



December 3, 2010

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Mr. Kevin McLeod, P.Eng.
Project Director
Government of the Northwest Territories
2nd Floor, 4510 Franklin Avenue
P.O. Box 1320
Yellowknife, NT X1A 2L9

**Re: DEH CHO BRIDGE PHASE I - LEVELTON CONSULTANTS LTD.
REVIEW OF SUBSTRUCTURE DESIGN AND CONSTRUCTION**

Dear Mr. McLeod:

Enclosed are two (2) copies of the Levelton Consultants Ltd. (Levelton) report on the audit of the Phase 1 construction work that was carried out from the start of construction of the bridge until March 2010.

We have reviewed the report and recommend acceptance of the Phase 1 works provided that the recommendations contained in the report are complied with and that the remedial work, as defined in the Phase 2 construction scope, is completed.

Our specific comments on items in the report, and recommendations of actions to be taken, are as follows:

- J.R. Spronken and Associates Ltd. (Spronken) originally issued construction drawings for the substructure on September 21, 2007. However, in the process of construction certain design modifications were made by Jivko Engineering, and subsequently others were made by Infinity Engineering Group, after Spronken withdrew from the project in February 2009. Although the individual designs and modifications may have properly been reviewed at the time, it appears that; in each case, the designers assumed limited liability, for only their portions of the designs. As we have discussed, it is important to now have the overall substructure reviewed globally to ensure that there is design continuity and proper integration of the individual design and construction stages. We recommend that this task be initiated as soon as possible.
- A minor cavity, exposing reinforcing bars, most likely exists on the top surface of Pier 3 South footing. Given the size and location of the cavity it will not have an adverse short term effect on the behaviour and integrity of the footing; however, we do recommend that the cavity be repaired to avoid long term durability issues, or possible stress concentrations in the footing. Given that it is not urgent to carry out the repair work, we suggest that it be done by a suitably qualified marine contractor (there are numerous capable firms in Western Canada that can do the work) directly after construction of the bridge. It is possible that the repair may be undertaken under water; the



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most challenging aspect of the repair will be to gain access to the cavity by removing the scour rock already placed on the footing. We recommend that the repair procedure be designed, and a tender package prepared, so that the work can commence after completion of the bridge construction, or in conjunction with remediation of the rip rap as discussed below.

- Based on the records available to us, it appears that the scour rock material, which did not meet the specified design gradation, was incorrectly placed around the north and south piers. Northwest Hydraulic Consultants (NHC) inspected the site on October 21, 2010 and reviewed bathymetric surveys conducted in 2009 and 2010. NHC provided recommendations in a letter report dated November 29, 2010. We recommend acceptance and implementation of their recommendations. In view of the work recommended for the Pier 3S rip rap, it may be expedient to carry out the inspection and repair of the cavity at the same time.
- A significant amount of the steel bent fabrication was completed prior to the implementation of a proper in-plant Quality Assurance process. Levelton was able to gain only limited access to the pertinent QC documentation from that period, which revealed potential deficiencies in the QC process and the work. It has not been established that the work during this initial stage of the bent fabrication was completed satisfactorily. We therefore recommend in-situ inspection and testing of the pier bent portions fabricated prior to the commencement of Quality Assurance inspection work by Sargent and Associates in the first phase of construction. The testing and inspection work should be done as soon as possible, and prior to completion of the bridge, by a suitably qualified testing company under the direction of an engineering company familiar with the design of the piers, such as the GNWT Technical Advisor - BPTEC-DNW Engineering.

Mr. McLeod, we trust that the report comprehensively addresses concerns and questions regarding the Phase 1 construction of the bridge.

Please do not hesitate to contact me if you have any further questions.

Yours truly,

Leslie Mihalik, P. Eng.
Project Manager

LM/gsm