

**GEOTECHNICAL ENGINEERING EXPLORATION  
FREEWAY MANAGEMENT SYSTEM, PHASE 2  
FEDERAL AID PROJECT NO. NH-0300(160)  
DISTRICTS OF HONOLULU AND EWA, ISLAND OF OAHU  
W.O. 6891-20(A)    MARCH 9, 2018**

<b>SUMMARY OF FINDINGS AND RECOMMENDATIONS</b>
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Based on our field exploration and research of available geologic information, the geologic units that comprise the sites include lava flows of the Koolau volcanic series at the Kualakai VMS, Kunia West CCTV, Waipio CCTV, H-2 CCTV, and H-2 VMS sites. The Kualakai CCTV site encountered about a 14-foot thick layer of fill material overlying lava flows of the Waianae volcanic series. The Farrington VMS, Palailai CCTV, and Speed Reader 4 sites encountered alluvium. We did not encounter groundwater in the borings at the time of our field exploration.

In order to develop the required bearing and lateral load resistances for the new CCTV, VMS, and speed reader structures, we recommend supporting the CCTV, VMS, and speed reader structures on 36 or 48-inch diameter drilled shaft foundations. Based on the anticipated structural loads and the subsoil conditions encountered at each site, the length of the drilled shafts supporting the CCTV and speed reader structures would range from 12 to 15 feet. The length of the drilled shafts supporting the VMS structures would range from 20 to 30 feet.

The performance of the drilled shafts depends significantly upon the contractor's method of construction, construction procedures, and workmanship. Therefore, the contractor should follow the recommendations and general guidelines presented in this report during the drilled shaft foundation construction.

The drilled shaft subcontractor will need to have the appropriate equipment and tools to drill through the cobbles, boulders, and basalt rock where encountered. Basalt rock was encountered at the Kualakai VMS, Kunia West CCTV, and H-2 CCTV sites. Residual and saprolitic soils were encountered at the Kualakai CCTV, H-2 VMS, and Waipio CCTV sites. It should be noted that there is a high potential for encountering basalt rock in the form of unweathered cobbles and boulders in the residual and saprolitic soils. The text of this report should be referred to for detailed discussion and recommendations.

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END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS