March 30, 2003

Ms. Suzanne Shane
Information Management Supervisor
Navigable Waters Protection
Canadian Coast Guard
Central Region
201 N. FRONT STREET, SUITE 703
SARNIA, ONTARIO N7T 8B1

Dear Ms. Shane,

Yellowknife HWY #3, km 23. Proposed Deh Cho bridge on Mackenzie River. Application for Authorisation under the Navigable Waters Protection Act

The purpose of this correspondence is to request the necessary authorisation from your agency for the construction of a privately owned bridge at the crossing of Yellowknife HWY #3, NT and Mackenzie River. The Applicant for this work is the *Deh Cho Bridge Corporation* of Fort Providence, NT.

The Applicant has retained the Consultant *Jivko Engineering* of Yellowknife to submit applications to obtain required approvals before proceeding with the project. *Jivko Engineering* is also part of the design and construction management team for the project.

In addition to your office we have contacted the following government agencies:

Mackenzie Valley Land & Water Board, Yellowknife, NT
DFO, Fish Habitat Management Office, Yellowknife, NT
DIAND Water Resource Management Board, Lands Division, Yellowknife, NT

The contact person from the Deh Cho Bridge corporation is:

Mr. Andrew Gamble, P. Eng.
Andrew Gamble & Associates
14 Mitchell Drive
Yellowknife, NT X1A 2H5
Tel: 867 873-4629

The enclosed Application for Authorisation under the Navigable Waters Protection Act contains all information relevant to the Bridge Construction. 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. Andrew Gamble

Fisheries and Oceans Canada | Pêches et océans Canada
Coast Guard | Garde côtière

Canadian Coast Guard

Central and Arctic Region

NAVIGABLE WATERS PROTECTION ACT

APPLICATION FOR THE CONSTRUCTION OF DEH CHO BRIDGE ON MACKENZIE RIVER

Navigable Waters Protection
201 North Front Street
Suite 703
Sarnia, Ontario, N7T 8B1

Phone (519) 383-1865 Fax (519) 383-1989

Canada

Fisheries and Oceans Canada | Pêches et océans Canada
Coast Guard | Garde côtière

Office Use Only

NWPA # 8200-

NAVIGABLE WATERS PROTECTION ACT APPLICATION

Name of Owner: **Andrew Gamble, P.Eng., Project Manager Deh Cho Bridge Corporation**		
Mailing Address: **14 Mitchell Drive, Yellowknife, NT**		Postal Code: **X1A 2H5**
Home Telephone No: **(867) 444-2099**	Business **(867) 873-4629**:	Other:

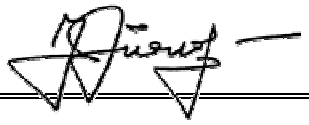
Contractor **Consultant: Jivko Jivkov, P.Eng. Principal Jivko Engineering**		
Address: **5610- 50 A Avenue, Yellowknife, NT**		Postal Code:**X1A 1G3**
Tel **#: (867) 920-4455 or (867) 444-1123**	Fax #: **(867) 873-6090**	Contact Person: **Jivko Jivkov, P.Eng.**

LOCATION OF WORK SITE

Lot, Concession, Township: **The proposed site is located at the crossing of the Yellowknife HWY #3, NT and the Mackenzie River. It is located on the existing highway right-of-way, at km 23 HWY #3, near Fort Providence, NT.**

Section, Range:

Province: **Northwest Territories**	County/District: **Mackenzie**	Name of Upland Property Owner: **Jurisdiction of the GNWT, Minister of Transport**
Name of Lake, River, Bay (waterway): **Mackenzie River**		Topographic/Chart #: **1:5,000,000 NT Geographic Map (*Attachment #1).*** **1:50,000 Topographic Map 85F/5 *(Attachment #2).*** **1:25,000 Hydrographics Chart #6453 *(Attachment #3).***
Latitude: **61° 15' 45" N**		Longitude: **117° 31' 30" W**

Description of project (Work) (Please circle one or more) : DOCK RETAINING WALL BREAKWATER BOAT SLIP RAMP FILL DREDGE Proposed Construction Date: **Start: November 01, 2003** **Completion: September 30, 2005** OTHER **Bridge**	Status of Project (Please Circle): **NEW X** EXISTING ADDITION…….REPAIRS……
Date: March 31,2003 **Signature:** 	

Project Description:

1. Introduction.

The Deh Cho Bridge Corporation Ltd. of Fort Providence, NT is proposing to the GNWT to construct a privately owned bridge across the Mackenzie River, at km23, Yellowknife HWY #3. The estimated cost of the bridge is $52M, which will be raised through Territorial and Federal Government and shareholders contributions and bank loans. After construction, the bridge will be operated under an agreement with GNWT for a period of 35 years. For the duration of the agreement the bridge will be operated and maintained by the Deh Cho Bridge Corporation. On expiration of the agreement the ownership of the bridge will be transferred to the GNWT.

The proposed bridge will replace the existing ferry and ice bridge crossings, and will make the Yellowknife HWY an all-weather facility guaranteeing an uninterrupted link between the capital of the NT and the rest of Canada.

The proposed initiative, including the selected bridge site and bridge parameters were approved by the DOT, GNWT engineering personnel, and is fully supported by the local residents and the Municipal Authorities of Fort Providence *(Attachment #9)*. A Memorandum of Intent (MOI), between the GNWT and the Deh Cho Bridge Corporation Ltd., for proceeding with the final design and preparation for construction was signed on November 15, 2002.

The proposed bridge site and bridge parameters, as depicted on *Attachment #4*, have been agreed to by the Northern Transportation Company Limited (NTCL), which are the major operator on the Mackenzie River Water Way *(Attachment #10)*.

2. Selection of Bridge Site

It is proposed to construct the bridge at the existing ferry crossing. At this site the natural riverbed is approximately 1,560 m wide. For the purpose of the ferry operation, partial causeways were built on the north and on the south shore over 30 years ago. The north causeway is projecting into the river for 430 m, and the south one for 165 m. Presently, the constricted river is 965 m wide at the ferry crossing. The proposed bridge is 1,045 m long and would allow an increase of the waterway to 995 m. *(Attachment #4)*

The proposed site has been recommended in a Study named Preliminary Hydraulic Design, Mackenzie River Bridge, Liard River Bridge, Great Bear River Bridge prepared for the PWC by NORTHWEST HYDRAULIC CONSULTANTS LTD (NHCL) of Edmonton, AB in 1975. The Study establishes that the waterway could be constricted to 3,000 feet (915 m) or less without serious hydraulic effects, and concludes that a design value of less than 3,000 feet would be acceptable from a river engineering viewpoint. The Study evaluates three potential sites for a bridge crossing between Fort Providence Rapids and the Beaver Lake *(Attachment#3)*, and recommends the site at the existing ferry crossing for the following reasons:

- ✓ The bed of the river at the proposed site is believed to be highly stable and scour resistant with changes occurring only in geologic time scale.
- ✓ The direction of flow does not vary markedly from point to point across the section
- ✓ The structure is not located in a curve of the navigation channel and is perpendicular to the channel.
- ✓ The depth of the river at the proposed site is fairly uniform. The maximum depth is substantially less than the ones of the other locations
- ✓ The bridge would use the existing highway approaches and would not interfere with lands along the shoreline that might be of interest to others

The proposed site was confirmed by PWC and it was the basis for their Mackenzie River Bridge, Fort Providence, Yellowknife HWY #3, NT, Preliminary Design and Cost Estimate, dated December 1975.

3. Regime Analysis, Geotechnical, Bed Scour

The banks of Mackenzie River in the vicinity of the proposed site are stable with no appreciable changes having occurred during a 50-year interval based on inspection of air photographs. A distinctive feature of the banks is numerous spur-like projections, some of which exceed 300 m in length. Although portions of them are submerged during high open water or ice jam high water, there is no sign of recent erosion.

The bed of the Mackenzie River in the vicinity of the proposed crossing is comprised of hard, dry clay-till overlain by 0.8 m to 1.2 m layer of alluvium. At the ferry crossing divers have reported that the bed was clay, scattered with large partially embedded boulders.

Constructing eight piers, of comparatively negligible width, would further constrict the water way very little. The resulting minor increase in the velocity would probably produce no scour effect. However if we assume that scour occurs, the bed would adjust over a very long period, and the increase in depth would be less than 0.3 m.

4. Ice Action

The bridge piers, abutments and the approaches projecting into the river would be designed for the calculated ice forces, and according to the applicable chapters of the Canadian Bridge Code CSA-S6-00.

5. Components & Parameters

.1 The proposed bridge is 1,045 m long, consisting of nine continuous spans, steel girders-concrete deck composite construction. The superstructure is supported on eight piers constructed in the watercourse and two abutments constructed on the approach berms.

Under the centre (main) span there is a navigation track used by large tug-barges configurations. The main span is 190 m long with 22.56 m vertical clearance, at High Navigational Water Level. On each side of the main span there are three at 112.5 m intermediate spans and one at 90.0 m end span. In order to reduce the depth of the superstructure of the main span, and consequently to reduce the longitudinal grade on the bridge, the design contemplates a system of portal and suspenders installed on the piers on both sides of the main span. This system allows for 8.0 m vertical clearance, and 10.5 m horizontal clearance on the bridge deck. It is anticipated that such clearances will not present limitation for oversize loads travelling between Alberta and the NWT.

The roadway width on the bridge deck is 10.50 m, allowing for two at 3.75 m traffic lanes and two at 1.50 m shoulders. On each side of the deck there is 0.82 m high safety rail consisting of 0.25 m high concrete curbs and 0.57 m high steel rail. The maximum longitudinal grade on the bridge is 3.5%.

There will be vessel-arresting devices constructed in front of the piers potentially exposed to vessel collision.

.2 The Design Live Load for the bridge is CL-750 in accordance with the CSA-S6-00. This is a vehicle with GVW of 75,000 kg. A 40% dynamic allowance and another 60% safety factor are added to the design load. With this reserve, virtually any conceivable overload vehicle, presently and in the future, could travel safely on the bridge.

.3 The superstructure is a composite construction of two WWF-Special steel girders and a deck of pre-cast concrete panels. The deck panels will be pre-stressed transversely at the fabrication plant, and will be post-tensioned longitudinally after installation.

.4 The substructure consists of eight concrete caisson piers, and two concrete abutments supported on steel piles. *(Attachment #5, Attachment #6).*

- ✓ The foundation of each pier is composed of two pre-drilled circular concrete caissons with diameters of 3.0 m or 4.0 m depending on the pier location. The caissons will be braced at water level, and protected with metal casing to elevation of 1.0 m above the calculated ice action. The caissons will be installed to an approximate depth of 10 m below the riverbed. Allowance for the calculated bed scour is incorporated in the depth of the foundations.

- ✓ Each pier shaft consists of two circular, concrete columns constructed of pre-cast and post-tensioned concrete rings. At the top end of each pier there is a hammerhead concrete beam supporting the superstructure.

.5 Each vessel arresting device consists of concrete-caisson foundations and heavy concrete superstructure. It is designed as ramp that would allow the stray vessel climbing and stopping on it, before getting in contact with the bridge pier. Friction and deformation of the colliding vessel would almost entirely absorb the energy of the impact.

.6 The proposed road approaches are 12.0 m wide. Both approaches are situated on top of the existing causeways of the north and south ferry landings. The north approach is projecting into the river for 350 m, and the south one for 230 m. In order to avoid potential flooding and ice shove accumulations, the approaches are set at elevation of not less than 2.0 m above the calculated ice jam. This elevation is the same as the one of the highway-winter road intersection on the north side of the bridge, which historically has never been flooded.

The footprints on the riverbed of the bridge approaches exceed the ones of the existing causeways. The required extension and widening of the footprints will be achieved by placing clean blasted rock into the river. This rock will be placed to an elevation of 1.0 m above the Mean Navigational Water Level. The approach embankments above that elevation will be constructed of common backfill and will be dressed with 1 m thick layer of blasted rock rip rap. The roadway on the approaches would be paved. There is a standard highway guardrail installed on each side of the roadway.

.7 It is proposed to excavate and remove the backfill material from two areas within the limits of the watercourse *(Attachment #4)*. These areas have been previously constructed in relation with the existing ferryboat operation. The excavation and removal of backfill material will be completed to depths between 2.0 m and 4.0 m below the water level, to match the adjacent natural riverbed. These areas could be described as follows:

- ✓ Area “E” (4,300 sq. m) is part of the existing north ferry landing projected 80 m into the watercourse beyond the proposed bridge approach. The material to be removed from this area consists of 9,000 cu m granular backfill for embankment, 500 cu m blasted rock for rip rap, 80 cu m concrete for landing pad, and 30,000 kg structural steel for sheet-pile wall.
- ✓ Area “D” (9,500 sq. m), is part of the existing ferry haul-out on the south shore. It is located downstream, adjacent to the bridge approach. The material to be removed from this area consists of 11,000 cu m granular backfill and 90 cu m structural timber.

Most of the removed steel, concrete, and timber, will be disposed of in nearby gravel pits, and will be covered with a layer of gravel. Some of the steel and timber might be salvaged. The excavated gravel will be tested for contaminants, and if found suitable may be used for road embankment widening. Alternatively it will be appropriately disposed of in a gravel pit. The armour rock will be salvaged and will be incorporated in the erosion protection of the bridge approaches.

.8 Access for public and commercial vehicles to both ferry landings and clear route for the ferryboat will be maintained, without interruption, for the duration of the bridge construction. Since sections of the existing access roads to the ferry landings and the bridge approaches overlap *(Attachment #7, Attachment #8)*, it is proposed to construct detours as follows:

- ✓ South Approach: Construct approx. 250 m detour road and arrange for temporary south ferry landing 10 m downstream of the existing one. This involves minor road improvement works with no in-stream construction activities.
- ✓ North Approach: Construct approx. 450 m detour road 25 m downstream of the existing access. This involves placing approx. 6,000 cu m blasted rock into the watercourse, with corresponding 5800 sq m footprint on the riverbed. The road embankment above the water level will be built of gravel. After completion of the bridge construction the gravel and the blasted rock will be thoroughly recovered from the river, and will be incorporated in the bridge approach widening, and armouring correspondingly.