

**GEOTECHNICAL ENGINEERING EXPLORATION  
TRAFFIC SIGNAL MODERNIZATION PROJECT  
KAHUAPAANI STREET & ULUNE STREET INTERSECTION  
HALAWA, OAHU, HAWAII  
W.O. 7328-00(A)    AUGUST 6, 2019**

<b>SUMMARY OF FINDINGS AND RECOMMENDATIONS</b>
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Our field exploration generally encountered a pavement structure consisting of about 6 inches of Portland cement concrete overlying 12 inches of gravelly sand fill. Below the pavement, stiff fill material was encountered at a depth of approximately 4 feet followed by stiff to hard residual soil extending to a depth of about 15 feet below the existing ground surface. Underlying the residual soil, very dense saprolite was encountered at a depth of approximately 21.5 feet followed by medium hard to hard basalt rock formation extending to the maximum depth explored of about 28 feet below the existing ground surface. We did not encounter groundwater in the borings drilled at the time of our field exploration. However, it should be noted that water levels may vary with seasonal rainfall, time of year, and other environmental factors.

We recommend supporting the new traffic signal poles on cast-in-place concrete drilled shaft foundations. Based on the subsurface conditions encountered, for traffic signal poles with mast arm lengths of 40 feet or less, we believe the Standard Plan TE-33A.1 and 33A.2, Type II Traffic Signal Standard by the State of Hawaii – Department of Transportation, Highways Division may be used for the design of the drilled shaft foundations. We did not encounter groundwater at the time of our field exploration. Therefore, we recommend utilizing the appropriate drilled shaft diameters and lengths in accordance with TE-33A.2, Type II Traffic Signal Standard Drilled Shaft Foundation Schedule for a Level Ground Condition – Above Ground Water Table.

The Type II Traffic Signal Standard does not include recommendations for traffic signal poles with mast arm lengths greater than 40 feet. Structural loading information for the 50-foot mast arm traffic signal pole was not available at the time this report was prepared. Therefore, in-house structural loading information from similar projects was used to develop preliminary foundation recommendations. It is imperative that Geolabs be forwarded the final structural loading information when it becomes available to develop final foundation recommendations for the project.

Based on the typical dimensions of the base plate and anchor bolts, we envision that a 36-inch diameter cast-in-place concrete drilled shaft with a minimum embedment length of 12 feet would be required for the proposed 50-foot mast arm traffic signal pole.

The text of this report should be referred to for detailed discussion and specific design recommendations.

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END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS