

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION REPORT FOR BRIDGE NO. 39-0139, DATED DECEMBER 10, 2009

FOUNDATION REPORT FOR BRIDGE NO. 39-0241, DATED APRIL 21, 2010

FOUNDATION REVIEW FOR BRIDGE NO. 39-0139, DATED APRIL 21, 2010

FOUNDATION REVIEW FOR BRIDGE NO. 39-0241, DATED APRIL 21, 2010

Memorandum

*Flex your power!
Be energy efficient!*

To: MR. ABBAS TOURZANI
Acting Branch Chief
Bridge Design Branch 7
Office of Bridge Design North
Division of Engineering Services

Attention: Keith Stillmunkes

Date: December 10, 2009

File: 10-MER-99-14.2
EA: 10-481001
15th Street UC
39-0139
(widen)

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

Subject: Foundation Report

Introduction

Per your request, we are providing final foundation recommendations for the bridge project referenced above. A median widening and side widenings of the original structure is proposed in 3 stages. This report is for use by the project design engineer, construction personnel, bidders and contractors.

Pertinent Plans and Data

The following resources were used in the assessment of the site conditions for these recommendations:

1. The general and foundation plans for the proposed bridge replacement dated May 18, 2009.
2. The as-built, 1958 Log of Test Borings for the original structure.
3. The pile driving records for the original structure.
4. A hydrologic report entitled: "Merced Groundwater Basin Groundwater Management Plan Update, Merced County, CA", AMEC Geomatrix, Inc., Project No. 13651.001, July 28, 2008, (AMEC).
5. Caltrans Seismic Hazard Map 1996.

Site Geology

The project site is underlain by alluvial deposits consisting of interbedded layers of medium dense/stiff to hard silt, silty sand and sand with minor lenses of clayey silt and clayey sand.

Groundwater

Based on the AMEC report referenced above, the region local to the bridge site has historically high, near surface groundwater conditions. Although the near surface groundwater has been declining since 1980, groundwater is expected to be a factor during construction, especially during the summer due to irrigation.

Seismicity

Based on the 1996 Caltrans Seismic Hazard Map, the controlling fault for the project alignment is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault. This fault possesses a Maximum Credible Earthquake magnitude of $M_w = 6.5$, and is located approximately 18 miles from the project site to the northeast. Based on the referenced map, the peak bedrock acceleration for the new bridge is estimated to be 0.2g. The soil profile is classified as type "D" per the Department's Seismic Design Criteria (SDC).

Based on the Log of Test Borings a final Caltrans Seismic Design Criteria (CSDC) Acceleration Response Spectrum (ARS) Curve corresponding to soil profile Type D is recommended for design. The recommended ARS Curve may be found in Figure B.9 of CSDC Version 1.4 of June 2006.

Liquefaction Potential

The site is not located in an area shown as potentially liquefiable on the State Seismic Hazard Map. Since the project location has a deep groundwater condition, the potential for liquefaction under the proposed bridge is considered very low. The potential for seismically induced settlement and lateral spreading is also considered very low.

Surface Fault Rupture Hazard

Surface fault rupture is defined as displacement that occurs along the surface trace of a fault. The site is not located within any Earthquake Fault Zone (EFZ) as defined by the California Department of Conservation (Special Publication 42, 1997). There are no known faults crossing beneath or extending directly toward the site. Therefore, the potential hazard due to ground rupture is considered to be very low.

Corrosivity

Composite soil samples were taken from bulk soil samples at the site. The test results indicate that the foundation materials are non-corrosive to construction materials or structural elements.

Scour

Scour is not an issue at this project site.

Geotechnical Recommendations

Based on the review of the general plan, foundation plan and site subsurface conditions, 6 foot diameter drilled shafts are the recommended pile type for the bent support locations. Class 90, Alternative “W” driven steel pipe piles are the optimum foundation type for the abutment supports. Tables 1 and 2 list the foundation recommendation parameters. Table 3 is the pile data table to be included in the project contract documents.

Table 1.
Foundation Recommendations for Abutments
 Class 90 , Alt. “W”, open-ended steel pipe.

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 Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1 (Stage 1)	Class 90 Alt. “W”	184.85	920	715	90	180	120.0 (a)	120.0	180
Abut 4 (Stage 1)	Class 90 Alt. “W”	180.85	920	715	90	180	120.0 (a)	120.0	180
Abut 1 (Stage 2 and 3)	Class 90 Alt. “W”	184.85	280	200	90	180	120.0 (a)	120.0	180
Abut 4 (Stage 2 and 3)	Class 90 Alt. “W”	180.85	280	200	90	180	120.0 (a)	120.0	180

Note: 1) Design tip elevations are controlled by (a) compression.

Table 2.
Foundation Recommendations for Bents
 6 foot diameter Cast-In-Drilled-Hole (CIDH)

Bent Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevation (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 (Stage1)	CIDH, 6' ϕ	164.0	930	1	1505	0	885	0	102.0 (a) 120.0 (b)	102.0	N/A
Bent 3 (Stage1)	CIDH, 6' ϕ	164.0	930	1	1505	0	885	0	102.0 (a) 120.0 (b)	102.0	N/A
Bent 2 (Stage 2 and 3)	CIDH, 6' ϕ	164.0	790	1	1005	0	735	0	116.0 (a) 124.0 (b)	116.0	N/A
Bent 3 (Stage 2 and 3)	CIDH, 6' ϕ	164.0	790	1	1005	0	735	0	116.0 (a) 124.0 (b)	116.0	N/A

Tip elevations controlled by (a) compression (Strength Limit), (b) compression (Extreme Limit)

Table 3. Pile Data Table
 Class 90 , Alt. "W", open-ended steel pipe (Abutments)
 6 foot diameter Cast-In-Drilled-Hole (CIDH) (Bents)

Support Location	Pile Type (ft)	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
		Compression	Tension			
Abut 1 (Stage 1, 2 and 3)	Class 90 Alt. "W"	180	N/A	120.0	120.0	180
Bent 2 (Stage 1)	CIDH, 6' ϕ	1505	0	102.0 (a)	102.0	N/A
Bent 3 (Stage 1)	CIDH, 6' ϕ	1505	0	102.0 (a)	102.0	N/A
Bent 2 (Stage 2 and 3)	CIDH, 6' ϕ	1005	0	116.0 (a)	116.0	N/A
Bent 3 (Stage 2 and 3)	CIDH, 6' ϕ	1005	0	116.0 (a)	116.0	N/A
Abut 4 (Stage 1, 2 and 3)	Class 90 Alt. "W"	180	N/A	120.0	120.0	180

Tip elevations controlled by (a) compression (Strength Limit)

Construction Considerations

A shallow groundwater condition exists at the site and is at a maximum during the summer months. Groundwater is expected to be encountered during CIDH pile shaft excavation.

The calculated geotechnical capacity of the CIDH piles at the Bent locations is based on skin friction only, assuming wet conditions and no bottom of shaft excavation cleanout.

The Class 90, Alternative "W" driven steel piles at both abutment locations are to be driven in predrilled holes through the existing embankment fills. The predrilling shall be in accordance with section 49-1.06 of the Standard Specifications and shall not extend below an elevation of 168 feet at both abutments.

If any conceptual changes are proposed during final project design, the Office of Geotechnical Design-North should review those changes to determine if the recommendations contained herein are still applicable.

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:
One 1958 as-built Log of Test Borings.

Data and information included in the Information Handout provided to the bidders and contractors are:
None.

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

Data and information available for inspection at the Transportation Laboratory are:
This report.

If you have any questions or comments, or need additional information please contact Christopher Koepke at (916) 227-1040.

Report by:



Christopher Koepke, C.E.G.
Engineering Geologist
Office of Geotechnical Design – North
Branch E

cc: Qiang Huang
R.E., Pending,
Structures OE (E-copy)
GDN File,
D10 PCE – Angela Ezekiel
D10 DME – Dave Dhillon

Memorandum

To: MR. ABBAS TOURZANI
Acting Branch Chief
Bridge Design Branch 7
Office of Bridge Design North
Division of Engineering Services

Attention: Keith Stillmunkes

Flex your power!
Be energy efficient!
Date: April 21, 2009²⁰¹⁰
File: 10-MER-99-14.1
EA: 10-481001
East Merced OH
39-0241
(replace 39-130 R/L)

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

Subject: Foundation Report

Introduction

Per your request, we are providing final foundation recommendations for the bridge project referenced above. A replacement of the original structure, number 39-0130, is proposed in 3 stages. This report is for use by the project design engineer, construction personnel, bidders and contractors.

Pertinent Plans and Data

The following resources were used in the assessment of the site conditions for these recommendations:

1. The general and foundation plans for the proposed bridge replacement dated May 18, 2009.
2. The as-built, 1958 Log of Test Borings for the original structure.
3. The pile driving records for the original structure.
4. A hydrologic report entitled: "Merced Groundwater Basin Groundwater Management Plan Update, Merced County, CA", AMEC Geomatrix, Inc., Project No. 13651.001, July 28, 2008, (AMEC).
5. Caltrans Seismic Hazard Map 1996.

Site Geology

The project site is underlain by alluvial deposits consisting of interbedded layers of medium dense to hard sand, sandy silt, silt, clayey silt, sandy clay and scattered lenses of fine grained sand. These deposits contain thin scattered lenses of gravelly sand.

Groundwater

Based on the AMEC report referenced above, the region local to the bridge site has historically high, near surface groundwater conditions. Although the near surface groundwater has been declining since 1980, groundwater is expected to be a factor during construction, especially during the summer due to local irrigation.

Seismicity

Based on the 1996 Caltrans Seismic Hazard Map, the controlling fault for the project alignment is the Prairie Creek-Spenceville-Dentman (PSD, normal) fault. This fault possesses a Maximum Credible Earthquake magnitude of $M_w = 6.5$, and is located approximately 18 miles from the project site to the northeast. Based on the referenced map, the peak bedrock acceleration for the new bridge is estimated to be 0.2g. The soil profile is classified as type "D" per the Department's Seismic Design Criteria (SDC).

Based on the Log of Test Borings a final Caltrans Seismic Design Criteria (CSDC) Acceleration Response Spectrum (ARS) Curve corresponding to soil profile Type D is recommended for design. The recommended ARS Curve may be found in Figure B.9 of CSDC Version 1.4 of June 2006.

Liquefaction Potential

The site is not located in an area shown as potentially liquefiable on the State Seismic Hazard Map. The potential for liquefaction under the proposed bridge is considered very low. The potential for seismically induced settlement and lateral spreading is also considered very low.

Surface Fault Rupture Hazard

Surface fault rupture is defined as displacement that occurs along the surface trace of a fault. The site is not located within any Earthquake Fault Zone (EFZ) as defined by the California Department of Conservation (Special Publication 42, 1997). There are no known faults crossing beneath or extending directly toward the site. Therefore, the potential hazard due to ground rupture is considered to be very low.

Corrosivity

Composite soil samples were taken from bulk soil samples at the site. The test results indicate that the foundation materials are non-corrosive to construction materials or structural elements.

Scour

Scour is not an issue at this project site.

Geotechnical Recommendations

Based on the review of the general plan, foundation plan and site subsurface conditions, Class 90, Alternative “W” driven steel pipe piles are the optimum foundation type for the abutment locations and 6 feet diameter Cast-In-Drilled-Hole shafts are the recommended foundation type for the bent locations. Tables 1 and 2 list the foundation recommendation parameters. Table 3 is the pile data table to be included in the project contract documents.

Table 1.
Foundation Recommendations for Abutments
 Class 90 , Alt. “W”, open-ended steel pipe.

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 Elevation (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent	Compression				
Abut 1 (Stage 1)	Class 90 Alt. “W”	164.42	3980	3700	90	180	115.0 (a)	115.0	180
Abut 5 (Stage 1)	Class 90 Alt. “W”	183.92	2210	1930	90	180	115.0 (a)	115.0	180
Abut 1 (Stage 2)	Class 90 Alt. “W”	164.42	5700	5410	90	180	115.0 (a)	115.0	180
Abut 5 (Stage 2)	Class 90 Alt. “W”	183.92	2970	2680	90	180	115.0 (a)	115.0	180
Abut 1 (Stage 3)	Class 90 Alt. “W”	164.42	7110	6730	90	180	115.0 (a)	115.0	180
Abut 5 (Stage 3)	Class 90 Alt. “W”	183.92	3120	2830	90	180	115.0 (a)	115.0	180

Note: 1) Design tip elevations are controlled by (a) Standard Class pile design loading .

Table 2.
Foundation Recommendations for Bents
 6 foot diameter Cast-In-Drilled-Hole (CIDH)

Bent Foundation Design Recommendations											
Support Location	Pile Type	Cut-off Elevation (ft)	Service Limit State I Load (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevation (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 (Stage1)	CIDH, 6' ϕ	165	1510	1	2400	0	2290	0	92.2 (a) 116.4 (b)	92.2	N/A
Bent 3 (Stage1)	CIDH, 6' ϕ	165	1540	1	2450	0	2320	0	90.7 (a) 115.8 (b)	90.7	N/A
Bent 4 (Stage1)	CIDH, 6' ϕ	165	1430	1	2300	0	2210	0	95.3 (a) 118.1 (b)	95.3	N/A
Bent 2 (Stage2)	CIDH, 6' ϕ	165	1250	1	1900	0	2090	0	107.4 (a) 120.6 (b)	107.4	N/A
Bent 3 (Stage 2)	CIDH, 6' ϕ	165	1340	1	2020	0	2190	0	103.8 (a) 118.5 (b)	103.8	N/A
Bent 4 (Stage 2)	CIDH, 6' ϕ	165	1260	1	1920	0	2120	0	106.8 (a) 120.0 (b)	106.8	N/A
Bent 2 (Stage 3)	CIDH, 6' ϕ	165	1330	1	2000	0	2180	0	104.4 (a) 118.7 (b)	104.4	N/A
Bent 3 (Stage 3)	CIDH, 6' ϕ	165	1360	1	2040	0	2210	0	103.2 (a) 118.1 (b)	103.2	N/A
Bent 4 (Stage 3)	CIDH, 6' ϕ	165	1260	1	1920	0	2120	0	106.8 (a) 120.0 (b)	106.8	N/A

Tip elevations controlled by (a) compression (Strength Limit), (b) compression (Extreme Limit)

Table 3. Pile Data Table
 Class 90 , Alt. "W", open-ended steel pipe.

Support Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
		Compression	Tension			
Abut 1 (Stages 1, 2, 3)	Class 90 Alt. "W"	180	N/A	115.0 (a)	115.0	180
Bent 2 (Stage 1)	CIDH, 6' ϕ	2400	0	92.2 (b)	92.2	N/A
Bent 3 (Stage 1)	CIDH, 6' ϕ	2450	0	90.7 (b)	90.7	N/A
Bent 4 (Stage 1)	CIDH, 6' ϕ	2300	0	95.3 (b)	95.3	N/A
Bent 2 (Stage 2)	CIDH, 6' ϕ	1900	0	107.4 (b)	107.4	N/A
Bent 3 (Stage 2)	CIDH, 6' ϕ	2020	0	103.8 (b)	103.8	N/A
Bent 4 (Stage 2)	CIDH, 6' ϕ	1920	0	106.8 (b)	106.8	N/A
Bent 2 (Stage 3)	CIDH, 6' ϕ	2000	0	104.4 (b)	104.4	N/A
Bent 3 (Stage 3)	CIDH, 6' ϕ	2040	0	103.2 (b)	103.2	N/A
Bent 4 (Stage 3)	CIDH, 6' ϕ	1920	0	106.8 (b)	106.8	N/A
Abut 5 (Stages 1, 2, 3)	Class 90 Alt. "W"	180	N/A	115.0 (a)	115.0	180

Note: Tip elevations controlled by (a) Standard Class pile design loading
 (b) compression (Strength Limit)

Construction Considerations

A shallow groundwater condition exists at the site and is at a maximum during the summer months. Groundwater is expected to be encountered during CIDH pile shaft excavation.

The calculated geotechnical capacity of the CIDH piles at the Bent locations is based on skin friction only, assuming wet conditions and no bottom of shaft excavation cleanout.

The Class 90, Alternative "W" driven steel piles at both abutment locations are to be driven in predrilled holes through the existing embankment fills. The predrilling shall be in accordance with section 49-1.06 of the Standard Specifications and shall not extend below an elevation of 168 feet at both abutments.

If any conceptual changes are proposed during final project design, the Office of Geotechnical Design-North should review those changes to determine if the recommendations contained herein are still applicable.

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.

"Caltrans improves mobility across California"

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:

One 1958 as-built Log of Test Borings.

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

None.

Data and information available for inspection at the District Office:

None.

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

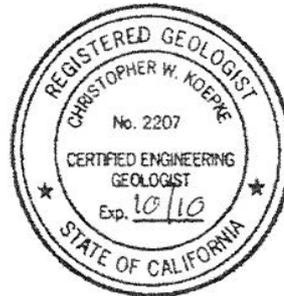
This report.

If you have any questions or comments, or need additional information please contact Christopher Koepke at (916) 227-1040.

Report by:



Christopher Koepke, C.E.G.
Engineering Geologist
Office of Geotechnical Design – North
Branch E



cc: Qiang Huang, R.E., Pending, Structures OE (E-copy), GDN File, D10 PCE - Angela Ezekiel, D10 DME - Dave Dhillon

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES GEOTECHNICAL SERVICES

Date: 4/21/10

15th St. UC
Structure Name

10 - Mar - 99 - 14.2
District County Route km Post

10-481001 39-0139
E.A. Number Structure Number

Dated: 12/10/09

R. Price (GS)

Foundation Plan Dated: 2/24/10

- To: **Structure Design**
1. Design
 2. R.E. Pending File
 3. Specifications & Estimates
 4. File
- Geotechnical Services**
1. GD - North ; South ; West
 2. GS File Room

District Project Development District Project Engineer

Foundation Report By: C. Koepke

Reviewed By: K. Stillmunkes (SD)

General Plan Dated: 2/24/10

No changes. The following changes are necessary.

FOUNDATION CHECKLIST

<p>Pile Types and Design Loads</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pile Lengths <input checked="" type="checkbox"/> Predrilling <input checked="" type="checkbox"/> Pile Load Test <input checked="" type="checkbox"/> Substitution of H Piles For Concrete Piles <p style="text-align: right;"> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Footing Elevations, Design Loads, and Locations <input checked="" type="checkbox"/> Seismic Data <input checked="" type="checkbox"/> Location of Adjacent Structures and Utilities <input checked="" type="checkbox"/> Stability of Cuts or Fills <input checked="" type="checkbox"/> Fill Time Delay 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Effect of Fills on Abutments and Bents <input checked="" type="checkbox"/> Fill Surcharge <input checked="" type="checkbox"/> Approach Paving Slabs <input checked="" type="checkbox"/> Scour <input checked="" type="checkbox"/> Ground Water <input checked="" type="checkbox"/> Tremie Seals/Type D Excavation
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[Signature] 7
Structure Design Bridge Design Branch No.

[Signature]
Geotechnical Services

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES GEOTECHNICAL SERVICES

To: **Structure Design**

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

Date: 4/21/10

East Merced OH
Structure Name

10-Mer-089-14.1
District County Route km Post

Geotechnical Services

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

District Project Development
District Project Engineer

10-481001 39-0241
E.A. Number Structure Number

Foundation Report By: C. Koepke

Dated: 4/21/09

Reviewed By: K. Stillmunkes (SD)

R. Price (GS)

General Plan Dated: 2/26/10

Foundation Plan Dated: 3/16/10

No changes. The following changes are necessary.

FOUNDATION CHECKLIST

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

[Signature] 7
Structure Design Bridge Design Branch No.

[Signature]
Geotechnical Services