KUGAARUK NU
ALIARUHIK RIVER SECOND BRIDGE CROSSING AND TWO CULVERT CROSSINGS

Interim Construction Report and Request for Extension of the Completion Date for Works Affecting Fish Habitat

Prepared for:
Fish Habitat Management Office
DFO, Iqaluit, NU

Prepared on behalf of:
GN, Department of Community Government & Transportation
Cambridge Bay, NU

Prepared by: *Jivko Engineering*
November 2001

JIVKO ENGINEERING
5610 50A Ave Yellowknife NT X1A 1G3, Tel: (867) 920-4455, fax: (867) 873-6090, cel: (867) 444-1123, email: jivko@theedge.ca

November 7, 2001

Mr. Jordan DeGroot,
Area Habitat Biologist
Fish Habitat Management
Department of Fisheries and Oceans, Canada
P. O. Box 358
Iqaluit, Nunavut X0A 0H0

Dear Mr. DeGroot,

Request for Extension of the Completion Date For Works Affecting Fish Habitat. Kugaaruk NU. Aliaruhik River Second Bridge Crossing and Two Culvert Crossings.

This is to request your authorisation to extend the completion date of the above specified project until September 30, 2002. The Department received authorisation to proceed with the work on September 27, 2001 with completion date November 30, 2001. Due to a significant temperature drop and snow blizzard the work was halted and the construction season was closed on October 09, 2001. Following is a brief report for the construction work completed on site and the description of the work to be completed next year:

1. **Second Bridge Crossing at km 22, Trail Kugaaruk - FOL Site**

   - The bridge material arrived in Kugaaruk with the sealift by mid September 2001.
   - The work on the bridge construction commenced on September 28, 2001, with excavation for installation of the south abutment.
   - The bridge structure was installed and the bridge was opened for traffic on October 07, 2001. Part of the riprap around the abutments, the spur dyke and the rock berms were completed after the bridge opening on October 08-09. Due to construction equipment breakdown the work on the bridge was interrupted on September 30 and October 01.
   - Thorough clean up and landscaping of the site could not be done, since the land was covered with several inches of snow by the time of the bridge opening.
   - Outstanding work for next year will include some cleanup and landscaping of the site. Also, placing of some rock may be required on the existing ford located approximately 15 m downstream from the bridge crossing.

2. **CSP 1500 mm Culvert at km 18, Trail Kugaaruk - FOL Site**

   - During the site inspection of June 20, 2001 the CG&T requested Jivko Engineering to carry out site survey, produce design and manage the installation of culverts at km 18 and km 23 of the trail to the FOL site. Also, to amend the construction application for the second bridge crossing to include the construction of the culverts.
   - Site survey and layout of the culvert approaches at km 18 was carried out on July 17, 2001. In order to achieve acceptable grade on the south approach, a 4.5 m high road embankment was established to be required at the culvert crossing. The culvert size was established to be one CSP 1500 m diameter with length of 24 m.
   - During the visit of July 17, we discussed with hamlet's foreman construction techniques for the work on the culvert and the approaches. Hamlet placed a purchase order for the delivery of the culvert material with the forthcoming sealift.

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- By the end of July, hamlet completed the construction of the road to the culvert site at km18. In order to continue the construction further to the FOL site, hamlet installed a smaller size culvert on a temporary basis.
- Replacement of the temporary culvert with the new CSP 1500 commenced on October 07, after completion of the second bridge construction. The top 0.6 m layer of the road was frozen and had to be removed with ripper tooth on the excavator.
- On October 08 the culvert was installed and backfilled. Non-frozen backfill material was paced in layers and compacted properly. The road embankment was constructed to 2.5 m height. Sufficient amount of riprap was placed on the inlet and outlet to prevent potential siltation during break-up. Reflective dyke was constructed of large size boulders on the downstream side of the culvert to break the water velocity and direct the stream into the existing channel.
- Snow blizzard and significant temperature drop on October 09, 2001 were the cause for halting the construction activities and closing the construction season.
- Outstanding work for next summer will include completion of the road embankment above the culvert and on the approaches. An estimated 2,000 cu m of backfill material will be required for the completion of this work. Also, spot improvement on the riprap may have to take place. Site cleaning and landscaping will be carried out at the end of the construction.

3. Two CSP 1200 mm Culverts at km 23, Trail Kugaaruk - FOL Site

- Site survey and layout of the culvert approaches at km 23 was carried out on July 17, 2001. The required height of the road embankment at the crossing was established to be 2.5 m. The culvert size of two CSP 1200 mm diameter and 18 m length was also established. Construction techniques were discussed with the hamlet's foreman and a purchase order for the culvert supply was placed.
- Construction of the culvert commenced on October 02, 2001. Due to a shipping error, only part of the ordered culvert material arrived in Kugaaruk. As a result, only one CSP 1200 could be installed as opposed to two specified in the design.
- On October 03-04 non-frozen backfill was placed to an elevation of 1.8 m above the stream bed. Sufficient amount of riprap was placed on the inlet and outlet to prevent potential washout and siltation during spring break-up. A reflective dyke (or pool) was constructed of medium size boulders, several meters downstream from the culvert outlet.
- Outstanding work for next year will include excavation into the road embankment and installation of the second culvert. The road embankment will be built-up to the design elevation. An estimated 800 cu m of backfill material will be required for this work. Also, spot improvement on the riprap may have to take place. Site cleaning and landscaping will be carried out at the end of the construction.

4. Miscellaneous & Discussion

- The Amended Application for the construction of the 36.0 m long bridge at Aliaruhik River Second Crossing was forwarded to DFO, Iqaluit on May 04, 2001. By June 20, 2001, DFO requested the GN to include the construction of culverts at km 18 and km 23 in the same application. Subsequently, on few occasions, the DFO requested additional information mostly related to the adequacy of the bridge design, and the compensation package for the loss of fish habitat caused by the construction of the bridge and the culverts.

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- The issue of main concern for the DFO appeared to be the construction of partial causeway within the wet perimeter of the river at high water discharge.
- In compliance with the DFO requirements, GN retained specialised consulting firms to visit the proposed construction sites and to prepare reports addressing the DFO concerns.
- RL&L Environmental Services Ltd. of Edmonton, AB prepared the Fish and Habitat Assessment of Three Watercourses near Kugaaruk NU. The assessment concluded that construction of the culverts would have minimum impact, and that construction of the bridge would have minimum to moderate impact on fish habitat.
- Golder Associates Ltd. of Burnaby, BC prepared Hydraulic Assessment of Proposed Aliaruhik River (Second) Crossing, Kugaaruk, NU. The assessment confirmed the adequacy of the main parameters of the bridge, such as span, vertical clearance, etc.
- With a Letter of Authorisation, dated September 27, 2001 the DFO authorised the GN to commence construction according to the originally proposed designs.
- October 03-09 Mr. Keith Pelly of DFO, Rankin Inlet was monitoring the construction activities on the bridge and the culverts construction sites. Upon completion of the work he appeared to be satisfied with the achieved results.
- In accordance with the DFO Authorisation, in 2002 the GN will conduct a Post Construction Study for the impact of the bridge and culverts construction on the fish habitat.
- For cost comparison purposes is probably worthwhile to mention that:
  - The Consulting Engineering cost (including airfare, accommodation, etc) directly associated with the additional information requested by the DFO in 2001 is **$48,000**.
  - The cost of the Post Construction Study scheduled for 2002 is estimated at additional **$40,000.**
  - The cost to supply material and fabricate the 36 m long bridge structure is **$79,000.**

Enclosed for your files, are site photographs depicting different stages of the construction work. Few photographs of the construction of the first Aliaruhik River Bridge are also enclosed. If you have any questions or wish additional information, please contact the undersigned at Tel (867) 920-4455, Fax (867) 873-6090, or email: jivko@TheEdge.ca.

Sincerely,

Jivko I. Jivkov, P.Eng.
Principal,
Jivko Engineering

Enclosure:

Cc Mr. David Crockatt, CG&T, Cambridge Bay
Mr. Alan Johnson, CG&T, Gjoa Haven
Mr. David Parker, CG&T, Iqaluit
Ms. Rita Becker, NWB, Gjoa Haven

KUGAARUK, NU

ACCESS TRAIL TO FOL SITE, KM 22 ALIARUHIK RIVER SECOND BRIDGE CROSSING

Construction Fall 2001

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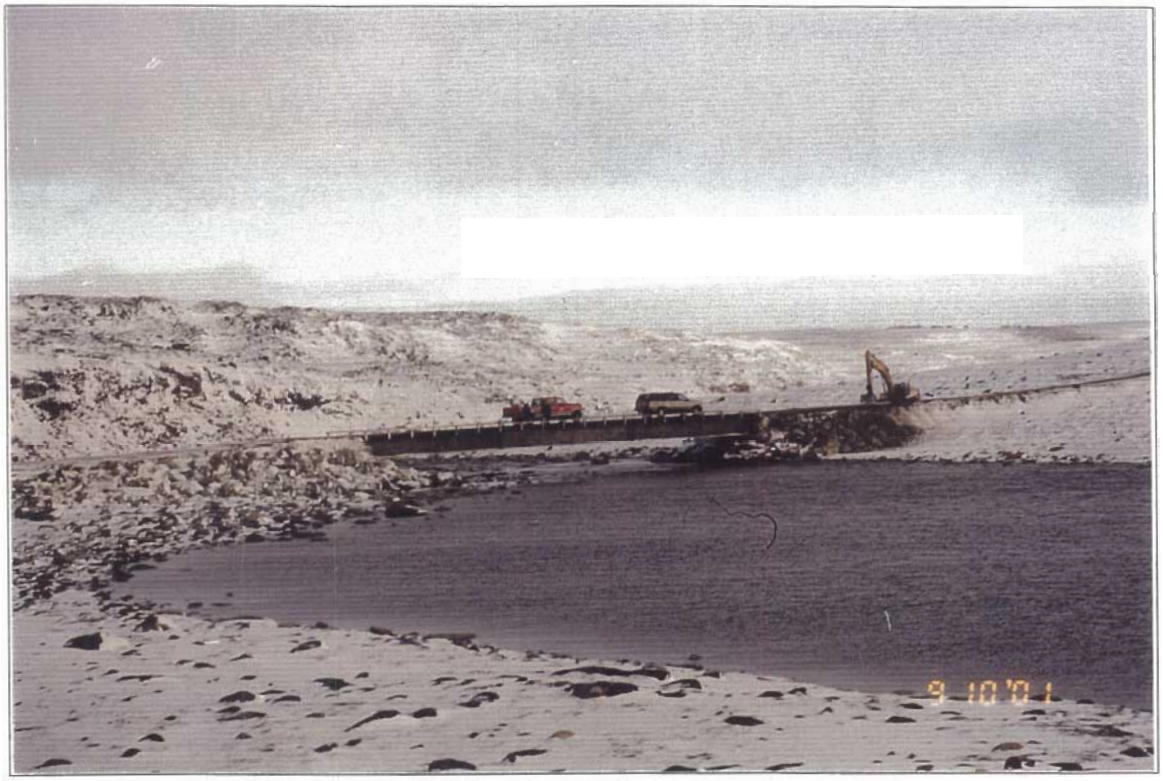
KUGAARUK, NU. ACCESS TRAIL TO FOL SITE, KM 22
ALIARUHIK RIVER SECOND BRIDGE CROSSING.



General view of bridge and approaches from Barrow Lake (upstream) side

View of bridge deck towards east. Ford on the right of the bridge.

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Layout of East Binwall abutment

Construction of Binwall on east abutment

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ALIARUHIK RIVER SECOND BRIDGE CROSSING

Riprap on west-up stream corner of bridge.

Riprap on west down stream corner of bridge.

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View of east abutment downstream riprap arrangement and ford

View of east abutment upstream riprap arrangement

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Spur dyke and riprap protection along the high water mark on east downstream abutment.

Spur dyke and riprap protection along east downstream shore-detail.

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Elevation of Second Bridge Crossing. Bridge span 36 m

View of timber deck towards west

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General view of the bridge and the vicinity

Wild flowers near the bridge site

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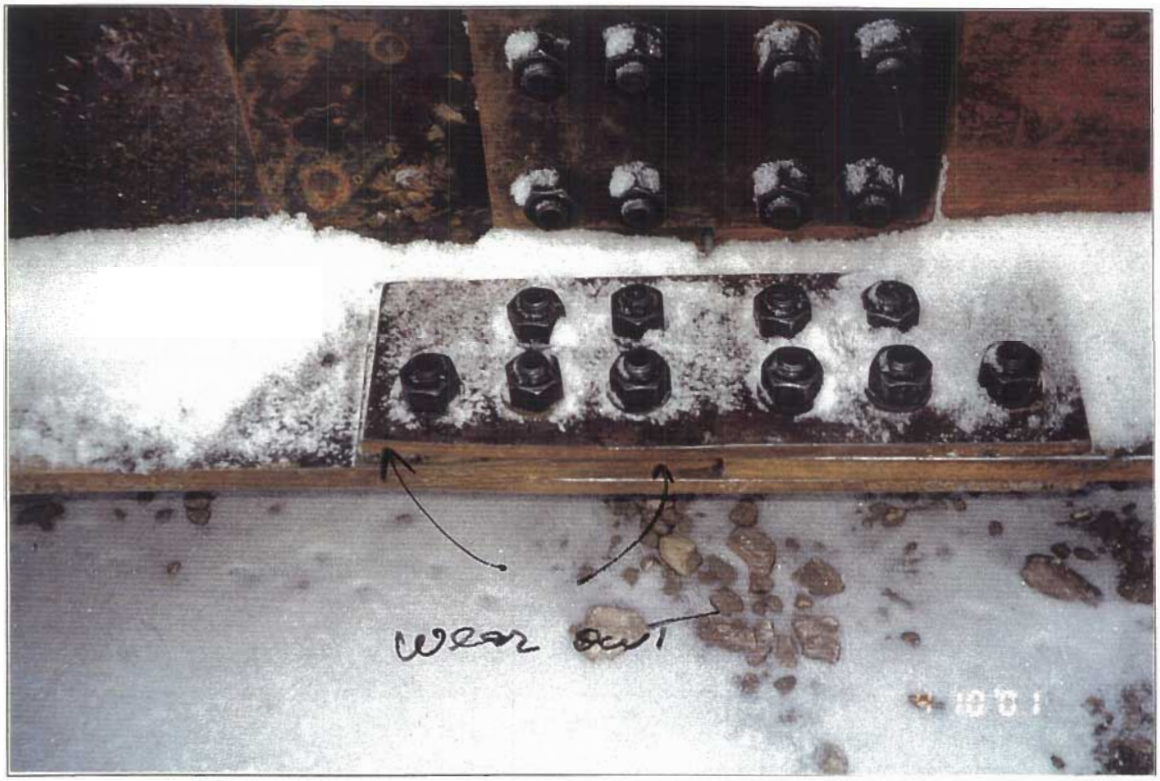
Bottom splice detail. Evidence of damage (wear out) on bottom flange due to dragging of girders on the ground during transportation.



Evidence of damage on bottom flange. Most girders present similar damage. It appears that girders have been "dragged" on the ground during transportation.

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Inspection of pre-assembled bridge in fabrication shop. Side view of bridge.

View of bridge floor.

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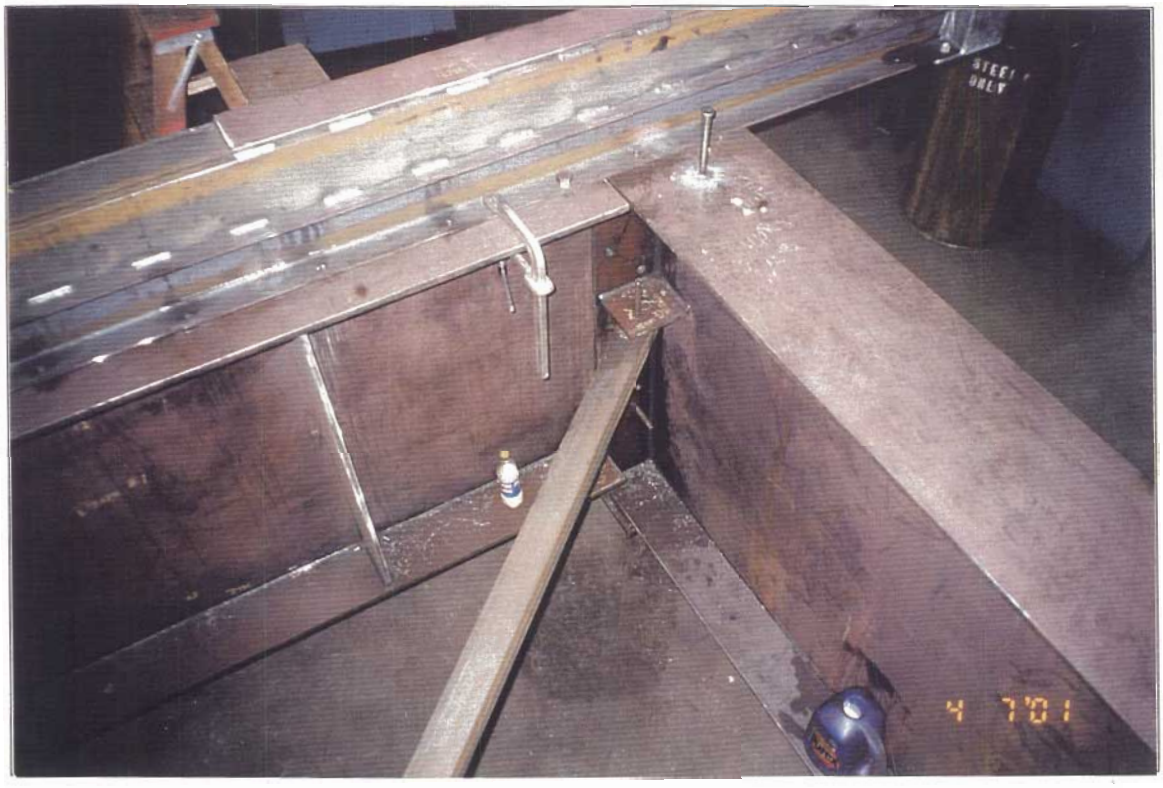

Bridge assembly details

Bridge assembly details

KUGAARUK, NU
ACCESS TRAIL TO FOL SITE
Km 18, Culvert CSP 1500
Km 23, Culvert 2 CSP 1200

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KUGAARUK, NU. ACCESS TRAIL TO FOL SITE, KM 18
CSP 1500 CULVERT CROSSING.

View of outlet with riprap and reflective dyke

View of outlet

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CSP 1500 CULVERT CROSSING.

View of inlet with riprap protection. Temporary creek crossing in close plan.

View of inlet with riprap protection.

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CSP 1200 CULVERT CROSSING.

View of inlet with riprap protection.

View of outlet with riprap protection and reflective dyke forming a pool.