

## Appendix 1: Development Description

**Appendix 1-A** contains Attachments 1 through 17 including Maps, Air-photos, Drawings and Sketches

**Appendix 1-B** contains Schematic Spill Contingency Plan

### 1. Bridge Location

The proposed bridge 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.

Mackenzie River, originating at the south-western extremity the Great Slave Lake, NT and flowing into the Beaufort Sea, is shown on a 1:5,000,000 NT geographic map (*Attachment #1*). The proposed bridge site is shown on the 1:50,000 topographic map 85F/5 (*Attachment #2*). The proposed bridge site is located at km 66 of Mackenzie River Navigation Route, between the Beaver Lake and the Providence Rapids, as shown on the Canadian Hydrographics Service Chart #6453, edition 1999 (*Attachment #3*).

The co-ordinates of the bridge are:      Latitude: **61° 15' 45" N**              Longitude: **117° 31' 30" W**

### 2. Components & Parameters

- 1 The proposed bridge, consisting of nine spans is 1,045 m long, and is configured as steel truss-concrete deck composite construction. The static scheme is a simple main span supported on the cantilevered ends of two opposing continuous four span approaches. Enclosed are Preliminary Design Drawings prepared by the bridge designer J.R. Spronken & Associates of Calgary, AB. (*Attachment #4, Attachment #5 & Attachment #6*).

The geometric parameters of the bridge presented in the context of the existing ferry facilities, the navigation track, the existing road approaches, etc., could be found in *Attachment #7*. General arrangement of the bridge plotted in scale 1:6,000 on an air photo mosaic of the bridge surroundings could be found on *Attachment #17*

The superstructure is supported on eight piers constructed in the watercourse and two abutments constructed on the approach berms. Under the main span there is a navigation channel used by large tug-barges configurations. The main span, including the cantilevers, is 190 m long with a vertical clearance of 22.56 m at H.W.L. The main span is flanked by three 112.5 m spans and one at 90.0 m end span. In order to reduce the depth of the trusses on the main span the design contemplates a system of portal and stays installed on the piers on both sides of the main span. The vertical clearance under the portal is 9.0 m over the 8.6 m width of 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 10.40 m, allowing for two 3.70 m wide traffic lanes and two at 1.50 m shoulders. On each side of the deck there are 0.82 m high safety rails 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%.

- 2 The Design Live Load for the bridge is CL-750 (GVW of 750 kN) in accordance with the CSA-S6-00. There is a 40% dynamic allowance and additional 60% safety factor incorporated in the design. Additionally, the design allows for special, overload truck configurations as shown on the drawings.
- 3 The superstructure is composite construction of two steel trusses with pre-cast concrete deck panels. The trusses are 4.5 m deep with 7.3 m horizontal distance between. The steel part of the superstructure, involves of 4,750,000 kg non-painted weathering steel. The concrete panels are 11.5 m wide and 0.3 m thick. The panels are pre-stressed transversely during fabrication, and

## Deh Cho Bridge – Developer’s Assessment Report

post-tensioned longitudinally after installation. The deck is built of 4,520 cu m (11,300,000 kg) concrete with 40 Mpa strength.

- .4 The abutments are cast in place reinforced concrete structure consisting of pile cap, back wall, and wing walls at 45 degree to the centre line of the bridge. The abutment construction involves placing of 560 cu m concrete and 40,000 kg reinforcing steel.

Each abutment is supported 16 @ 12.0 m long HP-350 piles (173 kg/m), predrilled and driven to refusal into the underlying till.

- .5 The substructure of the piers consists of cast-in-place concrete flat footings and pedestals. The lower part of the pedestals, located below the ice action is of cylindrical shape. The top part is of conical shape. In order to reduce friction with moving ice and to improve durability the top part is encased in 16 mm thick steel casing.

Potential scouring will be controlled by placing on the riverbed around each pier 0.6 m layer of selected blast-rock over an elliptic area with radiuses 33 m and 28 m.

The substructure is designed to resist the impact of a colliding stray vessel. Friction and deformation of the colliding vessel will absorb the energy of the impact.

- .6 The superstructure of the piers, or the pier shafts are composed of prefabricated steel elements assembled on site. The shafts of the piers supporting the main span are of triangular shape with the horizontal side on top. The shafts of the remaining piers are hollow steel columns with a hammerhead widening on top. The shafts are built of 315,000 kg non-painted weathering steel.
- .7 The proposed bridge approaches are 12.0 m wide (*Attachment #8*). Both approaches coincide with the existing causeways of the north and south ferry landings. The north approach is projected into the river 350 m, and the south one 230 m. In order to avoid potential flooding and ice shove accumulations, the approaches are set at elevation 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 comprises placing into the river of 25,200 cu m clean limestone rock, to an elevation of 1.0 m above the Mean Water Level. In order to resist the river current selected larger rock sizes will be placed as a berm on the upstream side of the south causeway. The approach embankments above that elevation will be constructed of 96,200 cu m common backfill and will be dressed with 1 m thick layer of blasted rock rip rap.

The head-slopes of the approaches and their upstream shoulders exposed to ice action will be armoured with approx. 3,000 cu m large size granite rip-rap.

The roadway on the approaches will be paved. There is a standard highway guardrail installed on each side of the roadway.

- .8 Accesses 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 overlap with the bridge approaches 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. The

## Deh Cho Bridge – Developer’s Assessment Report

detour embankment above the High Water Level and the surfacing will be built of gravel. The detour arrangements are depicted on *Attachment #9 & Attachment #10*.

### 3. Land Use and Quarrying

Lands directly affected by the physical construction of the bridge, the construction support facilities and the granular and rock sources include:

- i.) Construction Corridor for Bridge Structure & Approaches
- ii.) Area for Construction Camp
- iii.) Two Areas for Temporary Concrete Plants
- iv.) Two areas in the vicinity of the bridge for temporary storage and parking
- v.) Reclamation areas related to removal of existing ferry infrastructure

Granular materials, concrete aggregates and rock required for the construction of the bridge will be obtained from the following areas:

- vi.) Mackenzie HWY #1, km 188.5 – Proposed Limestone Quarry
- vii.) Mackenzie HWY #1, km 188.5 – Existing Gravel Pit
- viii.) Yellowknife HWY #3, km 23 – Proposed South Borrow Area
- ix.) Yellowknife HWY #3, km 26 – Proposed North Borrow Area
- x.) Yellowknife HWY #3, km 87 – Existing Gravel Pit for Concrete Aggregate
- xi.) Yellowknife HWY #3, km 156 – Existing Grey Limestone Quarry
- xii.) Yellowknife HWY #3, km 232 – Proposed Granite Rock Quarry

Construction activities on the above areas will be carried out by qualified contractors selected via competitive tender. Prior commencement of the work every contractor will present a detailed Spill Contingency Plan that will reflect specific technology and method of work selected by the contractor. These Plans will be in the framework of the overall Spill Contingency Plan prepared by the General Contractor. Prior to commencement of on-site work a Spill Contingency Plan for every one of the above specified sites will be presented to the MVLWB for approval. A Schematic Spill Contingency Plan prepared by the DCBC is enclosed for your reference in Appendix #1-B.

### 4. Construction Details and Schedule

#### i.) Construction Corridor *Attachment 11*

**.1 General:** All Bridge Components including Detours and Bridge Approaches are situated in a **Construction Corridor** that extends from km 23+120 to km 25+840 of Yellowknife HWY #3. The Corridor is 2,720 m long, 60 m wide (30 m on each side of HWY centre line), and covers an area of 163,200 sq m. The corridor coincides with the highway Right-of-Way.

The details of the bridge construction activities taking place in the Corridor are not presented in chronological order, but are rather grouped by type of different construction activities as follows:

- Earthworks
- Pier foundation works
- Pier shafts fabrication and installation
- Abutments construction
- Steel superstructure fabrication and installation
- Bridge deck fabrication and installation

The **Land Use Permit** for the Construction Corridor is required for the period between **March 01, 2005** and **October 30, 2007**.

The proponent will be prepared to reasonably reschedule the “in-stream” construction activities, if this would minimise further the harm to fish habitat and population.

## Deh Cho Bridge – Developer’s Assessment Report

**.2 Earthworks:** Completion of the Earthworks is divided into stages interdependent with the rest of the construction activity of the bridge as follows:

- .1 Placing 15,500 cu m limestone base for detour (8,600 cu m) and for widening of the North Approach (6,900 cu m) is “in-stream” activity. It is scheduled for March 23-April 07, 2005. The supply and delivery of the rock is discussed in **item 4.vi.)** of this document. The work on the placing includes:
  - Ripping and removal of ground-fast ice from the 4,800 sq m footprint area. The removed ice will be left to melt on top of the natural river ice cover.
  - Placing the rock over “dry” riverbed. The rock will be delivered on site by trucks; end-dumped in the excavated pits; and spread to the design grade with a bulldozer. No equipment will be placed in the water during this work.
- .2 Placing 18,300 cu m limestone base for extension of the South Approach is “in-stream” activity. It is scheduled for July 08-23, 2005. The supply and delivery of the rock is discussed in **item 4.vi.)** and **item 4.xi.)** of this document. The rock will be delivered on site by trucks; end-dumped directly in the water; and spread to the design grade with a bulldozer. No equipment will be placed in the water during this work.
- .3 Placing 41,000 cu m common backfill for Phase One- lower portion of the North Embankment is not “in-stream” activity. It is scheduled for June 16-July 15, 2005. The supply and delivery of the common fill is discussed in **item 4.ix.)** of this document. The material will be placed to the elevation of the bridge bearing seat.
- .4 Placing 26,000 cu m common backfill for the Phase One - lower portion of the South Embankment is not “in-stream” activity. It is scheduled for August 01-21, 2005. The supply and delivery of the common fill is discussed in **item 4.viii.)** of this document. The material will be placed to the elevation of the bridge bearing seat.
- .5 Dressing with 6,800 cu m limestone the side slopes of the North Embankment (3,400 cu m) and South Embankment (3,400 cu m) is not “in-stream” activity. It is scheduled for August 23-31, 2005. The supply and delivery of the rock is discussed in **item 4.vi.)** of this document.
- .6 Armouring with 6,000 cu m granite the upstream slopes of the North Embankment (3,000 cu m) and the South Embankment (3,000 cu m) is in part “in-stream activity. It is scheduled for August 08-31, 2005. The supply and delivery of the granite is discussed in **item 4.xii.)** of this document. The granite will be placed with an excavator deployed on top of the existing embankment. Only the bucket and part of the boom will be immersing in the water to place the rock. No equipment will be placed in the water during this work.
- .7 Placing 12,000 cu m common backfill for the Phase Two- upper portion of the North Embankment is not “in-stream” activity. It is scheduled for July 16-30, 2006. The supply and delivery of the common fill is discussed in **item 4.ix.)** of this document. The material will be placed to the elevation of the of the sub-grade..
- .8 Placing 12,000 cu m common backfill for the Phase Two- upper portion of the South Embankment is not “in-stream” activity. It is scheduled for July 01-15, 2006. The supply and delivery of the common fill is discussed in **item 4.viii.)** of this document. The material will be placed to the elevation of the of the sub-grade.

## Deh Cho Bridge – Developer’s Assessment Report

- .9 Placing 700 cu m pit-run gravel for structural backfill behind the abutments is not “in-stream” activity. Supply and delivery of this gravel is discussed in in **item 4.vii.)** of this document.
- .10 Placing 10,600 cu m gravel for:
  - 5,900 cu m pit-run gravel for sub-base on the North Approach) is not “in-stream” activity.
  - 2,100 cu m crushed gravel for base on the North Approach is not “in-stream” activity.
  - 2,600 cu m crushed gravel for base on the South Approach is not “in-stream” activity.The supply and delivery of 10,600 cu m pit-run gravel is discussed in **item 4.vii.)** of this document.
- .11 Placing 1,000 chips for chip-sealing N & S approaches is not “in-stream” activity. Supply and delivery of this gravel is discussed in **item 4.vii.)** of this document.

### Equipment & Labour:

- .1 Placing 15,500 cu m limestone base: Equipment: 1 midsize bulldozer equipped with ripper; Labour: 1 operator accommodated in Construction camp
- .2 Placing 18,300 cu m limestone base: Equipment: 1 midsize bulldozer equipped with ripper; Labour: 1 operator accommodated in Construction camp
- .3 Placing 41,000 cu m - N. Embankment: Equipment: 1 midsize bulldozer, 1 heavy compactor; Labour: 2 operators accommodated in Construction camp
- .4 Placing 26,000 cu m - S. Embankment: Equipment: 1 midsize bulldozer 1 heavy compactor; Labour: 2 operators accommodated in Construction camp
- .5 Dressing N & S Embankments with 6,800 cu m stone: Equipment: 1 midsize excavator; Labour: 1 operator accommodated in Construction camp
- .6 Armouring with 6,000 cu m granite: Equipment: 1 midsize loader and 1 midsize excavator; Labour: 2 operators accommodated in Construction camp
- .7 Placing 12,000 cu m on N Emb; Equipment: 1 midsize bulldozer, 1 heavy compactor; Labour: 2 operators accommodated in Construction camp
- .8 Placing 12,000 cu m S Emb: Equipment: 1 midsize bulldozer, 1 heavy compactor; Labour: 2 operators accommodated in Construction camp
- .9 Placing 700 cu m pit-run for abutments: Equipment: 1 midsize excavator, 1 Bomag compactor; Labour: 2 operators accommodated in Construction camp
- .10 Placing 10,600 cu m pit-run & crush: Equipment: 1 midsize bulldozer, 1 grader and one large vibrating compactor; Labour: 1 local operator and 2 operators in camp
- .11 Placing 1,000 cu m chips for chip-sealing: Equipment: 1 grader, 1 compactor, 1 truck for asphalt emulsion; Labour: 4 operators and 3 workers in Big River Motel

## Deh Cho Bridge – Developer’s Assessment Report

### Schedule:

#	Activity	Schedule		Labor (men)	Accomm. (man/day)	
		days	dates		Con.Camp	Other
1	Placing 15,500 cum N Imstn base	14	23Mar- 07Apr, 2005	1	14	-
2	Placing 18,300 cum S Imstn base	14	08 Jul - 23 Jul, 2005	1	14	-
3	Placing 41,000 cu m on N. Emb	30	16 Jun- 15 Jul, 2005	2	60	-
4	Placing 26,000 cum on S.Emb	21	01Aug -21Aug, 2005	2	45	-
5	Dressing Emb 6,800 cum stone	7	23Aug-31 Aug,2005	1	7	-
6	Armouring w/ 6,000 cun granite	7	23Aug-31 Aug,2005	2	15	-
7	Placing 12,000 cu m on N. Emb	15	16 Jul - 30 Jul, 2006	2	60	-
8	Placing 12,000 cum on S.Emb	15	01 Jul - 15 Jul, 2006	2	60	-
9	Placing 700 cum str bkfill abtm	2	15 Jun -17 Jun 2006	2	4	-
10	Placing 10,600 cum grav.	7	07 Sep -14 Sep 2006	3	15	7
11	Placing 1,000 cum chips	2	25Aug -27Aug 2007	7	-	14

### Fuel:

#	Activity	Diesel fuel (litres)	Gasoline (litres)
1	Placing 15,500 cum N Imstn base	10,500	-
2	Placing 18,300 cum S Imstn base	11,500	-
3	Placing 41,000 cu m on N. Emb	33,000	-
4	Placing 26,000 cum on S.Emb	23,100	-
5	Dressing Emb 6,800 cum stone	2,100	-
6	Armouring w/ 6,000 cun granite	4,900	-
7	Placing 12,000 cu m on N. Emb	15,400	-
8	Placing 12,000 cum on S.Emb	15,400	-
9	Placing 700 cum str bkfill abtm	880	-
10	Placing 10,600 cum grav.	10,010	-
11	Placing 1,000 cum chips	2,640	100
		129,430	100

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

- .3 Pier Foundation Works:** Construction of the pier foundations is “in-stream” activity scheduled for completion throughout the 2005 open water season (June-October 2005). The work includes:

- .1 Deployment & Operation of Barge-Bridge:** The barge-bridge will be used to access from shore four consecutive piers from each side of the river and for deployment of working equipment and material. It will be 405 m long, composed of nine barges series 600 connected end-to-end and anchored to shore and upstream against the current. Additionally, spud-barges of series 1000 will be deployed perpendicular to the barge-bridge, along each of the four pier locations. A configuration of small tug and barge will be deploying and maintaining the bridge and will shuttle some equipment and material across the river. The barge-bridge will be deployed alternatively on the north and south side, maintaining the navigation track on the main span open at all times. The barge-bridge will be composed of surplus inventory of the NTCL, and will be deployed and maintained by them.

## Deh Cho Bridge – Developer’s Assessment Report

The Barge-Bridge will be operated by a crew of 3 mariners and 3 general labourers, for 140 days between June 05 and October 25, 2005. The crew will be accommodated on the tug.

- .2 Installation of 8 Cofferdams:** The sheet piles for the cofferdams are AZ-26 of 155 kg/sq m mass. The cofferdams are of oval shape pier with diameters 18 m and 13 m. The sheet piles will be driven to approx. 5.0 m below the riverbed and will be cut-off 1.0 m above the High Water Level.

After installation of the cofferdam a 4.0 m thick layer of riverbed material (850 cu m per cofferdam), will be excavated and disposed of directly into the river. The bottom of the will be sealed with 0.6 m thick “mud-slab” of tremie concrete (110 cu m per pier) and the cofferdam will be dewatered directly into the river (1,900 cu m water per cofferdam). Placing the concrete for mud slab is addressed below in **item 4.i).3.3**

The rate of discharge into the river of excavated material and water will be controlled according to methodology described in the enclosed Golder Associates report.

The sheet-piling material will be inventory of the Contractor. After completion of the pier foundation works this material will be extracted and shipped down south for reuse.

Scour Protection around the piers will be provided by placing of 650 cu m of blasted rock over an area of 720 sq m around each pier. Production and delivery of 7,200 cu m rock for scour protection is discussed in **item 4.xi.)** of this document. 5,200 cu m of this rock will be placed into the river. The remaining 2,000 cu m will account for some waste and reserve for unforeseen uses.

**.1 Mobilisation:**

- Material from ED, AB: 850,000 kg steel including sheet piles, walers, tie rods and fasteners;
- Equipment from ED, AB: 3 Hydraulic Crawler Drills, 1 150t crawler crane, 1 50t mobile crane, 1 welding truck, 80,000 kg portable bridges, diesel hammers, vibrating extractors, water pumps, etc.
- Equipment available on site: excavators, loaders and bulldozers

**.2 Installation of 4,800 sq m steel sheet piling includes:**

- Pre-drilling one 8” hole for each sheet pile with Hydraulic Crawler Drill
- Driving sheet piles with diesel hammer mounted on 150 t crane
- A loader and a welding truck will assist the operation.

The work will be completed within 96 days (12 days per cofferdam) between June 15 and September 20, 2005. If the contractor schedule is delayed by unforeseen circumstances the First Pier on the north side will be completed in October and early November 2005. A 25 m long temporary causeway will be built of limestone to link the North Ferry Approach with the cofferdam.

**.3 Excavation of 7,000 cu m riverbed material from the cofferdams includes:**

- Pre-drilling three 8” holes per sq m using 2 Hydraulic Crawler Drills
- Excavation and disposal of riverbed material 1 large excavator and 1 large loader
- Dewatering of the cofferdam using two or three 8”Ø pumps.

This work will go in tandem with the Installation of the sheet piling and will follow the same schedule.

## Deh Cho Bridge – Developer’s Assessment Report

### .4 Scour control includes:

Placing of 650 cu m of blasted rock per pier using a large excavator and 50t crane with clamp

- .3 Placing 11,200 cu m concrete:** A total of 11,200 cu m concrete (900 cu m mud slab concrete and 10,300 cu m structural concrete) will be placed for the foundations of 8 piers. The mud-slab concrete will be placed in 8 pours of 100 cu m (1 pour per pier). The concrete for each pier (1,300 cu m) will be placed in three pours: footing – 780 cu m, lower pedestal – 300 cu m, and upper pedestal – 220 cu m. The upper pedestal will be encased in steel casing and will not need formwork.

### .1 Mobilisation:

- Material from ED, AB: 830,000 kg reinforcing steel; 240,000 kg steel cone-casing, 80,000 kg reusable prefab forming, bracing, hardware, etc.
- Equipment from ED, AB: 3 concrete pumps mounted on trucks, 4 pickups for crew
- Equipment available on site: loaders

Supply and delivery of the concrete to the pier locations in discussed in **item 4.iii.)** of this document

- .2 Placing of 11,200 cu m concrete:** This concrete will be divided into 32 pours, average 3 days apart, within a period of 96 days between July 01 and October 05 2005. Three crews of 6 men will be working different piers on forming, rebar installation and concrete placing. The rebar will be preassembled down south in mats and cages between 3,000 kg and 12,000 kg. The forming will be prefab reusable panels and will be needed for the lower pedestals only.

## Equipment, Labour & Traffic

- .1 Barge-Bridge:** Equipment: 1 tug-pusher 1 pickup truck; Labour: 3 labourers from Ft. Providence and Crew of 3 mariners accommodated on the tug

### **.2 Installation of 8 Cofferdams:**

- .1 Mobilisation from Edmonton: Equipment: 32 truckloads (B-trains or semi trailers) and 6 pickups (1 welding truck & 4 pickups for crew); Labour: 38 operators in commercial accommodation
- .2; .3 & .4: Work
- Equipment: 1 150 t crane, 1 50t mobile crane 3 Hydraulic Crawler Drills, 1 welding truck, 2 midsize loaders, 1 large excavator, 3 pickups for the crew and 3 water pumps
- Labour: 10 local labourers and 10 operators in camp

### **.3 Placing 11,200 cu m concrete:**

- .1 Mobilisation from Edmonton: Equipment: 39 B-trains, 3 pump trucks, 4 pickup trucks; Labour: 46 operators
- .2 Placing concrete: Equipment: 2 concrete pumps, 4 pickups for the crew. Labour: 8 local labourers, 2 operators and 12 carpenters in camp

## Schedule:



## Deh Cho Bridge – Developer’s Assessment Report

#	Activity	Schedule		Labor (men)	Accomm. (man/day)		Traffic veh/day
		days	dates		Con.Camp	Other	
.1	Barge-Bridge	140	05 Jun -25 Oct, 2005	6	-	840	-
.2	Installation of 8 Cofferdams						
.1	- Mobilization	4	01 Jun-05 Jun, 2005	37		152	19
.2; .3; .4	-Work	140	05 Jun -25 Oct, 2005	20	1,400	1,400	-
.3	Placing 11,200 cum concrete						
.1	Mobilization	4	01 Jun-05 Jun, 2005	46		184	24
.2	Placing concrete	140	05 Jun -25 Oct, 2005	22	1,400	1,120	-

### Fuel:

#	Activity	Diesel fuel (litres)	Gasoline (litres)
.1	Barge bridge-Tug-pusher, 2005	403,200	7,000
	Barge bridge-Tug-pusher, 2006	403,200	7,000
.2	Installation of 8 Cofferdams		
.1	- Mobilization	40,960	4,000
.2 .3 & .4	-Work	532,000	21,000
.3	Placing of 11,200 cum concrete		
.1	Mobilization	67,200	2,560
.2	Placing Concrete	140,000	28,000
Totals		1,586,560	69,560

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

**.4 Pier Shafts Fabrication & Installation:** Construction of the Pier Shafts is not “in-stream” activity. However, material, equipment and workers have to cross the water body in order to access the piers.

- **Fabrication:** The 8 pier shafts are composed of 48 prefabricated structural steel elements of 315,000 kg total weight. For easy transportation and installation each individual element will be fabricated within the limits of 12 m length, 3.6 m width/height and 15,000 kg weight. Fabrication of the steel will take place in a specialized shop in southern Canada.
- **Mobilization:** The 48 prefab elements, scaffold frames and tools will be transported on B-trains to the south side of the river and skidded to each pier location. 80t mobile crane will be mobilised from Edmonton. A 50t mobile crane, midsize loader, bulldozer and welding truck will be available locally.
- **Ice Preparation:** An access ice road will be build along the pier locations by clearing the snow with light bulldozer and increasing the thickness of the natural ice by flooding by augers mounted on trucks.
- **Installation of the pier shafts:** This will be completed between March 01 and April 15, 2006 with an 80 t mobile crane deployed on the ice. Shaft elements will be transported from shore on skids pulled by light bulldozer. Two crews of six men will be working simultaneously on different pier shafts

## Deh Cho Bridge – Developer’s Assessment Report

### Equipment, Labour & Traffic:

- .1 Mobilisation: Equipment: 12 B-trains, 1 80t crane, 4 pickups for the crew; Labour: 17 drivers.
- .2 Ice preparation: Equipment: 1 light bulldozer, 1 pickup truck equipped with auger; Labour: 3 local operators
- .3 Installation of pier shafts: Equipment: 1 80t mobile crane, 1 50 t mobile crane, 1 light bulldozer, 1 welding truck and 4 pickups for the crew; Labour: 5 local labourers and 13 operators/steel workers accommodated in Big River Motel.

### Schedule Pier Shafts:

#	Activity	Schedule		Labor (men)	Accomm. (man/day)		Traffic veh/day
		days	dates		Con.Camp	Other	
1	Mobilization	4	25 Feb- 01 Mar, 2006	17	-	68	9
2	Ice Preparation	30	01Feb-01 Mar, 2006	3		90	-
3	Installation of shafts	45	01 Mar- 15 Apr, 2006	18	-	810	-

### Fuel:

#	Activity	Diesel fuel (litres)	Gasoline (litres)
1	Mobilization	20,800	2,560
2	Ice Preparation	4,500	1,500
3	Installation of shafts	49,500	9,000
Totals		25,300	13,060

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

### .5 Abutments Construction: Construction of the bridge abutments is not “in-stream” activity. The work includes:

- .1 Mobilisation:
  - Material from ED, AB: 70,000 kg piles HP350; 40,000 kg rebar; 10,000 kg forming material
  - Equipment from YK, NT: 20,000 kg Hydraulic Crawler Drill; 50 t mobile crane; diesel hammer, concrete bucket, etc

Fuel consumption and traffic volume for Mobilization of Material will be increased by 20% to reflect Mobilisation and Demobilisation of Equipment.
- .2 Pile Driving:
  - Pre-drilling 32 holes (250 mm diameter) with hydraulic crawler drill deployed on top of partially completed approach embankment.
  - Driving 32 piles HP 350 to refusal in the till strata below the riverbed.
- .3 Placing concrete: Preparation, installation & removal of forming; installation of rebar, pouring and curing of 560 cu m concrete. Supply and delivery of concrete is accounted for in **item 4.iii.)** of this document. Placing of the concrete will be done in 2 phases:
  - Phase One: Placing 300 cu m (150 on each abutment) for pile cap, scheduled for summer 2005
  - Phase Two: Placing 260 cu m (130 on each abutment) for Back-wall and wing-walls, scheduled for summer 2006

## Deh Cho Bridge – Developer’s Assessment Report

### Equipment, Labour & Traffic:

- .1 Mobilisation: Equipment: 3 B-train truckloads from Edmonton (1,200 km); Labour: 3 operators, (6 man days in commercial accommodation)
- .2 Pile Driving: Equipment: 1 hydraulic crawler drill (2 days), 1 wheel crane-50t (7 days), 1 midsize loader (7 days), 1 welding truck (7 days); Labour: 5 operators (26 man days in Camp)
- .3 Placing concrete 2005: Equipment: 1 wheel crane-50t with concrete bucket (5 days), 1 midsize loader (5 days), 1 pickup for the crew (10 days); Labour: 3 labourers from Ft. Providence, 2 operators (10 man days in Camp) and 2 carpenters (20 man days in Camp).
- .4 Placing concrete 2006: Equipment: 1 wheel crane-50t with concrete bucket (5 days), 1 midsize loader (5 days), 1 pickup for the crew (10 days); Labour: 3 labourers from Ft. Providence, 2 operators (10 man days in Camp) and 2 carpenters (20 man days in Camp).

### Schedule Abutment Construction:

#	Activity	Schedule		Labor (men)	Accomm. (man/day)		Traffic veh/day
		days	dates		Con.Camp	Other	
1	Mobilization	7	01Aug- 07 Aug, 2005	3	-	6	7
2	Pile driving	7	07Aug- 14Aug, 2005	7	26	-	0
3	Placing concrete 2005	15	15Aug- 30Aug, 2005	7	30	42	0
4	Placing Concrete 2006	15	01 Jun - 14 Jun, 2006	4	30	42	0

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Mobilization	4,800	-
Pile driving	9,400	350
Placing concrete 2005	6,300	700
Placing Concrete 2006	6,300	700
Totals	26,800	1,750

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

- .6 Steel Superstructure Fabrication & Installation:** Fabrication and installation of the steel superstructure are not “in-stream” activities. However, during installation material and labour will be moved on and over the water body.

- Fabrication: The steel structure will be fabricated in a specialized shop in southern Canada. The total of 4,750,000 kg steel will be broken down into several hundred prefabricated truss panels, portal column sections, diaphragm panels, braces, rods, etc. The fabrication will be done within 12 months (March 2005-February 2006).
- Mobilization: All bridge material will be transported to the NT in approximately 180 truckloads by road. The largest transported section will not exceed 37 m in length, 4.5 m in width and 40,000 kg in weight.

Material for the four end spans on each side of the bridge will be delivered on site, offloaded and sorted on the bridge approaches and on the highway right-of-way on both sides of the river. Material for the main (centre) span will be delivered to the shipyard in Hay River.

The delivery of material will be done within 90 days between February and April 2006. Vehicles delivering material to the north side will cross the river on the ice road.

## Deh Cho Bridge – Developer’s Assessment Report

- Site Preparation & Offloading steel: This includes clearing the snow and levelling the areas for offloading the bridge components and the area of the approaches for the preassembly. The work will be done in stages in concert with the arrival of the material. Offloading will be done with a 150t crawler crane.
- Installation: The trusses for the four end spans on each side of the bridge will be fully preassembled and braced on the corresponding approaches and launched towards the center. For better deflection control during launching a 50 m long “launching nose” will be attached on the leading end of the truss. Assembly and launching will be completed within 60 days between March 01 and May 31, 2006.

The main span will be preassembled on a large barge in the Hay River shipyard, will be sailed to site and lifted into position with winches mounted on the cantilevered sections of the launched end spans. Installation of portals stays and main span will be done between June 07 and June 21, 2006, or earlier ice traffic permitting.

Two crews of 6 steel erectors will be working simultaneously on each side of the river. After completion the launching the same crews will assemble and install the portals the stays and the main span.

### Equipment, Labour & Traffic:

Mobilisation from Edmonton: Material: 180 truckloads bridge material; Equipment: 30 truckloads launching mechanisms, scaffolds, compressors, cables, tools, etc. 1 150t crawler crane (4 truck loads), 1 50t mobile crane and 6 pickups; Labour: 5 truck drivers in commercial accommodation.

Site Preparation & Offloading: Equipment: 1 150 t crawler crane, 1 light bulldozer and 2 pickup trucks; Labour: 3 local operator/labourers and 1 operator accommodated in Big River Motel.

Installation of 4,750,000 kg steel: Equipment: 2 150t crawler cranes, 2 mobile cranes, 2 large loaders, 6 pickups for the crew; Labour: 8 local labourers and 18 steel erectors and operators accommodated in Big River Motel.

### Schedule Steel Superstructure:

Schedule		Labor	Accomm. (man/day)		Traffic	
Activity	days	dates	(men)	Con.Camp	Other	veh/day
Mobilization	90	01 Feb- 30 Apr, 2006	5	-	450	5
Site prep. & Offloading	90	01 Feb- 30 Apr, 2006	4	-	360	-
Installation 4,750,000 steel	90	01 Mar - 31 May, 2006	26		2,340	-

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Mobilization	275,200	3,840
Site Preparation	58,500	4,500
Installation 4,750,000 steel	199,400	2,700
Totals	533,100	11,040

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

## Deh Cho Bridge – Developer’s Assessment Report

**.7 Bridge Deck Fabrication & Installation:** Fabrication and installation of the concrete deck are not “in-stream” activities. However, during installation material and labour will be moved over the water body.

- **Fabrication:** The pre-cast and pre-stressed concrete panels and curb elements will be fabricated in a specialised plant in Southern Canada. The deck panels are 11.5 m long, 2.5 m wide, with 0.3 m thickness. Each panel weights 21.5 tonnes. The curb elements are 5.0 m long, 1.0 m wide, with 0.45 m average thickness. Each curb element weights 5.6 t. The fabrication involves a total of 4,520 cu m concrete (11,300,000 kg). The fabrication will be done within 15 months (March 2005-June 2006).
- **Mobilization:** Deck panels will be transported, two at a time, on customized truck configurations. Curbs will be delivered on flat deck B-train trucks. The resulting 266 truckloads will be delivered within 90 days (3 truckloads per day) between March and May 2006. Vehicles delivering material to the north side will cross the river on the ice road. The delivered material will be offloaded and stacked on the highway right-of-way on both sides of the river. Offloading will be done with the 150 crane used for the offloading of the steel superstructure. Bridge railing, light posts, expansion joints, post-tensioning and grouting equipment and other miscellaneous will be delivered in 50 truckloads (3 truckloads per day) in the first two weeks of June 2006.
- **Installation:** Installation of the deck panels will proceed simultaneously from each end of the bridge towards the centre. The panels will be delivered to the deck on customized truck configurations and will be placed with 80 t mobile crane deployed on previously installed panels. After installation, the panels will be post-tensioned with specialized hydraulic jacks and will be grouted to the steel trusses. The work will be completed within 10 weeks between June 15 and August 31, 2006. One crew of ten men will be working on each side of the bridge.

Concrete curbs, handrails and bridge lights will be installed on both sides of the finished deck using 2 mid size loader and one 20t mobile crane. Installation will be completed between September 01 and October15, 2006 by 2 crews of 10 men.

### Equipment, Labour & Traffic:

Mobilisation from Edmonton: Material & Equipment: 316 truckloads; Labour: 6 truck drivers in commercial accommodation.

Installation of concrete deck: Equipment: 2 80t mobile cranes, 2 large loaders, 2 customized bed trucks, 6 pickups for the crew; Labour: 8 local labourers and 18 concrete installers & operators accommodated in Camp.

Installation of rail, lights & misc.: Equipment: 1 20t mobile crane, 2 midsize loaders, 6 pickups for the crew; Labour: 8 local labourers and 15 concrete installers & operators accommodated in Camp

### Schedule Bridge Deck:

Schedule			Labor	Accomm. (man/day)		Traffic
Activity	days	dates	(men)	Con.Camp	Other	veh/day
Mobilization	105	01Mar-15 Jun, 2006	6	-	630	6
Installation deck pannels	75	15 Jun-Aug 31,2006	24	1,350	600	-
Install curbs, rail, lights, etc	45	01 Sep-15 Oct, 2006	23	675	360	0

## Deh Cho Bridge – Developer’s Assessment Report

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Mobilization	505,600	-
Installation deck panels	210,000	22,500
Install curbs, rail, lights, etc	31,500	13,500
Totals	747,100	36,000

### ii.) Area for Construction Camp *Attachment 11*

This is an area of 15,000 sq m (150 m by 100 m) located on the south side of the river adjacent to the existing Ferry Camp at km 23+270 of Yellowknife HWY #3. Access from the highway is via 70 m long existing trail. The area is fairly flat and is vegetated with spruce and poplar trees.

Site Preparation: This includes removal of the trees from an area of 15,000 sq m (100 m by 150 m). The trees could be harvested by local residents, or burned. The overburden will be spread along the east limit of the area and landscaped. During the site preparation a portable “pump-out” toilet cell will be installed on site.

Description of the Camp: The Camp will consist of 6 specialized trailer units including kitchen, dining room, bathrooms & showers, laundry services, mechanical, storage, and 30 bed sleeping quarters in addition to the Camp personnel of 4. A 200 sq m light frame-canvas mechanical shelter will be installed in the area as well. Storages for fuel and lubricants will include:

#### Operation:

- Electric power for the camp will be supplied from the power plant that provides electricity for the adjacent Ferry Camp.
- Fresh water will be delivered from Fort Providence with specialized water truck and will be stored in 5,000 litres tank. Assuming 50 litres/man-day fresh water consumption and 90% average occupancy the daily demand for fresh water is calculated at 1,600 litres.
- Sewage will be collected in a 10,000 litres sewage tank, will be pumped out with specialised truck and will be discharged in the Ft. Providence sewage lagoon.
- Food supplies will be delivered to camp with a truck from Hay River.
- It is not anticipated any significant fuel consumption in the Camp. There will be not fuel storage in the camp area.
- Solid organic wastes will be incinerated on site. Non-organic wastes estimated at 1,500 kg per month containerised and transported to Pt. Providence landfill area for disposal.
- Water supply, sewage removal, catering services and garbage disposal will be contracted out to professional outfits.

Personnel: Full time camp personnel include 1 Chef, 1 helper cook, 1 maintainer/mechanic and 1 camp Manager. 3 part-time workers residing in Ft. Providence will provide additional kitchen help and room cleaning services.

Operating Schedule: The Camp will be in operation for 10 months (June-October 2005 and June-October 2006) and will be able to provide accommodation services for a total of 9,000 man-day. Contractor’s personnel working in the winter as well as overflow workers during the summer months will be accommodated in the Big River Motel, 7 km to the north of the bridge sit.

## Deh Cho Bridge – Developer’s Assessment Report

**Demobilization:** After closing of the Camp all facilities and inventory will be removed from site. The remaining debris will be incinerated or disposed off in environmentally friendly manner. The area will be thoroughly cleaned from any foreign objects and landscaped.

### Schedule

The Land Use Permit for the **Area for Construction Camp** is required for the period between **October 01, 2004** and **October 30, 2006**.

#	Schedule		Labor (men)	Accomm. (man/day)		Traffic veh/day	
	Activity	days		dates	Con.Camp		Other
1	Site Preparation	21	01 Oct- 21 Oct 2004	6		126	4
2	Mobilization	15	15 May-30 May 2005	6		90	4
3	Operation 2005	150	01 Jun -30 Oct, 2005	27	4,050		2
4	Operation 2006	150	01 Jun -30 Oct, 2006	27	4,050		2

### Summary operation Construction Camp:

Calculated average occupancy 90% for the duration of 10 months

Item	unit	daily	10 months
		Quantity	Quantity
Provided accommodation	man-day	27	8,100
Provided local employment	man-day	6	1,800
Fuel consumption	litres	120	36,000
Fresh water consumption	litres	1,400	420,000
Waste water disposal	litres	1,400	420,000
Solid waste disposal	kg	50	15,000
Traffic generated	veh	2	600

**Impact on the Community:** The camp will generate 5 full time or part-time employments for the residents of Ft. Providence.

The impact on the municipal services (fresh water plant, sewage lagoon and garbage dump) the operation of the camp would equivalent to an increase of the Ft Providence population by less than 5% for the duration of 10 months.

### iii.) Two Areas for construction and operation of Temporary Concrete Plants

*Attachment 11 & Attachment 12*

Two areas, one on each side of the river, are designated for Temporary Concrete Plants. The Primary Concrete Plant will be set on the north side of the river at km 30.2 HWY #3, approximately 6.0 km from the bridge site. The Secondary Plant is optional depending to the Contractor’s work plan. If required, it will be set on the south side of the river, at 23+270 HWY #3, less than 1 km from the bridge site. Both sites are located near existing sources of electric power.

- **The Primary Concrete Plant (North Plant), km 30.2 HWY #3** will be constructed on an area of 5,600 sq m (70 m by 80 m). Access from the highway is via 20 m long existing trail. The area is cleared of trees and it appears to have been partially levelled and covered with gravel in the past. Presently it is vegetated with grass and second-growth shrubs.
- **The Secondary Concrete Plant (South Plant) km 23+270 HWY #3** will be constructed on an area of 5,600 sq m (70 m by 80 m) adjacent to the South Borrow Area and will share the same access from the highway. The area is vegetated with fairly large spruce and poplar trees.

## Deh Cho Bridge – Developer’s Assessment Report

### Capacity of the Plants

The total demand for cast in place concrete is 13,000 cu m, required for the construction of the piers, the abutments and other smaller bridge components. This concrete will be produced in approx. 30 reprises distributed almost evenly between early June and mid October 2005. Each plant will be able to produce in excess of 50 cu m concrete per hour and to maintain this rate of production for a period of not less than 15 hours.

### Description of the Plants

Technologically both plants will most likely be identical. Since they would not need to be operated simultaneously, the contractor may choose to move some of the specialized plant components from one plant to the other, depending on the location of the corresponding demand for concrete.

Each Concrete Plant will be operated with electric power and will consist of 3 mixer-truck stalls, 3 aggregate scales, 3 @ 70 cu m cement-silos, 3 @ 50 cu m water tanks and systems of hoppers and elevator belts. On the area surrounding the plant there will be a mechanical trailer, an office trailer equipped with pump-out toilet and not less than 3,000 cu m stockpiled concrete aggregates. For operation in temperature near or below zero (October) some of the plant components might need to be hoarded and the water and aggregates, heated.

### Site Preparation

- North Plant: Includes partial grubbing, levelling and covering the area with a layer of gravel. The removed overburden will be spread along the north limit of the area and landscaped.
- South Plant: Development of this site is included in the Site Preparation of the South Borrow Area.

Mobilisation & Setup: Includes installation of all mechanical components of the Plants and test run. Vehicle traffic involved in the mobilization is not accounted for, since it is considered a negligible contribution to the total amount of traffic generated by the Concrete Plants activity.

Material Supply: Includes and supply of ingredient materials for concrete production including:

- 4,600 t bulk cement delivered from Edmonton
- 2,600 cu m mixing water delivered from the water treatment plant in Ft Providence
- Supply of 16,000 cu m concrete aggregates is accounted for in **item 4 .x**) of this document.

Operation & Transportation: Includes production and delivery of 13,000 cu m concrete from the concrete plant to the location of the corresponding pour on the bridge site. Over 97% of the concrete will be produced in summer 2005. The remaining less than 3% will be produced in summer 2006. This later is considered to generate negligible amount of activity and is omitted in the construction schedule.

Demobilisation: Includes dismantling of the mechanical components and landscaping of the areas.

### **Equipment, Labour & Traffic:**

- Site Preparation: Equipment: 1 large size bulldozer equipped with ripper, 1 large size loader and 3 pickup trucks for the crew. Labour: Crew of 6 residents of Ft. Providence and 2 operators.



## Deh Cho Bridge – Developer’s Assessment Report

- **Mobilisation:** Equipment: 2 large size loaders, 50 t crane and 3 pickups for the crew. Labour: Crew of 2 residents of Ft. Providence and 6 operators accommodated in Big River Motel.
- **Material Supply:** B-train trucks of capacity 40 t bulk cement, water-truck with 15 cu m tank: Traffic: Cement -115 loads from Edmonton, average 1 load/day; Water -180 loads from Ft. Providence, average 1.5 loads/day. Labour: 2 B-train drivers
- **Operation & Transportation:** Equipment: 9 trucks concrete-mixers (a mixer will make one round trip per hour and will carry 6 cu m concrete per trip), 3 mid size loaders and 3 pickup trucks for the crew. Traffic: total 2,170 loads of concrete; average 18 loads per/day from plant to bridge; Labour: 2 labourers from Ft. Providence and crew of 18 accommodated in Camp (9 drivers, 6 plant operators, 3 loader operators)
- **Demobilisation:** Equipment: 2 large size loaders, 50 t crane and 3 pickups for the crew; Labour: 6 labourers from Ft. Providence and 6 operators accommodated in Camp.

### Schedule

The Land Use Permit for the **Two Areas for Temporary Concrete Plants** is required for the period between **March 01, 2005** and **October 30, 2006**.

#	Schedule		Labor		Accommodation (man/days)		Traffic
	Activity	days	dates	(men)	Constr.Camp	Other	veh/day
1	Site Prep (2 sites)	15	01 Oct -14 Oct, 2004	8	0	120	6
2	Mobilization	15	15May -30 May,2005	8	0	120	0
3	Material Supply						
	Cement: Edm-North Plant	70	01 Jun - 08 Aug 2005	2	0	140	2
	Cement: Edm-South Plant	70	09 Aug - 20 Oct 2005	2	0	140	2
	Water: Edm-North Plant	70	01 Jun - 08 Aug 2005	1	0	70	2
	Water: Edm-South Plant	70	09 Aug - 20 Oct 2005	1	0	70	2
4	Operat&Transp						
	Conc.Delivery: N Plant-Bridge	70	01 Jun - 08 Aug 2005	20	1260	140	36
	Conc.Delivery: S Plant-Bridge	70	09 Aug - 20 Oct 2005	20	1260	140	36
5	Demobilization	2	01 Oct -15 Oct 2006	8	0	120	0

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Site Prep (2 sites)	23,800	2,100
Mobilization	26,600	2,100
Mateial Supply	175,000	-
Operation & Transp.	46,800	18,000
Demob	26,600	2,100
Totals	298,800	24,300

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling of heavy equipment will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

#### iv.) Two Areas for temporary storage and parking

*Attachment 11*

These areas are located on the north side of the river, adjacent to the highway right-of-way near km 25+700 of the Yellowknife HWY #3. Both areas are levelled, covered with gravel, and have dimensions of 40 m by 110 m (4,400 sq m) and 50 m by 300 m (15,000 sq m) respectively.

## Deh Cho Bridge – Developer’s Assessment Report

These areas are readily available for parking of vehicles and construction equipment, also for storage of clean construction materials including structural steel, pre-cast concrete elements, structural timber, gravel, etc. No fuel, lubricants or other substances harmful to aquatic life will be stored on these areas.

The Land Use Permit for the Two areas for temporary storage is required for the period between **March 01, 2005** and **September 30, 2007**.

### v.) **Reclamation Areas related to removal of existing ferry infrastructure**

*Attachment 7 & Attachment 11*

The infrastructure related to the ferry operation will not be needed after completion of the bridge. As owner of the infrastructure the GNWT is responsible for its removal and reclamation of the corresponding lands. In agreement with the GNWT the DCBC accepted to participate in the reclamation only for the facilities affecting the construction of the bridge. Following is a list of the ferry facilities and description of the reclamation works corresponding to the DCBC:

#### Ferry Camp and Power Plant

These facilities occupy an area of approx 15,000 sq m (100 m x 150 m) located near km 23+200, HWY #3. They do not affect the construction of the bridge, and their removal remains with the GNWT. However, upon agreement with the GNWT, the DCBC may use electric power from the power plant during the bridge construction.

#### North and South Causeways

Both Causeways lay within the footprints of the proposed bridge approaches. Material on the causeways will not be excavated, but will be covered with backfill as described in **item 2.7** of this document.

#### North Ferry Landing, South Ferry Landing & Ferry Haul-out

These facilities are located within the watercourse, adjacent to the Construction Corridor and affect the bridge construction. As part of the reclamation, backfill material and structural components will be removed from the watercourse. All material will be removed to the elevations of the adjacent natural riverbed found between 2.0 m to 4.0 m below the water level. Equipment involved in this work will be not be deployed in the water.

It is possible that the areas of these facilities are contaminated with hydrocarbons or other harmful to the fish habitat materials. In order to establish if any contaminants are present, the GNWT Department of Transportation has commissioned a study with the environmental consultant Dillon Consulting Ltd. It is noted that it will be Department’s liability should any contaminants are found.

It is anticipated that the reclaimed areas will attract aquatic life within one to two years. Detailed plan for monitoring the recovery could be found in the Appendix 14: Fisheries Assessment of Mackenzie River, Proposed Deh Cho Bridge, prepared by Golder Associates.

The areas subject to reclamation are identified on Attachment #7 and could be described as follows:

- Area “E” (4,300 sq m) comprising the North Ferry Landing: This area is projected into the watercourse 80 m beyond the north 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. In order to accommodate equipment working on the reclamation a Land Use Permit for a larger area of 9,100 sq m is required.

## Deh Cho Bridge – Developer’s Assessment Report

- Area “D” (9,500 sq m) comprising the South Ferry Landing and the Ferry Haul-out: This area is located on the downstream side of the south 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. In order to accommodate equipment working on the reclamation a Land Use Permit for a larger area of 24,000 sq m is required.

The work on both sides will be carried out consecutively, commencing with the North Area.

Preparatory Work: The concrete aprons will be demolished into fragments suitable for loading, transportation and disposal. The steel sheet-pile wall will be extracted and cut/sorted for transportation. The timber of the haul-out will be dismantled and sorted/stacked for transportation. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Excavation of 20,000 cu m granular material: Material excavated below water level will be piled to drain before transportation. Material above the water level could be loaded directly.

### Transportation & Disposal:

- The excavated granular will be disposed of and landscaped in the North and South Borrow Areas, within 1 km from the corresponding ferry landings.
- The concrete fragments will be buried in the Borrow Areas and the gravel cover landscaped
- The steel will be transported to a smelter in Edmonton (1,200 km) and sold for scrap iron.
- Over 80% of the timber will be salvaged and stacked in the South Borrow Area for use by the GNWT on other ferry landings. The remaining fragments will be piled and burned on site.

### **Equipment Labour & Traffic:**

- Preparatory Work: Equipment: 1 large excavator equipped with bucket and concrete jack-hammer, 1 large size loader, 1 welding truck and 3 pickup trucks; Labour: local crew of 6 men from Ft Providence; 4 operators accommodated in the Big River Motel.
- Excavation of 20,000 cu m granular: Equipment: 1 large excavator, 1 large loader equipped with forks and bucket, and 3 pickup trucks; Labour: local crew of 6 men from Ft Providence; 2 operators accommodated in the Big River Motel.
- Transportation & Disposal: of 20,000 cu m granular & concrete debris: Equipment: 1 large loader, 1 large bulldozer (in the pit), 1 pickup truck for the crew, and 3 trucks-semi trailers with 15 cu m boxes or articulated dump trucks of similar capacity. The travel distance of approx 1 km will result in 20 min round trip for each truck. Assuming 10 hour workday the resulting traffic volume will be 90 truck trips per day in each direction for the duration of 2 weeks. Labour: 5 operators accommodated in the Big River Motel.
- Transportation of 30,000 kg scrap iron: Equipment: 1 B train-flat bed; Labour: 1 driver accommodated in commercial accommodation.

### **Schedule:**

The Land Use Permit for these **Reclamation Areas** is required for the period between **July 01, 2007** and **September 30, 2007**.

## Deh Cho Bridge – Developer’s Assessment Report

Activity	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
1 Preparatory work	7	01Aug -07Aug, 2007	10	0	70	8
2 Excav.20,000 cum granular Transportation	14	08Aug -22Aug, 2007	8	0	120	0
3 Bridge to N Borrow Area	7	08Aug -14Aug, 2007	5	0	35	180
4 Bridge to S Borrow Area	7	015Aug -22Aug, 2007	5	0	35	180
5 Transp. 30 t scrap iron	2	10Aug -11Aug, 2007	1	0	4	1

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Preparatory work	5,600	1,050
Excav.20,000 cum granular	11,200	2,100
Tranp.21,000 cum material	33,600	700
Transp. 30 t scrap iron	1,500	-
<b>Totals</b>	<b>51,900</b>	<b>3,850</b>

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

**vi.) Mackenzie HWY #1, km 188.5 – Proposed Limestone Quarry** *Attachment 13*  
(Also known as HWY #1, km 191-east)

Large limestone deposit is located 2 km to the south of km 188.5, Mackenzie HWY #1. The parcel identified for development is situated on the north slope of 20 m high hill. The area is vegetated with 6” to 10” diameter spruce trees. On top of the hill there is a forest-fire monitoring tower and a helicopter pad installed on a large clearing. There is an existing trail in good condition leading to this area.

Site Preparation includes removal of the trees and the thin layer of organic overburden from an area of 20,000 sq m (100 m by 200 m). The trees could be harvested by local residents, or burned. The overburden will be spread along the east limit of the area and landscaped. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production of 40,000 cu m limestone will be done by drilling and blasting. The produced material will be used as follows:

- 8,600 cu m for the ‘in water’ base of detour on the North Approach
- 6,800 cu m for widening the ‘in water’ base of the North Approach
- 16,500 cu m for extension the ‘in water’ base of the South Approach
- 6,800 cu m for dressing the shoulders of the North and South Approaches

#### Transportation

- The 15,400 cu m limestone destined for the North Approach will be transported immediately after production using the ice crossing.
- The 16,500 cu m will be left on site to be transported to the South Approach later in summer according to schedule.
- One half of the remaining 6,800 cu m destined to the north side will be transported across the river on the shuttle barge contracted to maintain the barge-bridge.

## Deh Cho Bridge – Developer’s Assessment Report

### Equipment Labour & Traffic:

- Site Preparation: Equipment: 1 large bulldozer equipped with ripper, 1 medium loader and 3 pickup trucks for the crew; Labour: A crew of 6 residents of Ft. Providence and 2 equipment operators accommodated in the Big River Motel near Ft Providence.
- Production of 40,000 cu m rock: Equipment: 2 hydraulic crawler drills, 1 trailer for explosives, 1 strong box for primers, and 2 pickup trucks for the crew; Labour: 4 operators accommodated in Big River Motel.
- Transportation of 15,400 cu m rock (8,600 cu m+6,800 cu m) to the North Approach: Equipment: 1 large excavator, 8 trucks-semi trailers with 15 cu m boxes, and 1 pickup. The distance to the North Side is approx 30 km, which will result in 1 ¼ hour round trip for each truck. Assuming 12 hour workday the resulting traffic volume will be 80 truck trips per day in each direction for the duration of 2 weeks; Labour: 8 operators accommodated in Bid River Motel.
- Transportation of 16,500 cu m rock to the South Approach: Equipment: 1 large excavator, 8 trucks-semi trailers with 15 cu m boxes and 1 pickup. The distance from the quarry to the South Side is approx 25 km, which will result in 1 hour round trip for each truck. Assuming 10 hour workday the resulting traffic volume will be 80 truck trips per day in each direction for the duration of 2 weeks; Labour: 9 operators accommodated in Camp.
- Transportation of 6,800 cu m rock to the bridge site: Equipment: 1 large excavator, 8 trucks-semi trailers with 15 cu m boxes and 1 pickup. The distance to the bridge site is approx. 25 km, which will result in 1 hour round trip for each truck. Assuming 10 hour workday the resulting traffic volume will be 80 truck trips per day in each direction for the duration of 6 days; Labour: 9 operators accommodated in Camp.

### Schedule:

The Quarry Permit for extraction of 40,000 cu m rock from **Mackenzie HWY #1, km 188.5 – Proposed Limestone Quarry** is required for the period between **October 01, 2004** and **October 31, 2006**.

Activity	days	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
		dates			Constr.Camp	Other	
1 Site Preparation	7	16 Oct-	23 Oct, 2004	8	0	14	6
2 Produce 40,000 cum rock	14	16 Mar-	31Mar, 2005	4	0	60	0
Transportation							
3 15,400cum: Quarry-N Appr	14	23 Mar-	07 Apr, 2005	9	0	135	160
4 16,500cum: Quarry-S Appr	14	08 Jul -	23 Jul, 2005	9	135	0	160
5 6,800cum: Quarry-bridge	7	23Aug -	31Aug, 2005	9	70	0	160

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Site preparation	9,600	1,200
Production of 40,000 cu m rock	18,000	400
Transportation of 15,400 cu m rock	54,000	700
Transportation of 6,800 cu m rock	25,000	350
Transportation of 16,500 cu m rock	52,000	700
Totals	158,600	3,350

## Deh Cho Bridge – Developer’s Assessment Report

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

**vii.) Mackenzie HWY #1, km 188.5 – Existing Gravel Pit** *Attachment 13-*  
(This pit is also known as HWY #1, km 191-east)

The area proposed for development is located 600 m to the east of the Limestone Quarry described in **Item vi.)** of this document. This area is part of larger section reserved for development of granular source by the GNWT Department of Transportation. The area is fairly flat, vegetated with 6” to 10” diameter spruce trees. The material in this area is coarse gravel mixed with pebble and cobbles of limestone origin.

Site Preparation includes removal of the trees and the thin layer of organic overburden from an area of 25,500 sq m (300 m by 85 m). The trees could be harvested by local residents, or burned. The overburden will be spread along the east limit of the area and landscaped. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production of 16,000 cu m pit-run gravel will be completed by ripping and scraping the ground to a depth of 1.2 m below the average surface level. The pit-run gravel will be used as follows:

- 700 cu m (2@350) for structural backfill behind the abutments
- 5,900 cu m will be used for Sub-base on the North Approach
- 1,900 cu m for surfacing the camp area, the concrete plant area and for other misc. purposes
- 6,500 cu m will be crushed, screened and stockpiled in different fractions, to be used for:
  - 2,100 cu m for base material on the North Approach
  - 2,600 cu m for base material on the South Approach
  - 800 cu m for surfacing and maintaining the detours
  - 1,000 cu m (after screening) for chip-sealing of the bridge approaches.

### Transportation:

The structural backfill for abutments will be delivered in July 2006 after completion concrete for abutments. The 350 cu m for the north abutment will be moved across the river on the shuttle barge.

The pit-run gravel for sub-base of the north side will be delivered for placement in late summer 2006 using the bridge. The material for chip-sealing will be delivered for placing in August 2007 after completion the gravel haul for the Reclamation Areas.

### **Equipment, Labour & Traffic:**

- Site Preparation: Equipment: 1 large size bulldozer equipped with ripper, 1 midsize wheeled loader and 2 pickup trucks for the crew; Labour: A crew of 6 residents of Ft. Providence and 2 operators accommodated in Camp.
- Production of 15,000 cu m pit-run gravel: Equipment: 1 large bulldozer equipped with ripper, 1 midsize loader and 1 pickup truck for the crew; Labour: 2 operators accommodated in Camp.
- Crushing of 6,500 cu m gravel: Equipment: 1 midsize crusher, 1 midsize loader and 2 pickups for the crew. Labour: 4 operators accommodated in Camp.
- Transportation of 700 cu m structural backfill: Equipment: 4 trucks-semi trailers with 15 cu m boxes, 1 mid size loader and 1 pickup truck. The travel distance of approx 30 km will result in 2 hour round trip for each truck. Assuming 12 hour workday the resulting traffic volume will be 24 truck trips per day in each direction for the duration of 2 days. Labour: 5 operators accommodated in Camp.

## Deh Cho Bridge – Developer’s Assessment Report

- Transportation of 10,600 cu m gravel (5,900 for Sub-base N, 2,100 for base N and 2,600 for base S): Equipment: 8 trucks-semi trailers with 15 cu m boxes, 1 mid size loader and 1 pickup truck. The travel distance of approx 24 km will result in 45 min round trip for each truck. Assuming 10 hour workday the resulting traffic volume will be 104 truck trips per day in each direction for the duration of 7 days. Labour: 9 operators accommodated in Camp.
- Transportation of 2,700 cu m gravel (1,900 for surfacing misc. and 800 for detours): This gravel will result in 180 truck loads material that will be used in small volumes on “as & when” required basis throughout the 10 months construction period and will generate only negligible amount of daily traffic.
- Transportation of 1,000 cu m chips: 3 tandem trucks with 15 cu m boxes, 1 midsize loader and 1 pickup truck. The average distance to the bridge site is approx. 25 km, which will result in 1 hour round trip for each truck. Assuming 11 hour workday the resulting traffic volume will be 33 truck trips per day in each direction for the duration of 2 days.

### Schedule:

The Quarry Permit for extraction of 16,000 cu m gravel from **Mackenzie HWY #1, km 188.5 – Existing Gravel Pit** is required for the period between **October 01, 2004** and **October 31, 2007**.

Activity	Schedule		Labor (men)	Accommodation(man/day)		Traffic veh/day
	weeks	dates		Constr.Camp	Other	
Site Preparation	1	23 Jun -31 Jun 2005	8	14	42	6
Produce 15,000 cum grav.	2	01 Jul -15 Jul 2005	2	30	0	0
Crush. 6,000 cum gravel	1	16 Jul -21 Jul 2005	4	28	0	0
Transp. 12,000 cum grav.	2	01 Mar -15 Mar 2006	9	135	0	128
Transp. 9,000 cum grav.	2	01 Aug -15 Aug 2006	4	60	0	180
*Transp. 6,000 cum crush	1	01 Sep -07 Sep 2006	5	0	35	150

\* The 6,000 cum crush is the combined volume transported to the North and South Approaches.

### Fuel:

#	Activity	Diesel fuel (litres)	Gasoline (litres)
1	Site Preparation	7,700	700
2	Produce 15,000 cum grav.	16,800	700
3	Crush. 6,500 cum gravel	16,300	350
4	Transp. 700 cum str bkfill abtm	4,200	100
5	Transp. 10,600 cum grav.	25,900	350
6	Transp. 1,000 cum chips	3,740	100
		74,640	2,300

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

### viii.) Yellowknife HWY #3, km 23+270 – Proposed South Borrow Area Attachment 11

The proposed area is located 200 m to the west of km 23+270, Yellowknife HWY #3, adjacent to the access road leading to the CCG docking facility. The deposit of sandy-silty clay is found on a flat area elevated an average of 1.0 m above the road elevation. The area is vegetated with fairly large spruce and poplar trees. Test holes excavated randomly in the area indicate that the

## Deh Cho Bridge – Developer’s Assessment Report

material is dense with little or no evidence of underground water. However, during operation of the pit, provision will be made to dewater the rain-water by pumping.

After completion of the bridge construction part of the excavated pit will be used for disposal of the material removed from the Reclamation Area #2 as specified above in **Item 4.v.)**

Site Preparation: This includes removal of the trees and the layer of organic overburden from an area of 32,000 sq m. The trees could be harvested by local residents, or burned. The overburden will be spread in a layer along the south limits of the corresponding areas and landscaped. A 30 m wide strip of undisturbed forest will be left between the road and the borrow area. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production & Transportation: Production of 38,000 cu m pit-run material involves ripping, pushing and stockpiling. The ground will be cut to a depth of 2.0 m below the average surface elevation. The excavated material will be used for common backfill in the embankment construction of the South Approach embankment. The material will be produced and transported for placement in the embankment in two phases:

- Phase One: 26,000 cu m placed to the elevation of the bridge bearing seats will be placed before the installation of the bridge superstructure.
- Phase Two: 12,000 cu m placed to the final sub-grade elevation before the installation of the concrete deck panels.

### **Equipment, Labour & Traffic:**

- Site Preparation: Equipment: 1 large size bulldozer equipped with ripper, 1 midsize loader and 2 pickup trucks for the crew; Labour: A crew of 6 residents of Ft. Providence and 2 operators accommodated in Camp.
- Production of 26,000 cu m common fill: Equipment: 1 large bulldozer equipped with ripper; Labour: 1 operator accommodated in Camp.
- Production of 12,000 cu m common fill: Equipment: 1 large bulldozer equipped with ripper; Labour: 1 operator accommodated in Camp.
- Transportation of 26,000 cu m common fill: Equipment: 3 trucks-semi trailers with 15 cu m boxes or articulated dump trucks of similar capacity, 1 midsize loader and 1 pickup. The travel distance of approx 1 km will result in 20 min round trip for each truck. Assuming 10 hour workday and some standby required for placing the material the resulting traffic volume will be 80 truck trips per day in each direction for the duration of 3 weeks. Labour: 4 operators accommodated in Camp.
- Transportation of 12,000 cu m common fill: Equipment: 3 trucks-semi trailers with 15 cu m boxes or articulated dump trucks of similar capacity, 1 midsize loader and 1 pickup truck. The travel distance of approx 1 km will result in 20 min round trip for each truck. Assuming 10 hour workday and some standby required for placing the material the resulting traffic volume will be 45 truck trips per day in each direction for the duration of 2 weeks; Labour: 4 operators accommodated in Camp.

### **Schedule:**

The Quarry Permit for extraction of 40,000 cu m material from the **South Borrow Area** is required for the period between **October 01, 2004** and **October 31, 2007**.



## Deh Cho Bridge – Developer’s Assessment Report

Activity	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
Site Preparation	15	01Oct -15 Oct 2005	8	0	120	6
Produce 26,000 cum fill	14	01Aug-14 Aug 2005	1	15	0	0
Transp. 26,000 cum fill	21	01Aug-21 Aug 2005	4	90	0	160
Produce 12,000 cum fill	7	01 Jun -07 Jun 2006	1	7	0	0
Transp. 12,000 cum fill	15	01 Jun -15 Jun 2006	4	60	0	90

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Site Preparation	15,400	1,400
Produce 26,000 cum fill	9,800	-
Transp. 26,000 cum fill	33,600	1,050
Produce 12,000 cum fill	4,900	-
Transp. 12,000 cum fill	22,400	700
Totals	86,100	3,150

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

### ix.) Yellowknife HWY #3, km 26+240– Proposed North Borrow Area *Attachment 11*

The proposed area is located 80 m to the north of km 26+240, Yellowknife HWY #3. The deposit of sandy-silty clay is found on a flat area slightly elevated above the road grade. The area is vegetated with fairly large spruce and poplar trees. Test holes excavated randomly in the area indicate that the material is dense with little or no evidence of underground water. However, during operation of the pit, provision will be made to dewater the rain-water by pumping.

After completion of the bridge construction part of the excavated pit will be used for disposal of the material removed from the Reclamation Area #1 as specified above in **Item 4.v.)**

Site Preparation includes removal of the trees and the layer of organic overburden from an area of (23,400 sq m (130 m by 180 m). The trees could be harvested by local residents, or burned. The overburden will be grubbed, spread in a layer along the east limit of the area and landscaped. A 50 m wide strip of undisturbed forest will be left between the road and the borrow area. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production of 53,000 cu m pit-run material involves ripping, pushing and stockpiling. The ground will be cut to a depth of 2.5 m below the average surface elevation. The excavated material will be used for common backfill in the embankment construction of the North Approach embankment. The material will be produced and transported for placement in the embankment in two phases:

- Phase One: 41,000 cu m placed to the elevation of the bridge bearing seats will be placed before the installation of the bridge superstructure.
- Phase Two: 12,000 cu m placed to the final sub-grade elevation before the installation of the concrete deck panels.

## Deh Cho Bridge – Developer’s Assessment Report

### Equipment Labour & Traffic:

- Site Preparation: Equipment: 1 large size bulldozer equipped with ripper, 1 midsize wheeled loader and 2 pickup trucks for the crew; Labour: a crew of 6 residents of Ft. Providence and 2 operators accommodated in Camp.
- Production of 41,000 cu m common fill: Equipment: 1 large bulldozer equipped with ripper and 1 pickup truck for the crew; Labour: 1 operator accommodated in Camp.
- Transportation of 41,000 cu m common fill: Equipment: 3 trucks-semi trailers with 15 cu m boxes or articulated dump trucks of similar capacity, 1 midsize loader and 1 pickup truck for the crew. The travel distance of approx 1 km will result in 20 min round trip for each truck. Assuming 10 hour workday and some standby required for placing the material the resulting traffic volume will be 90 truck trips per day in each direction for the duration of 4 weeks; Labour 4 operators accommodated in Camp.

Production of 12,000 cu m common fill: Equipment: 1 large bulldozer equipped with ripper and 1 pickup truck for the crew; Labour: 1 operator accommodated in Camp.

- Transportation of 12,000 cu m common fill: Equipment: 3 trucks-semi trailers with 15 cu m boxes or articulated dump trucks of similar capacity, 1 midsize loader and 1 pickup truck for the crew. The travel distance of approx 1 km will result in 20 min round trip for each truck. Assuming 10 hour workday and some standby required for placing the material the resulting traffic volume will be 45 truck trips per day in each direction for the duration of 2 weeks; Labour: 4 operators accommodated in Camp.

### Schedule:

The Quarry Permit for extraction of 55,000 cu m material from the **North Borrow Area** is required for the period between **October 01, 2004** and **October 31, 2007**.

Activity	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
1 Site Preparation	15	16 Oct -30 Oct 2004	8		120	6
2 Produce 41,000 cum fill	30	16 Jun -15 Jul 2005	1	30	0	0
3 Transp. 41,000 cum fill	30	16 Jun -15 Jul 2005	4	90	0	180
4 Produce 12,000 cum fill	7	01 Jun -07 Jun 2006	1	7	0	0
5 Transp. 12,000 cum fill	15	01 Jun -15 Jun 2006	4	60	0	90

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Site Preparation	15,400	1,400
Produce 41,000 cum fill	21,000	-
Transp. 41,000 cum fill	48,000	1,500
Produce 12,000 cum fill	4,900	-
Transp. 12,000 cum fill	22,400	700
Totals	111,700	3,600

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

x.) **Yellowknife HWY #3, km 87 – Gravel Pit for Concrete Aggregate** *Attachment 14*

This is an existing, large gravel pit located 500 m to the west of km 87.0, Yellowknife HWY #3. The area proposed for development is located on the south-east section of the pit immediately behind the existing communication tower. The area is moderately undulated. Part of it is sparsely vegetated with spruce trees and is covered with thin organic layer.

The material in this area consists of well graded gravel, clean of silt, with constituents ranging from fine sands to 3” diameter cobbles. Lab tests of several samples collected from different sections of the area indicated suitability for concrete aggregates.

Site Preparation: All trees and the layer of organic overburden will be removed from an area of (7,200 sq m (120 m by 60 m). The trees could be harvested by local residents, or burned. The overburden will be grubbed, spread in a layer along the west limit of the area and landscaped. The crusher will be setup and tested. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production of 21,000 cu m gravel involves ripping, pushing and stockpiling. The ground will be cut to a depth of 1.5 m below the average surface elevation. The excavated gravel will be crushed, screened and sorted by size of aggregates in three or four stockpiles.

Transportation: Approx. 16,000 cu m of the sorted aggregates will be transported to the Temporary Concrete Plant located at km 30.2, HWY #3. In case the contractor decides to set a second concrete plant on the south side of the river, part of the aggregates will have to be transported there directly from the gravel pit. The land reserved for second concrete plant is located at 23+270, HWY #3. The difference in distance between the gravel pit and each of the concrete plant sites is negligible.

**Equipment Labour & Traffic:**

- Site Preparation: Equipment: 1 large bulldozer equipped with ripper, 1 midsize loader, 1 mid size crusher, camp trailer and 3 pickups for the crew; Labour: A crew of 4 residents of Ft. Providence; 5 operators accommodated in Big River Motel.
- Production of 21,000 cu m crushed gravel: Equipment: 1 large bulldozer equipped with ripper, 1 midsize loader, 1 mid size crusher with 3 dedicated operators and 2 pickup trucks for the crew; Labour: 4 operators accommodated in the Big River Motel.
- Transportation 16,000 cu m aggregates: Equipment 3 truck-semi trailers with 15 cu m boxes and 1 midsize loader. The distance from the Gravel Pit to the Concrete Plant is approx 65 km, which will result in 2 hour round trip for each truck. Assuming 10 hours workday the resulting traffic volume will be 15 truck trips per day in each direction for the duration of 10 weeks; Labour: 2 operators accommodated in the Big River Motel.

**Schedule: Labour & Camp**

The Quarry Permit for extraction of 23,000 cu m material from **Yellowknife HWY #3, km 87 – Gravel Pit for Concrete Aggregate** is required for the period between **May 01, 2004** and **October 31, 2006**.

## Deh Cho Bridge – Developer’s Assessment Report

Activity	Schedule		Labor (men)	Accommodation (man day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
1 Site Preparation	7	24 May -31May 2005	9	0	63	6
2 Produce 21,000 cum crush	21	01 Jun -21 Jun 2005	6	0	126	0
3 Transp. 16,000 cum aggreg	70	07 Jun -21 Aug 2005	4	0	280	30

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Site Preparation	7,700	1,050
Produce 21,000 cum crush	93,240	2,100
Transp. 16,000 cum aggregates	120,000	-
Totals	220,940	3,150

Fuel will be delivered on site by local contractor using specialized fuel truck. Fuel will be stored on site in 5,000 gallons self contained “enviro-tank”. Re-fuelling will be taking place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

### xi.) Yellowknife HWY #3, km 156 – Existing Grey Limestone Quarry Attachment 15

This is an existing rock quarry located 50 m to the west of km 156, Yellowknife HWY #3. The rock in this quarry consists of laminated grey limestone that breaks into 4” to 24” material after blasting. The existing pit is nearly 20,000 sq m (90 m by 220 m) with depth in excess of 4.0 m. An estimated 80,000 cu m rock has been extracted from this pit for the reconstruction of the highway.

The rock will be used for construction of upstream berm on the South Causeway extension (1,800 cu m) and for placing around the pier footings for scour protection (7,200 cu m).

Site Preparation & Production: Includes: Improvement of the access to the blasting area. Equipment and labour is accounted for in the Production phase. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production: The required 9,000 cu m rock will be produced by drilling and blasting from 2,400 sq m area (60 m by 40 m) located on the north east corner of the pit.

Transportation: 3,600 cu m of the produced rock will be transported and stockpiled in the North Borrow Area. The remaining 5,400 cu m, or 360 truck loads will be delivered to the South Side crossing the river on the ferry at a rate 12 vehicles per day for the duration of one month (July, 2005). 3,600 cu m of this rock will be stockpiled on the South Borrow Area, and 1,800 cu m will be placed directly on the extension of the South Causeway.

### Equipment, Labour & Traffic:

- Production 9,000 cu m rock: Equipment: 1 hydraulic crawler drill, 2 pickup trucks, 1 trailer for explosives, 1 strong box for primers; Labour: 4 operators accommodated in the Big River Motel.
- Transportation of 9,000 cu m rock: Equipment: 10 truck-semi trailers with 15 cu m boxes and 1 large size excavator. The distance from the Gravel Pit to the bridge site is approx 130 km, which will result in 5 hour round trip for each truck. Assuming 10 hours workday the resulting traffic volume will be 20 truck trips per day in each direction for the duration of 4 weeks; Labour: 11 operators accommodated in Camp.

## Deh Cho Bridge – Developer’s Assessment Report

### Schedule:

The Quarry Permit for extraction of 9,000 cu m material from this quarry is required for the period between **May 01, 2005** and **October 31, 2006**

Activity	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
1 Produce 9,000 cum rock	7	01 Jul -07 Jul 2005	4	0	28	6
2 Transp. 9,000 cum rock	30	01 Jul -30 Jul 2005	11	330	0	40

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Produce 9,000 cum rock	4,200	700
Transp. 9,000 cum rock	132,000	-
Totals	136,200	700

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

### xii.) Yellowknife HWY #3, km 232 – Proposed Granite Rock Quarry *Attachment 16*

The proposed for development area is located 200 m to the west of km 232, Yellowknife HWY #3. The deposit of granite is found in several exposed bedrock formations, of height ranging between 10 m and 50 m. The area is vegetated with occasional 4” to 6” diameter spruce trees. There is an existing trail in good condition leading to this area.

The produced rock will be used for armouring the head slopes and part of the side slopes of the bridge approaches which are exposed to heavy ice traffic.

Site Preparation: Includes improvement of the access to the blasting area only. Equipment and labour is accounted for in the Production phase. During this and the following phases of work a portable “pump-out” toilet cell will be installed on site.

Production: 6,000 cu m rock will be produced by drilling and blasting from an area of 3,000 sq m (50m x 60 m) located to the north of the access road.

Transportation: 3,000 cu m of the produced rock will be transported and stockpiled on North Storage near the bridge. The remaining 3,000 cu m will be stockpiled on the South Approach right-of-way. Vehicles delivering rock on the south side will cross the river using the shuttle barge.

### Equipment Labour & Traffic:

- Production 6,000 cu m rock: Equipment: 1 hydraulic crawler drill, 2 pickup trucks, 1 trailer for explosives, 1 strong box for primers; Labour: 4 operators accommodated in hotel in Rae-Edzo.
- Transportation of 6,000 cu m rock: Equipment: 10 truck-semi trailers with 15 cu m boxes and 1 large excavator. The distance from the quarry to the bridge site is approx 210 km, which will result in 5½ hour round trip for each truck. Assuming 11 hours workday the resulting traffic volume will be 20 truck trips per day in each direction for the duration of 20 days; Labour: 11 operators accommodated in Camp.

## Deh Cho Bridge – Developer’s Assessment Report

### Schedule:

The Quarry Permit for extraction of 6,000 cu m rock from this quarry is required for the period between **June 01, 2005** and **October 31, 2006**

Activity	Schedule		Labor (men)	Accommodation (man/day)		Traffic veh/day
	days	dates		Constr.Camp	Other	
Produce 6,000 cum rock	7	01 Jun- 07 Jun 2005	4	0	0	0
Transp. 6,000 cum rock	20	08 Aug -31Aug 2005	10	300	0	40

### Fuel:

Activity	Diesel fuel (litres)	Gasoline (litres)
Produce 6,000 cum rock	3,000	700
Transp. 6,000 cum rock	101,640	-
Totals	104,640	700

Fuel will be delivered on site by local contractor using specialized fuel truck. Re-fuelling will take place on a designated location not less the 100 m from any water body. Trucks will be refuelled at the Big River gas station located at km 31, HWY #3.

Prepared by:  
J. Jivkov, P.Eng.