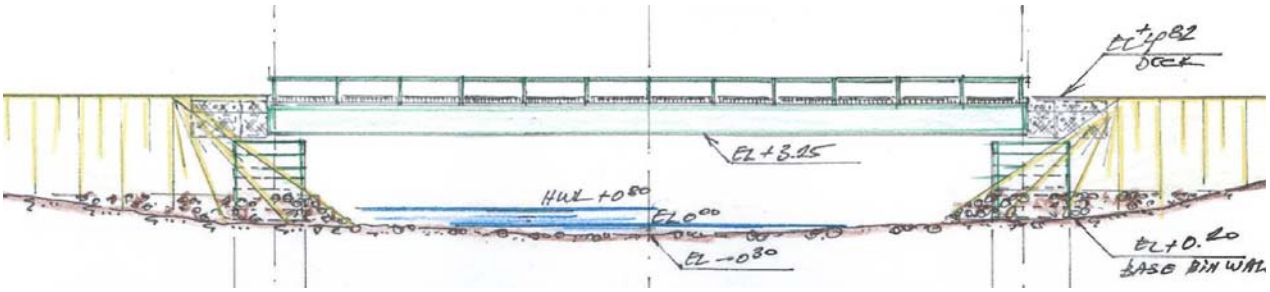
Hamlet of Gjoa Haven, NU

Swan Lake River Bridge

Project Brief



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Swan Lake River Bridge Hamlet of Gjoa Haven, NU

1. Background

The Community of Gjoa Haven, NU is planning to construct a bridge for local vehicle traffic, over the Swan Lake River near Gjoa Haven. Project funding was provided by the GN, Department of Economic Development and Transportation. Design and acquisition of structural material was done by Jivko in 2008-2009. Presently, the Community has retained Jivko to acquire the documentation relevant to the construction and to proceed with the bridge construction.

2. Bridge Site Description

Location: 68°38'13.27" N; 95°59'41.17" W

The distance by road from the community to the proposed bridge site is nearly 8.0km. The first 4.0km of this road is in fair condition, and is used for access to the community fresh water intake and to gravel sources. The remaining part is 5m wide trail, covered with thin layer of gravel. The last 120m of the access to the river are yet to be constructed.

While detailed geotechnical investigation was not carried out, it was observed that the riverbed in the section targeted for construction of the bridge crossing is covered with mixture of coarse sands, cobbles and occasional boulders. Improvised soil testing at various locations 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 location, shown on the pictures below and on the enclosed Google Earth maps, is proposed for construction of the bridge crossing.

Excavator crossing the river at the proposed bridge location

Dump truck crossing the river at the proposed bridge locatoion

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 built progressively higher, to match the elevation of the Bridge Deck. The Approach will be surfaced with a layer of 0.1m crushed (street) gravel.

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.

Approximately 400m^2 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. Proposed Method of Delivery and Schedule

All Work on the bridge construction will be done using local heavy equipment and labour. This includes excavator, loader, 2 dump-trucks and up to 6 labourers. Jivko will have on site a Senior Structural Engineer and a Foreman with experience in Civil Works. Jivko will also provide specialised small tools for the abutments and bridge assembly.

Due to budget considerations, the Work will be completed in two Stages, over the current and the following Fiscal Years.

The Stage One will include construction of the Bridge Abutments and the lower part of the Approaches. The Abutments will be armoured with selected Rip-Rap for scour protection during spring freshet. The work will be completed within two weeks, at low water levels, in late August and early September 2015.

The bridge superstructure would be installed in March 2011 on a snow berm constructed between the bridge abutments to the full abutment height. After installation of the bridge the snow berm would be partially removed to allow for beginning of the spring water flow.

The Stage Two will include assembly-installation of the superstructure, completion of the Bridge Approaches and landscaping of the area. The work will be completed within two weeks, in April 2016.

After completion, Jivko Engineering Ltd. will certify the Work as safe for public traffic and completed in accordance with the design and code requirements.

5. Water

The bridge construction activities do not involve using of water from, or discharging water into the river.
Related to construction of the south abutment excavator and loader will be crossing the river a total of 8 to 10 times. Pickup trucks moving construction crew will cross the river another 12 to 15 times.

This will result in an average of two crossings per day for the total period of the bridge construction. It is estimated that local hunters and picnic goers are crossing the river during summer months not less than 20 times per day.

6. Waste water

There is no waste water produced in association with the bridge construction. There is no plan for setting a construction camp or preparation of meals on site.
The construction crew composed mainly of local residents will use their own accommodation. The Engineering crew will be accommodated in the hotel. For lunch and most likely for the coffee breaks the crew will travel to town.

7. Fuel

Re-fueling of the equipment will be done at distance of more than 100' from the river using specialised Fuel Truck. All equipment will be thoroughly inspected for leaks of oils and lubricants on a daily basis. Equipment will be allowed to proceed with Work after repair of all deficiencies and successful re-inspection. Equipment will not be deployed in the water for working purposes.
In the unlikely case of spill into, or near the river, the accident will be immediately reported to NWT/NU Spill Line (867-920-8130).

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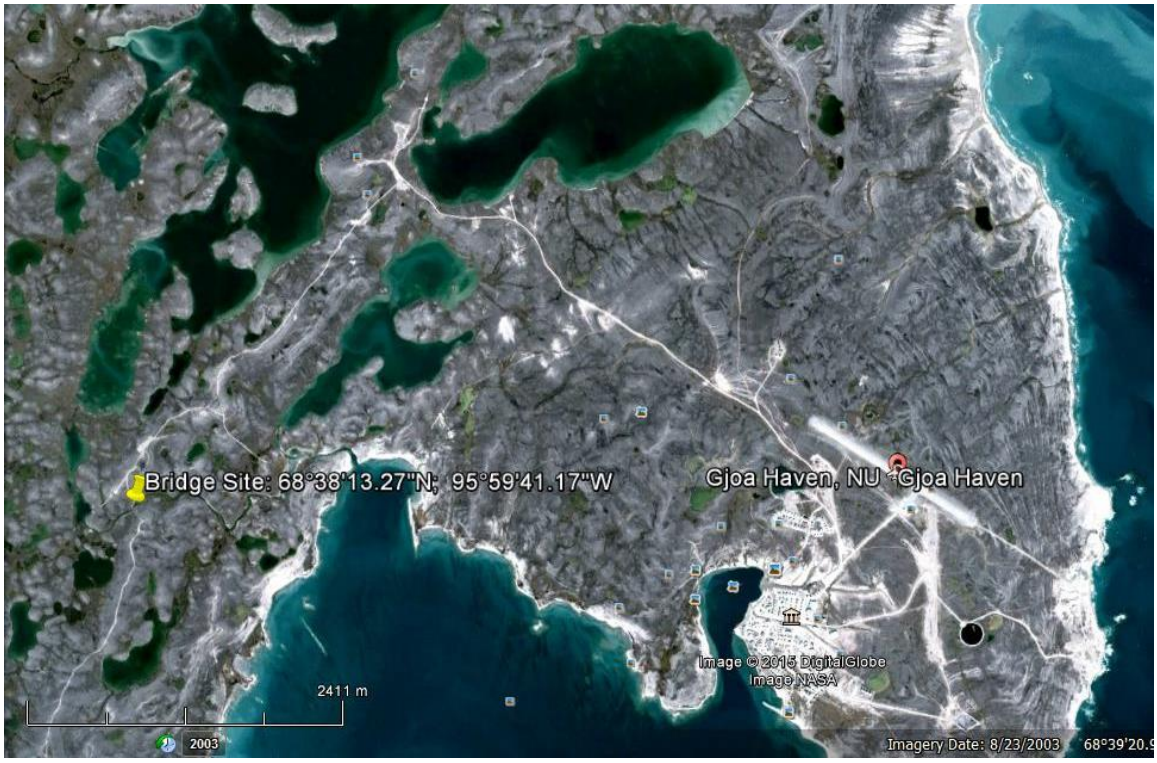

Bridge Location Map

Bridge Location Detail