repeated plantings are
20 necessary, then monitoring, maintenance, and annual reporting shall
21 continue for the subsequent three (3) years).
22
23 ● Seeding and mulching exposed slopes, or stream banks not revegetated with
24 riparian shrubs or trees:
25
26 ○ The seed blend shall include a minimum of three (3) locally native grass
27 species. Locally native wildflower and/or shrub seeds may also be included
28 in the mix. One (1) or two (2) sterile non-native perennial grass species
29 may be added to the seed mix provided that amount does not exceed
30 25 percent of the total seed mix by count.
31
32 ○ Seeding shall be completed as soon as possible, but no later than
33 November 15 of the year construction ends.
34
35 26. At the discretion of the Department, all exposed areas where seeding is
36 considered unsuccessful after 90 days shall receive appropriate soil preparation and a
37 second application of seeding, straw, or mulch as soon as is practical on a date
38 mutually agreed upon.
39

40 **MONITORING AND REPORTING PROGRAM (MRP):**

41 PURPOSE

42
43
44 The purpose of the MRP is to ensure that the protective measures required by the
45 Department are properly implemented, and to monitor the effectiveness of those
46 measures.

Agreement No. 2009-0107-R4
Department of Transportation
Deadman Creek, Duck Slough, and
Duck Slough Overflow - Merced County

1 OBLIGATIONS OF THE OPERATOR

2
3 Caltrans shall have primary responsibility for monitoring compliance with all protective
4 measures included as "Provisions" in this Agreement. Protective measures must be
5 implemented within the time periods indicated in the Agreement and the program
6 described below.

7 Caltrans shall submit the following Reports to the Department:

- 8
- 9 • Verification of employee training (Provision 2).
 - 10
 - 11 • Construction/work schedule (Provision 3).
 - 12
 - 13 • Wildlife survey results (Provisions 6 through 11).
 - 14
 - 15 • Revegetation Plan (Provision 14 and 25). Plan shall be implemented for a
16 minimum of three (3) years with annual reports on survivorship due January 31
17 each year until the minimum of 70 percent survivorship has been achieved, at
18 which time a Final Restoration Report shall be submitted.
 - 19
 - 20 • A Final Project Report submitted within 30 days after the Project is completed.
21 The final report shall summarize the Project construction, including any problems
22 relating to the protective measures of this Agreement. "Before and After" photo
23 documentation of the Project site shall be required and included in the final report.
 - 24

25 In addition to the above monitoring and reporting requirements, the Department
26 requires as part of this MRP that Caltrans:

- 27
- 28 • Immediately notify the Department in writing if monitoring reveals that any of the
29 protective measures were not implemented during the period indicated in this
30 program, or if it anticipates that measures will not be implemented within the time
31 period specified.
 - 32
 - 33 • Immediately notify the Department if any of the protective measures are not
34 providing the level of protection that is appropriate for the impact that is occurring,
35 and recommendations, if any, for alternative protective measures.
 - 36

37 **VERIFICATION OF COMPLIANCE:**

38
39 The Department shall verify compliance with protective measures to ensure the
40 accuracy of Caltrans' monitoring and reporting efforts. The Department may, at its sole
41 discretion, review relevant Project documents maintained by Caltrans, interview
42 Caltrans' employees and agents, inspect the Project area, and take other actions to
43 assess compliance with or effectiveness of protective measures for the Project.

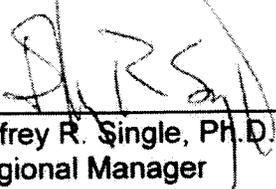
1 **CONCURRENCE:**

2
3
4
5

6 **APPROVED BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME**

7
8 on 11-9-09, 2009.

9
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18

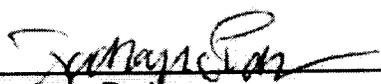


Jeffrey R. Single, Ph.D.
Regional Manager
Central Region

19 **ACKNOWLEDGMENT**

20
21 The undersigned acknowledges receipt of this Agreement and, by signing, accepts and
22 agrees to comply with all terms and conditions contained herein. The undersigned also
23 acknowledges that adequate funding shall be made available to implement the
24 measures required by this Agreement.

25
26
27
28

29
30 By: 
31 Zachary Parker
32 California Department of Transportation

Date: 10/21/2009



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

REPLY TO
ATTENTION OF

March 8, 2011

Regulatory Division (SPK-2002-00316)

California Department of Transportation, District 6
Attn: Mr. Zachary K. Parker
2015 East Shields Avenue, Suite A-100
Fresno, California 93726-5428

Dear Mr. Parker:

We are responding to your August 3, 2009 request for a Department of the Army permit for the State Route 99 (SR99) Arboleda Freeway project. The project involves activities, including discharges of dredged or fill material, into waters of the United States as indicated on the attached Permit Area drawings, to realign Deadman Creek (37-acre permit area), replace Russell Lateral (22-acre permit area), Lingard Lateral (17-acre permit area), and Fairfield Lateral (9-acre permit area) with new reinforced concrete pipe culverts, and install new concrete bridge piles at Duck Slough and demolish Mariposa Creek Bridge (12-acre permit area). The authorized work is located along SR99 between Post Miles 4.6 – 10.5, specifically at Deadman Creek, Russell Lateral, Lingard Lateral, Fairfield Lateral, Duck Slough, and Mariposa Creek, Section 23, Township 21 South, Range 28 East, Mount Diablo Meridian, Latitude 36.0647365253912°, Longitude -118.885528267098° respectively, in Merced County, California.

Based on the information you provided, the proposed discharges of fill, resulting in the permanent loss of approximately 1.12 acres of open waters of the U.S. (0.38 acre at Deadman Creek, 0.22 acre at Russell Lateral, 0.34 acre at Lingard Lateral, 0.18 acre at Fairfield Lateral, 0.001 acre at Duck Slough) and temporary impacts to approximately 0.11 acre of open water at Duck Slough and 0.048 acre of wetland at Mariposa Creek, are individually authorized at these locations by Nationwide Permit Number NWP 14, Linear Transportation Projects. Your work must comply with the general terms and conditions listed on the enclosed Nationwide Permit information sheets and the following special conditions:

Special Conditions

1. All terms and conditions of the August 28, 2009 Section 401 Water Quality Certification are expressly incorporated as conditions of this permit.
2. To ensure compliance of the authorized work, the enclosed documents entitled *ENG 4345 Form-Additional Information for the Arboleda Freeway Project (10-41570)*, permit area maps, plan drawings, construction details, and layouts included in the applicants (Caltrans) Pre-construction Notification (PCN) are incorporated by reference as a condition of this authorization.

3. We understand the State of California, Department of Transportation (Caltrans) is the National Environmental Policy Act (NEPA) lead federal agency for this project, and as such, will ensure the authorized work complies with the National Environmental Policy Act, the Endangered Species Act, the National Historical Preservation Act and any other applicable federal laws. This authorization is contingent upon the permittee implementing all actions necessary to comply with these requirements.

4. To ensure your project complies with the National Historic Preservation Act, you must implement all of the mitigating measures identified in the enclosed State Office of Historic Preservation letter of concurrence dated February 17, 2006 (FHWA021021A), including those ascribed to Caltrans therein. If you are unable to implement any of these measures, you must immediately notify Caltrans and this office, so we may consult as appropriate, prior to initiating the work, in accordance with Federal law.

5. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify the appropriate Caltrans and U.S. Army Corps of Engineers Regulatory offices of what you have found. Caltrans acting as the lead Federal agency for this project may consult as appropriate to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register, pursuant to 36 CFR Part 800, as amended 8/05/2004.

6. This Corps permit does not authorize you to take threatened or endangered species, in particular the endangered San Joaquin kit fox (*Vulpes macrotis mutica*), threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), or their designated critical habitat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (e.g., an Endangered Species Act Section 10 permit, or a Biological Opinion under Endangered Species Act Section 7, with "incidental take" provisions with which you must comply). The enclosed Fish and Wildlife Service Biological Opinion (Number 1-1-03-F-0224, dated February 6, 2006), contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the Biological Opinion. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with "incidental take" of the attached Biological Opinion, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the Biological Opinion, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The U. S. Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its Biological Opinion, and with the Endangered Species Act. You must comply with all conditions of this Biological Opinion, including those ascribed to Caltrans.

7. To mitigate for the permanent loss of 1.12 acres of open waters, you shall purchase 1.12 acres of created open water credits *or* 2.24 acres of created riparian credits at a Corps approved mitigation bank. The selected mitigation bank shall include the area of the permitted project within its service area. A list of approved mitigation banks is available through the Regional Internet Bank Information Tracking System (RIBITS), accessible from our website. Evidence of this purchase shall be provided to this office prior to proceeding with any activity otherwise authorized by this permit.

8. If credits are not available for either created open water or created riparian at a Corps approved bank, you shall mitigate for the permanent loss of 1.12 acre of waters of the U.S. ($1.12 \times \$150,000.00 = \$168,000.00$), by submitting a check in the amount of \$168,000.00 payable to the National Fish and Wildlife Foundation (NFWF). The *Tulare-Buena Vista Lakes* Hydrologic Unit Code, #18030006, must be indicated on the check in order to insure the proper location of future mitigation. Prior to proceeding with any activity otherwise authorized by this permit, we must receive notification from you that your in-lieu fees have been deposited into NFWF's Sacramento District Wetlands Conservation Fund.

9. Approximately 0.16 acres of temporary fills to construct trestles, dams, and/or water structures shall be removed in their entirety and the affected areas returned to pre-construction elevations, contours and conditions within 30 days of completion of authorized work in waters of the U.S.

10. Within 30 days prior to initiation of construction activities within waters of the United States, you shall submit to this office, pre-construction photographs of the proposed discharge areas in waters of the U.S., and landscape view photographs of major project features, which have been taken no more than 1 year prior to initiation of construction activities. Within 30 days following construction activities, you shall submit post-construction photographs of the same locations, showing the placement and/or removal of fill, landscape view photographs of major project features, and any mitigation areas. The pre & post camera positions and view angles of the photographs shall be identical and identified on a map, aerial photo, or project drawing.

11. You shall notify this office of the start and completion dates for each phase of the authorized work within 30 calendar days prior to initiation of construction activities within waters of the U.S. and 30 calendar days following completion of construction activities. Along with this notification, you shall submit a copy of the project construction/work schedule or similar report.

12. You shall notify this office of any proposed modifications to the project, including revisions to any of the work plans or documents cited in this authorization, for review and approval prior to construction work associated with the proposed modification(s).

13. Within 60 days following completion of the authorized work or at the expiration of the construction window of this permit, whichever occurs first, you shall submit as-built drawings and a description of the work conducted on the project site to this office for review. The drawings shall be signed and sealed by a registered professional engineer and include the following:

- a. The Department of the Army Permit number.
- b. A plan view drawing of the location of the authorized work footprint (as shown on the permit drawings) with an overlay of the work as constructed in the same scale as the attached permit drawings. The drawing should show all "earth disturbance," wetland impacts, structures, and the boundaries of any on-site avoidance areas. The drawings shall contain, at a minimum, 2-foot topographic contours of the entire site.
- c. Ground photographs of the completed work. The cameral positions and view-angles of the ground photographs shall be identified on a map, aerial photograph, or project drawing.

d. A description and list of all deviations between the work as authorized by this permit and the work as constructed. Clearly indicate on the as-built drawings the location of any deviations that have been listed.

14. All equipment staging, including Temporary Construction Areas (TCA's), shall take place within Corps of Engineers approved areas within the project boundary. Prior to construction implementation, you shall ensure all equipment staging, TCA's, demolition and excavation, off pavement detours, borrow and fill areas, and upland disposal areas have been evaluated under National Environmental Policy Act, Section 401 and 404 of the Clean Water Act, Section 7 of the Endangered Species Act and Section 106 of the National Historical Preservation Act and all required permits have been obtained.

15. Excavated materials shall only be placed in upland locations. The upland disposal site(s) shall be delineated for waters of the U.S. and must be approved by the Corps of Engineers prior to disposal.

16. Prior to proceeding with any activity otherwise authorized by this permit, you shall install Environmentally Sensitive Area (ESA) fencing and employ appropriate water quality protection measures and/or Best Management Practices (BMP's), to ensure unauthorized fills and unforeseen impacts to waters of the U.S. are avoided. All fencing surrounding avoidance areas shall allow unrestricted visibility of these areas to discourage vandalism, destruction or disturbance. An example of fencing includes; high-visibility orange plastic or similar type.

17. You shall follow specifications and standards described in the Storm Water Pollution Prevention Plan (SWPPP) and/or Water Pollution Control Plan (WPCP), to prevent erosion and sedimentation during and after construction. Construction work within waters of the U. S. shall be performed when the flows are at their seasonal low or when they have ceased and the areas are dry, typically late summer through early fall.

18. Between construction seasons all equipment and materials, with the exception of ESA fencing, temporary falsework, and trestles, shall be removed from waters of the U.S. and all disturbed areas shall be stabilized to prevent erosion and sedimentation.

19. If any of the above conditions are violated or unauthorized activities occur, you shall stop work immediately and notify the Sacramento District, Regulatory Division Office. You shall provide us with a detailed description of the unauthorized activity(s), photo documentation, and any measures taken to remedy the violation.

20. The Permittee (Caltrans) is responsible for all work authorized herein and ensuring that all contractors and workers are made aware and adhere to the terms and conditions of this permit authorization. You shall ensure that a copy of the permit authorization and associated drawings are available for quick reference at the project site until all construction activities are completed.

21. You and your authorized contractor shall allow representatives from this office to inspect the authorized activity and all mitigation areas at any time deemed necessary to ensure that work is being or has been accomplished in accordance with the terms and conditions of this verification.

22. Within 30 days after completion of the authorized work, you must sign the enclosed *Compliance Certification* form and return it to this office, along with the items required in special condition #10.

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

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

Please refer to identification number SPK-2002-00316 in any correspondence concerning this project. If you have any questions, please contact Ms. Leah Fisher at our California South Branch, 1325 J Street, Room 1480, Sacramento, California 95814-2922, email Leah.M.Fisher@usace.army.mil, or telephone 916-557-6639. For more information regarding our program, please visit our website at www.spk.usace.army.mil/regulatory.html.

Sincerely,



Paul M. Maniccia
Chief, California South Branch

Enclosure(s)

Copy furnished without enclosure(s)

Milford W. Donaldson, State Historic Preservation Officer, California State Department of Parks and Recreation, 1725 23rd Street Suite 100, Sacramento, California 95816
California Regional Water Quality Control Board, Storm Water and Water Quality Certification Unit, Central Valley Region, 11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
U.S. Fish and Wildlife Service, Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, California 95825-3901
California Department of Fish and Game, 1701 Nimbus Road, Rancho Cordova, California 95670-4504
Central Valley Flood Protection Board, 3310 El Camino Avenue, Room LL40, Sacramento, California 95821
U.S. Environmental Protection Agency, Region IX, Wetlands Regulatory Office (WTR-8), 75 Hawthorne Street, San Francisco, California, 94105-3901



U S Army Corps of
Engineers
Sacramento District

Nationwide Permit Summary

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

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

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

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

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

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

A. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact

the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

- 1. Navigation.**
 - (a) No activity may cause more than a minimal adverse effect on navigation.
 - (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
 - (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
- 2. Aquatic Life Movements.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.
- 3 Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.
- 4. Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
- 5. Shellfish Beds.** No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.
- 6. Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).
- 7. Water Supply Intakes.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.
- 8. Adverse Effects From Impoundments.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or

restricting its flow must be minimized to the maximum extent practicable.

- 9. Management of Water Flows.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).
- 10. Fills Within 100-Year Floodplains.** The activity must comply with applicable FEMA-approved state or local floodplain management requirements.
- 11. Equipment.** Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.
- 12. Soil Erosion and Sediment Controls.** Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.
- 13. Removal of Temporary Fills.** Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.
- 14. Proper Maintenance.** Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.
- 15. Wild and Scenic Rivers.** No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).
- 16. Tribal Rights.** No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.
- 17. Endangered Species.**

(a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No

activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

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

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

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

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

18. Historic Properties.

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

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

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

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

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to

notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

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

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

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

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

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

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

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the

aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

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

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

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

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

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

21. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR

330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

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

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

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

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

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

(Transferee)

(Date)

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

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

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

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

27. Pre-Construction Notification.

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

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

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

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

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

(2) Location of the proposed project;

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

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

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

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

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

property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

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

(d) Agency Coordination:

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

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

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

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

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

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

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

submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

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

B. Regional Conditions:

I. Sacramento District (All States, except Colorado)

1. When pre-construction notification (PCN) is required, the prospective permittee shall notify the Sacramento District in accordance with General Condition 27 using either the South Pacific Division Preconstruction Notification (PCN) Checklist or a completed application form (ENG Form 4345). In addition, the PCN shall include:
 - a. A written statement explaining how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;
 - b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and size (in acreage) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the high tide line should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation; and
 - c. Pre-project color photographs of the project site taken from designated locations documented on the plan drawing.
2. The permittee shall complete compensatory mitigation required by special conditions of the NWP verification before or concurrent with construction of the authorized activity, except when specifically determined to be impracticable by the Sacramento District. When project mitigation involves use of a mitigation bank or in-lieu fee program, payment shall be made before commencing construction.
3. The permittee shall record the NWP verification with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property against areas (1) designated to be preserved as part of mitigation for authorized impacts, including any associated covenants or restrictions, or (2) where structures such as boat ramps or docks, marinas, piers, and permanently moored vessels will be constructed in or adjacent to navigable waters (Section 10 and Section 404). The recordation shall also include a map showing the surveyed location of the authorized structure and any associated areas preserved to minimize or compensate for project impacts.
4. The permittee shall place wetlands, other aquatic areas, and any vegetative buffers preserved as part of mitigation for impacts into a separate "preserve" parcel prior to discharging dredged or fill material into waters of the United States, except where specifically determined to be impracticable by the Sacramento District. Permanent legal protection shall be established for all preserve parcels, following Sacramento District approval of the legal instrument.
5. The permittee shall allow Corps representatives to inspect the authorized activity and any mitigation areas at any time deemed necessary to determine compliance with the terms and conditions of the NWP verification. The permittee will be notified in advance of an inspection.
6. For NWPs 29, 39, 40, 42, 43, 44, and 46, requests to waive the 300 linear foot limitation for intermittent or ephemeral waters of the U.S. shall include an evaluation of functions and services provided by the waterbody taking into account the watershed, measures to be implemented to avoid and minimize impacts, other measures to avoid and minimize that were found to be impracticable, and a mitigation plan for offsetting impacts.
7. Road crossings shall be designed to ensure fish passage, especially for anadromous fisheries. Permittees shall employ bridge designs that span the stream or river, utilize pier or pile supported structures, or involve large bottomless culverts with a natural streambed, where the substrate and streamflow conditions approximate existing channel conditions. Approach fills in waters of the United States below the ordinary high water mark are not authorized under the NWPs, except where avoidance has specifically been determined to be impracticable by the Sacramento District.
8. For NWP 12, clay blocks, bentonite, or other suitable material shall be used to seal the trench to prevent the utility line from draining waters of the United States, including wetlands.
9. For NWP 13, bank stabilization shall include the use of vegetation or other biotechnical design to the maximum extent practicable. Activities involving hard-armoring of the bank toe or slope requires submission of a PCN per General Condition 27.
10. For NWP 23, the PCN shall include a copy of the signed Categorical Exclusion document and final agency determinations regarding compliance with Section 7 of the Endangered Species Act, Essential Fish Habitat under the Magnusen-Stevens Act, and Section 106 of the National Historic Preservation Act.
11. For NWP 44, the discharge shall not cause the loss of more than 300 linear feet of streambed. For intermittent and ephemeral streams, the 300 linear foot limit may be waived in writing by the Sacramento District. This NWP does not authorize discharges in waters of the United States supporting anadromous fisheries.
12. For NWPs 29 and 39, channelization or relocation of intermittent or perennial drainage, is not authorized, except when, as determined by the Sacramento District, the relocation would result in a net increase in functions of the aquatic ecosystem within the watershed.
13. For NWP 33, temporary fills for construction access in waters of the United States supporting fisheries shall be accomplished with clean, washed spawning quality gravels where practicable as determined by the Sacramento District, in consultation with appropriate federal and state wildlife agencies.

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

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

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

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

II. California Only

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

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

III. Nevada Only

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

IV. Utah Only

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

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

3. For NWP 27, facilities for controlling stormwater runoff, construction of water parks such as kayak courses, and use of grout or concrete to construct in-stream structures are not authorized. A PCN is required for all projects exceeding 1500 linear feet as measured on the stream thalweg, using in stream structures exceeding 50 cubic yards per structure and/or incorporating grade control structures exceeding 1 foot vertical

drop. For any stream restoration project, the post project stream sinuosity shall be appropriate to the geomorphology of the surrounding area and shall be equal to, or greater than, pre project sinuosity. Sinuosity is defined as the ratio of stream length to project reach length. Structures shall allow the passage of aquatic organisms, recreational water craft or other navigational activities unless specifically waived in writing by the District Engineer.

V. Colorado Only

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

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

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

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

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

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

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

building structures is not authorized by this nationwide permit.

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

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

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

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

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

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

h. Invasive Aquatic Species. General Condition 11 is amended by adding the following condition for work in perennial or intermittent waters of the United States: If heavy equipment is used for the subject project that was previously working in another stream, river, lake, pond, or wetland within 10 days of initiating work, one the

following procedures is necessary to prevent the spread of New Zealand Mud Snails and other aquatic hitchhikers:

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

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

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

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

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

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

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

4. Additional Information

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

a. Permittees are reminded of the existing General Condition No. 6 which prohibits the use of unsuitable material. Organic debris, building waste, asphalt, car bodies, and trash are not suitable material. Also, General Condition 12 requires appropriate erosion and sediment controls (i.e. all fills must be permanently stabilized to

prevent erosion and siltation into waters and wetlands at the earliest practicable date). Streambed material or other small aggregate material placed along a bank as stabilization will not meet General Condition 12. Also, use of erosion control mats that contain plastic netting may not meet General Condition 12 if deemed harmful to wildlife.

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

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

C. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

D. Definitions

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

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

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

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

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic

resource function(s). Enhancement does not result in a gain in aquatic resource area.

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

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

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

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

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

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

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands

contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal

interruption of normal stream processes. A channelized stream remains a water of the United States.

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

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

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

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

**APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
(33 CFR 325)**

OMB APPROVAL NO. 0710-003

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, Searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States; the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

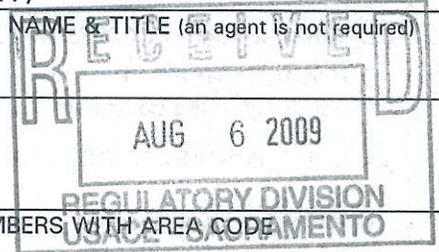
One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Zachary Parker -CA Department of Transportation	8. AUTHORIZED AGENT'S NAME & TITLE (an agent is not required)
6. APPLICANT'S ADDRESS 2015 E. Shields Avenue Suite 100 Fresno, CA 93726-5428	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 559 243 8196	10. AGENT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business



11. **STATEMENT OF AUTHORIZATION**

I hereby authorize _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE

DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions) Arboleda Freeway	
13. NAME OF WATERBODY, IF KNOWN (if applicable) 2 creeks, 1 slough, 3 irrigation ditches	14. PROJECT STREET ADDRESS (if applicable) State Route 99 between Buchanan Hollow Road and McHenry Road
15. LOCATION OF PROJECT Merced COUNTY CA STATE	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) UTM: 732068.853E 4123470.539N (Zone 10)	
17. DIRECTIONS TO THE SITE From the Sacramento Army Corps of Engineers Office, head south on State Route 99 for approximately 110 miles to the city of Merced. The end of the project is approximately 3 miles south of the Childs Avenue exit.	

18. NATURE OF ACTIVITY (Description of project, include all features)

Convert the four-lane expressway to a six-lane freeway from Buchanan Hollow Road to just north of McHenry Road. The six-lane freeway would be constructed to the east of the existing alignment with a 70-foot wide median. The new freeway would consist of 12 foot lanes, 10 foot outside shoulders, and 10 foot inside shoulders. A new frontage road with 12 foot lanes and 8 foot outside shoulders would also be constructed east of the proposed freeway. (continued on attachment)

19. PROJECT PURPOSE (Describe the reason or purpose of the project, see instructions)

The purpose of the project is to improve safety for motorists, reduce congestion, and provide route continuity.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. REASON(S) FOR DISCHARGE

DEADMAN CREEK: The existing box culvert at State Route 99 (northbound lanes and median) will be removed and 1,100 feet of the existing channel will be backfilled with dirt. The realigned channel will be constructed in an upland area just north of the existing channel. The realignment alternative was selected primarily to avoid an (continued on attachment)

21. TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS

Dirt to backfill the existing Deadman Creek channel (5,430 cubic yards)
Dirt to backfill the existing Russell Lateral, Lingard Lateral, and Fairfield Lateral channels (133 cubic yards)
Concrete piles for bridges at Duck Slough (297 cubic yards); Concrete bridge demolition at Mariposa Creek (475 cubic yards)

22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (see instructions)

DEADMAN CREEK: The channel is used as an irrigation canal by the Le Grand-Athlone Water District. The flow mainly depends upon the controlled release of irrigation water and is often dry. A backhoe will be used to (continued on attachment)

23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? YES NO IF YES, DESCRIBE THE WORK

Construction is anticipated to begin July 1, 2010 and be completed by November 16, 2013.

24. ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC. WHOSE PROPERTY ADJOINS THE WATERBODY (If more than can be entered here, please attach a supplemental list)

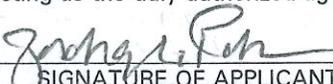
Supplemental List Attached

25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE, OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
RWQCB	401 Certification		8/03/09	Certification pending	
CDFG	1602 Streambed Alteration Agreement		8/03/09	Agreement pending	

* Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.




SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

BLOCK 18 – NATURE OF ACTIVITY

The existing southbound lanes would be converted into a western frontage road and the existing northbound lanes would be removed. A new interchange would be constructed near Le Grand Road and Arboleda Drive. The at-grade intersections at Athlone Road, Ranch Road, Arboleda Drive, Le Grand Road, Worden Avenue, Pioneer Road, Lingard Road, Mariposa Way, and McHenry Road would be eliminated. The total project study area encompassed 1,456 acres, however, only 437 acres of this study area will be modified as a result of the proposed freeway. Location and vicinity maps of the project area are enclosed.

Waterways within the project area (aerial maps and plan drawings are enclosed):

1. Deadman Creek: The existing concrete double box culvert (Bridge No. 39-02, PM 5.22) at State Route 99, measuring 24 feet wide x 7 feet high, will be removed from the existing median and northbound lanes. The existing channel (1,100 feet) will be backfilled with dirt and a new channel will be realigned to the north of the existing channel. The proposed channel will be longer (1,325 feet) and the width will be increased as a result of modifying the side slopes (from 1:0.5 to 1:1) reducing the flow velocity. Rock slope protection will be used at the bends of the creek to avoid possible scouring of the embankment. In addition, rock slope protection will be used at the bridges to allow for kit fox passage, which is included in the biological opinion as an avoidance and minimization measure. Permanent Impacts = 0.38 acre
2. Russell Lateral: The existing 48-inch concrete pipe culvert at State Route 99 and the existing 36-inch concrete pipe culvert at Le Grand Road will remain in place and the existing channel will be backfilled with dirt for a total of 735 feet to accommodate the proposed freeway. A new 48-inch reinforced concrete pipe culvert will replace the open channel as requested by the Merced Irrigation District and it will be constructed in an upland area near the existing channel. Permanent Impact = 0.22 acre
3. Lingard Lateral: The existing reinforced concrete box culvert (4 feet wide x 4 feet high) at State Route 99 and the existing 36-inch concrete pipe culvert at Worden Drive will remain in place and the existing channel will be backfilled with dirt for a total of 750 feet to accommodate the proposed freeway. A new 66-inch reinforced concrete pipe culvert will replace the open channel as requested by the Merced Irrigation District and it will be constructed in an upland area near the existing channel. Permanent Impact = 0.34 acre
4. Fairfield Lateral: The existing concrete double box culvert (6 feet wide x 4 feet high) at State Route 99 will remain in place and the existing channel will be backfilled with dirt for a total of 400 feet to accommodate the proposed freeway. A new 84-inch reinforced concrete pipe culvert will replace the open channel as

requested by the Merced Irrigation District and it will be constructed in an upland area near the existing channel. Permanent Impact = 0.18 acre

5. Mariposa Creek: The existing northbound bridge at State Route 99 (42 feet wide x 76 feet long) will be removed and the southbound bridge left intact in order to serve as a county frontage road. The bridge will be demolished in large sections to minimize impacts to the wetland area (0.057 acre) below State Route 99. No permanent impact will occur at this location. Temporary impacts (0.048 acre) to the wetland area will occur as a result of the bridge demolition. A potential beneficial impact associated with the removal of the northbound lanes is that wetland vegetation may be established in this section that is currently vegetation free due to the shading effect of the bridge. The three new proposed bridges east of the existing bridge will be constructed in an upland area (orchard).
6. Duck Slough: The existing northbound bridge at State Route 99 (42 feet wide x 75 feet long) will be removed and the southbound bridge left intact in order to serve as a county frontage road. Three new bridges will be constructed east of the existing bridge. The new northbound and southbound bridges (60 feet wide x 88 feet long) will each be supported by 15 concrete piles (16 inch diameter) and the frontage road bridge (40 feet wide x 94 feet long) will be supported by 10 concrete piles (16 inch diameter). Temporary impacts (0.11 acre) will occur as a result of vehicles/equipment in the channel due to bridge construction. In addition, the bridge removal may require the contractor to divert water through a temporary diversion dam to avoid impacts to water quality. The temporary pipe would carry water from east to west below the northbound bridge allowing work to be done when the channel is dry. Rock slope protection will also be used below the bridges to allow for kit fox passage, which is included in the biological opinion as an avoidance and minimization measure. Permanent Impact = 0.001 acre

BLOCK 20 – REASON(S) FOR DISCHARGE

archaeological site found to be eligible for the National Register of Historic Places. The site will be protected by the placement of fill material on top of the site. Concurrence letters from the State Historic Preservation Officer are enclosed.

The option to construct span bridges over the existing channel was not feasible based on cost, structural design, right of way take, and environmental impact. A single span bridge about 600 feet long would result in a much deeper structure and would require raising the roadway profile 36 feet. Each bridge would cost approximately \$6,000,000. Import borrow would be required for the height increase in the embankment. The profile change would require the re-alignment of both the eastern frontage road and the proposed northbound and southbound lanes; both would be moved further east due to the limited space available. This would impact the archaeological site and would result in additional right of way acquisition.

The new proposed bridges will be raised to allow for the bridge soffit to be above the 100-year floodplain high water mark. In addition, rock slope protection is proposed within part of the channel. Sedimentation is minimal upstream due to low velocity. Rock slope protection will reduce the velocity and prevent erosion at the culvert exit points. The velocity on this project does not exceed 2 feet/second, therefore, no deposition is expected.

RUSSELL LATERAL, LINGARD LATERAL, FAIRFIELD LATERAL: Early coordination with the Merced Irrigation District regarding their irrigation conveyance system and waterways was conducted and their recommendations were considered for the proposed project. Caltrans is required to continue the function of the irrigation conveyance system, including ensuring that existing conveyance capacity is maintained, providing the irrigation district with a means to access their facilities for operations and maintenance activities, without adding additional costs or potential liabilities to the irrigation district as a result of the proposed expressway construction. The option to leave the open channels in place was not considered as the irrigation district would not be able to access these channels for operations and maintenance purposes (as Caltrans restricts access to its right-of-way) and it would create potential liabilities for both the irrigation district and Caltrans, including potential flooding and safety issues due to the elevated roadway. Furthermore, the existing man-made open canals present a conflict with the freeway construction.

These raised channels do not accept sheet flow runoff (as they are higher than adjacent grounds) and are shut off (no water conveyance) for a minimum of four months out of the year. Various portions of each of the channels are pipelined in several different locations. It is the irrigation district's policy that when non-agricultural encroachment occurs over or adjacent to said channels, the channels are placed into pipeline assemblies due to operations, maintenance, and liability issues. Pipeline assemblies shall provide for access points at 300 to 400 foot intervals (depending on the pipe size), whereas man-made open channels shall be accessible along both banks for their entire length.

Bottomless culverts were not considered a feasible option for the three laterals. The existing culverts function as siphons and are under some pressure. Under this condition, a bottomless culvert would erode and fail.

The work at the three laterals is to be completed by the irrigation district prior to the freeway construction.

DUCK SLOUGH: The option to construct span bridges for the new northbound lanes, southbound lanes, and eastern frontage road was not feasible based on cost, structural design, and right of way take. A single span bridge about 94 feet long would result in a much deeper structure. For the three span bridges, the deck would be 5 feet 8 inches thick and would require raising the roadway profile 4 feet. Import borrow would be required for the height increase in the embankment. The profile change would require the re-alignment of both the eastern frontage road and the proposed northbound and southbound lanes; both would be moved further east due to the limited space available.

The estimated increase in cost for the span bridges would be \$6,500,000, which includes additional right of way, import borrow, and structures.

BLOCK 22 – SURFACE AREA IN ACRES OF OTHER WATERS FILLED

backfill the channel. Fill material will be produced from onsite. A backhoe will be used to remove the existing box culvert within the median and northbound lanes of State Route 99 and a bulldozer will be used to construct the new channel. The new channel will be constructed first and then the existing channel will be backfilled.

RUSSELL LATERAL: The channel is used as an irrigation canal by the Merced Irrigation District. A backhoe will be used to backfill the channel and excavate the new channel along with a bulldozer. The irrigation district will perform the pipeline assembly work prior to the road project in upland conditions.

LINGARD LATERAL: The channel is used as an irrigation canal by the Merced Irrigation District. A backhoe will be used to backfill the channel and excavate a small section of new channel. The irrigation district will perform the pipeline assembly work prior to the road project in upland conditions.

FAIRFIELD LATERAL: The channel is used as an irrigation canal by the Merced Irrigation District. A backhoe and bulldozer will be used to backfill the channel and excavate the new channel. The irrigation district will perform the pipeline assembly work prior to the road project in upland conditions.

MARIPOSA CREEK: The type of equipment to be used for the removal of the northbound bridge at State Route 99 include a rammer hammer, excavator and dump truck. This is a temporary impact as the debris from the bridge demolition may affect the seasonal wetland located near the western edge of the southbound bridge, which will remain intact.

DUCK SLOUGH: The channel is used as an irrigation canal by the Merced Irrigation District. The type of equipment to be used for the removal of the northbound bridge at State Route 99 include a rammer hammer, excavator, and dump truck. A crane will be used to install the bridge piles and a pile driver will be used for the placement of concrete piles in the channel. Temporary impacts include vehicle and equipment access within the channel.

The sequence of construction for the proposed project: build the new eastern frontage road, build the new northbound lanes, direct traffic to the new northbound lanes, remove the existing northbound lanes, and build the new southbound lanes.

Project Alternatives Analysis

Alternative 5 is considered the least environmentally damaging practicable alternative based on reduced project cost, residential relocations, and farmland acquisition. There

were no significant differences between the two proposed alternatives (Alternative 4 and Alternative 5) in relation to impacts to wetlands and waters of the U.S. Both alternatives would involve constructing new bridges over Deadman Creek, Mariposa Creek, and Duck Slough, and converting Russell Lateral, Lingard Lateral, and Fairfield Lateral from open channels to underground pipe culverts. Three realignment alternatives were considered at Deadman Creek. Realignment alternative A was not selected due to the presence of an archaeological site. Realignment alternative C was not selected due to the presence of an archaeological site and design constraints for constructing the new channel within the existing median with northbound and southbound traffic along State Route 99. Alternative B was selected primarily because it avoided impacts to an archaeological site. A span bridge over Deadman Creek was not considered for the proposed freeway because of cost. Caltrans did not consider alternatives that did not relocate State Route 99 away from the railroad, due to cost issues. An interchange over a railroad would need to be at least 24 feet high requiring a much larger footprint and would require the construction of a second frontage road.

The project has been evaluated for compliance with the Section 404(b)(1) Guidelines as follows:

- The project represents the least environmentally damaging, practicable alternative
- The project complies with all applicable State and Federal criteria
- The project will not result in significant degradation of the aquatic environment
- The project proposes appropriate and practicable mitigation to offset the permitted loss of aquatic functions

Farmland Impacts

To comply with the requirements of the Farmland Protection Policy Act, Caltrans submitted a Farmland Conversion Impact Rating form, AD_1006 to the local Natural Resource Conservation Service. Because the Arboleda Freeway Project and the Plainsburg Freeway Project were evaluated with one environmental document, the impacts for both farmland projects were evaluated together. All of the following numbers are for both projects. The project would convert 752.2 acres of farmland for transportation use. Of those 752 acres, 250 are prime and unique farmland and 386.5 are of state and local importance. These acreages are noted in Part IV of the Farmland Impact Rating form (attached).

Loss of Food and Fiber Production

Based on parcel surveys conducted during the 2001 growing season, an estimated 1,238 acres of agricultural land exists within the project impact area for the proposed project. The agricultural type and estimated acreage is as follows:

Food and Fiber Type	Acres
Alfalfa	495
Oat	272
Grape	248
Orchard	223
Estimated Total =	1,238*

*The total acreage studied was 1,456 acres; the remaining 218 acres consists of the Caltrans right of way, county roads, railroad right of way, irrigation canals, and residential parcels, which are not categorized as agricultural.

The total loss of food production totals 1,238 acres and there is no loss of fiber production as a result of the proposed project.

Existing Waterway Conditions

1. Deadman Creek is a natural channel that has been highly channelized by the Le Grand/Athlone Water District. Its flow mainly depends upon the controlled release of irrigation water. Thus, the channel is often dry, but during heavy winter rains, it can also carry precipitation runoff. It consists of high, steep, channeled banks covered primarily with invasive non-native tree of heaven (*Ailanthus altissima*) within the project area. Other riparian vegetation includes California black walnut (*Juglans californica* v. *hindsii*), Fremont's cottonwood (*Populus fremontii*), and willows (*Salix gooddingii*, *S. lasiolepis*, *S. laevigata*). This waterway does provide a crossing for wildlife and nesting habitat for cliff swallows. Raptors have also been observed to use this area as perching/nesting habitat and the adjacent agricultural fields for foraging habitat.
2. Russell Lateral is an artificial channel that is maintained by the Merced Irrigation District for the controlled transport of irrigation water. It is an earth-lined channel with little to no vegetation present along the banks. The channel is subject to irrigation maintenance activities, such as dredging, bank stabilization, and vegetation removal. Water levels, dependent upon irrigation needs, fluctuate dramatically, and the canal is often dry. It is not considered potential habitat for wildlife species. Following construction, the channel will no longer be a raised open channel, rather it will be replaced with an underground reinforced concrete pipe assembly. Rock slope protection will be used in the channel at the culvert outlets as proposed by the irrigation district.
3. Lingard Lateral is an artificial channel that is maintained by the Merced Irrigation District for the controlled transport of irrigation water. It is an earth-lined channel with little to no vegetation present along the banks. The channel is subject to irrigation maintenance activities, such as dredging, bank stabilization, and vegetation

- removal. Water levels, dependent upon irrigation needs, fluctuate dramatically, and the canal is often dry. It is not considered potential habitat for wildlife species. Following construction, the channel will no longer be a raised open channel, rather it will be replaced with an underground reinforced concrete pipe assembly. Rock slope protection will be used in the channel at the culvert outlets as proposed by the irrigation district.
4. Fairfield Lateral is an artificial channel that is maintained by the Merced Irrigation District for the controlled transport of irrigation water. It is an earth-lined channel with little to no vegetation present along the banks. The channel is subject to irrigation maintenance activities, such as dredging, bank stabilization, and vegetation removal. Water levels, dependent upon irrigation needs, fluctuate dramatically, and the canal is often dry. It is not considered potential habitat for wildlife species. Following construction, the channel will no longer be a raised open channel, rather it will be an underground reinforced concrete pipe assembly. Rock slope protection will be used in the channel at the culvert outlets as proposed by the irrigation district.
 5. Duck Slough Overflow South (Mariposa Creek) was an intermittent stream based on a 1950 soil survey. Today, the stream is no longer present, however, water continues to collect under the bridge, and a wetland is present. Water flows under the bridge via irrigation tail water during the summer and precipitation runoff in the winter. Wetland vegetation is present west of the bridge only. The bridge provides suitable habitat for cliff swallows and roosting bats and may serve as a potential crossing for wildlife. As a result of the proposed project, the northbound lanes will be removed and wetland vegetation may be established in this section that currently lacks vegetation due to the shading effect of the bridge. Temporary impacts will occur to this wetland only.
 6. Duck Slough is a natural channel that is maintained by the Merced Irrigation District as a controlled floodway. It also carries precipitation runoff during the winter. The irrigation district removes vegetation along the banks every other year under a Memorandum of Understanding with the Department of Fish and Game. It consists of steep banks covered by Himalayan blackberry (*Rubus discolor*), Valley oak (*Quercus lobata*), and blue gum eucalyptus (*Eucalyptus globulus*). This waterway does provide a crossing for wildlife, nesting habitat for cliff swallows, and roosting habitat for bats.

Mission Avenue Interchange/Freeway Conversion

The Mission Avenue project converted State Route 99 from a four-lane expressway to a four-lane freeway from post-mile 10.5 to 12.8 in Merced County. It also affected two creeks and two laterals. As such, it is considered similar to the Arboleda Freeway Project. The waterways affected included Miles Creek, Owens Creek, Farndale Lateral, and Koff Lateral. Bridges with concrete piles were constructed in the creeks for the main alignment and the existing southbound lanes were left intact to serve as the western frontage road. The two laterals were open channels, but were filled in and converted into underground pipeline assemblies. These design features are similar to those proposed for

the Arboleda Freeway Project. The Mission Avenue Interchange/Freeway Conversion Project was completed in early 2008.

Avoidance and Minimization Measures

Construction activities associated with all of the waterways will occur when the channels are dry (October to April). The runoff from the project will be stored on site within infiltration basins and side ditches. Earthen infiltration basins will be constructed as a partial source of imported borrow for the project. These basins will collect sheet flow from the road directly and water from the interchange ramp areas via culverts. Earthen side ditches (10 feet wide x 3 feet deep) will be constructed within the right of way adjacent to the northbound lanes, southbound lanes, and eastern frontage road for the entire length of the project (21 acres total). These ditches will serve as natural filters for surface runoff and have onsite storage capacity for 1 or 2- 10 year 24-hour storms. The side ditches will be constructed directly on top of Russell Lateral, Lingard Lateral, and Fairfield Lateral pipe culverts, therefore, no adverse effects to water quality is anticipated. A total of 18 natural berms will be created to retain the water in the right of way rather than draining into Deadman Creek, Mariposa Creek, and Duck Slough. The project will discharge and store runoff into the side ditches and infiltration basins thereby reducing peak flow discharge. Due to the relatively flat grades of the channels and on-site storage, sediment loading is anticipated to be minimal. The water from the median will flow into drainage inlets (3 feet 5 inches long x 2 feet wide) with outlets (18 inch pipe culvert) to the side ditches. A total of 51 drainage inlets will be installed. Cut and fill slopes were designed as flat as possible to allow re-vegetation and limit erosion. For most of the project, the fill slopes will be 4:1 or flatter. Under the bridges and around the structures, the slopes will be 2:1, then transition to 3:1 or flatter. Fiber rolls will also be placed in all of the waterways to serve as erosion control measures and to prevent surface contaminants and debris from entering the waterways during construction. Following construction, permanent erosion control (seeds/straw) will be applied throughout the project area.

Proposed avoidance and minimization measures in the biological opinion:

- Bridges would be constructed with increased vertical clearance over local streams and overflow areas providing enhanced crossing potential for kit fox
- At bridge locations, the right of way fence would be designed to direct animals under the alignment by attaching the fence directly to bridge footings. Open space within the right of way near stream banks or overflow areas would be kept free of vegetation to facilitate kit fox passage
- Under the entire right of way fence, a suitable material would be buried and/or placed to discourage kit foxes and other canids from digging under the right of way fence and entering trafficked areas
- One large box culvert would be constructed under the proposed alignment. This culvert would serve as an additional crossing feature specific to kit fox measuring approximately 6 feet high x 10 feet wide x 240 feet long. The bottom of the culvert would be approximately 12 inches above ground and would not carry

water during normal precipitation events. Four sections of corrugate metal pipe, 20 feet long and 10 inches in diameter, would be anchored at equal intervals on the culvert floors. The openings of both ends of all corrugated metal pipe would be narrowed to a 4-6 inch diameter. This corrugated metal pipe design would allow for a temporary refuge opportunity in the event they find themselves in a culvert with a larger predator

- Right of way fence gaps, 4-6 inches high and approximately 60 feet wide would be provided at the bottom of the right of way fence in front of the kit fox culvert entrances. A suitable material would be placed under the gaps to prevent vegetation growth from obscuring them and to prevent enlargement of the gaps via burrowing. Right of way areas between the right of way fence and the box culvert entrances would be kept vegetation free too
- The overpass at Le Grand Road would provide an additional location kit fox could utilize to cross State Route 99
- Conservation easements would be pursued for three proposed buffer areas (40 acres each) on adjacent parcels in front of the entrances of the kit fox box culvert and east of the proposed bridge at Deadman Creek, totaling 120 acres
- Large areas within the Caltrans right of way will be the source of fill material. One of the basins near the Le Grand / Arboleda Interchange may be relinquished to the U.S. Fish and Wildlife Service (48 acres). The proposed kit fox box culvert would be constructed at this location. It is anticipated that these areas would provide substantial foraging habitat for kit fox, burrowing owl, and Swainson's hawk and they would not be intended for use as drainage basins and would not be expected to hold large amounts of water.

Proposed Mitigation

Deadman Creek: The onsite planting of riparian vegetation along the proposed new channel is not feasible due to the lack of cooperation with the Le Grand/Athlone Water District. They prefer to leave the channel banks open and free of riparian vegetation because the potential for water loss through the root system could deplete their already low water supply. In addition, the area east of Deadman Creek is being sought as a conservation easement to keep the agricultural land intact as potential kit fox foraging habitat. Since kit fox may utilize the channel to cross State Route 99, the presence of riparian habitat could potentially exclude kit fox use in the area.

Russell Lateral, Lingard Lateral, and Fairfield Lateral: These open non-vegetated channels are maintained by the Merced Irrigation District and onsite planting of riparian vegetation following construction is not feasible, as these channels will become underground pipes.

Duck Slough: The onsite planting of riparian vegetation along the existing channel is not feasible due to the routine removal of vegetation performed by the Merced Irrigation District. Caltrans proposes to plant 6 Valley oak saplings (3:1 ratio applied to the two trees to be removed) at the Le Grand / Arboleda interchange area located approximately 2.5 miles from Duck Slough following construction. The interchange will have a

permanent water source allowing for a successful plant establishment within three years after the initial planting.

Caltrans proposes to contribute funds to the San Luis National Wildlife Refuge for restoration efforts along Deadman Creek downstream from the project area or to the Army Corps of Engineers in-lieu fee program. The ratio of compensation required is determined to be 1:1 based on the quality of habitat at Deadman Creek, Russell Lateral, Lingard Lateral, and Fairfield Lateral. The total contribution is determined by using the current in-lieu fee costs for the creation of open water habitat. Therefore, the total compensation mitigation proposed is $1.1 \text{ acres} \times 1.0 \times \$150,000 = \$168,000$ for impacts to waters. A total of 1.1 acre of offsite compensation in conjunction with the proposed onsite plantings for Duck Slough would appropriately replace the functions and values lost from impacts to the waters within the project area. The proposed compensatory mitigation would be completed prior to construction for the road project.



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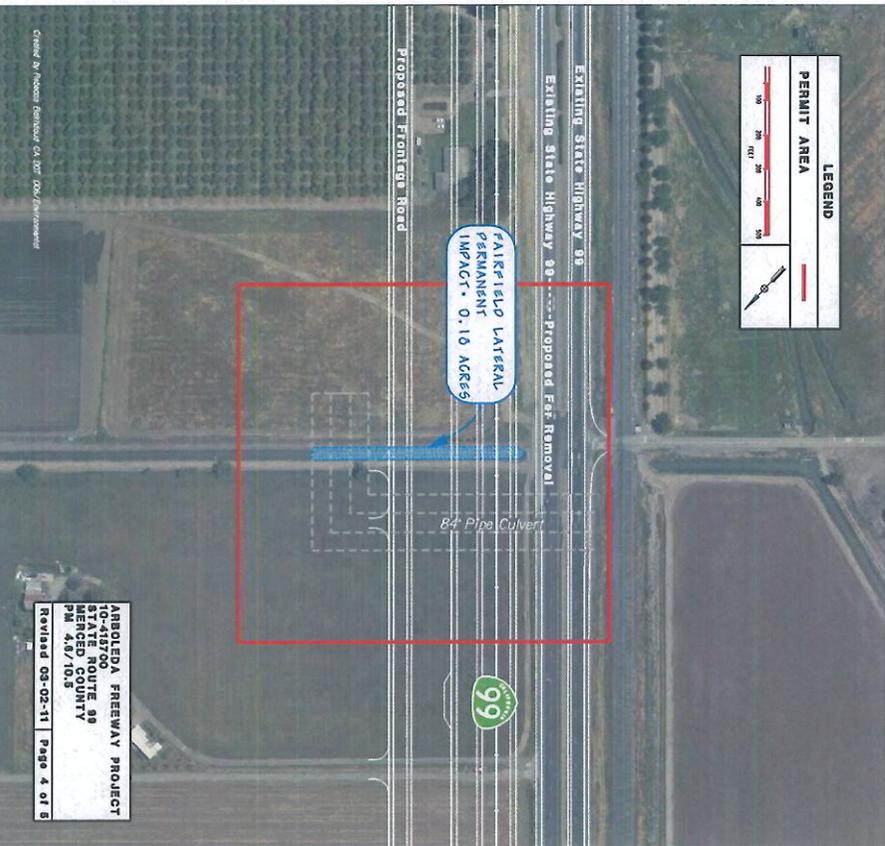


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ARROYO FREEMWAY PROJECT
 10-415700
 STATE ROUTE 99
 MERCED COUNTY
 PM 4/9/10.9
 Revised 03-02-11 Page 3 of 5



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ARROYO FREEMWAY PROJECT
 10-415700
 STATE ROUTE 99
 MERCED COUNTY
 PM 4/9/10.9
 Revised 03-02-11 Page 4 of 5



CENTRAL VALLEY FLOOD PROTECTION BOARD

3310 El Camino Ave., Rm. 151
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0685 FAX: (916) 574-0682



MAY 18 2011

Permit No. 18584 BD

California Department of Transportation, District 10
2015 East Shields Avenue, Suite 100
Attention: David Farris
Fresno, California 93726

Enclosed is your approved Central Valley Flood Protection Board Encroachment Permit Conditions.

Under the Standard General Condition Four (4) of the permit, you are required to accomplish the work under direction and supervision of the Department of Water Resources; therefore, you must advise the Department at 3310 El Camino Avenue, Sacramento, California 95821, attention Lorraine Pendlebury, telephone (916) 574-0609, at least ten days prior to starting your project. An addressed postcard is enclosed for your convenience.

Please note that the permit grants the work proposed in your application. This permit, in addition to the twelve (12) standard conditions, includes special conditions, which may place limitations on or require modifications to your project. You are advised to read all conditions prior to starting the project. Commencing any work under this permit shall constitute an acceptance of the provisions of the permit and an agreement to perform accordingly. This permit does not relieve you from the responsibility for obtaining authorization from any State, local, or federal agencies for your proposed project.

Please refer to your permit number when communicating with this office. For further information, contact Jon Tice at (916) 574-2380.

Sincerely,

Mitra Emami, Senior Engineer, WR
Floodway Protection Section
Central Valley Flood Protection Board

Enclosure

STATE OF CALIFORNIA
THE RESOURCES AGENCY
THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18584 BD

This Permit is issued to:

California Department of Transportation, District 10
2015 East Shields Avenue, Suite 100
Attention: David Farris
Fresno, California 93726

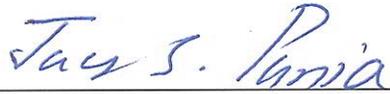
To construct three new bridges: north and southbound bridges (60-foot-wide x 88-foot-long) will each be supported by 15 concrete piles (16-inch-diameter), and a frontage road bridge (40-foot-wide x 82-foot-long) which will be supported by 10 concrete piles (16-inch-diameter); and remove a portion of the existing bridge (82-foot-wide x 76-foot-long) across the channel of Duck Slough. The project is located southeast of Merced on Highway 99 in Merced County (Section 11, T8S, R14E, MDB&M, Duck Slough, Merced County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

MAY 18 2011

Dated: _____



Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to

change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18584 BD

THIRTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FOURTEEN: There shall be no plantings within the project area under this permit, except that of native grasses, which may be required for slope protection.

FIFTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion

SIXTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

SEVENTEEN: The Central Valley Flood Protection Board and Department of Water Resources shall

not be held liable for damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

EIGHTEEN: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

NINETEEN: Prior to start of any demolition and/or construction activities within the floodway, the applicant shall provide the Central Valley Flood Protection Board with two sets of layout plans for any and all temporary, in channel cofferdam(s), gravel work pad(s), work trestle(s), scaffolding, piles, and/or other appurtenances that are to remain in the floodway during the flood season from November 1 through April 15.

TWENTY: Debris that may accumulate on the permitted encroachment(s) and related facilities shall be cleared off and disposed of outside the floodway after each period of high water.

TWENTY-ONE: The permittee shall contact the Department of Water Resources by telephone, (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

TWENTY-TWO: Temporary staging, formwork, stockpiled material, equipment, and temporary buildings shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-THREE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-FOUR: Fill material shall be placed only within the area indicated on the approved plans.

TWENTY-FIVE: Backfill material for excavations shall be placed in 4- to 6-inch layers and compacted to at least the density of the adjacent, firm, undisturbed material.

TWENTY-SIX: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the regulated channel.

TWENTY-SEVEN: The soffit of the bridge shall be no lower than that of the replaced bridge.

TWENTY-EIGHT: Revetment shall be uniformly placed and properly transitioned into the bank, levee slope, or adjacent revetment and in a manner which avoids segregation.

TWENTY-NINE: Revetment shall be quarry stone or cobbles and shall meet the following grading:

Quarry Stone

Stone Size	Percent Passing
15 inches;	100
8 inches;	80-95
6 inches;	45-80

4 inches; 15-45
2 inches; 0-15

THIRTY: The revetment shall not contain any reinforcing steel, floatable, or objectionable material. Asphalt or other petroleum-based products may not be used as fill or erosion protection on the levee section or within the floodway.

THIRTY-ONE: The recommended minimum thickness of revetment, measured perpendicular to the bank or levee slope, is 18 inches below the usual water surface and 12 inches above the usual water surface.

THIRTY-TWO: All debris generated by this project shall be disposed of outside the regulated channel.

THIRTY-THREE: The work area shall be restored to the condition that existed prior to start of work.

THIRTY-FOUR: The permittee shall submit as-built drawings to the Department of Water Resources' Flood Project Inspection Section upon completion of the project.

THIRTY-FIVE: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

THIRTY-SIX: If the project result(s) in an adverse hydraulic impact, the permittee shall provide appropriate mitigation measures, to be approved by the Central Valley Flood Protection Board, prior to implementation of mitigation measures.

THIRTY-SEVEN: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

THIRTY-EIGHT: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

THIRTY-NINE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

FORTY: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or

project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

FORTY-ONE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

FORTY-TWO: The permittee shall comply with all conditions set forth in the letter from the U.S. Army Corps of Engineers dated May 17, 2011, which is attached to this permit as Exhibit A and is incorporated by reference.

REPLY TO
ATTENTION OFDEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Flood Protection and Navigation Section (18584)

MAY 17 2010

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

Dear Mr. Punia:

We have reviewed a permit application by California Department of Transportation (application number 18584). This project includes constructing new northbound and southbound Highway 99 bridges (60 feet wide by 88 feet long), each supported by fifteen 16-inch diameter concrete piles; constructing an east frontage road bridge (40 feet wide by 82 feet long) supported by ten 16 inch diameter concrete piles; and removing a portion of the existing Highway 99 bridge across the channel of Duck Slough. Note that in the operation and maintenance manual for "Channels and Levees of the Merced County Stream Group", at Highway 99, Duck Slough is the same waterway as Mariposa Creek. This project is located southeast of Merced on Highway 99, at 37.2503°N 120.4103°W NAD83, in Merced County, California.

The District Engineer has no objection to approval of this application by the Board from a flood control standpoint, subject to the following conditions:

- a. That no work shall be performed and no stockpiles of materials or equipment shall remain in the floodway during the flood season of November 1 to April 15, unless otherwise approved in writing from your Board.
- b. That in the event trees and brush are cleared, they shall be properly disposed of outside the limits of the project right-of-way.
- c. That backfill material for any excavations shall be placed in 4 to 6 inch layers and compacted to at least the same density of the adjacent undisturbed embankment.
- d. That the proposed bridges shall allow for at least the same channel flow capacity, vertical clearance, and waterway area as the existing bridges.
- e. That the soffit of the proposed bridges shall be no lower than the existing bridges.
- f. That the proposed work shall not interfere with the integrity or hydraulic capacity of the flood damage reduction project; easement access; or maintenance, inspection, and flood fighting procedures.

g. That in the event erosion occurs at the sites, adequate revetment shall be placed to repair the eroded areas.

h. That the proposed piers for the bridges shall be aligned parallel to the direction of flow.

i. That drainage for the proposed bridges shall not direct water toward the banks without ensuring adequate erosion protection.

j. That the proposed bank protection shall be placed uniformly and properly transitioned into the natural bank.

k. That the portion of the bridge to be removed shall be completely removed from the project right-of-way.

A Section 10 and/or Section 404 permit (2002-00316) has been issued for this work.

A copy of this letter is being furnished to Mr. Don Rasmussen, Chief, Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821.

Sincerely,



Michael D. Mahoney, P.E.
Chief, Construction-Operations Division

STATE OF CALIFORNIA
THE RESOURCES AGENCY
THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18600 BD

This Permit is issued to:

California Department of Transportation
2015 East Shields Avenue, Suite 100
Fresno, California 93726

To remove a portion of existing bridge (82-feet-wide by 76-feet-long); to construct two new bridges, north and southbound, each 60-feet-wide by 76-feet-long, each supported by 12 concrete piles, 16-inches-in-diameter, and a frontage road bridge, 40-feet-wide by 76-feet-long, supported by 9 concrete piles, 16-inches-in-diameter, across Mariposa Creek. The project is located south of the City of Merced along Highway 99 (Section 11, T8S, R14E, MDB&M, Mariposa Creek, Merced County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: DEC 13 2010

Jay S. Poppa
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection

Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18600 BD

THIRTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FOURTEEN: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

FIFTEEN: The permittee shall contact the Department of Water Resources by telephone, (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

SIXTEEN: The Central Valley Flood Protection Board and Department of Water Resources shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

SEVENTEEN: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

EIGHTEEN: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act

may be required.

NINETEEN: The permittee shall be responsible for repair of any damages to the Mariposa Creek and other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion

TWENTY-ONE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

TWENTY-TWO: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board. A professional engineer registered in the State of California shall certify that all work was inspected and performed in accordance with submitted drawings, specifications, and permit conditions.

TWENTY-THREE: Upon completion of the project, the permittee shall submit as-built drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Room 256, Sacramento, California 95821.

TWENTY-FOUR: There shall be no plantings within the project area under this permit, except that of native grasses, which may be required for slope protection.

TWENTY-FIVE: If the permitted encroachments result in an adverse hydraulic impact, the permittee shall provide appropriate mitigation measures, to be approved by the Central Valley Flood Protection Board, prior to implementation of mitigation measures.

TWENTY-SIX: All cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SEVEN: The new bridge shall have at least the same waterway area and vertical clearance as the replaced bridge.

TWENTY-EIGHT: The soffit of the bridge shall be no lower than that of the replaced bridge.

TWENTY-NINE: The abandoned or dismantled bridge shall be completely removed and disposed of outside the limits of the levee section and floodway.

THIRTY: Piers, bents, and abutments being dismantled shall be removed to at least 1 foot below the natural ground line and at least 3 feet below the bottom of the low-water channel.

THIRTY-ONE: The work area shall be restored to the condition that existed prior to start of work.

THIRTY-TWO: Trees, brush, sediment, and other debris shall be kept cleared from the bridge site and disposed of outside the floodway to maintain the design flow capacity and flowage area.

THIRTY-THREE: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

THIRTY-FOUR: The mitigation measures approved by the CEQA lead agency and the permittee are found in its Mitigation and Monitoring Reporting Program (MMRP) adopted by the CEQA lead agency. The permittee shall implement all such mitigation measures.

THIRTY-FIVE: The letter from the Department of the Army dated December 06, 2010 attached to this permit as Exhibit A is in reference to this project.



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ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
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1325 J Street
Sacramento, California 95814-2922

Flood Protection and Navigation Section (18600)

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

DEC 6 2010

Dear Mr. Punia:

We have reviewed a permit application by the California Department of Transportation (application number 18600). This project includes removing a portion of an existing bridge (82 feet wide by 76 feet long), constructing two new bridges, north and southbound, each 60 feet wide by 76 feet long, each supported by 12 concrete piles, 16 inch in diameter, and constructing a frontage road bridge, 40 feet wide by 76 feet long, supported by 9 concrete piles, 16 inches in diameter across a creek 330 feet south of Mariposa Creek. The proposed project is located south of the City of Merced along Highway 99, at 37.2502°N 120.4107°W NAD83, Merced County, California.

The District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

A Section 10 and/or Section 404 permit application (2002-00316) is in process for this work.

A copy of this letter is being furnished to Mr. Don Rasmussen, Chief, Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821.

Sincerely,

A handwritten signature in black ink, appearing to read "Meegan G. Nagy".

Meegan G. Nagy, P.E.
Chief, Flood Protection and Navigation Section