INFORMATION HANDOUT

MATERIALS INFORMATION

1. Final Foundation Recommendations:
   A. Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076 dated 7/27/06.
   B. Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 7/27/06.
   C. Western Avenue Undercrossing, Bridge No. 53-1079 dated 7/27/06.
   D. Allen Avenue Undercrossing, Bridge No. 53-1081 dated 7/27/06.
   E. Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 7/27/06.
   F. Providencia Avenue Overhead, Bridge No. 53-1085 dated 7/27/06.
   G. Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 7/27/06.

2. Foundation Recommendations:
   A. Los Angeles River Bridge, Bridge No. 53-1075 dated 4/21/08.
   B. Soundwall Nos. 437 and 440 Spanning Extended Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076 dated 4/09/08.

3. Geotechnical Design Report for Retaining Wall No. 466, Bridge No. 53E0138 dated 7/30/07.

4. Addendum to Final Foundation Recommendations:
   A. Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 10/29/08.
   B. Western Avenue Undercrossing, Bridge No. 53-1079 dated 11/22/07.
   C. Allen Avenue Undercrossing, Bridge No. 53-1081 dated 10/29/08
   D. Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 11/20/07.
   E. Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 10/29/08.

5. Revised Final Foundation Design Recommendations - No. 1 for Providencia Avenue Overhead, Bridge No. 53-1085 dated 10/29/08.

6. Updates to the Revised Final Foundation Recommendations, dated November 20, 2007:
   A. Western Avenue Undercrossing, Bridge No. 53-1079 dated 10/29/08.
   B. Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 10/29/08.
   C. Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 10/29/08.

7. Revised Pile Tip Recommendations Due to Projected Elevated Groundwater for Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 12/22/08.

8. Revision to Revised Pile Tip Recommendations Due to Projected Elevated Groundwater for Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 01/07/09.

9. Revised Pile Tip Recommendations Due to Projected Elevated Ground Water for Providencia Avenue Overhead, Bridge No. 53-1085 dated 1/21/09.

10. Revised Geotechnical Design Report for Retaining Wall No. 466, Bridge No. 53E0138 dated 8/19/08.

11. Addendum to Foundation Design Recommendations-MSE Walls for MSE Walls A, B, C, D, & E, Bridge No. 53E0127 & 53E0128 dated 10/27/08.

12. Global Slope Stability Analysis for MSE Walls Nos. C & E, Bridge No. 53E0128 dated 11/20/08.

13. Final Hydraulic Report for Los Angeles River Bridge and Separation, Bridge No. 53-1075 dated 4/20/05.

14. Hydraulic Study at Providencia Avenue Overhead, Bridge No. 53-1085 dated 8/16/06.

15. Foundation Review
    A. Los Angeles River Bridge and Separation, Bridge No. 53-1075.
    B. Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076.
    C. Sonora Avenue Undercrossing, Bridge No. 53-1077.
    D. Western Avenue Undercrossing, Bridge No. 53-1079.
    E. Allen Avenue Undercrossing, Bridge No. 53-1081.
    F. Alameda Avenue Undercrossing, Bridge No. 53-1082.
    H. Providencia Avenue Overhead, Bridge No. 53-1085.
    I. Verdugo Avenue Undercrossing, Bridge No. 53-1086.

16. Vibration Monitoring and Pile Driving System Submittal for I5 Bridges, dated 4/14/09
17. Lead Site Investigation Reports (Portions).
18. Site Investigation on Private Properties (Portion).
19. California Regional Water Quality Control Board, Section 401 Water Quality Certification
20. California Department of Fish and Game, Streambed Alteration Agreement.
21. Metrolink Work Window Chart.

ROUTE: 07-LA-5-42.8/47.3

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

FINAL FOUNDATION RECOMMENDATIONS

Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076 dated 7/27/06.
Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 7/27/06.
Western Avenue Undercrossing, Bridge No. 53-1079 dated 7/27/06.
Allen Avenue Undercrossing, Bridge No. 53-1081 dated 7/27/06.
Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 7/27/06.
Providencia Avenue Overhead, Bridge No. 53-1085 dated 7/27/06.
Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 7/27/06.

ROUTE: 07-LA-5 42.8/47.3

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-KP 44.34
07-121801
I-5 HOV Lane Widening Project
Hazel Street PUC (Extension)
Bridge No. 53-1076

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Recommendations

INTRODUCTION

This final foundation recommendation memorandum is provided in response to your request dated January 27, 2005 for the proposed widening of Route 5 (I-5) Hazel Street Pedestrian Under-crossing (PUC) located in the City of Glendale. According to the request, Hazel Street PUC is one of the 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The scope for this project includes left and right exterior widening, and lengthening of the existing PUC tunnel. The PUC was built in 1957 and the tunnel was lengthened in 1964 to accommodate the widening of Interstate 5.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 47 borings for the 13-bridge project, which commenced in July 2005 and was completed in November 2005. At the Hazel Street PUC, two shallow borings were drilled to a maximum depth of 4.6 meters below ground. In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation, the 1957 As-Built Plans, 1955 Foundation Review memo, and the 1964 Foundation Recommendation memo were reviewed.

GEOLOGY

The Hazel Street PUC tunnel, located in the eastern San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several streams that originated in the nearby Verdugo Mountains. The valley outlines an east trending sediment filled structural basin within the Transverse Ranges. Generally, the sediments within the basin consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine deposits.

Based on the recent borings (Haz05-1, and Haz05-2) which were drilled through the existing invert concrete slab, the geology under the PUC tunnel left bridge entrance consists of predominately medium dense silty sand to the maximum boring depth of 4.6 meters (elevation 140.3). The existing concrete slab measures 381 mm and underneath, there was approximately 76 mm of aggregate base rock. At the right bridge tunnel entrance, the geology consists of 2.1 meters (elevation 142.6 m) of loose to medium dense silt followed by 2.5 meters (elevation 140.1 m) of medium dense fine sand. The existing concrete slab measures 406 mm and underneath, there was approximately 50 mm of aggregate base rock. See the LOTB Attachment for detailed soil descriptions.

GROUNDWATER

Groundwater was not encountered during the previous or present investigations. The depth to groundwater at the PUC site base on extrapolation from measurements taken from the Sonora Avenue UC and Los Angeles River Bridge borings is about 11 meters below ground corresponding to elevation 134 meters.

SCOUR

The PUC tunnel does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from the samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design-West submitted the Final Seismic Design Recommendations to your Office in a memo dated June 23, 2006.

FOUNDATION RECOMMENDATIONS

According to the General Plan No. 1 and No. 2 (May 11, 2005), provided by Traci Holden, the proposed tunnel extension, as is the case with the existing tunnel will be supported on the invert slab. These plans also indicate the existing and proposed invert grade will vary sufficiently to produce potential drainage flowing from the center to the entrances of the tunnel.

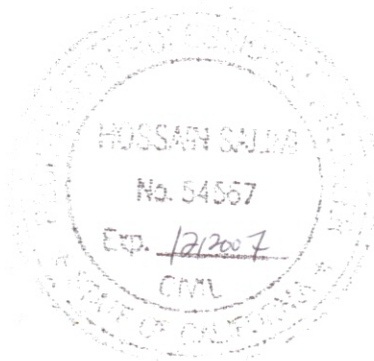
Based on our field investigation and engineering analysis, we recommend that a value of 201 kPa (2.0 tsf) allowable bearing capacity be used for the new tunnel invert slab section. A factor of safety of 3 was used to determine the allowable bearing capacity. Settlement under design load is anticipated to be less than 25 mm and differential settlement less than 12 mm.

To insure adequate performance of the foundations, the underlying soils should have a relative compaction of 95 percent. If the soils do not meet this criterion, then reworking in accordance to Standard Specifications Earthwork Section 19-3.06 shall be required. The depth and lateral extent of the soil rework shall be determined during construction by the Caltrans Construction Representative.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm



State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-KP 44.34
07-121801
I-5 HOV Lane Widening Project
Sonora Ave. UC (Widening)
Bridge No. 53-1077 L&R

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendation memorandum is provided in response to your request dated January 27, 2005 for the proposed widening of Route 5 (I-5) Sonora Avenue Under-crossing (UC) located in the City of Glendale. According to the request, Sonora Avenue UC is one of the 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The project scope for this bridge includes median widening and left and right exterior widening with left exterior that includes a sound wall. The existing structure was built in 1957.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combine foundation investigation that included 47 borings for the 13-bridge project, which commenced in July 2005 and was completed in November 2005. At Sonora Avenue UC, two new borings were drilled to a maximum depth of 26.4 m (elevation 119.2 m). In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation, 1964 supplemental investigation, and 1965-67, as well as 1981-82 As-Built Plans and notes were reviewed.

GEOLOGY

The bridge site, located at the eastern end of the San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several intermittent streams that flow out of the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep basin filled with sedimentary deposits that extend to depths greater than 500 meters. These deposits consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine sediments.

Based on the latest LOTBs (SON05-1 and SON05-2), the Abutments 1 and 2 (left and right bridges) are underlain by approximately 7.2 meters (Elevation 138.5 m) of loose silty sand, and clayey sandy alluvial deposits. Underneath, these deposits to a depth of about 10.7 meters (Elevation 135 m), become predominantly medium dense poorly graded sand and silty sand interbeded with dense clayey sand and stiff clay. Below that and to the maximum boring depth (Elevation 119.3 m) dense to very dense silty sand, clayey sand, and sand were encountered. The detailed soil descriptions are presented in the LOTB attachments.

GROUNDWATER

The groundwater depth will typically fluctuate with season and may correlate with local topography. Groundwater at the latest borings was measured at elevation of approximately 131.2 meters.

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from the samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design-West submitted the Final Seismic Design Recommendation in a memo submitted to your Office on January 9, 2006.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the General Plan (May 11, 2005), the foundation loads provided by Traci Holden on December 16, 2005 via e-mail, and observed subsurface soil conditions. Class 400 Alt. "W" piles are recommended. Cast-in-Drilled-Hole piles are not recommended because the soils underlying the site are predominantly granular, and caving during drilling may occur. Displacement type driven pre-cast concrete piles are also not recommended due to the potential for excessive vibration transmitted to the existing bridge.

Pile foundations support the existing abutments. These abutment foundations extend continuously from the left exterior through the median gap to the right exterior. The existing piles are Raymond Step Taper piles, with a diameter of 283 mm (11 1/8") at the tip and 394 mm (15 ½") at the butt. Based on review of the bridge As-builts that included pile data, the existing piles are not considered adequate to support the median widening at the abutments. Therefore, new piles will be required to support the proposed median abutments. The pile specifications are presented in Table 1.

Calculations for pile tip elevations utilized the Federal Highway Administration's Manual on Design and Construction and Driven pile software program (U.S. Department of Transportation, 1998).

Table 1
Pile Specifications

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	Class 400, Alt "W"	350	700	0	144.4	133.5	**133.5**
Abutment 2	Class 400, Alt "W"	350	700	0	144.4	133.5	**133.5**

Notes: Pile tip elevations are controlled by Compression.

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design-West shall be contacted before employing any assistance in installation techniques or cutting off of files.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of the piles.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-KP 44.82
07-121801
I-5 HOV Lane Widening Project
Western Ave UC (Widening)
Bridge No. 53- 1079 R/L

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendation memorandum is provided in response to your request (January 27, 2005) for the proposed widening of Route 5 (I-5) Western Avenue Under-crossing (UC) located in the City of Glendale. According to the request, Western Avenue UC is one of 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The project scope for this bridge includes median barrier upgrade, gap closures between the northbound and southbound bridges and between the north and southbound collector roads. The existing structure was built in 1956.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 47 borings for the 13-bridge project, which commenced in July 2005, and was completed in November 2005. At Western Avenue UC, two borings were drilled to a maximum depth of 23.3 meters (Elevation 126.0 m). In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation, and the 1956 As Built Plans were also reviewed.

GEOLOGY

The bridge site, located at the eastern end of the San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several streams that originated in the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep basin filled with sedimentary deposits, near the valley center and extending to depths greater than 500 meters. These deposits consist of unconsolidated poorly stratified flood plain, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine deposits.

Based on the LOTBs, the left bridge is underlain by approximately 5 meters (Elevation 144 m) of loose to medium dense silty sand followed by 9 meters (Elevation 134.5 m) of interbeded stiff sandy clay and medium dense sand, and clayey sand. Below that and to the depth of about 23 meters (Elevation 126 m), these deposits become predominately dense to very dense silty sand. Soil deposits under the right bridge consist of loose to medium dense silty sand and sand with silt to a depth of 5.5 meters (Elevation 144 m +/-) followed by 3 meters of firm silty clay and stiff sandy clay (Elevation about 141 m). Below that and to elevation of approximately 130 m, dense clayey sand, silty sand, and sand was encountered. These deposits become predominately very dense silty sand and sand with gravel with the increased depth. The detailed soil descriptions are presented in the LOTBs Attachment.

GROUNDWATER

The groundwater depth will typically fluctuate with season and may correlate with local topography. Groundwater was initially measured approximately at Elevation 131 meters (Boring WES05-1) and at Elevation 129.6 meters (Boring WES05-2).

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design – West submitted the Final Seismic Design Recommendations to you in a memo dated June 15, 2006.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the General Plan (May 9, 2005), the foundation information and loads provided by Traci Holden on October 21, 2005 via e-mail, and observed subsurface soil conditions. Class 625 Alt. "W" piles (Abutments) and Class 400 Alt. "W" piles (Bent 2) are recommended. Cast-in-Drilled-Hole piles are not being considered because the soils underlying the site are predominantly granular and caving during drilling may occur. Displacement type pre-cast concrete driven piles are also not recommended because of the potential for excessive vibration transmitted to the existing bridge. The pile specifications including pile tip elevations are presented in Table 1.

The existing bridge abutments are supported by a pile foundation. The abutments' foundation extends continuously from the left exterior through the median gaps to the right exterior. The existing piles are Raymond step taper piles, with diameter of 283 mm (11 1/8") at tip and 394 mm (15 ½") at butt. Based on review of the bridge As-builts and pile driving records, the existing piles are not considered adequate to support the abutment sections proposed for the median widening. Therefore, new piles will be required to support these abutments. The pile specifications are presented in Table 1.

Calculations for pile tip elevations utilized the Federal Highway Administration's Manual on Design and construction and Driven pile software program (U.S. Department of Transportation, 1998).

Superseded see 11/22/07 report

Table 1
Pile Specifications

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	Class 625, Alt "W"	450	900	0	147.9	133.9 (a)	**133.9**
Bent 2	Class 400, Alt "W"	N.A.	750	200	149.9	134.3 (a) 142.6 (b)	**134.3**
Abutment 3	Class 625, Alt "W"	450	900	0	148.04	133.9 (a)	**133.9**

Notes: Pile tip elevations are controlled by: (a) Compression (b) Tension

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing bridge, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, Office of Geotechnical Design West shall be contacted before employing any assistance in installation techniques or cutting off of piles.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of piles.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, Wbertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, TranslabFile, Route File, Daily File

WBertucci/HSalimi/mm

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-KP 45.28
07-121801
I-5 HOV Lane Widening
Allen Ave. UC (Widening)
Bridge No. 53-1081 L&R

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendation memorandum is provided in response to your request dated January 27, 2005 for the proposed widening of Route 5 (I-5) Allen Avenue Under-crossing (UC) located in the City of Glendale. According to the request, Allen Avenue UC is one of the 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The project scope of work includes Median barrier upgrade and Right Exterior widening. The existing structure was built in 1956.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 47 mud rotary and auger borings for the 13-bridge project which commenced in July 2005, and was completed in November 2005. At Allen Avenue UC, one new boring was drilled to a maximum depth of 18.8 meters (Elevation 134.8 m). In addition, Caltrans 1955 Foundation Investigation Report, Caltrans 1956 As-Built Plans, Caltrans 1964 Foundation (Widening) Investigation Report, and CH2MHILL 2002 final Bridge/Sound Wall Foundation Report were reviewed.

GEOLOGY

The bridge site, located at the eastern end of the San Fernando Valley is situated on a relatively gentle west sloping alluvial fan. This feature was formed from the coalescing deposition of several intermittent streams that flow out of the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep sedimentary basin with deposits extending to depths greater than 500 meters. These deposits consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine sediments.

Based on the CH2MHILL borings, the embankment fills behind the existing abutments are approximately 6 meter thick and consist of medium dense to dense silty sand with gravel. Underneath Abutment 1 (Caltrans and CH2MHILL borings) and to approximate elevation 144 meters, the native soils consist mainly of medium dense silt, sandy silt, and silty sand. Below to the exploratory depth of 21.9 meters (elevation 136.5 m), these soils become predominately very dense and include gravel between elevation 140 and 137 meters. Native soils underlying Abutment 2 (Caltrans and CH2MHILL borings) consist of predominately medium dense silty sand, sandy, and sandy lean clay. Beneath to the exploration depth of 18.8 meters (elevation 134.8 m), the alluvial soil consist of predominately medium dense to dense silty sand interbeded with scattered layers of stiff to hard silt and sandy clay. The detailed soil descriptions are presented in the Log of Test Borings (LOTB) Attachments.

GROUNDWATER

No groundwater was encountered during the present investigation or during the previous 1956 Caltrans and the 2004 CH2MHILL investigations. The estimated depth to groundwater based on extrapolation from measurements taken from borings at both Western Avenue UC and Alameda UC is approximately 21 meters below ground (elevation 123 m).

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design-West will provide the Final Seismic Design Recommendations.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the general Plan (May 9, 2005), the foundation loads provided by Traci Holden on September 9, 2005 via e-mail, and observed subsurface soil conditions. Open-ended Class 400 Alt. "W" piles or as an alternative 400 mm 400 kN Cast-in-Drilled-Hole (CIDH) piles are recommended. The west side of Allen Avenue is a residential zone. If it is determined that pile driving will produce unacceptable levels of noise, then CIDH pile shall be chosen. The pile specifications for the two pile types are presented in Tables 1 and 2.

Calculations for pile tip elevations utilized the Federal Highway Administration's Manual on Design and Construction and Driven pile software program (U.S. Department of Transportation, 1998) and Drilled Shafts: (Construction Methods and Design Procedures NTIS, 1999).

Superseded, see 10/29/08 report

Table 1
CIDH Pile Specifications

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	400 mm 400 kN CIDH	300	600	0	150.5	143.7	**143.7**
Abutment 2	400 mm 400 kN CIDH	300	600	0	151.0	143.7	**143.7**

Notes: 1) Pile tip elevations are controlled by Compression.
2) The Bridge Designer shall determine the design tip elevations controlled by lateral load demands.

Superseded, see 10/29/08 report

Table 2
Pipe Pile Specifications

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	360mm Class 400, Alt "W"	300	600	0	150.5	140.9	**140.9**
Abutment 2	360mm Class 400, Alt "W"	300	600	0	151.0	140.9	**140.9**

Notes: 1) Pile tip elevations shown are controlled by Compression.
2) The Bridge Designer shall determine the design tip elevations controlled by lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. If driven piles are chosen, the potential for excessive vibration transmitted to the bridge shall be monitored.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design-West shall be contacted before employing any assistance in installation techniques or cutting off of files.

4. The bottom of the CIDH piles shall be firm and free of loose material.

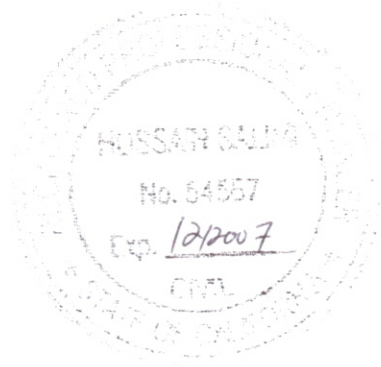
5. The drilling of the CIDH piles, the placement of the rebar cages, and pouring of concrete shall be done in a continuous operation.

6. If driven piles are chosen, the Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of the piles.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm



State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-PM 26.7/30.1
07-121801
I-5 HOV Lane Widening Project
Alameda Ave UC (Widening
Bridge No. 53-1082 R/L

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendations memorandum is provided in response to your request (January 27, 2005) for the proposed widening of Route 5(I-5) Alameda Avenue Under-crossing (UC) located in the City of Glendale. According to the request, Alameda Avenue UC is one of 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The project scope for this bridge includes median barrier upgrades, and three gap closures (median widening). The existing structure was built in 1956.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 47 borings for the 13-bridge project, which commenced in July 2005 and was completed in November 2005. At Alameda Avenue UC, two borings were drilled to a maximum depth of 27.9 meters (elevation 129.5). In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation and the 1956 As-built Plans including available pile driving records were also reviewed.

GEOLOGY

The bridge site, located at the eastern end of the San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several streams that originated in the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep basin filled with sedimentary deposits, which extends to depths greater than 500 meters. These materials consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine deposits.

Based on the LOTBs, the left bridge is underlain by approximately 21 meters (Elevation 148 m) of predominately soft silty clay, sandy lean clay interbeded with loose poorly graded sand, silty sand, and clayey sand. Below that and to the maximum depth explored (Elevations 129.5 m) the deposits are generally similar to above but the sands become medium dense to very dense and clays are typically stiff. Soil deposits under the right bridge consist of loose to medium dense silty sand and silt to a depth of 13 meters (Elevation 144.6). Below that and to the maximum depth explored (Elevation 129.8), the deposits consist of medium dense silt interbeded with dense to very dense fine sand with silt, sand, and silty sand. The detailed soil descriptions are presented in the LOTBs Attachment.

GROUNDWATER

The groundwater depth will typically fluctuate with season and may correlate with local topography. Groundwater was initially measured at Elevation 133.9 meters (Boring ALA05-1).

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design-West will provide the Final Seismic Design Recommendation.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the General Plan (May 9, 2005), the foundation information and loads provided by Traci Holden on October 21, 2005 via e-mail, and observed subsurface soil conditions. Class 625 Alt. "W" piles (Abutments) and Class 400 Alt. "W" piles (Bent) are recommended. Cast-in-Drilled-Hole piles are not being considered because the soils underlying the site are predominantly granular and caving during drilling may occur. Displacement type pre-cast concrete driven piles are also not recommended because of the potential for excessive vibration transmitted to the existing bridge. The pile specifications including pile tip elevations are presented in Table 1.

The existing bridge abutments are supported by a pile foundation. The foundation extends continuously from the left exterior through the median gaps to the right exterior. The piles are Raymond step taper piles, with diameter of 283 mm (11 1/8") at tip and 394 mm (15 ½") at butt. Based on review of the bridge As-Built Plans, pile driving records, and static analysis, the existing foundation is not considered adequate to support the abutments planned for the median widening. Therefore, new piles will be required to support these abutments. The pile specifications are presented in Table 1.

Calculations for pile tip elevations utilized the Federal Highway Administration's Manual on Design and Construction and Driven pile software program (U.S. Department of Transportation, 1998).

Superseded, see 11/20/07 report

Table 1
Pile Specifications

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	360 x 11.12 Class 625 kN, Alt "W"	450	900	0	156.1	144.3 (a)	**144.3**
Bent 2	360 x 9.53 Class 400 kN, Alt "W"	N.A.	750	200	155.8	144.8 (a) 150.2 (b)	**144.8**
Abutment 3	360 x 11.12 Class 625 kN, Alt "W"	450	900	0	156.1	144.3 (a)	**144.3**

Notes: Pile tip elevations are controlled by: (a) Compression (b) Tension

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing bridge, vibration monitoring during pile driving is recommended.

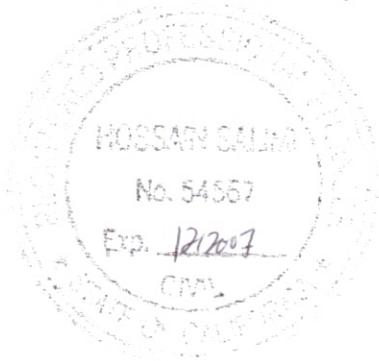
3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design-West shall be contacted before employing any assistance in installation techniques or cutting off of piles.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of piles.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm



State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9-3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-PM 26.7/30.1
07-121801
I-5 HOV Lane Widening Project
Providencia OH (Widening)
Bridge No. 53-1085 R/L

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendations memorandum is provided in response to your request (January 27, 2005) for the proposed widening of the Providencia Avenue Over-Head (OH) located in the City of Burbank. The bridge is situated along the western edge of the existing Providencia Pedestrian Over Crossing (Bridge No. 53-2982), which is scheduled for replacement. According to the General Plan, dated June 16, 2005, the proposed widening will take place at the left and right bridge as well as the middle reinforced concrete slab structure.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 15 borings for the Providencia Avenue OH, and Providencia Avenue Pedestrian Over Crossing between July and August 2005. The maximum depth of these borings was 27.9 m (91.5 ft). The Log of Test Boring (LOTB) from the original foundation investigation in 1957, and 1991 supplemental investigation were also reviewed.

GEOLOGY

The bridge site, located in the eastern San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several intermittent streams that originated in the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep basin filled with sedimentary deposits that extend to depths greater than 500 meters. These deposits consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth, these deposits become more consolidated and interbeded with marine sediments.

At the bridge site, the native deposits observed were predominately streambed and alluvial fan materials that consisted of cohesionless sand and silty sand interbeded with lesser amounts of floodplain materials that consisted of stiff cohesive clay, sandy clay and clayey sand. A general stratigraphy along the bridge alignment is described below.

Bents 2 through 5 are underlain primarily by medium dense sand, and silty sand interbeded with clay and clayey sand to elevation of 145 m. Below that, and to the maximum exploration depth (136.8 m) the soils become predominately dense sand, silty sand, and clayey sand. Bents 6 through 8 are underlain by primarily medium dense sand, silty sand, and clayey sand to an approximate elevation of 153 m. Below that, the soils are similar to above but become denser and include scattered thin lenses of stiff clay.

Abutments 1 and 9 are situated on existing embankment fill, which is planned to be enlarged to accommodate the I-5 highway widening. The existing fills consist of approximately 11 meters of inter-layered dense to very dense silty sand, clayey sand, and sand with gravel. Native soils immediately below the fill consist of medium dense clayey sand, silty sand, and sand. Detailed soil descriptions are presented in the LOTB Attachment.

GROUNDWATER

The groundwater depth will typically fluctuate with season and may correlate with local topography. At the bridge site, the groundwater elevation (initial readings) were at an average of 143.2 m, which is approximately 8 meters below the lowest proposed pile tip elevation. A piezometer was installed at boring PRO05-4A during the recent investigation and will be monitored to establish the variation in the groundwater level at the bridge site.

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design - West submitted the Final Seismic Design Recommendations in a report date May 19, 2006.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the previously noted General Plan, the foundation loads sent via e-mail on December 1, 2005, footing dimensions and cut off-elevations sent via e-mail on May 16, 2006, provided by Traci Holden, and observed subsurface conditions. Class 400 Alt. "W" driven pipe piles are recommended to support all Bents, except for Bent 7. Due to the proximity of Bent 7 to the Los Angeles Metrolink tracks, excessive vibration during pile driving may negatively affect the tracks and track bed. Therefore, Class 900 cast-in-Drill-Hole piles are proposed at this location. The pile specifications including pile tip elevations are presented in Tables 1 through 4.

Spread footings are recommended for Abutment 1 and 9. To insure adequate performance of the foundations, the underlying soils shall have a relative compaction of 95 percent at the abutments. If the soils do not meet this criterion, then reworking the material including moisture conditioning and compaction in accordance to Standard Specifications Earthwork Section 19-2.06 shall be required. Soil bearing capacity recommendations for Abutment 1 and 9 are shown in Table 5.

Superseded, See 10/29/08 report

Table 1
Driven Pile Date – Left Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	N/A	550	150	160.3	151.3 (1) 154.6 (2)	**151.3**
Bent 3	Class 400, Alt "W"	N/A	550	150	160.9	152.3 (1) 155.2 (2)	**152.3**
Bent 4	Class 400, Alt "W"	N/A	550	150	161.8	153.9 (1) 159.2 (2)	**153.9**
Bent 5	Class 400, Alt "W"	N/A	550	150	162.5	153.3 (1) 157.6 (2)	**153.3**
Bent 6	Class 400, Alt "W"	N/A	850	200	163.5	152.8 (1) 157.2 (2)	**152.8**
Bent 8	Class 400, Alt "W"	N/A	800	200	163.5	153.0 (1) 155.6 (2)	**153.0**

Note: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Superseded, See 10/29/08 report

Table 2
Pier Driven Pile Data – Middle Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	N/A	550	150	160.3	151.3 (1) 154.6 (2)	**151.3**
Bent 3	Class 400, Alt "W"	N/A	550	150	160.9	152.3 (1) 157.2 (2)	**152.3**
Bent 4	Class 400, Alt "W"	N/A	550	150	161.8	152.0 (1) 156.9 (2)	**152.0**
Bent 5	Class 400, Alt "W"	N/A	550	150	162.5	151.7 (1) 155.7 (2)	**151.7**
Bent 6	Class 400, Alt "W"	N/A	850	200	163.5	150.7 (1) 154.7 (2)	**150.7**
Bent 8	Class 400, Alt "W"	N/A	650	200	163.5	153.1 (1) 157.2 (2)	**153.1**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Superseded, See 10/29/08 report

Table 3
Pier Driven Pile Data – Right Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	N/A	550	150	160.3	150.3 (1) 155.7 (2)	**150.3**
Bent 3	Class 400, Alt "W"	N/A	550	150	160.9	150.3 (1) 158.6 (2)	**150.3**
Bent 4	Class 400, Alt "W"	N/A	550	150	161.8	151.3 (1) 159.2 (2)	**151.3**
Bent 5	Class 400, Alt "W"	N/A	550	150	162.5	151.0 (1) 155.7 (2)	**151.0**
Bent 6	Class 400, Alt "W"	N/A	850	200	163.5	150.7 (1) 154.4 (2)	**150.7**
Bent 8	Class 400, Alt "W"	N/A	800	200	163.5	153.0 (1) 155.6 (2)	**153.0**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Superseded, see 10/29/08 report

Table 4
Pier CIDH Pile Data – Pier 7

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 7 Left Bridge	610 mm CIDH	N/A	2400	500	163.5	151.4 (1) 156.5 (2)	**151.4**
Bent 7 Middle Bridge	610 mm CIDH	N/A	750	200	163.5	153.1 (1) 157.5 (2)	**153.1**
Bent7 Right Bridge	610 mm CIDH	N/A	750	200	163.5	151.4 (1) 156.5 (2)	**151.4**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension.

Table 5
Abutment Spread Footing Data Table

Support Location	Footing Size (m x m)	Bottom of Footing Elevation (m)	**Recommended Soil Bearing Pressures (kPa)**	
			WSD (1)	LFD (2)
			Gross Allowable Soil Bearing Pressure (q_{all})	Ultimate soil Bearing Pressure (q_{ult}')
Abut. 1 & 9		168.0	150	N/A

Notes: (1) WSD -Working Stress Design.
(2) LFD - Load Factor Design.

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing bridge, and the Metro Link tracks, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design-West shall be contacted before employing any assistance in installation techniques or cutting off of piles.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of piles.

5. Pile driving analyzer (PDA) testing at two bents shall be used to establish acceptance criteria. The bents selected shall be determined before the start of construction.

6. For CIDH piles (Bent 7), the bottom of the piles shall be firm and free of loose material. To maintain this condition during the drilling, placement of reinforcing steel cage and concrete placement shall be done in a continuous operation.

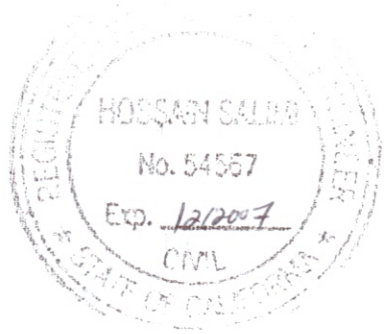
7. Abutment 9 will be constructed in part on new embankment fill. However, the underlying native soils are granular and any subsequent induced settlement is expected to be minimal and occur prior to the construction of the abutment.

8. The soils at footing grade shall be compacted to 95 percent minimum relative compaction in accordance with Standard Specifications Earthwork Section 19-2.06 to accommodate the spread footings at Abutments 1 and 9. Caltrans construction representative shall determine the depth and lateral extent of the soil rework.

If you have any questions or need additional information, please call William Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, Hsalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm



State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MR. YEN-HSI DENG, CHIEF
Bridge Design Branch 15
Office of Bridge Design South
Structure Design
Division of Engineering Services MS 9 3/3G

Date: July 27, 2006

Attention: Ms. Traci Holden

File: 07-LA-05-KP 46.56
07-121801
I-5 HOV Lane Widening Project
Verdugo Ave. UC (Widening)
Bridge No. 53-1086 L&R

From: WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOSSAIN SALIMI
Senior Materials and Research Engineer
Office of Geotechnical Design - West
Geotechnical Services
Division of Engineering Services

Subject: Final Foundation Design Recommendations

INTRODUCTION

This final foundation recommendations memorandum is provided in response to your request dated January 27, 2005 for the proposed widening of Route 5(I-5) Verdugo Avenue Under-crossing (UC) located in the City of Burbank. According to the request, Verdugo Avenue UC is one of 13 planned bridge widening and/or replacement projects along I-5 between KP 43.0 and KP 58.0. The project scope for this bridge includes median barrier upgrade and right exterior widening. The existing structure was completed in 1959 and widened/extended in 1992.

Caltrans Office of Geotechnical Design-West, and URS Corporation performed a combined foundation investigation that included 47 borings for the 13-bridge project, which commenced in July 2005, and was completed in November 2005. At Verdugo Avenue UC, three borings were drilled to a maximum depth of 23.3 meters (elevation 147.8 m). In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation, 1958 As-built plans that includes pile driving graphs, 1958 Vertical Pile Load Test Data, and a 1958 Foundation Report memo were reviewed.

GEOLOGY

The bridge site, located at the eastern end of the San Fernando Valley is situated on a relatively gentle west sloping alluvial fan, which was formed from the coalescing deposition of several streams that originated in the nearby Verdugo Mountains. Underlying the valley floor, there is a relatively deep basin filled with sedimentary deposits that extends to depths greater than 500 meters. These deposits consist of unconsolidated poorly stratified flood plains, streambed, and alluvial fan deposits. At depth these deposits become more consolidated and interbeded with marine sediments.

Based on the recent borings (Ver05-1, Ver05-2, and Ver05-3), the proposed Abutment 1 extension (Right Bridge) is underlain by approximately 6 meters (elevation 164.3 m) of interbeded loose silty to clayey sand and medium dense silty sand. Below and to the maximum boring depth (Elevation 150 m), the deposits become dense poorly graded sand and silty sand interbeded with stiff sandy lean clay and clayey sand. Abutment 2 (Right Bridge) is underlain by approximately 8 meters of interbeded medium dense silty sand, loose clayey sand, and soft sandy lean clay. Underneath and to the maximum boring depth (Elevation 147.7 m), these deposits become predominately dense silty sand and sand with silt interbeded with dense clayey sand. The detailed soil descriptions are presented in the LOTB Attachments.

GROUNDWATER

No groundwater was encountered during the latest investigation.

SCOUR

The bridge does not cross over a body of water. Therefore, scour potential is not considered a design issue.

CORROSIVITY

The site is considered non-corrosive based on soil corrosion tests conducted from samples taken during the field investigation.

SEISMICITY/LIQUEFACTION POTENTIAL

Hossain Salimi from the Office of Geotechnical Design-West will provide the Final Seismic Design Recommendations.

FOUNDATION RECOMMENDATIONS

The final foundation recommendations are based on the General Plan (May 7, 2005), the foundation loads provided by Traci Holden via e-mail, and observed subsurface soil conditions. Class 400 Alt. "W" piles are recommended. Cast-in-Drilled-Hole piles are not recommended because the soils underlying the site are predominantly granular and caving during drilling may occur. Displacement type driven pre-cast concrete piles are also not recommended due to the potential for excessive vibration transmitted to the existing bridge.

Calculations for pile tip elevations utilized the Federal Highway Administration's Manual on Design and Construction and Driven pile software program (U.S. Department of Transportation, 1998). The pile specifications are presented in Table 1.

Superseded, see 10/29/08 report

Table 1
Driven Pile Data

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abutment 1	Class 400, Alt "W"	350	700	0	168.2	157.8	**157.8**
Abutment 2	Class 400, Alt "W"	350	700	0	168.2	157.8	**157.8**

Notes: Pile tip elevations are controlled by Compression

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design-West shall be contacted before employing any assistance in installation techniques or cutting off of files.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of the piles.

If you have any questions or need additional information, please call Bill Bertucci at 510-622-8744 or Hossain Salimi at 916-227-7147.

c: TPokrywka, WBertucci, HSalimi, GWilcox, JStayton (4), R.E. Pending File, Route File, Translab File

WBertucci/HSalimi/mm

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

FOUNDATION RECOMMENDATIONS

Los Angeles River Bridge, Bridge No. 53-1075 dated 4/21/08.

Soundwall Nos. 437 and 440 Spanning Extended Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076 dated 4/09/08.

ROUTE: 07-LA-5 42.8/47.3

Memorandum

Flex your power!
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To: TRACI MENARD
Structures Design, MS#9-3/3G
Chief, Bridge Design Branch 15
Office of Bridge Design South 1

Date: April 21, 2008

File: 07-LA-005-KP 43.6 (PM 27.1)
07-121841
Los Angeles River Bridge (MedianWiden)
Bridge No. 53-1075R/L

Attention: Jose Higareda

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design - South 1, Branch D

Subject: Foundation Recommendations (As-Built Pile/Soil Resistances) for Los Angeles River Bridge

1.0 INTRODUCTION

In a memo dated March 17, 2008, Ms. Traci Menard of Structures Design requested Foundation Recommendations/Evaluation of As-Built Pile Foundations for the proposed median widening of the Los Angeles River Bridge, Br. No. 53-1075R/L, as part of the Interstate Route 5 widening project in Los Angeles County.

The Los Angeles River Bridge (both Right and Left bridges) was constructed in 1957 and was outside widened in 1967 to accommodate the widening of Interstate 5. Los Angeles River Bridge consists of two five span steel girder bridges supported on steel H-piles at both abutments and pier walls.

In 1998, the LA River Bridge was retrofitted, however, it appears that the retrofitting was limited to the bridge superstructure.

A median widening is proposed which will close the gap between the northbound and southbound bridges. In addition the southbound outside barrier will be upgraded and will also have a soundwall added on top. The existing abutments and pier walls provide continuous support across and between the Right and Left bridges and therefore only the superstructure will be widened. Minor additional load will be added to the bridge supports to accommodate the median widening and the added southbound soundwall on barrier. As-

Built pile/soil resistances have been calculated (this report) to determine whether existing foundations are adequate to support the new proposed loads. The As-Built Pile Data Table shows the new design loads provided by Structures Design (Menard, 2008).

URS Corporation under contract with Caltrans performed a foundation investigation for the Interstate 5-HOV widening project in December 2005. Two - 98 mm (3.85 in) diameter, rotary wash sample borings, LAR 05-1 and LAR 05-2, were drilled near piers 3 and 4 to a maximum depth of 22.56 m (74 ft). The other bridge supports were not considered in their investigation.

Messrs. William Bertucci and Colin Kark, of Caltrans Office of Geotechnical Design West (OGDW), conducted a later field investigation at each of the remaining supports not covered in the earlier consultant 2005 field study. Four – 114 mm diameter (4.5 in) rotary wash sample borings, LAR 06-3, 06-2, 06-1, and 06-4, were drilled at abutment 1, pier 2, pier 5, and abutment 6 respectively in September 2006.

Seismicity and Liquefaction Potential of the subject site have been previously addressed in the Final Seismic Design Recommendation, and Revised Seismic Design Recommendations memos prepared by Mr. Hossain Salimi of OGDW (2006a and 2006b). Preliminary Seismic Design Recommendations (which included Final ARS Curves and Data) were prepared (2005) by Dr. Bhaskar Joshi of the Office of Geotechnical Design South 1 (OGDS1).

The scour potential for the Los Angeles River Bridge is addressed in the Final Hydraulic Report for Los Angeles River Bridge (Widen) by Division of Structures dated April 20, 2005.

In addition, the As-Built Log of Test Borings (LOTB) from the September 1954 original bridge foundation investigation [including five - 76 mm (3 in) diameter rotary wash sample borings and five – 57 mm (2.25 in) diameter cone penetrometer soundings] and the September 1964 investigation for the bridge outside widenings [including two – 76 mm (3 in) diameter rotary wash sample borings and six – 57 mm (2.25 in) diameter cone penetrometer soundings] were reviewed for this report.

All Metric plans and recent boring elevations referenced within this report and shown on the Log of Test Boring are based on the NAVD88 vertical datum.

All English unit elevations shown on the As-Built Plans and LOTB are based on assumed NGVD29 datum. OGDS1 estimated the approximate necessary shift amount (add) for the 1957 and 1967 As-Built plan elevations to correlate with the current 2008 metric (NAVD88) plan elevations for this bridge structure. Required elevation adjustments and verification of foundation data are discussed within the As-Built Foundation section. An elevation shift (add) of 0.6 m (2 ft) has been assumed and applied to As-Built plans to convert to current metric elevations for the As-Built Foundations section of this report. This estimated shift amount will need verification from D07 Surveys or Structure Design.

2.0 GEOLOGY

The Rte. 5 Los Angeles River Bridge (Br. No. 53-1075R/L) median widening project is located in the cities of Los Angeles and Glendale. The subject bridge is located in the Transverse Range Province in the northwestern block of the Los Angeles Basin which includes the San Fernando Valley. The northwestern block site is bounded on the south by the Santa Monica and Raymond Hill faults, on the east and northeast by the San Gabriel Mountains, and on the west and north by the ranges included in the Ventura Basin portion of the transverse ranges. Glendale and this portion of Los Angeles is further bounded by the Verdugo Mountains to the northeast and the Santa Monica Mountains to the southwest. A thick Cenozoic sedimentary section underlies the San Fernando Valley (synform). The Los Angeles River flows first to the east around the north side of the Santa Monica Mountains than generally turns south in the gap between the Santa Monica and Verdugo Mountains.

At the Los Angeles River Bridge site, embankment fill ranges between approximately 6.8 to 9.5 m (22 to 31 ft) thick at Abutment 1 and 5.6 to 7.6 m (18 to 25 ft) thick at Abutment 6. Fill is underlain by Holocene gravel and sand deposited by the Los Angeles River (Qg unit of Dibblee, 1991). The above units are underlain by Holocene alluvium (Qa), possible undifferentiated older Pleistocene alluvium (Qoa), and probable Cretaceous quartz diorite or (qd) or Miocene formational material (Upper Topanga Formation – Cahuenga Conglomerate, Ttucg) at depth. The older Tertiary and Mesozoic rocks outcrop to the south in the Santa Monica Mountains (Dibblee, 1991). The deeper borings/penetration borings have likely terminated within older Pleistocene alluvium at the subject bridge site.

Embankment fill ranging from elevations +148.5 to +147.7 m down to elevations +139.0 to +142.0 m (9.5 to 5.6 m thick) consists of very loose to medium dense, silty sand and

poorly graded sand. Underlying Holocene gravel and sand deposited by the Los Angeles River and undifferentiated Holocene and possible older Quaternary alluvium can be divided into two units. The upper alluvial unit ranging from elevations +139.0 to +142.0 m down to +134.8 to +137.1 m (2.9 to 5.9 m thick) consists of very loose to medium dense, sand to silty sand with sporadic gravel. The lower alluvial unit, below approximate elevations +134.8 to +137.1 m down to +112.94 m (measured at least 21.0 m thick), generally consists of dense to very dense and some medium dense, sand with intermittent gravel interlensed with gravel with sporadic cobbles, silty sand, silty gravel and minor clayey sand with gravel. The deepest boring (LAR 05-2) extends to a maximum depth of 22.56 m (74.0 ft) down to approximate elevation +112.94 m. All borings have terminated within alluvium. The new Log of Test Borings (LOTB) and previous As-Built LOTB's should be studied for additional information and specific details.

2.1 Groundwater and Surface Water

Groundwater was encountered during the recent field investigation for the subject bridge within Borings LAR 06-3 (Abutment 1 – Left side) and LAR 06-1 (Pier 5 – Left side). Table No. 1 below shows the pertinent information and recent measurements.

Table No. 1 – Groundwater measurements for the LA River Bridge & Separation (Median Widen), Br. No. 53-1075R/L

Boring No.	Support Location	Top of Hole Elevation m (ft)	Depth to Water Below Surface m (ft)	Groundwater Elevation m (ft)
LAR 06-3 (piezo)	**Abutment 1 (Lt. side)**	**+140.10 (459.65)**	**8.77 (28.8)** meas. 04/04/08	**+131.33 (+430.9)** meas. 04/04/08
			8.93 (29.30) meas. 12/22/06	+131.17 (+430.35) meas. 12/22/06
LAR 06-1 (piezo)	**Pier 5 (Lt. side)**	**+142.60 (+467.85)**	**11.02 (36.2)** meas. 04/04/08	**+131.58 (+431.7)** meas. 04/04/08
			11.08 (36.35) meas. 02/22/08	+131.52 (+431.5) meas. 02/22/08
			11.14 (36.55) meas. 12/22/06	+131.46 (+431.3) meas. 12/22/06

Mr. John Pham (2007) of Structures Hydraulics also mentions Geotech measured groundwater at elevation +131.31 m (+430.11 ft) on December 21, 2006 or about 9 to 10 feet below the bottom of the channel.

The 1957 As-Built LOTB for the original bridge shows no groundwater was encountered at the time borings were made (September 1954) and notes that groundwater will correspond to the water level in the stream bed. The 1967 As-Built LOTB for the outside widening shows no groundwater was encountered during the September 1964 field investigation.

Comparing the above information shows that groundwater levels fluctuate between different locations, years, and seasons.

Surface water was observed flowing in the LA River channel just below approximate elevation +135 m on April 4, 2008. This water flow was just below the concreted channel bench immediately north of Pier 4.

After the above observations, OGDS1 used a **Design Groundwater Level of +136 m** for evaluating possible liquefaction and existing pile/soil resistances at Abutments 1 and 6 and Piers 2 and 5. At Piers 3 and 4, Design Groundwater Level was assumed at +135.0 m elevation based on field observation of the surface flow. It is felt this is a reasonable groundwater level for evaluating the above. Mr. John Pham (2007) of Structures Hydraulics mentions that most of the channel is concrete-lined, and once the rain stops, the water surface will quickly go down to normal depth since the velocity is fast and the channel is well drained. Mr. Pham also mentions the U.S. Army Corps. of Engineers maintains and controls the discharge in the channel to avoid flooding. OGDS1 agrees with this assessment and thus has a fairly low design groundwater level [approximately 4.42 m (14.5 ft) above the recently measured highest groundwater level shown above].

3.0 SEISMICITY, LIQUEFACTION POTENTIAL, AND LATERAL SPREADING

Site seismic and liquefaction potential evaluation are addressed in Revised Final Seismic Design Recommendations and Final Seismic Design Recommendations by OGDW (Mr. Hossain Salimi, December 5 and January 24, 2006). The ARS Curve and Data was provided by Mr. Bhaskar Joshi (2005) in the Preliminary Seismic Design

Recommendations and Recommended Design ARS Curve and Data for the LA River Bridge & Separation (Widen), Br. No. 53-1075R/L.

Messrs. Hossain Salimi (Senior Materials and Research Specialist) and Jose Higareda (Structures Design) reviewed the Revised Final Seismic Design Recommendations (Salimi, 2006) and summarized the issue of potential lateral spreading (Higareda, 2006, E-mail correspondence). The summary concluded that:

1) "The abutment locations (as mentioned in an earlier E-mail) are not considered to be prone to lateral spreading.
2) Given that the high water elevation of L.A. River could vary substantially throughout any given year it was assumed that the water table elevation could likewise vary. Thus, as a worst case scenario it was assumed that loose soil layers subject to liquefaction would be completely submerged during the occurrence of a seismic event.
3) It wasn't possible to establish the location of the water table during drilling of boreholes due to drilling method used." Observation wells (LAR 06-3 and LAR 06-1) were installed later with groundwater measurements (provided in section 2.1 of this report).

OGDS1 agrees with the low probability of lateral spreading at the abutments as measured groundwater was well below the bottom of the channel and the channel is lined with concrete helping protect the abutment locations.

OGDS1's evaluation used a Design Groundwater Elevation of +136 m. Above that elevation, OGDS1 considered liquefaction of very loose to medium dense soils, unlikely as the bridge site area would have to be flooded and soils saturated during a significant earthquake event.

4.0 SCOUR

The scour potential is addressed in the Final Hydraulic Report for Los Angeles River Bridge (Widen) by Division of Structures (Pallares and Myers, 2005). Based on the Hydraulic Report, the 100-year flood as well as the 50-year flood are higher than the channel capacity and will result in flooding the adjacent highways. Pallares and Myers (2005) mention that scour and channel degradation are not a problem due to the concrete and cobble stone linings and that the bridge was determined to not be scour critical in an earlier 2001 study by Caltrans Office of Specialty Investigations. The 2001 study found

that the "Bridge foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be above top of footing by assessment, by calculation, or by installation of properly designed countermeasures."

Based on the As-Built information, bottom of footing elevation for channel piers were set at Elevation +430 ft (OGDS1 assumes a shift in elevation correction of 2 ft to +432 ft or +131.7 m elevation as shown in Table No. 3 – As-Built Pile Data) or at well below channel invert elevations, whichever was lower.

OGDS1 did a quick reconnaissance (April 4, 2008) of the river channel site on the north side of Pier 4 (on the concreted rock/channel platform and measured about 1.1 m down to the channel bottom which was covered intermittently by large rip-rap boulders. The concreted rock/channel platform is shown at about +135.0 m elevation on the Foundation Plan. The solid channel bottom would be at approximate elevation +133.9 m elevation. The bottom of pile footings is estimated at +131.7 m elevation. This provides about 2.2 m (7.2 ft) solid cover over the Pier 4 and possibly Pier 3 bottom of pile footings. There is about 1 m (3 ft) thick of scattered rip-rap overlying this within the stream. Possibly 0.6 m (2 ft) of rip-rap with sand may underlie the scattered rip-rap above. Material below the rip-rap is granular and considered to be potentially scourable. In order to protect for possible scour, OGDS1 recommends that this be field inspected or considered and if the rip-rap cover is determined to be insufficient, than additional rip-rap cover be added to protect Piers 3 and 4 where existing piles are very short in average length (5.0 to 5.1 m, 16.2 to 16.5 ft).

5.0 CORROSION

Caltrans Sacramento Lab performed corrosion tests on the soil samples obtained during the subsurface investigation by OGDW (William Bertucci, 2006). The test results tabulated below were performed on November 2, 2006 and were transmitted to our office via email by Mr. Rudy Lopez, April 16, 2008. The corrosion test results indicate a non-corrosive environment at the subject bridge site.

Table No. 2: Corrosion Test Results

Sample Location	Sample Depth m	Minimum Resistivity ohm-cm	pH	Chloride Content ppm	Sulfate Content ppm
LA River Bridge Boring LAR 06-3	15.24 (50 ft)	2700	8.23	NA*	NA*
LA River Bridge Between Pier 5 & 6 Boring LAR 06-2	1.52-2.0 (5-6.5 ft)	5300	7.49	NA*	NA*
Corrosive Guidelines		<1000	**≤5.5**	**≥500**	**≥2000**

NA = not applicable

*It is the practice of Caltrans Corrosion Technology Section (with the exception of MSE Walls) if the minimum resistivity of the sample is greater than 1000 ohm-cm and the pH is greater than 5.5, the sample is considered to be noncorrosive and testing to determine sulfate and chloride is not performed. For structural elements, the California Department of Transportation considers a site to be corrosive if one or more of the following conditions exist for representative soil and/or water samples taken at the site: Chloride concentration ≥500 ppm, sulfate concentration ≥2000 ppm, or the pH is ≤5.5. Corrosion mitigation is required if one or more of the 3 conditions noted above exists where structural elements are involved (Caltrans Corrosion Guidelines, September 2003). Since resistivity serves only as an indicator parameter for the possible presence of soluble salts, it isn't included to define a corrosive area (distinguished by light face print above).

6.0 AS-BUILT FOUNDATION CAPACITIES/EVALUATION FOR MEDIAN WIDENING

The following recommendations for the Los Angeles River Bridge (Median Widen) are based on the General Plan Nos. 1 and 2 (Draft SPS&E, plotted May 18, 2007) and the Foundation Plan revised July 6, 2005. The pile information was provided to our office by Ms. Traci Menard of Structures Design via Emails dated March 18 and 31, 2008. Additional personal communications and Emails with Messrs. Traci Menard, Jose Higareda, and Andrew Rittenhouse (Structures Design) involving Hydraulic Studies and scour potential at the site, groundwater measurements, slope stability issues for embankments above the concrete-lined channel, and added loads and concepts for the median widening during March and April 2008 were instrumental for OGDS1's investigation/evaluation. The recent draft Log of Test Borings (revised May 30, 2007) and soils laboratory test results from the Office of Geotechnical Design–West field

investigation (William Bertucci, July 27, 2006) were utilized. Also, the As-Built Plans and LOTB's for the original left and right bridges (Contract No. 56-7VC28F, dated February 20, 1957) and outside widening (Contract No. 07-020844, dated September 19, 1967) were used.

According to C.J. Verner (Bridge Department Representative, June 6, 1967, Caltrans Memorandum) the existing steel H-piles (10BP42) were driven to 45 tons bearing (45 ton design load) with both Vulcan and MAX hammers. Piles were driven to average tip elevations ranging between +413 to +415 ft elevation (assumed NGVD29 datum) at all supports. The As-Built Log of Test Borings also show piles were driven to 60 tons ENR bearing.

Steel H-piles (10BP42), approximately 400 kN (45 ton) design load, are used to support the existing bridge as shown below. Soil resistance in axial nominal compression was calculated for both liquefiable and non-liquefiable cases with results shown in Table No. 3 below. The Driven Pile Program (Version 1.2) was used to determine pile/soil resistance including loss of soil resistance in potentially liquefiable layers (where present). Potentially liquefiable layers with elevations have been provided by Mr. Hossain Salimi (Revised Final Seismic Design Recommendations, December 5, 2006) for the site. Approximate Existing Grade/Finish Grade Elevation was obtained from recent metric Foundation Plans based on NAVD88 vertical datum. Approximate Bottom of Pile Footing and Average Pile Tip Elevations were obtained from the As-Built Plans based on assumed NGVD29 vertical datum. As-Built elevations were shifted by adding an assumed 0.61 m (2.0 ft) to adjust approximately to the current metric plans. In Table No. 3 below, Bottom of Pile Footing and Average Pile Tip Elevations reflect this shift or rise in elevation to adjust to the current metric plans.

Table No. 3: As-Built Pile Data for Los Angeles River Bridge, Br. No. 53-1075R/L

	Required Axial Design Loading	Anticipated Axial Nominal Resistance	**Calculated Axial Nominal Resistance**						
Support Location/ Type & Diameter	Compression kN (kips)	Compression kN (kips)	Compression kN (kips)		**Design Safety Factor**		Approx. Existing Grade/ Finish Grade Elevation m (ft)	Approx. Bottom of Pile Footing m (ft)	Average Pile Tip Elevation m (ft)
			Liquef	**Non-liq**	**Liquef**	**Non-liq**			
Abutment 1 Rt. & Lt. Bridges/	475 (104)	950 (208)	**1181 (265.5)**	**1238 (278.5)**	**2.48**	**2.60**	+140.0 (+459.3)	+138.2 (+453.5)	+127.0 (+416.7)
Pier 2 Rt. & Lt. Bridges/ 10BP42	500 (110)	1000 (220)	**1600 (359.8)**	**1733 (389.6)**	**3.20**	**3.46**	+141.25 (+463.4)	+138.4 (+454.0)	+126.5 (+415.0)
Pier 3 Rt.& Lt. Bridges/ 10BP42	450 (100)	900 (200)	**671 (151.0)**	**710 (159.7)**	**1.49**	**1.58**	+133.7 to +133.9 (+438.6 to +439.3)	+131.7 (+432.0)	+126.7 (+415.8)
Pier 4 Rt. & Lt. Bridges/ 10BP42	450 (96)	900 (192)	**628 (141.3)**	**653 (146.9)**	**1.40**	**1.45**	+133.8 to +134.1 (+439.0 to +440.0)	+131.7 (+432.0)	+126.6 (+415.5)
Pier 5 Rt. & Lt. Bridges/ 10BP42	425 (94)	850 (188)	**1496 (336.4)**	**1627 (365.8)**	**3.52**	**3.82**	+139.75 to +140.0 (+458.5 to +459.3)	+138.4 (+454.0)	+127.1 (+416.9)
Abutment 6 Rt. & Lt. Bridges/ 10BP42	475 (104)	950 (208)	**1631 (366.8)**	**1798 (404.3)**	**3.43**	**3.78**	+142.0 (+465.9)	+138.6 to +139.4 (+454.75 to +457.25)	+127.1 (+416.9)

Note: Axial Resistance in Compression is considered to control Design. Both Liquefiable and Non-liquefiable scenarios are shown. Lateral Capacities were not evaluated in this study.

Axial resistance in compression noted in the table above is based on combined skin friction and end bearing within alluvial soils below Bottom of Pile Footing/Pile Cap Elevation. At Piers 3 and 4, piles are much shorter in length (5.0 to 5.1 m, 16.2 to 16.5 ft) and are dominantly dependent on end bearing. At Piers 3 and 4 the safety factor is less than 2 as shown above. Design groundwater was assumed at +136.0 m elevation for Abutments 1 and 6 and Piers 2 and 5. At Piers 3 and 4, OGDS1 assumed top of flowing water at elevation +135.0 m as observed during field reconnaissance.

7.0 CONCLUSIONS

In conclusion:

1) Abutments for the LA River Bridge (Br. No. 53-1075R/L) are not considered prone to lateral spreading.
2) Design groundwater for liquefaction analysis and As-Built pile/soil resistances was considered to be at +136.0 m elevation for the bridge. At Piers 3 and 4 in the river channel, the top of the stream was estimated at approximate elevation +135 m and was used at these two piers.
3) OGDS1 feels that potential liquefaction effects will be minimal and the bridges will not collapse from foundation failure.
4) OGDS1 agrees with the Hydraulic Studies regarding scour as not being an issue, but feels that a field inspection and survey may be needed to determine the actual rip-rap cover that exists and the adequacy of the cover.
5) Abutments 1 and 6, and Piers 2 and 5 foundations all display an adequate factor of safety greater than 2.0 (above Axial Design Loading). Piers 3 and 4 show lower factors of safety ranging from 1.40 to 1.58 depending on whether the site experiences liquefaction or not.
6) Current Metric Contract Plans dealing with As-Built elevations (including As-Built LOTB sheets, General Plan and Foundation Plan information) should show the elevation shift (elevation add) and specify the datum from the As-Built Plans. The Current Metric Contract Plans will show the datum on which these plans are based also.

If you have any questions or comments, please call Joe Pratt at (213) 620-2313 or Shiva Karimi at (213) 620-2146.

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OGDS1 File - Sacramento (MS-5)
OGDS1 LA File

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Memorandum

Flex your power!
Be energy efficient!

To: TRACI MENARD
Structures Design, MS#9-3/3G
Chief, Bridge Design Branch 15
Office of Bridge Design South 1

Date: April 9, 2008

File: 07-LA-005-KP 44.2 (PM 27.4)
07-121841
Hazel Avenue PUC
Bridge No. 53-1076

Attention: Andrew Rittenhouse

Soundwall Nos. 437 and 440

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design - South 1, Branch D

Subject: Foundation Recommendations for Special Design Segments of Soundwall Nos. 437 and 440 Spanning Extended Hazel Avenue Pedestrian Undercrossing, Bridge No.53-1076

1.0 INTRODUCTION

In a memo dated March 17, 2008, Ms. Traci Menard of Structures Design requested Final Foundation Design Recommendations for the proposed special design segments of Soundwalls Nos. 437 and 440 spanning extended Hazel Avenue Pedestrian Undercrossing (PUC) Bridge No. 53-1076, as part of the Interstate Route 5 widening project in Los Angeles County.

The Hazel Avenue PUC was constructed in 1957 and the tunnel was extended in 1964 to accommodate the widening of Interstate 5. Hazel Avenue PUC is a reinforced concrete culvert supported on concrete invert slab. Additional attached retaining walls on both ends of the PUC are supported on spread footings over compacted fill.

The proposed improvements include construction of two special design segments of soundwalls on concrete barriers, spanning over the PUC, from SW 437 LOL Station 442+04.200 to Station 442+10.568 and SW 440 LOL Station 441+85.423 to Station 441+91.791 on southbound and northbound I-5, respectively. The proposed soundwall segments will each be supported on a beam spanning over the tunnel segments. The beams will be supported by two 760 mm (2.5 ft) diameter CIDH piles on both sides of the tunnel segments.

Mr. William Bertucci of the Office of Geotechnical Design–West (OGDW) and URS Corporation performed a combined foundation investigation for Hazel Street PUC (Extension) for the I-5 Widening Project and prepared a Final Foundation Recommendation dated July 27, 2006. Seismicity and Liquefaction Potential of the subject site were provided in the Final Seismic Design recommendation memo prepared by Hossain Salimi of Office of Geotechnical Design – West dated June 23, 2006.

Bhaskar Joshi of Office of Geotechnical Design South–1 performed a field investigation for several retaining walls along I-5 as a part of study for I-5 Widening Project in 2005. Retaining Wall Nos. 439 and 440 of Bhaskar Joshi's field investigation are located in the vicinity of the Hazel Avenue PUC.

In addition, the Log of Test Borings (LOTB) from the 1954 original foundation investigation, the 1957 As-Built Plans, 1955 Foundation Review memo, and the 1964 Foundation Recommendation memo were reviewed.

For information regarding geology, groundwater, scour, and corrosivity pertaining to the site refer to the Final Foundation Recommendation by the Office of Geotechnical Design – West (William Bertucci, July 27, 2006). Site seismic and liquefaction potential evaluation are addressed in Final Seismic Design Recommendations by Office of Geotechnical Design – West (Hossain Salimi, June 23, 2006).

2.0 FOUNDATION DESIGN RECOMMENDATIONS

The following recommendations are based on the General Plan (Draft SPS&E, plotted March 19, 2008) of the Hazel Street PUC (Modify) with the subject soundwalls, the Foundation Plan and the East and West Portal Details dated March 4, 2008. The pile information was provided to our office by Ms. Traci Menard of Structures Design via emails dated March 18 and 31, 2008. Additional personal communications/Emails during March and April 2008 verified slope geometry in the vicinity of the proposed piles.

The Log of Test Borings from Office of Geotechnical Design–West field investigation (William Bertucci, July 27, 2006) and Office of Geotechnical Design South–1 study (Bhaskar Joshi, August 8, 2007) were used for this report. The LOTB from the 1954 original foundation investigation was also reviewed.

The axial pile/soil resistancees for the proposed CIDH piles were performed using SHAFT for Windows, V5.0 by ENSOFT Inc. The lateral load-deformation response of single pile was analyzed utilizing the LPILE plus for Windows, V5.0 by ENSOFT Inc.

The results of axial and lateral pile analyses are presented in Table-1 Pile Data Table below:

Table No. 1: Pile Data Table

Location	Pile Type	Design Load	Nominal Resistance			Bottom of Footing Elev.	Design Tip Elevation	Specified Tip Elevation
			Comp.	Tension	Lateral			
Soundwall 437	760mm CIDH	N/A	**400 kN**	0	**150 kN**	148.045	142.545(1) 140.545(2)	140.545
Soundwall 440	760mm CIDH	N/A	**400 kN**	0	**150 kN**	149.035	143.535(1) 141.535(2)	141.535

Design tip elevations are controlled by (1) Compression, (2) lateral loads

A maximum bending moment of 383.5 kN-m (maximum shear force of 150 kN) and lateral pile head deflection of 7 mm were computed for Soundwall 440. A maximum bending moment of 340.8 kN-m (maximum shear force of 150 kN) and lateral pile head deflection of 5 mm were computed for Soundwall 437.

Please note that these calculations assume the finished grade slope is no steeper than 1V:1.5H adjacent to the CIDH piles.

3.0 CONSTRUCTION CONSIDERATIONS

1. Specified Pile Tip Elevation will be above the groundwater table, therefore no groundwater is anticipated during pile construction.

2. Moderate to heavy caving is anticipated during excavation of the pile borings in the granular fill and alluvium for CIDH pile construction.

3. The contractor shall clean out the bottom of the pile borings prior to placing the cage and the concrete.

4. Temporary casing and/or slurry methods may be required to stabilize the pile borings during construction of the CIDH piles.

5. Concrete placement for construction of the CIDH piling shall be completed as soon as possible within the same day that excavation of the drilled holes has been completed.

If you have any questions or comments, please call Joe Pratt at (213) 620-2313 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 04/09/08

Joseph S. Pratt

Joe Pratt, C.E.G. No. 2141
Engineering Geologist
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 04/09/08

REGISTERED PROFESSIONAL ENGINEER
SHIVA KARIMI
No. GE2651
Exp. 06/30/08
GEOTECHNICAL
STATE OF CALIFORNIA

Shiva Karimi, Ph.D., P.E., G.E.
Senior Transportation Engineer
Office of Geotechnical Design South 1
Branch D

REGISTERED GEOLOGIST
Joseph S. Pratt
No 2141
Exp. 5-31-09
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

cc: GS File – Sacramento (MS-5)
OGDS1 File - Sacramento (MS-5)
OGDS1 LA File

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

GEOTECHNICAL DESIGN REPORT

FOR

RETAINING WALL No. 466,
Bridge No. 53E0138, dated 7/30/07

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: CELINA AVILES-07
Senior Transportation Engineer
District Design-Section D

Attention: Munchi Mohsin

Date: July 30, 2007

File: 07-LA-05-KP43-58
07-121801
Retaining Wall No. 466FR for replacing Br#53-1632H, NB605/10 Separation, with new bridge, Br#53-3027H

Caltrans Metric

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Geotechnical Design Report for Retaining Wall No. 466

This is a supplemental to the Geotechnical Design Report for the project issued by this office on 11/16/2005. This supplemental report is issued to address the design and subsurface information of retaining wall No. 466 along the northeast side of the Verdugo Ave and Interstate 5 (I-5), in the city of Burbank.

The proposed wall lies in the east side of the I-5, at the toe of the slope extending from Verdugo Ave to Olive Ave exit. Maximum design height of the wall is 2.4m with a 1v:2h slope of up to 7.0m high above the wall. In a site visit on 07/30/2007, an existing wall along the right of way for a newly constructed hotel was observed. Retaining wall 466 is planned to be constructed partially or completely along the right of way.

A geotechnical site exploration was conducted on July 17, 2007. The purpose of this exploration was to obtain subsurface information of the site. One 96 mm diameter mud-rotary borehole was drilled at the toe of the slope, 39m right of station 465+70 to a depth of 12.5m. Standard Penetration Tests (SPT) was performed in this borehole at selected depths. Relatively disturbed soil samples were collected. No groundwater was encountered in any of the boreholes during drilling. The borehole revealed that the subsurface soil consisted of mainly medium dense to dense silty sand, with trace fine gravel. Furthermore, a soil sample was obtained at a depth of 1 to 4ft for corrosion potential following the guidelines of the Corrosion Technology Branch. Based on the results of the corrosion analysis, soils at the site are non-corrosive. The corrosion results are shown in the following table, Table 1.

Table 1-Corrosion Test Summary

Location	Sample Depth	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring B1	1 to 4ft	7.47	1700	N/A	N/A

Note: Caltrans currently defines a corrosive environment as an area where the soil has a minimum resistivity of less than 1000 ohm-cm, and either contains more than 500 ppm of chlorides, more than 2000 ppm of sulfates, or has a pH of 5.5 or less.

Based on the subsurface exploration, this office recommends two options for foundations of this retaining wall:

- A Type One Retaining Wall may be constructed along the proposed wall layout line. The subsurface soil of the site has a calculated allowable bearing capacity of 268kPa for a base footing size of 1.6m. A soil friction angle of 32 degrees and soil density of 18kN/m^3 was used in the calculation. The bearing capacity value exceeds allowable toe pressure of 155kPa in the standard plans, page B3-4 of 2004 Standard Plans.

- A Mechanically Stabilized Embankment (MSE) wall may be constructed some distance away from the right of way. No additional right of way is needed, if this option is selected. A request should be sent to DES Structure Design for design of the MSE wall.

The recommendations in this report are based on plan sheets provided by the District 7 Design Office-Section D. Any questions regarding the above recommendations should be directed to the attention of Vahid Khata-O-Khotan, (916) 227-7059 (CALNET 8-498-7059), or Deh-Jeng Jang, (916) 227-5722 (CALNET 8-498-5722).

Prepared by: Date:

Vahid Khata-O-Khotan, P.E. C66980
Transportation Engineer, Civil
Branch A

Cc: OGDS1 - Sacramento
OGDS1 – Los Angeles
GS - File Room
Deh-Jeng Jang
(OGDS-1)

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

ADDENDUM
to
FINAL FOUNDATION RECOMMENDATIONS

Sonora Avenue Undercrossing, Bridge No. 53-1077 dated 10/29/08.
Western Avenue Undercrossing, Bridge No. 53-1079 dated 11/22/07.
Allen Avenue Undercrossing, Bridge No. 53-1081 dated 10/29/08
Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 11/20/07.
Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 10/29/08.

ROUTE: 07-LA-5 42.8/47.3

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
(PM 26.7 – 36.0)
07-121841
Sonora Avenue UC
Bridge No. 53 - 1077

Subject: Addendum #3 to Final Foundation Recommendations dated July 27, 2006

At you request (Memorandum dated August 22, 2008) we have revised the Final Foundation Recommendations for the Sonora Avenue Under Crossing (UC) Bridge located in the City of Glendale referenced above. The Abutment 1 Layout (revision date August 8, 2008), Retaining Wall Details No. 1 (revision date August 8, 2008) and revised pile Type and loads you provided formed the basis for the addendum. A revised Pile Data Table is presented below. The subject addendum applies to Abutment No. 1 (Right Widening) only all other recommendations remain applicable. To provide continuity the other applicable foundations recommendations are also included herein.

Table 1 - Pile Data Table (Revised)

Support Location	(2)(3) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abut 1 & Ret Wall Left widen	Class 400 Alt. 'W'	400	800	400	144.25	132.0 (a) 134.3 (b)	132.0
Abut 1 & Ret Wall Center Widen	Class 400 Alt. 'W'	400	800	400	144.55	132.0 (a) 134.3(b)	132.0
Abut 1 & Ret Wall Right Widen	Class 400 Alt. 'W'	400	800	400	144.23	132.0(a) 134.3 (b)	132.0
	600 mm CIDH	900	1800	900	144.23	129.9(a) 132.4(b)	129.9

Table 1 (continued) - Pile Data Table (Revised)

Support Location	(2) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abut 2 & Ret Wall Left widen	Class 400 Alt. 'W'	400	800	400	144.23	133.2 (a) 134.7 (b)	133.2
Abut 2 & Ret Wall Center Widen	Class 400 Alt. 'W'	400	800	400	144.23	133.2 (a) 134.7 (b)	133.2
Abut 2 & Ret Wall Right Widen	Class 400 Alt. 'W'	400	800	400	144.23	133.2 (a) 134.7 (b)	133.2

Notes:
1. Pile tip elevations are controlled by: a) Compression. b) Tension.
2. Middle widenings are supported on existing CIP Concrete Piles, alternative "Z". 1955 Log of Test Borings indicates that test piles achieved 620-660 kN capacity (ENR). See attached As-Builts.
3. See General Plan and foundation Plan details for the specific locations of the Class 400 Alt. 'W' and CIDH piles.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

Driven Piles

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

CIDH Piles

4. Prior to placement of concrete, the interior surface of the shaft including the bottom should be cleaned of residue from drilling operations.

5. The contractor has the option of using full-length temporary casing if appreciable soil unraveling due to loss of moisture or in the case water is encountered. The later is not anticipated but if water is encountered where the amount cannot be contained to a maximum of 3 to 6 inches above the shaft bottom the construction will have to be done under "Wet Specification " condition. The use of temporary casing will require that it be removed while the concrete is being placed in order to develop the expected pile capacity and to facilitate the casing removal.

6. The drilling of the CIDH piles, the placement of the rebar cage, and concrete pour shall be completed in a relatively continuous operation.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Materials & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, JStayton (4), R.E. Pending File, GS File Room, GDN File, MIslam

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: November 22, 2007

File: 07-LA-05-KP43.0-58.0
(PM 26.7 – 36.0)
07-121841
Western Avenue UC
Bridge No. 53-1079

Bent 2 information superseded - see 10/29/08 report

Subject: Addendum to Final Foundation Recommendations

At you request (Memorandum dated October 16, 2007) we have revised the Final Foundation Recommendations for the Western Avenue Under Crossing (UC) Bridge located in the City of Glendale. The updated General plan and revised pile loads you provided formed the basis for the addendum.

A revised Pile Data Table is presented below. All other information and recommendations presented in the original report remain applicable.

Table 1 - Pile Data Table (Revised)

Support Location	(2) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abut 1 Closures	Class 400 Alt. 'W'	375	750	0	148.33	134.7(a)	134.7
Bent 2 Closures	Class 400 Alt. 'W'	275	550	275	148.33	136.8 (a) 140.1(b)	136.8
Abut 3 Closures	Class 400 Alt. 'W'	375	750	0	1448.48	134.7(a)	134.7

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.
2. Abutments are supported on existing CIP Concrete Piles, Alternative "Z". 1955 LOTB(s) indicates that test piles achieved a 575 KN capacity (ENR). See Attached As-Builts.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to installation of the piles.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Material & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, WBertucci, JStayton (4), R.E. File, Translab File, Route File, Daily File

WBertucci/JHuang

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
07-121841
Allen Avenue UC
Bridge No. 53-1081

Subject: Addendum to Final Foundation Recommendations dated July 27, 2006

At you request (Memorandum dated August 22, 2008) we have revised the Final Foundation Recommendations of the Allen Avenue Under Crossing (UC) Bridge referenced above. The Abutment Layout Plan (revised date July 1, 2006) and revised pile type and loads you provided formed the basis for the addendum. A revised Pile Data Table is presented below.

Table 1 – Allan Ave UC Pile Data Table (Revised)

Support Location	Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abut 1	400 mm 625kN CIDH	600	1200	N/A	151.9	140.8	140.8
Abut 2	400 mm (625kN) CIDH	600	1200	N/A	151.9	140.8	140.8

Note: Pile tip elevations shown are controlled by compression.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile construction.

2. Prior to placement of concrete, the interior surface of the shaft including the bottom should be cleaned of residue from drilling operations.

3. The contractor has the option of using full-length temporary casing if appreciable soil unraveling due to loss of moisture or in the case water is encountered. The later is not anticipated but if water is encountered where the amount cannot be contained to a maximum of 3 to 6 inches above the shaft bottom the construction will have to be done under "Wet Specification " condition. The use of temporary casing will require that it be removed while the concrete is being placed in order to develop the expected pile capacity and to facilitate the casing removal.

4. The drilling of the CIDH piles, the placement of the rebar cage, and concrete pour shall be completed in a relatively continuous operation.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or Qiang Huang at 916. 227.7237.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

QIANG HUANG
Senior Transportation Engineer & Research
Office of Geotechnical Design – North

c: RBibbens, JStayton (4), R.E. Pending File, GS File Room, GDN File, MIslam

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: November 20, 2007

File: 07-LA-05-KP43.0-58.0
(PM 26.7- 36.0)
07-121841
Alameda Avenue UC
Bridge No. 53-1082

Bent 2 pile data superseded, see 10/29/08 Report

Subject: Addendum to Final Foundation Recommendations

At you request (Memorandum dated October 16, 2007) we have revised the Final Foundation Recommendations for the Alameda Avenue Under Crossing (UC) Bridge located in the City of Glendale. The updated General plan and revised pile loads you provided formed the basis for the addendum.

A revised Pile Data Table is presented below. All other information and recommendations presented in the original reports remain applicable.

Table 1 - Pile Data Table (Revised)

Support Location	(2) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abut 1 Left & Mid Closure	Class 400 Alt. 'W'	400	800	0	156.34	145.8 (a)	145.8
Abut 1 Right Closure	Class 400 Alt. 'W'	400	800	0	156.41	144.5 (a)	144.5
Bent 2 Closures	Class 400 Alt. 'W'	400	800	400	156.11	144.5(a) 146.2 (b)	144.5
Abut 3 Left & Mid Closure	Class 400 Alt. 'W'	400	800	0	156.34	145.8 (a)	145.8
Abut 3 Right Closure	Class 400 Alt. 'W'	400	800	0	156.41	144.5(a)	144.5

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.
2. Middle widenings are supported on existing CIP Concrete Piles, alternative "Z". 1955 Log of Test borings indicates that test piles achieved a capacity of 445 kN (ENR). See attached As-Builts.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

4. The Contractor shall provide a driving system submittal including drivability analysis for approval prior to installation of the piles.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Materials & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, WBertucci, JStayton (4), R.E. File, Translab File, Route File, Daily File

WBertucci/JHuang

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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See Combined Report (Western, Alameda, Verdugo) dated 10/29/08 for CTDH Recommendations @ A2

To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
(PM 26.7 – 36.0)
07-121841
Verdugo Avenue UC
Bridge No. 53-1086

Subject: Addendum to Final Foundation Recommendations

At you request (Memorandum dated October 16, 2007) we have revised the Final Foundation Recommendations for the Verdugo Avenue Under Crossing (UC) Bridge located in the City of Burbank. The updated General plan and revised pile loads you provided formed the basis for the addendum.

A revised Pile Data Table is presented below. All other information and recommendations presented in the original reports remain applicable.

Table 1 - Pile Data Table (Revised)

Support Location	(2) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abutment 1	Class 400 Alt. 'W'	400	800	400	168.15	157.1(a) 162.0(b)	157.1
Abutment 1 Ret Wall	Class 400 Alt. 'W'	400	800	400	168.04	157.1(a) 162.0 (b)	157.1
Abutment 2	Class 400 Alt. 'W'	400	800	400	168.71	157.1 (a) 162.0(b)	157.1
Abutment 2 Ret Wall	Class 400 Alt. 'W'	400	800	400	168.71	157.1(a) 162.0(b)	157.1

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Material & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, JStayton (4), R.E. Pending File, GS File Room, GDN File, MIslam

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

REVISED FINAL FOUNDATION DESIGN RECOMMENDATIONS

PROVIDENCIA OVERHEAD
Bridge No. 53-1085, DATED October 29, 2008

ROUTE: 07-LA-5 42.8/47.3

State of California Business, Transportation and Housing Agency

DEPARTMENT OF TRANSPORTATION

Memorandum

Flex your power!
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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

Attention: Andrew Rittenhouse

File: 07-LA-05-KP 43-58
PM 26.7/36.0
07-121841
I-5 HOV Lane Widening Project
Providencia OH (Widening)
Bridge No. 53-1085

Subject: Revised Final Foundation Design Recommendations – No. 1
(Revises Final Foundation Design Recommendations Report dated July 27, 2006)

INTRODUCTION

This revised final foundation recommendations memorandum is provided in response to your request (April 3, 2008) for the proposed widening of the Providencia Avenue Over-Head (OH) Bridge located in the City of Burbank. Subsequent to the July 27, 2006 Report, it became evident that several utility and adjacent structure constraints will require changes to pile types including loads and pile layouts. This report addresses the aforementioned changes. All other aspects of the July 27, 2006 Report remains applicable. The changes affect the Construction Considerations; therefore they have been updated and included herein.

FOUNDATION RECOMMENDATIONS

The revised final foundation recommendations are based on the updated General Plan No. 1 (revision date 12-17-07) updated General Plans No. 2 and 3 (revision date 8-14-07) and revised pile loads provided by Traci Menard. The pile specifications including pile tip elevations are presented in Tables 1 through 4.

Spread footings are recommended for Left and Middle Bridge Abutments 1 and 9. Soil

bearing capacity recommendations for Abutment 1 and 9 are shown in Table 5.

Table 1
Bent & Pier Pile Data – Left Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	400	800	400	160.3	147.8 (1) 149.7 (2)	**147.8**
Bent 3	600 mm CIDH	N/A	1800	900	160.4	145.2 (1) 151.9(2)	**145.2**
Bent 4	Class 400, Alt "W"	400	800	400	162.1	152.4 (1) 153.3(2)	**152.4**
Bent 5	Class 400, Alt "W"	400	800	400	162.4	152.4(1) 153.3(2)	**152.4**
Pier 6	600 mm CIDH	N/A	1800	900	163.8	148.6 (1) 151.6(2)	**148.6**
Pier 7	600 mm CIDH	N/A	1800	900	164.0	148.9(1) 152.3(2)	**148.9**
Pier 8	600 mm CIDH	N/A	1800	900	163.8	148.7(1) 152.3 (2)	**148.7**

Note: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Table 2
Bent & Pier Pile Data – Middle Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	400	800	400	160.3	149.2 (1) 151.0 (2)	**149.2**
Bent 3	Class 400, Alt "W"	400	800	400	160.6	149.2 (1) 151.0 (2)	**149.2**
Bent 4	Class 400, Alt "W"	400	800	400	162.1	150.4 (1) 151.9 (2)	**150.4**
Bent 5	600 mm CIDH	N/A	1800	900	162.4	147.3 (1) 152.8 (2)	**147.3**
Pier 6	600 mm CIDH	N/A	1800	900	163.8	148.6 (1) 151.6 (2)	**148.6**
Pier 7	600 mm CIDH	N/A	1800	900	164.0	148.8 (1) 151.6 (2)	**148.8**
Pier 8	600 mm CIDH	N/A	1800	900	163.8	148.7 (1) 151.5 (2)	**148.7**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Table 3
Bent & Pier Pile Data – Right Bridge

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2	Class 400, Alt "W"	400	800	400	160.3	149.2 (1) 151.0 (2)	**149.2**
Bent 3	600 mm CIDH	N/A	1800	900	160.0	143.3 (1) 148.7 (2)	**143.3**
Bent 4	Class 400, Alt "W"	400	800	400	161.5	147.7 (1) 149.2 (2)	**147.7**
Bent 5	Class 400, Alt "W"	400	800	400	162.4	149.8 (1) 151.3 (2)	**149.8**
Pier 6	600 mm CIDH	N/A	2200	900	163.8	146.0 (1) 151.2 (2)	**146.0**
Pier 7	600 mm CIDH	N/A	1800	900	164.0	148.1 (1) 151.6 (2)	**148.1**
Pier 8	600 mm CIDH	N/A	1800	900	163.8	148.7 (1) 153.2 (2)	**148.7**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Table 4
Abutment Pile Data

Location	Pile Type	Design Loading (kN)	Nominal Resistance		Bottom of Footing Elev. (m)	Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abut 1 Right Widen	Class 400 Alt "W"	400	800	400	161.4	148.6 (1) 150.4 (2)	**148.6**
Abut 9 Right Widen	Class 400 Alt "W"	400	800	400	170.5	149.8 (1) 153.5 (2)	**149.8**

Notes: Pile tip elevations are controlled by the following demands: (1) Compression (2) Tension

Table 5
Abutment Spread Footing Data Table

Support Location	Bottom of Footing Elevation (m)	**Recommended Soil Bearing Pressures (kPa)**	
		WSD (1)	LFD (2)
		Gross Allowable Soil Bearing Pressure (q_{all})	Ultimate soil Bearing Pressure (q_{ult})
Abut. 1 Left	168.1	150	N/A
Abut. 1 Middle	167.5	150	N/A
Abut. 9 Left	171.6	150	N/A
Abut. 9 Middle	172.6	150	N/A

Notes: (1) WSD -Working Stress Design.
(2) LFD - Load Factor Design.

The Structural Designer shall determine the design tip elevations for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an adjacent existing bridge, and the Metro Link tracks, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, Office of Geotechnical Design North shall be contacted before employing any assistance in installation techniques or cutting off of piles.

4. Pile acceptance criteria for all driven piles shall be based on the Gates formula (Caltrans Standard Specifications Section 49-1.08).

5. For CIDH piles the bottom of the piles shall be free of loose material and firm. To maintain this condition the drilling, placement of reinforcing steel cage and concrete placement shall be done in a continuous operation.

6. Abutment 1 and 9 will be constructed in part on new embankment fill. However, the underlying native soils are granular and any subsequent induced settlement is expected to be minimal and occur prior to the construction of the abutment.

7. Pre-drilling oversize holes through the embankment fill at abutments 1 and 9 Right Bridge shall be required. Follow Caltrans Standard Specifications Section 49-1.06. Predrilling should extend to elevation 162.0 meters (Abut. 1) and 166.9 meters Abut. 9). These elevations are the estimated base of existing and /or proposed fill at the respective abutments. If the base of the fill is below its present estimated grade, our office shall be notified so that possible adjustments to the pile tip elevations can be evaluated.

8. To insure adequate performance of the foundations, the soils underlying the proposed spread footings (Abutment 1 and 9; Left and Middle Bridges) shall have a relative compaction of 95 percent at the abutments. If the soils do not meet this

criterion, then reworking the material including moisture conditioning and compaction in accordance to Standard Specifications Earthwork Section 19-2.06 shall be required. The soils at footing grade shall be compacted to 95 percent minimum relative compaction in accordance with Standard Specifications Earthwork Section 19-2.06 to accommodate the spread footings at Abutments 1 and 9. Caltrans construction representative shall determine the depth and lateral extent of the soil rework.

If you have any questions or need additional information, please call William Bertucci at 916-227-1045 or John Huang at 916-227-1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed By:

JOHN HUANG
Senior Materials and Research Engineer
Office of Geotechnical Design - North

c: RBibbens, JStayton (4), R.E. Pending File, GS File Room, GDN File, MIslam

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

UPDATES TO THE REVISED FINAL FOUNDATION RECOMMENDATIONS

Western Avenue Undercrossing, Bridge No. 53-1079 dated 10/29/08.
Alameda Avenue Undercrossing, Bridge No. 53-1082 dated 10/29/08.
Verdugo Avenue Undercrossing, Bridge No. 53-1086 dated 10/29/08.

ROUTE: 07-LA-5 42.8/47.3

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
(PM 26.7-36.0)
07-121841

Western Avenue UC
Bridge No. 53-1079
Alameda Avenue UC
Bridge No. 53-1082
Verdugo Avenue UC
Bridge No. 53-1086

Subject: Updates to the Revised Final Foundation Recommendations, dated November 20, 2007

At your request (Memorandum dated February 13, 2008) we have updated the revised Final Foundation Recommendations for the above structures. The updated General plans; revised pile loads and change in pile type at Abutment 2 (Verdugo Ave UC) provided formed the basis for the addendum.

Updated Pile Data is presented in the tables below. All other information and recommendations presented in the original reports remain applicable.

Table 1 – Western Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2 Closures	Class 625 Alt. 'W'	450	900	625	148.33	133.2 (a) 134.5(b)	133.2

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

Table 2 – Alameda Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2 Clousures	Class 625 Alt. 'W'	500	1000	500	156.11	142.3(a) 143.5(b)	142.3

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

Table 2 – Verdugo Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abut. 2	610 mm CIDH	N/A	1500	500	168.71	153.4(a) 159.2(b)	153.4

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

General

1. Shoring may be needed to facilitate safe pile cap construction at all bridge sites.

Western Ave UC and Alameda UC – Driven Piles

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

Verdugo Ave UC – CIDH Piles

4. Relatively Dry soil conditions are expected therefore some soil unraveling within the sandy layers should be expected if pile shafts are left open and if the steel rebar cages come in contact with the pile wall during installation.

6. The placement of the rebar cage, and concrete pour should be completed in a continuous operation.

7. The contractor has the option of using full-length temporary casing as needed. The use of temporary casing will require that it be removed while the concrete is being place in order to develop the assumed pile capacity.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Material & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, Wbertucci, JStayton (4), R.E. Pending File, GS File, GDN File, MIslam

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
(PM 26.7-36.0)
07-121841

Western Avenue UC
Bridge No. 53-1079
Alameda Avenue UC
Bridge No. 53-1082
Verdugo Avenue UC
Bridge No. 53-1086

Subject: Updates to the Revised Final Foundation Recommendations, dated November 20, 2007

At your request (Memorandum dated February 13, 2008) we have updated the revised Final Foundation Recommendations for the above structures. The updated General plans; revised pile loads and change in pile type at Abutment 2 (Verdugo Ave UC) provided formed the basis for the addendum.

Updated Pile Data is presented in the tables below. All other information and recommendations presented in the original reports remain applicable.

Table 1 – Western Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2 Closures	Class 625 Alt. 'W'	450	900	625	148.33	133.2 (a) 134.5(b)	133.2

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

Table 2 – Alameda Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Cut-off Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Bent 2 Clousures	Class 625 Alt. 'W'	500	1000	500	156.11	142.3(a) 143.5(b)	142.3

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

Table 2 – Verdugo Ave UC

Support Location	Pile Type	Design Load (kN)	Nominal Resistance		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression (kN)	Tension (kN)			
Abut. 2	610 mm CIDH	N/A	1500	500	168.71	153.4(a) 159.2(b)	153.4

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

General

1. Shoring may be needed to facilitate safe pile cap construction at all bridge sites.

Western Ave UC and Alameda UC – Driven Piles

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

Verdugo Ave UC – CIDH Piles

4. Relatively Dry soil conditions are expected therefore some soil unraveling within the sandy layers should be expected if pile shafts are left open and if the steel rebar cages come in contact with the pile wall during installation.

6. The placement of the rebar cage, and concrete pour should be completed in a continuous operation.

7. The contractor has the option of using full-length temporary casing as needed. The use of temporary casing will require that it be removed while the concrete is being place in order to develop the assumed pile capacity.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Material & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, Wbertucci, JStayton (4), R.E. Pending File, GS File, GDN File, MIslam

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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See Combined Report (Western, Alameda, Verdugo) dated 10/29/08 for CTDH Recommendations @ A2

To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 29, 2008

File: 07-LA-05-KP43.0-58.0
(PM 26.7 – 36.0)
07-121841
Verdugo Avenue UC
Bridge No. 53-1086

Subject: Addendum to Final Foundation Recommendations

At you request (Memorandum dated October 16, 2007) we have revised the Final Foundation Recommendations for the Verdugo Avenue Under Crossing (UC) Bridge located in the City of Burbank. The updated General plan and revised pile loads you provided formed the basis for the addendum.

A revised Pile Data Table is presented below. All other information and recommendations presented in the original reports remain applicable.

Table 1 - Pile Data Table (Revised)

Support Location	(2) Pile Type	Design Load (kN)	Nominal Resistance (kN)		Pile Bottom of Footing Elev. (m)	(1) Design Tip Elev. (m)	Specified Tip Elev. (m)
			Compression	Tension			
Abutment 1	Class 400 Alt. 'W'	400	800	400	168.15	157.1(a) 162.0(b)	157.1
Abutment 1 Ret Wall	Class 400 Alt. 'W'	400	800	400	168.04	157.1(a) 162.0 (b)	157.1
Abutment 2	Class 400 Alt. 'W'	400	800	400	168.71	157.1 (a) 162.0(b)	157.1
Abutment 2 Ret Wall	Class 400 Alt. 'W'	400	800	400	168.71	157.1(a) 162.0(b)	157.1

Notes: 1. Pile tip elevations are controlled by: a) Compression. b) Tension.

The Structural Designer shall determine the design tip elevation for lateral load demands.

CONSTRUCTION CONSIDERATIONS

1. Shoring may be necessary to facilitate safe pile cap construction.

2. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

3. Hard driving or refusal is not anticipated at this site. Should this happen, the Office of Geotechnical Design- North shall be contacted before employing any assistance installation techniques or cutting off piles.

If you have any questions regarding this addendum, please contact William Bertucci at 916.203.7992 or John Huang at 916. 227.1037.

Report By:

WILLIAM BERTUCCI
Associate Engineering Geologist
Office of Geotechnical Design – North

Reviewed by:

JOHN HUANG
Senior Material & Research Engineer
Office of Geotechnical Design – North

c: RBibbens, JStayton (4), R.E. Pending File, GS File Room, GDN File, MIslam

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

REVISED
PILE TIP RECOMMENDATIONS
DUE TO PROJECTED ELEVATED
GROUNDWATER
for
SONORA AVENUE UNDERCROSSING BRIDGE
No. 53-1077, dated 12/22/08

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MS. TRACI MENARD
Chief, Bridge Design Branch15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: December 22, 2008

File: 07-LA-05-KP44.32
07-121841
Sonora Avenue UC
(Widen and Retrofit)
Bridge No. 53-1077

Attention: Andrew Rittenhouse

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South 1, Branch D

Subject: Revised Pile Tip Recommendations Due to Projected Elevated Ground Water

Per your request, transmitted to our office via email dated November 20, 2008, the Office of Geotechnical Design South 1 (OGDS1) calculated revised pile tip recommendations due to projected elevated ground water of approximately 10 meters for existing Sonora Avenue Undercrossing plus the widening, Bridge No. 53-1077, in the City of Glendale on State Hwy 5.

OGDS1 reviewed the following references:

1. The recently completed, 2008 Log of Test Borings (LOTB's) for Sonora Avenue UC Widen and Retrofit (Total of 2 sheets) near centerline Rte 5 Station 443+20 (KP44.32), Boring Nos. SONO5-1 and SONO5-2.

2. "Final Geotechnical Data Report, Interstate 5-HOV Widening, Los Angeles County, California," dated December 15, 2005, prepared by Mr. Farid Motamed of URS.

3. "Final Foundation Design Recommendations," dated July 27, 2006, prepared by Mr. William Bertucci and Mr. Hossain Salimi of Caltrans Geotechnical Design West.

4. "Effect of CIDH Pile Installation on Groundwater Regime, I-5 from Route 5/134 Separation to Magnolia Boulevard," dated October 7, 2008, prepared by Ms. Shiva Karimi and Mr. Joe Pratt of OGDS1, Branch D.

5. "Addendum #3 to Final Foundation Recommendations dated July 27, 2006," addendum dated October 29, 2008, prepared by Mr. William Bertucci of OGDN.

Computer program Driven 1.2 was used for Driven Pile Analysis (axial resistance) and LPILE Plus 5.0 (lateral resistance for both driven piles and pile shafts) and SHAFT version 5.0 (axial load and settlement for pile shafts).

For Seismic Design, moment magnitude Mw = 6.75 and the corresponding median Peak Ground Acceleration (PGA) at the site is estimated to be about 0.7g. The results of the geotechnical analyses are tabulated in Table No. 1, below.

Table No. 1 - Revised Pile Data Table for Sonora Ave UC (Widen and Retrofit)

Location	Design Loading (kN)	Pile Type (mm)	Nominal Resistance		Bottom of Footing Elevation (m)	Design Tip Elevations (m)	Specified Tip Elevation (m)
			Compression (kN)	Tension (kN)			
Abutment 1 (Left)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.25	130.5[1] 134.6[2] 135.1[3]	130.5
Abutment 1 (Center)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.55	130.8[1] 134.9[2] 135.4[3]	130.8
Abutment 1 (Right)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.23	130.5[1] 134.5[2] 135.0[3]	130.5
	900	CIDH 600mm	1800	900	144.23	125.7[4] 131.2[2] 131.2[3]	125.7
Abutment 2 (Left)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.23	130.5[1] 134.1[2] 134.1[3]	130.5
Abutment 2 (center)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.23	130.5[1] 134.1[2] 134.1[3]	130.5
Abutment 2 (Right)	400	Class 400 Alt.'w' (PP360x9.53)	800	400	144.23	130.5[1] 134.1[2] 134.1[3]	130.5

Notes: Design Tip is controlled by the following demands:

(1) Nominal Resistance in Compression (Driven 1.2)
(2) Nominal Lateral Resistance – Fixed Head Condition (specified 6.35 mm lateral deflection at top of pile, derived lateral resistance shown in Table No. 2)
(3) Nominal Lateral Resistance – Free Head Condition (specified 6.35 mm lateral deflection at top of pile, derived lateral resistance shown in Table No. 2)
(4) Nominal resistance in compression (Shaft 5.0)

Table 2- Lateral Load Per Pile

Lateral deflection of pile head (mm)	Lateral load per pile (kN)			
	Proposed CIDH (Fixed Head)		Proposed CIDH (Free Head)	
	Abutment 1	Abutment 2	Abutment 1	Abutment 2
	Class 400/ CIDH 600mm	Class 400	Class 400/ CIDH 600mm	Class 400
6.25	154.12 / 324.14	153.37	67.91 / 152.76	67.26

CONSTRUCTION CONSIDERATIONS

Shoring may be necessary to facilitate safe pile cap construction.

Driven Piles

1. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

2. Hard driving is anticipated near specified pile tip elevation and sporadically between approximate elevations +137 to +129 m at this site. The Office of Geotechnical Design South 1 should be contacted before employing any assistance installation techniques or cutting off of piles.

3. The contractor shall provide a driving system submittal including drivability analysis for approval prior to the installation of the pipe piles.

4. Cast-in-drilled-hole (CIDH) piles are anticipated to extend well below the water table (approximately 5.5 to 6.5 m below). The "Wet Specification" condition for CIDH pile construction is required.

CIDH Piles

5. The drilling of the CIDH piles, the placement of the rebar cage, and concrete pour shall be completed in a relatively continuous operation.

The recommendations contained in this report are based on specific project information and plans regarding bridge location, type, height and bottom of the footing elevations that has been provided to OGDS1. Recommendations are also based on soils information with in the 2008 LOTB. If any conceptual changes are made during final project design, this office should review those changes to determine if those foundation recommendations are still applicable.

If you have any questions or comments, please call Kevin Lai at (213) 620-2344 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 12/22/08

Kevin Lai
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 12/22/08

REGISTERED PROFESSIONAL ENGINEER
SHIVA KARIMI
No. GE2651
Exp. 06/30/10
GEOTECHNICAL
STATE OF CALIFORNIA

Shiva Karimi, Ph.D., P.E., G.E., Chief
Office of Geotechnical Design South 1
Branch D

cc: OGDS1 File - Sacramento (MS-5)
OGDS1 LA File
R.E Pending File – District 7 Design Celina Aviles

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

REVISION TO REVISED PILE TIP RECOMMENDATIONS DUE TO PROJECTED ELEVATED GROUND WATER

SONORA AVENUE UNDERCROSSING
Bridge No. 53-1077, DATED JANUARY , 2009

ROUTE: 07-LA-5 42.8/47.3

State of California | Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MS. TRACI MENARD
Chief, Bridge Design Branch15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: January 7, 2009

File: 07-LA-05-KP44.32
07-121841
Sonora Avenue UC
(Widen and Retrofit)
Bridge No. 53-1077

Attention: Andrew Rittenhouse

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South 1, Branch D

Subject: Revision to Revised Pile Tip Recommendations Due to Projected Elevated Ground Water

Based on Mr. Andrew Rittenhouse's request, transmitted to our office via email dated January 5, 2009, the Office of Geotechnical Design South 1 (OGDS1) removed the pile driving system requirement for existing Sonora Avenue Undercrossing retrofit plus the widening, Bridge No. 53-1077, in the City of Glendale on State Hwy 5.

After communications with Mr. Andrew Rittenhouse, the following revision to Construction Considerations, Driven Piles, Item 3 is applicable.

Item 3 (drivability analysis) can be removed, however, hard driving conditions may be encountered between elevations +137 to +133 m. If piles can't be successfully driven past the above zone to obtain required geotechnical resistance, then center relief drilling is allowed to assist driving above specified pile tip elevations. If center relief drilling needed, drilling should be discontinued at least 3 m above specified pile tip elevations. Below this, piles should be only driven to reach specified pile tip.

If you have any questions or comments, please call Kevin Lai at (213) 620-2344 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 01/07/2009

Kevin Lai
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 1/07/09

REGISTERED PROFESSIONAL ENGINEER
SHIVA KARIMI
No. GE2651
06/30/11
GEOTECHNICAL
STATE OF CALIFORNIA

Shiva Karimi, Ph.D., P.E., G.E., Chief
Office of Geotechnical Design South 1
Branch D

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

REVISED PILE TIP RECOMMENDATIONS DUE TO PROJECTED ELEVATED GROUNDWATER for PROVIDENCIA AVENUE OVERHEAD BRIDGE No. 53-1085, dated 01/21/09

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: MR. TRACI MENARD
Chief, Bridge Design Branch15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: January 21, 2009
(Revised February 10, 2009)

File: 07-LA-05-KP43.0-58.0
07-121841
Providencia Avenue OH
(Widening)
Bridge No. 53-1085

Attention: Andrew Rittenhouse

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design - South 1, Branch D

Subject: Revised Pile Tip Recommendations Due to Projected Elevated Ground Water

Per your request, transmitted to out office via email dated November 20, 2008, the Office of Geotechnical Design South (OGDS1) calculated revised pile tip recommendations due to projected elevated ground water of approximately 10 meters for Providencia Avenue Over Head (OH) widening, Bridge No. 53-1085, in the City of Burbank on State Hwy 5.

We reviewed the following references:

1. The recently completed, 2008 Log of Test Borings (LOTB's) for Providencia Avenue OH (Total of 10 sheets) near centerline Rte 5 Station 462+00 to Station 464+00 (KP43.0 – 58.0), Boring Nos. PRO05-1, PRO05-2, PRO05-3A, PRO05-3B, PRO05-4, PRO05-4B, PRO05-4C, PRO05-4D, PRO05-5A, PRO05-5B, PRO05-6, PRO05-7, PRO05-8, PRO05-9A, and PRO05-9B.

2. "Final Geotechnical Data Report, Interstate 5-HOV Widening Los Angeles County, California," dated December 15, 2005, prepared by Mr. Farid Motamed of URS.

3. "Final Foundation Design Recommendations," dated July 27, 2006, prepared by Mr. William Bertucci of OGDW.

4. "Effect of CIDH Pile Installation on Groundwater Regime, I-5 from Route 5/134 Separation to Magnolia Boulevard," dated October 7, 2008, prepared by Ms. Shiva Karimi and Mr. Joe Pratt of OGDS1, Branch D.

5. "Revised Final Foundation Design Recommendations," dated October 29, 2008, prepared by Mr. William Bertucci of OGDN.

Computer program Driven 1.2 was used for Driven Pile Analysis (axial resistance) and LPILE Plus 5.0 (lateral resistance for both driven piles and pile shafts) and SHAFT version 5.0 (axial load and settlement for pile shafts).

For Seismic Design, moment magnitude Mw = 6.75 and the corresponding median Peak Ground Acceleration (PGA) at the site is estimated to be about 0.7g. The results of the geotechnical analyses are tabulated in Table No.1, below.

Table No. 1 - Pile Data Table (Revised)

Location	Design Loading (kN)	Pile Type (mm)	Nominal Resistance		Bottom of Footing Elevation (m)	Design Tip Elevations (m)	Specified Tip Elevation (m)
			Compression (kN)	Tension (kN)			
Bent 2	Left Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	160.3	145.5[a] 147.3[b] 150.6[d1] 150.1[d2]	145.5
	Middle Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	160.3	145.5[a] 147.3[b] 150.6[d1] 150.1[d2]	145.5
	Right Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	160.3	145.5[a] 147.3[b] 150.6[d1] 150.1[d2]	145.5
Bent 3	Left N/A	600 mm CIDH	1800	900	160.4	145.2[a] 146.7[d1] 146.9[d2]	145.2
	Middle Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	160.6	146.6[a] 148.6[b] 150.6[d1] 150.4[d2]	146.6
	Right N/A	600 mm CIDH	1800	900	160.0	143.3[a] 146.3[d1] 146.5[d2]	143.3
Bent 4	Left Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	162.1	147.6[a] 149.1[b] 152.2[d1] 152.2[d2]	147.6

	Middle Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	162.1	147.6[a] 149.1[b] 152.2[d1] 152.2[d2]	147.6
	Right Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	161.5	147.0[a] 148.5[b] 151.6[d1] 151.6[d2]	147.0
Bent 5	Left Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	162.4	151.9[a] 155.3[b] 154.1[d1] 154.1[d2]	151.9
	Middle N/A	600 mm CIDH	1800	900	162.4	145.9[a] 148.7[d1] 150.2[d2]	145.9
	Right Bridge 400	Class 400 Alt.'w' (PP360x9.53)	800	400	162.4	148.4[a] 149.4[b] 154.1[d1] 154.1[d2]	148.4
Pier 6	Left N/A	600 mm CIDH	1800	900	163.8	145.5[a] 148.5[d1] 151.6[d2]	145.5
	Middle N/A	600 mm CIDH	1800	900	163.8	145.5[a] 148.5[d1] 151.6[d2]	145.5
	Right N/A	600 mm CIDH	2200	900	163.8	144.5[a] 149.6[d1] 150.1[d2]	144.5
Pier 7	Left N/A	600 mm CIDH	1800	900	164.0	148.9[a] 150.8[d1] 152.3[d2]	148.9
	Middle N/A	600 mm CIDH	1800	900	164.0	146.7[a] 148.2[d1] 148.2[d2]	146.7
	Right N/A	600 mm CIDH	1800	900	164.0	146.7[a] 148.2[d1] 148.2[d2]	146.7
Pier 8	Left N/A	600 mm CIDH	1800	900	163.8	147.0[a] 151.6[d1] 151.6[d2]	147.0
	Middle N/A	600 mm CIDH	1800	900	163.8	147.0[a] 151.6[d1]	147.0

	Right N/A	600 mm CIDH	1800	900	163.8	147.6[a] 151.6[d1] 151.6[d2]	147.6
Abut 1 Right	400	Class 400 Alt.'w' (PP360x9.53)	800	400	161.4	146.9[a] 148.9[b] 151.8[d1] 151.8[d2]	146.9
Abut 9 Right	400	Class 400 Alt.'w' (PP360x9.53)	800	400	170.5	156.5[a] 158.2[b] 160.3[d1] 160.3[d2]	156.5

Notes: Design Tip is controlled by the following demands:
(a) Nominal Resistance in Compression
(b) Nominal Resistance in Tension
(d1) Nominal Lateral Resistance – Fixed Head Condition (specified 6.35 mm lateral deflection at top of pile, derived lateral resistance)
(d2) Nominal Lateral Resistance – Free Head Condition (specified 6.35 mm lateral deflection at top of pile, derived lateral resistance)

CONSTRUCTION CONSIDERATIONS

Shoring may be necessary to facilitate safe pile cap construction.

Driven Piles

1. Due to the proximity of an existing structure, vibration monitoring during pile driving is recommended.

2. Hard driving is anticipated near specified pile tip elevation and sporadically between approximate elevations +147 to +143 m at this site. The Office of Geotechnical Design South 1 should be contacted before employing any assistance installation techniques or cutting off of piles. If piles can't be successfully driven past the above zone to obtain required geotechnical resistance, then center relief drilling is allowed to assist driving above specified pile tip elevations. If center relief drilling needed, drilling should be discontinued at least 3 m above specified pile tip elevations. Below this, piles should be only driven to reach specified pile tip.

CIDH Piles

3. Cast-in-drilled-hole (CIDH) piles are anticipated to extend well below the water table (approximately 5.5 to 9 m below). The "Wet Specification" condition for CIDH pile construction is required.

4. The drilling of the CIDH piles, the placement of the rebar cage, and concrete pour shall be completed in a relatively continuous operation.

The recommendations contained in this report are based on specific project information and plans regarding bridge location, type, height and bottom of the footing elevations that has been provided to OGDS1. Recommendations are also based on soils information with in the 2008 LOTB. If any conceptual changes are made during final project design, this office should review those changes to determine if those foundation recommendations are still applicable.

If you have any questions or comments, please call Kevin Lai at (213) 620-2344 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 02/10/09

Kevin Lai
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 2/10/09

Shiva Karimi, Ph.D., P.E., G.E., Chief
Office of Geotechnical Design South 1
Branch D

cc: OGDS1 File - Sacramento (MS-5)
OGDS1 LA File
R.E Pending File – District 7 Design Celina Aviles

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

REVISED GEOTECHNICAL DESIGN REPORT
for
RETAINING WALL No. 466, BRIDGE No. 53E0138, dated 8/19/08

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: TRACI MENARD
Chief, Bridge Design Branch 15
Office of Bridge Design, South 1

Attention: Andy Rittenhouse

Date: August 19, 2008

File: 07-LA-05-KP43-58
07-121841
Retaining Wall No. 466

Caltrans Metric

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South - 1

Subject: Revised Geotechnical Design Report for Retaining Wall No. 466

As requested by the Office of Bridge Design, South 1 (Bridge Design Branch 15) dated July 17, 2008, following is the revised recommendation for the proposed Crib Wall (Wall No. 466) along Interstate Highway 5 in the city of Burbank. According to the request, the Standard Plan Crib Wall was determined to be the most economic and feasible option over the Type 1 Retaining Wall or Mechanically Stabilized Embankment (MSE) Wall, which were recommended in the Geotechnical Design Report dated July 30, 2007. This report is issued to provide the recommendation for the Crib Wall.

Based on the General Plan of Retaining Wall 466, the proposed wall lies in the east side of the I-5, beginning station 465+68.88 m, 40.438 m RT and ending Station 466+98.727, 36.754 m RT. The design height of the walls varies from 2.075 m to 3.725 with a 2h:1v or flatter slope above the wall with Chain Link railing. In a site visit on 07/30/2007, an existing wall along the right of way for a newly constructed hotel was observed. Retaining wall 466 is planned to be constructed partially or completely along the right of way.

A geotechnical subsurface exploration was conducted on July 17, 2007. The purpose of this exploration was to obtain subsurface information of the site. One 96 mm diameter rotary wash borehole was drilled at the toe of the slope, 39m right of station 465+70, to a depth of 12.5m. Standard Penetration Tests (SPT) was performed in this borehole at selected depths. Relatively disturbed soil samples were collected. No groundwater was encountered in any of the boreholes during drilling. The borehole revealed that the subsurface soil consisted of mainly medium dense to dense silty sand, with trace fine gravel. Furthermore, a soil sample was obtained at a depth of 1 to 4ft for corrosion potential following the guidelines of the Corrosion Technology Branch. Based on the results of the corrosion analysis, soils at the site are non-corrosive. The corrosion results are shown in the following table, Table 1.

Table 1-Corrosion Test Summary

Location	Sample Depth	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring B1	1 to 4ft	7.47	1700	N/A	N/A

Note: Caltrans currently defines a corrosive environment as an area where the soil has a minimum resistivity of less than 1000 ohm-cm, and either contains more than 500 ppm of chlorides, more than 2000 ppm of sulfates, or has a pH of 5.5 or less.

Based on the subsurface exploration, the following engineering properties were assumed for our calculations:

- Friction angle of foundation soil (Bearing Capacity): 32°
- Unit weight: 18 kN/m^3

Considering engineering properties above and overburden pressure in front of the wall (additional resisting force from existing wall and building), the foundation soils of the subject site should provide adequate bearing resistance and satisfactory global stability. Therefore, we recommend that the Standard Plan Crib Wall (C7C, C7E and C7G of the Standard Plans, May 2006) can be used to support the proposed roadway embankment.

If you have any questions regarding the above recommendations, please contact Seungwoon Han.

Seungwoon Han, Ph.D, P.E. 73527
Transportation Engineer, Civil
Branch A

Cc: OGDS1 - Sacramento
OGDS1 – Los Angeles
GS - File Room
Deh-Jeng Jang
(OGDS-1)

Andy Rittenhouse & Christine Chan called S Han on 8/26/08. Confirmed that he intended this to mean that the soils are adequate to support H=6' Type II B=6', Case A, bearing capacity adequate for table value.

Soils also adequate for the 13' & 11'-6" heights

TM 8/26/08

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

ADDENDUM TO FOUNDATION DESIGN RECOMMENDATIONS – MSE WALLS for MSE WALL Nos. A, B, C, D, and E, BRIDGE Nos. 53E0127 and 53E0128, dated 10/27/08

ROUTE: 07-LA-5 42.8/47.3

Memorandum

Flex your power!
Be energy efficient!

To: **TRACI MENARD**
Chief, Bridge Design Branch 15
Office of Bridge Design South1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: October 27, 2008

File: 07-LA-5_KP 46.2 (PM 28.7)
07-121841
MSE Wall 53E0127
(Walls A & B)
MSE Wall 53E0128
(Walls C, D & E)

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

Subject: Addendum to Foundation Design Recommendations – MSE Walls

Introduction

Per your request, this report addendum has been prepared to provide additional geotechnical engineering recommendations for the proposed MSE walls 53E0127 (Walls A and B) and 53E0128 (Walls C, D, and E) as parts of the Providencia Pedestrian OC & OH project located in the City of Glendale.

Previously, a foundation report titled "Foundation Design Recommendations – MSE Walls" dated August 29, 2008 was issued by this office, in which foundation recommendations including soil parameters, bearing capacity, settlement, and global stability for the MSE walls with initially proposed profiles of wall cross sections were recommended.

During determination of the length of the wall reinforcement and investigation of internal stability, new profiles of wall cross sections were generated and provided to this office. In addition, an increased soil bearing capacity was requested.

Global Stability Study

To study global stability of the MSE walls, a computer program SLOPE/W (GeoSlope International, Ltd., 1998) was used. The program employs a mechanism of Limit Equilibrium to perform two-dimensional slope stability computation using a variety of

methods including Bishop's Modified (1955), Janbu's Generalized (1968), and Spencer (1967). The soil parameters used in the study are summarized below.

Material	Unit Weight, γ, (pcf)	Internal Friction Angle, ϕ, (degree)
Foundation Soil	120	30
Backfill Soil	120	34

The geotechnical design criteria utilized in the study are:

- Static Loading Condition
  Minimum Factor of Safety of 1.3
- Seismic Loading Condition
  Minimum Factor of Safety of 1.1
  Non-dimensional horizontal seismic coefficient, K_h, of 0.2g

The results of the study are provided below. Critical slip surfaces corresponding to trial cross-section profiles are provided in the Appendix of this report addendum.

Trial Cross Section (Meter)						Factor of Safety	
Top Wall		Middle Wall		Bottom Wall		Static Loading	Seismic Loading
Wall Height	Length of Reinforcement	Wall Height	Length of Reinforcement	Wall Height	Length of Reinforcement		
5.570	4.22	4.387	5.40	2.713	3.50	1.11	0.89
5.570	5.00	4.387	6.00	2.713	7.00	1.33	1.19

Recommendations

Soil Parameters

The following geotechnical engineering parameters are judged to be suitable for the soils encountered at the site.

Unit Weight, γ	120	pcf
Internal Friction Angle, ϕ (backfill)	34	degree
Internal Friction Angle, ϕ (foundation)	30	degree

Soil Bearing Capacity

Based on the surface conditions encountered in the selected soil test borings, an allowable soil bearing pressure of 4,000 pounds per square foot (psf) is judged to be available at the site.

Settlement

Due to granular nature of the soils at the site, potential settlements associated with the proposed constructions are primarily the result of immediate settlement in which soil particle roll, slide, and grain being crushed under loading. Significant soil consolidation is not anticipated at the site.

A model developed for sands by Schmertmann (1970, 1978) was used to estimate the magnitude of the potential settlement.

The estimated maximum total and differential settlements are on the order of 75 and 30 millimeters, respectively. The majority of the settlement is expected to occur during construction, i.e. during and shortly after application of load.

Length of Reinforcement/Global Slope Stability

Based on the result of Global Slope Stability study, the following minimum lengths are recommended for the reinforcements of the MSE walls.

Top Wall	5.00 Meter
Middle Wall	6.00 Meter
Bottom Wall	7.00 Meter

Other Considerations

Generally, the length of soil reinforcement will be dependent on the height of the wall. To maintain global stability of the MSE walls, we recommend that, when determine the length of the reinforcement, the wall heights be taken from the bottom elevation of the subject wall to the top of the entire cross-section, i.e. the top of the highest wall at the same cross-section location.

We also recommend that the materials used to backfill the MSE walls be primarily cohesionless materials. The majority of the soils encountered in aforementioned selected borings appear to be suitable to backfill the MSE walls.

The recommendations contained in this report addendum are based on specific project information provided by the Office of Geotechnical Design – North (OGDN). If any changes are made during final project design, the OGDN should review those changes to determine if these foundation recommendations are still applicable.

This report is an addendum to the aforementioned previous foundation report. All conditions and recommendations contained in the previous report will apply.

If you have any questions regarding this memo, please contact Thomas Song at 916.227.1039 or John Huang at 916. 227.1037.

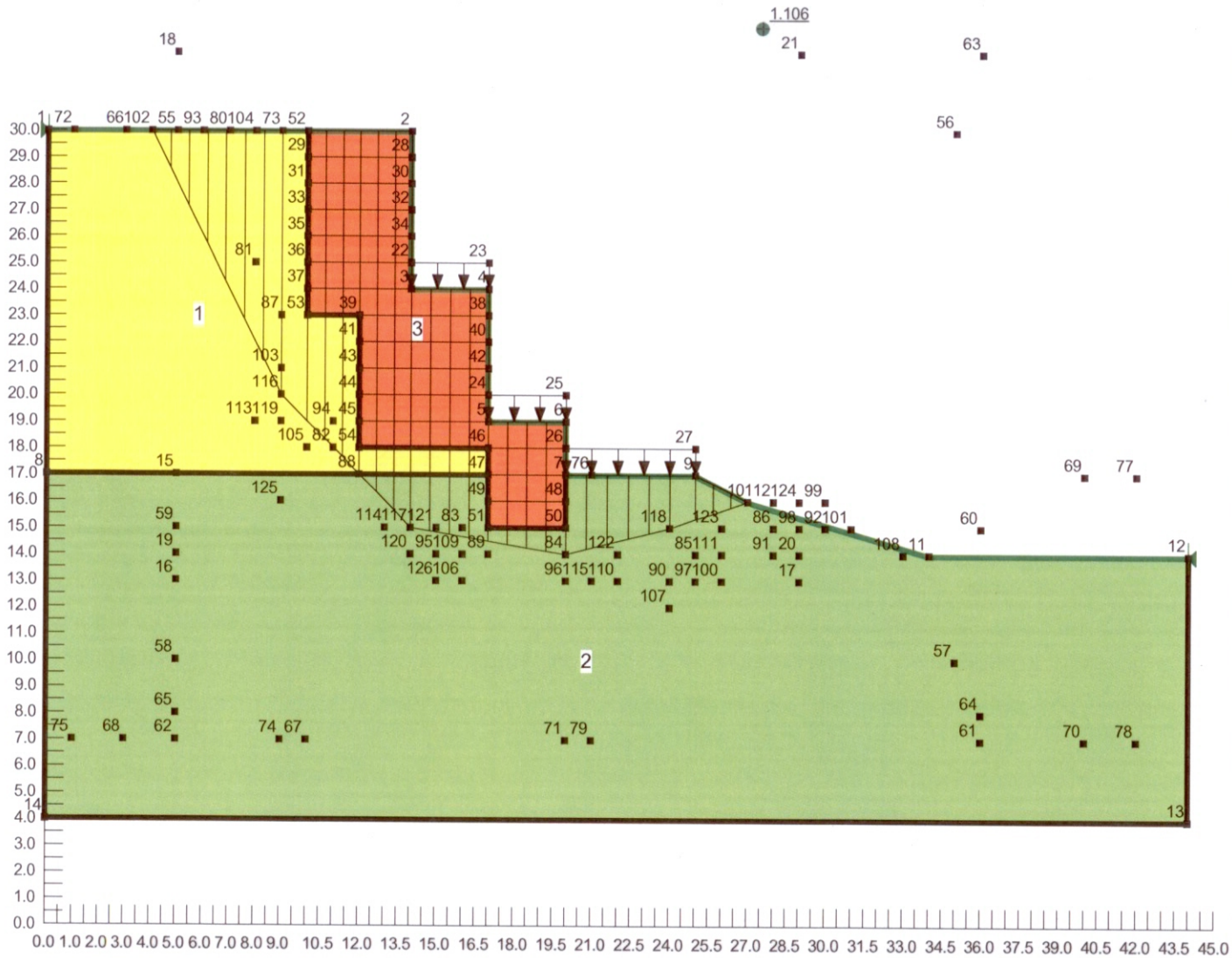
Report by:

THOMAS NAXIN SONG
Transportation Engineer, Civil
Office of Geotechnical Design – North
Branch E

c: R.E. Pending
JStayton
GDN File
GS File Room
Mislam
JHuang

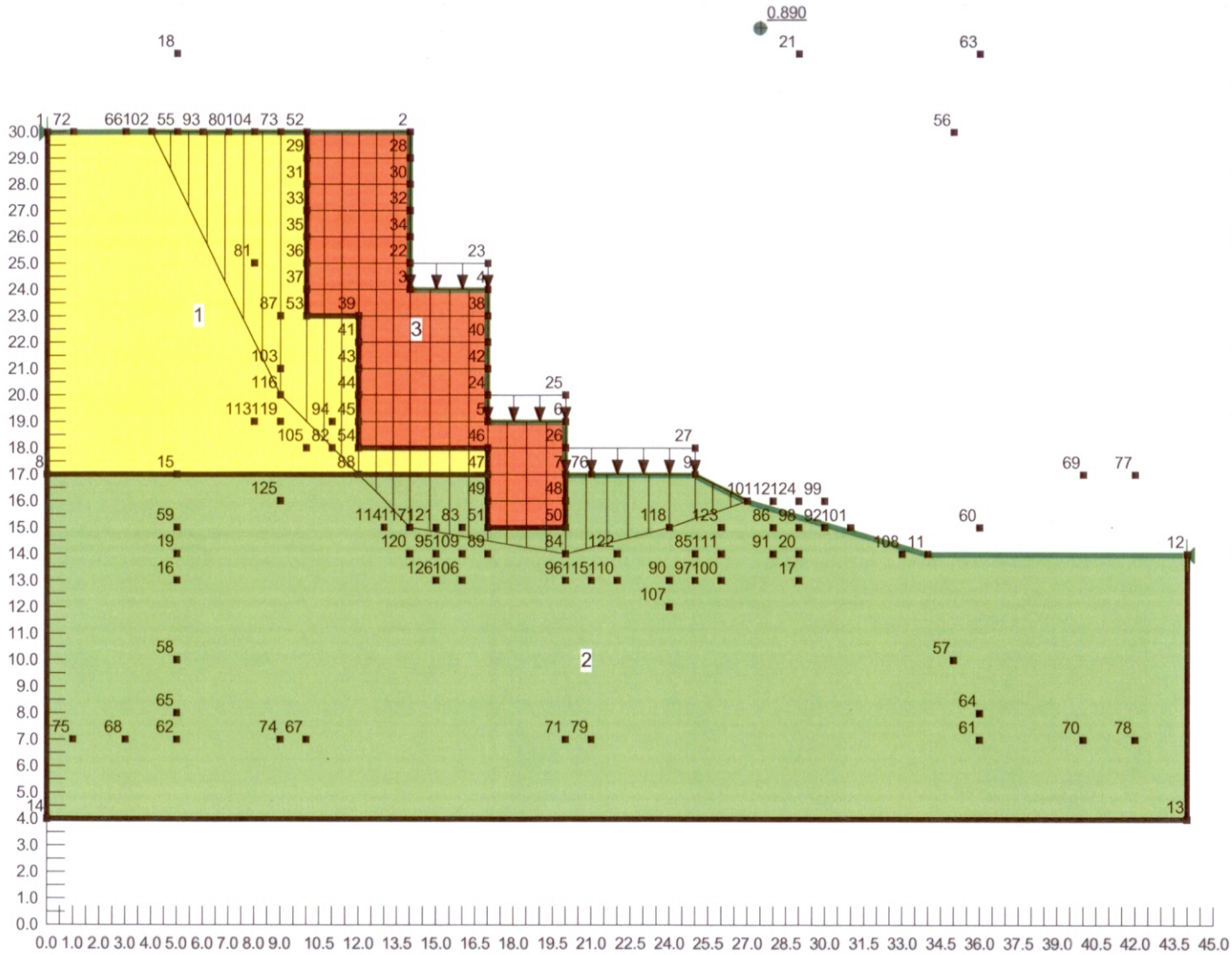
Appendix

Critical Slip Surfaces



CALTRANS
Division of Engineering Services
Geotechnical Services
Geotechnical Design -North

EA: 07-121841	**Critical Slip Surface**
Date: October 2008	**Proposed Wall – Static Loading**
07-LA-5 KP 43.0-58.0 **MSE Walls 53E0127 & 53E0128**	Plate No. 1



CALTRANS
Division of Engineering Services
Geotechnical Services
Geotechnical Design -North

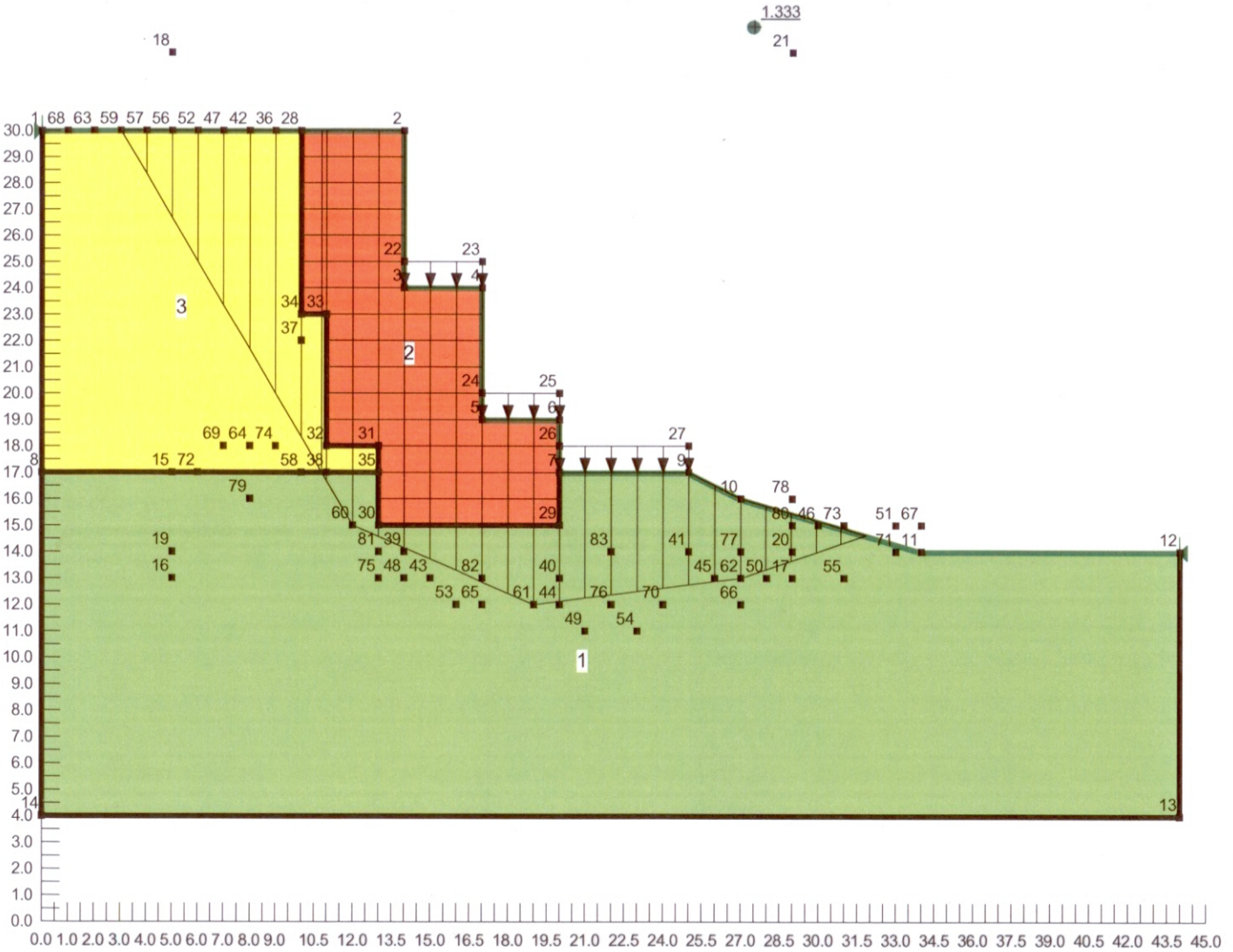
EA: 07-121841

Date: October 2008

Critical Slip Surface
Proposed Wall – Seismic Loading

07-LA-5 KP 43.0-58.0
MSE Walls 53E0127 & 53E0128

Plate No.
2



CALTRANS
Division of Engineering Services
Geotechnical Services
Geotechnical Design -North

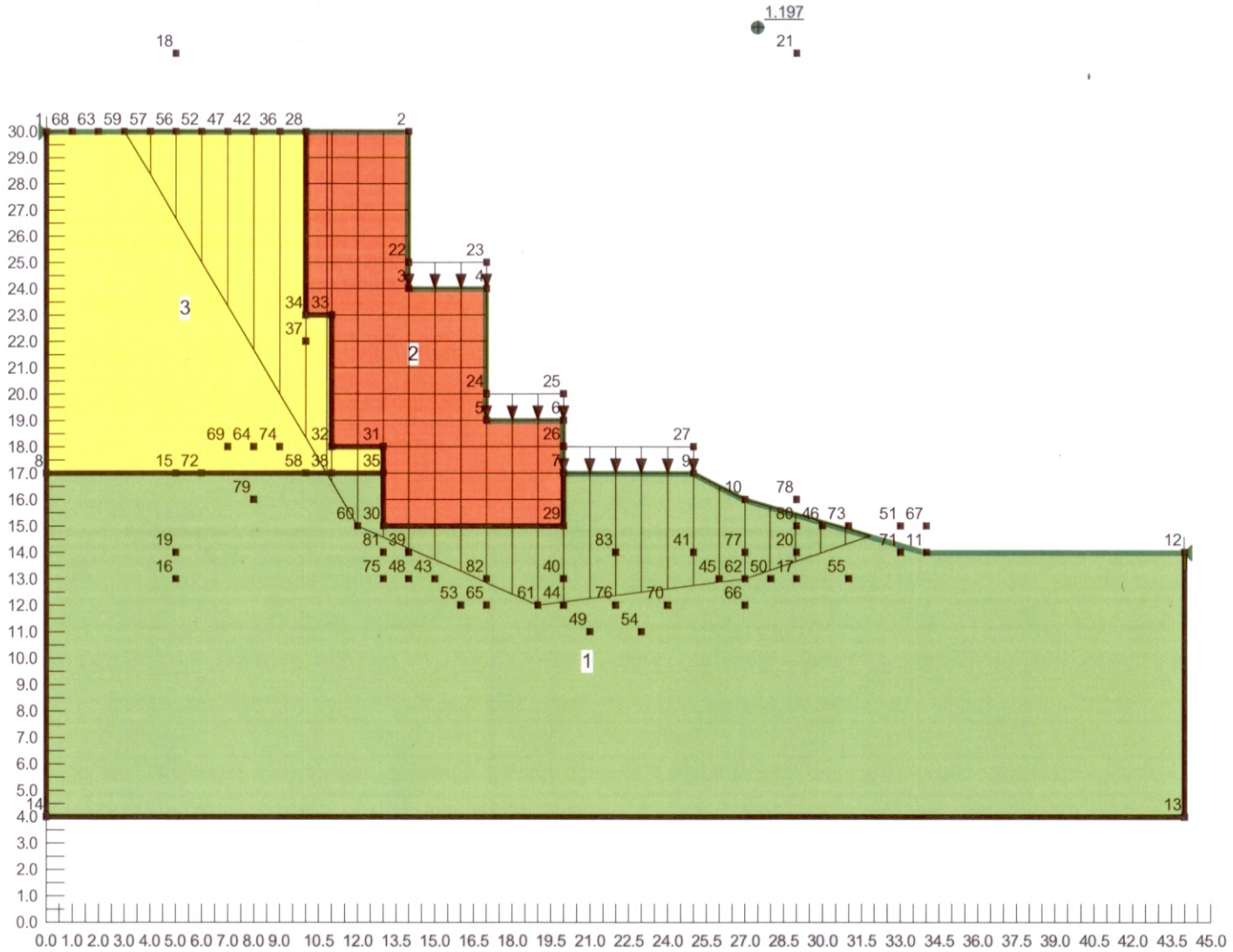
EA: 07-121841

Date: October 2008

Critical Slip Surface
Recommended Wall – Static Loading

07-LA-5 KP 43.0-58.0
MSE Walls 53E0127 & 53E0128

Plate No.
3



CALTRANS
Division of Engineering Services
Geotechnical Services
Geotechnical Design -North

EA: 07-121841

Date: October 2008

Critical Slip Surface
Recommended Wall – Seismic Loading

07-LA-5 KP 43.0-58.0
MSE Walls 53E0127 & 53E0128

Plate No.
4

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

GLOBAL SLOPE STABILITY ANALYSIS
for
MSE WALL Nos. C AND E, BRIDGE No. 53E0128, dated 11/20/08

ROUTE: 07-LA-5 42.8/47.3

State of California
Agency

Business, Transportation and Housing

Memorandum

Flex your power!
Be energy efficient!

To: MR. Gabriel Galo
Design Branch 15
Office of Bridge Design- South

Date: November 20, 2008
File: 07-LA-005
07-121841
MSE Walls Nos. C & E.

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Service
Office of Geotechnical Design - South 1, Branch D

Subject: Global Slope Stability Analysis for MSE Walls Nos. C &E at Station 4+30.4873

Per your request, transmitted to our office via email dated November 3, 2008, we performed a global stability analysis for the two MSE Walls Nos. C & E at Station 4+30.4873 ("P.O.C.") near Sta. 464+ 00 of State Hwy 5.

We reviewed the following references:

1. Log of Test Borings (LOTB's) for Providencia Avenue OH widen (total of 9 sheets) near Sta. 464+ 00 of State Hwy 5, Boring Nos. PR005-6, PR005-7, PR005-9A, PR 005-9B, PR005-8.

2. "Addendum to Foundation Design Recommendations-MSE Walls," dated October 27, 2008, prepared by Mr. Thomas Naxin Song of OGDN, Branch E.

Computer program SLOPE/W (GeoSlope International, Ltd., 2004) was used for Global Slope Stability analysis at the subject station only. A horizontal seismic coefficient, Kh, of 0.2g was utilized.

The soil parameters used in this analysis are shown in Table No.1.

Table No. 1

Material	Unit Weight (pcf)	Internal Friction Angle (degree)	Cohesion (psf)
Foundation Soil	120	32	N/A
Backfill Soil	120	34	N/A

The result of the analysis is tabulated in Table No. 2. The critical slip surfaces corresponding to this cross section are provided attached to this memo.

The lengths of the reinforcements and the difference between the two MSE walls were updated based on fax sheet transmitted to our office on November 5,2008 by Mr. Gabriel Galo.

Table No. 2

Station "P.O.C." 4+30.4873				Factor of Safety	
Top Wall		Bottom Wall			
Wall Height (m)	Length of Reinforcement (m)	Wall Height (m)	Length of Reinforcement (m)	Static Loading	Seismic Loading
7.7	5.5	5.313	7.00	1.46	1.103

If you have any questions or comments, please call Kevin Lai at (213) 620-2344 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 11/20/08

Kevin Y. Lai
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 11/20/08

REGISTERED PROFESSIONAL ENGINEER
SHIVA KARIMI
No. GE2661
Exp. 09/30/10
GEOTECHNICAL
STATE OF CALIFORNIA

Shiva Karimi, Ph.D., P.E., G.E.
Senior Transportation Engineer
Office of Geotechnical Design South 1
Branch D

11/20/08

James Holloway
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

cc:
OGDS1 File - Sacramento (MS-5)
OGDS1 LA File

MSE Wall

Slip Surface Option: EntryAndExit

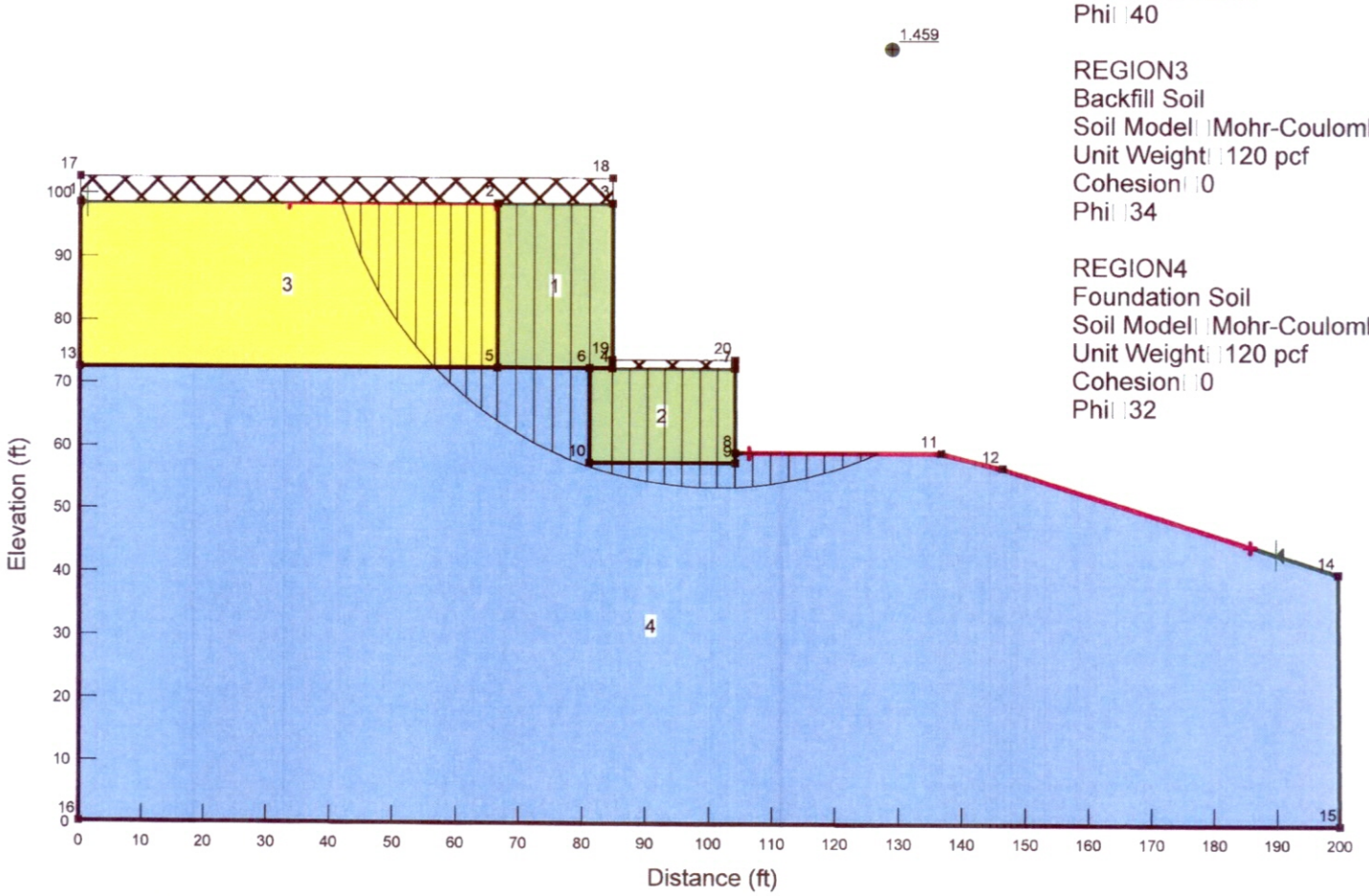
Directory: K:\Branch D\James\

File Name: MSE WALLS original ENGLISH UNITS.gsz

REGIONS 1&2
MSE
Soil Model | Mohr-Coulomb
Unit Weight | 125 pcf
Cohesion | 4000
Phi | 40

REGION3
Backfill Soil
Soil Model | Mohr-Coulomb
Unit Weight | 120 pcf
Cohesion | 0
Phi | 34

REGION4
Foundation Soil
Soil Model | Mohr-Coulomb
Unit Weight | 120 pcf
Cohesion | 0
Phi | 32



MSE Wall

Slip Surface Option: EntryAndExit

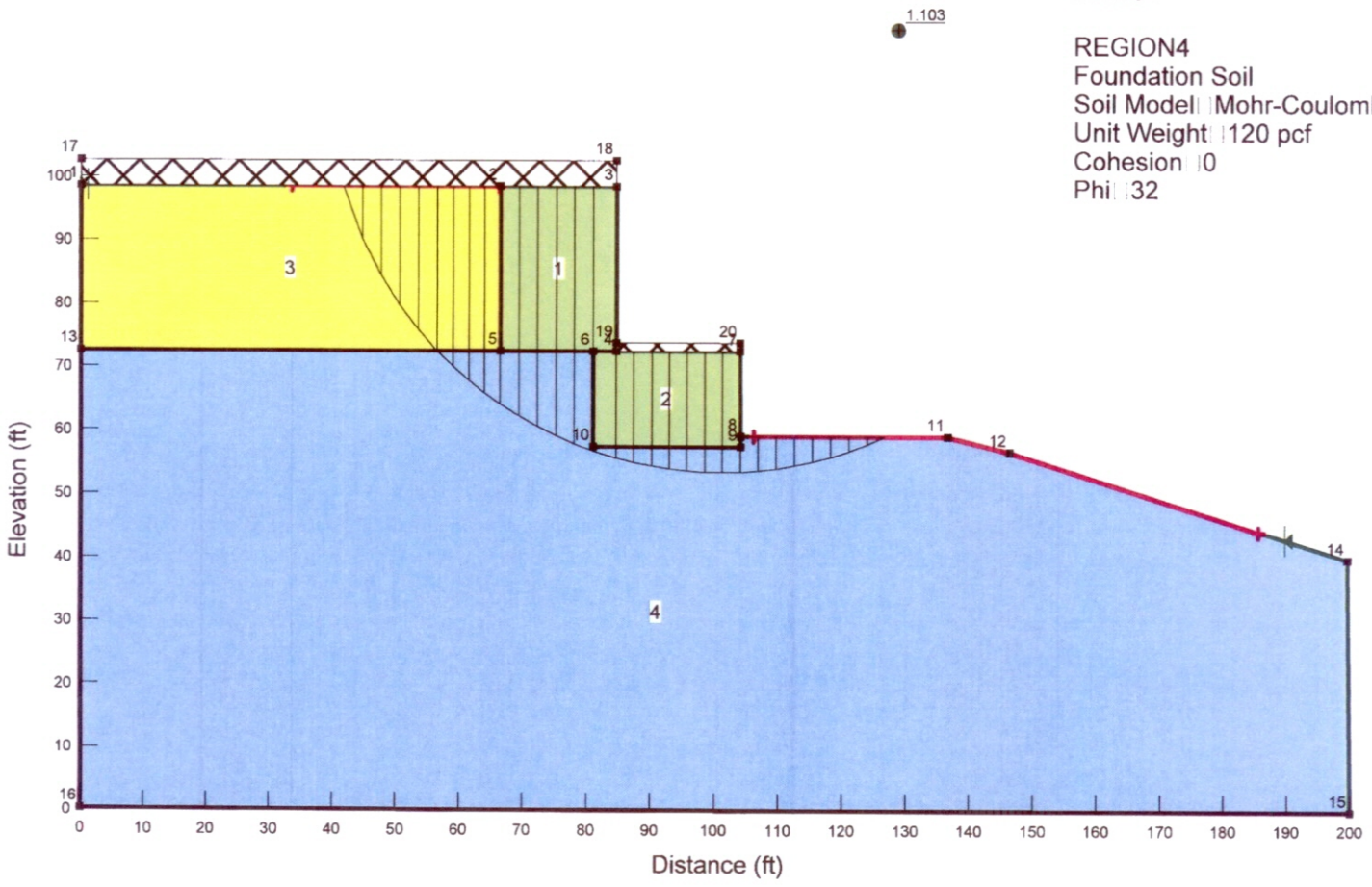
Directory: K:\Branch D\James\

File Name: MSE WALLS originalSeismic.gsz

REGIONS 1&2
MSE
Soil Model | Mohr-Coulomb
Unit Weight | 125 pcf
Cohesion | 4000
Phi | 40

REGION3
Backfill Soil
Soil Model | Mohr-Coulomb
Unit Weight | 120 pcf
Cohesion | 0
Phi | 34

REGION4
Foundation Soil
Soil Model | Mohr-Coulomb
Unit Weight | 120 pcf
Cohesion | 0
Phi | 32



FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

FINAL HYDRAULIC REPORT
for
LOS ANGELES RIVER BRIDGE and SEPARATION
BRIDGE No. 53-1075, dated 4/20/05

ROUTE: 07-LA-5 42.8/47.3

DIVISION OF STRUCTURES

FINAL HYDRAULIC REPORT

Los Angeles River Bridges (Widen)

Located on State Route 5, Los Angeles County

JOB: BRIDGE NO:	Los Angeles River Bridge and Separation (Widen) 53-1075 R/L
LOCATION:	07-LA-005-27.07-GNDL
EA:	07-121801
DATE:	April 20, 2005
WRITTEN BY: Jimmie Pallares, PE	REVIEWED BY: F. Julie Myers, PE

State of California | Business, Transportation and Housing Agency

Memorandum

To: YEN-HSI DENG
Branch Chief
Bridge Design Branch 15
Office of Bridge Design South

Date: April 20, 2005

Los Angeles River Bridges,
Br. Nos. 53-1075 R/L
07-121801

From: **DEPARTMENT OF TRANSPORTATION**
ENGINEERING SERVICE CENTER
STRUCTURE HYDRAULICS AND HYDROLOGY, MS #9-HYD 1/2I

Subject: Final Hydraulic Report for Los Angeles River Bridges

The Final Hydraulic Report for the above referenced project is attached for your records. If you have any questions, please call Jimmie Pallares at (916) 227-8230 (CALNET 498-8230) or me at (916) 227-8303 (CALNET 498-8303).

Sincerely,

Steve Jaques, Chief
Hydrology/Hydraulics Engineer

Attachment

cc: Ulysses Smpardos– Bridge Design Branch 15, Office of Bridge Design South
Timothy Tieu – District 7 Hydraulics/Senior Engineer, Area B

Hydrology & Hydraulics Report

General

The project proposes to join the adjacent bridges 53-1075 R/L. The widening project will add one lane to both bridges. The project will lower traffic delays, congestion, and improve safety.

Andre R. Daniel, of the U.S. Army Corps of Engineers – Los Angeles District, provided information for this report.

Los Angeles River Bridge Right (Br. No. 53-1075R, 07- LA-005-27.07-GNDL)

The dimensions of the five-span southeasterly bound bridge are 194.5 meter (638 feet) long by 22.25± meter (73± feet) wide by .2 meter (.63 feet) deep.

Los Angeles River Bridge Left (Br. No. 53-1075L, 07- LA-005-27.07-GNDL)

The dimensions of the five-span southeasterly bound bridge are 194.5 meter (638 feet) long by 22.25± meter (73± feet) wide by .2 meter (.63 feet) deep.

The pier footings and pier walls are continuous (continuous foundation supporting both structures).

This final hydraulic report makes references to data found in the Los Angeles County Drainage Area (Review) Part 1-Base Conditions dated December 1991 and plans titled "Los Angeles River Improvement-Derrick Stone Fill" Sheets 2 and 9 of 9, both dated July 1959. All items were provided from the US Army Corps of Engineers, Los Angeles District. In addition, the CAiCE file titled "LARIVER" was used for this report.

Note: All calculated elevations in this report are based on the CAiCE file titled "LARIVER" provided by Structure Design. Please verify datum references on the bridge layouts and make elevation adjustments as required.

Brease, from H_2Flow Consulting – version 3.2, hydraulic computer program used to model the bridge site waterways. This program estimated the flood velocities and stage elevations.

Basin - General

The bridge site is located within the western section of the Los Angeles River Basin. Dams Sepulveda and Hansen are located upstream of the bridge site and will influence the hydraulics within the basin. Tributaries to the Los Angeles River include Bell Creek, Arroyo Calabasas, Western Burbank Cannel, Pacoima and Tujunga Wash. This is a heavily populated area. The Corp of Engineer's document list the basin size as 1,204 km^2 (465 mi^2).

Channel

Los Angeles River is a trapezoidal channel with concrete sidewalls and the channel base has a 1.5 meter (5 feet) deep cobble stone lining. The typical dimensions of the channel are 75 meter (246 feet) wide base and a 6.2 meter (20.2 feet) height. The channel walls have a 1 to 3.3 side slope. The Corp of Engineers document list the channel capacity at 1,133 cms (40,000 cfs). The hydraulic skew, channel to pier alignment, is zero.

Discharge

The Corp of Engineering document list the Q_{50} and Q_{100} flowrates as 1,795 cms (63,400 cfs) and 2,376 cms (83,900 cfs) respectively. These flowrates are higher than the channel capacity and will result in flooding the adjacent highways.

Velocity and Stage

The table below lists average velocities and stage elevations.

Bridge	V_{100}		Q_{100} Stage Elevation		Q_{50} Stage Elevation	
	(m/s)	(ft/s)	(m)	(ft)	(m)	(ft)
Los Angeles River Right	3.9	13	142.6	467.7	141.6	464.6
Los Angeles River Left	3.9	13	142.6	467.7	141.6	464.6

Scour and Channel Degradation

Scour and channel degradation are not a problem due the concrete and cobble stone linings.

Scour and Channel Degradation, cont.

In 2001, CT Office of Specialty Investigations assessed the bridge's scour potential in accordance with FHWA Technical Advisory T5140.23, "Evaluating Scour at Bridges". The bridge was determined to be not scour critical. The Item 113 scour vulnerability code is 8, "Bridge foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be above top of footing by assessment, by calculation or by installation of properly designed countermeasures."

Minimum Soffit Elevation

The minimum soffit elevation is based on the 100-year water surface elevation. The available freeboard is measured from the lowest soffit elevation to the minimum soffit elevation.

Bridge	Minimum soffit Elev.		Available Freeboard Distance	
	(m)	(ft)	(m)	(ft)
Los Angeles River Right	142.6	467.7	2.14	7.03
Los Angeles River Left	142.6	467.7	2.85	9.4

Bank Protection

Bank protection is not needed due the concrete and cobble stone linings.

Summary Information for the Bridge Designer

Below is a summary of key design parameters based on the hydrology and hydraulic analysis performed for each structure:

Los Angeles River Bridge Right (Br. No. 53-1075R, 07- LA-005-27.07-GNDL)

Minimum Soffit Elevation	142.6 m
Potential Scour Depth at Piers/Abutments	Not Applicable
Required Waterway	601 m^2
Average Velocity	3.9 m/s

Los Angeles River Bridge Right (Br. No. 53-1075R, 07- LA-005-27.07-GNDL), continued

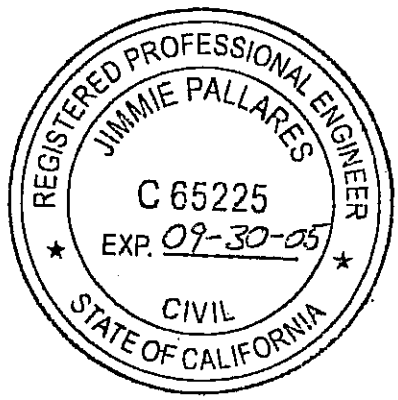
HYDROLOGIC SUMMARY			
Drainage Area: 1,204 km^2			
	Design Flood	**Base Flood**	**Overtopping Flood**
Frequency (yrs)	50	100	>>500
Discharge (m^3/s)	1,795	2,376	
Water Surface Elevation at Bridge (m)	141.6	142.6	144.7
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.			

Los Angeles River Bridge Left (Br. No. 53-1075L, 07- LA-005-27.07-GNDL)

Minimum Soffit Elevation	142.6 m
Potential Scour Depth at Piers/Abutments	Not Applicable
Required Waterway	601 m^2
Average Velocity	3.9 m/s

HYDROLOGIC SUMMARY			
Drainage Area: 1,204 km^2			
	Design Flood	**Base Flood**	**Overtopping Flood**
Frequency (yrs)	50	100	>>500
Discharge (m^3/s)	1,795	2,376	
Water Surface Elevation at Bridge (m)	142.6	142.6	145.45
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.			

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.



Jimmie Pallares

REGISTERED CIVIL ENGINEER (SIGNATURE)

C 65225 — REGISTRATION NUMBER

04-28-05 — DATE:

Hi Traci,

This is the response to your request, and the US Army Corps of Engineers Study offered only for 10 to 100-year storm return. The water surface elevation is shown below:

LOS ANGELES RIVER BRIDGE (BR. No. 53-1075 R&L)

Discharge	Q (Cfs)	W S E (Ft)	W S E (M)
10-year	40,300	456.27	139.07
25-year	53,900	459.57	140.07

Notes:

1. The water surface elevation was estimated by using BrEase, Ver. 3.1 – A Hydraulic software.

2. The discharge for 10 and 25-year event were obtained from Los Angeles County Drainage Area (Review) prepared by US Army Corps of Engineers, December 1991.

3. US Army Corps of Engineers owns and regulates the discharges of three dams in this area. The study was prepared for 10,25, 50 and 100-year storm event.

This is a concrete lining channel, once the rain stop, the water surface will quickly goes down to normal depth since the velocity is fast (14 Ft/s for 100-year storm event), and the channel is well drain. US Army Corps of Engineers maintains and controls the discharge in the channel to avoid flooding at local streets; therefore over topping in the trapezoid channel is not likely to happen. The elevation of the water table measured by Geotech on December 21, 2006 was 430.11 Ft (131.31M) or about 9 feet to 10 feet below the bottom of the channel.

If you have any questions, please call me at 916-227-9859.

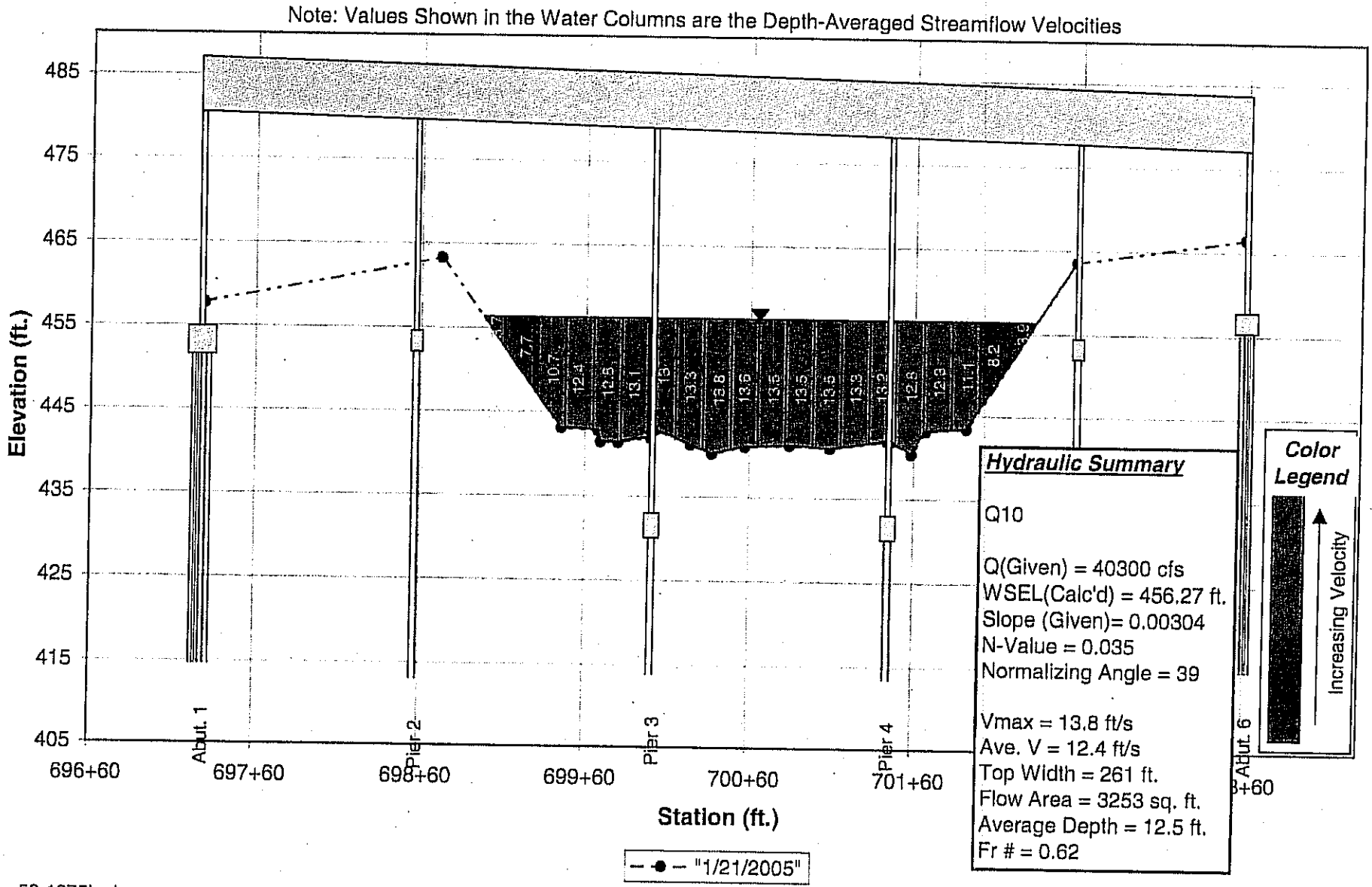
Sincerely,

John Pham, P.E.
Structures Hydraulics

Bridge ID: 53-1075L

07-LA-005-27.07

Los Angeles River Bridge - Upstream



53-1075L.xlu

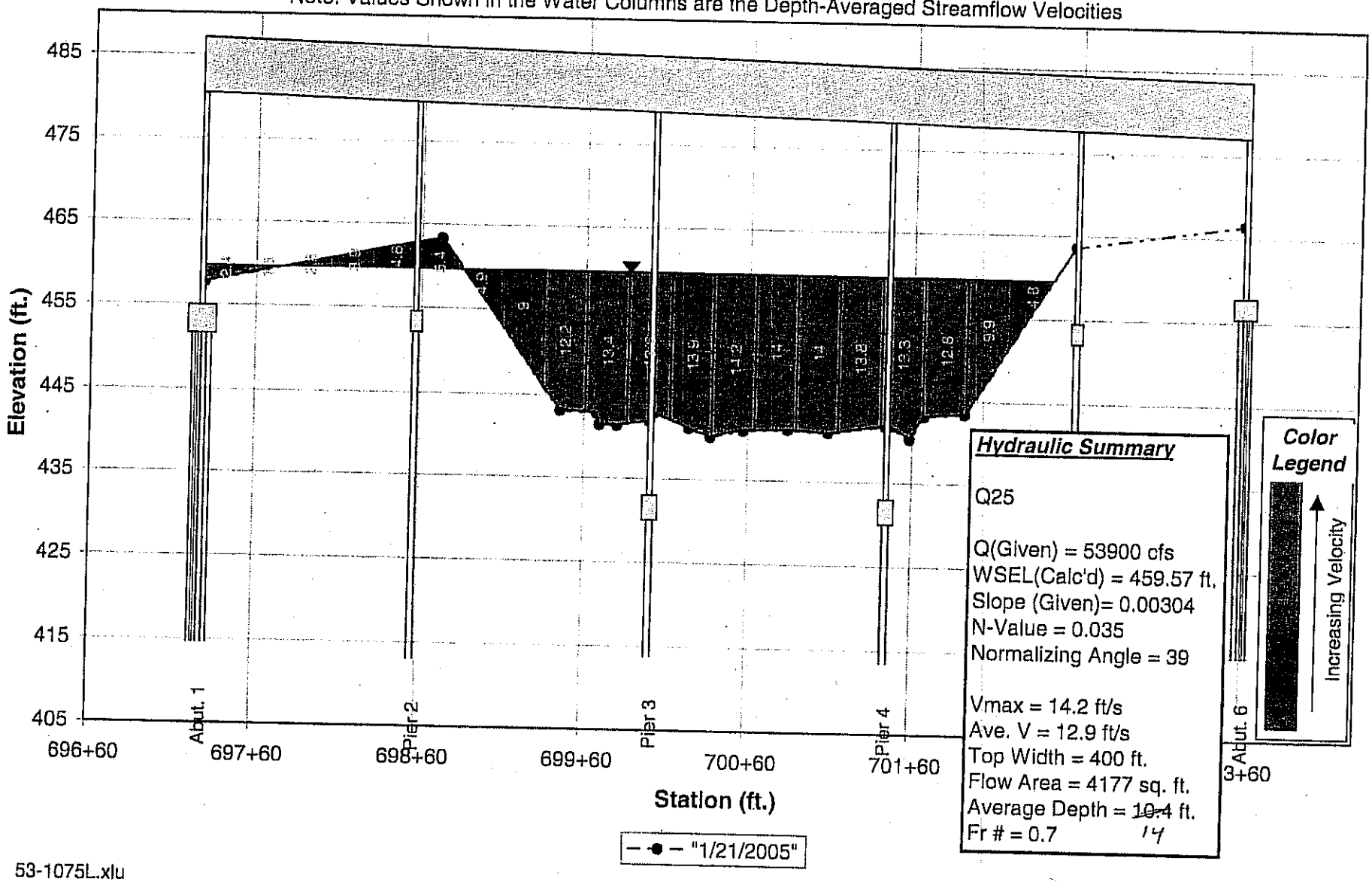
By JP on 1/19/2007

Bridge ID: 53-1075L

07-LA-005-27.07

Los Angeles River Bridge - Upstream

Note: Values Shown in the Water Columns are the Depth-Averaged Streamflow Velocities



53-1075L.xlu

By JP on 1/19/2007

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

HYDRAULIC REPORT
for
PROVIDENCIA AVENUE OVERHEAD
BRIDGE No. 53-1085, dated 8/16/06

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing

Memorandum

To : Celina Aviles , Senior T.E.
Design Branch-D

Date : August 16,2006 .
File : 121801.hyd
I-5 HOV Project /
KM- 43.0/58.0

From : DEPARTMENT OF TRANSPORTATION
District 07

Subject : **Hydraulic Study at Providencia Avenue Overhead at Rail Road**

Please refer to your memorandum of July 26,2006 relating to the subject matter. Based on our **"As Built Plan"** under **Contract No. 58-14vc10 dated May 07,1959** , bearing **sheet no . 129 of 260** , the *following was observed* and later on verified in the field to avoid conflict in the widening of O/H Bridge and rail road :

i) **6 feet X 3 feet Reinforced Concrete Box Culvert** : Existing Box Culvert crossing the Rail Road is **shown abondoned** and is **verified in the field.**

ii) **18 inches dia Concrete Pipe with Steel Casing** : This is not a storm drain and is **a water line** crossing rail road . It is owned,operated and maintained by the City **of Burbank.**

iii) **69 inches Dia Reinforced Concrete Pipe Storm Drain** : This is an existing Storm drain **as shown in the Drainage Plan D-12** . This pipe is parallel to Abutment #9 and *is not in conflict with the wing Wing Walls of the abutment as well as Rail road.* The profile of new extended Wing walls (provided by Structures Design/Foundation plan) and that of existing 69 inches RCP Storm drain are 35 feet apart vertically .

Conclusion : In view of above, it is concluded that there is no interference or conflict of any Storm Drain in the proposed widening of Overhead Bridge as well as Rail Road .

Dave Bhalla
Senior Transportation Engineer
Hydraulics Branch ,Group-C

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

FOUNDATION REVIEW

Los Angeles River Bridge and Separation, Bridge No. 53-1075.
Hazel Street Pedestrian Undercrossing, Bridge No. 53-1076.
Sonora Avenue Undercrossing, Bridge No. 53-1077.
Western Avenue Undercrossing, Bridge No. 53-1079.
Allen Avenue Undercrossing, Bridge No. 53-1081.
Alameda Avenue Undercrossing, Bridge No. 53-1082.
Providencia Avenue Overhead, Bridge No. 53-1085.
Verdugo Avenue Undercrossing, Bridge No. 53-1086.

ROUTE: 07-LA-5 42.8/47.3

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 11/6/08

Los Angeles River Br & Sep.
Structure Name

07 - LA - 005 - ~~53~~ 43.6
District County Route Post Km

07-124841 53-1075
E.A. Number Structure Number

Foundation Report By: J. Pratt Dated: 4/21/08

Reviewed By: T Menard (OSD) R. Price (GS)

General Plan Dated: 10/30/08 Foundation Plan Dated: 10/31/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☐ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Trac Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 11/6/08

Hazel St. Ped UC
Structure Name

07 - LA - 005 - 44.2
District County Route Post Km

07-121841 53-1076
E.A. Number Structure Number

Foundation Report By: J. Pratt Dated: 4/9/08

Reviewed By: T. Menard (OSD) R. Price (GS)

General Plan Dated: 9/2/08 Foundation Plan Dated: 8/21/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☐ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Toni Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

Date: 4/8/08

Sonora Ave UC
Structure Name

07 – LA – 005 – 44.32
District County Route Post Km

District Project Development
District Project Engineer

07-121841 53-1077
E.A. Number Structure Number

Foundation Report By: W. Bertucci Dated: 2/27/06 ; 11/20/07

Reviewed By: Traci Menard (OSD) R. Price (GS)

General Plan Dated: 2/21/08 Foundation Plan Dated: 2/20/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- — Pile Lengths
- — Predrilling
- — Pile Load Test
- — Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- — Location of Adjacent Structures and Utilities
- — Stability of Cuts or Fills
- — Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- — Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Traci Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 4/8/08

Western Ave. U.C.
Structure Name

07 - LA - 005 - 44.8
District County Route Post Km

07 - 121841 53-1079
E.A. Number Structure Number

Foundation Report By: W. Bertucci
Dated: 7/27/06; 11/22/07; 3/10/08

Reviewed By: T. Menard (OSD) R. Price (GS)

General Plan Dated: 5/3/07
Foundation Plan Dated: 3/27/07

☐ No changes. ☒ The following changes are necessary.

The new abutment loads will be supported on the existing piles. No new abutment pile are required.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- — Stability of Cuts or Fills
- — Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Tran Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 4/8/08

Allen Ave. U.C.
Structure Name

07 – LA – 005 – 45.2
District County Route Post Km

07-121841 53-1081
E.A. Number Structure Number

Foundation Report By: W. Bertucci Dated: 7/27/06

Reviewed By: T. Menard (OSD) R. Price (GS)

General Plan Dated: 4/7/08 Foundation Plan Dated: 2/19/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Trevi Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

Date: 4/8/08

Alameda Ave UC
Structure Name

07 - LA - 005 - 45.7
District County Route Post Km

District Project Development
District Project Engineer

07-121841 53-1082
E.A. Number Structure Number

Foundation Report By: W. Bertucci
Dated: 7/27/06; 11/20/07; 3/10/08

Reviewed By: T. Menard (OSD) R. Price (GS)

General Plan Dated: 3/14/08 Foundation Plan Dated: 3/19/08

☐ No changes. ☒ The following changes are necessary.

The new abutment loads will be supported on the existing piles. No new abutment piles are required.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- — Footing Elevations, Design Loads, and Locations
- — Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- — Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Tom Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 11/6/08

Providencia Ave. OH
Structure Name

07 - LA - 005 - 46.1
District County Route Post Km

07-121841 53-1095
E.A. Number Structure Number

Foundation Report By: B Bertucci Dated: 10/29/08

Reviewed By: T. Menard (OSD) R. Price (GS)

General Plan Dated: 9/1/08 Foundation Plan Dated: 9/2/08

☑ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- — Substitution of H Piles For Concrete Piles ☐ Yes ☑ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Terri Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

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

Geotechnical Services
1. GS (Sacramento)
2. GS

District Project Development
District Project Engineer

Date: 4/8/08

Verdugo Ave. UC
Structure Name

07 - LA - 005 - 46.5
District County Route Post Km

07-121841 53-1086
E.A. Number Structure Number

Foundation Report By: W. Bertucci
Dated: 7/27/06; 11/20/07; 3/10/08

Reviewed By: T. Menard (OSD)
R. Price (GS)

General Plan Dated: 1/14/08
Foundation Plan Dated: 1/16/08

☒ No changes. ☐ The following changes are necessary.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☒ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Traci Menard 15
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

VIBRATION MONITORING and PILE DRIVING SYSTEM SUBMITTAL for I-5 BRIDGES DATED 4/14/09

ROUTE: 07-LA-5 42.8/47.3

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MS. TRACI MENARD
Chief, Bridge Design Branch15
Office of Bridge Design South 1
Division of Engineering Services
Structure Design; MS 9-3/3G

Date: April 14, 2009

File: 07-LA-05-KP43.0/58.0
07-121841

Bridge No. 53-1077
Bridge No. 53-1079
Bridge No. 53-1082
Bridge No. 53-1085
Bridge No. 53-1086

Attention: Andrew Rittenhouse

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South 1, Branch D

Subject: Vibration Monitoring and Pile Driving System Submittal for I5 Bridges, Sonora Ave. UC Bridge No. 53-1077 (widen & Retrofit), Western Ave. UC Bridge No. 53-1079 (widen), Alameda Ave. UC Bridge No. 53-1082 (widen), Providencia Ave. OH Bridge No. 53-1085 (widen), Verdugo Ave. UC Bridge No. 53-1086 (widen & Retrofit)

Based on Mr. Andrew Rittenhouse's request, transmitted to our office (Geotechnical Design South 1) via email dated March 24, 2009, due to proximity of the existing structures, Vibration Monitoring are recommend for all subject structures (Bridge Nos. 53-1077, 53-1079, 53-1082, 53-1085, and 53-1086) before and during driven pile installation procedures.

In addition, Driving System Submittal with minimum number of control locations as shown in Table No. 1 below is required.

Table No. 1 Driving System Submittal Control Locations

Bridge Name and Number	Control Location
Sonora Ave. UC Bridge No. 53-1077	Abutment 1
Western Ave. UC Bridge No. 53-1079	Bent 2
Alameda Ave. UC Bridge No. 53-1082	Bent 2
Providencia Ave. OH Bridge No. 53-1085	Abutment 1, Bent 4, Abutment 9
Verdugo Ave. UC Bridge No. 53-1086	Abutment 1

If you have any questions or comments, please call Kevin Lai at (213) 620-2344 or Shiva Karimi at (213) 620-2146.

Prepared by: Date: 4/14/2009

Kevin Lai
Transportation Engineer
Office of Geotechnical Design South 1
Branch D

Supervised by: Date: 4/14/09

REGISTERED PROFESSIONAL ENGINEER
SHIVA KARIMI
No. GE2651
Exp. 06/30/10
GEOTECHNICAL
STATE OF CALIFORNIA

Shiva Karimi, Ph.D., P.E., G.E., Chief
Office of Geotechnical Design South 1
Branch D

Cc: R.E. Pending File
Luqi Yang (Specs.)
Sacramento file
LA file

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

LEAD SITE INVESTIGATION REPORTS (PORTIONS)

Lead Site Investigation Report I-5 HOV, North of SR-134 to 3.0 Kilometers South of SR-170, KP 43.0/58.0 (PM 26.7/36.4), Burbank, Glendale, and Los Angeles, California, Task Order No.07A1752-09, EA 121801, Contract No. 07A1752

Lead Site Investigation Report, Providencia Avenue Undercrossing, 07-LA-5 KP 43.0/47.3 (PM 26.7/29.4), Los Angeles County, California, Task Order No.7, EA 121841, Statewide Contract 07A2211

ROUTE: 07-LA-5 42.8/47.3

June 30, 2008
Project No. 207126007

Dr. Ayubur Rahman
State of California
Department of Transportation
District 7, 12th Floor, MS-16
Office of Environmental Engineering and Corridor Studies
100 South Main Street
Los Angeles, California 90012

Subject: Lead Site Investigation Report
07-LA-5 KP 43.0/47.3 (PM 26.7/29.4)
Los Angeles County, California
Task Order No. 7
EA No. 121841, Contract No. 07A2211

Dear Dr. Rahman:

In accordance with the State of California, Department of Transportation (Department) Contract No. 07A2211, Task Order No. 7, Ninyo & Moore has conducted a Lead Site Investigation at selected locations along Route 5 from kilo post (KP) 43.0 to 47.3 (post mile [PM] 26.7 to 29.4) in Los Angeles County, California. The following report documents our methodologies, findings, conclusions, and recommendations.

We appreciate the opportunity to be of service to you on this project.

Sincerely,
NINYO & MOORE

Peter Sims
Staff Environmental Geologist

Nancy J. Anglin, R.E.A.
Senior Engineer

David I. Shaler, P.G. 6370
Senior Geologist

PROFESSIONAL GEOLOGIST
DAVID I. SHALER
NO. 6370
EXP. 7/31/10
STATE OF CALIFORNIA

PDS/DIS/NA/sc/mlc

Distribution: (7) Addressee (6 hard copies and 1 CD)

EXECUTIVE SUMMARY

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct an Aerially Deposited Lead (ADL) Site Investigation (SI) along Route 5 from kilo post (KP) 43.0 to 47.3 (post mile [PM] 26.7/29.4) in Los Angeles County, California, shown in Figure 1. W ork was conducted in general accordance with the Department Contract No. 07A2211, Task Order (TO) No. 07A2211-07, and Ninyo & Moore's Aerially Deposited Lead Survey and Site Investigation Work Plan, dated April 15, 2008.

Four borings were advanced by hand auger for this task in general accordance with the work plan. Proposed borings were augered to the depths outlined in the work plan with the exceptions noted in the variance section. Soil sample depths varied between locations but were collected up to 3 feet below ground surface (bgs). Samples were not collected to the proposed depth of 5 feet bgs due to refusal.

Eighteen samples (including duplicates) were collected from four locations, divided between two groups. Among the four borings augered, nine planned samples were not collected due to refusal. In accordance with the work plan, borings were located in unpaved areas in proposed construction locations along Route 5. The boring locations are presented on the Figure 2 and Layouts 11 and 12.

None of the eighteen soil samples collected (including duplicates) contained concentrations of lead that exceeded the California Total Threshold Limit Concentration (TTLC) for lead (1,000 milligrams per kilogram [mg/kg]). In addition, none of the soil samples collected (including duplicates) exceeded the 3,397-mg/kg limit provided in the Department of Toxic Substances Control (DTSC) variance modification letter dated December 13, 2002, which modified the September 22, 2000, California Environmental Protection Agency (Cal-EPA) DTSC variance to Department District 7 (variance) as amended by Assembly Bill 414. This variance was extended to June 30, 2009, by the DTSC on June 17, 2008. Four soil samples (including duplicates) contained concentrations of total lead less than the TTLC of 1,000 mg/kg but more than or equal to 50 mg/kg, which is 10 times the California Soluble Threshold Limit Concentration (STLC) for lead (5 milligrams per liter [mg/l]). The eighteen samples were analyzed for soluble lead

(STLC), in accordance with the work plan. Four samples contained STLC above 5 mg/l. The eighteen soil samples were further analyzed for soluble lead using the de-ionized water Waste Extraction Test (DI-WET) Method. One sample contained soluble lead (DI-WET) at a concentration greater than or equal to 0.5 mg/l.

In accordance with the work plan, all soil samples (including duplicates) were analyzed for soluble lead by the Toxicity Characteristic Leaching Procedure (TCLP). None of the eighteen samples (including duplicates) analyzed for TCLP contained soluble lead greater than or equal to 5 mg/l. Eighteen samples (including duplicates) contained TCLP lead concentrations less than 5 mg/l. The results are presented on Table 1.

In accordance with the work plan, one sample per borehole was tested for soil pH using. Four randomly selected samples were analyzed for pH. The pH values ranged from 5.9 to 8.6. Results of the lead and pH testing are presented on Table 1.

In accordance with the work plan, surface samples were analyzed for Title 22 Metals to evaluate if a concern for other heavy metals, with the exception of lead, exists at the project site. With one exception the detected concentrations of these metals did not exceed 10 times their respective STLC value or their respective TTLC value. One sample (1001-101-0) exceeded the 10 times STLC value for selenium and the next deeper sample from that boring (1001-101-1) was analyzed for selenium STLC. The analytical results for selenium STLC for 1001-101-0 and 1001-101-1 were non-detect. Results of the Title 22 Metals testing are presented on Table 2.

The cost-effective layer combinations based on the analytical data are presented on the block diagrams for each group in Appendix B.

Recommendations for Soil to be Reused On Site

Group 1 – Northbound (Borings 1001-101 and 1001-104):

- Soil from the surface layer is Y-2 type soil. Soil of this type is hazardous but can be re-used at the job site in accordance with the variance. Place a minimum of five feet above the

maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department.

- Soil from the 1-foot layer is Y-1 type soil. Place a minimum of five feet above the maximum water table elevation and cover with at least 1 foot of non-hazardous soil.
- Soil from the 2 and 3-foot layers is X type soil. Soil of this type is non-hazardous and can be re-used on the job site without restrictions based on the lead content of the soil.
- Soil from the layers combined is Y-2 type soil. Soil of this type is hazardous but can be re-used at the job site in accordance with the variance. Place a minimum of five feet above the maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department.

Group 2 – Southbound (Borings 1001-102 and 1001-103):

Soil from this group combined or separated is X type soil. Soil of this type is non-hazardous and can be re-used on the job site without restrictions based on the lead content of the soil.

Recommendations for Soil to be Disposed Off Site

Group 1 – Northbound (Borings 1001-101 and 1001-104):

- Soil from the surface and 1-foot layers is Z-2 type soil. Soil of this type is hazardous. If soil of this type is to be disposed off site, the soil should be disposed at a Class 1 disposal site and all other Title 22 restrictions apply.
- Soil from the 2 and 3-foot layers is X type soil. Soil of this type is non-hazardous and can be disposed of off-site without restrictions based on the lead content of the soil.
- Soil from the layers combined is Z-2 type soil. Soil of this type is hazardous. If soil of this type is to be disposed off site, the soil should be disposed at a Class 1 disposal site and all other Title 22 restrictions apply.

Group 2 – Southbound (Borings 1001-102 and 1001-103):

Soil from this group combined or separated is X type soil. Soil of this type is non-hazardous and can be disposed of off-site without restrictions based on the lead content of the soil.

1. INTRODUCTION

The State of California, Department of Transportation (Department), authorized Ninyo & Moore to conduct an Aerially Deposited Lead (ADL) Site Investigation (SI) along Route 5 from kilo post (KP) 43.0 to 47.3 (post mile [PM] 26.7 and 29.4) in Los Angeles County, California. Work was conducted in general accordance with the Department Contract No. 07A2211, Task Order (TO) No. 7, and Ninyo & Moore's Aerially Deposited Lead Survey and Site Investigation Work Plan, dated April 15, 2008.

The purpose of the SI was to evaluate the potential presence of ADL-impacted soil with concentrations in excess of acceptable regulatory limits in the vicinity of the project location. The project location was investigated for concentrations of ADL and Title 22 Metals. The presence of ADL is suspected in the soil as a result of historical vehicle emissions during the time of leaded gasoline usage. The information obtained from the limited soil sampling and laboratory testing was used to evaluate the method of re-use or disposal of soil excavated during the proposed construction on Route 5, which includes widening of the freeway for high occupancy vehicle (HOV) lanes and the placement of support columns. The data will also help evaluate the health risk when handling ADL-impacted soil during construction. The Department's convention regarding layer thickness definition was used for this project. The layers are defined as surface (surface to ½ foot), 1-foot (½ to 1½ feet), 2-foot (1½ to 2½ feet), and 3-foot (2½ to 3½ feet).

2. PROJECT DESCRIPTION

The following sections describe the site, purposes, and limitations of this project.

2.1. Site Description

The site was divided into two groups along the project location (Table 1). Soil samples were collected from the unpaved areas adjacent to Route 5, as noted on the boring layout plans (BLPs) provided by the Department and described in the TO dated March 27, 2008. Soil borings augered for this SI were located next to the Route 5 in current shoulder and slope areas.

2.2. Purposes

The purposes of the TO were: 1) to analyze for ADL in soil to evaluate if concentrations exceed acceptable regulatory levels at the above-mentioned locations and 2) to provide recommendations regarding the handling of the soil for re-use or disposal. Analytical results are presented on Tables 1 and 2.

2.3. Variations to the Work Plan

The SI boring locations were augered in general accordance with the work plan. Among the 4 borings augered, 9 planned samples were not collected due to refusal. Based on direction from the Department, when refusal was met, the boring location was moved and re-tried once, giving each boring a total of two attempts to reach the desired depth. Depths that were successfully sampled in the earlier attempts at the same location were not sampled again. Borings were planned to total depths of 5 feet bgs. This depth was not reached in any borings due to refusal. Actual boring depths are shown on Table 1.

Based on the analytical results and geographic distribution of boring locations, the TO was broken in two groups.

3. INVESTIGATION METHODS

The field work was conducted on May 5, 2008. Traffic control was not necessary for the collection of samples. Hand augering was conducted by Ninyo & Moore. The following sections describe soil sampling conducted by hand auger, investigative-derived wastes, laboratory analyses, and Geographical Information System (GIS) data.

3.1. Health and Safety Plan (HSP)

A site-specific HSP dated April 15, 2008, was prepared by Ninyo & Moore and submitted to the Department for approval prior to commencing field work.

3.2. Utility Clearance

The boring locations were described to Underground Service Alert (USA) during the notification at least 48 hours prior to conducting the soil sampling. USA marked the public utilities known to be in the vicinity of the boring locations.

3.3. Hand-Auger Sampling

Eighteen soil samples (including duplicates) were collected from 4 soil boring locations divided among two groups along Route 5. Soil sampling depths varied between locations, but samples were planned to be collected at the following intervals: surface (0.0), 1-, 2-, 3- and 5-foot depths. The surface sample was collected from 0 to 6 inches, the 1-foot sample was collected from 1 to 1½ feet, the 2-foot sample was collected from 2 to 2½ feet, and the 3-foot sample was collected from 3 to 3½ feet (deeper samples were not collected due to refusal). A composite sample was collected by placing remaining hand-auger soil cuttings from a single boring in a large plastic bag and mixing the soil. Samples collected from each boring are listed on Table 1. Variations to the planned sampling are discussed in Section 2.3.

Samples were placed into new, 4-ounce glass jars, capped with Teflon-coated plastic lids, and labeled. The sampling equipment was decontaminated between each boring, and an equipment rinsate sample was collected. The equipment rinsate sample was collected by pouring deionized water over/through decontaminated equipment and allowing the water to drain into laboratory-supplied sample containers. Soil samples and the equipment rinsate samples were transferred under chain of custody (COC) protocol to Advanced Technology Laboratories (ATL), a State-certified laboratory, within 24 hours of collection.

3.4. Investigative-Derived Wastes

Soil cuttings generated by hand-auger drilling were stored in DOT approved 55-gallon drums on the Department right-of-way (R/W) for later disposal. Decontamination water was disposed in soil areas of the Department R/W. As specified by the contract, no decontamination water entered storm drains or escaped the Department R/W.

3.5. Laboratory Analyses

Once the samples were received by ATL, the samples were analyzed for Total Threshold Limit Concentration (TTLC) lead, Soluble Threshold Limit Concentration (STLC) lead, Title 22 Metals, and pH on a five-day turnaround basis. The laboratory reports are included in Appendix A, and results are summarized on Tables 1 and 2.

In accordance with the work plan, each of the 18 soil samples (including duplicates) collected was analyzed for total lead (TTLC) in general accordance with United States Environmental Protection Agency (EPA) Method 6010B. Soil samples were further analyzed for soluble lead (STLC) using EPA Method 7420. Soil samples were further analyzed for soluble lead using the deionized water Waste Extraction Test (DI-WET) Method in general accordance with EPA Method 7420. A total of eighteen samples were analyzed for soluble lead (DI-WET).

In accordance with the work plan, the samples were analyzed for soluble lead by Toxicity Characteristic Leaching Procedure (TCLP) in general accordance with EPA Method 1311/7420. Analysis for TCLP is used to evaluate whether soils should be classified as hazardous for disposal purposes under Federal law.

In accordance with the TO, one sample per borehole was tested for soil pH using EPA Method 9045C. Four randomly selected samples were analyzed for pH. Results of the lead and pH testing are presented on Table 1.

In accordance with the work plan, surface samples were analyzed for Title 22 Metals to evaluate if a concern for other heavy metals, with the exception of lead, exists at the project site. With one exception the detected concentrations of these metals did not exceed 10 times their respective STLC value or their respective TTLC value. One sample (1001-101-0) exceeded the 10 times the STLC value for selenium and the next deeper sample from that boring (1001-101-1) was analyzed for selenium STLC. Results of the Title 22 Metals testing are presented on Table 2.

Each of the soil samples collected was recorded on a COC record. One equipment rinsate sample (EB) was collected. The equipment rinsate sample was analyzed for total lead in general accordance with EPA Method 6010B, and the results are summarized in Table 1.

3.6. Geographical Information System (GIS)

Latitude and longitude (North American Datum [NAD] 83) of sampling locations were recorded with a handheld Global Positioning System (GPS) unit (GeoXT, Trimble). Sample IDs intended for use by the Department for sampling and for GIS tables were provided to Ninyo & Moore. The sample IDs presented in this report are the sample IDs shown on the attached Tables 1 and 2. The sample IDs in Tables 1 and 2 are in the following format: four-digit prefix – three-digit boring number – depth in feet. The four-digit prefix for this TO was 1001. For example, sample 1001-101-1 is the sample collected from a depth of one foot in boring 101 advanced for this TO. A copy of the Access database file is presented in Appendix C.

4. INVESTIGATIVE RESULTS

The results of the field work, field quality assurance/quality control (QA/QC), laboratory results, and laboratory QA/QC are presented below.

4.1. Summary of Field Work

Eighteen soil borings were advanced at the site by hand-auger methods. Samples were collected at depths of 0, 1, 2, and 3 feet bgs and a composite of all depths or refusal from each boring location. Due to refusal at depths of less than the proposed total depths, 9 planned soil samples were not collected as described in Section 2.3.

4.2. Field Quality Assurance/QA/QC

In order to reduce the likelihood of cross-contamination, sampling equipment was decontaminated between borings. Equipment was washed in a solution of non-phosphate detergent, rinsed in clear water, rinsed in distilled water, and dried. To evaluate the effec-

tiveness of the decontamination procedures, one equipment rinsate blank was collected and analyzed for total lead. The sample was collected by pouring deionized water through/over decontaminated equipment and collecting the water in laboratory-supplied containers. Lead was not detected in the equipment blanks analyzed, indicating decontamination was effective and cross-contamination did not occur.

4.3. Laboratory Results

Analytical results are shown in Tables 1 and 2. None of the eighteen soil samples collected (including duplicates) contained concentrations of lead that exceeded the California Total Threshold Limit Concentration (TTLC) for lead (1,000 milligrams per kilogram [mg/kg]). In addition, none of the soil samples collected (including duplicates) exceeded the 3,397-mg/kg limit provided in the Department of Toxic Substances Control (DTSC) variance modification letter dated December 13, 2002, which modified the September 22, 2000, California Environmental Protection Agency (Cal-EPA) DTSC variance to Department District 7 (variance) as amended by Assembly Bill 414. This variance was extended to June 30, 2009, by the DTSC on June 17, 2008. Four soil samples (including duplicates) contained concentrations of total lead less than the TTLC of 1,000 mg/kg but more than or equal to 50 mg/kg, which is 10 times the California Soluble Threshold Limit Concentration (STLC) for lead (5 milligrams per liter [mg/l]). The eighteen samples were analyzed for soluble lead (STLC), in accordance with the work plan. Four samples contained STLC lead above 5 mg/l. The eighteen soil samples were further analyzed for soluble lead using the de-ionized water Waste Extraction Test (DI-WET) Method. One sample contained soluble lead (DI-WET) at a concentration greater than or equal to 0.5 mg/l.

In accordance with the work plan; all soil samples (including duplicates) were analyzed for soluble lead by the Toxicity Characteristic Leaching Procedure (TCLP). None of the eighteen samples (including duplicates) analyzed for TCLP contained soluble lead greater than or equal to 5 mg/l.

In accordance with the work plan, one sample per borehole was tested for soil pH. Four randomly selected samples were analyzed for pH. The pH values ranged from 5.9 to 8.6. Results of the lead and pH testing are presented on Table 1.

In accordance with the TO, surface samples were analyzed for Title 22 Metals to evaluate if a concern for other heavy metals, with the exception of lead, exists at the project site. With one exception the detected concentrations of these metals did not exceed 10 times their respective STLC value or their respective TTLC value. One sample (1001-101-0) exceeded the 10x STLC value for selenium and the next deeper sample from that boring (1001-101-1) was analyzed for selenium STLC. The analytical result for selenium STLC for 1001-101-1 was non-detect. Results of the Title 22 Metals testing are presented on Table 2.

4.4. Laboratory Quality Assurance/QA/QC

ATL conducted laboratory QA/QC in accordance with Contract No. 07A2211; QA/QC procedures included analyses of method blanks, duplicate samples, and spiked samples. These procedures are included in the analytical reports presented in Appendix A of this report.

5. STATISTICAL EVALUATION

The analytical data were reviewed in order to determine the need for statistical evaluation. Based on the results of the analytical data no statistics were performed.

6. DATA EVALUATION

Based on the analytical results, the data evaluation as it applies to the off-site disposal is summarized in Section 7.2. The review of the data indicates that, the surface layers tend to have the highest concentrations of total lead and concentrations of total lead generally decrease with depth. Assuming the soil has not been disturbed since creation of Route 5 in the site vicinity, it would be expected to have total lead concentrations decreasing with depth.

The results of pH testing indicate pH values ranged from 5.9 to 8.6. These levels would not be considered hazardous and are above the variance minimum level of 5. Please refer to Table 1.

The analytical results for Title 22 Metals indicated no analytes exceeding 10 times their respective STLC value or their respective TTLC value and are considered non-hazardous with respect to metals (exclusive of lead) except for 1001-101-0 which exceeded the ten times its respective STLC limit. Please refer to Table 2. The sample was subsequently analyzed for STLC selenium; STLC selenium was not detected.

7. RECOMMENDATIONS

Based on the results of the analytical data no statistics were performed. The following are recommendations based on the individual results:

7.1. Recommendations for Soil to be Reused On Site

Group 1 – Northbound (Borings 1001-101 and 1001-104):

- Soil from the surface layer is Y-2 type soil. Soil of this type is hazardous but can be re-used at the job site in accordance with the variance. Place a minimum of five feet above the maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department.
- Soil from the 1-foot layer is Y-1 type soil. Place a minimum of five feet above the maximum water table elevation and cover with at least 1 foot of non-hazardous soil.
- Soil from the 2 and 3-foot layers is X type soil. Soil of this type is non-hazardous and can be re-used on the job site without restrictions based on the lead content of the soil.
- Soil from the layers combined is Y-2 type soil. Soil of this type is hazardous but can be re-used at the job site in accordance with the variance. Place a minimum of five feet above the maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department.

Group 2 – Southbound (Borings 1001-102 and 1001-103):

Soil from this group combined or separated is X type soil. Soil of this type is non-hazardous and can be re-used on the job site without restrictions based on the lead content of the soil.

7.2. Recommendations for Soil to be Disposed Off Site

Group 1 – Northbound (Borings 1001-101 and 1001-104):

- Soil from the surface and 1-foot layers is Z-2 type soil. Soil of this type is hazardous. If soil of this type is to be disposed off site, the soil should be disposed at a Class 1 disposal site and all other Title 22 restrictions apply.
- Soil from the 2 and 3-foot layers is X type soil. Soil of this type is non-hazardous and can be disposed of off-site without restrictions based on the lead content of the soil.
- Soil from the layers combined is Z-2 type soil. Soil of this type is hazardous. If soil of this type is to be disposed off site, the soil should be disposed at a Class 1 disposal site and all other Title 22 restrictions apply.

Group 2 - Southbound:

Soil from this group combined or separated is X type soil. Soil of this type is non-hazardous and can be disposed of off-site without restrictions based on the lead content of the soil.

8. HEALTH EFFECTS OF LEAD

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft, gray metal. The permissible exposure limit (PEL) for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average (TWA); Immediately Dangerous to Life and Health (IDLH) exposure limit is 100 mg/m^3 as established by the National Institute of Occupational Safety and Health (NIOSH). Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead HSP should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 Code of Federal

Regulations (CFR) 1910.120 and 8 California Code of Regulations (CCR) 1532.1. The plan developed by the CIH should include a hazard analysis, dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

TABLE 1 – ROUTE 5 SOIL SAMPLE ANALYTICAL TEST RESULTS – LEAD AND pH

Group	Layout Plan	Sample	Sample Depth (ft)	Sample Date	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
NORTHBOUND									
1	12	1001-101-0	0	5/5/2008	340	61	0.54	1.5	5.9
1	12	1001-101-1	1	5/5/2008	10	1.1	<0.25	<0.25	--
1	12	1001-101-Comp	0-1	5/5/2008	170	23	0.40	0.59	--
1	11	1001-104-0	0	5/5/2008	630	75	2.8	3.1	--
1	11	1001-104-1	1	5/5/2008	75	22	0.37	0.80	--
1	11	1001-104-2	2	5/5/2008	<5.0	0.58	<0.25	<0.25	--
1	11	1001-104-3	3	5/5/2008	<5.0	0.46	<0.25	<0.25	8.6
1	11	1001-104-Comp	0-3	5/5/2008	26	2.5	0.26	<0.25	--
1	11	1001-104-Comp dup	0-3	5/5/2008	18	2.7	0.26	<0.25	--
SOUTHBOUND									
2	12	1001-102-0	0	5/5/2008	34	3.5	<0.25	<0.25	--
2	12	1001-102-1	1	5/5/2008	49	4.5	<0.25	0.28	7.8
2	12	1001-102-Comp	0-1	5/5/2008	38	3.6	<0.25	<0.25	--
2	11	1001-103-0	0	5/5/2008	14	1.6	<0.25	<0.25	--
2	11	1001-103-0 Dup	0	5/5/2008	16	1.8	<0.25	<0.25	--
2	11	1001-103-1	1	5/5/2008	25	2.2	<0.25	0.32	--
2	11	1001-103-2	2	5/5/2008	17	2.0	<0.25	0.4	8.1
2	11	1001-103-3	3	5/5/2008	37	3.7	<0.25	0.36	--
2	11	1001-103-Comp	0-3	5/5/2008	20	2.6	<0.25	<0.25	--
Maximum					630	75	2.8	3.1	8.6
Minimum					<5.0	0.46	0.26	0.28	5.9
Count					19	18	18	18	18
EQUIPMENT BLANK (mg/l)									
		Rinsate 2		5/5/2008	<0.0050	--	--	--	--

Notes:
ft – feet
TTLC – total threshold limit concentration
STLC – soluble threshold limit concentration
DI-WET – deionized water waste extraction test
TCLP – toxicity characteristic leaching procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
-- = not analyzed

TABLE 2 – ROUTE 5 SOIL SAMPLE ANALYTICAL TEST RESULTS – TITLE 22 METALS

Group	Layout Plan	Sample	Sample Date	Metals (mg/kg)																
				Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Mercury*	Molybdenum	Nickel	Selenium	Selenium STLC (mg/l)	Silver	Thallium	Vanadium	Zinc
1	12	1001-101-0	5/5/2008	<2.0	1.5	130	<1.0	<1.0	27	11	38	<0.10	<1.0	17	11	<1.0	<1.0	<1.0	49	460
1	12	1001-101-1	5/5/2008	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	--	--	--	--
1	12	1001-102-0	5/5/2008	<2.0	<1.0	80	<1.0	<1.0	21	10	28	<0.10	<1.0	13	8.8	--	<1.0	<1.0	42	95
1	11	1001-103-0	5/5/2008	<2.0	1.8	110	<1.0	<1.0	21	10	28	<0.10	1.1	14	9.2	--	<1.0	<1.0	55	93
1	11	1001-104-0	5/5/2008	<2.0	2.5	110	<1.0	<1.0	17	7.6	36	<0.10	<1.0	12	8.5	--	<1.0	<1.0	39	230
TTLC (mg/kg)				500	500	10,000	75	100	2,500	8,000	2,500	20	3,500	2,000	100	--	500	700	2,400	5,000
10 x STLC (mg/l)				150	50	1,000	7.5	10	50	800	250	2.0	3,500	200	10	1**	50	70	240	2,500

Notes:

mg/kg – milligrams per kilogram

mg/l - milligrams per liter

Samples were analyzed using United States Environmental Protection Agency (US EPA) Test Method 6010B.

*Mercury was analyzed using United States Environmental Protection Agency test method 7471A.

-- – not analyzed

** – STLC limit = 1 mg/l

REFERENCE: 2005 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

APPROXIMATE SCALE IN FEET

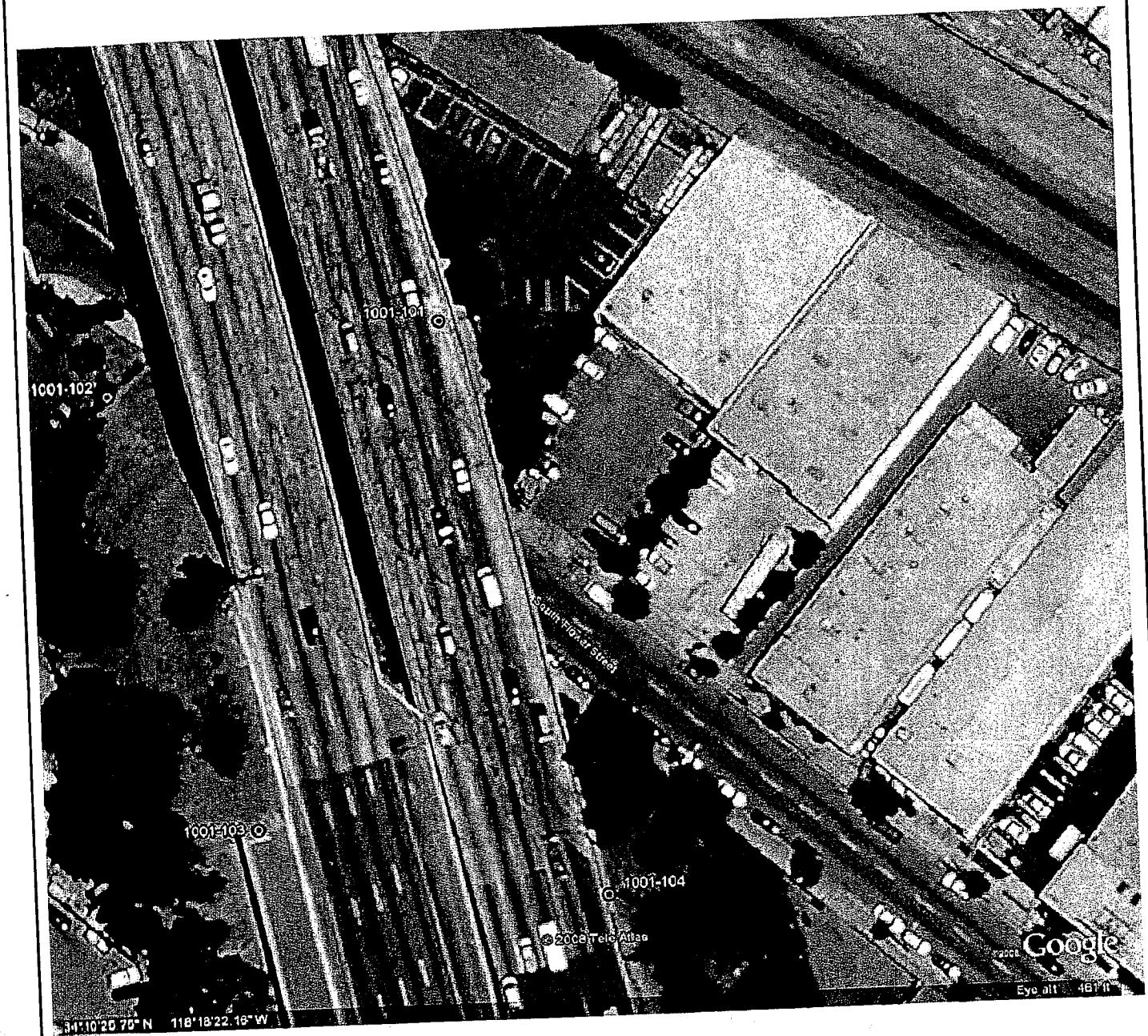
0 2400 4800

N

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Thomas Bros. Maps, By permission of Rand McNally, R.L.07-S-129

Ninyo & Moore	SITE LOCATION MAP	FIGURE
PROJECT NO. 207126007 / DATE 6/08	PROVIDENCIA AVENUE UNDERCROSSING LOS ANGELES COUNTY, CALIFORNIA	1



REFERENCE: GOOGLE MAP, 2008.

N

APPROXIMATE SCALE IN FEET

0 40 80

ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND	
◎	APPROXIMATE LOCATION OF BORING

Ninyo & Moore	BORING LOCATION MAP	FIGURE
PROJECT NO. 207126007 / DATE 6/08	PROVIDENCIA AVENUE UNDERCROSSING LOS ANGELES COUNTY, CALIFORNIA	2

INDEX OF SHEETS

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY

IN LOS ANGELES COUNTY

IN LOS ANGELES, GLENDALE, AND AT BURBANK

FROM ROUTE 5/134 INTERCHANGE TO MAGNOLIA AVE UC

To be supplemented by Standard Plans dated July, 2004

DIST	COUNTY	ROUTE	ALTERNATIVE POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	5	43.0/47.5		

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

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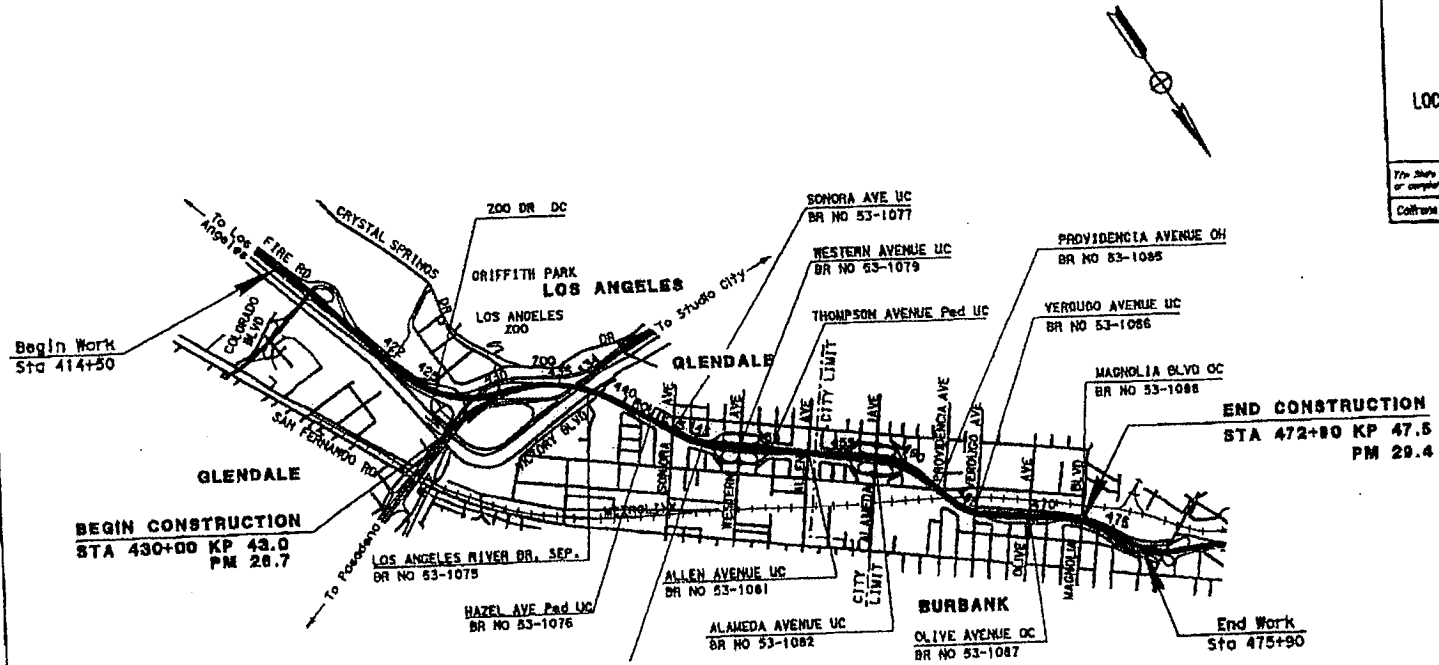


Project Engineer Date
Registered Civil Engineer

Plans Approval Date

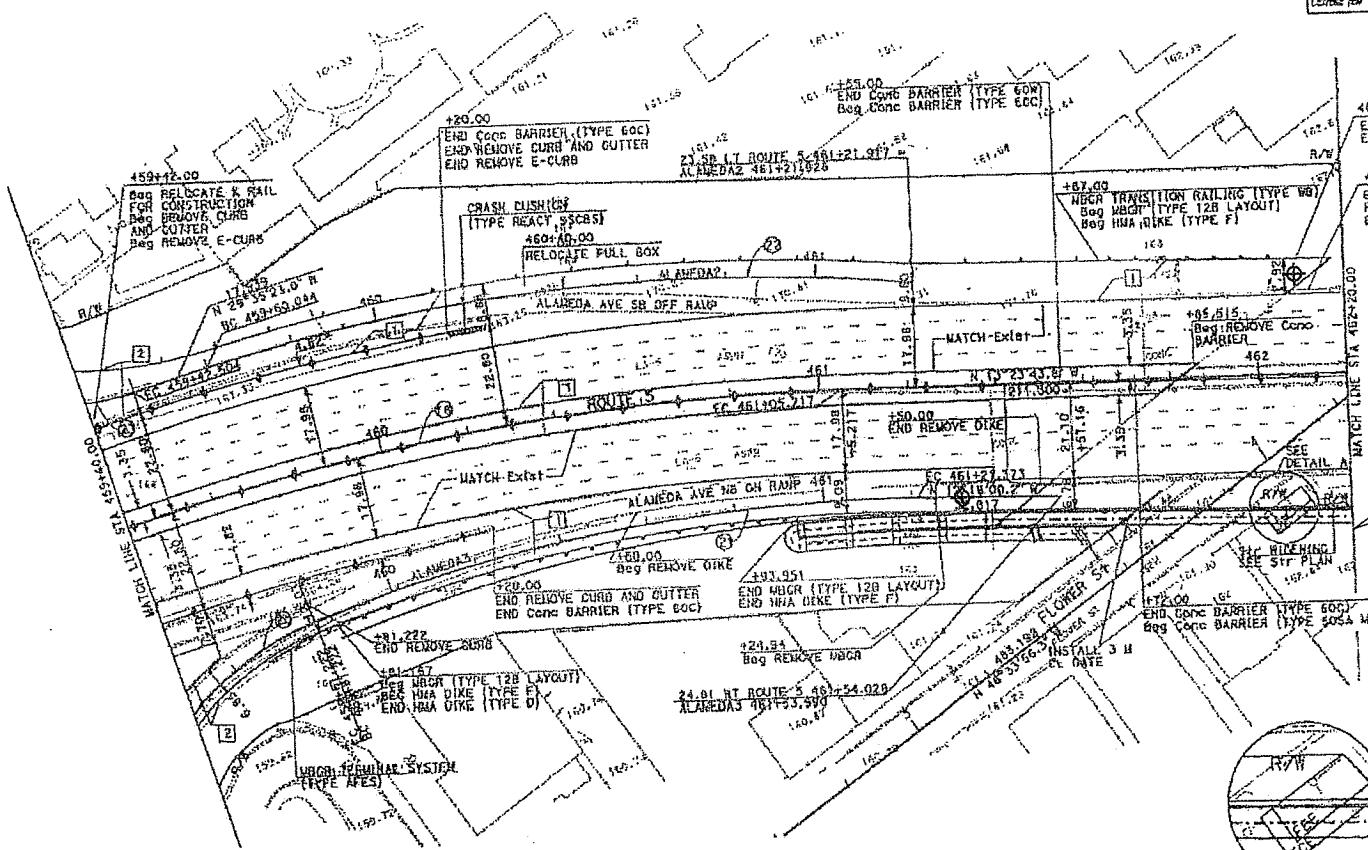
Contract No.

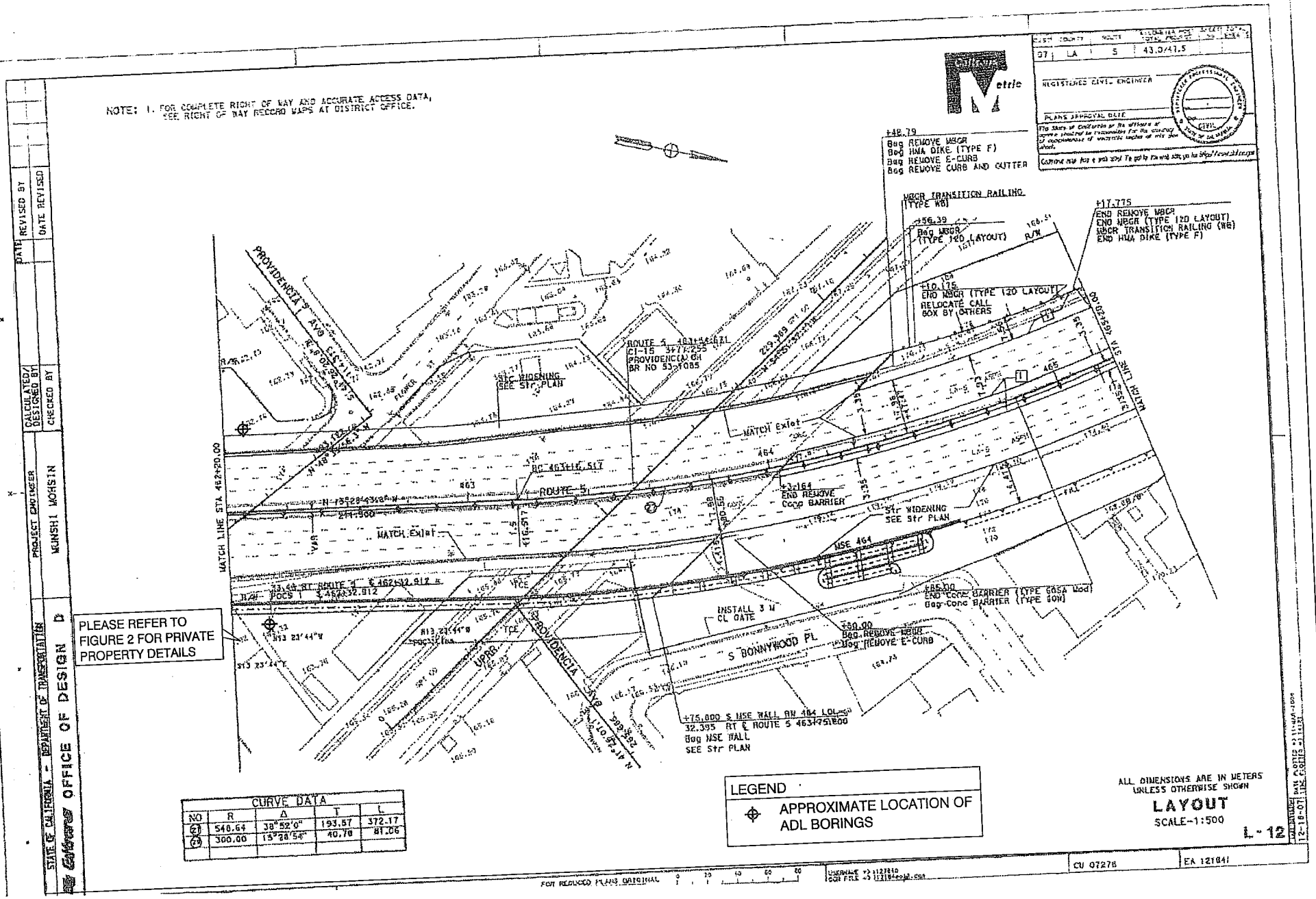
The Contractor shall possess the class (or classes) of license as specified in the "Notice to Contractors".

DESIGNED	DETAILED	QUANTITIES	CHECKED
M. MARTIN	M. F-COLE		

DATE REVISED 12-18-07

CU 07276 EA 12(841)


NOTE: 1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORDED MAPS AT DISTRICT OFFICE.
459+12.00
Beg RELOCATE K RAIL FOR CONSTRUCTION
Beg REMOVE CURB AND GUTTER
Beg REMOVE E-CURB
+20.00
END Conc BARRIER (TYPE 60C)
END REMOVE CURB AND GUTTER
END REMOVE E-CURB
+55.00
END Conc BARRIER (TYPE 60H)
Beg Conc BARRIER (TYPE 60C)
462+10.00
END MBGR (TYPE 12B LAYOUT)
END HMA DIKE (TYPE F)
462+10.00
END RELOCATE K RAIL FOR CONSTRUCTION
END REMOVE E-CURB
+67.00
MBGR TRANSITION RAILING (TYPE WB)
Beg MBGR (TYPE 12B LAYOUT)
Beg HMA DIKE (TYPE F)
CRASH CUSHION (TYPE REACT 350KS)
460+40.00
RELOCATE FULL BOX
ALAMEDA2
ALAMEDA AVE SB OFF RAMP
MATCH-Exist
+05.615
Beg REMOVE Conc BARRIER
ROUTE 5
MATCH-Exist
+50.00
END REMOVE DIKE
ALAMEDA AVE NB ON RAMP 461
SEE DETAIL A
MATCH LINE STA 462+20.00
MATCH LINE STA 459+40.00
ALAMEDA3
460.00
Beg REMOVE DIKE
+20.00
END REMOVE CURB AND GUTTER
END Conc BARRIER (TYPE 60C)
+93.951
END MBGR (TYPE 12B LAYOUT)
END HMA DIKE (TYPE F)
FLOWER ST
+00.00
END Conc BARRIER (TYPE 60C)
Beg Conc BARRIER (TYPE 50SA Mod)
+81.222
END REMOVE SLOPE
424.94
Beg REMOVE MBGR
+81.157
BEG MBGR (TYPE 12B LAYOUT)
BEG HMA DIKE (TYPE F)
END HMA DIKE (TYPE D)
24.81 RT ROUTE 5 461+54.029
ALAMEDA3 461+53.990
INSTALL 3 M CL DATE
MBGR TERMINAL SYSTEM (TYPE AFES)
PLEASE REFER TO FIGURE 2 FOR PRIVATE PROPERTY DETAILS
R/W
SEE DETAIL A
SEE Str PLAN
DETAIL A
SCALE 1:250
LEGEND
APPROXIMATE LOCATION OF ADL BORINGS
ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN
LAYOUT
SCALE-1:500
L-11
CURVE DATA
NO | R | Δ | T | L
1 | 348.64 | 32°10'0" | 173.86 | 336.74
2 | 60.96 | 49°6'32" | 27.85 | 52.25
3 | 67.45 | 51°56'24" | 32.85 | 61.14
4 | 380.04 | 21°15'21" | 71.31 | 140.99
5 | 410.00 | 22°37'20" | 82.10 | 161.88
CU 07276
EA 121841
207126-A4.DWG


NOTE: 1. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
OFFICE OF DESIGN D
PROJECT ENGINEER
MUNSHI MOHSIN
CALCULATED/ DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED
PLEASE REFER TO FIGURE 2 FOR PRIVATE PROPERTY DETAILS
PROVIDENCIA AVE
ROUTE 5
MATCH EXIST
MATCH LINE STA 462+20.00
S BONNYWOOD PL
INSTALL 3 M CL GATE
+75.000 S MSE WALL, RT 464 LOL
32.395 RT ℄ ROUTE 5 463+751.800
Bag MSE WALL
SEE Str PLAN
+48.79
Bag REMOVE MBGR
Bag HMA DIKE (TYPE F)
Bag REMOVE E-CURB
Bag REMOVE CURB AND GUTTER
MBGR TRANSITION RAILING (TYPE WB)
+56.39
Beg MBGR (TYPE 120 LAYOUT)
+10.175
END MBGR (TYPE 120 LAYOUT)
RELOCATE CALL BOX BY OTHERS
+17.775
END REMOVE MBGR
END MBGR (TYPE 120 LAYOUT)
MBGR TRANSITION RAILING (WB)
END HMA DIKE (TYPE F)
+31.64
END REMOVE Conc BARRIER
Str WIDENING SEE Str PLAN
MSE 464
+85.00
END Conc BARRIER (TYPE 60SA Mod)
Beg Conc BARRIER (TYPE 50W)
+50.00
Beg REMOVE MBGR
Beg REMOVE E-CURB
CURVE DATA
NO | R | Δ | T | L
(2) | 540.64 | 38°52'0" | 193.87 | 372.17
(3) | 300.00 | 15°28'54" | 40.78 | 81.06
LEGEND
APPROXIMATE LOCATION OF ADL BORINGS
ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN
LAYOUT
SCALE-1:500
L - 12
07 | LA | 5 | 43.0/41.5
REGISTERED CIVIL ENGINEER
PLANS APPROVAL DATE
CIVIL
CU 07276
EA 121041
207126-A5.DWG

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

September 8, 2006
Project No. 206133009

Dr. Ayubur Rahman, Contract Manager
State of California
Department of Transportation, District 7, 12th Floor, MS-16
Office of Environmental Engineering and Feasibility Studies
100 South Main Street
Los Angeles, California 90012

Subject: Lead Site Investigation Report
I-5 HOV, North of SR-134 to
3.0 Kilometers South of SR-170
KP 43.0/58.0 (PM 26.7/36.4)
Burbank, Glendale, and
Los Angeles, California
Task Order No. 07A1752-09,
Expenditure Authorization No. 121801
Contract No. 07A1752

Dear Dr. Rahman:

In accordance with Caltrans Contract No. 07A1752, Task Order No. 07A1752-09, Ninyo & Moore has conducted a Lead Site Investigation at the above-referenced site. The following report documents our methodologies, findings, conclusions, and recommendations.

We appreciate the opportunity to be of service to you on this project. Should you have any questions, please contact the undersigned at your convenience.

Sincerely,
NINYO & MOORE

Richard H. Stevenson
Senior Staff Environmental Scientist

David I. Shaler, P.G., R.E.A.
Senior Project Environmental Geologist

PROFESSIONAL GEOLOGIST
DAVID I. SHALER
NO. 6370
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STATE OF CALIFORNIA

R. Leonard Allen, G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT LEONARD ALLEN
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Civil Engineering
STATE OF CALIFORNIA

RHS/DIS/RLA/emp

Distribution: (6) Addressee (5 hard copies, 1 CD)

1. SUMMARY OF RECOMMENDATIONS

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct a Lead Site Investigation (LSI) for the Interstate 5 (I-5) High Occupancy Vehicle (HOV) project, north of State Route (SR) 134 to 3.0 Kilometers (km) south of SR 170 in Burbank, Glendale, and Los Angeles, California (site, Figure 1). Aerially Deposited Lead (ADL) is expected to be encountered in the unpaved areas of the proposed sound wall and retaining wall locations, widening locations, detention basin locations, and locations of clearing and grubbing activities. Work was conducted in general accordance with the Department Task Order No. 9, Contract No. 07A1752, dated August 24, 2005, and Ninyo & Moore's Revised Cost Estimate for LSI (Second Revision) I-5 HOV, North of SR-134 to 3.0 Kilometers South of SR-170, Burbank, Glendale, and Los Angeles, California, Task Order (TO) No. 07A1752-09, EA 121801, Contract No. 07A1752, dated August 18, 2005.

A total of 379 samples were collected from 192 boring locations. Among the 216 proposed borings, five (5) borings were not completed because the boring locations were located along a portion of I-5 that had been part of a previous LSI completed by Ninyo & Moore. Nineteen (19) borings were not completed due their proposed locations being at paved areas of the I-5, being in areas of current construction, or being in areas not safely accessible. A total of 407 samples were not collected due to refusal. The boring locations are presented on Figure 2. Two (2) borings were completed outside the Department right-of-way at 599 Bonnywood Place, Burbank.

In addition to the data collected for this TO, data from samples collected under TO 3 which were in this project area were used to develop the recommendations for this report. Data from the TO 3 activities are presented in Table 1 and Table 4. The borings from TO 9 that the data from TO 3 cover are identified in the notes of Table 1. The TO 3 boring locations that analyze the TO 9 area are shown on Figure 2, Boring Location Map.

Based on the results of this assessment, the following conclusions and recommendations are provided. At the direction of the Department, recommendations for the "bridge borings" are presented in Table 3.

The following text contains several recommendations for removal of soil as Resource Conservation and Recovery Act (RCRA) hazardous waste from specific locations such as from 50 meters south of a particular boring to 37 meters north of a second boring. These distances are approximately one-half the distance to the nearest boring with soil that is not classified as RCRA hazardous.

Also note that several groupings contain data from sampling conducted for TO-3. These data are from depths of 0.15, 0.75, and 1.5 meters. Table 4 contains the data from TO-3 that was incorporated into this TO.

Based on the lead analytical test results, soil excavated from 0.0 to 0.15 meter at the 599 Bonnywood Place, Burbank property is classified as hazardous waste by Title 22 California Code of Regulations (CCR).

Summary of Recommendations

Name	Direction	BLP	Depth Ranges (m)	Recommendations	
				Invoking Variance	Surplus Soil
SW437	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
SW441	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
SW445	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
SW447A	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil

Summary of Recommendations

Name	Direction	BLP	Depth Ranges (m)	Recommendations	
				Invoking Variance	Surplus Soil
SW447B	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
SW521	SB	L-21 to L-22	0-0.75	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-0.75	Y-1 soil	Z-2 soil
SW535	SB	L-26 to L-28	0-1.2	Y-2 soil	Z-2 soil
			0-0.15	Y-2 soil	Z-2 soil
			0.15-1.2	X soil	X soil
SW537	SB	L-26 to L-28	0-1.2	Y-2 soil	Z-2 soil
			0-0.15	Y-2 soil	Z-2 soil
			0.15-1.2	X soil	X soil
SW541	SB	L-28 to L-33	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
SW543	SB	L-28 to L-33	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
SW565	SB	L-37 to L-39	0-0.75	X soil	X soil
SW569	SB	L-37 to L-39	0-0.75	X soil	X soil
SW438	NB	L-3 to L-5	0-1.5	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
			1.2-1.5	Y-1 soil	Z-2 soil
SW516	NB	L-20 to L-21	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
SW522	NB	L-21	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
SW524	NB	L-22 to L-23	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
SW526	NB	L-22	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil

Summary of Recommendations

Name	Direction	BLP	Depth Ranges (m)	Recommendations	
				Invoking Variance	Surplus Soil
SW568	NB	L-37 to L-39	0-0.75	Y-2 soil	Z-2 soil
SW576	NB	L-40	0-1.5	X soil	X soil
RET 439	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
RET 443	SB	L-3 to L-6	0-1.2	Y-1 soil	Z-2 soil
			0-0.45	Y-1 soil	Z-2 soil
			0.45-0.75	X soil	X soil
			0.75-1.2	Y-2 soil	Z-2 soil
RW 471	SB	L-13 to L-16	0-1.5	Y-2 soil*	*Exceptions: Near boring 858-167 (L-9), 0 to 0.15 m, dispose of as RCRA waste from 5 m southeast of boring 858-167 to 50 m northwest of boring 858-167. Near boring 858-171 (L-13), 0 to 0.45 m, dispose of as RCRA waste from 40 m southeast of boring 858-171 to 45 m northwest of boring 858-171
RW 475A	SB	L-13 to L-16	0-1.5	Y-2 soil	Z-2 soil
RW 475B	SB	L-13 to L-16	0-1.5	Y-2 soil	Z-2 soil
RW 477	SB	L-13 to L-16	0-1.5	Y-2 soil	Z-2 soil
RW 509	SB	L-18 to L-21	0-0.9	Y-2 soil	Z-2 soil
RET 513	SB	L-18 to L-21	0-0.9	Y-2 soil	Z-2 soil
RW 519	SB	L-18 to L-21	0-0.9	Y-2 soil	Z-2 soil
RW 533	SB	L-21 to L-22	0-0.75	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-0.75	Y-1 soil	Z-2 soil
RET 539	SB	L-21 to L-22	0-0.75	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-0.75	Y-1 soil	Z-2 soil
RW 529	SB	L-22 to L-24	0-0.45	Y-2 soil	Z-2 soil
RET 523	SB	L-22 to L-24	0-0.45	Y-2 soil	Z-2 soil

Summary of Recommendations

Name	Direction	BLP	Depth Ranges (m)	Recommendations	
				Invoking Variance	Surplus Soil
RET 440	NB	L-3 to L-5	0-1.5	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
			1.2-1.5	Y-1 soil	Z-2 soil
RW 474	NB	L-14 to L-16	0-0.9	Y-2 soil	Z-2 soil
			0-0.15	Y-2 soil	Z-2 soil
			0.15-0.9	X soil	X soil
RW 510	NB	L-18 to L-19	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
RW 512	NB	L-19 to L-20	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
RET 518	NB	L-21	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
RET 520	NB	L-21 to L-22	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
RET 528	NB	L-22	0-1.2	Y-2 soil	Z-2 soil
			0-0.45	Y-2 soil	Z-2 soil
			0.45-1.2	X soil	X soil
RW 478	NB	L-14 to L-16	0-0.9	Y-2 soil	Z-2 soil
			0-0.15	Y-2 soil	Z-2 soil
			0.15-0.9	X soil	X soil
Northbound Widening Borings	NB	L-8 to L-24	0.0-0.75	Z-3 soil	Z-3 soil
			0.0-0.45	Y-2 soil	Z-2 soil
			0.45-0.75	Y-1 soil	Z-2 soil
Southbound Widening Borings	SB	L-13 to L-22	0.0-0.75	Y-2 soil	Z-2 soil
Northbound Grubbing Borings	NB	L-5 to L-8, L-18 to L-19	0.0-0.15	Y-2 soil	Z-2 soil
Southbound Grubbing Borings	SB	L-6 to L-18	0.0-0.15	Y-2 soil	Z-2 soil
Alameda Avenue Detention Basin	NB and SB	L-9	0.0-0.15	Y-1 soil	Z-2 soil

Summary of Recommendations

Name	Direction	BLP	Depth Ranges (m)	Recommendations	
				Invoking Variance	Surplus Soil
Western Avenue Detention Basin	NB	L-6	0.0-0.15	Y-1 soil	Z-2 soil

Notes:
m – meters
BLP – Boring Layout Plan
RW – Retaining Wall
SW – Sound Wall on Barrier
RET – Sound Wall on Retaining Wall
NB – Northbound
SB – Southbound
X soil – Soil is non-hazardous
Y-1 soil – Hazardous soil and the layer contains STLC DI-WET results < 0.5 mg/l. Variance applies. Use material on job site. Place at minimum of 1.5 meters above maximum water table elevation and cover with at least 0.3 meters of non-hazardous soil.
Y-2 soil – Hazardous soil and the layer contains STLC DI-WET results ≥0.5 mg/l. Variance applies. Use material on job site. Place at minimum of 1.5 meters above maximum water table elevation and protected from infiltration by a pavement structure.
Z-2 soil – Soil is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying.
Z-3 soil – Soil is hazardous and must be disposed of at a Class 1 disposal site with all RCRA requirements applying.
NA – Not Applicable
NS – Not Sampled

2. INTRODUCTION

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct a Lead Site Investigation (LSI) for the Interstate 5 (I-5) High Occupancy Vehicle (HOV) project, north of State Route (SR) 134 to 3.0 Kilometers (km) south of SR 170 in Burbank, Glendale, and Los Angeles, California (site, Figure 1). Work was conducted in general accordance with the Department Task Order No. 9, Contract No. 07A1752, dated August 24, 2005, and Ninyo & Moore's Revised Cost Estimate for Lead Site Investigation (Second Revision) I-5 HOV, North of SR-134 to 3.0 Kilometers South of SR-170, Burbank, Glendale, and Los Angeles, California, Task Order No. 07A1752-09, EA 121801, Contract No. 07A1752, dated August 18, 2005.

The Department's proposed construction activities include construction of HOV lanes, road widening, replacement of one (1) overcrossing, and construction of 24 retaining walls and 20 sound walls along I-5. Also included in the construction activities are the installation of four (4) detention basins and clearing and grubbing work along the shoulders of the I-5. Aerially Deposited Lead (ADL) was expected to be encountered in the unpaved areas of the proposed sound wall and retaining wall locations, widening locations, detention basin locations, and locations of clearing and grubbing activities.

The objective of this LSI was to evaluate the surface and subsurface soil along the unpaved shoulders of the northbound and southbound portions of the site.

The information obtained from this LSI was used to evaluate the method of re-use or disposal of soil excavated during the proposed construction at the site. The data were also used to inform the Department of potential health and safety issues for workers at the site during geotechnical investigations and construction activities.

3. VARIATIONS TO THE WORK PLAN

The LSI was conducted in general accordance with the Boring Location Plan (BLP) prepared by the Department with some variations as described below.

- At the request of the Department, five (5) proposed borings and 25 proposed samples were removed from the BLP because these five (5) borings were located in a portion of the I-5 that had been part of a previous LSI (TO 07A1752-03) performed by Ninyo & Moore. Samples were to be collected at depths of 0.0, 0.3, 0.6, 0.9, and 1.5 meters or refusal at depths of less than 1.5 meters. Although the five (5) proposed borings were not completed, the data collected from the previous LSI for the area of these proposed borings was incorporated into this report (Table 4).

- Six (6) proposed borings and 20 proposed samples were removed from the BLP because the boring locations were proposed in an area that was already undergoing construction activities. Samples were to be collected at depths of 0.0, 0.3, and 0.6 meter or refusal at depths of less than 0.6 meter in five (5) of the borings. Samples were to be collected at depths of 0.0, 0.3, 0.6, 0.9, and 1.5 meters or refusal at depths of less than 1.5 meters in one of the borings.

- Thirteen proposed borings and 47 proposed samples were not completed because the borings were located in paved areas, were in areas that compromised worker safety, or were in oth-

erwise inaccessible areas. Samples were to be collected at depths of 0.0, 0.3, 0.6, 0.9, and 1.5 meters or refusal at depths of less than 1.5 meters in six (6) of the borings. Samples were to be collected at depths of 0.0, 0.3, and 0.6 meter or refusal at depths of less than 0.6 meter in five (5) of the borings. Samples were to be collected at 0.0 meter in two (2) of the borings.

- At the request of the Department, 11 proposed borings, referred to as the Bridge borings, and 22 proposed samples were not included in the statistical analysis completed as part of the LSI.

- According to the TO, samples were to be collected from the proposed locations of retaining walls RW 2, and RW 464, and sound wall SW 435. However, based on the Boring Layout Plan developed by the Department, soil sample locations were not located within the station locations of these proposed retaining walls and sound wall.

4. INVESTIGATION METHODS

Field work was conducted between September 12 and 16, 2005, and September 26 and 27, 2005, in general accordance with the TO dated August 24, 2005. Exceptions to the TO are discussed in Section 3.Traffic control consisted of shoulder closures provided by American Barricade, Inc., of Anaheim, California. The following sections document and/or describe the activities conducted prior to the field work, soil sampling conducted at the site using hand-auger methods, investigative-derived wastes, laboratory analyses, and Geographical Information System (GIS) data.

4.1. Health and Safety Plan

A site-specific Health and Safety Plan dated September 7, 2005, was prepared by Ninyo & Moore and submitted to the Department for approval prior to commencing field work. The Department approved the Plan on September 7, 2005.

4.2. Utility Clearance

The boring locations were described to Underground Service Alert (USA) during the notification at least 48 hours prior to conducting the soil sampling. USA marked the public utilities known to be in the vicinity of boring locations. The Department provided Ninyo &

Moore with a right-of-entry permit for borings 858-308 and 858-309, which were completed at 599 Bonnywood Place, Burbank, a private residence.

4.3. Soil Boring Locations

As stated in the August 18, 2005, Revised Cost Estimate, the TO provided by the Department constituted the Work Plan. The boring locations were provided on BLPs provided to Ninyo & Moore by the Department. The boring locations are shown on Figure 2 as well as the BLPs in Appendix A. The sample IDs contained in the laboratory reports in Appendix A and as summarized in Tables 1 through 3 are in the following format: three-digit prefix-three-digit boring number-depth in meters. The three-digit prefix for this TO was 858. The three-digit boring numbers are based on which proposed activity the boring is associated with, and the total depth of the proposed boring. Borings in the 100 and 200 series are associated with the proposed construction of sound walls, retaining walls, and bridge abutments, and had proposed total depths of 1.5 meters; borings in the 300 series are associated with proposed road widening and HOV lane construction, and had proposed total depths of 0.6 meter (borings 858-308 and 858-309 were completed outside the Department R/W at 599 Bonnywood Place, Burbank); borings in the 400 series are associated with the proposed construction of detention basins and with clearing and grubbing activities and had a proposed total depth of 0.15 meter. As an example, sample 858-105-0.3 is the sample collected from a depth of 0.3 meter in boring 105 for this TO.

4.4. Soil Sampling

A total of 379 soil samples were collected from 192 soil boring locations using hand-auger equipment. Borings were located based on the type of construction activity the Department has planned. Soil samples collected from areas of proposed sound walls and retaining walls were collected at depths of 0.0, 0.3, 0.6, 0.9, and 1.5 meters or refusal at each boring location. These samples represent the layers from surface to 0.15 meter, from 0.15 to 0.45 meter, from 0.45 to 0.75 meter, from 0.75 to 1.2 meters, and from 1.2 to 1.5 meters, respectively. Samples collected from each boring are presented on Table 1.

Samples collected from areas of proposed highway widening and HOV lanes were collected at depths of 0.0, 0.3, and 0.6 meter or refusal at each sample location. These samples represent the layers from surface to 0.15 meter, from 0.15 to 0.45 meter, and from 0.45 to 0.75 meter, respectively. Samples collected from each boring are presented in Table 1.

Samples collected from areas of proposed detention basins and for clearing and grubbing activities were collected at depths of 0.0 meter, representing the layer from 0.0 to 0.15 meters. Samples collected from each boring are presented in Table 1.

Soil samples were collected with hand-auger equipment and were placed into new 4-ounce glass jars, sealed with plastic lids, and labeled accordingly. The sampling equipment was decontaminated between each boring, and an equipment rinseate sample was collected and analyzed for each chain-of-custody (COC). Equipment rinseate samples were collected by pouring deionized water over/through decontaminated equipment and allowing the water to drain into a laboratory-supplied sample container. Soil and the equipment rinseate samples were transferred under COC protocol to Advanced Technology Laboratories (ATL) of Signal Hill, California, within 24 hours of collection. In accordance with TO 07A1752-09, soil sample homogenization was performed in the laboratory.

4.5. Investigative-Derived Wastes

Soil cuttings generated by hand-auger drilling were returned to the boreholes upon collection of soil samples. Decontamination water was disposed of within landscaped areas of the Department R/W. As required by the contract, no decontamination water entered storm drains or escaped the Department R/W.

4.6. Laboratory Analyses

Soil samples were transferred under COC forms to ATL of Signal Hill, California. The laboratory reports are included in Appendix B, and results are summarized on Tables 1 and 2. Soil samples collected for lead analysis were analyzed for Total Threshold Limit Concentration (TTLC) in general accordance with EPA Method 6010B. Soil samples analyzed for

TTLC with concentrations of lead greater than or equal to 50 mg/kg up to 1,000 mg/kg were further analyzed for soluble lead using the Waste Extraction Test (WET[1]) method. Soil samples analyzed by the WET that were found to have a Soluble Threshold Limit Concentration (STLC) of lead greater than 5 milligrams per liter (mg/l) were further analyzed for soluble lead by the WET using De-Ionized Water (DI-WET[1]) . Samples with TTLC lead concentrations equal to or over 1,000 mg/kg, as well as additional samples selected by the Department, were analyzed for soluble lead using Toxicity Characteristic Leaching Procedures (TCLP) in general accordance with EPA Method 1311. Soil samples analyzed for Title 22 Metals were analyzed in general accordance with EPA Method 6000/7000 series. Selected soil samples were analyzed for pH in general accordance with EPA Method 9045C.

4.7. Geographical Information System (GIS)

Latitude and longitude (North American Datum [NAD] 83) of sampling locations were recorded with a handheld Global Positioning System (GPS) unit (GeoXT, Trimble). Laboratory data and coordinates were entered into the Access database provided by the Department. Sample IDs intended for use by the Department for sampling and for GIS tables were provided to Ninyo & Moore. The GIS tables are presented in Appendix C.

5. INVESTIGATIVE RESULTS

The results of the field work, field quality assurance/quality control (QA/QC), laboratory results, and laboratory QA/QC are presented below.

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[1] In accordance with the industry standard, WET is the acronym used to identify the Waste Extraction Test. The WET analytical procedure is in California Code of Regulations Title 22. This test is used to classify a waste as hazardous or non-hazardous; and the only approved procedure for this purpose uses diluted citric acid as the extraction fluid. The DTSC variance granted to the Department, District 7, discusses a "modified" waste extraction test using deionized water as the extractant. The industry standard for referring to this test method is to use the acronym DI-WET.

5.1. Summary of Field Work

A total of 192 soil borings were advanced at the site by hand-auger methods. A total of 127 borings had samples collected at depths of 0.0, 0.3, 0.6, 0.9, and 1.5 meters or refusal from each boring location. A total of 46 borings had samples collected at 0.0, 0.3, and 0.6 meter or refusal from each boring location. A total of 19 borings had samples collected 0.0 meter (surface). Due to refusal at depths of less than the proposed total depths in 164 borings, a total of 379 soil samples were collected from the 192 soil borings advanced. If each of the proposed 216 borings had been completed to the proposed depth, a total of 900 samples would have been collected.

5.2. Field Quality Assurance/Quality Control (QA/QC)

In order to reduce the likelihood of cross-contamination, sampling equipment was decontaminated between borings. Equipment was washed in a solution of non-phosphate detergent, rinsed in clear water, rinsed in distilled water, and dried. To evaluate the effectiveness of the decontamination procedures, a total of 14 equipment rinseate blanks were collected and analyzed for lead. The samples were collected by pouring deionized water through/over decontaminated equipment and collecting the water in laboratory-supplied containers. Lead was not detected in the equipment blanks analyzed, indicating decontamination was effective, and cross-contamination did not occur.

5.3. Laboratory Results

A total of 379 soil samples collected were analyzed for lead. Of the 379 soil samples, 31 samples contained concentrations of lead which equaled or exceeded the TTLC for lead (1,000 mg/kg). Three (3) of these 31 soil samples exceeded the 3,397-mg/kg limit provided in the Department of Toxic Substances Control (DTSC) variance modification letter dated December 13, 2002, which modified the September 22, 2000, Cal-EPA DTSC variance to Department District 7 (Variance) as amended by Assembly Bill 414. These 31 samples were subsequently analyzed for soluble lead by the TCLP. At the request of the Department, 62 additional samples with TTLC concentrations greater than 350 mg/kg were also analyzed

for soluble lead by TCLP, for a total of 93 samples analyzed for soluble lead by TCLP. Eighteen (18) of the 93 samples analyzed for TCLP contained soluble lead greater than 5 mg/l. Federal regulations indicate that waste soil containing 5 mg/l or more of lead by TCLP analyses be classified as a RCRA-regulated hazardous waste for disposal purposes. If a layer is found to contain samples with TCLP results of 5 mg/l or more, additional in-ground and/or stockpile soil sampling should be performed near these sample locations during construction activities. Per the Variance and Assembly Bill 414, the Department may reuse fill soil containing less than 3,397 mg/kg of total lead (TTLC). Analytical results for samples analyzed for lead are presented in Table 1.

A total of 220 soil samples contained concentrations of lead less than the TTLC of 1,000 mg/kg but more than or equal to 50 mg/kg, which is 10 times the STLC for lead (5 mg/l). These 220 soil samples were analyzed for soluble lead (STLC) by the WET. A total of 179 of the 220 soil samples analyzed contained 5 mg/l or more of soluble lead (STLC). Each of these 179 soil samples was subsequently analyzed for soluble lead using the DI-WET extraction. A total of 70 of these 179 samples contained 0.5 mg/l or more of lead using the DI-WET method. Based on the DTSC's direction in the Variance, layers that can be reused onsite and contain samples with a soluble lead concentration of greater than 0.5 mg/l using the DI-WET method must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Such layers that can be reused onsite and contain samples with a soluble lead concentration of less than 0.5 mg/l using the DI-WET method must be placed a minimum of 1.5 meters above the maximum water table elevation and covered by at least 0.3 meter of non-hazardous soil. Analytical results for samples analyzed for lead are shown on Table 1.

In accordance with the TO, 45 randomly selected samples were analyzed for pH. The pH values ranged from 3.8 to 8.8. One (1) sample, 858-157-0.9, had a pH (3.8, with a retest of 3.9) less than 5.0. According to the Variance, contaminated soil with a pH of less than 5.0 shall only be used as fill material under paved portions of the roadway. All other samples analyzed had pH levels greater than 5.0.

Forty-six (46) soil samples collected were analyzed for Title 22 Metals using EPA Method 6010B. Concentrations of each metal detected were less than their respective TTLC limit and less than 10 times their respective STLC limit, with two (2) exceptions. The concentration of arsenic in sample 858-165-0.0 was 62 mg/kg. The STLC limit for arsenic is 5 mg/l. Ten times the STLC is 50 mg/l, therefore the concentration of 62 mg/kg is greater than 10 times the STLC for arsenic. The concentration of copper in sample 858-115-0.3 was 2,100 mg/kg. The STLC limit for copper is 25 mg/l. Ten times the STLC is 250 mg/l, therefore the concentration of 2,100 mg/kg is greater than 10 times the STLC for copper. These two (2) samples were subsequently run for soluble arsenic and copper, respectively. Soluble arsenic (<1.0 mg/l) and copper (7.5 mg/l) did not exceed their respective STLC limits of 5.0 mg/l and 25 mg/l.

Each of the soil samples collected was recorded on one (1) of 14 COC records. Over seven (7) days of sampling, a total of 14 equipment rinseate samples were collected and analyzed for lead. Lead was not detected in any of the equipment rinseate samples.

5.4. Laboratory QA/QC

ATL conducted laboratory QA/QC in accordance with Contract No. 07A1752; QA/QC procedures included analyses of method blanks, duplicate samples, and spiked samples. These procedures are included in the analytical reports presented in Appendix B of this report. The laboratory QA/QC reports contained relatively few data qualifiers. These qualifiers do not impact the quality of data reported such that the conclusions and recommendations of this report would change.

6. STATISTICAL EVALUATION

A statistical evaluation of the laboratory results was conducted in accordance with the procedures outlined in Chapter 9 of the EPA's SW-846 for four (4) groups. For purposes of statistical analysis, the site was divided into groups based on whether the data were for retaining wall and sound wall locations, freeway widening locations, grubbing locations, or detention basin locations:

- Retaining Wall 440; Sound Wall 438 (Borings 858-101 through 858-106)
- Retaining Walls 474 and 478 (Borings 858-116 through 858-123)
- Retaining Walls 510, 512, 518, 520, and 528; Sound Walls 516, 522, 524, and 526 (Borings 858-124 through 858-144)
- Sound Wall 568 (Borings 858-145 through 858-149)
- Sound Wall 576 (Borings 858-150 through 858-152)
- Retaining Walls 439 and 443; Sound Walls 437, 441, 445, 447A, and 447B (Borings 858-153 through 858-164)
- Retaining Walls 471, 475A, 475B, and 477 (Borings 858-167 through 858-181)
- Retaining Walls 509, 513, and 519 (Borings 858-182 through 858-197)
- Retaining Walls 533 and 539; Sound Wall 521 (Borings 858-198 through 858-203, and 858-205)
- Retaining Walls 523 and 529 (Borings 858-204 and 858-206 through 858-213)
- Sound Walls 535 and 537, (Borings 858-214 through 858-222)
- Sound Walls 541 and 543 (Borings 858-223 through 858-230)
- Sound Walls 565 and 569 (Borings 858-231 through 858-239)
- Northbound Widening Borings (Borings 858-301 through 858-335)
- Southbound Widening Borings (Borings 858-338 through 858-356)
- Northbound Grubbing Borings (Borings 858-401, 858-402, 858-407, 858-408, and 858-411 through 858-413)
- Southbound Grubbing Borings (Borings 858-414 through 858-417, 858-420, and 858-421)
- Alameda Avenue Detention Basin Borings (Borings 858-403 through 858-406)
- Western Avenue Detention Basin Borings (Borings 858-409, 858-410, 858-418, and 858-419)

As indicated on Table 1, auger refusal was encountered at depths below 0.3 meter in numerous borings. As a result, the majority of data were from samples collected at depths of 0.0 and 0.3 meter. Because there are more shallow samples, the statistical analyses are biased toward the shallow depths.

For samples having lead concentrations below the practical quantitation limit, the value of one-half of the detection limit was used for the purpose of statistical evaluation.

At the request of the Department, 11 borings ("bridge borings") and 22 samples were not included in the statistical analysis completed as part of the LSI. The analytical results for these "bridge borings" are included in Table 1. Recommendations for soil use in the vicinity of the "bridge borings" are included in Table 3.

One (1) histogram of the TTLC data for the site was developed to evaluate the normality of the data (Appendix D, Figure D-1). The histogram was generated by the Excel software. The data set for the site is not normally distributed but skewed generally to the right. The data sets were transformed using the arcsine transformation, and another histogram for the site was developed (Appendix D, Figure D-2). The transformed data set for the site is not normally distributed but skewed generally to the right. However, the transformed data set is closer to a normal distribution than the non-transformed data set. The statistical calculations were performed on the transformed data in accordance with SW 846 and EPA QA/G-9.

As required by the TO, analyses of the TTLC data were performed for the 90 percent and 95 percent upper confidence limits (UCLs). For the TTLC data, the 90 percent UCL was used to evaluate whether the DTSC Variance could be invoked; the 95 percent UCL was used to evaluate off-site handling and disposal options for soil to be relinquished to a contractor or disposed outside the Department R/W per the Health and Safety Code disposal criteria. When evaluating whether the DTSC Variance (90 percent UCL) applies, a maximum total lead concentration of

3,397 mg/kg and a soluble lead concentration (WET[2]) of 5 mg/l were used; for evaluation of off-site soil handling and disposal (95 percent UCL), a maximum total lead concentration of 1,000 mg/kg and a soluble lead concentration (WET) of 5 mg/l were used. For the TCLP data, the 90 and 95 percent UCL was calculated using TCLP data from each grouping where there were four (4) or more TCLP results. The use of an absolute maximum value per layer combination for TCLP was used for groupings that had less than four (4) TCLP results. Statistical datasets for TCLP data is presented in Tables F-78 through F-87 in Appendix F.

A correlation function for samples collected at the site between the total and soluble lead concentrations was established (Appendix E) by calculating the correlation coefficient for the data set. The purpose of calculating the correlation coefficient for the TTLC/STLC data set is to evaluate the strength of the association between TTLC and STLC. Once the association was evaluated, the 90 percent and 95 percent UCL TTLC values were used to predict the 90 percent and 95 percent, respectively, UCL STLC values through a linear relationship.

For a set of variable pairs, the correlation coefficient gives the strength of the association. The square of the size of the correlation coefficient is the fraction of the variance of the one (1) variable that can be explained from the variance of the other variable. The relation between the variables is called the regression line. The regression line is defined as the best fitting straight line through all value pairs, i.e., the one explaining the largest part of the variance. TTLC/STLC data pairs were used to establish each correlation function. The correlation function is shown on Figures E-1 in Appendix E.

The procedure used to predict the soluble lead concentration was to calculate the correlation coefficient R of the pairs (TTLC, STLC) for the site using the following equation:

[2] See footnote 1 for explanation of WET and DI-WET procedures.

$$R = \frac{\{\text{Sum(TTLC*STLC)-Sum(TTLC)*Sum(STLC)}/N\}}{\text{sqrt}(\{\text{Sum(TTLC**2)-Sum(TTLC)**2}/N\}*\{\text{Sum(STLC**2)-Sum(STLC)**2}/N\})}$$

The regression line STLC=a*TTLC+b is calculated as:

a = {Sum(TTLC*STLC)-Sum(TTLC)*Sum(STLC)/N}/{Sum(TTLC**2)-Sum(TTLC)**2/N}
b = Sum(STLC)/N-a*Sum(TTLC)/N

The TTLC/STLC data pairs from each direction of the site were used to calculate the correlation coefficient. In both cases, the resulting correlation coefficient was greater than 0.80.

The resulting correlation coefficient for the site is:

R = 0.91

The resulting regression line for the site is:

STLC = (0.0973 x TTLC)- 2.8137

Statistical analyses were performed on each of the groups as indicated above. The statistical outputs can be found in Tables F-1 through F-77 (Appendix F). Block diagrams were also created based on the results of the statistical analyses and present the recommendations based on those results (Figures 3 through 40).

In general, first the mean and variance of the TTLC for each data set were calculated. These values are shown in Tables F-1 through F-77. In each case, the mean was less than the variance. For TTLC concentrations, the difference between the mean and variance was one to several orders of magnitude with the exception of the groups represented by Tables F-13 and F-16. In accordance with SW-846, the data were transformed with an arcsine transformation, and the subsequent calculations were done with the transformed data. To transform the data, the data were first converted to percentages of the maximum value in accordance with SW-846 (see Tables F-1 through F-77).

The arcsine-transformed data are listed in the bottom portion of each table (F-1 through F-77). Statistical "t" values were established for 90 percent and 95 percent UCLs based on the degrees of freedom of each data set, and 90 percent and 95 percent UCLs were calculated for each data set. The calculated values were "back transformed" to convert them to concentration values (see line Reverse Transformation for 90/95 percent on Tables F-1 through F-77). These are listed at the bottom of each of the tables.

The correlation function presented previously, derived from plotting the TTLC/STLC pairs on an x-y graph and calculating the best fit line (Figure E-1), were used to establish the 90 percent and 95 percent UCLs for STLC values. These STLC values are presented on Tables F-1 through F-77.

The same procedure was followed to evaluate the 90 and 95 percent UCL values for the relevant TCLP data. However, no correlation function was established. One (1) sample, 858-157-0.9, had a pH of 3.8 with a retest of 3.9. According to the Variance, contaminated soil with a pH of less than 5.0 shall only be used as fill material under paved portions of the roadway. Other samples analyzed had pHs greater than 5.0 and, therefore, have no bearing on soil disposition in accordance with the DTSC Variance.

7. ADL DATA EVALUATION

Based on the analytical results and subsequent statistical analysis, the data evaluation for the 90 percent UCL as it applies to the Variance and the data evaluation for the 95 percent UCL as it applies to the off-site disposal, are summarized in Tables 5 and 6.

8. RECOMMENDATIONS

Based on the findings of this study, recommendations (based on the ADL sampling) are summarized on block diagrams in Figures 3 through 40 and are discussed below. The following convention regarding layer thickness definition was used for this project. The layers are defined as 0.0 meter (surface to 0.15 meter), 0.3 meter (from 0.15 to 0.45 meter), 0.6 meter (from 0.45 to

0.75 meter), 0.9 meter (from 0.75 to 1.2 meters), and 1.5 meters (from 1.2 to 1.5 meters). Samples collected from each boring are presented on Table 1. At the direction of the Department, recommendations for the "bridge borings" are presented in Table 3. Also at the direction of the Department, this report repeats these depth intervals when a specific layer is discussed.

The following text contains several recommendations for removal of soil as Resource Conservation and Recovery Act (RCRA) hazardous waste from specific locations such as from 50 meters south of a particular boring to 37 meters north of a second boring. These distances are approximately one-half the distance to the nearest boring with soil that is not classified as RCRA hazardous.

It should be noted that certain layers of soil could not be classified in various sample groups. This is due to the inability to collect samples from areas were refusal was encountered. Therefore, soil classification was only done down to the depths of the deepest sample in a sampling group. Layers below the deepest sample were not classified as either hazardous or non-hazardous.

Also note that several groupings contain data from sampling conducted for TO-3. These data are from depths of 0.15 (from 0.0 to 0.15 meters) and 0.75 meter (0.75 to 0.9 meter). The previously sampled borings were incorporated into their respective groups in Table 1. The borings that the previous data replaced is presented in the notes of Table 1. Table 4 also contains the data from TO-3 that was incorporated into this TO.

8.1. Recommendations for 90 Percent Upper Confidence Limit (UCL) Evaluation/Variance Applies (Soil to be Re-used On Site)

- **Retaining Wall 440; Sound Wall 438 (Borings 858-101 through 858-106)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.6 and 0.9 meter layers (0.45-1.2 meter) is non-hazardous. Soil in the 1.5-meter layers (1.2 to 1.5 meters) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. This soil must be

placed a minimum of 1.5 meters above the maximum water table elevation and covered with at least 0.3 meter of non-hazardous soil.

- **Retaining Walls 474 and 478 (Borings 858-116 through 858-123)** – Soil in the 0.0-meter layer (0.0 to 0.15 meters) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.3- and 0.75-meter layer (0.15 to 0.9 meter) non-hazardous. There are no data below the 0.75 meter layer for this group.

- **Retaining Walls 510, 512, 518, 520, and 528; Sound Walls 516, 522, 524, and 526 (Borings 858-124 through 858-144)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.6- and 0.9-meter layers (0.45 to 1.2 meters) is non-hazardous. There are no data below the 0.9 meter layer for this group.

- **Sound Wall 568 (Borings 858-145 through 858-149)** – Soil in the 0.0-, 0.3-, and 0.6 meter layers (0.0 to 0.75 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. There are no data below the 0.6 meter layer for this group.

- **Sound Wall 576 (Borings 858-150 through 858-152)** – Soil in the 0.0-, 0.3-, 0.6-, 0.9-, and 1.5-meter layers (0.0 to 1.5 meters) is non-hazardous.

- **Retaining Walls 439 and 443; Sound Walls 437, 441, 445, 447A, and 447B (Borings 858-153 through 858-164)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and covered with at least 0.3 meter of non-hazardous soil. Soil in the 0.6-meter layer (0.45 to 0.75 meter) is non-hazardous. Due to the low pH results, soil in the 0.9-meter layer (0.75 to 1.2 meters) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. (Based on pH result of 3.8, the soil was re-tested. The second result was 3.9). Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. There are no data below the 0.9 meter layer for this group.

- **Retaining Walls 471, 475A, 475B, and 477 (Borings 858-167 through 858-181)** – Soil in the 0.0- to 1.5-meter layers (0.0 to 1.5 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Exceptions to this recommendation are as follows:

Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-167 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in the 0.0-meter layer (0.0 to 0.15 meter) starting at approximately 5 meters southeast of boring 858-167 and extending approximately 50 meters northwest of boring 858-167, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.3-meter layer (0.15 to 0.45 meter) in the vicinity of boring 858-171 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer (0.15 to 0.45 meter) starting at approximately 40 meters southeast of boring 858-171 and extending approximately 45 meters northwest of boring 858-171, to the width of the proposed excavation and to a depth of approximately 0.45 meter. There are no data below the 0.6 meter layer for this group.

- **Retaining Walls 509, 513, and 519 (Borings 858-182 through 858-197)** – Soil in the 0.0-, 0.3-,0.6, and 0.75-meter layers (0.0 to 0.9 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. There are no data below the 0.75 meter layer for this group.

- **Retaining Walls 533 and 539; Sound Wall 521 (Borings 858-198 through 858-203, and 858-205)** – Soil in the 0.0- and 0.3-meter layers(0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.6-meter layer (0.45 to 0.75 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and covered with at least 0.3 meter of non-hazardous soil. There are no data below the 0.6 meter layer for this group.

- **Retaining Walls 523 and 529 (Borings 858-204 and 858-206 through 858-213)** – Soil in the 0.0-and 0.3-meter layers (0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. There are no data below the 0.3-meter layer.

- **Sound Walls 535 and 537 (Borings 858-214 through 858-222)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.3-, 0.6-, and 0.9-meter layers (0.15 to 1.2 meters) is non-hazardous. There are no data below the 0.9-meter layer.

- **Sound Walls 541 and 543 (Borings 858-223 through 858-230)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Soil in the 0.6- and 0.9-meter layers (0.45 to 1.2 meter) is non-hazardous. There are no data below the 0.9-meter layer.

- **Sound Walls 565 and 569 (Borings 858-231 through 858-239)** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is non-hazardous. There are no data below the 0.6-meter layer.

- **Northbound Widening Borings 858-301 to 858-335** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Exceptions to this recommendation are as follows: Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-301 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 10 meters southeast of boring 858-301 and extending approximately 25 meters northwest of boring 858-301, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-319 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 30 meters southeast of boring 858-319 and extending approximately 38 meters northwest of boring 858-319, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-327 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 35 meters southeast of boring 858-327 and extending approximately 20 meters northwest of boring 858-327, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Southbound Widening Borings 858-336 to 858-356** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Exceptions to this recommendation are as follows: Soil in the 0.0 and 0.3-meter layers (0.0 to 0.45 meter) in the vicinity of boring 858-338 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 45 meters southeast of boring 858-338 and extending approximately 40 meters northwest of boring 858-338, to the width of the proposed excavation and to a depth of approximately 0.45 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-341 is

hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 25 meters southeast of boring 858-341 and extending approximately 25 meters northwest of boring 858-341, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Northbound Grubbing Borings Sampled at Surface Only (Borings 858-401, 858-402, 858-407, 858-408, and 858-411 through 858-413)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure. Exceptions to this recommendation are as follows: Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-401 and 858-402 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 38 meters southeast of boring 858-401 and extending approximately 38 meters northwest of boring 858-402, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-411 and 858-412 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 200 meters southeast of boring 858-327 and extending approximately 50 meters northwest of boring 858-412, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Southbound Grubbing Borings Sampled at Surface Only (Borings 858-414 through 858-417, 858-420, and 858-421)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure.

- **Alameda Avenue Detention Basin Borings Sampled at Surface Only (Borings 858-403 through 858-406)** – Soil in the 0.0-meter layer (0.0 to 0.15 meters) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and covered with at least 0.3 meter of non-hazardous soil.

- **Western Avenue Detention Basin Borings (Borings 858-409, 858-410, 858-418, and 858-419)** – Soil in the 0.0-meter layer (0.0 to 0.15 meters) is hazardous but can be re-used as fill material on the job site in accordance with the Variance. Soil must be placed a minimum of 1.5 meters above the maximum water table elevation and covered with at least 0.3 meter of non-hazardous soil.

8.2. Recommendations for 95 Percent UCL Evaluation (Soil to be Disposed of Off-site)

- **Retaining Wall 440; Sound Wall 438 (Borings 858-101 through 858-106)** – Soil in the 0.0- and 0.3- meter layers (0.0-0.45 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.6- and 0.9-meter layers (0.45-1.2 meter) is non-hazardous. Soil in the 1.5-meter layer (1.2 to 1.5 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying.

- **Retaining Walls 474 and 478 (Borings 858-116 through 858-123)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.3-, 0.6-, and 0.75-meter layers (0.15 to 0.9 meter) is non-hazardous. There are no data below the 0.75 meter layer for this group

- **Retaining Walls 510, 512, 518, 520, and 528; Sound Walls 516, 522, 524, and 526 (Borings 858-124 through 858-144)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.6- and 0.9-meter layers (0.45-0.9 meter) is non-hazardous. There are no data below the 0.9 meter layer for this group.

- **Sound Wall 568 (Borings 858-145 through 858-149)** – Soil in the 0.0-, 0.3-, and 0.6-meter layer (0.0 to 0.75 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. There are no data below the 0.6 meter layer for this group.

- **Sound Wall 576 (Borings 858-150 through 858-152)** – Soil in the 0.0-, 0.3-, 0.6-, 0.9-, and 1.5-meter layer (0.0 to 1.5 meter) is non-hazardous.

- **Retaining Walls 439 and 443; Sound Walls 437, 441, 445, 447A, and 447B (Borings 858-153 through 858-164)** – Soil in the 0.0- and 0.3-meter layers (0.0 to 0.45 meter) is hazardous and must be disposed of at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.6-meter layer (0.45 to 0.75 meter) is non-hazardous. Soil in the 0.9-meter layer (0.75 to 1.2 meter) is hazardous and must be disposed of at a Class 1 disposal site with all other Title 22 CCR requirements applying. There are no data below the 0.9 meter layer for this group.

- **Retaining Walls 471, 475A, 475B, and 477 (Borings 858-167 through 858-181)** – Soil in the 0.0- to 1.5-meter layers (0.0 to 1.5 meter) is hazardous and must be disposed of at a Class 1 disposal site with all other Title 22 CCR requirements applying. Exceptions to this recommendation are as follows: Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-167 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous

waste in this layer starting at approximately 5 meters southeast of boring 858-167 and extending approximately 50 meters northwest of boring 858-167, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.3-meter layer (0.15 to 0.45 meter) in the vicinity of boring 858-171 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in the 0.15-meter layer (0.15 to 0.6 meter) starting at approximately 40 meters southeast of boring 858-171 and extending approximately 45 meters northwest of boring 858-171, to the width of the proposed excavation and to a depth of approximately 0.45 meter.

- **Retaining Walls 509, 513, and 519 (Borings 858-182 through 858-197)** – Soil in the 0.0-, 0.3-, 0.6-, and 0.75-meter layers (0.0 to 0.9 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. There are no data below the 0.75 meter layer for this group.

- **Retaining Walls 533 and 539; Sound Wall 521 (Borings 858-198 through 858-203, and 858-205)** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. There are no data below the 0.6 meter layer for this group.

- **Retaining Walls 523 and 529 (Borings 858-204 and 858-206 through 858-213)** – Soil in the 0.0- to 0.3-meter layers (0.0 to 0.45 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. There are no data below the 0.3 meter layer for this group.

- **Sound Walls 535 and 537 (Borings 858-214 through 858-222)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.3- to 0.9-meter layers (0.15 to 1.2 meter) is non-hazardous. There are no data below the 0.9-meter layer for this group.

- **Sound Walls 541 and 543 (Borings 858-223 through 858-230)** – Soil in the 0.0- to 0.3-meter layers (0.0 to 0.45 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Soil in the 0.6- and 0.9-meter layers (0.45-1.2 meter) is non-hazardous. There are no data below the 0.9-meter layer for this group.

- **Sound Walls 565 and 569 (Borings 858-231 through 858-239)** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is non-hazardous. There are no data below the 0.6-meter layer for this group.

- **Northbound Widening Borings 858-301 to 858-335** – Soil in the 0.0-, 0.3, and 0.6-meter layers (0.0 to 0.75 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Exceptions to this recommenda-

tion are as follows: Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-301 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 10 meters southeast of boring 858-301 and extending approximately 25 meters northwest of boring 858-301, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-319 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 30 meters southeast of boring 858-319 and extending approximately 38 meters northwest of boring 858-319, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-327 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 35 meters southeast of boring 858-327 and extending approximately 20 meters northwest of boring 858-327, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Southbound Widening Borings 858-336 to 858-356** – Soil in the 0.0-, 0.3-, and 0.6-meter layers (0.0 to 0.75 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Exceptions to this recommendation are as follows: Soil in the 0.0 and 0.3-meter layers (0.0 to 0.45 meter) in the vicinity of boring 858-338 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 45 meters southeast of boring 858-338 and extending approximately 40 meters northwest of boring 858-338, to the width of the proposed excavation and to a depth of approximately 0.45 meter. Soil in the 0.0-meter layer (0.0 to 0.15 meter) in the vicinity of boring 858-341 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 25 meters southeast of boring 858-341 and extending approximately 25 meters northwest of boring 858-341, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Northbound Grubbing Borings Sampled at Surface Only (Borings 858-401, 858-402, 858-407, 858-408, and 858-411 through 858-413)** – Soil in the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying. Exceptions to this recommendation are as follows: Soil at the surface (0.0 to 0.15 meter) in the vicinity of boring 858-401 and 858-402 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in this layer starting at approximately 38 meters southeast of boring 858-401 and extending approximately 38 meters northwest of boring 858-402, to the width of the proposed excavation and to a depth of approximately 0.15 meter. Soil at the surface (0.0 to 0.15 meter) in the vicinity of boring 858-411 and 858-412 is hazardous and must be disposed at a Class 1 disposal site with all RCRA requirements applying. Remove soil as RCRA hazardous waste in

this layer starting at approximately 200 meters southeast of boring 858-327 and extending approximately 50 meters northwest of boring 858-412, to the width of the proposed excavation and to a depth of approximately 0.15 meter.

- **Southbound Grubbing Borings Sampled at Surface Only (Borings 858-414 through 858-417, 858-420, and 858-421)** – Soil at the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying.

- **Alameda Avenue Detention Basin Borings Sampled at Surface Only (Borings 858-403 through 858-406)** – Soil at the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying.

- **Western Avenue Detention Basin Borings Sampled at Surface Only (Borings 858-409, 858-410, 858-418, and 858-419)** – Soil at the 0.0-meter layer (0.0 to 0.15 meter) is hazardous and must be disposed at a Class 1 disposal site with all other Title 22 CCR requirements applying.

8.3. 599 Bonnywood Place, Burbank

Based on the lead analytical results, soil excavated from 0.0 to 0.15 meter at this property would be classified as hazardous waste by Title 22 CCR.

9. HEALTH EFFECTS OF LEAD

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft, gray metal. The permissible exposure limit (PEL) for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average (TWA); Immediately Dangerous to Life and Health (IDLH) exposure limit is 100 mg/m^3 as established by the National Institute of Occupational Safety and Health (NIOSH). Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension,

anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead Health and Safety Plan should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 Code of Federal Regulations (CFR) 1910.120 and 8 CCR 1532.1. The plan developed by the CIH should include hazard analysis, a description of dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

SITE INVESTIGATIONS ON PRIVATE PROPERTIES

(PORTION)

ROUTE: 07-LA-5 42.8/47.3

September 30, 2005
Project No. 206133007

Dr. Ayubur Rahman, P.E.
State of California
Department of Transportation, District 7, 12th Floor, MS-16
Office of Environmental Engineering and Feasibility Studies
100 South Main Street
Los Angeles, California 90012

Subject: Site Investigations on Private Properties
LA-5 HOV Project from North of SR-134 to 3.0 km South of SR-170
(07-LA-5; PM 26.7/36.4)
Los Angeles County, California
Task Order No. 07A1752-07
Expenditure Authorization No. 121801
Contract No. 07A1752

Dear Dr. Rahman:

Ninyo & Moore is pleased to provide this Site Investigation report for the subject Task Order No. 07A1752-07. The attached report presents our methodology, findings, conclusions, and recommendations regarding the environmental conditions at the site.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, please contact the undersigned at your convenience.

Respectfully submitted,
NINYO & MOORE

Julie E. Wozencraft
Senior Staff Environmental Scientist

Nancy J. Anglin, R.E.A.
Senior Project Environmental Engineer

R. Leonard Allen, G.E.
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Distribution: (6) Addressee (5 hard copies and 1 CD)

EXECUTIVE SUMMARY

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct a Site Investigation (SI) for the Private Properties Interstate 5 (I-5) High Occupancy Vehicle (HOV) Project (north of State Route [SR] 134 to 3.0 kilometers [km] south of SR-170 in Los Angeles County, California [site, Figures 1 and 2]). Work was conducted in general accordance with the Department Contract No. 07A1752, Task Order (TO) No. 07A1752-07, dated June 8, 2005.

According to the TO, the Department is currently preparing Plans, Specifications, and Estimates (PS&E) to construct HOV lanes in the northbound and southbound directions along I-5 from North of SR-134 to 3.0 km South of SR-170. The project also includes the addition of sound-walls and retaining walls along the project corridor, which requires Cast-In-Drilled-Hole (CIDH) structures, median reconstruction, and outside widening between kiloposts (KP) 43.0 and 58.0. A California Highway Patrol (CHP) enforcement area will be constructed in the median between Station 508+70 and Station 519+00. The project also proposes parking lot regrading, driveway reconstruction, and drainage facilities adjustment on one temporary construction easement.

Five parcels were identified as representing a potential environmental concern based on the surrounding industrial and commercial land use and years of operation as a railroad right-of way, which is subject to potential cargo spills, illicit dumping, and other environmental impacts. Based on this information and assumption, it is possible that contaminated soil or groundwater may be encountered near the railroad right-of-way. The presence of heavy metals and hazardous waste chemical contamination in the soil is a possibility.

Nine borings were advanced at the site (eight borings using hand-auger equipment and one boring using hollow-stem auger [HSA] methods) in general accordance with the TO. The sample identifications are in the following format: three-digit prefix – three-digit boring number – depth in meters. The three-digit prefix for this TO was 841. The three-digit boring numbers are based on type of sampling conducted (i.e., hand auger or HSA). Boring numbers in the 100 series represent borings advanced by hand-auger methods; boring numbers in the 200 series represent borings advanced by HSA. For example, sample 841-102-0.0 is the sample collected from a

depth of 0.0 meter (surface) in boring 102 (completed using hand-auger equipment) advanced for this TO.

Twenty-three samples were collected from nine boring locations. Among the nine proposed borings completed, seven samples were not collected due to refusal.

Eight soil borings were advanced at the site by hand-auger methods. Samples were collected at depths of 0.0 (surface), a composite of 0.0 to 1.5 or refusal, and 1.5 meters or refusal from each boring location. Due to refusal at depths of less than 1.5 meters in seven borings, a total of 17 soil samples were collected from the eight soil borings advanced. Refusal was met at depths of less than 1.5 meters in each boring, with the exception of boring 841-105, which was completed to the proposed total depth of 1.5 meters.

One soil boring was advanced at the site by HSA methods. Samples were collected at 7.6-meter and 3.01-meter intervals thereafter to a depth of 22.9 meters.

Detectable total petroleum hydrocarbon (TPH) concentrations in the diesel range (approximately C_5 to C_{22}), ranged from 33 to 240 milligrams per kilogram (mg/kg) at the site. No TPH concentrations in the gasoline range were detected in the soil samples. Typical hydrocarbon cleanup standards were not exceeded in the soil samples analyzed from the site.

Seventeen soil samples collected were analyzed for Title 22 Metals using EPA Method 6000/7000 series. Concentrations of each metal detected were less than their respective Total Threshold Limit Concentration (TTLC) limit and less than 10 times their respective Soluble Threshold Limit Concentration (STLC), with the exception of lead. Of the seventeen soil samples analyzed, one sample contained a concentration of lead which exceeded the TTLC for lead (1,000 mg/kg). This soil sample did not exceed the 3,397 mg/kg limit provided in the Department of Toxic Substance Control (DTSC) variance modification letter dated December 13, 2002, which modified the September 22, 2000, California Environmental Protection Agency (Cal-EPA) DTSC variance to Department District 7 (variance) as amended by Assembly Bill 414.

Thirteen soil samples contained concentrations of lead less than the TTLC of 1,000 mg/kg but greater than or equal to 50 mg/kg, which is 10 times the STLC for lead (5 mg/l). These 13 soil samples were analyzed for soluble lead (STLC) by the Waste Extraction Test (WET) method. A total of 10 of the 13 soil samples analyzed contained 5 milligrams per liter (mg/l) or more of soluble lead (STLC). Each of these 10 soil samples was subsequently analyzed for soluble lead using the Deionized-WET (DI-WET) extraction method. Three of these 10 samples contained 0.5 mg/l or more of lead using the DI-WET method.

Seventeen soil samples collected were analyzed for volatile organic compounds (VOCs) using United States Environmental Protection Agency (EPA) Method 8260B. Trichloroethylene (TCE) and perchloroethylene (PCE) were not detected in the samples collected and analyzed for VOCs. A low concentration of benzene was detected in one sample collected from one boring location. The concentration of benzene did not exceed the industrial EPA Preliminary Remediation Goals (PRGs). No other VOCs were detected in samples analyzed.

A total of eight soil samples collected were analyzed for pesticides using EPA Method 8081 and for herbicides using EPA 8151A. Pesticides including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-Chlordane, Chlordane, Dieldrin, and gamma-Chlordane were detected in seven of the eight samples collected. The concentrations of these pesticides did not exceed the industrial PRGs. Herbicide concentrations in the eight samples collected were reported to be non-detected.

Eight samples were analyzed for polychlorinated biphenyls (PCBs). Low concentrations of PCBs were detected in each of the eight samples collected from eight boring locations. The concentrations of PCBs did not exceed the industrial PRGs.

Analytical results for lead indicate that soil in the 0.0- to 0.9-meter-layer is hazardous except at borings 841-104 and 841-108. If the soil is to be reused on site, it must be placed a minimum of 1.5 meters above the maximum water table elevation and protected from infiltration by a pavement structure maintained by the Department. If the soil is to be transported off site, it must be disposed at a Class 1 disposal site with all Title 22 California Code of Regulations (CCR) requirements applying.

Analytical results for total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), VOCs, herbicides, pesticides, PCBs, and Title 22 Metals (other than lead) at the site, indicated results below their respective cleanup levels. Therefore, Ninyo & Moore has no further recommendations regarding these contaminants of concern.

Recommendations for worker safety when handling potentially VOC-impacted soil are based on maximum concentrations for each sample. The maximum VOC concentrations for each sample were less than their respective EPA PRG. Based on this information, there appear to be no restrictions for handling this soil with respect to VOCs. Personnel performing subsurface work, including geotechnical investigations, utility installations, or other subsurface construction, should be aware of the possible presence of VOCs and take appropriate health and safety precautions.

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Because of the potential hazard from exposure to lead-contaminated soil, a lead Health and Safety Plan should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 Code of Federal Regulations (CFR) 1910.120 and 8 CCR 1532.1. The plan developed by the CIH should include a hazard analysis, describe dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

1. INTRODUCTION

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct a Site Investigation (SI) for the Private Properties Interstate 5 (I-5) High Occupancy Vehicle (HOV) Project (north of State Route [SR] 134 to 3.0 kilometers [km] south of SR-170 in Los Angeles County, California [site, Figures 1 and 2]). Work was conducted in general accordance with the Department Contract No. 07A1752, Task Order (TO) No. 07A1752-07, dated June 8, 2005.

According to the TO, the Department is currently preparing Plans, Specifications, and Estimates (PS&E) to construct HOV lanes in the northbound and southbound directions along I-5 from North of SR-134 to 3.0 kilometers (km) south of SR-170. The project also includes the addition of soundwalls and retaining walls along the project corridor, which requires Cast-In-Drilled-Hole (CIDH) structures, median reconstruction, and outside widening between kiloposts (KP) 43.0 and 58.0. A California Highway Patrol (CHP) enforcement area will be constructed in the median between Station 508+70 and Station 519+00. The project also proposes parking lot regrading, driveway reconstruction, and drainage facilities adjustment on one temporary construction easement.

Five parcels were identified as representing a potential environmental concern based on the surrounding industrial and commercial land use and years of operation as a railroad right-of way, which is potentially subject to potential cargo spills, illicit dumping, and other environmental impacts. Based on this information and assumption, it is possible that contaminated soil or groundwater may be encountered near the railroad right-of-way. The presence of heavy metals and hazardous waste chemical contamination in the soil is a possibility.

2. SITE DESCRIPTION

The following sections include a site description, objectives, and limitations.

2.1. SITE DESCRIPTION

Five private properties listed below are being acquired by the Department for permanent footing and aerial easements for the I-5 Widening Project within the subject project limits, northbound and southbound directions along I-5 from North of SR-134 to 3.0 km south of SR-170. The five private properties for permanent footing and aerial easements are:

- Assessor's Parcel Number (APN) 2453-042-901, Parcel No. 78705, Rail Road Providencia
- APN 2453-042-900, Parcel No. 78705, Rail Road Providencia
- APN 2451-005-902, Parcel No. 78709, Rail Road Providencia
- APN 2451-005-903, Parcel No. 78709, Rail Road Providencia
- APN 2632-001-900, Parcel No. 78718, Rail Road, Sun Valley

2.2. SITE INVESTIGATION OBJECTIVES

The objectives of this SI were as follows:

- Evaluate the surface and subsurface soil at the private properties for the presence of heavy metals and hazardous waste chemicals.
- Evaluate the likelihood that groundwater would be encountered during the construction of the project.

The information obtained from this SI was used to evaluate the method of re-use or disposal of soil excavated during the proposed construction at the site. The data were also used to inform the Department of potential health and safety issues for workers at the site during geotechnical investigations and construction activities.

2.3. VARIATION TO THE WORK PLAN

The SI was completed in accordance with the TO with the following exceptions:

- The TO proposed eight soil borings to be advanced and 24 soil samples to be collected at the site using hand-auger methods. Samples were proposed at the surface (0.0), a composite sample from surface to 1.5 meters, and at 1.5 meters. However, due to refusal at depths of less than 1.5 meters in seven borings, a total of 17 soil samples were col-

lected from the eight soil borings advanced. In the case of refusal, a composite sample was collected to the depth of refusal. No sample was taken at the depth of refusal.

- The TO proposed one soil boring to be advanced at the Sun Valley Overhead (OH) using hollow-stem auger (HSA) method. At the direction of the Department, the boring was not drilled.

2.4. GEOLOGY/HYDROGEOLOGY

The site is within the northwestern block of the Los Angeles Basin. A majority of this province consists of the alluvium, lake, playa, and terrace deposits, unconsolidated and semi-consolidated deposits. According to the Soil Survey of Los Angeles County, published by the United States Department of Agriculture Soil Conservation Service, dated June 1967, revised December 1969, the near surface soil associations underlying the site belong primarily to the Hanford association and the Tujunga-Soboba association.

According to the TO, groundwater was anticipated to be encountered approximately 11 to 27 meters below ground surface (bgs) near the Providencia Avenue OH. Groundwater was not encountered during Ninyo & Moore's field activities to a maximum depth of 22 meters on July 1, 2005.

3. INVESTIGATION METHODS

Field work was conducted between July 1, 2005, and July 18, 2005, in general accordance with the TO dated June 8, 2005. Exceptions to the TO are discussed in Section 2.3. The following sections document and/or describe the activities conducted prior to the field work, soil sampling conducted at the site using hand-auger methods, soil sampling conducted at the site using HSA methods; investigative derived waste; laboratory analyses, and Geographical Information System (GIS) data.

3.1. HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan dated June 22, 2005, was prepared by Ninyo & Moore and submitted to the Department for review and approval prior to commencing field work. The Department approved the Plan on June 22, 2005.

3.2. UTILITY CLEARANCE

The boring locations were described in detail to Underground Service Alert (USA) when USA was notified at least 48 hours prior to conducting the soil sampling.

3.3. SOIL BORING LOCATIONS

Nine soil borings were advanced in locations approved by the Department. The boring locations are shown on Figures 3 and 4. The sample identifications (IDs) contained in the laboratory reports in Appendix A and as summarized in Tables 1 and 2 are in the following format: three-digit prefix – three-digit boring number – depth in meters or a range of depths in meters (indicating a composite sample). The three-digit prefix for this TO was 841. The three-digit boring numbers are based on type of sampling conducted (i.e., hand auger or HSA). Boring numbers in the 100 series represent borings advanced by hand-auger; boring numbers in the 200 series represent borings advanced by HSA. For example, sample 841-102-0.0 is the sample collected from a depth of 0.0 meter (surface) in boring 102 (completed using hand-auger equipment) advanced for this TO.

3.4. SOIL SAMPLING (HAND-AUGER EQUIPMENT)

A total of 17 soil samples were collected from eight soil boring locations using hand-auger equipment. Soil samples were collected at depths of 0.0 (surface), a composite from the surface to 1.5 meters or refusal, and 1.5 meters or not sampled if refusal was encountered shallower than 1.5 meters at each sample location. Samples collected from each boring are presented on Tables 1 and 2.

Samples collected at the site using hand-auger equipment were placed in new, 50.8-millimeter (mm)-diameter by 76-mm-long brass sleeves, capped with plastic end caps, and labeled accordingly. The sampling equipment was decontaminated between each boring, and an equipment rinsate sample was collected and analyzed for each chain-of-custody. Equipment rinsate samples were collected by pouring deionized water over/through decontaminated equipment and allowing the water to drain into a laboratory-supplied sample container. Soil and the equipment rinsate samples were transferred under chain-of-custody protocol to Advanced Technology Laboratories (ATL) of Signal Hill, California, within 24 hours of collection.

3.5. SOIL SAMPLING (HOLLOW-STEM AUGER METHOD)

Seven samples were collected from one soil boring using HSA methods. Samples were collected at 7.6-meter and 3.0-meter intervals thereafter to a total depth of 22.9 meters. The boring log for the HSA boring is presented in Appendix B. Soil samples collected from HSA equipment were collected using 50.8-mm-diameter brass sleeves, the sleeve ends covered with Teflon and then capped with plastic end caps and labeled. Soil samples were transferred under chain-of-custody protocol to ATL within 24 hours of collection.

3.6. INVESTIGATIVE DERIVED WASTES

Soil cuttings generated by hand-auger drilling were returned to the boreholes upon collection of soil samples. As discussed in the contract, no decontamination water entered storm drains. Soil cuttings from the HSA borings were containerized in 208-liter DOT-approved drums and left at the Department maintenance facility pending chemical characterization. The soil in the drums was profiled for disposal purposes. A sample from the boring was analyzed for volatile organic compounds (VOCs) and Title 22 Metals in general accordance with United States Environmental Protection Agency (EPA) Methods 8260B and 6000/7000 series, respectively. The laboratory report is presented in Appendix A. Analytical results indicate the five soil drums from boring 841-201 are non-hazardous. On August 5, 2005, the

drums were transported to facilities licensed to receive waste. Disposal documents are presented in Appendix C.

3.7. LABORATORY ANALYSES

Soil samples were transferred under chain-of-custody from to ATL of Signal Hill, California. The laboratory reports are included in Appendix A, and results are summarized on Tables 1, 2, and 3. Soil samples analyzed for Title 22 Metals were analyzed in general accordance with EPA Method 6000/7000 series. Soil samples analyzed for VOCs were analyzed in general accordance with EPA Method 8260B. Soil samples analyzed for total petroleum hydrocarbons as gasoline (TPHg) and diesel (TPHd) were analyzed in general accordance with EPA Method 8015M. Soil samples analyzed for pesticides and herbicides were analyzed in general accordance with EPA Method 8081 and 8151A, respectively. Soil samples analyzed for polychlorobiphenyls (PCBs) were analyzed in general accordance with EPA Method 8082.

3.8. GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Latitude and longitude (NAD) 83 of sampling locations were recorded with a handheld Global Positioning System (GPS) unit (GeoXT, Trimble). Laboratory data and coordinates were entered into the Access database template provided by the Department. Sample IDs intended for use by the Department for sampling and for GIS tables were provided to Ninyo & Moore. The GIS tables are presented in Appendix D.

4. INVESTIGATIVE RESULTS

The results of the field work, field quality assurance/quality control (QA/QC), laboratory results, and laboratory QA/QC are presented below.

4.1. SUMMARY OF FIELD WORK

Eight soil borings were advanced at the site by hand-auger methods. Samples were collected at depths of 0.0 (surface), a composite of 0.0 to 1.5 or refusal, and 1.5 meters or refusal from

each boring location. Due to refusal at depths of less than 1.5 meters in seven borings, a total of 17 soil samples were collected from the eight soil borings advanced. Refusal was met at depths of less than 1.5 meters in each boring, with the exception of boring 841-105, which was completed to the proposed total depth of 1.5 meters.

One soil boring was advanced at the site by HSA methods. Samples were collected at 7.6-meter and 3.0-meter intervals thereafter to a depth of 22.9 meters.

4.2. FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

In order to reduce the likelihood of cross-contamination, sampling equipment was decontaminated between borings. Equipment was washed in a solution of non-phosphate detergent, rinsed in clear water, rinsed in distilled water, and dried. To evaluate the effectiveness of the decontamination procedures, one equipment rinsate blank was collected and analyzed for VOCs. The sample was collected by pouring deionized water through/over decontaminated equipment and collecting the water in laboratory-supplied containers. In addition, one trip blank was analyzed for VOCs to assess possible cross-contamination. VOCs were not detected in the equipment blank or trip blank analyzed indicating decontamination was effective and cross-contamination did not occur.

4.3. LABORATORY RESULTS

Twenty-three samples were collected from the nine boring locations. Among the nine borings completed, seven planned samples were not collected due to refusal. Six of the seven soil samples collected with the HSA methods were not analyzed as groundwater was not encountered. One sample (841-201-7.6) was analyzed for waste characterization purposes.

There are no current regulatory cleanup standards for petroleum hydrocarbons in soil. The Regional Water Quality Control Board (RWQCB) typically sets cleanup goals on a case-by-case basis. The RWQCB issued an Interim Site Assessment and Cleanup Guidebook, dated May 1996 (guidance document), as a guideline for petroleum hydrocarbon-impacted soil. Based on information obtained from the Los Angeles Department of Public Works

(LADPW), Hydrologic Records Division, groundwater depths in the vicinity of the site are expected to be greater than 30 meters bgs. According to the guidance document, if the depth to groundwater is from 6 to 45 meters, typical cleanup standards for total petroleum hydrocarbons (TPH) in the gasoline and diesel ranges are approximately 500 and 1,000 mg/kg, respectively.

Detectable TPH concentrations in the diesel range (approximately C_5 to C_{22}), ranged from 33 to 240 mg/kg in the hand auger borings. No detectable TPH concentrations in the gasoline range were detected in the soil samples from the hand-auger borings. Typ hydrocarbon cleanup standards were not exceeded in the soil samples analyzed from the si

Seventeen soil samples collected were analyzed for Title 22 Metals using EPA Meth 6000/7000 series. Of the 17 soil samples, one sample contained a concentration of lea which equaled or exceeded the TTLC for lead (1,000 mg/kg). This soil sample did not ex ceed the 3,397-mg/kg limit provided in the DTSC variance modification letter date December 13, 2002, which modified the September 22, 2000, Cal-EPA DTSC variance to Department District 7 (variance) as amended by Assembly Bill 414. This sample was subsequently analyzed for soluble lead by the Toxicity Characteristic Leaching Procedure (TCLP). The soil sample analyzed contained 0.65 mg/l. Federal regulations indicate that waste soil containing 5 mg/l or more of lead by TCLP analyses be classified as a Resource, Conservation, and Recovery Act (RCRA)-regulated hazardous waste for disposal purposes. If a layer is found to contain samples with TCLP results of 5 mg/l or more, additional in-ground and/or stockpile soil sampling should be performed near these sample locations during construction activities. Per the variance and Assembly Bill 414, the Department may reuse fill soil containing less than 3,397 mg/kg of total lead (TTLC).

Thirteen soil samples contained concentrations of lead less than the TTLC of 1,000 mg/kg but greater than or equal to 50 mg/kg, which is 10 times the STLC for lead (5 mg/l). These 13 soil samples were analyzed for soluble lead (STLC) by the Waste Extraction Test (WET). A total of 10 of the 13 soil samples analyzed contained 5 mg/l or more of soluble lead (STLC). Each of these 10 soil samples was subsequently analyzed for soluble lead using the

Deionized-WET (DI-WET) extraction method. Three of these 10 samples contained 0.5 mg/l or more of lead using the DI-WET method. Based on the DTSC's direction in the Variance, layers that will be reused onsite and contain samples with a soluble lead concentration of greater than 0.5 mg/l (using the DI-WET method) must be placed a minimum of 1.5 meters above the maximum water table elevation and be protected from infiltration by a pavement structure maintained by the Department. Such layers that will be reused onsite and contain samples with a soluble lead concentration of less than 0.5 mg/l using the DI-WET method must be placed a minimum of 1.5 meters above the maximum water table elevation and covered by at least 0.3 meter of non-hazardous soil. Analytical results for samples analyzed for lead are shown on Table 3.

Seventeen soil samples collected were analyzed for VOCs using EPA Method 8260B. Trichloroethylene (TCE) and perchloroethylene (PCE) were not detected in the samples collected and analyzed for VOCs. A low concentration of benzene was detected in one sample collected from one boring location. The benzene concentration did not exceed the industrial EPA Preliminary Remediation Goals (PRGs). No other VOCs were detected in samples analyzed. VOC results are shown on Table 1.

Eight soil samples collected were analyzed for pesticides using EPA Method 8081 and for herbicides using EPA 8151A. Pesticides, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-Chlordane, Chlordane, Dieldrin, and gamma-Chlordane, were detected in seven of the eight samples collected. These pesticide concentrations do not exceed the industrial PRGs. Herbicide concentrations in the eight samples collected were reported to be non-detected.

Eight samples collected were analyzed for PCBs. Low concentrations of PCBs were detected in each of the eight samples collected from eight different boring locations. The concentrations of PCBs did not exceed the industrial PRGs.

Each of the soil samples collected was recorded on one of two chain-of-custody (COC) records. Over two days of sampling, two equipment rinsate samples were collected and one was analyzed for VOCs. As specified in the TO, the equipment rinsate sample from the HSA

method was not analyzed. In addition, two trip blanks were submitted to the laboratory for VOCs analysis. The trip blank associated with the HSA sampling was not analyzed. VOCs were not detected in any of the equipment rinsate or trip blank samples.

4.4. LABORATORY QA/QC

ATL conducted laboratory QA/QC in accordance with Contract No. 07A1752; QA/QC procedures included analyses of method blanks, duplicate samples, and spiked samples. These procedures are included in the analytical reports presented in Appendix A of this report.

5. RECOMMENDATIONS

Analytical results for lead indicate that soil in the 0.0- to 0.9-meter-layer is hazardous except at borings 841-104 and 841-108. If the soil is to be reused on site, it must be placed a minimum of 1.5 meters above the maximum water table elevation and be protected from infiltration by a pavement structure maintained by the Department. If the soil is to be transported offsite, it must be disposed at a Class 1 disposal site with all Title 22 California Code of Regulations (CCR) requirements applying.

Analytical results for TPHg, TPHd, VOCs, herbicides, pesticides, PCBs, and Title 22 Metals (with the exception of lead) at the site, indicated results below their respective cleanup levels. Therefore, Ninyo & Moore has no further recommendations regarding these contaminants of concern.

Recommendations for worker safety when handling potentially VOC-impacted soil are based on maximum concentrations for each sample. The maximum VOC concentrations for each sample were less than their respective EPA PRG. Based on this information, there appear to be no restrictions for handling this soil with respect to VOCs. Personnel performing subsurface work, including geotechnical investigations, utility installations, or other subsurface construction, should be aware of the possible presence of VOCs and take appropriate health and safety precautions.

6. HEALTH EFFECTS OF LEAD

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft, gray metal. The permissible exposure limit (PEL) for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average (TWA). The immediately Dangerous to Life and Health (IDLH) exposure limit is 100 mg/m^3 as established by the National Institute of Occupational Safety and Health (NIOSH). Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead Health and Safety Plan should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 Code of Federal Regulations (CFR) 1910.120 and 8 CCR 1532.1. The plan developed by the CIH should include a hazard analysis, describe dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

TABLE 1 – SOIL SAMPLE RESULTS – NON-METAL

Sample ID	Sample Depth (m)	Sample Date	TPHd (mg/kg)	TPHg (mg/kg)	PCB (µg/kg)	Pesticides (µg/kg)	Herbicides (µg/kg)	VOCs (µg/kg)	pH
841-101-0.0	0.0	7/18/2005	ND	140	Aroclor 1254 47 Aroclor 1260 50	4,4′-DDE 4.3 4,4′-DDT 17 alpha-Chlordane 6 Chlordane 58 Dieldrin 4.9 gamma-Chlordane 8.2	ND	ND	8.1
841-101-0.0-0.91	0.0-0.91	7/18/2005	ND	40	--	--	--	ND	7.9
841-102-0.0	0.0	7/18/2005	ND	60	Aroclor 1254 95 Aroclor 1260 95	4,4′-DDD 6.9 4,4′-DDE 12 4,4′-DDT 32 alpha-Chlordane 7.5 Chlordane 78 Dieldrin 7.3 gamma-Chlordane 10	ND	ND	8.6
841-102-0.0-0.15	0.0-0.15	7/18/2005	40	ND	--	--	--	ND	7.8
841-103-0.0	0.0	7/18/2005	66	ND	Aroclor 1254 32 Aroclor 1260 47	4,4′-DDD 3.2 4,4′-DDT 11 alpha-Chlordane 3.6 Chlordane 23 Dieldrin 2.2 gamma-Chlordane 3.1	ND	ND	7.6
841-103-0.0-0.46	0.0-0.46	7/18/2005	50	ND	--	--	--	ND	7.4
841-104-0.0	0.0	7/18/2005	81	ND	Aroclor 1254 43 Aroclor 1260 55	4,4′-DDE 2.6 4,4′-DDT 13 alpha-Chlordane 2.1 Chlordane 30 Dieldrin 3.5 gamma-Chlordane 3.8	ND	ND	8.2
841-104-0.0-0.43	0.0-0.43	7/18/2005	33	ND	--	--	--	ND	8
841-105-0.0	0.0	7/18/2005	160	ND	Aroclor 1254 500 Aroclor 1260 260	4,4′-DDD 20 4,4′-DDT 170 alpha-Chlordane 12 Chlordane 110 Dieldrin 29 gamma-Chlordane 16	ND	ND	8

TABLE 1 – SOIL SAMPLE RESULTS – NON-METAL

Sample ID	Sample Depth (m)	Sample Date	TPHd (mg/kg)	TPHg (mg/kg)	PCB (µg/kg)	Pesticides (µg/kg)	Herbicides (µg/kg)	VOCs (µg/kg)	pH
841-105-0.0-1.5	0.0-1.5	7/18/2005	21	ND	--	--	--	ND	7.8
841-105-1.5	1.5	7/18/2005	ND	ND	--	--	NA	ND	7.8
841-106-0.0	0.0	7/18/2005	44	ND	Aroclor 1254 310 Aroclor 1260 180	ND	ND	ND	8.3
841-106-0.0-0.20	0.0-0.20	7/18/2005	88	ND	--	--	--	ND	8.2
841-107-0.0	0.0	7/18/2005	150	ND	Aroclor 1254 32 Aroclor 1260 34	4,4'-DDT 20 alpha-Chlordane 1.4 Chlordane 16 gamma-Chlordane 2.5	ND	ND	8.4
841-107-0.0-0.51	0.0-0.51	7/18/2005	240	ND	--	--	--	ND	8.2
841-107-0.0-DUP	0.0	7/18/2005	200	ND	Aroclor 1254 150 Aroclor 1260 94	4,4'-DDT 44	ND	ND	8.2
841-108-0.0	0.0	7/18/2005	66	ND	Aroclor 1254 17 Aroclor 1260 17	4,4'-DDT 3.5 Chlordane 12 gamma-Chlordane 1.0	ND	Benzene 5.4	9
841-108-0.0-0.20	0.0-0.20	7/18/2005	70	ND	--	--	--	ND	8.7
841-108-0.0-0.20-DUP	0.0-0.20	7/18/2005	53	ND	--	--	--	ND	8.8
841-201-7.6	7.6	7/11/2005	ND	--	--	--	--	ND	--
EQ-1 (µg/l)	NA	7/18/2005	ND	ND	ND	ND	--	ND	NA
TB1 (µg/l)	NA	7/18/2005	--	--	--	--	--	ND	NA

m – meters
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
-- – not analyzed
ND – not detected above the laboratory Practical Quantitation Limit

TABLE 2 – SOIL SAMPLES RESULTS – METALS

Sample ID	Sample Date	Metals (mg/kg)																
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Total Chromium	Cobalt	Copper	Lead	Mercury *	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
841-101-0.0	7/18/2005	ND	1.6	210	ND	1.3	24	12	69	300	ND	ND	17	ND	ND	ND	44	230
841-101-0.0-0.91	7/18/2005	ND	ND	170	ND	ND	24	15	53	110	ND	ND	19	ND	ND	ND	52	140
841-102-0.0	7/18/2005	8.1	6.5	150	ND	9.4	22	11	44	1500	ND	1.4	17	ND	ND	ND	47	230
841-102-0.0-0.15	7/18/2005	ND	1.4	170	ND	6	13	12	25	170	ND	ND	9.5	ND	ND	ND	56	120
841-103-0.0	7/18/2005	7.7	1	140	ND	ND	20	11	36	190	ND	1.1	16	ND	ND	ND	41	130
841-103-0.0-0.46	7/18/2005	ND	2.9	130	ND	ND	19	11	27	75	ND	ND	15	1.1	ND	ND	42	110
841-104-0.0	7/18/2005	ND	1.6	150	ND	1.8	31	13	34	43	ND	ND	18	1	ND	ND	48	100
841-104-0.0-0.43	7/18/2005	ND	ND	150	ND	ND	22	13	26	11	ND	ND	15	ND	ND	ND	49	53
841-105-0.0	7/18/2005	ND	3.2	150	ND	2.9	23	9.9	58	910	ND	1.8	20	ND	ND	ND	35	490
841-105-0.0-1.5	7/18/2005	ND	7.8	140	ND	ND	19	12	26	29	ND	ND	14	1.2	ND	ND	48	62
841-105-1.5	7/18/2005	ND	ND	210	ND	ND	25	17	35	6.2	ND	ND	19	1.2	ND	ND	59	70
841-106-0.0	7/18/2005	ND	ND	140	ND	ND	22	13	28	130	ND	ND	16	ND	ND	ND	50	310
841-106-0.0-0.20	7/18/2005	ND	1.6	160	ND	ND	24	14	37	540	ND	ND	18	1.2	ND	ND	51	330
841-107-0.0	7/18/2005	ND	ND	73	ND	ND	11	5.9	18	64	ND	ND	7.6	ND	ND	ND	26	670
841-107-0.0-DUP	7/18/2005	ND	1.1	72	ND	ND	9.4	5.3	17	65	ND	ND	8.6	ND	ND	ND	25	280
841-107-0.0-0.51	7/18/2005	ND	1.3	74	ND	ND	9.9	5.9	20	98	ND	ND	8	ND	ND	ND	26	220
841-108-0.0	7/18/2005	ND	ND	73	ND	ND	9.6	6.4	23	29	ND	1	5.9	ND	ND	ND	28	140
841-108-0.0-0.20	7/18/2005	ND	1.1	77	ND	ND	11	6.2	19	55	ND	ND	6.4	ND	ND	ND	28	580
841-108-0.0-0.20-DUP	7/18/2005	ND	ND	66	ND	ND	8.5	5.6	18	61	ND	ND	5.9	ND	ND	ND	25	480
841-201-7.6	7/11/2005	ND	ND	160	ND	ND	18	13	31	3.8	ND	ND	12	1.4	ND	ND	56	65
EQ-1 (mg/l)	7/18/2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
Metals analyzed in general accordance with United States Environmental Protection Agency (EPA) Test Method 6010B
*Mercury analyzed in general accordance with EPA Test Method 7471A
mg/kg – milligrams per kilogram
mg/l – miligrams per liter
ND<1.0 – not detected above the Practical Quantitation Limit

TABLE 3 – SOIL SAMPLE RESULTS LEAD

Sample ID	Sample Depth (m)	Sample Date	TTLC (mg/kg)	STLC (mg/l)	DI-WET (mg/l)	TCLP (mg/l)
841-101-0.0	0.00	7/18/2005	300	21	0.28	--
841-101-0.0-0.91	0.00-0.91	7/18/2005	110	9.2	ND	--
841-102-0.0	0.00	7/18/2005	1,500	--	--	0.65
841-102-0.0-0.15	0.00-0.15	7/18/2005	170	13	0.66	--
841-103-0.0	0.00	7/18/2005	190	14	0.36	--
841-103-0.0-0.46	0.0-0.46	7/18/2005	75	7	ND	--
841-104-0.0	0.00	7/18/2005	43	--	--	--
841-104-0.0-0.43	0.00-0.43	7/18/2005	11	--	--	--
841-105-0.0	0.00	7/18/2005	910	110	ND	--
841-105-0.0-1.5	0.0-1.5	7/18/2005	29	--	--	--
841-105-1.5	1.50	7/18/2005	6.2	--	--	--
841-106-0.0	0.00	7/18/2005	130	2.9	--	--
841-106-0.0-0.20	0.0-0.20	7/18/2005	540	23	2.4	--
841-107-0.0	0.00	7/18/2005	64	4.9	--	--
841-107-0.0-DUP	0.00	7/18/2005	65	7	0.39	--
841-107-0.0-0.51	0.0-0.51	7/18/2005	98	8.4	0.71	--
841-108-0.0	0.0	7/18/2005	29	--	--	--
841-108-0.0-0.20	0.0-0.20	7/18/2005	55	4.7	--	--
841-108-0.0-0.20-DUP	0.0-0.20	7/18/2005	61	6.6	ND	--
841-201-7.6	7.6	7/11/2005	3.8	--	--	--
Equipment Blanks (mg/l)						
EQ-1	NA	7/18/2005	ND	--	--	--

Notes:
ID – identification
m – meters
TTLC – Total Threshold Limit Concentration
STLC – Soluble Threshold Limit Concentration
DI-WET – Deionized Water Waste Extraction Test
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
-- – not analyzed
ND – not detected above the laboratory Practical Quantitation Limit
NA – not applicable

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

California Regional Water Quality Control Board

Clean Water Act Section 401 Water Quality Certification

ROUTE: 07-LA-5 42.8/47.3

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Linda S. Adams
Agency Secretary

Arnold Schwarzenegger
Governor

320 W. 4th Street, Suite 200, Los Angeles, California 90013
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Mr. Paul Caron
California Department of Transportation
100 South Main Street MS-16A
Los Angeles, CA 90012

WATER QUALITY CERTIFICATION FOR PROPOSED ROUTE 5 HOV LANE (121841) PROJECT (Corps' Project No. (2008-00041-PHT), LOS ANGELES RIVER, CITY OF GLENDALE, LOS ANGELES COUNTY (File No. 07-190)

Dear Mr. Caron:

Board staff has reviewed your request on behalf of Caltrans (Applicant) for a Clean Water Act Section 401 Water Quality Certification for the above-referenced project. Your application was deemed complete on December 10, 2008.

I hereby issue an order certifying that any discharge from the referenced 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, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 - DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges that have received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Certification.

The Applicant shall be liable civilly for any violations of this Certification in accordance with the California Water Code. This Certification does not eliminate the Applicant's responsibility to comply with any other applicable laws, requirements and/or permits.

Should you have questions concerning this Certification action, please contact Valerie Carrillo, Lead, Section 401 Program, at (213) 576-6759.

Tracy J. Egoscue
Executive Officer

3/26/07
Date

DISTRIBUTION LIST

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ATTACHMENT A

Project Information
File No. 07-190

1. Applicant:

California Department of Transportation
100 South Main Street
Los Angeles, CA 90012

Phone: (213) 897-9362 Fax: (213) 897-2593

2. Applicant's Agent: Eric Hansen

3. Project Name: Route 5 HOV Lane Project (121841)

4. Project Location: Burbank area, Los Angeles County

Longitude	Latitude
118°17'23.58" W	34°9'21.65" W

5. Type of Project: Interstate 5 Freeway Improvements (gap closure)

6. Project Purpose: The purpose of the proposed project is to conduct a median reconstruction (gap closure) of I-5 Los Angeles River Bridge Separator (No. 53-1075) to alleviate congestion, promote ride sharing and reduce air pollution.

7. Project Description: The proposed project will construct one High Occupancy Vehicle (HOV) lane in each direction in the median on the I-5 Interstate from SR-134 to SR-118 in the Cities of Glendale, Burbank, and Los Angeles. The project includes widening or reconstruction of 5 segments of freeway. For this Certification, the project will consist of ONLY Segment 1. Segment 1 covers the areas in the Los Angeles River from Magnolia Avenue in Burbank to the SR-134 interchange. Specifically, the project proposes to construct a gap closure in the median of the I-5 Los Angeles River Bridge (No. 53-1075). Construction of working platforms will occur within the river, as well as the formation of pier caps on Piers 3 and 4 for new girders.

Water will be temporarily diverted to allow for equipment to work in the channel. Approximately 4,000 to 6,000 gravel filled bags or

	a CMP pipe culvert will be used to divert the water. A Surface Water Diversion Plan will be submitted as specified prior to project construction in Attachment B, Condition No. 18. Approximately 0.04 acres of riparian habitat in the streambed will be temporarily impacted due to project construction activities.
8. Federal Agency/Permit:	U.S. Army Corps of Engineers NWP No. 14 (Permit No. 2008-00041-PHT)
9. Other Required Regulatory Approvals:	California Department of Fish and Game Streambed Alteration Agreement
10. California Environmental Quality Act Compliance:	A Negative Declaration was prepared for the proposed project, pursuant to the provisions of CEQA. The Negative Determination was signed and approved on December 19, 2000.
11. Receiving Water:	Los Angeles River (Hydrologic Unit No. 405.21)
12. Designated Beneficial Uses:	MUN*, REC-1, REC-2, WARM, WILD *Conditional beneficial use
13. Impacted Waters of the United States:	Non-wetland waters (streambed): 0.04 temporary acres
14. Dredge Volume:	None
15. Related Projects Implemented/to be Implemented by the Applicant:	The Applicant has not identified the following related projects planned for implementation in the next 5 years. -Current I-5 HOV expansion from SR-118 -The overall project is broken up into 5 segments and permits will be obtained separately for each segment if necessary.

ATTACHMENT A

Project Information
File No. 07-190

16. Avoidance/ Minimization Activities:

The Applicant has proposed to implement several Best Management Practices, including, but not limited to, the following:

- Caltrans will use appropriate Construction Best Management Practices (BMP) to prevent construction debris from entering the channel
- Construction equipment will be washed prior to entering construction zone to reduce the risk of exotic weed transfer
- Construction equipment will be staged in the Caltrans right-of-way adjacent to the freeway and away from watercourses
- Water diversion will occur during the dry season to minimize impacts to water quality
- Bridgework will not occur during bird nesting season (February 15th through September 1st). If work must be done during the nesting season, a qualified biologist will be notified 2 weeks prior so surveys can be conducted.
- If birds are found to be present, work will cease until fledglings have left the nest.

17. Proposed Compensatory Mitigation:

The Applicant has not proposed any compensatory mitigation.

18. Required Compensatory Mitigation:

The Regional Board will require a 2:1 compensatory mitigation ratio for all impacts associated with the proposed project.

See *Attachment B, Conditions of Certifications, Additional Conditions* for modifications and additions to the above proposed compensatory mitigation.

ATTACHMENT B

Conditions of Certification
File No. 07-190

STANDARD CONDITIONS

Pursuant to §3860 of Title 23 of the California Code of Regulations (23 CCR), the following three standard conditions shall apply to this project:

1. This Certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to §13330 of the California Water Code and Article 6 (commencing with 23 CCR §3867).

2. This Certification action is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and 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. Certification is conditioned upon total payment of any fee required pursuant to 23 CCR Chapter 28 and owed by the Applicant.

ADDITIONAL CONDITIONS

Pursuant to 23 CCR §3859(a), the Applicant shall comply with the following additional conditions:

1. The Applicant shall submit to this Regional Board copies of any other final permits and agreements required for this project, including, but not limited to, the U.S. Army Corps of Engineers' (ACOE) Section 404 Permit and the California Department of Fish and Game's (CDFG) Streambed Alteration Agreement. **These documents shall be submitted prior to any discharge to waters of the State.**

2. The Applicant shall adhere to the most stringent conditions indicated with either this certification, the CDFG's Streambed Alteration Agreement, or the ACOE Section 404 Permit.

3. The Applicant shall comply with all water quality objectives, prohibitions, and policies set forth in the *Water Quality Control Plan, Los Angeles Region (1994).*

4. The Avoidance/Minimization activities proposed by the Applicant as described in Attachment A, No. **16**, are incorporated as additional conditions herein.

5. The Applicant and all contractors employed by the Applicant shall have copies of this Certification, the approved maintenance plan, and all other regulatory approvals for this project on site at all times and shall be familiar with all conditions set forth.

6. Fueling, lubrication, maintenance, operation, and storage of vehicles and equipment shall not result in a discharge or a threatened discharge to waters of the State. At no time shall the Applicant use any vehicle or equipment which leaks any substance that may impact water quality. Staging and storage areas for vehicles and equipment shall be located outside of waters of the State.

7. All excavation, construction, or maintenance activities shall follow best management practices to minimize impacts to water quality and beneficial uses. Dust control activities shall be conducted in such a manner that will not produce downstream runoff.

8. No construction material, spoils, debris, or any other substances associated with this project that may adversely impact water quality standards, shall be located in a manner which may result in a discharge or a threatened discharge to waters of the State. Designated spoil and waste areas shall be visually marked prior to any excavation and/or construction activity, and storage of the materials shall be confined to these areas.

9. All waste and/or dredged material removed shall be relocated to a legal point of disposal if applicable. A legal point of disposal is defined as one for which Waste Discharge Requirements have been established by a California Regional Water Quality Control Board, and is in full compliance therewith. Please contact Rodney Nelson, Land Disposal Unit, at (213) 620-6119 for further information.

10. The Applicant shall implement all necessary control measures to prevent the degradation of water quality from the proposed project in order to maintain compliance with the Basin Plan. The discharge shall meet all effluent limitations and toxic and effluent standards established to comply with the applicable water quality standards and other appropriate requirements, including the provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act. This Certification does not authorize the discharge by the applicant for any other activity than specifically described in the 404 Permit.

11. The discharge shall not: a) degrade surface water communities and populations including vertebrate, invertebrate, and plant species; b) promote the breeding of mosquitoes, gnats, black flies, midges, or other pests; c) alter the color, create visual contrast with the natural appearance, nor cause aesthetically undesirable discoloration of the receiving waters; d) cause formation of sludge deposits; or e) adversely affect any designated beneficial uses.

12. The Applicant shall allow the Regional Board and its authorized representative entry to the premises, including all mitigation sites, to inspect and undertake any activity to determine compliance with this Certification, or as otherwise authorized by the California Water Code.

13. The Applicant shall not conduct any construction activities within waters of the State during a rainfall event. The Applicant shall maintain **a five-day (5-day) clear weather forecast** before conducting any operations within waters of the State.

14. If rain is predicted after operations have begun, grading activities must cease immediately and the site must be stabilized to prevent impacts to water quality, and minimize erosion and runoff from the site.

15. The Applicant shall utilize the services of a qualified biologist with expertise in riparian assessments during any vegetation clearing activities. The biologist shall be available on site during construction activities to ensure that all protected areas are marked properly and ensure that no vegetation outside the specified areas is removed. The biologist shall have the authority to stop the work, as necessary, if instructions are not followed. The biologist shall be available upon request from this Regional Board for consultation within 24 hours of request of consultation.

16. No activities shall involve wet excavations (i.e., no excavations shall occur below the seasonal high water table). A minimum **5-foot** buffer zone shall be maintained above the existing groundwater level. If construction or groundwater dewatering is proposed or anticipated, the Applicant shall file a **Report of Waste Discharge** to this Regional Board and obtain any necessary NPDES permits/Waste Discharge Requirements prior to discharging waste. Sufficient time should be allowed to obtain any such permits (generally 180 days). If groundwater is encountered without the benefit of appropriate permits, the Applicant shall cease all activities in the areas where groundwater is present, file a Report of Waste Discharge to this Regional Board, and obtain any necessary permits prior to discharging waste.

17. All project/maintenance activities not included in this Certification, and which may require a permit, must be reported to the Regional Board for appropriate permitting. Bank stabilization and grading, as well as any other ground disturbances, are subject to restoration and revegetation requirements, and may require additional Certification action.

18. All surface waters, including ponded waters, shall be diverted away from areas undergoing grading, construction, excavation, vegetation removal, and/or any other activity which may result in a discharge to the receiving water. If surface water diversions are anticipated, the Applicant shall develop and submit a **Surface Water Diversion Plan** (plan) to this Regional Board. The plan shall include the proposed method and duration of diversion activities, structure configuration, construction materials, equipment, erosion and sediment controls,

and a map or drawing indicating the locations of diversion and discharge points. Contingency measures shall be a part of this plan to address various flow discharge rates. The plan shall be submitted prior to any surface water diversions. If surface flows are present, then upstream and downstream monitoring for the following shall be implemented:

- pH
- temperature
- dissolved oxygen
- turbidity
- total suspended solids(TSS)
- Downstream TSS shall be maintained at ambient levels
- Where natural turbidity is between 0 and 50 Nephelometric Turbidity Units (NTU), increases shall not exceed 20%. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

Analyses must be performed using approved US Environmental Protection Agency methods, where applicable. These constituents shall be monitored for on a daily basis during the first week of diversion and/or dewatering activities, and then on a weekly basis, thereafter, until the in-stream work is complete.

Results of the analyses shall be submitted to this Regional Board by the 15th day of each subsequent sampling month. A map or drawing indicating the locations of sampling points shall be included with each submittal. Diversion activities shall not result in the degradation of beneficial uses or exceedance of water quality objectives of the receiving waters. Any such violations may result in corrective and/or enforcement actions, including increased monitoring and sample collection.

19. The Applicant shall restore all areas of TEMPORARY IMPACTS to waters of the United States and all other areas of temporary disturbance which could result in a discharge or a threatened discharge to waters of the State. Restoration shall include grading of disturbed areas to pre-project contours and revegetation with native species. Restored areas shall be monitored and maintained with native species as necessary for five years. The Applicant shall implement all necessary Best Management Practices to control erosion and runoff from areas associated with this project.

20. The Applicant shall provide COMPENSATORY MITIGATION to offset the proposed temporary loss of **0.04 acres** waters of the United States by creating or restoring riparian habitat at a minimum **2:1** area replacement ratio (**0.08 acres**). As an alternative, the Applicant may provide adequate funding to a third party organization for the creation or restoration of a total of **0.08 acres** of riparian habitat within waters of the United States. The mitigation site shall be located within the Los Angeles River Watershed unless otherwise approved by this Regional Board. The boundary of the mitigation site shall be clearly identified on a map of suitable quality and shall be defined by latitude and longitude. This

information shall be submitted to this Regional Board for approval prior to any disturbance within waters of the United States and shall include copies of any agreements made between the Applicant and a third party organization regarding compensatory mitigation efforts.

21. The Applicant shall submit to this Regional Board **Annual Mitigation Monitoring Reports** (Annual Reports) by **January 1st** of each year for a minimum period of **five (5) years** until mitigation success has been achieved. The Annual Reports shall describe in detail all of the project/construction activities performed during the previous year and all restoration and mitigation efforts; including percent survival by plant species and percent cover. The Annual Reports shall describe the status of other agreements (e.g., mitigation banking) or any delays in the mitigation process. At a minimum the Annual Reports shall include the following documentation:

    (a) Color photo documentation of the pre- and post-project and mitigation site conditions;

    (b) Geographical Positioning System (GPS) coordinates in decimal-degrees format outlining the boundary of the project and mitigation areas;

    (c) The overall status of project including a detailed schedule of work;

    (d) Copies of all permits revised as required in Additional Condition 1;

    (e) Water quality monitoring results (as required) compiled in an easy to interpret format;

    (f) A certified Statement of "no net loss" of wetlands associated with this project;

    (g) Discussion of any monitoring activities and exotic plant control efforts; and

    (h) A certified Statement from the permittee or his/her representative that all conditions of this Certification have been met.

22. Prior to any subsequent maintenance activities within the project areas, including clearing, maintenance by-hand, and/or the application of pesticides, the Applicant shall submit to this Regional Board a NOTIFICATION of any such activity. Notification shall include: (a) the proposed schedule; (b) a description of the condition/capacity; (c) the area of proposed temporary impact within waters of the State; (c) a description of any existing aquatic resources (e.g., wetland/riparian vegetation); and (d) any proposed compensatory mitigation. Notifications must be submitted a minimum of **three (3) weeks** prior to commencing work activities.

23. All applications, reports, or information submitted to the Regional Board shall be signed:

    (a) For corporations, by a principal executive officer at least of the level of vice president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which discharge originates.

    (b) For a partnership, by a general partner.

    (c) For a sole proprietorship, by the proprietor.

    (d) For a municipal, State, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

24. Each and any report submitted in accordance with this Certification shall contain the following completed declaration:

    "I declare under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who managed the system or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

    Executed on the _____ day of _____ at _____.

    _____ (Signature)
    _____ (Title)"

25. All communications regarding this project and submitted to this Regional Board shall identify the Project File Number **07-190**. Submittals shall be sent to the attention of the 401 Certification Unit.

26. Any modifications of the proposed project may require submittal of a new Clean Water Act Section 401 Water Quality Certification application and appropriate filing fee.

27. Coverage under this Certification may be transferred to the extent the underlying federal permit may legally be transferred and further provided that the Applicant notifies the Executive Officer at least 30 days before the proposed transfer date, and the notice includes a written agreement between the existing and new Applicants containing a specific date of coverage, responsibility for compliance with this Certification, and liability between them.

28. The Applicant or their agents shall report any noncompliance. Any such information shall be provided verbally to the Executive Officer within 24 hours from the time the Applicant becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Applicant becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

29. *Enforcement:*

    (a) In the event of any violation or threatened violation of the conditions of this Certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under State law. For purposes of section 401(d) of the Clean Water Act, the applicability of any State law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this Certification.

    (b) In response to a suspected violation of any condition of this Certification, the State Water Resources Control Board (SWRCB) or Regional Water Quality Control Board (RWQCB) may require the holder of any permit or license subject to this Certification to furnish, under penalty of perjury, any technical or monitoring reports the SWRCB deems appropriate, provided that the burden, including costs, of the reports shall be a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

    (c) In response to any violation of the conditions of this Certification, the SWRCB or RWQCB may add to or modify the conditions of this Certification as appropriate to ensure compliance.

30. This Certification shall expire **five (5) years** from date of this Certification. The Applicant shall submit a complete application prior to termination of this Certification if renewal is requested.

FOR CONTRACT NO. 07-121844

INFORMATION HANDOUT

Department of Fish and Game

Streambed Alteration Agreement No. 1600-2007-0429-R5

ROUTE: 07-LA-5 42.8/47.3

DEPARTMENT OF FISH AND GAME
South Coast Region
Jamie Jackson
P.O. Box 92890
Pasadena, CA 91109
(626) 296-3430

December 07, 2007

Ms. Bridget Cameron
California Department of Transportation-District 7
100 S. Main Street MS-16A
Los Angeles, California 90012

Streambed Alteration Agreement Number # 1600-2007-0429-R5
I-5 High Occupancy Vehicle Lane Project EA: 121841
I-5/SR-134 Interchange at the Los Angeles River
Glendale, Los Angeles County

Dear Ms. Bridget Cameron:

On November 05, 2007 the Department of Fish and Game received your Notification of Lake or Streambed Alteration. On December 07, 2007 the Department determined that your notification is complete. By law, the Department is required to submit a draft Lake or Streambed Alteration Agreement to you within 60 calendar days from the date the notification is complete, if the Department determines that an agreement is required for the project. Hence, the Department has until February 10, 2008 to issue you a draft agreement or inform you that an agreement is not required.

As explained in the notification package you received, the Department must comply with the California Environmental Quality Act ("CEQA") (Public Resources Code section 21000 *et seq.*) before it may issue a final agreement. The Department will issue a final agreement after it receives from you the signed draft agreement. If the project described in your notification is not exempt from CEQA, the lead agency must prepare an environmental document for the project. If you represent a public agency, that agency is the lead agency for the project.

If the Department does not issue you a draft agreement or inform you that an agreement is not required by February 10, 2008 you may complete the project without an agreement. If that occurs, however, the project must be the same one and conducted in the same manner as described in the notification, which would include implementing all measures to protect fish and wildlife resources identified in the notification. (Fish and Game Code section 1602(a)(4)(D).) If your project differs from the one described in the notification, you may be in violation of Fish and Game Code section 1602. Also, even though you would be entitled to complete the project without an agreement, you would still be responsible for complying with all other applicable local, state, and federal laws, including, for example, the state and federal Endangered Species Acts and Fish and Game Code sections 5650 (water pollution) and 5901 (fish passage).

If you have any questions regarding this matter, please contact me at (626) 296-3430.

Sincerely,

Jamie Jackson
Environmental Scientist

State of California - The Resources Agency
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF FISH AND GAME
South Coast Region
Jamie Jackson
P.O. Box 92890
Pasadena, California 91109
(626) 296-3430

February 06, 2008

Ms. Bridget Cameron
California Department of Transportation-District 7
100 S. Main Street MS-16A
Los Angeles, California 90012

Streambed Alteration Agreement Number # 1600-2007-0429-R5
I-5 High Occupancy Vehicle Lane Project EA: 121841
I-5/SR-134 Interchange at the Los Angeles River
Glendale, Los Angeles County

Dear Ms. Bridget Cameron:

As the Department explained in its letter to you dated December 07, 2007 the Department had until February 10, 2008 to submit a draft Lake or Streambed Alteration Agreement to you or inform you that an agreement is not required. Due to staffing constraints, the Department was unable to meet that date. As a result, by law, you may now complete the project described in your notification without an agreement. In doing so, however, the project must be the same one and conducted in the same manner as described in the notification. That includes completing the project within the proposed term and seasonal work period and implementing all mitigation and avoidance measures to protect fish and wildlife resources specified in the notification. (Fish and Game Code section 1602(a)(4)(D).)

If your project differs from the one described in the notification, you may be in violation of Fish and Game Code section 1602. Also, even though you are entitled to complete the project without an agreement, you are still responsible for complying with all other applicable local, state, and federal laws, including, for example, the state and federal Endangered Species Acts and Fish and Game Code sections 5650 (water pollution) and 5901 (fish passage).

Finally, you must have a copy of this letter and your notification with all attachments available at all times at the work site. If you have any questions regarding this matter, please contact me at (626) 296-3430.

Sincerely,

Jamie Jackson
Environmental Scientist

121841

FOR DEPARTMENT USE ONLY				
Date Received	*Amount Received*	*Amount Due*	*Date Complete*	*Notification No.*
	$	$		

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Complete EACH field, unless otherwise indicated, following the enclosed instructions and submit ALL required enclosures. Attach additional pages, if necessary.

1. APPLICANT PROPOSING PROJECT

Name	Paul Caron		
Business/Agency	Caltrans District 7		
Street Address	100 South Main Street MS-16A		
City, State, Zip	Los Angeles, California 90012		
Telephone	(213) 897-0610	Fax	(213) 897-2593
Email	paul_d_caron@dot.ca.gov		

2. CONTACT PERSON (*Complete only if different from applicant*)

Name	Bridget Cameron		
Street Address	100 South Main Street MS-16A		
City, State, Zip	Los Angeles, California 90012		
Telephone	(213) 897-9362	Fax	(213) 897-2593
Email	bridget_cameron@dot.ca.gov		

3. PROPERTY OWNER (*Complete only if different from applicant*)

Name	Los Angeles County of Public Works		
Street Address	900 Fremont Avenue		
City, State, Zip	Alhambra, California 91803		
Telephone	(626) 458-5100	Fax	
Email			

4. PROJECT NAME AND AGREEMENT TERM

A. Project Name	I-5 High Occupancy Vehicle Lane Project EA: 121841			
B. Agreement Term Requested	☑ Regular (*5 years or less*) ☐ Long-term (*greater than 5 years*)			
C. Project Term		D. Seasonal Work Period		E. Number of Work Days
Beginning (*year*)	Ending (*year*)	Start Date (*month/day*)	End Date (*month/day*)	
2009	2009	04/01	12/01	200.00

5. AGREEMENT TYPE

Check the applicable box. If box B, C, D, or E is checked, complete the specified attachment.		
A.	☑ Standard *(Most construction projects, excluding the categories listed below)*	
B.	☐ Gravel/Sand/Rock Extraction (*Attachment A*)	*Mine I.D. Number:* _____
C.	☐ Timber Harvesting (*Attachment B*)	THP *Number:* _____
D.	☑ Water Diversion/Extraction/Impoundment (*Attachment C*)	*SWRCB Number:* _____ pending
E.	☐ Routine Maintenance (*Attachment D*)	
F.	☐ DFG Fisheries Restoration Grant Program (FRGP)	*FRGP Contract Number:* _____
G.	☐ Master	
H.	☐ Master Timber Harvesting	

6. FEES

Please see the current fee schedule to determine the appropriate notification fee. Itemize each project's estimated cost and corresponding fee. ***Note: The Department may not process this notification until the correct fee has been received.***

	A. Project	B. Project Cost	C. Project Fee
1	I-5 High Occupancy Vehicle Lane Project EA: 121841	$115,000,000.00	$4,000.00
2			
3			
4			
5			
		D. Base Fee *(if applicable)*	
		E. TOTAL FEE ENCLOSED	$4,000.00

7. PRIOR NOTIFICATION OR ORDER

A. Has a notification previously been submitted to, or a Lake or Streambed Alteration Agreement previously been issued by, the Department for the project described in this notification?

☐ Yes (*Provide the information below*) ☑ No

Applicant: _____ Notification Number: _____ Date: _____

B. Is this notification being submitted in response to an order, notice, or other directive ("order") by a court or administrative agency (including the Department)?

☑ No ☐ Yes (*Enclose a copy of the order, notice, or other directive. If the directive is not in writing, identify the person who directed the applicant to submit this notification and the agency he or she represents, and describe the circumstances relating to the order.*)

☐ *Continued on additional page(s)*

8. PROJECT LOCATION

A. Address or description of project location.

(Include a map that marks the location of the project with a reference to the nearest city or town, and provide driving directions from a major road or highway)

I-5/SR-134 Interchange at the Los Angeles River Bridge Separator (No. 53-1075) in Glendale, California.

☐ *Continued on additional page(s)*

B. River, stream, or lake affected by the project.	Los Angeles River
C. What water body is the river, stream, or lake tributary to?	Pacific Ocean
D. Is the river or stream segment affected by the project listed in the state or federal Wild and Scenic Rivers Acts?	☐ Yes ☑ No ☐ Unknown
E. County	Los Angeles

F. USGS 7.5 Minute Quad Map Name	G. Township	H. Range	I. Section	J. ¼ Section
Burbank	1N	13W		

☐ *Continued on additional page(s)*

K. Meridian (*check one*) ☐ Humboldt ☐ Mt. Diablo ☑ San Bernardino

L. Assessor's Parcel Number(s)

☐ *Continued on additional page(s)*

M. Coordinates (*If available, provide at least latitude/longitude or UTM coordinates and check appropriate boxes*)

Latitude/Longitude	*Latitude:* 34 9'21.65"N	*Longitude:* 118 17'23.58"W	
	☑ Degrees/Minutes/Seconds	☐ Decimal Degrees	☐ Decimal Minutes
UTM	*Easting:*	*Northing:*	☐ Zone 10 ☐ Zone 11
Datum used for Latitude/Longitude or UTM	☐ NAD 27	☐ NAD 83 or WGS 84	

9. PROJECT CATEGORY AND WORK TYPE *(Check each box that applies)*

PROJECT CATEGORY	NEW CONSTRUCTION	REPLACE EXISTING STRUCTURE	REPAIR/MAINTAIN EXISTING STRUCTURE
Bank stabilization – bioengineering/recontouring	☐	☐	☐
Bank stabilization – rip-rap/retaining wall/gabion	☐	☐	☐
Boat dock/pier	☐	☐	☐
Boat ramp	☐	☐	☐
Bridge	☑	☐	☐
Channel clearing/vegetation management	☐	☐	☐
Culvert	☐	☐	☐
Debris basin	☐	☐	☐
Dam	☐	☐	☐
Diversion structure – weir or pump intake	☐	☐	☐
Filling of wetland, river, stream, or lake	☐	☐	☐
Geotechnical survey	☐	☐	☐
Habitat enhancement – revegetation/mitigation	☐	☐	☐
Levee	☐	☐	☐
Low water crossing	☐	☐	☐
Road/trail	☐	☐	☐
Sediment removal – pond, stream, or marina	☐	☐	☐
Storm drain outfall structure	☐	☐	☐
Temporary stream crossing	☐	☐	☐
Utility crossing : Horizontal Directional Drilling	☐	☐	☐
Jack/bore	☐	☐	☐
Open trench	☐	☐	☐
Other *(specify)*:	☐	☐	☐

10. PROJECT DESCRIPTION

A. Describe the project in detail. Photographs of the project location and immediate surrounding area should be included.

- Include any structures (e.g., rip-rap, culverts, or channel clearing) that will be placed, built, or completed in or near the stream, river, or lake.
- Specify the type and volume of materials that will be used.
- If water will be diverted or drafted, specify the purpose or use.

Enclose diagrams, drawings, plans, and/or maps that provide all of the following: site specific construction details; the dimensions of each structure and/or extent of each activity in the bed, channel, bank or floodplain; an overview of the entire project area (i.e., "bird's-eye view") showing the location of each structure and/or activity, significant area features, and where the equipment/machinery will enter and exit the project area.

The project proposes to construct a gap closure in the median of I-5 Los Angeles River Bridge (No. 53-1075). Additionally, the following activities will occur:

construction of working platforms
lift steel plates for girder strengthening
form pier-caps on piers 3 and 4 for new girders

Water will be temporarily diverted to allow equipment to work in-stream. Approximately 4,000 to 6,000 gravel filled bags (0.35 x 0.75 x 0.2 meters) may be used at a total height of 1.0 meters and a total length of 137 meters. Alternately 900 mm plastic or CMP pipe culvert at 43 meters in length may also be used.

☐ *Continued on additional page(s)*

B. Specify the equipment and machinery that will be used to complete the project.

Front loader
Forklift
100-ton crane
1-ton truck

☐ *Continued on additional page(s)*

C. Will water be present during the proposed work period (specified in box 4.D) in the stream, river, or lake (specified in box 8.B).	☑ Yes ☐ No (*Skip to box 11*)
D. Will the proposed project require work in the wetted portion of the channel?	☑ Yes (*Enclose a plan to divert water around work site*) ☐ No

11. PROJECT IMPACTS

A. Describe impacts to the bed, channel, and bank of the river, stream, or lake, and the associated riparian habitat. Specify the dimensions of the modifications in length (linear feet) and area (square feet or acres) and the type and volume of material (cubic yards) that will be moved, displaced, or otherwise disturbed, if applicable.

Approximately 4,000 to 6,000 gravel filled bags (0.35 x 0.75 x 0.2 meters) may be used at a total height of 1.0 meters and a total length of 137 meters. Alternately 900 mm plastic or CMP pipe culvert at 43 meters in length may also be used. Temporary minimal impacts to aquatic life and vegetation may occur from the altered course of water.

☐ *Continued on additional page(s)*

B. Will the project affect any vegetation? ☐ Yes (*Complete the tables below*) ☑ No

Vegetation Type	Temporary Impact	Permanent Impact
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____

Tree Species	Number of Trees to be Removed	Trunk Diameter (range)

☐ *Continued on additional page(s)*

C. Are any special status animal or plant species, or habitat that could support such species, known to be present on or near the project site?

☐ Yes *(List each species and/or describe the habitat below)* ☑ No ☐ Unknown

☐ *Continued on additional page(s)*

D. Identify the source(s) of information that supports a "yes" or "no" answer above in Box 11.C.

Natural Environment Study from Caltrans

☐ *Continued on additional page(s)*

E. Has a biological study been completed for the project site?

☑ Yes (*Enclose the biological study*) ☐ No

Note: A biological assessment or study may be required to evaluate potential project impacts on biological resources.

F. Has a hydrological study been completed for the project or project site?

☐ Yes (*Enclose the hydrological study*) ☑ No

Note: A hydrological study or other information on site hydraulics (e.g., flows, channel characteristics, and/or flood recurrence intervals) may be required to evaluate potential project impacts on hydrology.

12. MEASURES TO PROTECT FISH, WILDIFE, AND PLANT RESOURCES

A. Describe the techniques that will be used to prevent sediment from entering watercourses during and after construction.

All appropriate Caltrans Construction Best Management Practices (BMP) will be used to prevent construction debris from entering the channel.

Construction equipment will be staged in the Caltrans right-of-way adjacent to the freeway and away from the watercourse.

☐ *Continued on additional page(s)*

B. Describe project avoidance and/or minimization measures to protect fish, wildlife, and plant resources.

Construction equipment will be washed prior to entering the construction area to reduce the risk of exotic weed transfer.

Water diversion will occur during the dry season to minimize impacts to water quality.

Bridgework may not occur during swallow nesting season (2/15-9/1). If work must be done during the nesting season, a qualified biologist will be notified two weeks prior to construction to confirm the absence of nests. If swallows are present, work will cease until fledglings have left the nest. Exclusionary devices will be implemented if deemed necessary.

☐ *Continued on additional page(s)*

C. Describe any project mitigation and/or compensation measures to protect fish, wildlife, and plant resources.

☐ *Continued on additional page(s)*

13. PERMITS

List any local, state, and federal permits required for the project and check the corresponding box(es). Enclose a copy of each permit that has been issued.

A. Army Corp of Engineers 404 Permit ☑ Applied ☐ Issued

B. Regional Water Quality Control Board 401 Permit ☑ Applied ☐ Issued

C. _____ ☐ Applied ☐ Issued

D. Unknown whether ☐ local, ☐ state, or ☐ federal permit is needed for the project. (*Check each box that applies*)

☐ *Continued on additional page(s)*

14. ENVIRONMENTAL REVIEW

A. Has a draft or final document been prepared for the project pursuant to the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), California Endangered Species Act (CESA) and/or federal Endangered Species Act (ESA)?

☑ Yes (*Check the box for each CEQA, NEPA, CESA, and ESA document that has been prepared and enclose a copy of each*)

☐ No (*Check the box for each CEQA, NEPA, CESA, and ESA document listed below that will be or is being prepared*)

☐ Notice of Exemption	☐ Mitigated Negative Declaration	☑ NEPA document (*type*): FONSI
☐ Initial Study	☐ Environmental Impact Report	☐ CESA document (*type*):
☑ Negative Declaration	☑ Notice of Determination *(Enclose)*	☐ ESA document (*type*):
☐ THP/ NTMP	☐ Mitigation, Monitoring, Reporting Plan	

B. State Clearinghouse Number (*if applicable*)	2000071084		
C. Has a CEQA lead agency been determined?	☑ Yes (*Complete boxes D, E, and F*)	☐ No (*Skip to box 14.G*)	
D. CEQA Lead Agency	Caltrans		
E. Contact Person	Garrett Damrath	F. Telephone Number	(213) 897-9016

G. If the project described in this notification is part of a larger project or plan, briefly describe that larger project or plan.

I-5 HOV extends from SR-134 to SR-118. This project is divided into 5 segments. Not all segments require a permit. Other permit applications will be applied for if deemed necessary.

☐ *Continued on additional page(s)*

H. Has an environmental filing fee (Fish and Game Code section 711.4) been paid?

☑ Yes (*Enclose proof of payment*) ☐ No (*Briefly explain below the reason a filing fee has not been paid)*

Note: If a filing fee is required, the Department may not finalize a Lake or Streambed Alteration Agreement until the filing fee is paid.

15. SITE INSPECTION

Check one box only.

☑ In the event the Department determines that a site inspection is necessary, I hereby authorize a Department representative to enter the property where the project described in this notification will take place at any reasonable time, and hereby certify that I am authorized to grant the Department such entry.

☐ I request the Department to first contact (*insert name*) _____ at (*insert telephone number*) _____ to schedule a date and time to enter the property where the project described in this notification will take place. I understand that this may delay the Department's determination as to whether a Lake or Streambed Alteration Agreement is required and/or the Department's issuance of a draft agreement pursuant to this notification.

16. DIGITAL FORMAT

Is any of the information included as part of the notification available in digital format (i.e., CD, DVD, etc.)?

☐ Yes (Please enclose the information via digital media with the completed notification form)

☑ No

17. SIGNATURE

I hereby certify that to the best of my knowledge the information in this notification is true and correct and that I am authorized to sign this notification as, or on behalf of, the applicant. I understand that if any information in this notification is found to be untrue or incorrect, the Department may suspend processing this notification or suspend or revoke any draft or final Lake or Streambed Alteration Agreement issued pursuant to this notification. I understand also that if any information in this notification is found to be untrue or incorrect and the project described in this notification has already begun, I and/or the applicant may be subject to civil or criminal prosecution. I understand that this notification applies only to the project(s) described herein and that I and/or the applicant may be subject to civil or criminal prosecution for undertaking any project not described herein unless the Department has been separately notified of that project in accordance with Fish and Game Code section 1602 or 1611.

_____ _____

Signature of Applicant or Applicant's Authorized Representative Date

_____

Print Name

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Applicant Name: **Caltrans District 7**

Project Name: **I-5 High Occupancy Vehicle Lane Project EA: 121841**

ATTACHMENT C

Water Diversion Questionnaire

I. DIVERSION OR OBSTRUCTION

Please provide the additional information below ***if*** the project is directly related to any diversion, obstruction, extraction, or impoundment of the natural flow of a river, stream, or lake. If you have a current or expired Lake or Streambed Alteration Agreement (LSAA) for some activity related to your project, provide the LSAA number in your project description below.

A. Attach plans of any diversion or water storage structure or facility that will be constructed or if no structures or facilities will be constructed, photographs of the project site, including any existing facilities or structures.

B. Please complete the water use table below. For diversion rate, use gallons per day (gpd) if rate is less than 0.025 cubic foot per second (cfs) (approximately 16,000 gallons per day).

SEASON OF DIVERSION		PURPOSE OF USE	DIVERSION RATE (cfs or gpm)	AMOUNT USED (acre feet)	
BEGINNING DATE (Mo. & Day)	ENDING DATE (Mo. & Day)			FROM STORAGE	BY DIVERSION
05/01	**09/30**	**Temporary diversion for**	**52.70**		
		construction equipment			

C. Attach a topographic map that is labeled to show the following:
   1. Source of the water
   2. Points of diversion
   3. Areas of use
   4. Storage areas

D. Specify the maximum instantaneous rate of withdrawal (using proposed equipment) in cubic feet per second (cfs) or gallons per minute (gpm): **62**.

E. Check each box below that applies to the project water rights and attach supporting documents.

- ☐ Riparian. *Attach the most recent statement of riparian rights filed with the State Water Resources Control Board (SWRCB).*
- ☑ Diversion for immediate use
- ☐ Diversion to storage (for less than 30 days)

☐ Appropriative

- ☐ Pre-1914
- ☐ Post-1914. *Attach a copy of the applicant's water right application, permit, or license filed with or issued by the SWRCB.*
- ☑ Diversion for immediate use. *Attach a copy of the applicant's water right application, permit, or license filed with or issued by the SWRCB.*
- ☐ Diversion to storage. *Attach a copy of the applicant's water right application, permit, or license filed with or issued by the SWRCB.*
- ☐ Small domestic or livestock stockpond use. *Attach a copy of the applicant's registration of water use form filed with the SWRCB.* (See Water Code section 1228 *et seq.*)

☐ Purchased or contracted water. *Attach a copy of the applicant's contract or letter from the applicant's water provider.*

☐ Other. *Describe below or attach separate page.*

F. Approximate lowest level of flow in the river, stream, or lake at the point of diversion during the proposed season of diversion in gpm or cfs: 52.

G. Other information. After the Department reviews the project description, and based on the project's location and potential impacts to fish and wildlife resources, the Department will determine if additional information is needed to complete the notification. Such information could include more site-specific information to ensure that the terms and conditions in the Lake or Streambed Alteration Agreement issued to the applicant will be adequate to protect the fish and wildlife resources the diversion or obstruction could adversely affect. Site-specific information could include specific studies based on the season of diversion, the location of the diversion relative to other diversions in the watershed, the method of diversion, and the quantity of water to be diverted, such as the following:

1. *Water Availability Analysis* to determine if the water can be diverted without causing substantial adverse effects on downstream fish and wildlife resources. Water availability analyses are based on a comparison of flows without any diversions (unimpaired flows) and flows available when all known diversions are "subtracted" (impaired flows). The protocol for water availability analyses is available on request.

2. *Instream Flow Study* to determine the minimum bypass flows needed and maximum rates of withdrawal possible to provide adequate depths and velocities to protect habitat for all life stages of aquatic resources. The study plan, which must be prepared by a qualified fisheries biologist and approved by the Department, will determine the effects of the proposed diversion on flow depth and velocity.

3. *Water Quality Study* to assess the effects of the proposed water diversion or impoundment on water temperature and water quality at and downstream from the point of diversion.

II. PERMANENT OR TEMPORARY RESERVOIR

Please provide the information below ***if*** the project includes the construction of a reservoir, whether permanent or temporary, and/or the filling of a reservoir by diverting or obstructing the flow of a river, stream, or lake.

A. Proposed use of the stored water: _____.

B. Construction plans for the reservoir and dam. (*Attach plans*)

C. A complete description of the reservoir and dam, including the methods and materials that will be used to construct the reservoir and dam and the following dimensions certified by a licensed professional: the width, length, depth, and total surface area of the reservoir pool; the volume of water in acre-feet that will be stored in the reservoir; and the height and length of the dam.

D. The amount of riparian land that will be inundated (i.e., upstream from the dam): _____.

E. Where vehicles will enter and exit the project site during construction and for maintenance purposes after construction. *(Attach map)*

F. The maximum distance of the disturbance that will occur upstream and downstream during construction: _____.

G. The methods that will be employed to ensure that the flow is maintained below the dam at all times when water is being diverted into the reservoir. _____

_____

_____

_____.

H. Specify the time period when the area below the dam becomes dry, if at all. _____.

I. The methods that will be employed to ensure that adult and juvenile fish will be able to pass over or around the dam. _____

_____

_____

_____.

J. If a fish ladder is necessary to enable adult and juvenile fish to pass over or around the dam, provide construction plans and an operation plan for the fish ladder. *(Enclose, if applicable)*

K. The methods that will be employed to monitor and maintain water quality (including temperature) within the reservoir. _____

_____

_____

_____.

III. TEMPORARY RESERVOIR

Please provide the information below ***if*** the project includes the construction of a temporary reservoir only within the stream zone.

A. Date of dam installation:_____.

B. Date of dam removal:_____.

C. Amount of time it will take to construct the dam: _____.

D. Amount of time it will take to remove the dam: _____.

E. Methods to ensure that the reservoir pool will be drained in a manner that does not strand or otherwise harm fish: _____

_____

_____

_____.

FOR CONTRACT NO. 07-121844

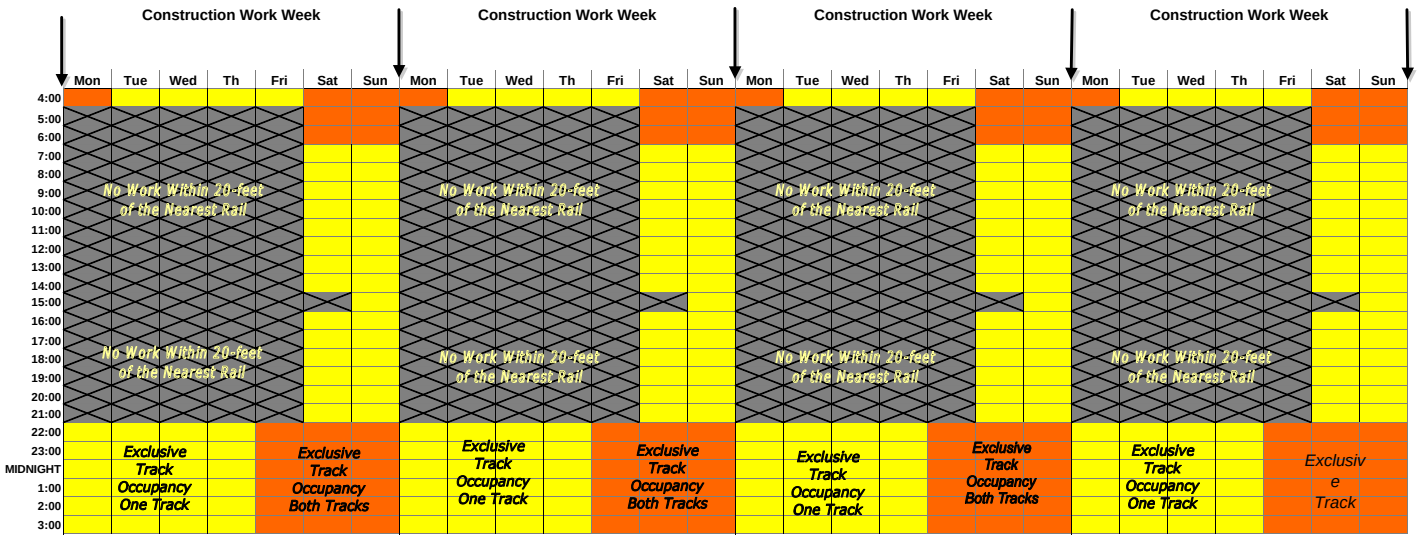
INFORMATION HANDOUT

METROLINK WORK WINDOW CHART

PROVIDENCIA AVENUE OVERHEAD

ROUTE: 07-LA-5 42.8/47.3

WORK WINDOW CHART - TYPICAL MONTH



LEGEND:

Track occupancy intermittently on one track using Track and Time with Form B on operating track. Must yield track and time for train movements on both tracks as indicated on chart. On those weekends on which exclusive track occupany on both tracks during the night has been scheduled, Track and time will not be available during daytime of the same weekend in order for freight train movements to be accommodated

Exclusive track occupany both tracks. Available on Friday, Saturday, and Sunday nights only with *60 days advance notice*.

Exclusive Track Occupancy on one track with Form B on operating track. Requires 7 days advance notice

No work within 20-foot of the nearest rail on both tracks. Monday through Friday approximately 5:00 AM until 9:30 PM. Work above the tracks will be permitted only if there is a complete separation between the track envelope and the work area.

NOTES:

1 Times of track occupany shown above are approximate. SCRRA dispatcher, SCRRA Employee in Charge, or both may decrease the working windows above based on actual train movements.

2 Amtrak Train No. 11 can be late up to 30% of the time due to track work and freight traffic between Los Angeles and Seattle. If the Contractor has scheduled an Exclusive Track Occupany on Both Tracks on a weekend in which Train 11 is late, the Exclusive Track Occupancy will be converted to a Form B with Track and Time until Train 11 has passed.

3 Union Pacific train ZLCSE normally departs Los Angeles nightly at 12:15 am. Train ZBRLC arrives Los Angeles at or about 2:30 pm. Other freight trains run but are dispatched as extras (non scheduled).

4 THE START TIME FOR DOUBLE TRACK AND SINGLE TRACK WORK WINDOWS IS AN ' AVERAGE" START TIME DEPENDENT ON LOCATION AND MAY VARY +/- 30 MINUTES.