

SECTION 1. GENERAL

1.1 Introduction

This report presents the results of our geotechnical engineering exploration performed for the “*Interstate Route H-1 and H-201 Destination Sign Upgrade/Replacement, Phase 3, Island of Oahu, Hawaii*” project from Ewa to Honolulu on the Island of Oahu, Hawaii. The project location and general vicinity are shown on the Project Location Map, Plate 1.

This report summarizes the findings and presents our geotechnical engineering recommendations derived from our field exploration, laboratory testing, and engineering analyses. These recommendations are only intended for the foundation design of the replacement destination sign structures. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.2 Project Considerations

The project involves the upgrade and replacement of 11 destination sign structures on the Island of Oahu. We understand that amongst the 11 destination sign structures, four of the destination sign structures, including signs H1EBR-253, H1WB-421, H1EB-305 and 78WB-853, will be replaced. The four destination sign structures to be replaced are located at various areas on the Island of Oahu along Interstate Route H-1 and Moanalua Freeway. We understand that two additional destination signs structures, H2NBR-722 along Kamehameha Highway and H1EB-104 along Interstate Route H-1 Freeway, are subsequently included for replacement. Therefore, a total of six destination sign structures will be replaced with new foundations.

The following structural load information acting at the top of the foundation was provided by the project structural engineer for our analysis of the new sign structure foundation design.

FOUNDATION LOADING FOR REPLACEMENT DESTINATION SIGNS					
EXTREME EVENT I LIMIT STATE					
Destination Sign Identification	H1EBR- 253 & 78WB- 853	H1WB- 421	H1EB- 305	H2NBR- 722	H1EB- 104
Vertical Load (kips)	49.2	60.5	48	42.2	52.6
Shear Parallel to Sign (kips)	4.4	10.7	6.6	4.4	10.7
Shear Perpendicular to Sign (kips)	59.5	70.1	46	46	58.7
Moment Parallel to Sign (ft.-kips)	68	1,313	403	68	845
Moment Perpendicular to Sign (ft.-kips)	1,429	1,603	1,045	1,080	1,409
Torsion (ft.-kips)	63	1,828	250	49	1,134

1.3 **Purpose and Scope**

The purpose of our exploration was to obtain an overview of the subsurface conditions to develop an idealized soil/rock data set to formulate geotechnical engineering recommendations for the design of the proposed project. The work was performed in general accordance with our revised fee proposal dated November 14, 2016, and additional fee proposal dated December 12, 2018. The scope of work for this exploration included the following tasks and work efforts:

1. Research and review of available in-house geologic and soils information along the highway alignment under this project.
2. Application of necessary excavation permits from the State of Hawaii – Department of Transportation, Highways Division.
3. Staking out of the boring locations and utility toning and clearance with various utility companies.
4. Provisions of police officers and safety devices for traffic control and lane closures at the boring locations during our field exploration program.
5. Mobilization and demobilization of a truck-mounted drill rig and two operators to the project sites and back.

6. Drilling and sampling of nine borings extending to depths of about 26.5 to 45.6 feet below the existing ground surface.
7. Coordination of the field exploration and logging of the borings by our geologist.
8. Laboratory testing of selected soil and rock core samples obtained during the field exploration as an aid in classifying the materials and evaluating their engineering properties.
9. Engineering analyses of the field and laboratory data to formulate geotechnical engineering recommendations pertaining to the foundation design of the replacement destination sign structures.
10. Preparation of this report summarizing our work on the project and presenting our findings and geotechnical engineering recommendations.
11. Coordination of our overall work on the project by our project engineer.
12. Quality assurance of our work and client/design team consultation by our principal engineer.
13. Miscellaneous work efforts such as drafting, word processing, and clerical support.

Detailed descriptions of our field exploration and the Logs of Borings are provided in Appendix A. Results of the laboratory tests are presented in Appendix B. Photographs of core samples are presented in Appendix C.

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