



## **Project Status Report**

### **Swan Lake River Bridge Hamlet of Gjoa Haven, NU**

#### **1. Background**

The GN, Department of Economic Development and Transportation is planning to construct a bridge over the Swan Lake River near Gjoa Haven, NU. Design and acquisition of structural material was done by Jivko in 2008-2009. Presently, in preparation for the impending construction the ED&T has retained Jivko to acquire the documentation relevant to the construction and to prepare Project Status Report including Proposal for Construction. List of deliverables for this assignment includes:

- Bridge Design Drawings
- Delivery Plan and Schedule
- Construction Cost Estimate based on the proposed delivery plan and schedule
- Letter of Consent from Community Council confirming selected bridge location
- Letter from Community Council securing access to the local rock and gravel sources
- Letters for Approval from the NIRB, Nunavut Water Board, DFO-Fish Habitat Office and MOT-Navigable Waters Office, if applicable

#### **2. Bridge Site Description**

The distance by road from the community to the bridge site is nearly 8km. The first 4.0km of this road are 6m to 7 m wide, in fair condition, and is used for access to the community fresh water intake and local gravel sources. The remaining part is low level of service 5m to 6m wide road. The last 120m of the access the river are yet to be constructed.

While detailed geotechnical investigation was not carried out, it was observed that the riverbed in the area targeted for crossing is covered with mixture of coarse sands, cobbles and occasional boulders. Improvised soil testing at various locations near the high water mark indicated that the ground surface is underlain by grey silt of nearly liquid consistency. While the depth of the liquefied silt was not confirmed, it is believed that it is part of the active layer of permafrost, which melts to a depth of 4' to 5' on areas exposed to sun radiation in summer. The only location we found competent to support loading from the bridge abutments is presently used by local residents for fording the river with vehicles ranging from ATV's to heavy construction equipment. This selected location is shown on the pictures below and on enclosed Google map pictures.



Excavator crossing the river at the proposed bridge location



Dump truck crossing the river at the proposed bridge location

In summer and fall the watercourse at the proposed location is between 12 m and 15 m wide and less than 0.3 m deep. The riverbanks, marginally vegetated with polar grass, are of slopes 1:8 to 1:12 towards the river. The longitudinal grade of the river is less than 0.5%. At High Water Levels during the spring thaw



the river runs 35 m to 40 m wide and 1.0 m deep. According to local residents, in spring the ice on this section of the river rots and thaws on the spot without significant movement.

### **3. Description and Design Parameters of the Bridge and Approaches**

The superstructure is 29m long twin-steel-girder, single-lane construction fabricated of weathering steel 350-AT, impact category 3. The design load is CAN3-S6-M78, MS250-77 consisting in 8.5m long vehicle of GVW 45,000kg (100,000lb). The design load is factored by 10% for travel off-centre, 40% for dynamic loading and additional 60% safety factor. The maximum static load, with the MS-250 configuration, that the bridge can support is in excess of 110,000kg.

The bridge deck is 4.2 m wide, and is built of creosote treated Douglas fir grade 2 or better. It is composed of 8"x10" sleepers and 3"x10" runners. The deck is boarded with 0.70 m high galvanised steel rail.

The substructure is galvanized steel Bin-wall in-filled with cement stabilised backfill. There is a Geotextile membrane installed at the base of the Bin-wall. The Bin-wall abutments and approach fill are protected against scouring with well graded Riprap.

Approximately 120m Approach Road will be built on the north side of the bridge. The road embankment will be 0.8m high and 7.0m wide at the crown. The last section of the approach will be higher, to match the elevation of the Bridge Deck. The Approach will be surfaced with a layer of 0.1m crushed (street) gravel. We are assuming that this gravel could be obtained from the Government stockpile at no cost to this Project.

Construction of bridge approach on the far (south) side of the river is not included. However, a ramp descending from the bridge deck to the ground beyond the High Water mark will be constructed. Should the Client require, we could amend this Proposal to include a specified length of road on the south side of the bridge.

Approximately 400m<sup>2</sup> Staging Area will be built adjacent to the bridge, to be used for material storage and pre-assembly of the abutment components. Eventually this area could be used by local residents as Picnic Area. Exact location of this area will be selected after consultation with local stakeholders.

### **4. Bridge Material**

- a. The bridge materials previously delivered on site include:
  - o All Superstructure components, fabricated in 2 end sections of 9.05m and one mid-section of 11.2m. Each section comprises 2 girders braced together with lateral and cross bracing
  - o All Creosote treated timber for the deck
  - o All Galvanized steel sections for the bridge rail
  - o All Bin wall components for the substructure
  - o 1 roll of 15'x120' Geotextile 400 no woven
  - o 4 Gabion Baskets 2x1x1 (m)

During site inspection on 5 November 2014 we found the structural material delivered on-site mostly covered with snow. Due to continuous snow blizzard, local stakeholders deemed unfeasible removing the snow to expose the material for inspection. Based on previously taken photographs and the condition of the visually exposed parts we conclude that all of the above listed material is in good condition. However, it would be prudent to re-inspect the material after the snow thaw, prior to construction.

- b. Additional material to be purchased and delivered to site prior to construction:
  - o 100lb of 6" twisted spikes for fastening the timber deck
  - o 4 Gabion Baskets 2x1x0.5 (m)
  - o 350 bags @80lb Portland cement for stabilised backfill in the Bin wall
- c. Material to be obtained from the local granular and rock sources for Earthworks includes:
  - o 900 m<sup>3</sup> gravel for construction of the north bridge approach
  - o 100 m<sup>3</sup> crush (street gravel) for surfacing the bridge approach
  - o 200 m<sup>3</sup> gravel for construction of staging area
  - o 300 m<sup>3</sup> gravel for structural backfill of the abutments.

- 150 m<sup>3</sup> rock for Riprap under and around the abutments

Most of the granular material available in Gjoa Haven area is fine to coarse sand mixed with cobbles and occasional boulders. When used for infill of the Binwall, this material will be dry-mixed with 5% Portland cement.



Detail of typical Granular Material available in Gjoa Haven



Granular material on pile on Gjoa Haven

## 5. Proposed Method of Delivery and Schedule

All Work on the bridge construction will be carried out by local heavy equipment and labour including excavator, loader, three dump trucks and up to 6 labourers. The excavator will be extensively used for the assembly of the Binwall and the superstructure. Since the local contractor advises that his operators are not experienced in lifting and assembly of steel structures, Jivko will mobilise a qualified operator for this work. In addition, Jivko will have on site a Senior Structural Engineer and a Foreman with experience in Civil Works.

The Work could be completed within three weeks in late August and early September, when the water level in the river is expected to be low.

- The Earthworks on the north approach and the staging area would be completed within 4 productive working days, using excavator and Loader. A crew of 2 local labourers will assist in the work.
- The assembly and backfill of the Binwall abutments, and placement of Riprap would be completed within 6 productive working days by 6 local labourers supported by loader and excavator.
- The superstructure sections would be transported to the bridge site by large loader. Assembly and launching would be completed within 4 productive working days, by local crew of 6 supported by large loader and excavator.
- Installation of the Gabion baskets, timber deck and bridge rail would be completed within 3 productive working days by local crew of 6 supported by excavator and loader.
- Road surfacing, grooming of embankment shoulders, cleaning and landscaping of the area would be completed within 2 productive working days by local crew of 4 supported by loader and excavator.

Compactors and other specialised tools would be provided by Jivko. After completion Jivko Engineering Ltd. will certify the Work as safe for public traffic and completed in accordance with the design and code requirements.

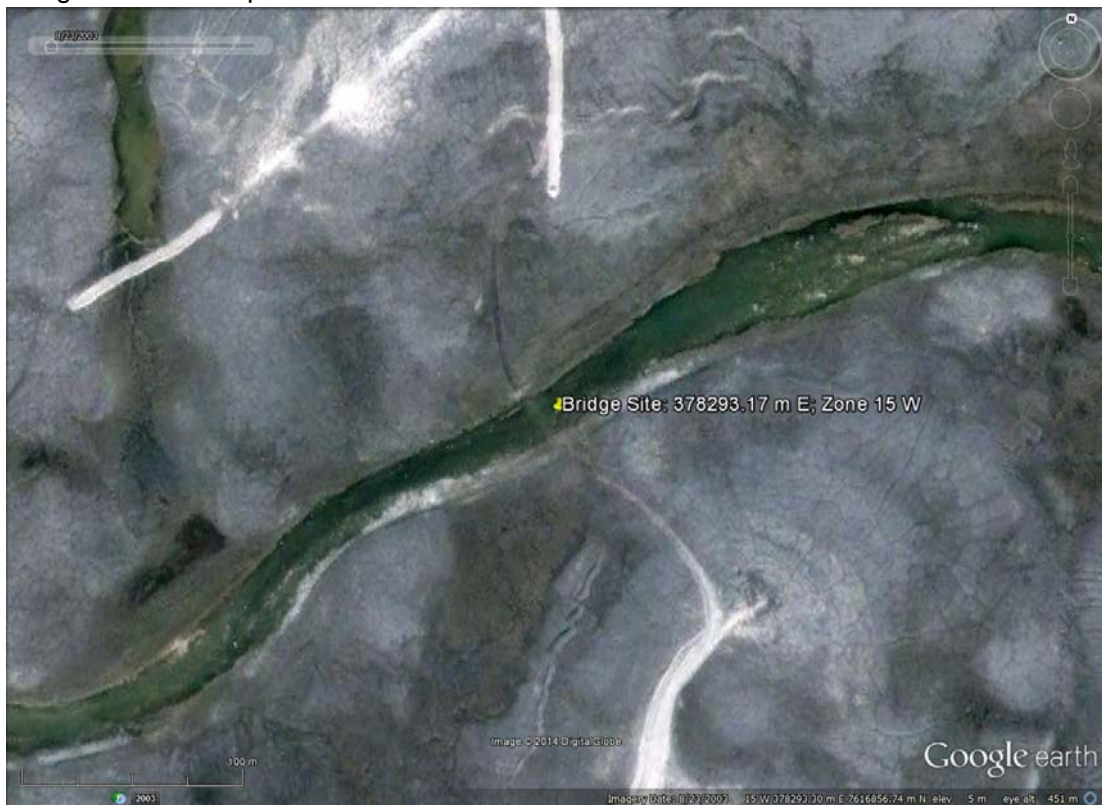
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## Gjoa Haven, NU, Swan Lake River Bridge



Bridge Location Map



Bridge Location Detail