

Memorandum

*Flex your power!
Be energy efficient!*

To: Diboro Kanabolo - 08
Design "O"

Attn: Dat Wong

Date: October 13, 2013

File: 08-SBd-58-PM R22.2/R31.1
EA: 08-043510
0800000010

From: **DEPARTMENT OF TRANSPORTATION**
Division of Engineering Services
Office of Geotechnical Design South - 2

Subject: Geotechnical Design Report for Seven Overhead Signs

Per your request dated June 19, 2013, our Office completed a site investigation and prepared this Geotechnical Design Report (GDR). The proposed project is to widen and realign the SR 58 roadway from two lanes to four lanes. This report addresses the proposed seven (7) overhead signs located within the project limits. The Type VII reinforced pile foundation is proposed to be a CIDH with a diameter of 5 feet and depth of 23 feet with a possible Type VIII or IX pile of 25 feet to be used if additional load is added to the sign.

General Geology

Regionally, the site is in the Mojave Geomorphic Province which can be sectioned into the East Mojave subprovince and the West Mojave subprovince as defined by the northerly flowing Mojave River. This study is located on the east side of the West Mojave subprovince. It is characterized by a flat valley floor with intermittent shallow drainage swales.

The project area is controlled by the Lockhart Fault Zone (LHT) which is about 0.6 miles wide and crosses the proposed alignment about mid-length at Hinkley Road. The fault is expressed topographically by uplifted hills and flat valley floors. The Lockhart Fault is a near vertical dip-slip fault with right lateral strike-slip component. The Lockhart Fault extends approximately 60 miles southeast to northwest. It is capable of a MCE 7.25 earthquake with a maximum acceleration of 0.6g (CT, Mualchin, 1996).

Site Investigation

Our Office conducted a site sub-surface investigation which consisted of seven vertical auger borings to a maximum depth of 51.5 feet. We used a CME 85 drill rig with sampled tests for density and corrosion. The material is predominantly sand with a trace of gravel and silt. The LOTB's for these borings will be sent when completed.

The potential for liquefaction is not anticipated based on groundwater depth and generally dense nature of the subsurface soils. No groundwater was encountered during our investigation at these locations. Water levels will fluctuate with rainfall events but should not affect construction.

Sign 1 (14A)

This site is located 7 feet right of Edge of Service (ES) of Eastbound (EB) at Station 1347+70, Post Mile (PM) 25.13. This location was drilled to a depth of 46.5 feet. The material from this boring was well-graded SAND in a very dense condition and SILT in a very stiff to hard condition for the entire exploratory depth.

Sign 2 (18A)

This site is located 7 feet right of (ES) of Eastbound (EB) at Station 1400+50, PM 26.10. This location was drilled to a depth of 45.5 feet. The material is SILTY SAND to 5 feet below the surface then inter-bedded very stiff-hard SILT with poorly-graded SAND in a very dense condition for the entire exploratory depth.

Sign 3 (26A)

This site is located 7 feet right of (ES) of Westbound (WB) at Station 1439+50, PM 26.71. This location was drilled to a depth of 46.5 feet. The material is SILTY SAND in a dense to very dense condition and poorly-graded to well-graded SAND in a very dense condition for the entire exploratory depth.

Sign 4 (29A)

This site is located 7 feet right of (ES) of Westbound (WB) at Station 1492+30, PM 27.81. This location was drilled to a depth of 41.5 feet. From the surface the material is SILTY SAND in a medium dense to very dense condition, well-graded SAND in a very dense condition, and SILT in a very stiff condition for the entire exploratory depth.

Sign 5 (34A)

This site is located 7 feet right of (ES) of Eastbound (EB) at Station 1555+70, PM 28.97. This site was drilled to a depth of 51.5 feet. The material is well-graded SAND in a medium dense condition, SILT with sand very stiff-hard, well to poorly-graded SAND dense to very dense, SILT to SILTY SAND very stiff to dense, then well-graded SAND medium dense, SILT in a stiff condition for the entire exploratory depth.

Sign 6 (37A)

This site is located 7 feet right of (ES) of Eastbound (EB) at Station 1608+50, PM 30.01. This site was drilled to a depth of 51.5 feet. The material from the surface is SILTY SAND in a medium dense condition, well-graded SAND medium dense to dense, poorly-graded SAND very dense, SILT stiff, SILTY SAND dense, well-graded SAND very dense, and SILT in a stiff-very stiff condition for the entire exploratory depth.

Sign 7 (45A)

This site is located 7 feet right of (ES) of Westbound (WB) Station 1659+00, PM 30.98. This location was drilled to a depth of 51.5 feet. The material is poorly-graded SAND medium dense, inter-bedded with SILT very stiff-hard, then well to poorly-graded SAND in a dense to very dense condition for the entire exploratory depth.

Corrosion

The Materials Engineering and Testing Services, Testing and Technology Branch, has performed corrosion tests CTM 417, 422, and 643 on soil samples from the field investigation. Laboratory test results from boring samples indicate that soils at the site are considered **non-corrosive** except from boring **A-13-004** which is **corrosive** for the Sign 29A location. Corrosion results are in the Table below.

Table: Corrosion Test Summary

Boring	Sample Depth	Sample Date	PH	Minimum Resistivity (ohm-cm)	Sulfate Content (PPM)	Chloride Content (PPM)
A-13-001	5-10 feet	9/11/2013	8.76	484	1305	332
A-13-002	5-10 feet	9/12/2013	8.85	777	321	359
A-13-003	5-10 feet	9/24/2013	8.73	554	751	452
A-13-004	5-10 feet	9/24/2013	7.68	1088	2500	17
A-13-005	5-10 feet	9/11/2013	8.72	10580	N/A	N/A
A-13-006	5-10 feet	9/10/2013	9.24	1511	95	65
A-13-007	5-10 feet	9/11/2013	9.36	3342	N/A	N/A

Note: Caltrans currently defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 1500 ppm of sulfates, has a minimum resistivity of less than 2000 ohm-centimeters or has a pH of 5.5 or less.

Recommendations for Overhead Sign Foundations

Based on our visual observations, boring logs, and our analysis, the following recommendations are made:

A standard Type VII to IX foundation design is concurred by our office.

The actual groundwater elevation may be different during construction due to seasonal rainfall, surface runoff and other man-made conditions.

The bottom of CIDH hole is expected to be in a dry condition during construction. The contractor will need to use care while drilling the shaft for the CIDH pile. Rapid insertion and removal of the drilling tools during the drilling process can cause excessive scouring and caving of the walls of the drilled shaft.

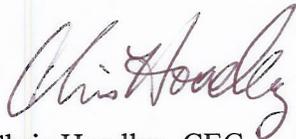
If slurry is used, it must be appropriate for the soil and environment. It must also be cleaned and filtered in accordance with the manufacture's specifications. It must be noted that some slurries are classified as hazardous materials and must be disposed of properly.

If temporary steel casing is used, concrete placed under slurry shall be maintained at a level at least 5 feet above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

The recommendations contained in this report are based on specific project information regarding design loads and structure locations that has been provided by District for CMS designs.

The recommendations contained in this report are based on specific project information regarding structure support locations that have been provided to Office of Geotechnical Design – South 2. If any conceptual changes are made during final project design, Office of Geotechnical Design, Branch C, should review those changes to determine if the foundation recommendations contained in this report are still applicable.

If you have further questions, please contact Chris Hoadley at 916-227-4515 or Shawn Wei at 916-227-5252.



Chris Hoadley, CEG
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Branch C



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