Wolverine Project

PHASE 2 ALL WEATHER ACCESS ROAD PLAN

Prepared by:

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YES Group

For:

Yukon Zinc Corporation

January 12, 2007

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km 0.0 to km 24.0
ISSUED FOR CONSTRUCTION
January 12, 2007"
(E06015_4_PP.dwg) ..... Bound Separately

1 Introduction

This submission is a revision to:

§ June 2006 YZC and YES submission "***Wolverine Project - All Weather Access Road Plan, Version 2006-01***", and is all-inclusive with the exception of Appendix A (Adopted YG Standards and Specifications) included in the June submission. Figure 1 has been revised to include information originally provided in Figures 3 and 4. Appendix A and Figure 2 were originally developed for tendering purposes and are not warranted here.

And…

§ October 25, 2006 YZC and YES submission "***Wolverine Project - Phase 1 Winter Access Road Plan***".

This Phase 2 submission provides all necessary information for the completion of the access road from km post 190.0 of the Robert Campbell Highway. The road will be constructed to the Wolverine Project in two phases:

- **Phase 1** – Construction of a temporary Winter Access Road, and clearing for Phase 2 as documented in the October 25 report Wolverine Project – Phase 1 Winter Access Road Plan (also included in the Wolverine Project General Site Plan Report, Version 2006-02).
- **Phase 2** – Construction of the All Weather Access Road and permanent crossings. This construction is described in the body of this report.

Information gathered and subsequent operations, following the June submission include:

- Geotechnical investigation program.
- Geochemical analyses of borrow sources and roadway cuts.
- LiDAR topography of road corridor.
- Detailed topographic surveys of the Campbell Highway intersection, stream crossings and rock outcrops.
- Complete re-design

This report was prepared by Yukon Engineering Services Inc. (YES) with contributions from Yukon Zinc Corp. (YZC), EBA Engineering Consultants Ltd. (EBA), and AMEC Earth & Environmental (AMEC).

YZC retained YES to complete the route selection, preliminary design, geotechnical assessment, detailed design, tendering, construction management and quality assurance of the all weather access road. YES retained the services of EBA to provide professional geotechnical evaluations of the route and sources, undertake a roadway geotechnical testing program, complete laboratory testing of samples taken along the route and from granular sources, and to provide construction recommendations resulting from their investigations and laboratory results and AMEC has developed the environmental (ARD/ML) testing protocol.

Preliminary assessments of the access road alignment were conducted in 2005, including biophysical and archaeological assessments as described in the *Wolverine Project Environmental Assessment Report* (YZC, 2005[1]). In 2006, detailed alignment layout and engineering have been completed, and additional fieldwork has been done.

The following sections provide details pertaining to road design, stream crossing details, borrow sources, environmental and geotechnical testing protocols and outcomes, traffic and access control measures, best management practices and mitigation measures for construction related activities, construction monitoring plans, and reclamation plans and cost estimates for closure of the road and borrow sites.

2 Wolverine Project Access Road

YZC will construct access to the site in two phases with construction of its Phase 1 Winter Access Road in February 2007 and construction of the Phase 2 All Weather Access Road in spring 2007. Both Phase 1 and Phase 2 are located on the Registered Quartz Mining Claims.

2.1 Phase 1 Winter Access Road

The first phase of the access road development is the construction of a ~24 km long temporary winter access road from km Post 190.0 of the Robert Campbell Highway to the mine site for the purpose of hauling in equipment and supplies required to set up the construction camp and for the onset of construction activities scheduled to commence in spring 2007. From the highway, the access road corridor follows Putt Creek and crosses small Money Creek tributaries before transitioning into the Go Creek drainage and the mine.

In order to minimize impact, and to better control access in the long term, YZC has chosen to construct its winter access road along the alignment of the cleared geotechnical investigation trail, which itself is within the footprint of the ultimate all weather access road clearing, and in the steeper side-hill areas, will fall within the ultimate roadway prism.

2.2 Phase 2 All Weather Access Road

The second phase entails construction of an all weather access road. The road will be a private, single lane road with passing bays, will have restricted access and will be operated under radio control. The road will be used year round with minimal load restrictions. Design and construction details for this phase are detailed within this report.

Prior to construction, clearing of the right of way will be required. It is preferred to conduct this work during the February to March 2007 period. Winter clearing operations allow for better access on frozen ground, and safe burning-disposal of non-salvageable product (rather than trucking and bury-disposal). An additional benefit is the early snow-melt and drainage from the roadway alignment.

3 Phase 2 Road Design and Specifications

The Phase 2 access road design has been revised subsequent to the completion of the two stage geotechnical field investigation and granular investigation programs (July and October, 2006) executed by EBA Engineering Consultants Ltd, and following the Bare Earth LiDAR topography provided by Woolpert on behalf of YZC.

The design of the Phase 2 road meets Transportation Association of Canada (TAC) RLU/LVR 60 Single Lane Resource Road, (with inter-visible two lane sections) employing the standards summarized in Table 3.1.

Table 3.1 Adapted Transportation Association of Canada Single Lane Resource Road Standards

- Desirable Minimum Curve Radii - Minimum Curve Radii - Minimum Switch-back Radii[1]	- 170m (Level of Service and Safety) - 120m (TAC: LVR = 130, RLU = 120) - 55m
- Maximum Gradient[2] - Actual Maximum Gradient - Minimum "k" Factor Crest - Minimum "k" Factor Sag	- 13% (TAC) - 11.6% (8% max. achieved in most cases) - 15 (TAC: LVR = 18, RLU = 15) - 10 (TAC: LVR = 18, RLU = 10)
- Single Lane Width - Two Lane Width - Super-elevation	- 6m crowned @ 3% (TAC: LVR = 4m) - 8.5m crowned @ 3% - Emax 6%
- Minimum Culvert Diameter - Culvert Installations	- 600mm or Q^{100} whichever is greater - as per *YG 06010-1, -2, -3, -4, -5, -6, -7 (Appendix A)* - Machine and Hand Clearing as per: *YG Sections 03010, 03011 (Appendix A)*
- Clearing	- to 15m either side minimum, or 3m beyond cuts (tree root protection), 6m beyond fills (access to reclaim stripping), whichever is greater.
- Surfacing Aggregate	- 300mm as per *YG Section 04060 (Appendix A)*
- Sideslopes (fill)	- 2H:1V ratio (except as noted below) - 1.5H:1V ratio, where safety berms are employed. (Rock embankment)
- Backslopes (earth cut) - Backslopes (rock cut)	- 1.5H:1V ratio - 0.5H:1V ratio
- Ditch Depth - Ditch Type	- 1m - "V" Ditch, with widenings for side-borrow.
- Safety Berms	- 0.75m Ht. where Fills > 10m, or where downhill side hazard requires. Roadbed widened 1.5m to accommodate.
Compactive Density	- 95% Standard Proctor (Embankment) - 98% Standard Proctor Density (Surfacing Aggregate and culvert bedding/backfill)

[1] Utilized in two situations: Bunker Ck. at km 10.25, to avoid a beaver dam, and at km 13.0, to avoid two stream crossings and for economic considerations.

[2] TAC LVR recommends maximum gradients of 13% in mountainous terrain, and 10% in semi-mountainous terrain. 8% was selected for safety, erosion control and reduced operating costs.

The road design drawings are provided in Figure 1 and have been sealed by Paul J. Knysh, P.Eng. (Registered APEY). This road design is Issued for Construction, and is complete in terms of impact and construction requirements. All assessments to date have been completed using techniques suiting the level of investigation required using systematic development planning.

Route selection and design were based on hydrology studies, stream data collection, terrain analyses and air photo interpretation of soil conditions, by hand sample truthing of the mapped interpretations, then by incorporation of the following information during the two phase geotechnical investigation:

- *Surface Geology, Soils and Associated Interpretations. Wolverine Biophysical Surveys* (Mougeot Geoanalysis 1996)
- Axys Environmental Consultants Ltd (satellite imagery interpretation of *Surficial Materials Distribution*)
- Jack Dennett, P.Geol., EBA Engineering Consultants Ltd., YES Geotechnical Sub-consultant (air photo interpretation)
- Paul J. Knysh, P.Eng., and Rob Harvey of Yukon Engineering Services Inc. (air photo interpretation)
- EBA Engineering Consultants Ltd. (Geotechnical Investigation)
- Bare Earth LiDAR topography (Woolpert)

The Phase 2 route is “final”, within acceptable uses of the term. The alignment is fixed within a defined corridor of 50m in width, except at controlling stream crossings, where the alignment is considered final at its present location to within +/-10m.

The controlling stream crossings are:

Table 3.2 Controlling Stream Crossings along the Road Alignment

Stream Crossing	Figure 1 Dwg #	km Location	Latitude	Longitude	Nominal Crossing Width at Centreline ****	Structure Type
Putt	"km 1.5"	2.74	61° 28’ 50.1”	129° 53’ 32.1”	0.5m	1600mm Dia. CSP*
Pitch	"km 3"	2.89	61° 28’ 46.8”	129° 53’ 33.5”	1.6m	2400mm Dia. CSP*
Bunker	"km 9"	10.25	61° 25’ 21.6”	129° 56’ 01.6”	4.5m	21.336m Single Lane Resource Bridge**
Bogie	"km 15"	15.59	61° 24’ 00.3”	129° 59’ 25.2”	0.9m	1000mm Dia. CSP***
Hawkowl	"km 22.5"	23.11	61° 24’ 00.4”	130° 03’ 49.8”	1.2m 0.9m	1600mm Dia. CSP at km 23+113, 1000mm Dia. CSP at km 23+085 overflow stream
*	CSP = Corrugated Steel Pipe Helical Culvert.					
**	Contractor supplied pre-Engineered Structure as per Fig. 1: AE Shop Dwg. No. *3751-SK-601* , *602* , *603* . Armtec Bin Wall Abutment Dwg. No. *BW 02-07 001* , *002* , *BW-40001E* , *BW-40002W* , *km 9* - Plan/Profile, *Bunker* - General Layout.					
***	Fluming required. Refer to Figure 1.					
****	YES completed topographic surveys of all stream crossings in July 2006, including edge of water, top of bank, OHWM and thalweg.					

Confirmation of soils types and conditions was by way of the road geotechnical investigation (See Section 6).

Phase 2 design elements have not changed significantly since the June 2006 submission. The following exceptions apply as shown on Figure 1:

- **km 0 to km 0.7** – The intersection with the Campbell Highway has been relocated, to km 190.0 of the Campbell Highway. This was done in order to accomplish the following:
  - Improve the intersection visibility for public safety.
  - Avoid permafrost over shallow bedrock km 0 to km 0.7.
  - Reduce impact by including the first section of roadway within the footprint of the planned Borrow Pit, Staging and Camp Area.
- **km 0.7 to km 2.9** – Grade-lines were lowered, as ice contents within the discontinuous permafrost in this section were found to be generally less than 10% in granular soils. Should site-specific observations during construction so dictate, road grades will be raised to preserve the permafrost.
- **km 6.95 to km 9.1** – Revised grade-lines ensure adequate embankment over ice-rich permafrost in this section. Non-woven geotextile has been incorporated into the design over undisturbed organic materials prior to backfilling.
- **km 10.1 to km 10.7** – Grade-lines have been steepened as a result of the more accurate surface topography, and in order to reduce the height and length of the bridge crossing over Bunker Creek.
- **km 10.7 to km 16.4** – Grade-lines have been modified from the consistent 8%, to varying grade-lines of 6% to short "pitches" of 10.5%, due to the improved topography.
- **km 16.5 to km 17.4** – The road alignment was changed in order to avoid wet swampy ground on the glacio fluvial terrace area.
- **Throughout:**
  - Accurate surface topography accommodated a complete grade-line revision throughout the entire alignment.
  - Test pit information provided representative bedrock profile information, as well as reliable stripping, waste-cut and grubbing thickness.

Phase 2 borrow pit, granular sources and side-borrow areas have been identified for the entire Phase 2 roadway and are shown on Figure 1 and in Section 4 herein.

Table 3.3 describes the conditions, construction method, and resultant plan for each segment along the ~24 km route.

Table 3.3 Phase 2 Methods of Clearing and Construction

KM RANGE		CLEARING METHOD	CONSTRUCTION METHOD	COMMENT
FROM	TO			
0+000	0+385	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	STAGING, CAMP, BORROW
0+375	0+535	HAND CLEARING	>1.5M FILL TYPICAL	BOG / SWAMP CROSSING
0+535	2+700	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
2+700	2+765	HAND CLEARING	EMBANKMENT CLEAN GRANULAR	PITCH CREEK CROSSING
2+765	2+855	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	GRANULAR DEPOSIT BETWEEN CREEKS.
2+855	2+915	HAND CLEARING	EMBANKMENT CLEAN GRANULAR	PUTT CREEK CROSSING
2+915	4+035	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
4+035	4+095	HAND CLEARING	OPTIMAL CUT TO FILL METHODS	UNNAMED STREAM CROSSING
4+095	4+935	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
4+935	4+995	HAND CLEARING	OPTIMAL CUT TO FILL METHODS	UNNAMED STREAM CROSSING
4+995	5+425	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
5+425	5+485	HAND CLEARING	OPTIMAL CUT TO FILL METHODS	UNNAMED STREAM CROSSING
5+485	6+300	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE esp. km 5+700 to 5+725, km 5+850 to 5+925 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
6+300	6+360	HAND CLEARING	OPTIMAL CUT TO FILL METHODS	UNNAMED STREAM CROSSING
6+360	6+600	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
6+600	6+660	HAND CLEARING	OPTIMAL CUT TO FILL METHODS	UNNAMED STREAM CROSSING
6+660	6+948	MACHINE CLEARING W/ STRATEGIC HAND CLEARING	NORMAL W/ STRATEGIC GEOTEXTILE, 1.5m FILL TYPICAL	SPORADIC PERMAFROST, ICE CONTENT <10% TYPE, SOME ICE CONTENT >10%.
6+948	7+500	HAND CLEARING	GEOTEXTILE, 1.5m FILL TYPICAL	DISCONTINUOUS ICE RICH PERMAFROST
7+500	7+575	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	
7+575	9+100	HAND CLEARING	GEOTEXTILE, 1.5m FILL TYPICAL	
9+100	10+035	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	
10+035	10+285	HAND CLEARING	OPTIMAL CUT TO FILL, PRE-ENGINEERED L100 SINGLE LANE RESOURCE BRIDGE	BUNKER CREEK CROSSING, BEAVER DAM
10+285	14+940	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL ASCENT
14+940	15+000	HAND CLEARING	HAND CLEARING	CHIP CREEK TRIBUTARY #1
15+000	15+070	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL ASCENT
15+070	15+130	HAND CLEARING	HAND CLEARING	CHIP CREEK TRIBUTARY #2
15+130	15+530	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL ASCENT, ROCK PREVALENT
15+530	15+590	HAND CLEARING	HAND CLEARING	BOGIE CREEK CROSSING
15+590	16+550	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL ASCENT, ROCK PREVALENT
16+550	18+650	MACHINE CLEARING	SMALL CUT TO FILLS	GLACIO FLUVIAL PLATEAU
18+650	20+155	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL DESCENT, ROCK PREVALENT
20+155	20+215	HAND CLEARING	HAND CLEARING	UNNAMED STREAM CROSSING
20+215	20+670	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL DESCENT
20+670	20+740	HAND CLEARING	HAND CLEARING	UNNAMED STREAM CROSSING
20+740	21+430	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL
21+430	21+490	HAND CLEARING	HAND CLEARING	UNNAMED STREAM CROSSING
21+490	23+030	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL
23+030	23+115	HAND CLEARING	HAND CLEARING	HAWKOWL CREEK CROSSING, TWIN CULVERT INSTALLATION
23+115	24+000	MACHINE CLEARING	OPTIMAL CUT TO FILL METHODS	SIDEHILL

3.1 Access Tie-In and Staging Areas

Yukon Engineering Services has completed its assessment of the proposed intersection of the all weather access road with the Robert Campbell Highway. This has been done by way of confirming required sight distances based on the Rural Arterial 80 km/hr posting (TAC RAU 80) and designation of the Robert Campbell Highway (Highway) at present, and the intended RAU 90 designation of the Highway upgrades over the coming years.

The intended intersection with the Highway has been relocated from km 189.4 to km Post 190.0, at the proposed staging area as shown in Figure 1. A road construction camp will be required near the Highway. A staging area will also be required, which will be used throughout the construction of the mine and road, and the operation of the mine. It is proposed to combine the access intersection, the construction camp and staging area into one development area.

Detailed topographic surveys were completed of the proposed Highway intersection during the geotechnical investigation program. Detailed site drawings and proposed intersection details have been presented to Yukon Highways and Public Works to ascertain their specific requirements or concerns. A Public Highways Access permit application has also been submitted to YG HPW for approval of the Phase 2 plan.

Construction needs for the staging area will include:

- Access road construction camp, engineering office
- Temporary storage of materials, camp and equipment awaiting availability of access to the mine site.
- Storage of culverts and other associated road construction materials.
- Parking and maintenance of construction equipment.
- Fuel, parts and lubricants storage and control.

Operational needs for the staging area include:

- Chaining of trucks during the winter months.
- Fuel for maintenance equipment.
- Holding area for vehicles awaiting authorization to proceed onto the access road.
- Traffic control gate

3.2 Access Control

Access control is required for three scenarios:

1. Access control during mine operation, including the construction phase.
2. Access control during temporary closure.
3. Access control following permanent closure.

3.2.1 Operational Access Control

Access control during mine operation (including during the construction phase) will be by way of a manned gate situated at the south end of the construction camp / staging area, near km 0+350 (Figure 1).

Prior to operation of the access road, and prior to completion of the road construction, YZC will develop a *Manual of Rules for the Operation of the Wolverine All Weather Access Road*. This manual will provide final procedures for access road control, traffic control plans, and rules for use. In general terms, the Manual will formalize the following:

- All travelers will be advised that respecting the posted speed limit of 60 km/hr is mandatory for single vehicle traveling safety and so that all authorized vehicle drivers can anticipate the progress of other vehicles on the road, between Kilometer announcements.

- As all authorized vehicles and maintenance equipment will be radio-equipped, the following policy will be respected by all operators of authorized vehicles and maintenance equipment:

  - After authorizing a vehicle to proceed, and upon the vehicle passing the gate, the Gate Operator will announce "*Authorized Vehicle*" (or "Authorized Visitor" to suggest lesser familiarity on the part of the driver) "*Kilometer 0.5 Empty*"[3], "*Unit 17,Service Truck*". This provides an aural outline or reminder of the announcement protocols for all drivers.

  - "Loaded" traffic already on the road will announce their updated locations in a similar manner ("*Kilometer 17 Loaded, Concentrate Hauler*", or "*Kilometer 6, Grader on the Road*")

  - Empty vehicles must yield to loaded vehicles. Empty vehicles will pull over in designated two lane areas when a loaded vehicle is within 2 km, and will announce: "*Kilometer 7.6 Pullout, Empty Waiting, Unit 17, Service Truck*"

Traffic control plans will be executed and enforced through the gate house and the Wolverine Mine site.

The gate house will be staffed by a trained operator, with current Advanced First Aid, during all hours and on all days that the road is to be used. The facility will be equipped with the following:

[3] "Loaded" refers to the direction of haul for loaded concentrate haulers (ie: from the mine site to shipping port)

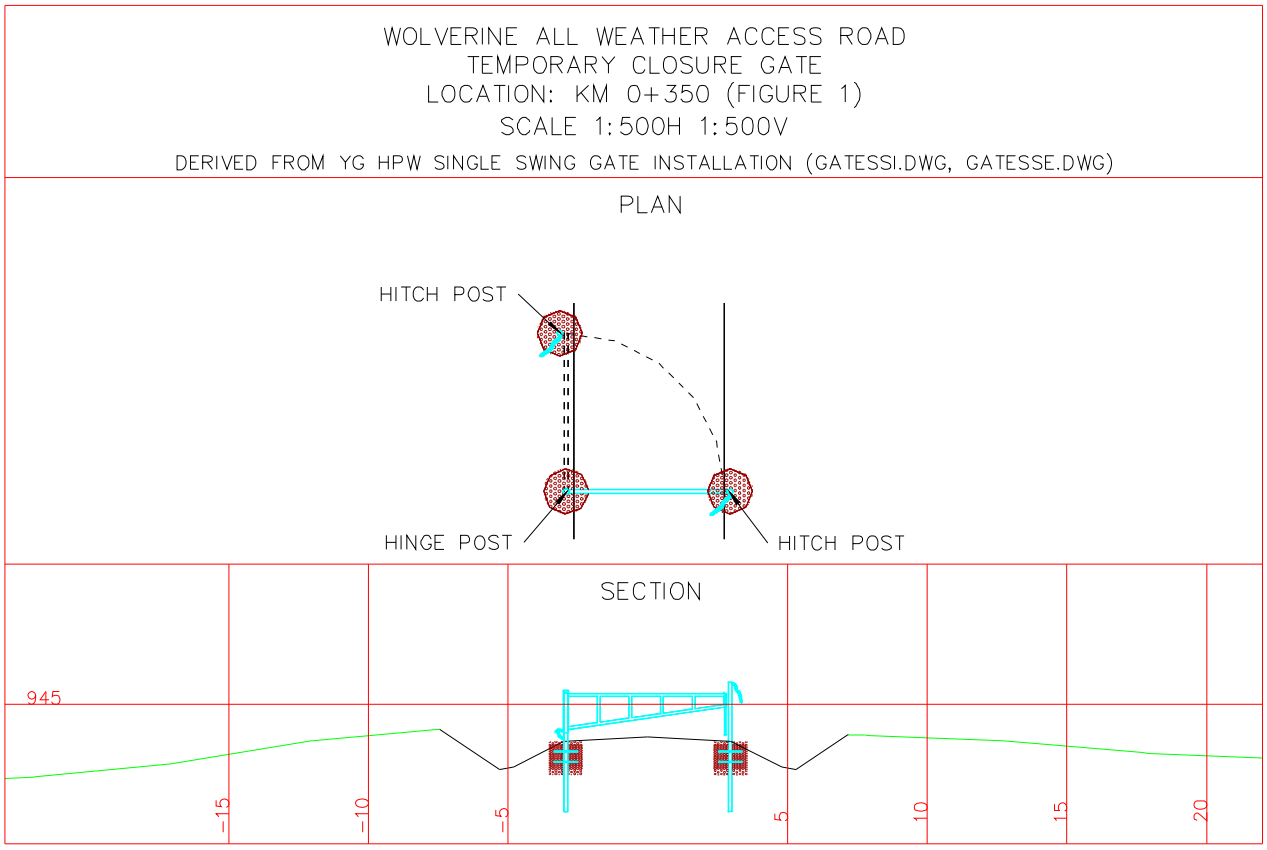
- Heated facility with electrical generation, telephone, facsimile and VHF radio communications
- Instructions for Authorized Use of Access Road
- Current manifest of Authorized Users. Authorized Users will be limited to company vehicles and authorized company personnel, contract suppliers, transporters (supplies, concentrate haul), company agents of specialists, and YG personnel
- Access road VHF radios and visitor unit numbers for authorized visitors and emergency vehicles.

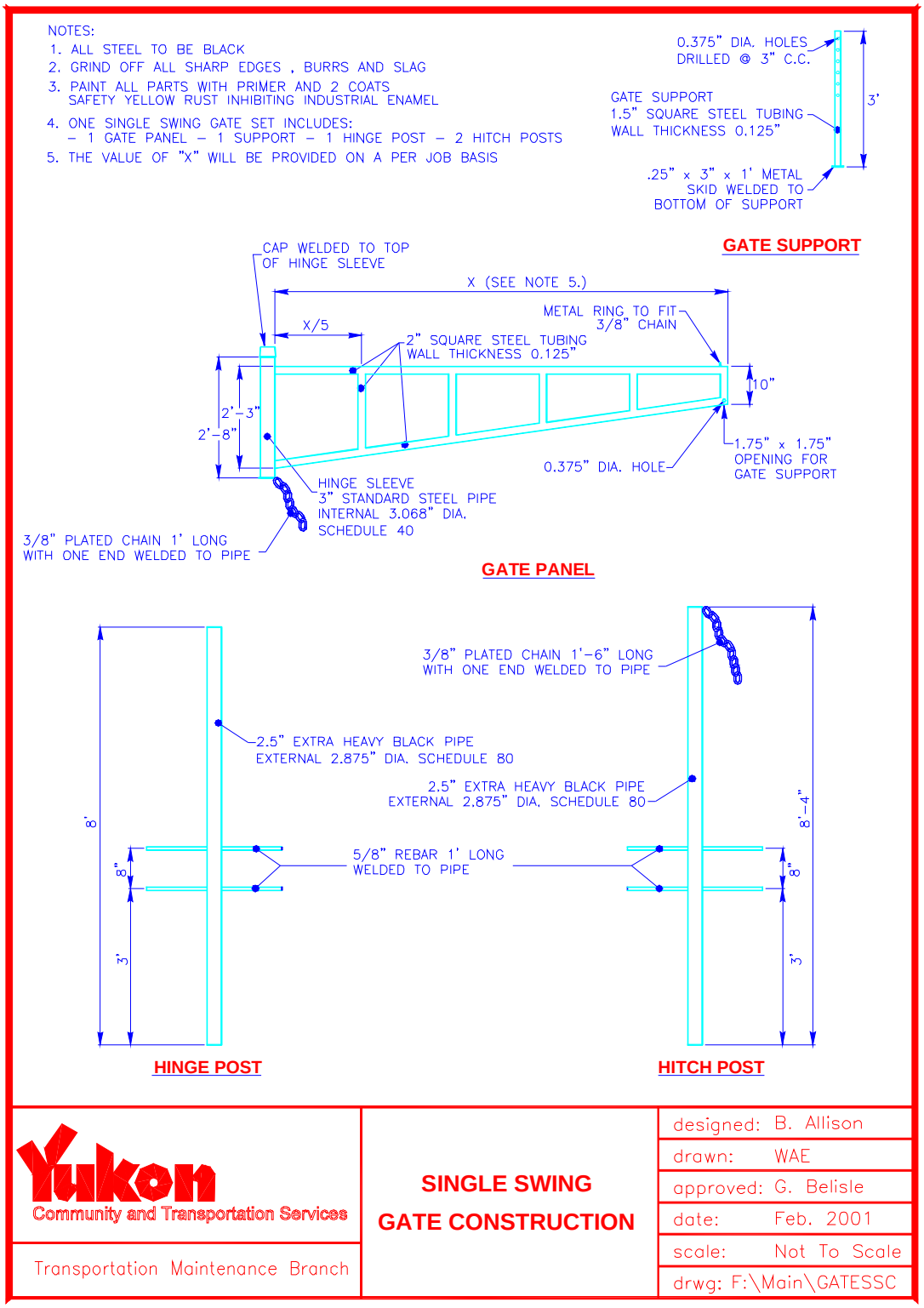
The gate house operator's duties will include:

- Confirming authorization for access
- Ensuring that all vehicles are equipped with operable access road VHF radios (radios will be checked at the gate by the operator) and visitor unit numbers. VUN's will be highly visible magnetic unique decals attached high on the driver's door of all visiting vehicles.
- Maintaining a manifest of authorized visitor access road VHF radios and visitor unit numbers.
- Retrieving all radios from authorized visitors.
- Providing written instructions for access road rules, and access road radio use. Providing a verbal review of the instructions to first time visitors.
- Logging all access road radio communications, and locations of all vehicles along the road.
- Monitoring access road radio communications, to eliminate "chatter" and non-safety communications.
- Dispatching emergency or retrieval equipment and personnel.
- Advising all traffic, including road maintenance traffic of unnoticed or unacknowledged traffic activity on the road.
- Advising all traffic of road conditions or hazards, including wildlife.
- Providing a daily access road report of all activities and traffic.

Figures 3.1 and 3.2 provide details of the Operational Access Control Gate, adopted from YG HPW Single Swing Gate details (GateSSI.dwg and GateSSE.dwg)

Figure 3.1 Operational Access Control Gate




NOTES:
1. ALL STEEL TO BE BLACK
2. GRIND OFF ALL SHARP EDGES , BURRS AND SLAG
3. PAINT ALL PARTS WITH PRIMER AND 2 COATS SAFETY YELLOW RUST INHIBITING INDUSTRIAL ENAMEL
4. ONE SINGLE SWING GATE SET INCLUDES: – 1 GATE PANEL – 1 SUPPORT – 1 HINGE POST – 2 HITCH POSTS
5. THE VALUE OF "X" WILL BE PROVIDED ON A PER JOB BASIS
0.375" DIA. HOLES DRILLED @ 3" C.C.
GATE SUPPORT 1.5" SQUARE STEEL TUBING WALL THICKNESS 0.125"
.25" x 3" x 1' METAL SKID WELDED TO BOTTOM OF SUPPORT
3'
GATE SUPPORT
CAP WELDED TO TOP OF HINGE SLEEVE
X (SEE NOTE 5.)
X/5
METAL RING TO FIT 3/8" CHAIN
2" SQUARE STEEL TUBING WALL THICKNESS 0.125"
10"
2'-3"
2'-8"
1.75" x 1.75" OPENING FOR GATE SUPPORT
0.375" DIA. HOLE
HINGE SLEEVE 3" STANDARD STEEL PIPE INTERNAL 3.068" DIA. SCHEDULE 40
3/8" PLATED CHAIN 1' LONG WITH ONE END WELDED TO PIPE
GATE PANEL
3/8" PLATED CHAIN 1'-6" LONG WITH ONE END WELDED TO PIPE
2.5" EXTRA HEAVY BLACK PIPE EXTERNAL 2.875" DIA. SCHEDULE 80
2.5" EXTRA HEAVY BLACK PIPE EXTERNAL 2.875" DIA. SCHEDULE 80
8'
8'-4"
8"
8"
5/8" REBAR 1' LONG WELDED TO PIPE
3'
3'
HINGE POST
HITCH POST
Yukon Community and Transportation Services
Transportation Maintenance Branch
SINGLE SWING GATE CONSTRUCTION
designed: B. Allison
drawn: WAE
approved: G. Belisle
date: Feb. 2001
scale: Not To Scale
drwg: F:\Main\GATESSC

3.2.2 Temporary Closure Access Control

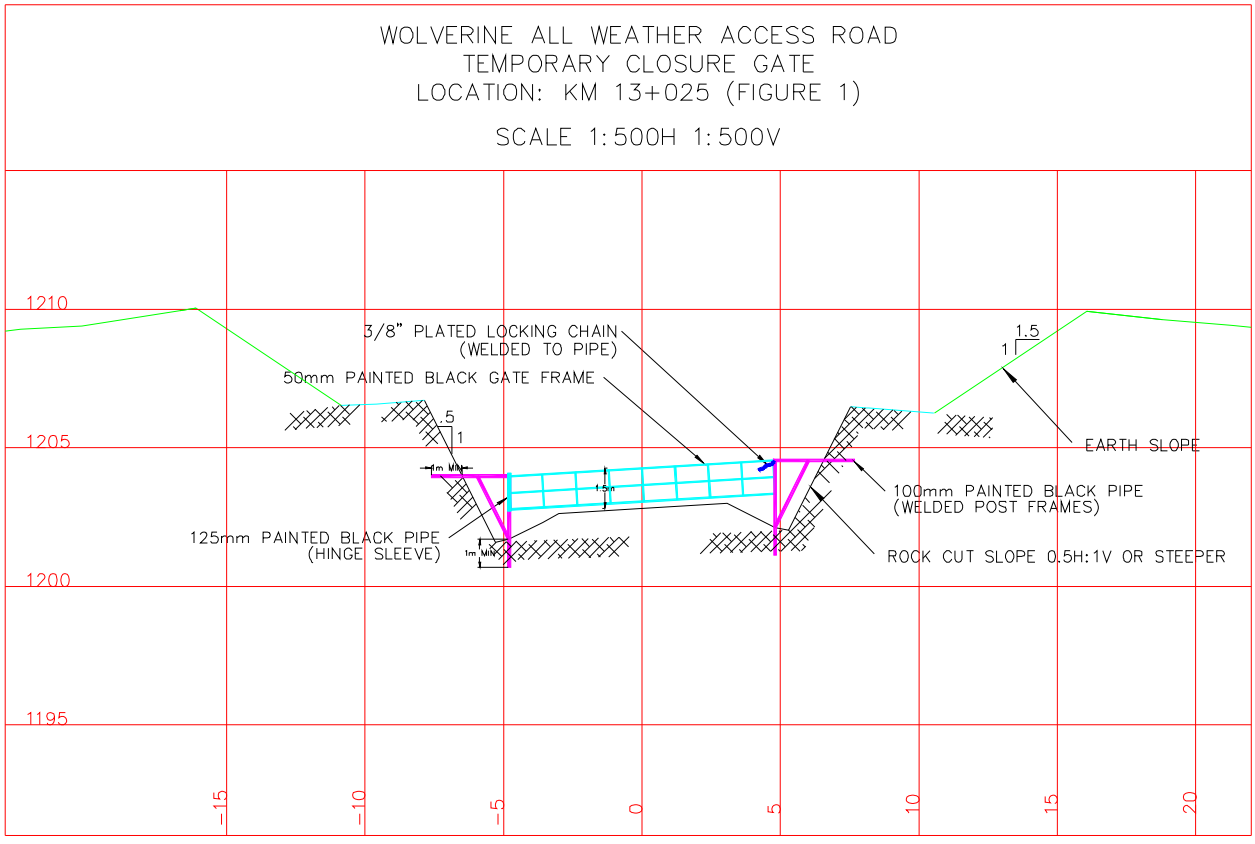
Access control will be required in the event of a temporary closure of the mine and the temporary suspension of hauling operations. Temporary closure access control will be employed immediately following both of the above conditions. The Operational Access Control Gate will also be locked closed, but will not be manned, unless deemed necessary from periodic inspections.

The Temporary Closure Access Control gate location must deny access to highway vehicles, all terrain vehicles and snow mobiles, and must be situated such that hunting and recreational access to the Go Creek drainage system is extremely difficult.

YG Environment (M. George et al) provided input to the selected location, near km 13+025 (Figure 1). This location is on a 10% ascending gradient, some 3 km north of the glacio fluvial plateau that separates the upper Money Creek and Go Creek drainages. The precise location is also in a rock cut, where the rock back-slopes will be 0.5H :1V or vertical.

Figure 3.3 provides details of the Temporary Closure Access Control Gate.

Figure 3.3 Temporary Closure Access Control Gate



3.2.3 Permanent Closure Access Control

Access control will ultimately be required upon the completion of mining and hauling operations.

Permanent Closure Access Control will be the final step in mine closure and reclamation, (including the removal of all road culverts, and the reshaping of roadway embankments) as access is required for these activities.

This will entail the removal (and hauling offsite) of the bridge at Bunker Creek (km 10.25 Figure 1) and the removal of the culvert at Bogie Creek (km 15.59 Figure 1), as well as the construction of blast rock obstacles within the rock cuts on the km 10.4 to km 16.5 ascending gradient.

Please refer to Figure 1.

4 Borrow Sources

Originally it was planned to utilize side-borrows for all roadway embankment rather than specific borrow sources. Subsequent geotechnical investigations by EBA however, have indicated ice rich permafrost in portions. This has resulted in the need to extract common excavation as well as granular surfacing material from designated sources in some areas.

Information used to develop the Borrow Source Plan was derived from EBA's two-phase geotechnical investigation (Appendix A and Appendix B).

- Of the nine possible borrow targets investigated, five will be developed during Phase 2, as summarized in Table 4.1 and shown in Figure 1. Haul roads are also shown in Figure 1.

Table 4.1 Phase 2 Designated Borrow Sources along the Road Alignment

PIT	STA	O/S	GROSS AREA (Ha.)	NET AREA (Ha.)	AVG DEPTH (m)	COMMON (m^3)	GRANULAR SURFACING (m^3)	CONCRETE AGGREGATE (m^3)	TOTAL (m^3)
P1	210	0	5.3	2.7	2	3,000	3,000	-	6,000
S3A	2560	70	1.6	0.8	2	9,000	3,000	-	12,000
S3B	2810	70	1.1	0.6	2	-	9,000	-	9,000
P2A	11060	60	1.0	0.5	2	-	8,000	-	8,000
P2B	10960	130	0.6	0.5	2	-	5,000	5,000	5,000
P4A	16560	-100	2.9	1.5	2	22,000	7,000	-	29,000
P4B	17310	110	3.0	1.5	2	23,000	7,000	-	30,000
P3	23460	-150	1.0	0.5	2	-	8,000	-	8,000
TOTALS			**16.5**	**8.5**	**2.0**	**57,000**	**50,000**	**5,000**	**107,000**

Phase 2 borrow source area will be utilized only if they are deemed to be non-acid generating, will developed according to acceptable construction practices, and to standards currently employed by the Yukon Government in its execution of highway construction contracts. Specifically:

- Prior to clearing, additional construction test pit information will be used to confirm the optimum depth of planned excavation. These depths will be used to confirm the extents of each source, with appropriate consideration to setbacks from streams and escarpments.
- A **Borrow Source Development Plan** drawing will be provided on a case-by-case basis. Once approved, the plan will be provided to the Contractor. This Development Plan will include instructions for the development stage: storage of overburden soils and organic stripping materials, stockpiling of granular screened or crushed product for construction and maintenance, designated area for setting up of a screening plant, limits of clearing, any required drainage remedies, and buffer areas; and for the reclamation stage: sloping of borrow walls (2H:1V maximum steepness recommended), re-contouring of pit area and haul road, creation of enhancements as may be directed, contouring of organic overburden over the surface area, and seeding.
- Limits of clearing for the borrow source and the haul road will be flagged in the field as per the Development Plan.
- Clearing, disposal and salvage will be completed by the Contractor, according to standards provided in *YG*

Sections 03010, 03011.

- Once cleared, the extents of the planned borrow excavation will be laid out in the field, leaving the required overburden storage and buffer zones.
- Grubbing and stripping operations will be by way of bulldozing materials to the perimeter of the cleared area, leaving adequate space to re-access the materials for reclamation.
- Excavation will be limited to the development area as shown on each specific Borrow Source Development Plan.
- Where granular deposits are underlain by colluvium, till or other materials suitable for common embankment, these materials will be used for roadway sub-grade construction purposes.
- "Oversize" boulders rejected by crushing or screening operations will be employed as rip rap where feasible, or stockpiled for future use as rock pile barricades at the entrances to the borrow source haul roads.

Once construction and maintenance requirements are met, the borrow source sites will be reclaimed as identified in each specific Borrow Source Development Plan.

5 Geochemical Evaluation

The access road from the Robert Campbell Highway to the Wolverine mine property was assessed and sampled along any significant road cuts, and significant lithology changes for geochemical testing by YZC Project Geologist Gilles Dessereau. Sampling was conducted as per the protocol requirements developed by AMEC Earth & Environmental (see Section 5.1). A summary of the onsite sampling by YZC and EBA is provided in Section 5.2, and Section 5.3 provides a summary of the acid-based accounting test results.

5.1 Geochemical Testing Protocol

Yukon Zinc Corporation (YZC) retained the services of AMEC Earth & Environmental to develop a protocol for environmental testing of construction materials and cut slopes along the access road from the Robert Campbell Highway to the Wolverine mine property. Construction materials used as borrow material along the road route may consist of unconsolidated sediments (soils, till, gravel, etc.) and bedrock. The protocols outlined below have and will be used for sampling and analysis along the access road to determine acid rock drainage and metal leaching (ARD/ML) potential. At sites of interest, the following actions will be carried out:

1. Visual inspection
   An inspection of the borrow source site or road cut will be completed by a qualified geoscientist or engineer. The inspection will be used to assess the areas for potential ARD/ML conditions. The visual inspection will include a geologic assessment of the following parameters:
   - rock type(s)
   - sulphide content
   - carbonate content
   - presence or absence of other ARD/ML indicators (iron-staining, etc.)

   The inspection will be focused on the potential for the site to produce ARD/ML if disturbed. This assessment will include a visual characterization of the mineralogy of the borrow material. Detailed descriptions of the type and amount of sulphide mineralization will include the size and shape of grains, any visible weathering, and a visual estimate of the proportion of sulphides to host rock. Careful attention will also be paid to features such as quartz and carbonate veins in the host rock, as well as the presence of iron staining and secondary precipitates that may have formed on the host rock during in situ weathering.

2. Sampling
   Following the completion of the visual inspection, the site will be sampled to provide sufficient material for environmental testing. Sampling will be conducted to collect a representative sample from each geologically distinct unit within the area. Samples will weigh a minimum of 2 kg. Depending upon their volume, large homogenous borrow sources may require multiple samples. After sampling, each sample will be bagged and carefully labelled with a unique identifier.

3. Analysis
   Samples will be submitted to a certified environmental laboratory for testing. The samples will be analyzed for acid-base accounting (ABA) parameters to assist in the determination of their ARD/ML potential. This will include the following analyses: paste pH, total sulphur, sulphate sulphur, sulphide sulphur, neutralization potential and metals by aqua regia-ICP. Analytical methods will follow current industry standards and/or those described in the Draft BC ARD Guidelines (Guidelines) by Price (1997[4]).

4. Assessment Analysis
   Samples which have sulphide sulphur contents >0.3% and/or paste pH values less than 5.5 will be considered potential ARD/ML materials. These materials will require additional testing using acid-base accounting (ABA) to further assess their ARD/ML characteristics. Samples with sulphide sulphur contents below 0.3% and paste pH values above 5.5 will be considered to be non-acid generating.

   Secondly, ABA test results will be assessed following the Draft BC ARD Guidelines use of Net Potential Ratios (NPR, the ratio of neutralization potential (NP) to the sulphide acid potential (AP). Materials will be classified according to the following criteria:

NPR < 1	Likely acid generating
NPR > 1 and NPR < 2	Potentially acid generating
NPR > 2 and NPR < 4	Not likely acid generating
NPR > 4	Not acid generating

   As an added precaution, any materials with neutralization potential (NP) values below 10 kg $CaCO_3$/tonne should undergo additional testing consisting of the shake flask extraction test (as per the Draft BC ARD Guidelines) to determine the presence of leachable acidity or metals. Materials with leachate chemistries in exceedance of Metal Mining Effluent Regulation (MMER) guidelines would be excluded from use as road or construction material.

5.2 2006 Geochemical Sampling

A thick organic cover over the first 9 km (from the Robert Campbell Highway) of the road route prevented any bedrock or overburden sampling by YZC in this area. The last ~4 kms were also covered with thick organic layers and the bedrock and/or overburden were not sampled. During their assessment in October 2006, EBA collected samples for geotechnical purposes and upon further examination, submitted geochemical samples for areas where the organic mat or permafrost did not limit sampling.A summary of the onsite inspections and sample locations are provided in Table 5.1 and shown on Figure 1.

[4] Price, W.A. (1997), DRAFT Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia, British Columbia Ministry of Employment and Investment, Energy and Minerals Division, Smithers, BC, (April), 143p.

Table 5.1 Summary of Geochemical Sampling Field Observations

Sample ID	Location (km)	Description	Fizz Rating (1-10*)	Sulfide Content (%)	ARD Potential Estimate
JD10-4-2-G1	0+100	Borrow Pit Primary 1, Staging Area, Construction Camp - 3.0 m testpit depth	-	-	-
JD-10-3-4	1+600	1.6 m testpit depth	-	-	-
JD-10-6-4G	2+800	Borrow Pit Secondary 3, 3.0 m testpit depth	-	-	-
WVR06-01	9+400	Small cut on west side of road, poorly sorted, well rounded glacial-fluvial overburden	5	<1	nil
WVR06-03	10+000	Road cut immediately north of Bunker Creek. Poorly sorted, well rounded glacial-fluvial overburden	1	<1	nil
JD10-5-1G	10+300	Road cut immediately south of Bunker Creek, Borrow Site Primary 2, 3.0-5.0m testpit depth	-	-	-
WVR06-02	10+400	Road cut on west side of road, poorly sorted, well rounded glacial-fluvial overburden	0	<1	nil
WVR06-04	14+100	Road cut on west side of road, poorly sorted sub-rounded to sub-angular glacial overburden	1	<1	nil
WVR06-05	15+100	Large outcrop on west side of road greenstone with abundant greenstone cobbles in creek bed	1	<1	nil
WVR06-06	15+400	Large outcrop on east side of road well foliated greenstone	1	<1	nil
WVR06-07	15+800	Large outcrop on west side of road near creek greenstone	1	<1	nil
JD10-06-10G	17+200	Borrow Pit Primary 4 on fluvial terrace, 3.0 m testpit depth, Money/Go Drainage Divide	-	-	-
WVR06-08	18+700	Large outcrop on west side of road greenstone	1	<1	nil
WVR06-09	20+000	Colluvium on west side of road consisting of cobbles and boulders of greenstone	1	<1	nil

Note: Fizz rating 1= no visible CO_2 production with the addition of 10% HCl; Fizz rating 10= abundant CO_2 production with the addition of 10% HCl.
Visual assessment information was not collected by EBA during their geotechnical program (samples beginning with JD)

5.3 Road Alignment ARD/ML Assessment

AMEC has reviewed the ABA results according to the protocols described in the Draft BC ARD Guidelines (Price, 1997), and described above for the access road samples. A summary of the geochemical test results is provided in Table 5.2

Table 5.2 2006 ABA Test Results for the Access Road

Sample ID	Location (km)	Paste pH	Fizz Rating	NP kg CaCO3/t rock	AP kg CaCO3/t rock	NNP kg CaCO3/t rock	NPR -	Total S %	Sulphate S %	Sulphide S %	Acid Potential*
JD10-4-2-G1	0+100	8.2	2	55	0.9	54	58.67	0.03	<0.01	0.03	NAG
JD-10-3-4	1+600	8.7	3	217	1.9	215	115.75	0.06	<0.01	0.06	NAG
JD-10-6-4G	2+800	8.4	3	52	0.9	51	55.47	0.03	<0.01	0.03	NAG
WVR06-01	9+400	8.4	2	55	1.9	53	29	0.06	<0.01	0.06	NAG
WVR06-03	10+000	7.6	1	11	0.9	10	12	0.03	<0.01	0.03	NAG
JD10-5-1G	10+300	7.7	1	6	<0.3	6	38.4	<0.01	<0.01	<0.01	Uncertain
WVR06-02	10+400	7.4	1	4	1.3	3	3	0.04	<0.01	0.04	Uncertain
WVR06-04	14+100	7.5	1	9	0.3	9	29	0.01	<0.01	0.01	Uncertain
WVR06-05	15+100	8.4	2	19	<0.3	19	122	<0.01	<0.01	<0.01	NAG
WVR06-06	15+400	8.4	2	24	0.3	24	77	0.01	<0.01	0.01	NAG
WVR06-07	15+800	8.7	2	13	0.3	13	42	0.01	0.02	<0.01	NAG
JD10-6-10G	17+200	7	1	7	0.6	6	11.2	0.02	<0.01	0.02	Uncertain
WVR06-08	18+700	8.2	1	13	<0.3	13	83	<0.01	<0.01	<0.01	NAG
WVR06-09	20+000	8.6	1	12	0.3	12	38	0.01	<0.01	0.01	NAG

Notes:
AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material.
NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material.
NNP = NP - AP
NPR = NP/AP
NAG = Non-acid Generating
S = Sulphur
*Acid Potential based on paste pH, sulphide sulphur, NPR and NP
< = Less than analytical detection limit

Based on these results, AMEC has come to the following conclusions:

- All samples have a paste pH > 5.5 and a sulphide sulphur content significantly less than 0.3%, indicating that the samples are considered to be non-acid generating.
- However, samples WVR06-02, WVR06-04, JD10-6-10G and JD10-5-1G have NP values of less than 10 kg $CaCO_3$/tonne. Sulphide sulphur contents of these materials are very low, ranging from <0.01 to 0.02%, and sulphate sulphur contents are below the detection limit of 0.01%.
- Due to the low NP values, it is recommended that these samples (WVR06-02, WVR06-04, JD10-6-10G and JD10-5-1G) undergo shake flask extraction testing to determine the presence of leachable acidity or metals.

YZC has requested shake flask testing for those samples listed as Uncertain in Table 5.2 as per AMEC's recommendation and results are pending.

6 Geotechnical Testing

Geotechnical Testing Protocols proposed in the June 2006 submission, were employed in two phases by EBA Engineering Consultants Ltd. Test results for both the roadway investigation (July 2006) and the granular source investigation (October 2006) have been provided in the Wolverine General Site Plan (Version 2006-02, December 2006).

Field work was completed in July 2006 by Jack Dennett, P.Geo. and James Buyck of EBA. The report was completed and sealed by J. Richard Trimble, M.Eng, P.Eng., and Jack Dennett, P.Geo. in August 2006, and submitted to EMR for review. The granular and borrow investigation field work and the Excerpts Report were completed by J. Dennett in October 2006. Moisture (ice) content information was provided in critical sections.

Design adjustments and recommended construction methods, resulting from these findings and recommendations, are provided in Figure 1 and in Table 3.3.

7 Phase 2 Road Closure Plans

At the completion of the mine production phase the mine closure plan will come into effect and reclamation of the access road will be undertaken. This will involve the removal of the culverts and drainage structures and decommissioning of the roadbed itself.

7.1 Phase 2 Culvert and Drainage Structure Removal

All culverts, drainage structures and the Bunker Creek bridge will be removed and disposed of off-site at an appropriate location. The following activities are planned:

- Trenches resulting from the removal of culverts will be swaled or contoured to match the surrounding terrain.
- Where warranted due to fine grain soils, erosion protection will be installed within the remaining swales, to a point where the reclaimed watercourse meets with its original path in undisturbed soil.
- Ditch blocks will be removed.
- Where ditches are to be left intact (some steeper sections) existing ditch erosion protection may be left in place, due to fine-grained soils.
- The Bunker Creek bridge will be removed, and the abutments will be excavated to the level of the rip-rap placed during construction.

7.2 Phase 2 Roadbed Decommissioning

The roadbed itself will be contoured and rounded throughout its length, and the following activities are planned:

- Soils will be shaped to match the surrounding topography.
- Surfaces of gradients less than 25% will be scarified (using scarifiers on bulldozers, excavators and graders) to better accept seeding.

Access will be prevented by removing the culvert and fill material across the bog at km 0+575, and by the measures provided in Section 3.2.3 herein.

7.3 Phase 2 Closure Costs

YZC proposes to provide security commensurate with outstanding environmental liability associated with the Phase 2 road reclamation and closure costs prior to the onset of activities for the Phase 2 all weather access road in spring 2007.

The total cost for closure and reclamation was provided in the All Weather Access Road Report Version 2006-01. The cost has been re-evaluated and is provided in the Table 7.1. The cost breakdown is based on the same unit rates provided by a SteveJan Consultants Inc report dated September 20, 2006 (requested by EMR to review Version 2006-01 report road closure cost estimate) with revised quantity estimates.

Based on these previous calculations and volumetric and plan area impact estimates, YES estimates the cost (without contingencies factored in) for the access road closure at ($652,950), as indicated in Table 7.1.

Table 7.1 Closure and Reclamation Cost Breakdown for Phase 2 All Weather Access Road

Component	Description-Equipment/Labor	Units	Quant.	Unit Cost	Cost
Lowering road grade	Removing excess material to adjacent areas (including borrow sources) to make road stable against erosion-Cat D8 dozer	Hrs.	100	$185	$18,500
"	"–Cat 325 excavator	Hrs	140	$190	$26,600
"	"–Volvo A35 articulating haul truck	Hrs.	140	$190	$26,600
Stabilize side slopes	Flatten minor roadside cut banks/fill slopes with small excavator-Cat 325 (includes return travel time for length of road)	Hrs.	80	$190	$15,200
Culverts - 600mm dia. size	Work includes uncovering, removal to offsite for re-use, re-sloping banks, armoring wetted portion	Ea.	34	$1,500	$51,000
Culverts - 800mm - 2600mm dia. size	"	Ea.	27	$4,000	$108,000
Culvert Crossings-restoration work	Minor restoration work, installation of environmental protection measures	L.S.	1	$20,000	$20,000
Bunker Creek Bridge removal	Removal of 21.336m bridge complete with bin-wall abutments, re-sloping of banks.	L.S.	1	$75,000	$75,000
Bunker Creek-habitat restoration	Restoration of habitat in riparian zone. (Re-seeding)	L.S.	1	$2,000	$2,000
Scarifying lowered road surface	To encourage re-vegetation (25km x 15m)-Cat D8	Ha.	37.5	$2,000	$75,000
Reclaiming spoil piles	Restoration of spoil piles containing excess organics from road construction-Cat 325	Km.	25	$1,000	$25,000
Borrow sources-stabilize slopes	Stabilize the slopes of the excavations-Cat D8 dozer	Hrs.	40	$185	$7,400
Borrow sources-S&F flat areas	Using ATV mounted applicator for seed & fertilizer	Ha.	15	$1,500	$22,500
Borrow sources-hydroseed	Apply hydro-seed to steeper slopes (>1V:4H slope)	Ha.	5	$3,000	$15,000
Corridor re-vegetate-broadcast S&F	Using ATV mounted applicator for seed & fertilizer incl staging area (25km x 15m & 4 ha)	Ha.	41.5	$1,500	$62,250
Maintenance S&F-after 1 year	Assume coverage of 50% with S&F, and other 50% with fertilizer alone	Ha.	41.5	$1,000	$41,500
Permanent barrier at highway access	Trenching and barricading using natural materials in the area, to dissuade casual access-Cat 315	L.S.	1	$2,000	$2,000
				Subtotal	**$593,550**
Engineering (5%)	For major components, especially removal of bridge				$29,700
Surveying (5%)	For final as-builts of new contours and stream crossings				$29,700
				Total	**$652,950**

8 Best Management Practices For Construction

To ensure construction activities have a minimal impact on the environment, best management practices will be followed. Examples of BMP procedures for sediment and erosion control and site islolation that will be incorporated in project planning activities are summarized in the sub-sections that follow. While it is recognized that there are general environmental techniques and procedures to minimize environmental damage, site-specific conditions will usually require a solution unique for that location. All onsite activities that interact with the environment will be reviewed by the onsite Environmental Coordinator and Yukon government inspectors, as required. The main steps for review and approval of an activity are as follows:

- obtain information pertaining to the job activity
- determine environmental risk, assess risk and determine mitigation measures
- if required, contact government regulatory agencies and prepare regulatory applications

Mitigation measures including general sediment and erosion control techniques and monitoring plan requirements are provided below and specific plans will be developed.

8.1 Sediment and Erosion Control

The key to controlling erosion and sedimentation caused by work-related activities is to manage off and onsite runoff. In general, to minimize erosion and sedimentation, work-related activities will be managed to:

- minimize disturbance to vegetation and limit area of clearing
- minimize length of time that unstable erodible soils are exposed
- stabilize erodible soils as soon as practical by seeding or installing erosion control blankets
- ensure effective installation of sediment control measures (silt fences, sediment traps, etc.) before starting work

Effective ways to control erosion and trap sediment are summarized in Table 8.1. Sediment traps and barriers (i.e., silt fences, straw bales, etc.) will be inspected regularly while they are in place, and cleaned when required to maintain effectiveness. Sediment-laden or turbid runoff will be directed into vegetated areas and temporary fills or stockpiles will be covered with impermeable covers (e.g., plastic) during heavy rainfall.

Table 8.1 Description of Sediment and Erosion Techniques

Technique	Description	Application
Vegetation: preservation and replanting	Maintain vegetation, minimize grubbing and maintain root mat, reseed/ replant	On slopes, stream banks, floodplains to permit infiltration and minimize surface disturbance
Silt fences	Geotextile vertical barrier that causes sediment deposition	On slopes with erodible soils – surface applications only (not to be used instream [i.e., flowing water])
Straw bales	Barrier that causes sediment deposition	On slopes with erodible soils and in low surface or low flows only
Sediment traps or basins	Excavate minor depressions to allow sediment to settle	In areas where high volumes of sediment-laden water occurs; may be used with silt fencing or bales
Flumes/ spillways	A chute or pipe of non-erodible material to convey runoff down a slope	In areas with concentrated high velocity surface runoff
Check dams	Small dams to reduce the velocity of storm water flows in swales/ditches	In small open channels
Erosion control blankets	Natural fibre matting used to minimize surface erosion	In areas with surface runoff or channels
Plastic covers	Tarp to cover erosive soils	In non-vegetated areas where a temporary measure is required to control runoff until the site is stabilized

8.2 Site Isolation

Isolation techniques are required for instream work where sensitive habitat is potentially affected, or in areas where site activities have the potential to adversely affect downstream habitat. The isolation of a site reduces erosion and the release of contaminants offsite. Methods of isolating a work site so that works may proceed in isolation of flowing water or surface runoff include instream diversions, surface diversion berms or dikes, and swales, by-pass pipes, and coffer dams. A brief description of these mitigation techniques is provided in Table 8.2

Table 8.2 Description of Site Isolation Techniques

Technique	Description	Application
Instream diversion	Divert streams using dams, alternate channel, berms, pumps, etc.	To isolate an area to work in the dry; may be used with other techniques to minimize erosion and sedimentation
Diversion berms/dikes	Low berm used to divert surface water	Near slopes or around a work site; good for containing an area or preventing runoff into an area
Swales	Ditch to intercept storm runoff and divert to acceptable area	Along uphill side of exposed slopes to minimize runoff flowing across slope; may be used with other techniques to minimize erosion and sedimentation
By-pass pipes	Flexible hoses, pipes, or flumes used to carry/ pump water through or around a site	To isolate an area to work in the dry; limits sediment release, maintains streamflow
Coffer dams	sandbags, sheet piling, geotextiles used as a dam, pumps used to remove water	To isolate or contain a work area on larger streams

8.3 Environmental Monitoring

The purpose of environmental monitoring is to ensure that site activities have minimal adverse environmental effects. Monitoring activities and priorities vary between sites and construction works and will include inspections to ensure that:

- all equipment used for instream work is clean and is in good mechanical order with no fluid leaks
- all fuels and lubricants are stored and refueling and changing of oils/lubricants is conducted well away from any body of water
- spill containment and clean-up equipment are onsite at all times
- all water displaced from concrete forms during concrete pouring is discharged into a sump
- all stockpiles of material are kept above high watermarks
- all mitigation measures are functioning as designed

Environmental monitoring will ensure a high standard of environmental protection and compliance with all regulatory requirements. Details of monitoring programs will be specific to each work activity and specific plans will be developed in conjunction with the various contractors. A fulltime Construction Management and Inspection Team will monitor all construction activities throughout the construction schedule, including clearing operations.

During construction activities in 2007, a qualified Construction Manager or Project Engineer and an Environmental Monitor will be on site to:

- coordinate the activities of contractors and technical specialists
- ensure accurate layout and measurement of the work as well as quality control
- re-design as required to accommodate changes in conditions (i.e., soils conditions or grade-line corrections)
- ensure contractor compliance with all regulatory, permitting and contractual conditions
- prepare daily reports of all construction activities, including equipment employed, areas works, personnel involved, and possible mishaps, outcomes and remedies
- complete photographic journal of all activities and a weekly summary report
- monitor for safety infractions and near misses, and document outcomes and corrective actions

9 Summary

This plan is provided following the completion of the Issued for Construction Design and Drawings, provided as Figure 1.

Thank you.
Yukon Engineering Services Inc.

Rob Harvey	Paul J. Knysh, P.Eng.
CEO YES Group, Project Designer	Engineering Manager, YES Group, Project Engineer

Enclosure:

Figure 1: "***Wolverine All Weather Access Road***
km 0.0 to km 24.0
ISSUED FOR CONSTRUCTION
January 12, 2007"
(E06015_4_PP.dwg)
KM 0 - PLAN/PROFILE KM 0+000 TO KM 1+500
KM 1.5 - PLAN/PROFILE KM 1+500 TO KM 3+000
KM 3 - PLAN/PROFILE KM 3+000 TO KM 4+500
KM 4.5 - PLAN/PROFILE KM 4+500 TO KM 6+000
KM 6 - PLAN/PROFILE KM 6+000 TO KM 7+500
KM 7.5 - PLAN/PROFILE KM 7+500 TO KM 9+000
KM 9 - PLAN/PROFILE KM 9+000 TO KM 10+500
KM 10.5 - PLAN/PROFILE KM 10+500 TO KM 12+000
KM 12 - PLAN/PROFILE KM 12+000 TO KM KM 13+500
KM 13.5 - PLAN/PROFILE KM 13+500 TO KM 15+000
KM 15 - PLAN/PROFILE KM 15+000 TO KM 16+500
KM 16.5 - PLAN/PROFILE KM 16+500 TO KM 18+000
KM 18 - PLAN/PROFILE KM 18+000 TO KM 19+500
KM 19.5 - PLAN/PROFILE KM 19+500 TO KM 21+000
KM 21 - PLAN/PROFILE KM 21+000 TO KM 22+500
KM 22.5 - PLAN/PROFILE KM 22+500 TO KM 24+000
BUNKER - GENERAL LAYOUT
3751-SK-601 - GENERAL ARRANGEMENT (AE)
3751-SK-602 - STEEL GIRDER DETAILS SHEET 1 (AE)
3751-SK-603 - STEEL GIRDER DETAILS SHEET 2 (AE)
BW 02-07001 - BIN WALL BRIDGE ABUTMENT DESIGN (ARMTEC)
BW 02-07002 - BIN TYPE RETAINING WALL BACKFILL INSTRUCTIONS AND DESIGN NOTES (ARMTEC)
BW-40001E - BIN TYPE RETAINING WALL STANDARD DETAILS AND COMPONENTS (ARMTEC)
BW-40002E - BIN TYPE RETAINING WALL STANDARD DEPTH AND HEIGHT COMBINATIONS (ARMTEC)