Appendix 1

Development Description

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Development Description

Appendix 1-A contains Attachments 1 through 17 including Maps, Air-photos, Drawings and Sketches
Appendix 1-B contains a 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 girder on the main span the design contemplates a system of portal and stays installed on the piers on both sides of the main span. This allows for 9.0 m vertical clearance over the traffic lanes 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 10.40 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 a composite construction of two steel trusses with pre-cast concrete deck panels. The deck panels are pre-stressed transversely during fabrication, and post-tensioned longitudinally after installation.

.4 The abutments are cast in place 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 production and placing of 650 cu m concrete.

The abutments are supported on heavy gage H piles, predrilled and driven to refusal into the underlying till.

.5 The substructure of the piers consists of cast-in-place concrete flat footing and pedestal of conical shape. The construction of the substructure includes:

- ✓ Installation of 4,800 sq m Sheet Pile Cofferdams around the perimeter of the footings
- ✓ Excavation of 6,100 cu m riverbed material to the design elevation
- ✓ Placing 1,000 cu m of tremie-concrete mud slabs and de-watering of the cofferdams
- ✓ Placing 12,500 cu m reinforced cast-in-place concrete for footings and pedestals
- ✓ Extraction of the sheet piling and placing of 5,000 cu m of blasted rock Riprap over an area totalling 6,000 sq m, for scour protection around the pier footings.

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 bents are presented in concrete and steel options.

- ✓ The concrete option consists of pre-cast and post-tensioned concrete sections involving 1,200 cu m pre-cast concrete and 1,100 cu m cast in place concrete.
- ✓ The steel option consists of prefabricated steel elements assembled on site. The amount of steel required for the steel bents is 1,250 tonnes.

.7 The proposed road 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 of 17,000 cu m clean limestone and 5,000 cu m granite into the river. This rock will be placed to an elevation of 1.0 m above the Mean Water Level. The approach embankments above that elevation will be constructed of 90,000 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 and the bridge approaches overlap 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.

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 and the construction supporting facilities include:

i.) Construction Corridor for Bridge Structure & Approaches
ii.) Area for Temporary Construction Camp
iii.) Two Areas for construction and operation of Temporary Concrete Plant
iv.) Two areas in the vicinity of the bridge for temporary storage and parking
v.) Two reclamation areas associated with 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 – Proposed Limestone Quarry
vii.) Mackenzie HWY #1, km 191 – Existing Gravel Pit
viii.) Yellowknife HWY #3, km 23 – Proposed Borrow Area
ix.) Yellowknife HWY #3, km 26 – Proposed Borrow Area
x.) Yellowknife HWY #3, km 87 – Existing Gravel Pit
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 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 are not presented in chronological order, but are rather grouped by type of different construction activities as follows:

- ✓ Earthworks, including realignment of accesses to the bridge, construction of bridge approaches, riprap installation and detours
- ✓ Pier foundation works
- ✓ Pier shafts fabrication and installation
- ✓ Abutments construction
- ✓ Steel superstructure fabrication and installation
- ✓ Bridge deck fabrication and installation
- ✓ Completion works including paving, guard rail on the approaches, bridge signs, and landscaping

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.

.2 Earthworks

- ✓ North and South Detours and widening the base of the North Approach will be completed within four weeks in April 2005. Extension of the South Approach will be completed within two weeks in July 2004. Limestone and granite will be delivered on site directly from the quarries by six to ten gravel trucks, and will be placed in the water by "end-dump" method. The delivered rock will be levelled with mid size bulldozer. The side slopes will be shaped-groomed with mid size excavator deployed on top of the completed embankment. Finishing layer of gravel will be placed on the detours using the same equipment. No equipment will be deployed in the water during this work.
- ✓ Embankment construction works on the North and South Approaches will be completed in two phases. In Phase One both embankments will be constructed to the elevation of the abutment bearing seats. In Phase Two the embankments will be completed to the final design grade.

  The Work in Phase One will be completed within 8 weeks during August - September 2005. Construction will be carried out simultaneously on both sides of the river using two sets of construction equipment. Equipment used on each side will include six to ten large off-road type gravel trucks, two compactors, water truck and a mid size excavator. No material will be placed or equipment positioned in the water during this phase of the work.

  Work on the Phase Two will be completed within 8 weeks during August – September 2006, in a fashion similar to the Phase One.
- ✓ Placing of riprap protection on the embankment side-slopes will be done after completion of each Phase of the embankment construction, within four weeks in October 2005 and October 2006 correspondingly. The rock will be delivered from the quarries with six to ten semi-trailer trucks and will be placed on the slopes with a large size excavator. A mid size wheeled loader might assist the operation.

.3 Pier Foundations

- ✓ Construction of the pier foundations is an in-stream activity and will be subject to the conditions of the DFO permit. Water quality monitoring program presented in the enclosed Fish Habitat Assessment Study prepared by Golder Associates in 2004.
- ✓ The pier foundations works will be carried out in open water season. The foundations of the four piers located to the north of the Navigation Track will be completed between June and September 2005. The foundations of the remaining four piers will be completed between August and November 2005.
- ✓ For the purpose of accessing the pier locations 450 m floating barge-bridge will be installed alternatively to the north and to the south of the main span. The barge-bridge will be composed of 15 flat deck barges with dimensions 45 m by 10 m and capacity of 600 t. The barges will be connected end to end, secured to the shore and anchored upstream against the current. The Navigation Channel will remain open for marine traffic at all times during the operation of the barge-bridge.
- ✓ The cofferdams for the pier foundations will consist of standard sheet piles driven to a depth of approx. 4.0 m in pre-drilled cased holes in the riverbed. Each cofferdam has an oval shape with diameters 18 m and 13 m. Installation of one cofferdam will be completed within 10 days by a drill rig and a diesel hammer installed on the barge-bridge.

- ✓ After installation of each cofferdam the riverbed will be excavated with large excavator to an elevation of approx. 3.5 m below the natural level. The excavated material, ranging from 500 cu m to 800 cu m per pier), will be disposed of in the river channel. The bottom of the cofferdam will be sealed with 0.5 m tremie concrete and the water contained in it will be pumped out into the river. The tremie concrete will be produced in an on-shore concrete plant, will be delivered on side with four to six concrete mixer-trucks, and will be placed into the cofferdam with two mobile concrete-pumps. The cofferdam will be dewatered by not less than two of 6" Ø water-pumps at a rate determined by the water quality monitoring agency that will be sampling the water on site.
- ✓ Construction of the pier footings and pedestals involves installation of formwork and rebar and placing concrete. Formworks and rebar frames will be prefabricated on shore and delivered to each pier location in sections loaded on flatbed trucks. Installation will be completed by a crew of ten to fifteen men assisted by a 50 t mobile crane. The concrete will be produced, delivered and placed similarly to the tremie concrete described above.
- ✓ After completion of the footings and pedestals the sheet piles will be removed (extracted) from the riverbed using vibrating rig positioned on the barge-bridge. Aprons of blasted rock will be placed around each footing using a boom-crane equipped with clamp. The blasted rock will be delivered on the barge-bridge with three to five dump trucks. The barge-bridge will be dismantled in November 2005 before freeze-up.

.4 Pier bents

- ✓ For both, steel and concrete options, the elements for pier bents will be pre-fabricated in a specialized plant in southern Canada and delivered on site by train and trucks. The assembly and installation will take place in June- July 2005, in concert with the bridge launching operation. Equipment involved in the installation includes 80 t crane deployed on a barge-tug configuration. The estimated time for the assembly of each individual pier is not more than a week.

.5 Bridge abutments

- ✓ Installation of piles for abutments is not an in-stream activity. "H" piles will be driven in pre-drilled holes using diesel hammer, crane and air-track deployed on top of the sub-grade of the bridge approaches. The work will be completed in May - September 2005 after completion of the extension and widening of the bridge approaches.
- ✓ The abutments will be constructed on top of the sub-grade of the bridge approaches. The design contemplates conventional formwork and cast in place reinforced concrete. The required 325 cu m concrete for each abutment will be formed and placed by a crew of six to eight men assisted by a 50 t mobile crane. The concrete will be produced, delivered and placed similarly to the tremie concrete described above.

.6 Steel for Superstructure

- ✓ Fabrication of the steel trusses will be carried out in a specialized plant in southern Canada. The truss sections will be delivered by rail and/or by road to the bridge site. Each truss section will not exceed 22.5 m in length x 4.5 m in depth and weigh not more than 37.5 tonnes. The fabrication and delivery will be completed between March 2005 and March 2006.
- ✓ Installation of the steel for the bridge superstructure is an in-stream activity. It will be completed in Two Phases. The Phase One consists of launching the four end-spans from each side of the river. This Phase will take place in March - August 2006. The Phase

Two consists of installation of the main, or centre-span of the bridge, and will take place in August 2005.

Phase One:

Assembly and launching works will be carried out simultaneously on both sides of the river. The truss sections of the end spans will be pre-assembles and braced together on levelled areas along the bridge approaches. These areas will have dimensions greater than 300 m by 20 m, sufficient to accommodate the pre-assembled sections and all launching mechanisms. Work on each side of the river will be completed by a crew of 15 – 20 men assisted by two crawler cranes of 150 t capacity, two mid size loaders and an excavator.

Launching will commence simultaneously on both sides of the river. In order to achieve better deflection control on the cantilevered part during launching, there will be temporary piers installed midway between the permanent piers. Each of the temporary piers will consist of steel frame tower supported on the ice. Once the steel superstructure has been secured, the temporary piers will be removed. Launching of the four end-spans on each side of the river will be completed within eight weeks.

Phase Two:

The truss of the main span will be fully pre-assembled on a barge in the NTCL docks in Hay River, and will be towed to the bridge site. The approximate weight of the pre-assembled span is 900 tonnes. The span will be lifted in place with winches installed on the cantilevered ends of the already erected spans. The work will be completed within two weeks.

The work on this phase will be completed within two weeks on late August- early September 2006.

.7 Bridge Deck

- ✓ The pre-cast and transversely pre-stressed concrete panels fabricated in a specialised concrete plant. Each panel will be 11.5 m long, 2.5 m wide, with 0.3 m thickness, weighing 21.5 tonnes. All panels will be trucked and stored on the bridge site prior to installation. Fabrication and delivery will be completed between March 2005 and August 2006.
- ✓ 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 a custom made steerable dolly and will be positioned in place with a 50 t mobile crane deployed on previously placed panels. After installation, the panels will be post-tensioned with specialized hydraulic jacks and will be grouted to the steel trusses. The prefabricated concrete curbs will be installed on both sides of the finished deck using a mid size wheeled loader. The work will be completed within 10 weeks between August and October 2006. One crew of ten-twelve men will be working on each side of the bridge.
- ✓ Handrails and bridge lights will be installed in September-October 2006 by a crew of 10 men using a 20 t mobile crane and a wheeled loader.

.8 Paving and Completion works

- ✓ Paving of the approaches will be completed in July 2007 using conventional paving equipment.

ii.) Area for Temporary 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 near km 23+270 of Yellowknife HWY #3. The area is adjacent to an existing power plant that provides electricity for the Ferry Camp. Access from the highway is via 70 m long existing trail.

Presently the area is vegetated with spruce and poplar trees that will be harvested by local residents or burned. The overburden will be removed and levelled on the south limit of the area. The ground will be levelled and covered with a layer of gravel. A 50 m undisturbed tree-band will be left between the road and the Camp area.

The Construction Camp will consist of approximately 10 specialized trailer units including kitchen, dining room, bathrooms & showers, laundry services, mechanical, storage, and 60 bed sleeping quarters. A 35000 sq ft mechanical shop will be installed in the area as well. Storages for fuel and lubricants will include a

- ✓ Approx. 5,000 gallons self contained diesel fuel tank
- ✓ Approx. 2,000 gallons self contained gasoline tank
- ✓ Approx. 20 @ 45 gallons oil drums

Water and fuel required for the operation of the Camp will be supplied in specialised trucks. Sewage and solid wastes will be disposed of in a specially excavated pits meeting the sanitary and environmental standards. A contract for construction, operation and maintenance of the Construction Camp will be awarded to a qualified contractor. Contractor's proposal for handling of sewage and solid wastes will be presented to the MVLWB for approval. The Camp will be used continuously for the 20 months period of the bridge construction.

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 construction and operation of Temporary Concrete Plants. The North Concrete Plant will produce approx. 7,000 cu m concrete required for the north abutment and for the foundations of the four piers to the north of the main span. The South Concrete Plant will produce the same amount of concrete for abutment and pier foundations to the south of the main span.

The North Plant will be constructed on an area of 5,600 sq m (70 m by 80 m) located near km 30.2 of the Yellowknife HWY #3. 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. For the purpose of the Concrete Plant installation the area will be grubbed, levelled and covered with a layer of gravel.

The South Concrete Plant will be constructed on an area of 5,600 sq m (70 m by 80 m) located near km 23+270 of the Yellowknife HWY #3. The area is 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. The development includes removal of the trees and the layer of organic overburden. The trees could be harvested by local residents, or burned. The overburden will be spread in a layer along the south limit of the area and landscaped. A 20 m wide undisturbed tree barrier will be left between the road and the borrow area.

The Concrete Plants installed on both areas will be of similar capacity and will consist of approx. 500 sq m steel framed building accommodating three mixer-truck stalls, aggregate scales, 500 cu m cement silo, a system of hoppers and elevator belts, water tank, mechanical section and a small office. Diesel fuel required for the operation of the plant will be stored in a

self contained 4,000 gallon tank. There will be a Portable Camp accommodation for a crew of four, installed in one corner of the area.

Water and fuel required for the operation of the Plant will be supplied in specialised trucks. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards. Most of the area surrounding the building will be occupied by stockpiles of concrete aggregates.

A contract for construction and operation of the Concrete Plants will be awarded to a qualified contractor. Contractor's proposal for operation of the plant and handling of sewage and solid wastes will be presented to the MVLWB for approval.

The North plant will produce most of its designated quantity of concrete between June and mid August 2005, while the South plant will produce its designated quantity between mid August and October 2005.

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.

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.

v.) Two Reclamation Areas related to removal of existing ferry infrastructure
Attachment 7 & Attachment 11

It is proposed to excavate and remove the backfill material from two areas within the limits of the watercourse. These areas are part of the existing ferryboat infrastructure. It is possible that these areas are contaminated with hydrocarbons or other harmful to the fish habitat material. In order to establish if any contaminants are present in these areas the Department of Transportation, in the capacity of owner, has commissioned study with the environmental consultant Dillon. It is noted that it will be Department's liability should any contaminants are found.

The excavation and removal of backfill material will be completed to the elevations of the adjacent natural riverbed between which some 2.0 m to 4.0 m below the water level. These areas are depicted on Drawing 1/7 and could be described as follows:

- ✓ Reclamation Area #1 (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.
- ✓ Reclamation Area #2" (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.

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 the borrow pits at HWY #3, km 23+270 and HWY #3, km 26+240 as described in **Items viii.)** & **ix.)** below.

Most of the removed steel, concrete, and timber, will be disposed of in the same borrow pits and will be covered with a layer of pit run. Some of the steel and timber will be salvaged. The armour rock will be salvaged and will be incorporated in the erosion protection of the bridge approaches.

Equipment used for this work includes a large excavator, two midsize loaders and six to eight dump trucks. Concrete-cutting and demolishing equipment might be used for the removal of the concrete landing. None of the above-specified equipment will be deployed in the water for the purpose of this work. The work will be completed in July – August 2007 after opening of the bridge for traffic and discontinuing the ferry operation.

The detour roads used for access to the ferry landings during the bridge construction will be left on site to be used by local residents and tourists as boat launching facilities.

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

The proposed area is located 2 km to the south of km 188.5, Mackenzie HWY #1. The deposit of laminated limestone identified for development is found 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.

The development 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.

Approximately 40,000 cu m limestone will be produced by drilling and blasting in October – November 2004. The produced rock will be stockpiled on the available nearby cleared area and will be hauled to the bridge site on a latter date, in accordance with the bridge construction schedule. Equipment involved in the production of the rock includes two air-track drills, bulldozer equipped with ripper, excavator, and midsize loader. It is anticipated that drilling, blasting and stockpiling of the rock will be completed in less than a month. During that time there will be a self contained fuel tank and a Portable Camp accommodation for a crew of four, installed on the existing clearing to the west of the area. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards.

The material obtained from this quarry will be used to build the submerged portion of the bridge approaches and for dressing the embankment slopes. It is anticipated that the area will be used intermittently for the duration of the bridge construction. Further details on the plan for development and reclamation of the quarry will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

vii.) Mackenzie HWY #1, km 188.5 – Proposed Gravel Pit *Attachment 13*
(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 the **Item vi.)** above. It is part of larger area identified and proposed for development by the GNWT Department of transportation.

The area is fairly flat, and is vegetated with 6" to 10" diameter spruce trees. The development 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.

The material in this area is coarse gravel mixed with cobbles of limestone origin. Approximately 9,000 cu m gravel will be excavated to an elevation of 1.0 m below the average

ground level. Part of the excavated gravel will be crushed, screened and stockpiled to be used for paving of the bridge approaches.

Equipment involved in the production of the gravel includes bulldozer equipped with ripper, excavator, midsize loader and a crusher. Excavation, crushing and stockpiling of the gravel will be completed in June – July 2005. During that time there will be a self contained fuel tank and a Portable Camp accommodation for a crew of four, installed on a suitable place. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards. A truck weigh-scale might be installed at the exit of the quarry.

It is anticipated that the pit will be used intermittently, for 16 months. Further details on the plan for development and reclamation of the pit will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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.

The development includes removal of the trees and the layer of organic overburden from an area of 32,000 sq m (160 m by 200 m). The trees could be harvested by local residents, or burned. The overburden will be spread in a layer along the east limit of the area and landscaped. A 30 m wide undisturbed tree barrier will be left between the road and the borrow area. Approximately 45,000 cu m material will be excavated to an elevation of 2.0 m below the ground level. 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.

The material obtained from this pit will be of used for construction of the road embankment of the south bridge approach. Equipment involved in the work includes bulldozer equipped with ripper, excavator, midsize loaders, and several semi-trailer trucks. The Contractor may choose to use large scrapers instead of semi-trailers. No fuel or lubricants will be stored on site. Refuelling of the equipment will be done by specialized fuel truck. Contractor's crew will stay in the Construction Camp.

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

It is anticipated that the pit will be used intermittently, for 16 months beginning June 2005. Further details on the plan for development and reclamation of the quarry will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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.

The development 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 spread in a layer along the north limits of the area and landscaped. A 50 m wide undisturbed tree barrier will be left between the highway and the borrow area. Approximately 55,000 cu m material will be excavated to an elevation of 2.5 m below the ground level. Three test holes excavated in the area indicated 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.

The material obtained from this pit will be of used for construction of the road embankment and detour of the north bridge approach. Equipment involved in the work includes bulldozer equipped with ripper, excavator, midsize loaders, and several semi-trailer trucks. The Contractor may choose to use large scrapers instead of semi-trailers. A truck weigh-scale might be installed at the exit of the pit. No fuel or lubricants will be stored on site. Refuelling of the equipment will be done by specialized fuel truck. Contractor's crew will stay in the Construction Camp.

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

It is anticipated that the pit will be used intermittently for 16 months beginning June 2005. Further details on the plan for development and reclamation of the pit will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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 corner 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. These trees could be harvested by local residents, or burned. The overburden will be spread in a layer along the west limits of the area and landscaped.

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 that this gravel is suitable for concrete aggregates. Approximately 25,000 cu m gravel will be excavated to an elevation of 1.5 m below the average ground level. The excavated gravel will be crushed, screened and separated in three, or four stockpiles.

Equipment involved in the production of the concrete aggregates includes bulldozer equipped with ripper, excavator, midsize loader, crusher and several semi-trailer trucks. It is anticipated that the production will be completed within two months. During that time there will be a self contained fuel tank and a Portable Camp accommodation for a crew of four, installed on a suitable place. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards. A truck weigh-scale might be installed at the exit of the quarry.

It is anticipated that the pit will be used intermittently, for 24 months beginning August 2004. Further details on the plan for development and reclamation of the pit will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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.

It is proposed to produce by drilling and blasting 10,000 cu m rock from an area of 2,400 sq m (60 m by 40 m) located on the north east corner of the pit. The produced rock will be stockpiled on the available nearby cleared area and will be hauled to the bridge site on a latter date, in accordance with the bridge construction schedule. Equipment involved in the work

includes two air-track drills, an excavator, a large loader, a midsize bulldozer and 6 to 8 semi-trailer trucks.

During the drilling, blasting, and stockpiling operation there will be a self contained fuel tank and a Portable Camp accommodation for a crew of four, installed on a suitable place. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards.

The material obtained from this quarry will be of used for scour control of the riverbed around the pier footings, and for upstream berm/breakwater on the extension of the south approach to the bridge.

It is anticipated that the pit will be used intermittently, for 27 months beginning August 2004. Further details on the plan for development and reclamation of the quarry will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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 a form of 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, which will be removed and burned. There is an existing trail in good condition leading to this area.

The development includes drilling and blasting of 8,000 cu m granite from an area of 16,000 sq m (100 m by 160 m). The produced rock will be stockpiled in the area and will be hauled to the bridge site on a latter date, in accordance with the bridge construction schedule.

Equipment involved in the work includes two air-track drills, an excavator, a large loader, a midsize bulldozer and 6 to 8 semi-trailer trucks. During the drilling, blasting, and stockpiling operation there will be a self contained fuel tank and a Portable Camp accommodation for a crew of four, installed on a suitable place. Sewage and solid wastes produced in the Portable Camp will be disposed of in a specially excavated pits meeting the sanitary and environmental standards.

The material obtained from this quarry will be of used for armouring the part of the side slopes of the bridge approaches that are exposed to ice traffic.

It is anticipated that the pit will be used intermittently, for 27 months beginning August 2004. Further details on the plan for development and reclamation of the quarry will be refined and submitted to the MVLWB after selection of the Contractor that will carry out the work.

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