



January 23, 2017

Mr. Robert Yanabu
County of Hawaii
Department of Public Works
101 Pauahi Street, Suite 7
Hilo, Hawaii 96720

Subject: Preliminary Geotechnical Consultation Letter
North Abutment Scouring Geotechnical Issues
Hakalau Stream Bridge (No. 29-3)
Hilo, County of Hawaii, Hawaii

Dear Mr. Yanabu:

At the request of Department of Public Works, County of Hawaii, Yogi Kwong Engineers, LLC (YKE) is pleased to submit this preliminary geotechnical consultation letter summarizing our preliminary geotechnical review comments and opinions pertaining to the foundation subgrade of the north bridge abutment of Hakalau Stream Bridge. Our service was performed in accordance with the Contract with the County of Hawaii (County), dated November 14, 2016.

A. List of Information Reviewed

A list of the information provided by the County and reviewed is presented below:

- a. Report on Underwater Bridge Inspection for Hakalau Stream Bridge (Bridge no. 001290001100003) by Hawaii Engineering Group, Inc., dated March 2016.
- b. Record drawings, Office of City & County Engineer, No.-Hakalau Bridge-29, District of South Hilo, Hawaii, Job No. 688, 4 sheets, dated September 1929.
- c. Biennial Bridge Inspection Report, Hakalau Stream Bridge, Old Mamalahoa Highway, Bridge No. 001290001100003, 29-3, Island of Hawaii, prepared for State of Hawaii Department of Transportation, Highways Division, by County of Hawaii, Department of Public Works., dated June 2, 2015.
- d. John Williams (HWY-CM) email, dated August 3, 2016.
- e. Domingo Galicinao (FHWA Regional Bridge Engineer) email, dated August 4, 2016.
- f. Underwater bridge inspection check list, Hakalau Stream Bridge, NBI Bridge Number 001290001100003, dated March 2016.
- g. Wesley R. Segawa & Associates, Inc. draft structural engineering consultation letter to County, undated.

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h. Draft Plan of Action, Hakalau Stream Bridge (#29-3).

B. Field Visit Observations

As requested by the County, an emergency field visit to the bridge site (Insert 1) was performed on October 5, 2016. The following was observed during the field visit.



Insert 1. Bridge 29-3 location (red oval)

- a. The Old Mamalahoa Highway and Bridge 29-3 provide access to a beach park and maintenance of the steel truss supported Mamalahoa Highway (19) bridge crossing Hakalau Gulch.
- b. Only one lane traffic was allowed to cross the bridge, and weight limit was limited to 6 tons (Insert 2).

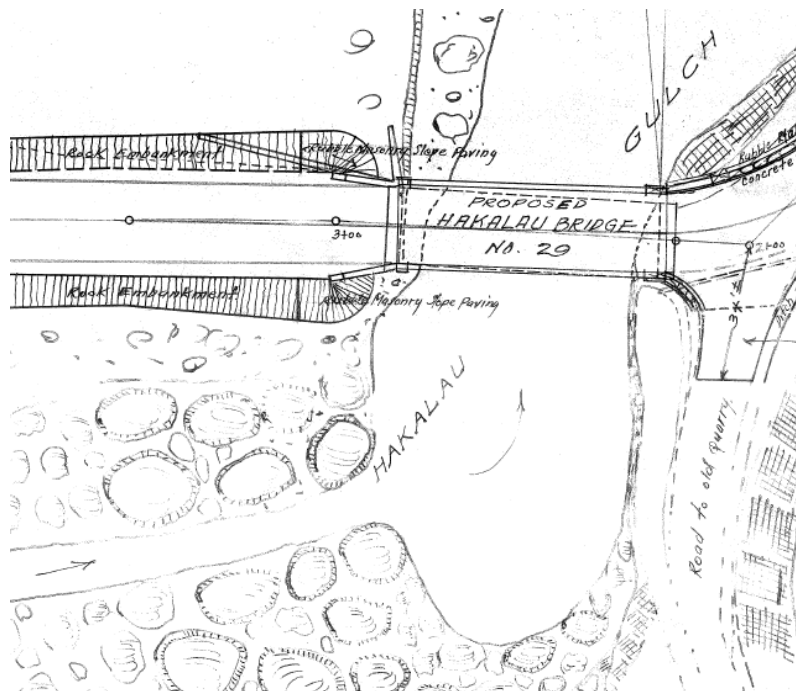


Insert 2. Looking south from north abutment.

- c. The asphalt concrete road surface appeared recently repaved and cracks on the bridge concrete railings were repaired or patched.
- d. The stream level was above the “rubble masonry slope paving” (Insert 4) fringing the base of the north abutment, and therefore the rubble masonry paving and undermining of the north abutment cannot be observed during the field visit (Insert 3).



Insert 3. View of “Rock Embankment” north of north abutment, looking south.



Insert 4. “Rubble Masonry Slope Paving” and “Rock Embankment” call out on 1929 record plans. North abutment is the left abutment on plan shown.

C. Review of March 2016 Report on Underwater Bridge Inspection

The following were noted based on a review of the Report on Underwater Bridge Inspection for Hakalau Stream Bridge (Bridge no. 001290001100003) by Hawaii Engineering Group, Inc., dated March 2016 (the report):

- a. The report provided no description of foundation subgrade geotechnical conditions at or under the north abutment.
- b. The underwater photographs presented in the report were taken in murky water and the geology or geotechnical conditions of the reported scoured areas were not discernible.
- c. The reinforced concrete arch bridge foundation outline shown on pages 26, 27, 29, 30, 31 of the report appeared superimposed in the opposite direction, i.e. the south foundation was superimposed onto the north abutment underwater survey ‘elevations’. Based on the 1929 record plans, the north foundation, which is larger in size, is superimposed on the underwater survey data and presented as Figures 1, 2, 3 and 4, attached.
- d. The “rock ledge” described and reported fringing the north abutment in the report should be the “rubble masonry slope paving” according to the 1929 record plan (Figure 1).
- e. The “fracture cracks & erosion on rock ledge” note on page 28 of the report and photograph B14 on page 16 of the report appeared to be erosion of a construction contact between the rubble masonry slope paving and sloping masonry paving with fine gravel sized aggregates, based on photograph B14. The “crack” or scoured contact did not appear to extend to the adjacent “rock embankment”.

D. Preliminary Geotechnical Opinions and Recommendation

- a. The available information do not contain site specific geotechnical information pertaining to the north abutment, particularly there is a lack of information on the foundation subgrade geotechnical conditions. We recommend a site specific geotechnical investigation be performed at the north abutment, and in-water reconnaissance of the exposed subgrade geotechnical conditions be performed and better underwater photography be obtained within the scoured area.
- b. The attached Figures 1 to 4 appear to indicate that based on the scoured extent indicated in the underwater bridge inspection report, the reinforced concrete arch bridge 29-3 north foundation appears to still distribute a significant portion of the foundation loads to subgrade beyond the surveyed scoured zone. The project’s structural engineer should evaluate the available information and situation, and we defer the evaluation of bridge



structural conditions and adequacy to the project’s structural engineer. The underwater bridge inspection report also recommended an engineering evaluation of the reported scour conditions be performed.

c. Since there is a lack of north abutment foundation subgrade geotechnical information, and a geotechnical investigation and structural engineering evaluation of the bridge and scour conditions at the north abutment is still pending, it may be pre-mature to consider closing the bridge.

d. Based on the available information, it is important the County’s Plan of Action (Draft) should be implemented as soon as possible. It is also important to implement the monitoring actions outlined in items 1 and 3 of the August 4, 2016 email by Mr. Domingo Galicinao of FHWA.

Limitations

This report was prepared for sole use by the Department of Public Works, County of Hawaii in accordance with generally accepted geotechnical engineering principles and practices. The geotechnical comments and opinions presented in this report are based on our interpretation of the data available at the time of this report. Additional conclusions and/or recommendations made from the information, comments and opinions in this report by others are solely their own responsibility. No warranty is included; either expressed or implied that the actual conditions encountered will conform exactly to the conditions described herein. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional geotechnical consultants in Hawaii.

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Please contact us if you have any questions or require additional information.

Yours truly,
Yogi Kwong Engineers, LLC

James Kwong, Ph.D., P.E.
Principal

Attachments

- Attachment 1 Hakalu Bridge Plans Overlay (North Side)
- Attachment 2a Hakalu Bridge Cross Section A (North Side)
- Attachment 2b Hakalu Bridge Cross Section B (North Side)
- Attachment 2c Hakalu Bridge Cross Section C (North Side)