# Wolverine Project

## GENERAL SITE PLAN

*VERSION 2007-03*

**Prepared by:**
**Yukon Zinc Corporation**

**In Association with:**
**AMEC Earth and Environmental**
**Klohn Crippen Berger**
**EBA Engineering Consultants Ltd.**
**Yukon Engineering Services Inc.**

**April 2007**

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# 1 Introduction

This report, prepared by Yukon Zinc Corporation (YZC), describes the general site plan to deliver the Wolverine Project over a period extending from April 2007 to December 2008. This report replaces the *General Site Plan* submitted in November 2006 (Version 2006-02) by YZC to Yukon Government Energy, Mines and Resources.

Section 2 of this report provides the current project development schedule for construction and operation activities. Section 3 outlines the overall project layout and associated mineral claims for the project area (industrial complex area to the tailings facility) and the access road. Sections 4 through 7 detail the activities to be conducted in accordance with Quartz Mining License QML-0006, prior to the effective date of the Type A Water Licence (A Licence).

The main construction targets include the access road, permanent camp, industrial complex infrastructure, pre-production underground development, as well as general site preparation activities in the tailings facility area.

# 2 Project Schedule

The schedule for construction and operation activities at the Wolverine Project, including required and critical path activities and milestones, is provided in Figure 1. YZC recognizes that minimal earthwork and concrete work will occur between November 15 and April 1, and have scheduled tasks accordingly.

The schedule is subject to a production decision, regulatory approvals, and project financing and is based upon the Quartz License (issued December 2006) and anticipated receipt of the A Licence in September 2007.

Where practical, prefabrication off site will be completed to reduce on site labour and construction time. The development of the surface infrastructure and the underground is estimated to take approximately one and one half years, resulting in commissioning of the plant in late 2008.

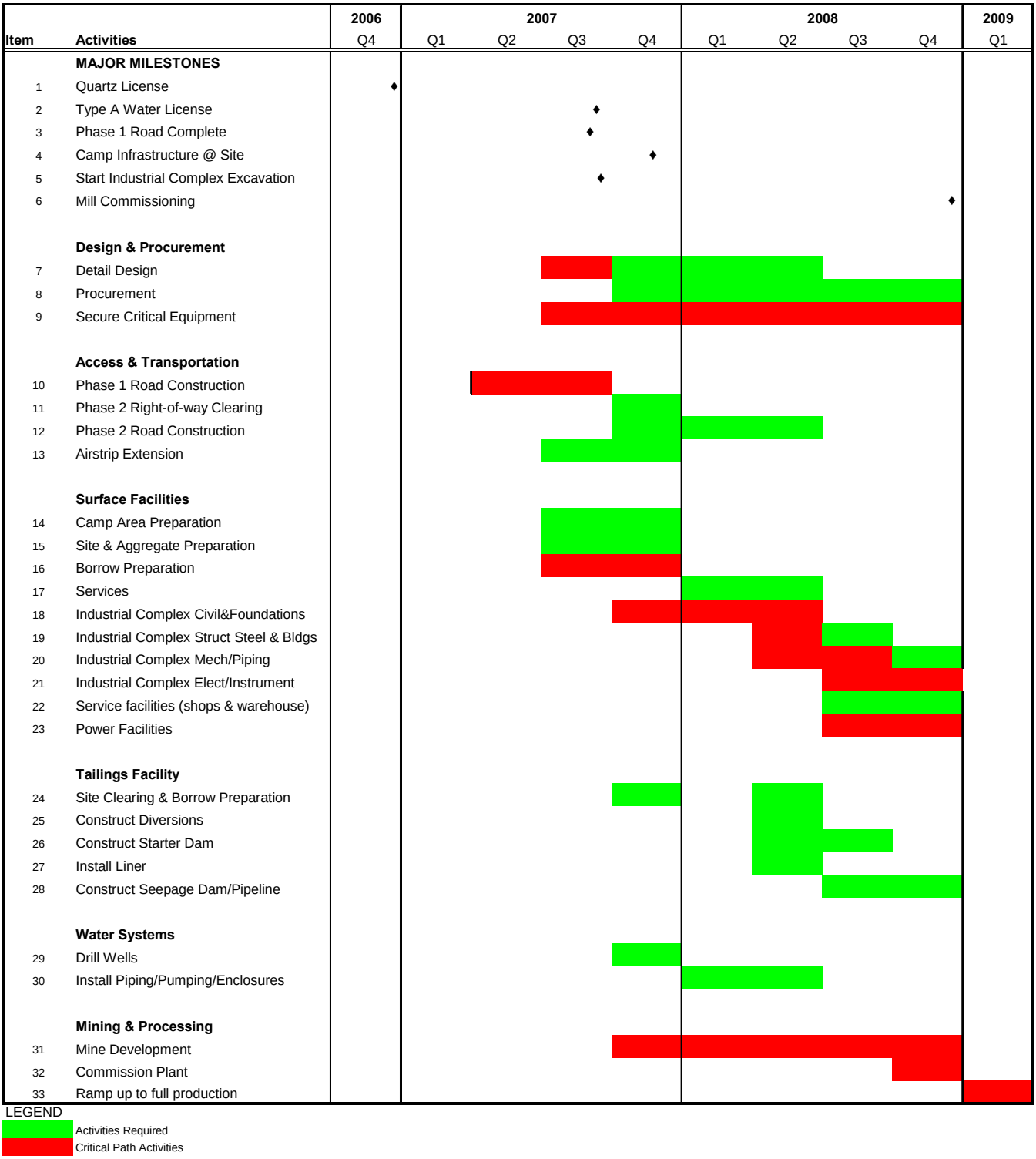



**Figure 1. Development Schedule for Wolverine Project**

# 3 Site Layout and Mineral Claims

The activities planned and the infrastructure to be constructed or in use as described herein are located on claims owned by YZC, with the exception of the Money Claims, which are subject to an Option Agreement with YGC Resources Ltd.

Table 1 provides a summary of the claims for the site facilities, site roads, the airstrip, the access road, the exploration and new camp locations, organic stockpiles, laydown and borrow locations, the tailings facility and associated infrastructure, and the ore body.

**Table 1. Claims List for Wolverine Project Infrastructure**

| Grant No. | Claim Name | Claim No. | Wolverine Project Infrastructure |
|---|---|---|---|
| YB87703 | CUP | 9 | access road, borrow site |
| YB87704 | CUP | 10 | access road, borrow site |
| YB87705 | CUP | 11 | access road, borrow site |
| YB87706 | CUP | 12 | access road, borrow site |
| YB87707 | CUP | 13 | access road, borrow site |
| YB87708 | CUP | 14 | access road, borrow site |
| YB87709 | CUP | 15 | access road, borrow site |
| YB87710 | CUP | 16 | access road, borrow site |
| YB87711 | CUP | 17 | access road, borrow site |
| YB87712 | CUP | 18 | access road, borrow site |
| YB87713 | CUP | 19 | access road, borrow site |
| YB45954 | FOOT | 1 | airstrip, tailings pipeline, water supply well, diversion structure, site roads, landfill, incinerator |
| YB45955 | FOOT | 2 | explosive and cap magazine sites, site roads |
| YB45956 | FOOT | 3 | tailings pipeline, site roads |
| YB45957 | FOOT | 4 | explosive and cap magazine sites, site roads |
| YB45958 | FOOT | 5 | industrial complex, batch plant, tailings pipeline, waste rock pad, camp, site roads, organic stockpile |
| YB45959 | FOOT | 6 | industrial complex, waste rock pad, camp, site roads |
| YB45960 | FOOT | 7 | industrial complex, tailings pipeline, camp, site roads |
| YB45961 | FOOT | 8 | industrial complex, camp, site roads |
| YB45962 | FOOT | 9 | industrial complex, ore body, site roads |
| YB45963 | FOOT | 10 | industrial complex, ore body, site roads, organic stockpile |
| YB51608 | FOOT | 11 | industrial complex, site roads, organic stockpile |
| YB71274 | FOOT | 11A | industrial complex, site roads, organic stockpile |
| YB51609 | FOOT | 12 | industrial complex, ore body, site roads |
| YB71275 | FOOT | 12A | industrial complex, ore body, site roads |
| YB45966 | FOOT | 13 | site roads |
| YB45967 | FOOT | 14 | site roads |
| YB45968 | FOOT | 15 | site roads |
| YB45969 | FOOT | 16 | site roads |
| YB45971 | FOOT | 18 | site roads |

**Table 1. Claims List for Wolverine Project Infrastructure (cont'd)**

| Grant No. | Claim Name | Claim No. | Wolverine Project Infrastructure |
|---|---|---|---|
| YB45973 | FOOT | 20 | site roads |
| YB59982 | FOOT | 180 | exploration camp, site roads |
| YB59983 | FOOT | 181 | exploration camp, site roads |
| YB59984 | FOOT | 182 | exploration camp, site roads |
| YC25006 | GOALIE | 29 | access road |
| YC25007 | GOALIE | 30 | access road, borrow site |
| YC25008 | GOALIE | 31 | access road, borrow site |
| YC25009 | GOALIE | 32 | access road, borrow site |
| YC25010 | GOALIE | 33 | access road, borrow site |
| YC25011 | GOALIE | 34 | access road |
| YC25012 | GOALIE | 35 | access road |
| YC25013 | GOALIE | 36 | access road |
| YC25014 | GOALIE | 37 | access road |
| YC25015 | GOALIE | 38 | access road, borrow site |
| YC25016 | GOALIE | 39 | access road, borrow site |
| YC25017 | GOALIE | 40 | access road, borrow site |
| YC25018 | GOALIE | 41 | access road, borrow site |
| YC25019 | GOALIE | 42 | access road, borrow site |
| YC25020 | GOALIE | 43 | access road, borrow site |
| YC25021 | GOALIE | 44 | access road |
| YC25022 | GOALIE | 45 | access road |
| YC25023 | GOALIE | 46 | access road |
| YC25024 | GOALIE | 47 | access road |
| YC25025 | GOALIE | 48 | access road |
| YC25026 | GOALIE | 49 | access road |
| YC25027 | GOALIE | 50 | access road |
| YC25028 | GOALIE | 51 | access road |
| YC25029 | GOALIE | 52 | access road, borrow site |
| YC25030 | GOALIE | 53 | access road |
| YC25031 | GOALIE | 54 | borrow site |
| YC25032 | GOALIE | 55 | borrow site |
| YC25037 | GOALIE | 60 | access road, borrow site |
| YC25039 | GOALIE | 62 | access road, borrow site |
| YC25040 | GOALIE | 63 | access road |
| YC25041 | GOALIE | 64 | borrow site |
| YC25042 | GOALIE | 65 | access road |
| YC25058 | GOALIE | 81 | access road |
| YC25060 | GOALIE | 83 | access road |
| YC25062 | GOALIE | 85 | access road |
| YC25064 | GOALIE | 87 | access road, borrow site |
| YC25065 | GOALIE | 88 | access road |
| YC25066 | GOALIE | 89 | access road |
| YC25067 | GOALIE | 90 | access road, borrow site |
| YC25068 | GOALIE | 91 | access road, borrow site |

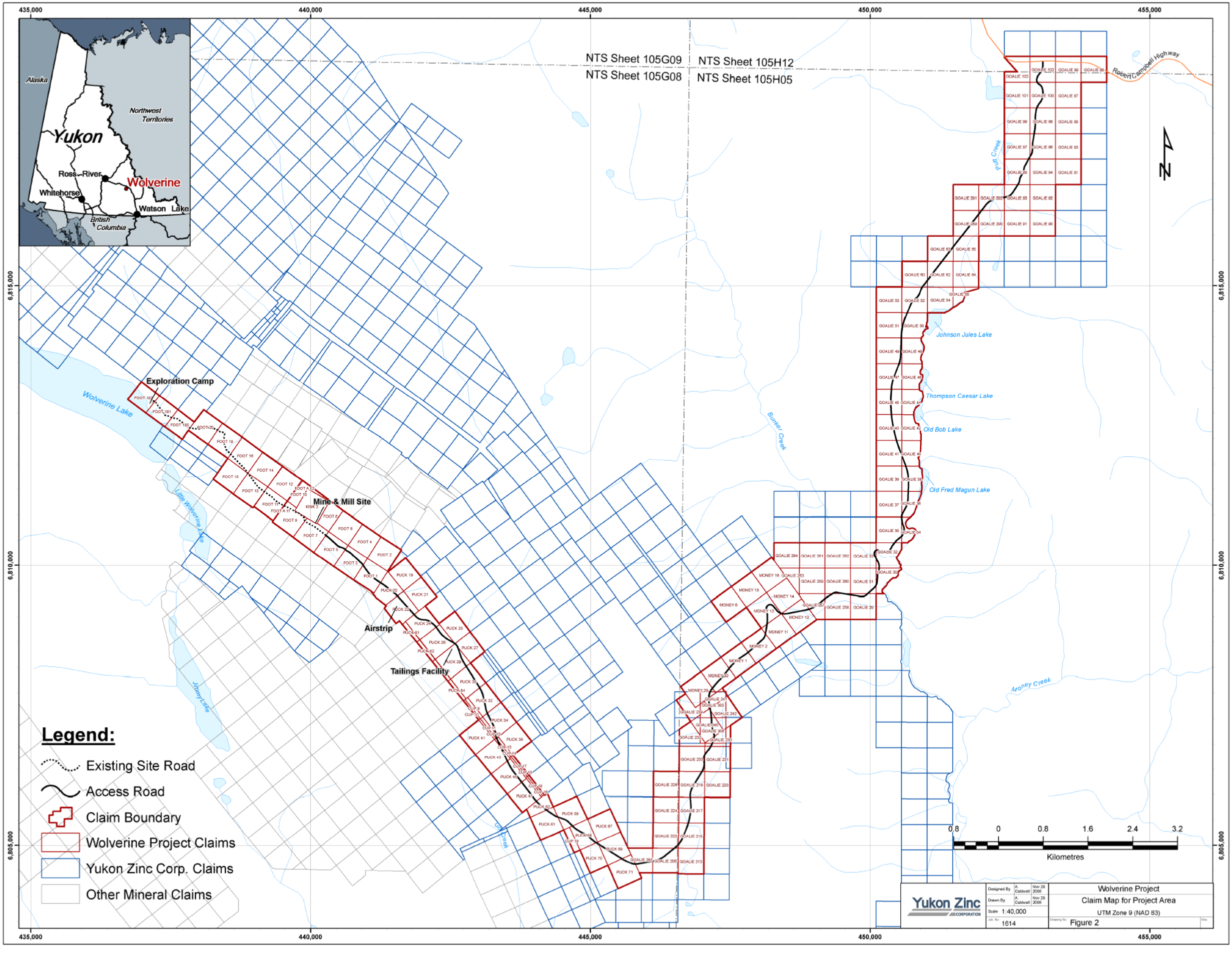
**Table 1. Claims List for Wolverine Project Infrastructure (cont'd)**

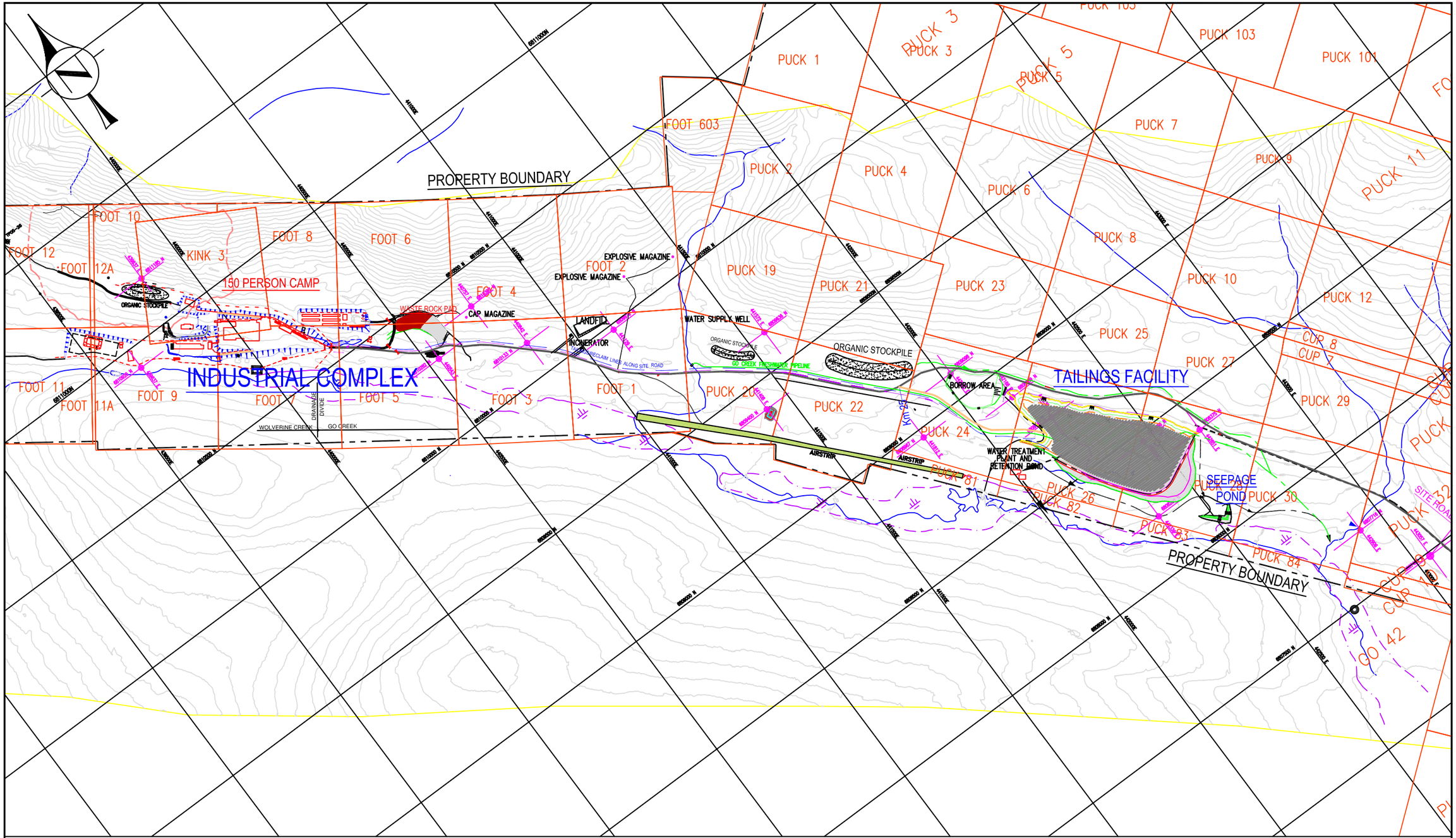
| Grant No. | Claim Name | Claim No. | Wolverine Project Infrastructure |
|---|---|---|---|
| YC25069 | GOALIE | 92 | access road, borrow site |
| YC25070 | GOALIE | 93 | access road, borrow site |
| YC25071 | GOALIE | 94 | access road |
| YC25072 | GOALIE | 95 | access road |
| YC25073 | GOALIE | 96 | access road |
| YC25074 | GOALIE | 97 | access road |
| YC25075 | GOALIE | 98 | access road, borrow site |
| YC25076 | GOALIE | 99 | access road, borrow site |
| YC25077 | GOALIE | 100 | access road, borrow site |
| YC25078 | GOALIE | 101 | access road, borrow site |
| YC25079 | GOALIE | 102 | access road |
| YC25080 | GOALIE | 103 | access road |
| YC25182 | GOALIE | 205 | access road |
| YC25183 | GOALIE | 206 | access road, borrow site |
| YC25299 | GOALIE | 213 | access road, borrow site |
| YC25301 | GOALIE | 215 | access road |
| YC25303 | GOALIE | 217 | access road |
| YC25305 | GOALIE | 219 | access road |
| YC25306 | GOALIE | 220 | access road |
| YC25308 | GOALIE | 222 | access road, borrow site |
| YC25310 | GOALIE | 224 | access road, borrow site |
| YC25312 | GOALIE | 226 | access road, borrow site |
| YC25316 | GOALIE | 230 | access road |
| YC25317 | GOALIE | 231 | access road |
| YC25318 | GOALIE | 232 | access road |
| YC25319 | GOALIE | 233 | access road |
| YC25325 | GOALIE | 239 | access road |
| YC25326 | GOALIE | 240 | access road |
| YC25327 | GOALIE | 241 | access road |
| YC25328 | GOALIE | 242 | access road |
| YC25343 | GOALIE | 257 | access road, borrow site |
| YC25344 | GOALIE | 258 | access road |
| YC25345 | GOALIE | 259 | borrow site |
| YC25346 | GOALIE | 260 | access road, borrow site |
| YC25347 | GOALIE | 261 | borrow site |
| YC25348 | GOALIE | 262 | borrow site |
| YC25349 | GOALIE | 263 | borrow site |
| YC25350 | GOALIE | 264 | borrow site |
| YC29140 | GOALIE | 289 | access road, borrow site |
| YC29141 | GOALIE | 290 | access road, borrow site |
| YC29142 | GOALIE | 291 | access road, borrow site |
| YC29143 | GOALIE | 292 | access road, borrow site |
| YC29439 | GOALIE | 305 | access road |
| YC29440 | GOALIE | 306 | access road |

**Table 1. Claims List for Wolverine Project Infrastructure (cont'd)**

| Grant No. | Claim Name | Claim No. | Wolverine Project Infrastructure |
|---|---|---|---|
| YA69009 | KINK | 3 | industrial complex, ore body, pipelines, organic stockpile |
| YB16726 | MONEY | 1 | access road |
| YB16727 | MONEY | 2 | access road |
| YB16731 | MONEY | 6 | borrow site |
| YB16736 | MONEY | 11 | access road |
| YB16737 | MONEY | 12 | access road, borrow site |
| YB16738 | MONEY | 13 | access road, borrow site |
| YB16739 | MONEY | 14 | access road, borrow site |
| YB16740 | MONEY | 15 | borrow site |
| YB16741 | MONEY | 16 | borrow site |
| YB51934 | MONEY | 29 | access road |
| YB51935 | MONEY | 30 | access road |
| YB55997 | PUCK | 19 | diversion ditch |
| YB55998 | PUCK | 20 | airstrip, tailings pipeline, water supply well, diversion structure, site roads |
| YB55999 | PUCK | 21 | organic stockpile, diversion ditch |
| YB56000 | PUCK | 22 | airstrip, tailings pipeline, site roads, diversion ditch, organic stockpile |
| YB56002 | PUCK | 24 | airstrip, tailings pipeline, site roads, organic stockpile |
| YB56003 | PUCK | 25 | diversion ditch |
| YB56004 | PUCK | 26 | tailings facility, site roads, diversion ditch, water treatment plant |
| YB56005 | PUCK | 27 | diversion ditch |
| YB56006 | PUCK | 28 | tailings facility, site roads, access road, borrow site, diversion ditch |
| YB56008 | PUCK | 30 | tailings facility, site roads, access road, borrow site |
| YB56010 | PUCK | 32 | access road, borrow site |
| YB56012 | PUCK | 34 | access road |
| YB56014 | PUCK | 36 | access road |
| YB56019 | PUCK | 41 | access road |
| YB56021 | PUCK | 43 | access road |
| YB56023 | PUCK | 45 | access road |
| YB56025 | PUCK | 47 | access road |
| YB56037 | PUCK | 59 | access road |
| YB56039 | PUCK | 61 | access road |
| YB56040 | PUCK | 62 | access road |
| YB56045 | PUCK | 67 | access road |
| YB56046 | PUCK | 68 | access road |
| YB56047 | PUCK | 69 | access road |
| YB56048 | PUCK | 70 | access road |
| YB56049 | PUCK | 71 | access road |
| YC31888 | PUCK | 81 | airstrip |
| YC31889 | PUCK | 82 | tailings facility, site roads, access road, borrow site, water treatment plant |
| YC31890 | PUCK | 83 | tailings facility, site roads, access road, borrow site |
| YC31891 | PUCK | 84 | tailings facility |

Figures 2 and 3 provide the claim map for the project area (including the mine access road) and the overall site layout for the main project area, respectively.


435,000
440,000
445,000
450,000
455,000
6,815,000
6,810,000
6,805,000
Alaska
Northwest Territories
Yukon
Ross River
Wolverine
Whitehorse
Watson Lake
British Columbia
NTS Sheet 105G09
NTS Sheet 105G08
NTS Sheet 105H12
NTS Sheet 105H05
Robert Campbell Highway
Putt Creek
Johnson Jules Lake
Thompson Caesar Lake
Old Bob Lake
Old Fred Magun Lake
Bunker Creek
Aroney Creek
Exploration Camp
Mine & Mill Site
Airstrip
Tailings Facility
Wolverine Lake
Little Wolverine Lake
Johnny Lake
Cat Creek
Legend:
Existing Site Road
Access Road
Claim Boundary
Wolverine Project Claims
Yukon Zinc Corp. Claims
Other Mineral Claims
0.8 0 0.8 1.6 2.4 3.2
Kilometres
Yukon Zinc Corporation
Designed By A. Caldwell Nov 28 2006
Drawn By A. Caldwell Nov 28 2006
Scale 1:40,000
Job. No. 1614
Wolverine Project
Claim Map for Project Area
UTM Zone 9 (NAD 83)
Drawing No. Figure 2
Rev.




LEGEND:

EXISTING SITE ROAD/MINE ACCESS ROAD

NEW ROAD

200m 0m 200m 400m 600m 800m 1000m

Yukon Zinc CORPORATION

| | | | |
|---|---|---|---|
| Designed By | H.Bosche | Dec 16 06 | WOLVERINE PROJECT |
| Checked By | | | OVERALL SITE LAYOUT WITH MINERAL CLAIMS |
| Drawn By | B.Wong | Dec 16 06 | |
| SCALE | 1 = 5000 | | |
| Job. No. | 1614 | | Drawing No. FIGURE 3 |
| | | | Rev. A |

| Rev. | REVISION DESCRIPTION | Date | By | App'd | Rev. | REVISION DESCRIPTION | Date | By | App'd | Dwg. No. | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|

# 4 Infrastructure Development Overview

Site development activities focus on construction of the mine access road, pre-production underground development as well as the following construction activities:

- clear, strip and bulk excavate the industrial complex and tailings facility areas
- establish the permanent camp and potable water source
- establish the concrete batch plant
- pour building foundations at the industrial complex, erect buildings and install/build internal workings

Figure 4 provides the site development areas, including the industrial complex, camp, landfill and incinerator area, airstrip extension, surface runoff diversion and collection ditches, water supply wells, borrow areas and tailings facility area. Figure 5 provides the general arrangement for the industrial complex and the location of laydown areas, buildings, stockpiles, fuel station and fuel and diesel storage, water management structures and the batch plant. Coordinates showing the extent of the development area are also provided.

Figure 6 provides cross sections through three areas of the industrial complex shown on Figure 5, including:

- Section A – through laydown area, truck shop, genset and fuel storage areas
- Section B – through mill building and fuel station and storage road
- Section C – through site road and camp

The general layouts of the mill, truckshop, assay lab, administration and camp buildings are provided in Figure 7. Construction activities will initially be supported by the existing exploration camp infrastructure located near Wolverine Lake, as well as the existing site roads and the airstrip. Beyond routine maintenance activities, no additional works are required for the camp and road infrastructure. Other surface works planned include activities at the portal laydown areas that support the current underground activities, including adit dewatering and subsequent water treatment, mine ramp rehabilitation, and pre-production development.

As outlined in Figure 1, scheduled tasks include design and procurement activities (Items 7 to 9), access road and airstrip extension activities (Items 10 to 13), surface facility site preparation and construction activities (Items 14 to 23), tailings facility site preparation activities (Items 24 and 28), as well as the installation of water wells and pipelines (Items 29 and 30) and mine development (Item 31). Details are provided in the following subsections.

N

PROPERTY BOUNDARY

TOTAL AREA OF DISTURBANCES
AT INDUSTRIAL COMPLEX = 265,000 sq.m.

150 PERSON CAMP

WASTE ROCK PAD

CAP MAGAZINE

ORGANIC STOCKPILE

INDUSTRIAL COMPLEX

EXPLOSIVE MAGAZINE

EXPLOSIVE MAGAZINE

LANDFILL

INCINERATOR

WATER SUPPLY WELL

ORGANIC STOCKPILE

GO CREEK FRESHWATER PIPELINE

TAILINGS/RECLAIM LINES ALONG SITE ROAD

TOTAL AREA OF DISTURBANCES
AT INCINERATOR = 20,000 sq.m.

TOTAL AREA OF DISTURBANCES
AT BORROW AREA = 32,000 sq.m.

TOTAL AREA OF DISTURBANCES
AT BORROW AREA & ORGANIC STOCKPILES = 190,000 sq.m.

ORGANIC STOCKPILE

BORROW AREA

Km 25

AIRSTRIP

AIRSTRIP

TAILINGS FACILITY

WATER TREATMENT
PLANT AND
RETENTION POND

PROPERTY BOUNDARY

DRAINAGE DIVIDE

WOLVERINE CREEK

GO CREEK

LEGEND:

EXISTING SITE ROAD/MINE ACCESS ROAD

NEW ROAD

TEST PIT

200m 0m 200m 400m 600m 800m 1000m

Yukon Zinc CORPORATION

| | | | |
|---|---|---|---|
| Designed By | H.Bosche | Dec 16 06 | WOLVERINE PROJECT |
| Checked By | | | OVERALL SITE LAYOUT |
| Drawn By | B.Wong | Dec 16 06 | FOR CONSTRUCTION ACTIVITIES |
| SCALE | 1 = 5000 | | |
| Job. No. | 1614 | | Drawing No. FIGURE 4 Rev. A |

| Rev. | REVISION DESCRIPTION | Date | By | App'd | Rev. | REVISION DESCRIPTION | Date | By | App'd | Dwg. No. | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|

N

AIR RETURN RAISE

OLD SITE ROAD

439837 E 6811185 N

FRESH AIR RAISE

ORGANIC STOCKPILE

AIR RETURN RAISE

ORE BODY OUTLINE

440000E

440500E

6810500 N

440750

439500E

FUEL STATION & STORAGE

SURFACE RUN-OFF DIVERSION DITCH

PROPANE & MINE HEATER

PORTAL

DYNAMIC STOCKPILE AREA @ EL 1370

150 PERSON CAMP

CAP MAGAZINE

PHASE 2

PHASE 1

GENSET/ELE. ROOM

MILL

ADMIN. BLDG

WASTE ROCK & & ORE STORAGE FACILITY

LAYDOWN AREA 13,500 sq. m.

BATCH PLANT

TAILINGS LINE

RECLAIM LINE

Fresh Water Pond 10,000 cu. m.

LAYDOWN AREA 12,000 sq. m.

FUEL

TRUCKSHOP

LAB

EXISTING ORGANIC STOCKPILE

TO EXPLORATION CAMP

LAYDOWN AREA 5,700 sq. m.

DIESEL

SITE RUN-OFF COLLECTION DITCH

SITE RUN-OFF COLLECTION DITCH

6810282 N

440543 E

6810000 N

WOLVERINE GREEK

COLLECTION POND

6811000N

A FIG 6

B FIG 6

C FIG 6

DRAINAGE DIVIDE

WOLVERINE CREEK

GO CREEK

439500E

6810500 N

440000E

6810000 N

LEGEND:

EXISTING SITE ROAD/MINE ACCESS ROAD

NEW ROAD

50m 0m 50m 100m 150m 200m 250m

Yukon Zinc CORPORATION

| Rev. | REVISION DESCRIPTION | Date | By | App'd | Rev. | REVISION DESCRIPTION | Date | By | App'd | Dwg. No. | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| Designed By | H.Bosche | Dec 16 06 |
| Checked By | | |
| Drawn By | B.Wong | Dec 16 06 |
| SCALE | 1=2,000 | |
| Job. No. | 1614 | |

WOLVERINE PROJECT

INDUSTRIAL COMPLEX WITH WATER MANAGEMENT STRUCTURES

Drawing No. FIGURE 5

Rev.

ORE BODY OUTLINE

AIR RETURN RAISE

OLD SITE ROAD

FUEL STATION & STORAGE

SURFACE RUN-OFF DIVERSION DITCH

PROPANE & MINE HEATER

LAYDOWN AREA
5,700 sq. m.

DYNAMIC STOCKPILE AREA @ El. 1370

150 PERSON CAMP

ADMIN. BLDG.

PORTAL

GENSET/ELE. ROOM

LAYDOWN AREA
13,500 sq. m.

MILL

TAILINGS LINE

TRUCKSHOP

LAB

RECLAIM LINE

SITE RUN-OFF COLLECTION DITCH

SITE RUN-OFF COLLECTION DITCH

COLLECTION POND

WOLVERINE CREEK

LEGEND:

EXISTING SITE ROAD/MINE ACCESS ROAD

NEW ROAD

50m 0m 50m 100m 150m 200m 250m

| Rev. | REVISION DESCRIPTION | Date | By | App'd | Rev. | REVISION DESCRIPTION | Date | By | App'd | Dwg. No. | REFERENCE DRAWINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|

Yukon Zinc CORPORATION

| | | |
|---|---|---|
| Designed By | H.Bosche | Dec 16 06 |
| Checked By | | |
| Drawn By | B.Wong | Dec 16 06 |
| SCALE | 1=2,000 | |
| Job. No. | 1614 | |

WOLVERINE PROJECT

INDUSTRIAL COMPLEX
MILL, TRUCKSHOP, LAB, ADMIN
AND CAMP PLAN

Drawing No. FIGURE 7

Rev.

# 5 Transportation Infrastructure

Infrastructure to support transportation requirements during site development and operation includes existing and new site roads, the mine access road from the Robert Campbell Highway and the airstrip.

## 5.1 Airstrip

In May and June 2007, the airstrip will be extended to a total length of 1220m to the northwest as indicated on Figure 4. The purpose of the extension is to accommodate larger aircraft to transport personnel to and from site. Go Creek runs perpendicular to the airstrip at the northern end, then parallels the airstrip on the western side. Go Creek is less than 5 m in width (at ordinary high water mark) at both the road crossing and airstrip crossing locations and YZC will divert the creek around the northern end of the airstrip.

Ditches will be upgraded on the eastern and western sides of the airstrip and the airstrip access road to promote drainage from the running surfaces and minimize surface erosion.

## 5.2 Site Roads

Between the airstrip and industrial complex and within the industrial complex, existing roads are shown as gray corridors and new roads are shown as orange corridors in Figures 3, 4, 5 and 7. There are no major stream crossings along any of the new road sections. Roadside ditches will be constructed and culverts installed in low-lying areas where necessary to minimize erosion and allow for proper drainage.

## 5.3 Access Road

YZC will construct access to the site from kilometer 189+965 of the Robert Campbell Highway to the project site in two phases with construction of a limited-use access road (Phase 1) in late May 2007 to mobilize equipment to site, and construction of the Phase 2 access road in fall 2007.

YZC retained Yukon Engineering Services Inc (YES) to complete the route selection, preliminary design, geotechnical assessment, detailed design, tendering, construction management and quality assurance. YES retained the services of EBA Engineering Consultants Ltd. (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. AMEC Earth & Environmental developed the environmental (ARD/ML) testing protocol provided in Section 5.3.6.

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 are provided below.

### 5.3.1 Phase 1 Access Road

The first phase of the access road development is the construction of a ~24 km long limited-use access road from km 189+965 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 summer 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 access road along the alignment of the cleared geotechnical investigation trail, which itself is within the footprint of the ultimate Phase 2 access road clearing, and in the steeper side-hill areas, will fall within the ultimate roadway prism. Details and drawings for the Phase 1 access road are contained within *General Site Plan Version 2006-02*. Although construction of the Phase 1 road has been delayed, it will be constructed within the same footprint proposed for winter construction. A part of the project monitoring by the onsite geotechnical manager will be to assess the conditions of the original ground prior to placement of sub-base materials. If sufficient ground ice contents are observed, the fill thicknesses will be correspondingly increased to preserve the permafrost.

### 5.3.2 Phase 2 Access Road

The second phase entails construction of an all weather access road for use by concentrate haul trucks and service vehicles during the operations phase. 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 the following sections.

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

**Table 2. Adapted Transportation Association of Canada Single Lane Resource Road Standards**

| | |
|---|---|
| - Desirable Minimum Curve Radii<br>- Minimum Curve Radii<br>- Minimum Switch-back Radii[1] | - 170m (Level of Service and Safety)<br>- 120m (TAC: LVR = 130, RLU = 120)<br>- 55m |
| - Maximum Gradient[2]<br>- Actual Maximum Gradient<br>- Minimum "k" Factor Crest<br>- Minimum "k" Factor Sag | - 13% (TAC)<br>- 11.6% (8% max. achieved in most cases)<br>- 15 (TAC: LVR = 18, RLU = 15)<br>- 10 (TAC: LVR = 18, RLU = 10) |
| - Single Lane Width<br>- Two Lane Width<br>- Super-elevation | - 6m crowned @ 3% (TAC: LVR = 4m)<br>- 8.5m crowned @ 3%<br>- Emax 6% |
| - Minimum Culvert Diameter<br>- Culvert Installations | - 600mm or $Q^{100}$ whichever is greater<br>- as per *YG 06010-1, -2, -3, -4, -5, -6, -7 (Appendix A)*<br>- 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)<br>- 1.5H:1V ratio, where safety berms are employed. (Rock embankment) |
| - Backslopes (earth cut)<br>- Backslopes (rock cut) | - 1.5H:1V ratio<br>- 0.5H:1V ratio |
| - Ditch Depth<br>- Ditch Type | - 1m<br>- "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)<br>- 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 Phase 2 access road design has been revised subsequent to the completion of the geotechnical field investigation (July 2006) and granular investigation (October 2006) programs executed by EBA Engineering Consultants Ltd, and following the Lidar Bare Earth topography provided by Woolpert on behalf of YZC. The EBA investigation reports were previously provided in *General Site Plan Version 2006-02*.

The road design drawings are provided in Appendix A and have been sealed by Paul J. Knysh, Yukon P.Eng. 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 soils conditions, by hand sample truthing of the mapped interpretations, then by a two phase geotechnical investigation. Contributing information to the design included a review of assessments by:

- *Surface Geology, Soils and Associated Interpretations. Wolverine Biophysical Surveys* (Mougeot Geoanalysis 1996)
- AXYS Environmental Consulting 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 provided in Table 3.

**Table 3. Controlling Stream Crossings along the Road Alignment**

| Stream Crossing | Figure 1 Dwg # | km Location | Latitude | Longitude | Nominal Crossing Width at Centreline **** | Structure Type |
|---|---|---|---|---|---|---|
| | | | | | | |
| Pitch | "km 1.5" | 2.74 | 61° 28’ 50.1” | 129° 53’ 32.1” | 0.5m | 1600mm Dia. CSP* |
| Putt | "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<br>0.9m | 1600mm Dia. CSP at km 23+113,<br>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. | | | | | |

Phase 2 design elements have not changed significantly since the initial road design submission (June 2006). The following exceptions apply as shown in Appendix A:

- **0 to 0.7 km** – The intersection with the Campbell Highway has been relocated, to 189+965 km of the Campbell Highway as per Access Permit #1560 (Appendix B). This was done in order to accomplish the following:
  - improve the intersection visibility for public safety
  - avoid permafrost over shallow bedrock 0 to 0.7 km
  - reduce impact by including the first section of roadway within the footprint of the planned Borrow Pit, Staging and Camp Area
- **0.7 to 2.9 km** – 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.
- **7.5 to 9.0 km** – Revised grade-lines ensure adequate embankment over ice-rich permafrost in this section. Non-woven geotextile will be applied over undisturbed organic materials prior to backfilling.
- **10.1 to 10.7 km** – Grade-lines have been improved from 10% to 8% for the section as a result of the more accurate surface topography. The design of the road through the Bunker Creek section has been optimized to the required standards. TAC RLU/LVR 60 provides for a maximum gradient of 13%, while the grade through the Bunker Creek section is at 10.29%. To flatten the hill would result in a huge change to the mass haul balance and higher construction costs. To adjust the alignment so that the road would follow the hill around would result in changes to the bridge design to allow for the long trucks to enter onto the bridge while still negotiating the corner. The cost of installing the modified bridge is high and the current road design fits within the proposed standards. Although it appears that the grades lines have been steepened to keep the span of the crossing as short as possible, in actuality the

bridge was made as short as possible to allow the grades to be flattened. The approaches to the bridge were made as flat as possible to minimize impact to the bridge structure with heavy loads crossings. Vertical impacts to the bridge structure could result in higher maintenance and shorter life span of the entire bridge unit. It is the opinion of YES, that the design as proposed is satisfactory through this section.

- **10.7 to 16.4 km** – Grade-lines have been modified from the consistent 8%, to varying grade-lines of 6% to short "pitches" of 10%, due to the improved topography.
- **16.5 to 17.4 km** – 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 in Appendix A. Table 4 describes the conditions, Phase 2 Construction Method, and resultant plan for each segment along the ~24 km route.

During road construction the geotechnical engineer will assess the conditions of the original ground prior to placement of sub base materials. If, in the opinion of the geotechnical manager the original ground does not provide a stable base for the sub grade as designed, he will have the responsibility to recommend a course of action. This course of action could take the form of "benching in" the new materials, insulating to prevent degradation, or design modifications to the road alignment or profile. The subsurface soil and permafrost conditions in the sliver fill areas will be assessed to ensure that slope instability is minimized. If sufficient ground ice contents are observed, the fill thicknesses will be correspondingly increased to preserve the permafrost. Table 5 lists the guidelines for the geotechnical monitoring protocols during road construction.

## Table 4. 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 |

**Table 5. Guidelines for Geotechnical Monitoring Protocols**

| Location | Structure Type | Guideline |
|---|---|---|
| Pitch Creek - km 2.74<br>Putt Creek - km 2.89 | 1600 mm dia. CSP<br>2400 mm dia. CSP | Monitor the installation of the culvert. The base must be properly prepared, and all culvert bedding and backfill materials must be compacted in maximum lift thicknesses of 300mm, with each lift compacted to at lest 98% of SPMDD (ASTM D698) |
| Bunker Creek - km 10.25 | 21.336 Single Lane Resource Bridge | Monitor the installation of the Bin-Wall foundation and test all required geotechnical components of abutment construction such as footing or pile installations, concrete pours and backfill compaction. |
| Bogie Creek - km 15.59<br>Hawkowl Creek - km 23.11<br>Hawkowl Creek overflow | 1000 mm dia. CSP<br>1600 mm dia. CSP<br>1000 mm dia. CSP | Monitor the installation of the culvert. The base must be properly prepared, and all culvert bedding and backfill materials must be compacted in maximum lift thicknesses of 300mm, with each lift compacted to at lest 98% of Standard Proctor Maximum Dry Density (SPMDD) (ASTM D698) |
| General Embankment | Throughout the entire length of the access road | Periodically monitor and complete compaction testing on embankment fills while on site during culvert installations and bridge construction. Embankment fills must be compacted to 98% SPMDD. Assist the project engineer with determination of suitable fill materials being sourced from road cuts and borrow sites. |

Once the Bunker Creek Phase 1 temporary bridge is installed and a more detailed geotechnical investigation of subsoil conditions completed in the area, excavation and abutment foundation details of the Bin-Wall will be finalized.

### 5.3.3 Access Tie-In and Staging Areas

Yukon Engineering Services and Yukon Highways and Public Works Transportation Maintenance Branc has completed its assessment of the proposed intersection of the access road with the 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 Campbell Highway at present, and the intended RAU 90 designation of the Campbell Highway upgrades over the coming years.

The intersection with the Campbell Highway has been relocated from 189.4 to kilometer post 189+965, at the proposed staging area as shown in Appendix A. Access Permit #1560 is provided in Appendix B. A road construction camp and staging area will be constructed near the Campbell Highway for both Phase 1 and Phase 2. The staging area will be used throughout the construction of the mine and road. It is proposed to combine the access intersection, the construction camp and staging area into one development area.

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
- temporary parking and maintenance of construction equipment
- temporary fuel, parts and lubricant storage and distribution

Operational needs for the staging area include:

- chaining of trucks during the winter months
- holding area for vehicles awaiting authorization to proceed onto the access road
- access control gate

### 5.3.4 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.

*Operational Access Control*

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

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.

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

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:

- 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 VUN's
- retrieving all radios and VUN's 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 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 8 and 9 provide details of the Operational Access Control Gate, adopted from YG HPW Single Swing Gate details (GateSSI.dwg and GateSSE.dwg)

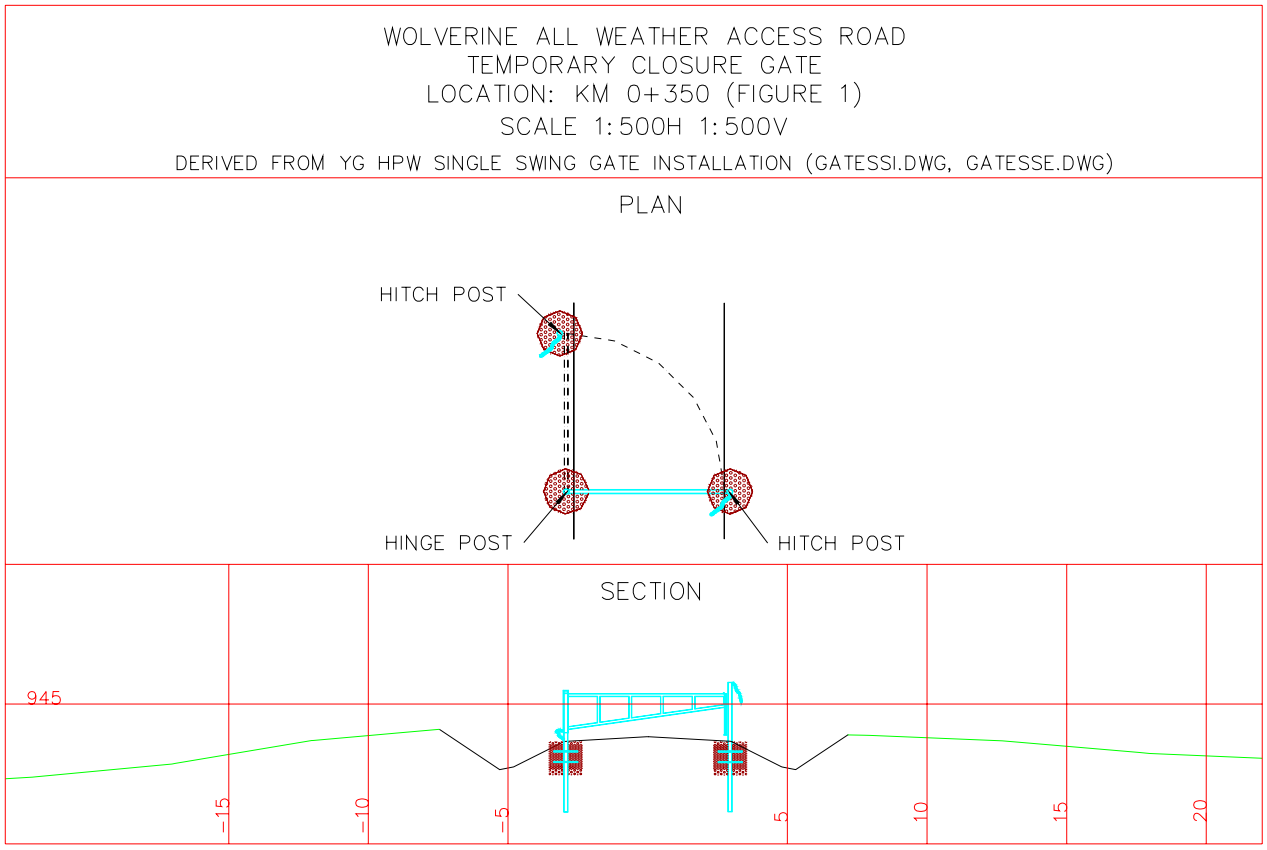



**Figure 8. Operational Access Control Gate**

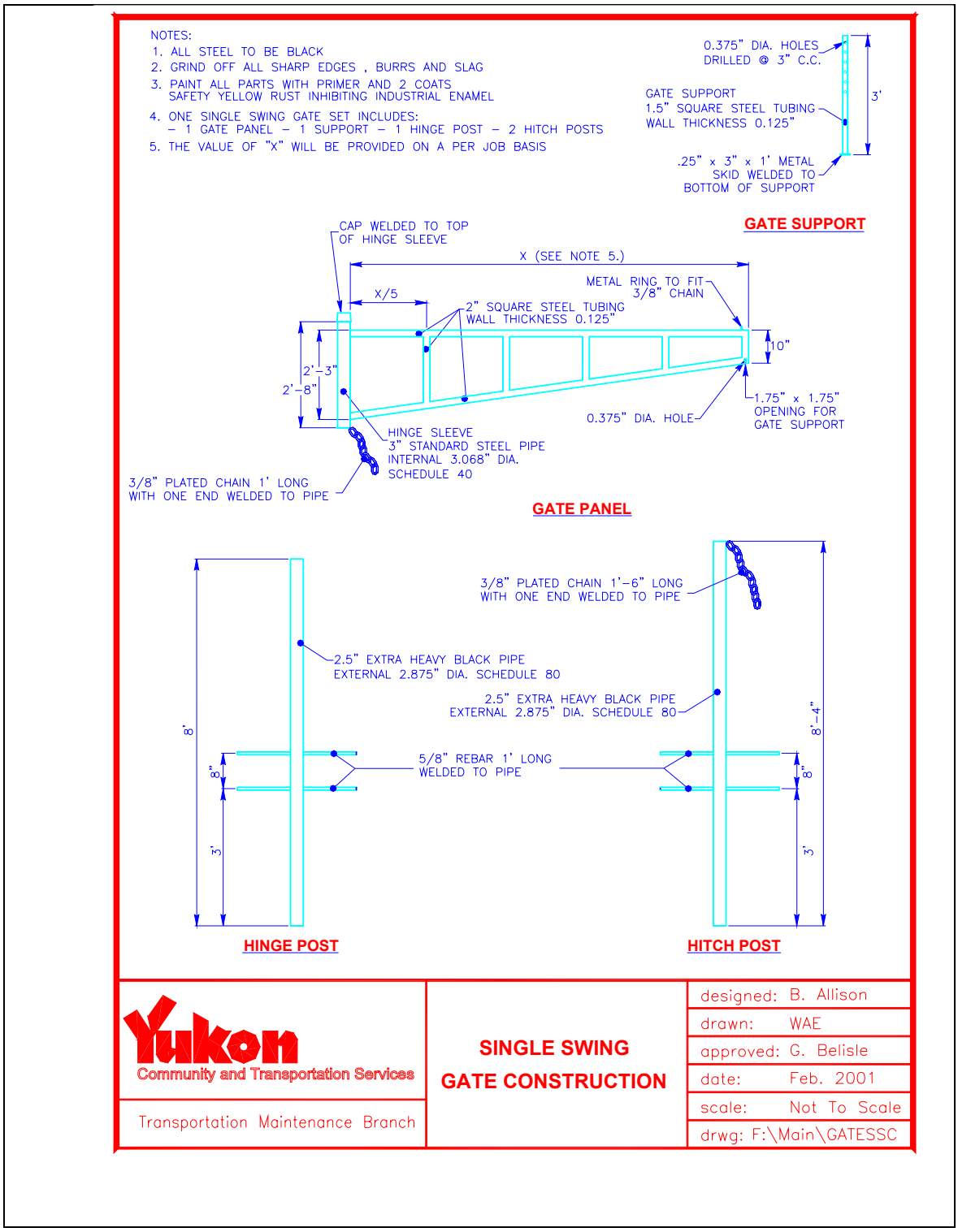



**Figure 9. YG HPW Single Swing Gate**

### 5.3.4.1 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 selection of the Temporary Closure Access Control gate location was critical to deny access to highway vehicles, all terrain vehicles and snow mobiles, and to deter hunting and recreational access to the Go Creek drainage system.

YG Environment (M. George et al) provided input to the selected location, near km 13+025 (Appendix A). 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 10 provides details of the Temporary Closure Access Control Gate.

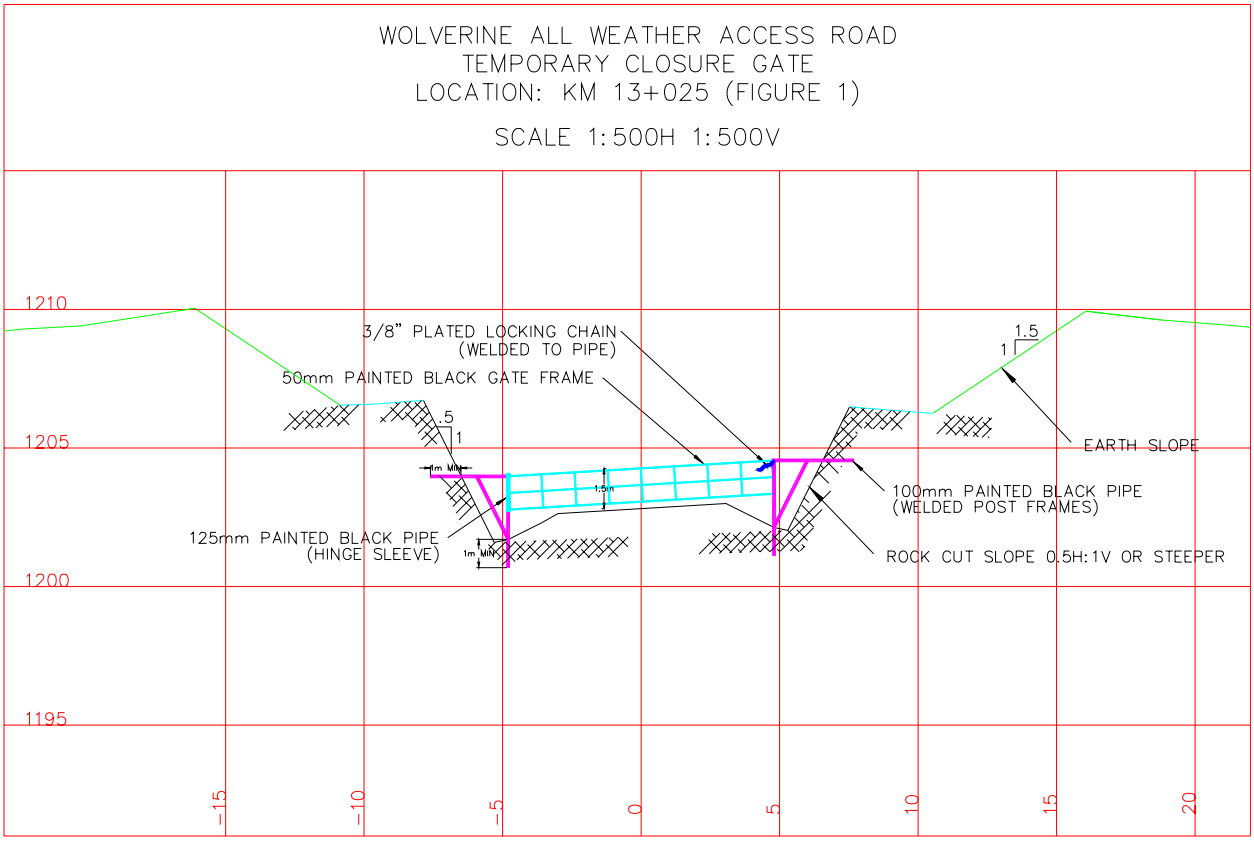



**Figure 10. Temporary Closure Access Control Gate**

#### 5.3.4.2 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.

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

### 5.3.5 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 (details provided in *YZC General Site Plan Version 2006-02*).

Of the nine possible borrow targets investigated, five will be developed during Phase 2 road construction, as summarized in Table 6 and shown in Appendix A. Haul roads are also shown in Appendix A.

**Table 6. 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 areas will be 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 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 riprap 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.

### 5.3.6 Geochemical Protocol for Evaluation

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 visual inspections, sites 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 an 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. This will include the following analyses: paste pH, total sulphur, sulphate sulphur, sulphide sulphur (by difference), 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

The resulting field inspection and testing data will be assessed by a qualified geoscientist or engineer. The data will be assessed according to criteria described in the Guidelines. This will include an assessment of the neutralization potential, acid generation potential and metal leaching potential of the borrow sources. Additional testing or assessment may be required as a result of the initial assessment.

Samples will be screened according to the following criteria as per the Guidelines:

a. Net Potential Ratios (NPR, or NP/AP), where

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

b. Sulphide sulphur content, where

| | |
|---|---|
| S_S >0.3% | Potentially acid generating |
| S_S <0.3% | Non-acid generating |

[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.

c. Paste pH, where

| | |
|---|---|
| pH<5.5 | Potentially acid generating |
| pH>5.5 | Non-acid generating |

d. Neutralization Potential, where

| | |
|---|---|
| NP<10 kg $CaCO_3$/tonne | Potentially acid generating |
| NP>10 kg $CaCO_3$/tonne | Non-acid generating |

Materials with NP values below 10 kg $CaCO_3$/tonne should undergo additional testing consisting of the shake flask extraction test (as per the Guidelines) to determine the presence of leachable acidity or metals.

Materials that are likely or potentially acid generating, and/or with leachate chemistries in exceedance of the Guidelines, would be excluded from use as road or construction material. Alternatively, additional study could be conducted on these materials to establish their suitability, or to determine what mitigative steps would need to be taken to ensure the material's safe use.

### 5.3.7 2006 Geochemical Evaluation

The access road from the Robert Campbell Highway to the Wolverine mine property was assessed and sampled for geochemical testing at any significant road cuts, and significant lithology changes by YZC Project Geologist Gilles Dessereau and EBA in October 2006. Sampling was conducted as per the protocol requirements developed by AMEC. A summary of the onsite sampling by YZC and EBA and acid-base accounting test results are provided below.

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. EBA collected samples for geotechnical purposes and upon further examination, submitted geochemical samples for areas over the first 3 km and at two other locations where the organic mat or permafrost did not limit sampling. A summary of the onsite inspections and sample locations are provided in Table 7 and shown in Appendix A.

Table 8 summarizes the geochemical test results for the fourteen samples collected and submitted for analyses.

## Table 7. 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)

## Table 8. 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 $CaCO_3$ equivalent per 1000 tonnes of material; NP = Neutralization potential in tonnes $CaCO_3$ 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

AMEC has reviewed the ABA results for the access road samples according to the protocol described above, and concluded the following:

- All samples with paste pH>5.5 and a sulphide sulphur content significantly less than 0.3% are considered non-acid generating
- Samples WVR06-02, WVR06-04, JD10-6-10G and JF10-5-1G have NP values less than 10 kg $CaCO_3$//tonne. Sulphide sulphur contents of these materials range from <0.01 to 0.02%, and sulphate sulphur contents are less than the detection limit of 0.01%. Based on this assessment, these four samples underwent shake flask extraction (SFE) testing to further assess the presence of leachable acidity and/or leachable metals.

Shake flask testing was conducted at ALS Laboratory Group (ALS) in North Vancouver, BC using a 24 hour 3:1 deionized water to rock extraction procedure as outlined in the Guidelines (Price, 1997). The resulting leachate was analyzed for mercury via cold vapour atomic fluorescence spectrophotometry and other metals via inductively coupled plasma-optical emission spectrophotometry. The results of these analyses are presented in Table 9 and compared to the Canadian Metal Mining Effluent Regulations (MMER) guideline values to identify any parameters that could potentially leach form in-place road construction materials at concentration that may affect receiving water quality.

Leachate pH values ranged between 6.7 and 7.9 and are well within the acceptable range in pH as regulated by MMER. Regulated metals arsenic, lead and nickel were less than detection and less than the maximum monthly mean concentration for all samples. Concentrations of copper ranged from 0.015 to 0.029 mg/L and were at least ten times less than MMER value of 0.3 mg/L. Zinc was detectable only in sample JD10-5-1G, although the concentration of zinc in this sample was more than twenty times less than the maximum monthly mean allowed under MMER guidelines. Based on the results for the 14 samples, there appear to be no concerns for acid drainage or metal leaching from the materials under consideration for road construction.

**Table 9. Access Road Shake Flask Extraction (SFE) Analysis Results**

| Physical Tests | | MMER* | WVR06-02 | WVR06-04 | VD10-6-10G | VD10-5-1G |
|---|---|---|---|---|---|---|
| pH | | 6.0 - 9.5 | 7.0 | 7.9 | 6.7 | 7.7 |
| **Leachable Metals** | **Units** | | | | | |
| Aluminum (Al) | mg/L | - | 3.08 | 2.43 | 4.19 | 2.04 |
| Antimony (Sb) | mg/L | - | <0.050 | <0.050 | <0.050 | <0.050 |
| Arsenic (As) | mg/L | 0.5 | <0.050 | <0.050 | <0.050 | <0.050 |
| Barium (Ba) | mg/L | - | 0.632 | 0.131 | 0.062 | 0.290 |
| Beryllium (Be) | mg/L | - | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| Bismuth (Bi) | mg/L | - | <0.10 | <0.10 | <0.10 | <0.10 |
| Cadmium (Cd) | mg/L | - | <0.010 | <0.010 | <0.010 | <0.010 |
| Calcium (Ca) | mg/L | - | 1.49 | 13.5 | 0.504 | 8.38 |
| Chromium (Cr) | mg/L | - | 0.013 | <0.010 | 0.011 | 0.012 |
| Cobalt (Co) | mg/L | - | <0.010 | <0.010 | <0.010 | <0.010 |
| Copper (Cu) | mg/L | 0.3 | 0.029 | 0.015 | 0.022 | 0.023 |
| Iron (Fe) | mg/L | - | 4.66 | 3.14 | 3.80 | 3.27 |
| Lead (Pb) | mg/L | 0.2 | <0.050 | <0.050 | <0.050 | <0.050 |
| Magnesium (Mg) | mg/L | - | 1.98 | 6.74 | 1.56 | 4.89 |
| Manganese (Mn) | mg/L | - | 0.438 | 0.326 | 0.211 | 0.246 |
| Mercury (Hg) | mg/L | - | <0.0010 | <0.0010 | <0.0010 | <0.0010 |
| Molybdenum (Mo) | mg/L | - | <0.030 | <0.030 | <0.030 | <0.030 |
| Nickel (Ni) | mg/L | 0.5 | <0.050 | <0.050 | <0.050 | <0.050 |
| Phosphorus (P) | mg/L | - | <0.30 | <0.30 | <0.30 | <0.30 |
| Potassium (K) | mg/L | - | 9.0 | 6.2 | <2.0 | 2.1 |
| Selenium (Se) | mg/L | - | <0.050 | <0.050 | <0.050 | <0.050 |
| Silicon (Si) | mg/L | - | 9.37 | 8.33 | 9.25 | 8.03 |
| Silver (Ag) | mg/L | - | <0.010 | <0.010 | <0.010 | <0.010 |
| Sodium (Na) | mg/L | - | <2.0 | 5.1 | 2.2 | <2.0 |
| Strontium (Sr) | mg/L | - | 0.0242 | 0.0366 | <0.0050 | 0.0355 |
| Thallium (Tl) | mg/L | - | <0.20 | <0.20 | <0.20 | <0.20 |
| Tin (Sn) | mg/L | - | <0.030 | <0.030 | <0.030 | <0.030 |
| Titanium (Ti) | mg/L | - | 0.076 | 0.201 | 0.322 | 0.044 |
| Uranium (U) | mg/L | - | <0.50 | <0.50 | <0.50 | <0.50 |
| Vanadium (V) | mg/L | - | <0.030 | <0.030 | <0.030 | <0.030 |
| Zinc (Zn) | mg/L | 0.5 | <0.020 | <0.020 | <0.020 | 0.023 |

Note VD10-6010G = JD10-6-10G and VD10-5-1G = JD10-5-1G

### 5.3.8 Phase 2 Road Closure Plan

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.

***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

***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 5.3.4.2.

***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 based on the 'for construction' level of design detail and is provided in Table 10. The cost breakdown is based on the same unit rates provided by the 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 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 10.

## Table 10. 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** |

# 6 Site Infrastructure

## 6.1 Industrial Complex Area

The industrial complex area is an expansion of the existing laydown areas at the portal (Picture 1). Once the Phase 1 access road is established, the priority for construction in the industrial complex area is to establish the concrete batch plant and pour foundations so that buildings can be erected prior to the end of 2007. The temporary batch plant location will be located at the southern end of the industrial complex area, down slope of the camp (Figure 5).

**Picture 1** **The industrial complex location will encompass the existing working area, and will extend ~200 m to the southwest (left)**

YZC plans to pour foundations for the mill, assay lab, administration and truck shop buildings starting in September 2007 (based on the milestones provided in Figure 1). Prior to commencing foundation work, organic material will be stripped and stockpiled northeast of the portal, as shown on Figure 5. Once barren, the ground will be leveled and form work will be constructed as per the footprint indicated in Figure 5.

With the implementation of best practices described in Section 7, YZC will limit erosion and reduce sediment-laden runoff from disturbed areas during construction and operations. A surface runoff diversion ditch on the upslope side of the industrial complex area will be constructed to direct clean runoff around the site to Wolverine Creek. A site runoff collection ditch down slope of the industrial complex area will be constructed to collect runoff from the site, and settle or treat it as necessary in the collection pond, prior to discharging to the Go Creek watershed. There are several other ditches within the complex that will be constructed as required and they will drain to the runoff collection ditch (as shown on Figure 5). Ditches and diversions within the industrial complex area are provided in cross-sections A, B and C in Figure 6 (cross section locations indicated on Figure 5).

Laydown areas for construction supplies are located within the industrial complex in locations as shown on Figure 5, along the road between the industrial complex and the airstrip, and at the airstrip.

### 6.1.1 Mill Building and Ancillary Facilities

The mill building site and associated process and ancillary facility locations were selected to take advantage of suitable ground conditions and to minimize the excavation requirements. Ore processing facilities are housed in a 130 m long by 40 m wide pre-engineered steel structure insulated building covered with metal cladding.

The primary crusher and connecting conveyors are located to the northeast end of the mill building close to the portal to minimize ore haul truck travel. Reagent storing, mixing and distributing will occur at the southeast end of the building. The secondary crusher and associated conveyors are also located the southeast end. At the northwest side, concentrates will be loaded into haul trucks within an enclosure with doors at both ends for dust control.

Additional modular buildings associated with the mill building include the power plant to the west, fuel station and storage area to the northwest, administration building to the east and truckshop and assay lab to the west as shown in Figure 5. Power plant infrastructure will include diesel generators with total estimated power generation capacity of 10.5 MW with operating power requirements of approximately 7.5 MW.

The diesel storage and dispensing tanks will be erected within a lined containment area sized to contain 110% capacity of the tanks. Diesel consumption for the power plant, surface equipment, and underground equipment is estimated at 48,000 L/d, 1552 L/d, and 3450 L/d, respectively.

Fuel storage consists of the fuel types listed below and in order to maintain at least a two week supply at site, the storage capacities are:

- diesel storage of 720,000 L for power plant and surface equipment use
- diesel (low sulfur) storage of 85,000 L for underground mobile equipment
- gasoline storage of 5000 L for light duty vehicles

The underground mine requires separate openings to supply fresh air and to exhaust return air. Intake air will be heated in the winter using specialized propane fired equipment located on the surface adjacent to the intakes, as shown in Figure 5. Liquid propane will be stored under pressure in torpedo tanks near the heaters, and vaporized through conventional pressure relief equipment before use.

### 6.1.2 150 Person Camp

During the early part of the construction phase in mid 2007, the existing infrastructure at the Wolverine exploration camp will be used to house construction workers. A modular 150-person camp will be mobilized to site in fall 2007 via the Phase 1 access road. The camp will be limited to 50 persons at any one time prior to the effective date of the A Licence.

The camp location is situated at the southern end of the industrial complex area. There are numerous benefits associated with this location such as the combining of service

facilities (potable water pipelines, sewage treatment plant, power plant) as well as reducing the need for crew buses.

Although some clearing and surface leveling will be required at the camp, permanent foundations will not be required. The camp facility will consist of customized modular units outfitted as bedrooms, bathrooms, laundry, kitchen, recreation facilities, etc.

### 6.1.3 General Site Services

#### *Potable Water*

Potable water will be sourced from Wolverine Lake for the exploration camp as per the current infrastructure and after the new camp is functional, potable water will be initially obtained from the existing surface sump location in the headwaters of Wolverine Creek, and subsequently from groundwater wells in an upper reach of the Go Creek watershed (Figure 3Figure 2). Water use will be limited to 300 $m^3$ per day for all uses (potable water, drilling, water truck for dust control, etc) prior to the effective date of the A Licence.

#### *Sewage*

When the permanent camp is functional during the latter part of the 2007 construction phase, sewage will be treated in a pre-packaged treatment plant. The modularized sewage treatment plant (STP) will be a stand-alone fully enclosed treatment plant with no requirement for tanks or ponds. The STP will be sized to treat wastes generated from the mill building, the administration building and the camp. Based on a 150 man camp capacity and effluent volumes of 225 L per day per person, the STP will be designed for treatment of approximately 33 $m^3$/d. All the components of the system will be factory assembled, inspected, tested and delivered to the site in major assemblies for final installation and commissioning on site.

The STP technology will utilize a fixed growth bacteria process whereby bacteria are grown on a media surface that is rotated into and out of the wastewater. The treated wastewater flows through separate zones each with a progressively higher standard of treatment. The media on which bacteria grow are engineered plastic disks made from grid extruded medium density polyethylene material with UV light inhibitors. The grid pattern promotes oxygen transfer into the wastewater. The system digests sludge efficiently as a result of the process design. The sludge remains in the primary settling tank during normal operation and will be pumped out every six to nine months depending on the influent total suspended solids level. The system is not prone to upsets and can be operated with varying flows.

Grey and black water will be collected at camp in a surge tank and pumped to the STP. Treated water is not considered to be a waste as it is clean water and will be discharged to the Go Creek drainage. Prior to initial discharge, water analyses will be performed and will include a fish bioassay. When the mill and administration building are operational, water will be sent via sanitary sewer systems to a small in-ground concrete surge tank from where it will be pumped to the STP. The treated wastewater will be pumped to a holding pond and either recycled through the process plant or be discharged to the tailings facility via the tailings pipeline. Digested sludge from the facility will be disposed of in the tailings facility, or hauled offsite for disposal at an approved facility.

### 6.1.4 Explosive Storage

The powder and cap magazines will remain in the same locations established for the 2005 Advanced Exploration Program (Figure 4). No additional access points or clearing for buffer areas are required.

## 6.2 Mine Development

The pre-production period will occur from October 2007 (or earlier depending on project financing) to the end of 2008 to prepare the mine for full operating status scheduled for the end of November 2008. During the pre-production period, an estimated 2200 m of lateral development plus 460 m of raise development is planned. Additional activities include:

- continue mine rehabilitation by replacing the roadbed with segregated aggregate, shot-creting the main ramp walls, and encasing the existing steel sets in concrete
- install a door that seals near the top of the decline for ventilation control purposes
- establish access to seven active ore production faces on five mining horizons
- advance three in-stope footwall drifts and excavate two in-stope escape-ways
- provide additional development for ventilation distribution and emergency egress, including: intake, exhaust, and egress raising from surface
- install and commission several mining facilities and systems including power distribution, communications, ventilation, emergency egress, compressed air, water supply and de-watering
- install a paste-fill line into the mine

Figures 11 and 12 provide plan and longitudinal projection views for mine pre-production development. The test mine and operation ramp developments, fresh air raises (FAR) and return air raise (RAR) as well as stope drifts are also shown.

CLAIM. BOUNDARY

LYNX ZONE

BARRIER PILLAR

WOLVERINE ZONE

DIRTY / CLEAN SUMP

SUMP

L1310 TEST STOPE

L1310 SA

W1310

1345 PORTAL (EXISTING)

S1100 S1120 S1140 S1160 S1180 S1200 S1220 S1240 S1260 S1280 S1300 S1320

S1090 S1110 S1130 S1150 S1170 S1190 S1210 S1230 S1250 S1270

1100 ESC 1120 ESC 1140 ESC 1160 ESC 1180 ESC 1200 ESC 1220 ESC 1240 ESC 1260 ESC 1280 ESC

1080 ESC 1110 ESC 1130 ESC 1150 ESC 1170 ESC 1190 ESC 1210 ESC 1230 ESC 1250 ESC 1270 ESC

1120 RAR 1130 FAR 1160 RAR 1170 FAR 1200 RAR 1210 FAR 1240 RAR 1250 FAR 1280 RAR 1300 FAR 1340 FAR

1160 DD 1170 DD 1240 DD 1250 DD

439800 E 439900 E 440000 E 440100 E 440200 E 440300 E

6811400 N 6811300 N 6811200 N 6811100 N 6811000 N 6810900 N 6810800 N

439700 E 439600 E

## LEGEND:

- EXISTING DEVLOPMENT (TEST MINE)
- PREPRODUCTION DEVELOPMENT
- OPERATION DEVELOPMENT
- STOPE FOOTWALL DRIFTS

| REV. | REVISION DESCRIPTION | DATE | BY | APP'D |
|---|---|---|---|---|

**Yukon Zinc** CORPORATION

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|---|---|---|
| DESIGNED BY | AP | |
| DWG. CHECK | AP | |
| DRAWN BY | RMO | 2007/10/10 |
| SCALE: | | |
| PROJECT NO. | 1614 | |

WOLVERINE PROJECT

WOLVERINE MINE
DEVELOPMENT PLAN

DRAWING NO. FIGURE 11

REV. A

439600 E 6811100 N | 439700 E 6811000 N | 439800 E 6810900 N | 439900 E 6810800 N | 439700 E 6810700 N

LYNX ZONE | BARRIER PILLAR | WOLVERINE ZONE

EL 1400 m

1300 FAR | 1280 RAR | 1340 FAR | 1345 PORTAL (EXISTING)

S1320

L1310 TEST STOPE

EL 1300 m — S1300 | S1300 E

1280 ESC | 1270 ESC | 1250 FAR | S1280 | 1260 ESC | S1270 | S1260 | 1250 ESC | 1250 DD | 1240 RAR | S1250 | 1240 ESC | S1240 | 1240 DD | 1210 FAR | 1230 ESC | 1220 ESC | S1230 | S1220 | 1210 ESC | S1200 | 1200 ESC | 1200 RAR | S1210

EL 1200 m — 1190 ESC | 1180 ESC | 1170 FAR | S1190 | S1180 | 1170 ESC | 1170 DD | 1160 RAR | S1170 | 1160 ESC | S1160 | 1160 DD | 1150 ESC | 1140 ESC | 1130 FAR | S1150 | S1140 | 1130 ESC | S1130 | 1120 ESC | 1120 RAR | S1120 | 1110 ESC | 1100 ESC | MAIN RAMP | S1110 | S1100 | 1090 ESC

EL 1100 m — S1090

LEGEND:

- EXISTING DEVLOPMENT (TEST MINE)
- PREPRODUCTION DEVELOPMENT
- OPERATION DEVELOPMENT
- STOPE FOOTWALL DRIFTS

439600 E 6811100 N | 439700 E 6811000 N | 439800 E 6810900 N | 439900 E 6810800 N | 439700 E 6810700 N

| Rev. | REVISION DESCRIPTION | Date | By | App'd | Rev. | REVISION DESCRIPTION | Date | By | App'd | Dwg. No. | REFERENCE DRAWINGS |
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Yukon Zinc CORPORATION

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| Designed By | AP | |
| Checked By | AP | |
| Drawn By | RMO | 2007/10/10 |
| SCALE | | |
| Job. No. | 1614 | |

WOLVERINE PROJECT

WOLVERINE MINE
PRE-PRODUCTION LONGITUDINAL PROJECTION
LOOKING NORTH-EAST

Drawing No. FIGURE 12 | Rev. A

## 6.3 Tailings Facility Area

The tailings facility consists of the main dam, a seepage dam, a spillway, seepage collection and diversion ditches, reclaim pump barge and pipeline, and a water treatment plant and retention pond. The reclaim and tailings pipelines extend from the tailings facility to the industrial complex and are aligned upslope of the site road between the two areas (Figures 13 and 14). The water treatment plant is located northwest of the tailings pond (Figure 13).

YZC will construct diversion and collection ditches starting in fall 2007, and will strip and clear the footprint of the area and excavate material from within the footprint for borrow (see Section 6.4). Approximate channel dimensions, and typical diversion and seepage collection ditch plan and profile drawings are provided in Figures 13, 14 and 15. Figure 15 shows the typical profile diversion of Diversion Ditches A and B, including the location of erosion control measures such as grass lining, turf reinforcement mat and riprap.

## 6.4 Borrow Areas

Borrow sources for construction materials required for the industrial complex and tailings dam will be excavated from the tailings facility footprint southeast of the airstrip as shown in Figure 4, and sources previously described in Section 5.3 along the access road. The total area of disturbance and volume of material at the tailings facility site are approximately 87,500 $m^2$ and 350,000 $m^3$, respectively.

Settling ponds will be constructed within the borrow areas to ensure adequate retention time for settling of any collected turbid water. Diversion ditches will be constructed upslope of the borrow areas to direct clean surface runoff to Go Creek, as shown on Figure 4. Appendix C provides the results of acid base accounting test work for four testpit locations within borrow area footprint (Figure 4). Granular material quantities required to manufacture the respective aggregate products are also summarized in Appendix C.

FRESH WATER SUPPLY WELL

GO CREEK TEMPORARY DIVERSION STRUCTURE

GO CREEK TEMPORARY FRESH WATER PIPELINE

TO MILL SITE

CULVERTS

GO CREEK

ROAD

AIRSTRIP

MINE ACCESS ROAD

CULVERTS

TAILINGS AND RECLAIM PIPELINES

DMS STOCKPILE EL. 1332 160,000 $m^3$

DMS HAUL ROAD

TAILINGS PIPELINE

WATER TREATMENT PLANT

℄ DIVERSION DITCH A

GO CREEK

4200 $m^3$ RETENTION POND (BOTTOM 22m X 45m, DEPTH 3m, SIDE SLOPES 2H:1V)

CULVERTS

WASTE WATER FOR TREATMENT

TREATED WATER DISCHARGE LINE

STAGE 2 EXCAVATION EL. 1316 TO 1305

℄ DIVERSION DITCH B

STAGE 1 EXCAVATION EL. 1305 TO 1295

CULVERT

RECLAIM PIPELINE

TAILINGS POND (NORMAL MAX. WATER LEVEL EL. 1308 AT CLOSURE)

℄ STARTER DAM SPILLWAY

℄ TAILINGS DAM CLOSURE SPILLWAY

BENCH EL 1305

RECLAIM BARGE

BENCH EL 1295

CULVERTS

℄ SEEPAGE COLLECTION DITCH D

℄ TAILINGS DAM CLOSURE SPILLWAY

MINE ACCESS ROAD TO ROBERT CAMPBELL HWY

SEEPAGE DAM

℄ SEEPAGE DAM SPILLWAY

STAGE 2 (FINAL) TAILINGS DAM CREST EL 1310

SEEPAGE COLLECTION POND

STAGE 1 (STARTER) TAILINGS DAM CREST EL 1306

℄ SEEPAGE COLLECTION DITCH C

HAWKOWL CREEK

PK97-13

HAWKOWL CREEK

GO CREEK

6809500N

6809000 N

6808500N

6808000N

441000E

441500E

442000E

442500E

443000E

NOTE
1. NOT ALL CULVERTS HAVE BEEN SHOWED.

PROFESSIONAL ENGINEER YUKON TERRITORY Jan. 16/07

NOT FOR CONSTRUCTION

0 250 m



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| DRAWN BY: | CKM | DEC 20/06 |
| CHECK. BY | RLO | --- |
| APP. BY: | RLO | DEC 20/06 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
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| ---------- | M09234A02 | FIGURE 13 | A |

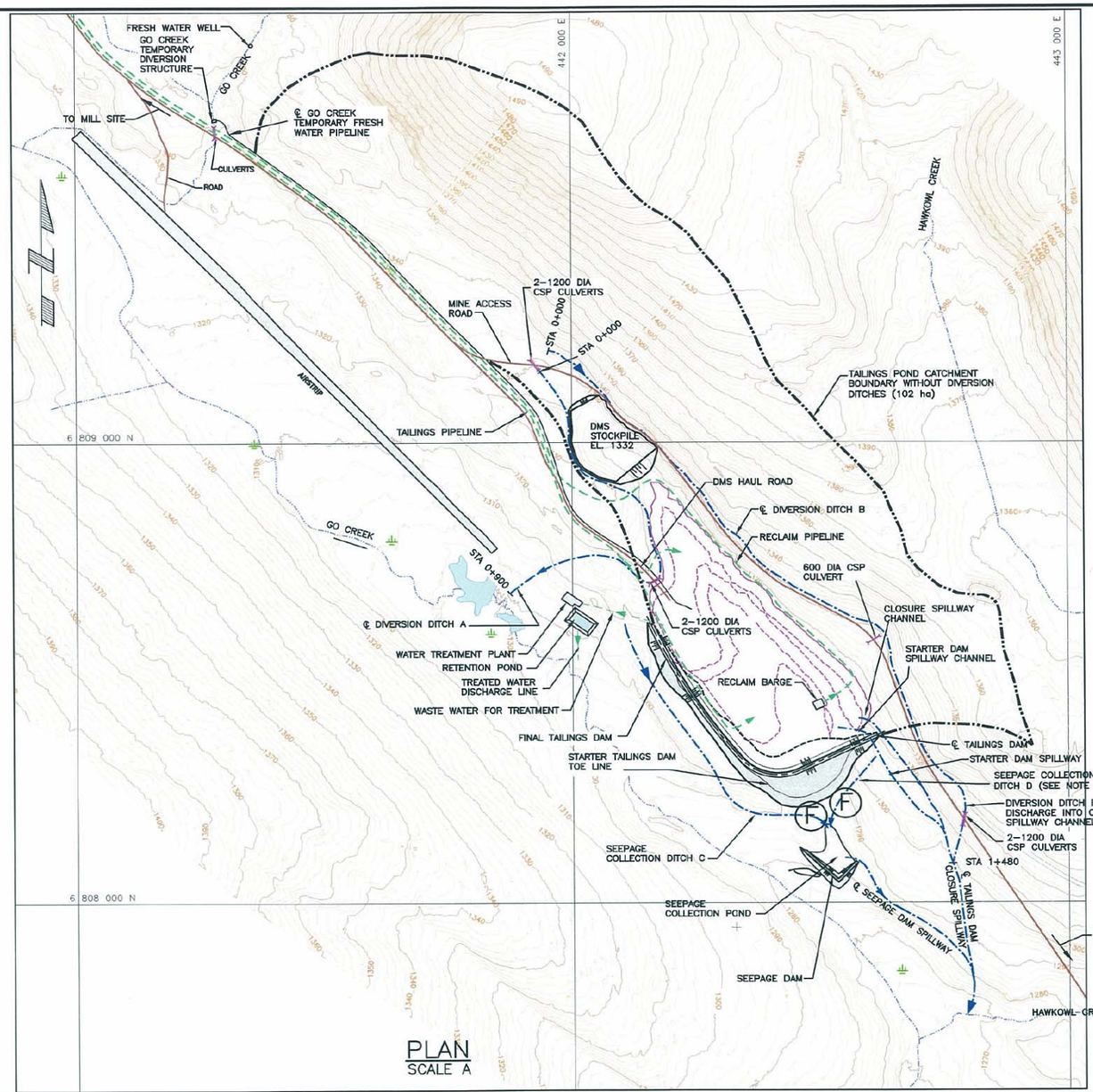
Klohn Crippen Berger

Yukon Zinc CORPORATION

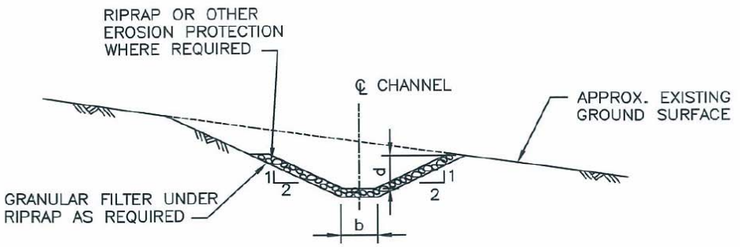
WOLVERINE PROJECT

TAILINGS FACILITY
GENERAL ARRANGEMENT

Drawing File: M:\M09234A02-Wolverine Feasibility Design & Envtro. Assess\400 Design\410 Drawings\Feasibility-Study\06110-fig\Client\Prog\fig35.1-37.1-38.3.dwg (ceong)
Xrefs: ProgressStamp, Utilities(3Jan07), CONT_2M_MINE_Akgrid(23Nov06)




PLAN
SCALE A




## TYPICAL DIVERSION AND SEEPAGE COLLECTION DITCH CROSS–SECTION

(SEE TABLE 1)

### TABLE 1 – APPROXIMATE CHANNEL DIMENSIONS

| DESCRIPTION | MINIMUM WIDTH b (m) | MINIMUM DEPTH d (m) | INVERT ELEV. AT DAM (m) |
|---|---|---|---|
| DIVERSION DITCH B | 1.0 | 1.3 | – |
| SEEPAGE COLLECTION DITCH C | 0.6 | 0.7 | – |
| SEEPAGE COLLECTION DITCH D | 0.6 | 0.6 | – |
| DIVERSION DITCH A | 0.6 | 0.6 | – |
| STARTER DAM SPILLWAY | 3.0 | 1.7 | 1304.0 |
| TAILINGS POND CLOSURE SPILLWAY | 3.0 | 1.7 | 1308.0 |
| SEEPAGE DAM SPILLWAY | 0.6 | 0.6 | 1284.0 |

### LEGEND

(F) APPROXIMATE LOCATION OF FLOW MEASURING STRUCTURE

### NOTES

1. CHANNEL SIZES SHOWN IN TABLE 1 ARE FOR CHANNEL REACHES WITH SLOPES IN THE ORDER OF 0.5%. SMALLER CHANNELS MAY BE USED THROUGH STEEPER SECTIONS WHERE DEEMED APPROPRIATE.
2. MINIMUM DEPTH INCLUDES MINIMUM 0.3m FREEBOARD FOR DIVERSION AND SEEPAGE COLLECTION DITCHES, 0.3m FOR SEEPAGE COLLECTION POND SPILLWAY CHANNEL, AND 0.6m FOR TAILINGS POND SPILLWAY CHANNELS.
3. FLOW MEASURING STRUCTURE MAY CONSIST OF A SHARP–CRESTED WEIR WITH A STAFF GAUGE, OR OTHER SUITABLE DEVICE.
4. NOT ALL CULVERTS HAVE BEEN SHOWN.
5. SEEPAGE COLLECTION DITCH D IS TO BE EXTENDED UPSLOPE WHEN TAILINGS DAM IS RAISED TO ULTIMATE HEIGHT.

NOT FOR CONSTRUCTION

SCALE A 0 300m



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| DRAWN BY: CYW | | DEC 20/06 |
| CHECK BY: --- | | --- |
| APP. BY: RLO | | DEC 20/06 |

PROFESSIONAL ENGINEER YUKON TERRITORY

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
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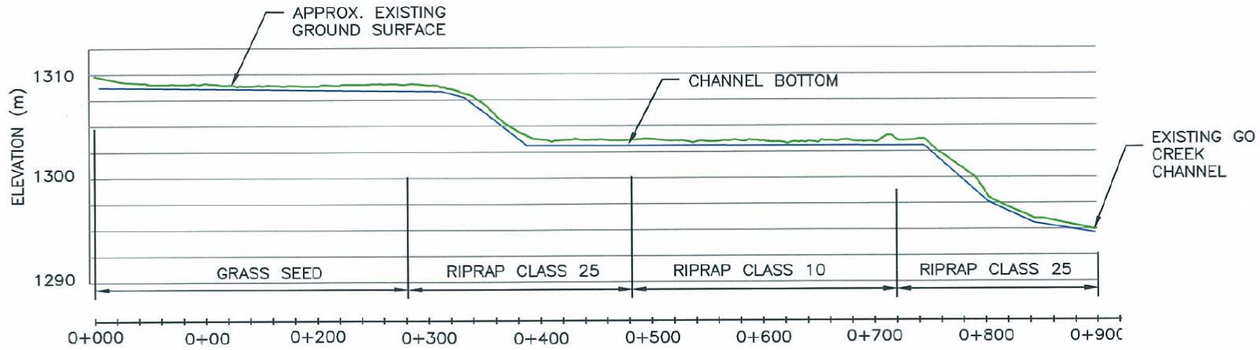
| ---------- | M09234A02 | FIGURE 14 | A |

Klohn Crippen Berger

Yukon Zinc CORPORATION

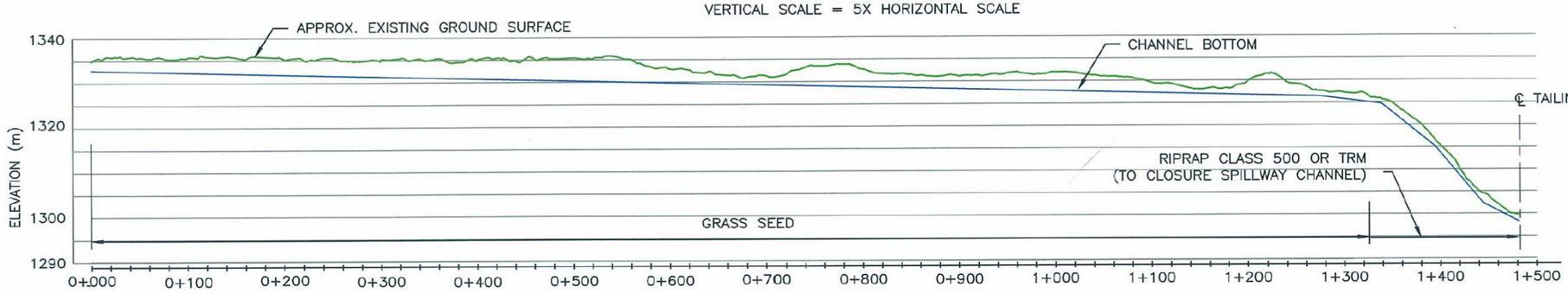
WOLVERINE PROJECT

TAILINGS FACILITY
DIVERSION DITCHES AND SPILLWAYS
PLAN AND TYPICAL SECTIONS



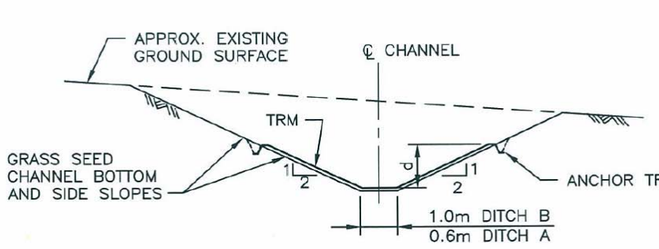

## PROFILE DIVERSION DITCH A

SCALE A
VERTICAL SCALE = 5X HORIZONTAL SCALE



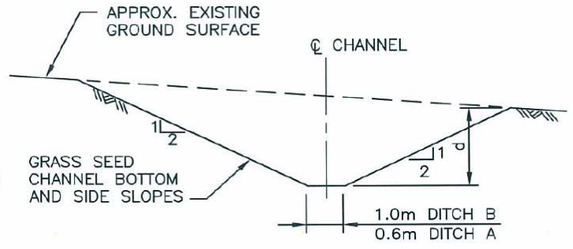

## PROFILE DIVERSION DITCH B

SCALE A
VERTICAL SCALE = 5X HORIZONTAL SCALE



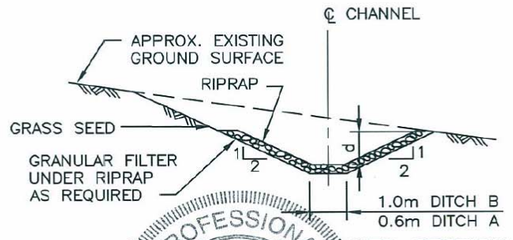

## TYPICAL TRM LINED SECTION

NOT TO SCALE




## TYPICAL GRASS LINED SECTION

NOT TO SCALE




## TYPICAL RIPRAP LINED SECTION

NOT TO SCALE

NOT FOR CONSTRUCTION

SCALE A 0 250 m



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SECTION
SCALE — DATE
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DRAWN BY: (CYW) — DEC 20/06
CHECK BY:
APP. BY: RLO — DEC 20/06

FILENAME | PROJECT NUMBER: M09234A02 | DRAWING NUMBER: FIGURE 15 | REV.: A

Klohn Crippen Berger

Yukon Zinc CORPORATION
WOLVERINE PROJECT
TAILINGS FACILITY
DIVERSION DITCHES A AND B
PROFILES AND SECTIONS

# 7 Mitigation Measures for Construction Activities

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 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 upon completion of detailed design for the industrial complex, camp, access road, and tailings facility.

## 7.1 Sediment and Erosion Control Plan

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 11. All 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 11. 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 |

## 7.2 Environmental Monitoring Plan

The purpose of 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

## 7.3 Wildlife Resource and Heritage Protection Plan

### 7.3.1 Wildlife Protection

The project area lies at the outer edges of the range of the Finlayson Caribou herd. Moose abound, as do small furbearers, in the project area. Grizzly bears and to a lesser degree Thinhorn sheep are occasionally seen in the project area.

The project results in disturbance of a relatively small area within a region that is rich in wildlife habitat and very little existing disturbance, apart from the Robert Campbell Highway. Using conservative assumptions about the size of the project disturbance footprint, effects on habitat availability for all valued species are expected to be low and barrier effects to wildlife movement are also predicted to be low. The project is on the perimeter of the Finlayson Caribou Herd Range. Concentrate haul south to Watson Lake will avoid potential effects on intensely utilized caribou range to the north. The relatively narrow right-of-way for the access road and low level of traffic will allow wildlife to cross with little impediment. Accordingly effects on wildlife movement patterns are expected to not be significant.

Potential wildlife mortality due to wildlife collisions and hunting on the access road is a concern. Mitigation measures to manage hunting/collision mortality include:

- Access to the mine road will be restricted by a locked gate during the construction, operations, and decommissioning and closure phases of the project.
- Firearms will not be permitted.
- Hunting and fishing will be prohibited at all times on or in the vicinity of the project site. This restriction will apply to all mine employees, managers and contractors and it will be in effect throughout the life of the project from construction through to closure and reclamation. This hunting and fishing prohibition has been in place successfully during the latter part of the exploration phase of the project.
- Fuel haul and concentrate haul volumes are estimated at 13 round trips per day on the mine access road during operations. Incidental traffic will be kept minimal with air

access to the mine predominating for personnel. No private vehicles (including ATVs, snowmobiles, motorized boats or other types of off-road vehicles) will be permitted.

- The maximum speed limit on all access and site roads will be set at 60 km/hr.
- Any observed wildlife corridors will be signed to alert drivers to potential wildlife crossings.

Any mortality on the access road will be recorded and reported and any modifications to the mitigation measures will be considered in consultation with YTG, as required.

### *Wildlife Attractants*

Food wastes are the typical wildlife attractant that is implicated in the development of problem wildlife, especially with respect to problem bears. There are, however, other wildlife attractants that may create problems: chemicals (e.g., road salt), wildlife carcasses (e.g., road kills), and roadside vegetation (e.g., clover). Policy and practice directed at minimizing wildlife concerns related to attractants are presented in Table 12.

Management related to the control of wildlife attractants are intended to minimize and even eliminate the development of problem wildlife. However, in the event a problem wildlife situation arises, the Environmental Coordinator, Mine Manager or designate(s) will initiate the appropriate response actions. Any direct intervention with respect to problem wildlife will be conducted by authorized personnel in consultation with, and as approved and/or directed by Environment Yukon officials.

Bear management practices for this project will have two closely linked components: a Bear Aware program and Bear Safety training. The goal is to reduce human-bear interactions and to reduce and even eliminate black bear and grizzly bear mortalities associated with the project (Table 12). The components will be presented to employees and consultants together unless specialized training in bear safety is required for field survey crews and personnel designated for problem bear responses. In those cases, a professional will provide the appropriate bear safety training course. Note that any direct intervention with respect to problem bears will be conducted in consultation with, and as approved and/or directed by government officials.

**Table 12. Mitigation Practices for Issues of Problem Wildlife**

| | |
|---|---|
| **Preventing Problem Wildlife** | 1. Littering is prohibited on and in the vicinity of the project site and along access roads. All garbage (e.g., lunch bags) must be returned to temporary storage containers. Note that this includes organic wastes (e.g., orange peels, apple cores).<br>2. Food wastes will be disposed of as per the Waste Management Plan.<br>3. Wastes associated with mechanical maintenance and repairs (e.g., motor oil) will be disposed of as per the Waste Management Plan.<br>4. All temporary (small) storage containers (e.g., garbage cans) for garbage and recycling will be located indoors in bear-proof buildings.<br>5. The area around disposal stations will be kept free of garbage and spills will be cleaned up appropriately.<br>6. Crews working in the field may carry commercially available personal deterrent devices (i.e., bear spray, bear 'bangers') but will require an orientation on the use of these devices. General restrictions on the use and transport of these devices must be followed.<br>7. Employees are not permitted to have firearms on or in the vicinity of the Project site.<br>8. Feeding wildlife is prohibited at all times on or in the vicinity of the project site.<br>9. Report wildlife incidents related to garbage or human food attractants to Environmental Coordinator, Mine Manager or designate(s) as soon as possible.<br>10. Report improperly disposed of garbage, particularly food wastes, to Environmental Coordinator, Mine Manager or designate(s) as soon as possible.<br>11. Be 'Bear Aware'. All Project workers will receive a Bear Aware Program orientation. Report all bear observations from in and around the Project site and along access roads. |
| **Dealing with Problem Wildlife** | 1. Immediately notify the Environmental Coordinator, Mine Manager or designate(s) of any problem wildlife issue. Note that reporting wildlife incidents as they occur will ensure that the proactive rather than reactive measures can be taken to prevent a serious outcome (e.g., human injury, destruction of the problem animal).<br>2. The Environmental Coordinator, Mine Manager or designate(s) will initiate the appropriate actions in response to a problem wildlife issue.<br>3. Only authorized personnel are permitted to use non-lethal (e.g., rubber bullets) and lethal problem wildlife interventions.<br>4. Do not attempt to deal with a problem wildlife issue on your own. Problem wildlife can be dangerous.<br>5. Conform to recommendations regarding bear safety. |

### *Wildlife and Vehicles*

Management procedures and policies are intended to reduce the incidence of wildlife-vehicle collisions and near misses. Table 13 presents management practices for traffic and wildlife/vehicle incidences.

**Table 13. Mitigation Practices for Issues of Wildlife and Vehicles**

| | |
|---|---|
| **Vehicles and Wildlife** | 1. Wildlife has the right-of-way on all roads, except where it is judged to be unsafe to do so.<br>2. Maximum speed limit on all access roads is 60 km/h.<br>3. Incorporate traffic signs for sensitive wildlife areas.<br>4. Verbally report ungulate and other large animal carcasses observed on and in the vicinity of the Project site, and along access roads to the Environmental Coordinator, Mine Manager or designate(s) as soon as possible.<br>5. Conform to road snow clearing requirements, such as exit corridors in areas of high snow, as per the discretion of the Environmental Coordinator, YG Conservation Officer and/or Regional Biologist.<br>6. Project-related traffic (including ATVs and snowmobiles) is restricted to designated access roads and trails (with certain exceptions).<br>7. A vehicle collision that results in the death or injury of an ungulate or other large animal must be reported as soon as possible.<br>8. A near miss between a vehicle and an ungulate or other large animal must be reported as a wildlife 'incident'. |

### *Habitat Management and Wildlife Harassment*

Wildlife species are known to be subject to stress in association with human-caused disturbances. Human-caused disturbances that could have potentially adverse effects on wildlife include off-road vehicles, humans on foot, research activities, wildlife viewing, and aircraft overflights.

Management will be directed at minimizing potential project-related effects on wildlife habitat that may either occur directly (habitat loss, nest destruction) or indirectly (habitat avoidance due to sensory disturbance, disruption of daily movements).

The restrictions presented in Table 14 will be essential in the minimizing harassment and effects of wildlife habitat.

**Table 14. Mitigation Practices for Issues of Wildlife Habitat and Harassment**

| | |
|---|---|
| **Wildlife Habitat** | 1. Conform to general restrictions for wildlife protection.<br>2. Conform to restrictions and seasonal restrictions on vegetation clearing as per the direction of the Environmental Coordinator, Mine Manager or designate(s).<br>3. Vegetated buffers will be maintained adjacent to facilities and access roads.<br>4. Conform to road snow clearing requirements at the discretion of the Environmental Coordinator.<br>5. Seeding along road corridors cannot be conducted without approval of the Environmental Coordinator, Mine Manager or designate(s), and will follow seed mix recommendation outlined in the Reclamation Plan.<br>6. Report wildlife observations from the project site and along access roads. |
| **Wildlife Harassment** | 1. Any harassment of wildlife will be prohibited on site and by all mine staff, guests and contractors.<br>2. Adopt and follow the Yukon guidelines for dealing with aerial impacts from helicopters and fixed-wing flights. Aircraft will, to the extent possible, avoid airspace over and in proximity to the Wolverine, Little Wolverine, Little Jimmy and Frances Lakes.<br>3. All staff, pilots, guests and contractors will receive orientation and training with respect to wildlife harassment policies. |

### *Wildlife Health*

Management policy and practices are intended to reduce potential project-related effects on wildlife health. For example, company procedures on the safe and prompt clean up of any chemical spills will be followed, with the recognition that special considerations for wildlife may be necessary in some cases. Table 15 provides mitigation practices for issues pertaining to wildlife health.

**Table 15. Mitigation Practices for Issues of Wildlife Health**

| | |
|---|---|
| **Wildlife Health** | 1. Feeding wildlife is prohibited at all times on or in the vicinity of the project site, including during travel to and from the site.<br>2. Company procedures on the safe and prompt clean up of any spills will be followed.<br>3. Engineering requirements for all ditches and engineered embankments/dams/settling ponds as per the direction of the Environmental Coordinator, Mine Manager or designate(s) will be adhered to.<br>4. Herbicides will not be used in vegetation management activities. Instead, manual clearing will be conducted when and where required, in adherence to the migratory bird vegetation clearing windows.<br>5. Report any observations of wildlife in and around potential sources of contaminants (e.g., settling ponds, fuelling sites).<br>6. Temporary fencing in areas to prevent wildlife access. |

### *Wildlife Reporting*

A wildlife records program that includes wildlife observations, location of wildlife features (e.g., active nests or dens), traffic incidents, and wildlife incidents (e.g., aggressive encounters) will be implemented. This information will be regularly reviewed to identify issues of concern (e.g., road segments with a high incidence of roadkills, active dens, etc.). If an issue of concern is identified, a strategy to address the concern will be developed in consultation with the appropriate agencies. The wildlife records program is an important tool in monitoring the effectiveness of the wildlife protection plan recommendations. Two different wildlife records will be recognized:

- Wildlife observations: Observation of sign (e.g., tracks, scat, nests, burrows, etc.) or observations of the animals themselves, behaving in a 'normal' way. Wildlife observations provide information on wildlife habitat use and behavior patterns in relation to the project. Project workers and contractors will be encouraged to record wildlife observations (including notes on habitat use).
- Wildlife incidents: Reports of close or aggressive encounters, unusual behavior in and around site facilities, traffic accidents or near misses, and observations of dead or injured animals. Project workers and contractors will be required to verbally notify the Environmental Coordinator, Mine Manager or designate(s) of wildlife incidents as soon as possible.

While the distinction between wildlife observations and wildlife incidents will be communicated to employees and consultants, there is the potential for overlap, especially regarding observations of certain wildlife (i.e., bears) in the immediate vicinity of project facilities. Thus, all wildlife observation reports should be reviewed for evidence of a potential problem (e.g., habituation).

A written log of wildlife observations and incidents for the mine property and access road will be maintained for the life of the mine (until there are no longer employees on site). The log will include time and date, species, location of observation and other relevant

information such as mortality of wildlife and birds. A review of the log will occur periodically with the YTG Regional Biologist for the area. Wildlife collisions and mortalities will be reported immediately to the local Environment Yukon conservation office.

Wildlife observations, monitoring programs, and incidents may require additional mitigation as determined in consultation with the Yukon Environment officials, the Ross River Dena Council, and local stakeholders.

### 7.3.2 Heritage Resource Protection

There are no heritage resources sites at the project site or along the access road; however, given the proximity of the project to Wolverine Lake, there is the potential for off site activities to disturb heritage sites in the area. The following five points outline Yukon Zinc Corporation's general First Nations heritage protection measures:

1. A heritage awareness program will be included in environmental awareness training to promote the nature and value of heritage resources, clearly express the importance of these sites to the Aboriginal peoples, and orientate personnel to YZC's policy of site identification, protection and mitigation for the benefit of the public.
2. Identified sites in the area will be protected and monitored during project activities.
3. Heritage resource awareness training will be provided in the basic orientation for all workers and contractors.
4. In the event that a heritage site is encountered during construction, work will cease until the site is assessed by a qualified archaeologist and/or a Ross River Dena Council representative. A protection plan may be required, and once developed it will be approved by the regulatory authority.
5. Workers will be required to report the discovery of archaeological sites, or the vandalism of such sites to the Environmental Coordinator, Kaska Environmental Technician, or Mine Manager.

To the extent possible, traditional trails and traplines will not be disturbed or blocked by project activities. Where a disturbance is unavoidable, YZC will reroute the trail, and reclamation of any disturbance will be undertaken as soon as practicable.

# 8 Waste Management

## 8.1 Solid Waste

Non-hazardous solid waste will be segregated into the two streams - putrescible and non-putrescible wastes. Regular pick-up times and designated areas will be established for all burnable materials such as kitchen waste, paper, cardboard, and untreated/ unpreserved wood waste. As per the Yukon *Environment Act*, a Commercial Dump Permit under the *Solid Waste Regulations* for the operation of the landfill and an Air Emissions Permit under the *Air Emissions Regulations* for incineration are required.

### 8.1.1 Putrescible Waste

Organic food wastes from the kitchen facilities will be segregated, collected in closed bear-proof bins and incinerated daily to minimize wildlife attraction.

### 8.1.2 Non-Putrescible Waste

Burnable non-organic wastes will be incinerated. Non-burnable materials (such as cans, bottles, etc), used rubber products, scrap metal, and plastic packaging will be collected in designated recycling bins and removed from site periodically.

Non-hazardous solid wastes that cannot be recycled will be buried in a landfill. The landfill will be established early in the construction phase and will remain in use for the life of the mine. Material will be periodically buried under a layer of soil to prevent the loss of garbage through wind action.

The landfill will be designed to accommodate the waste volume generated over the life of the mine and in a manner that will facilitate landfill closure. Surface water runoff will be diverted around the facility.

A sign at the entrance to the site will list conditions for use, emergency contacts and procedures, and items that may not be disposed of within the facility such as: hazardous wastes, acids, corrosives, solvents, oily wastes, explosives, or unsterilized medical waste. YZC will ensure that the site is managed in such a way as to prevent wildlife from being attracted to the facility.

### 8.1.3 Used Tires

Used tires will be collected and those not used on site during the construction and operation phase to provide vehicle protection barriers will be hauled off site and disposed of in accordance with the Yukon Used Tire Management Program. The Municipality of Watson Lake has a landfill facility that currently accepts used tires at no cost.

To minimize the potential fire hazard created by tire stockpiles, the rules provided by the 2005 National Fire Code of Canada will be followed.

## 8.2 Special Waste

Special or hazardous wastes are dangerous goods that are no longer used for their original purpose as defined in the federal *Transportation of Dangerous Goods Act and Regulations*. Special waste is regulated by the *Special Waste Regulations* under the Yukon *Environment Act*, and a Special Waste Permit is required to generate, handle or dispose of a special waste. Special wastes generated, handled and stored during construction activities will likely include used anti-freeze, used batteries, leftover solvents, cleaners, paints, and petroleum products. Details pertaining to the source and management of these substances are provided below.

Hazardous waste will be segregated at the point of generation, placed into appropriate storage containers and then shipped off site to an acceptable disposal or recycling facility in either Whitehorse or Watson Lake. When convenient, YZC will also participate in Environment Yukon's annual commercial special waste collection.

Two facilities in Whitehorse that are permitted to collect and dispose of hazardous wastes such as used oil, waste oil filters, used batteries, antifreeze, waste solvents and lubricants are as follows:

- Sunset Septic - current trucking costs are $1.60/km and $105/hr while onsite
- Corvus Industries - current trucking costs are $125/hr and 205L drums are supplied at $80 ea

Watson Lake is revising its Solid Waste Management Plan and is looking to build local businesses and facilities that have the capacity to support future industrial sites for all types of non-hazardous and hazardous wastes.

All wastes will be handled, stored and disposed of according to the appropriate regulations under the Yukon *Environment Act*, *Contaminated Site Regulation*, *Special Waste Regulation*, *Solid Waste Regulation*, and *Storage Tank Regulation*. In addition, unused or damaged explosives will be disposed of in a manner that complies with the *Explosive Act* (Canada).

The following general storage procedures will be followed to prevent special waste from endangering public health and the environment:

- Liquid special wastes will be stored in a tank if the volume is more than 205 L or in containers for smaller amounts. For transportation, flammable and combustible liquids will be stored in containers or tanks that meet the requirements of the federal Transportation of Dangerous Goods Regulations.
- When storing waste in tanks and containers, the National Fire Code guidelines will be followed with regards to distance from buildings and property lines, distance between tanks, dikes and drainage, and emergency access.
- Storage tanks with a capacity of more than 4000 L, or more than twenty-four 45-gallon drums stored in one group will have secondary containment. Tanks will have a clay or plastic liner or a curbed concrete pad surrounding the container, and a spill containment device attached to the intake valve. When containing 45-gallon drums, a drip pan or similar container or two containers (with one placed inside the other) will be used.

- Records of the wastes being stored, including type, volume, origin and storage location will be kept and will be readily accessible to assist response teams if a spill or fire occurs. Copies of waste manifests will be submitted to the Environmental Programs Branch.
- Containers stored outside will be covered to protect them from the weather. Containers will be stored in piles, with 1.5 m between the piles.
- Containers will be closed, except when waste is added or removed.
- The volume of waste will not exceed the limits set out in the National Fire Code for flammable and combustible liquids.
- If wastes with different flash points are stored together, the storage requirements for the liquid with the lowest flash point will be used.
- Containers will be labeled with the waste's identity, PIN no., class, and packing group as per the requirements of the Special Waste Permit, and in accordance with the federal *Transportation of Dangerous Goods Regulations.*
- Wastes will not be mixed or diluted with other wastes or water, as mixed products often cannot be recycled.

In the event of a temporary closure, all unused chemicals or reagents, with the exception of those required for water treatment plant and other incidental uses, that are deemed to have short shelf life will be returned to suppliers/manufacturers. Those chemicals that cannot be returned will be disposed of in a proper manner as per manufacture instructions. Fuel supplies for equipment will remain on site and diesel fuel tanks will remain in service during a temporary closure. YZC will comply with the requirements under the *Yukon Environment Act* pertaining to storage and handling of petroleum products.

### 8.2.1 Used Oil

The major sources of waste oil will be from mobile equipment and power plant generators. The most common types of used oil are crank case oil, gear oil, transmission fluid, and hydraulic oil. Under the Special Waste Regulations, a special waste permit is required if more than 20 L of used oil is generated per month or stored. For tanks with capacities greater than 4000 L, a permit will be required under the *Storage Tank Regulations.*

Used oil will be collected in designated waste oil tanks located in the mobile equipment maintenance area and near the diesel gensets. The oil will be periodically shipped off site by authorized carriers and taken to permitted facilities for shipping, treatment or recycling.

### 8.2.2 Waste Oil Filters

Before disposing of waste oil filters, as much oil as possible will be eliminated from them. Steps required to ensure proper disposal include puncturing the top of the filter, setting the filter in a tray and allowing the oil to drain for approximately 24 hours, and crushing the filter to increase waste oil recovery.

Once the oil is drained, the filter will be disposed of by recycling through a company interested in the filter's metal value, or through a disposal operator, or at a landfill site.

### 8.2.3 Used Batteries

Waste vehicle batteries will be collected for regular shipment to a licensed recycle or disposal facility. A Special Waste Permit is required for handling more than 5 kg of lead-acid batteries per month.

The steps outlined below for storing batteries will be followed to help prevent acid leaks and spills and to avoid contamination of the storage site:

- Batteries will be placed on wooden pallets in secondary containment (i.e., on a liner or berm) to prevent the escape of acid.
- Before putting waste batteries on the pallet, plastic sheeting will be placed on it to completely enclose all of the batteries in a continuous sheet of plastic. All sides will be wrapped to protect the batteries from the weather and to prevent any acid from being discharged into the environment.
- Batteries will not be stacked more than three layers thick and each layer will be separated with a sheet of plywood or other suitable material.

### 8.2.4 Antifreeze

A permit under the Special Waste Regulations is required if more than 5 L of waste antifreeze is generated within a 30 day period. Used antifreeze will be stored in good quality containers that are leak-free and have tight closures to prevent spills, then shipped to a licensed recycle or disposal facility.

### 8.2.5 Waste Solvents and Lubricants

Miscellaneous, small quantities of waste solvents and lubricants will be generated through routine maintenance and repair of equipment. Solvents are liquid substances that can dissolve other substances and can be recycled. Paint thinners and strippers, varsols, degreasing fluids, mineral spirits and petroleum distillates are common solvents. Most of these liquids are flammable and toxic. A Special Waste Permit must be obtained from the Environmental Programs Branch if more than 5 L of solvents per month, or more than 5 kg of solvent sludge per month is handled or stored.

Solvents and lubricants will be collected and stored in appropriate drums for regular shipment to a licensed recycle or disposal facility. Containers will be covered to protect them from precipitation and will be kept apart from other waste products. When transporting solvents, the container will be labeled according to the *Transportation of Dangerous Goods Act*.

### 8.2.6 Contaminated Sites

For wastes contaminated with petroleum hydrocarbons (with <3% hydrocarbon content), such as in the event of a spill, bioremediation will be used. A Land Treatment Facility permitted under the *Contaminated Sites Regulations* (#24-022) is located near the airstrip, and any additional contaminated soil generated and treated during the life of the project will require an amendment to this permit. Remediated soils will be sampled to determine when hydrocarbon contamination has been reduced to acceptable standards, and subsequently stockpiled for use in reclamation projects. Water collected in the land farm will run through an oil-water separator and the water will subsequently be discharged into

the tailings facility and the sludge will be disposed of according to *Special Waste Regulations*.

### 8.2.7 Medical Wastes

A small amount of hazardous waste (such as syringes, bandages etc.) will be generated at the first aid room. This waste will be collected in designated purpose-built containers and disposed of appropriately at an offsite facility.

# 9 Monitoring and Surveillance

The following sections provide details pertaining to the monitoring and reporting with respect to ground and surface water quality, and water quantity.

## 9.1 Groundwater Monitoring

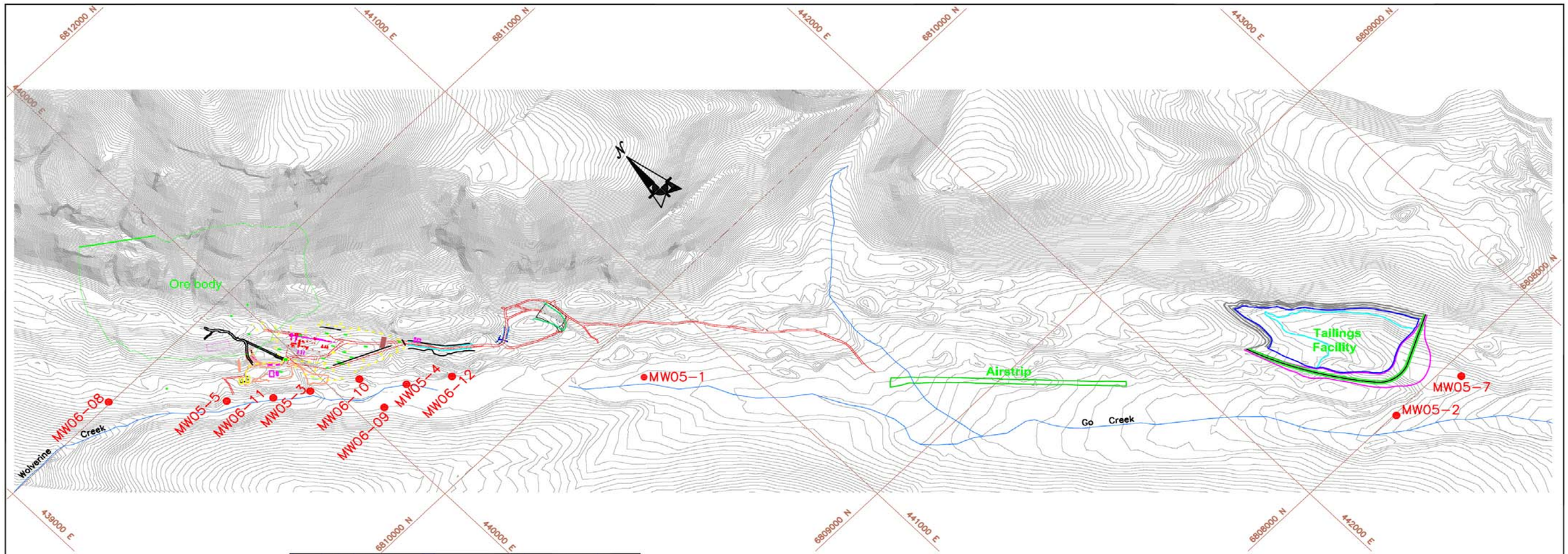
Monitoring of groundwater conditions around the Wolverine Mine facilities will focus on groundwater conditions in the upper Wolverine Creek and Go Creek basins. More specifically, monitoring of groundwater will occur in those areas downgradient of the underground and process plant operations, immediately adjacent to Wolverine Creek, as well as downgradient of the tailings facility in the upper reaches of Go Creek. Monitoring will consist of physical (e.g., piezometric water levels) and water quality determinations at all locations.

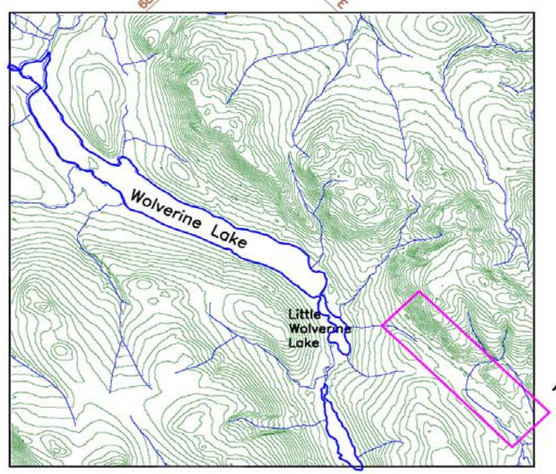
### 9.1.1 Wolverine Creek Basin

Groundwater monitoring wells adjacent to Wolverine Creek and downgradient of the proposed underground operations have been established and are currently being monitored as part of the continuing baseline groundwater characterization program. Well locations are depicted in Figure 16. The objectives of the groundwater monitoring program for the underground and process plant areas within the upper Wolverine Creek basin are as follows:

- provide information to delineate the direction of groundwater flow
- provide information to estimate the velocity and quantitative rate of groundwater flow
- monitor and delineate potential effects of mine dewatering on Wolverine Creek
- provide sampling locations to continue to document baseline groundwater quality prior to operations and to monitor for any impacts to groundwater quality that result from mining or mining related activities during operations and at closure.

A total of sixteen groundwater monitoring wells have been installed at eight nested locations in the Wolverine Creek basin, as illustrated in Figure 16.




Area of Detail

**Legend**

- Existing Monitoring Wells
- Creek
- 2m Contours

0 400 m

Projection: UTM Zone 9 - NAD27

Drawing By Lorax Environmental Services Ltd - January 22, 2007

LORAX ENVIRONMENTAL

Yukon Zinc CORPORATION

# Wolverine Project

FIGURE 16

Groundwater Monitoring Well Locations

Table 16 summarizes the well identification and depth of completion for each monitoring well in the upper Wolverine Creek basin.

**Table 16. Wolverine Creek Basin Groundwater Monitoring Wells**

| Well | Depth (m) | Stratigraphic Unit |
|---|---|---|
| MW05-3A | 19.98 | Shallow bedrock |
| MW05-3B | 4.52 | Alluvial Overburden |
| MW05-4A | 17.56 | Shallow bedrock |
| MW05-4B | 3.89 | Alluvial Overburden |
| MW05-5A | 26.50 | Shallow bedrock |
| MW05-5B | 4.39 | Alluvial Overburden |
| MW06-08S | 21.92 | Shallow bedrock |
| MW06-08M | 82.81 | Bedrock |
| MW06-08D | 184.71 | Deep Bedrock |
| MW06-09S | 21.30 | Shallow bedrock |
| MW06-09M | 80.38 | Bedrock |
| MW06-10S | 21.33 | Shallow bedrock |
| MW06-10M | 104.30 | Bedrock |
| MW06-10D | 185.00 | Deep Bedrock |
| MW06-11S | 21.30 | Shallow bedrock |
| MW06-12S | 21.65 | Shallow bedrock |

As illustrated, the wells have been designed to monitor groundwater quality at various depths and in different geological units including the shallow alluvial/colluvial aquifer and the shallow, medium and deep bedrock units.

Groundwater levels will be monitored monthly, with static levels recorded prior to sampling. Data will be summarized and reported annually. Reports will include elevation versus time graphs, interpreted equipotentials and updated assessments of the groundwater flow.

Groundwater quality samples will also be collected monthly and analyzed for a suite of parameters including physical parameters, major anions, nutrients and dissolved metals; total metals will not be monitored for groundwater wells. Wells will be purged prior to each sampling following static water level measurements to ensure representative samples are collected.

Analytical parameters to be monitored are listed in Table 17. QA/QC measures will include a travel blank, a field blank prepared from distilled water, a filter blank prepared from the distilled water, a blind field duplicate and a laboratory duplicate.

Groundwater quality sampling frequency may be reduced to quarterly sampling following sufficient data collection and a demonstration that the data is of adequate quality to justify a less frequent sampling program without compromising the integrity of the groundwater monitoring program.

## Table 17. Groundwater Quality Monitoring Parameters and Detection Limits

| Parameter | Symbol | Detection Limit | Units |
|---|---|---|---|
| **Physical Parameters** | | | |
| Conductivity | | 2 | µS/cm |
| Hardness | | 0.5 | mg/L |
| Total Dissolved Solids | TDS | 10 | mg/L |
| pH | pH | 0.1 | pH |
| Turbidity | NTU | 0.1 | NTU |
| **Major Anions** | | | |
| Alkalinity-Total | $CaCO_3$ | 0.5 | mg/L |
| Bromide | Br | 0.1 | mg/L |
| Chloride | Cl | 0.5 | mg/L |
| Fluoride | F | 0.02 | mg/L |
| Sulphate | $SO_4$ | 0.5 | mg/L |
| **Nutrient Parameters** | | | |
| Ammonia Nitrogen | N | 0.005 | mg/L |
| Nitrate Nitrogen | N | 0.005 | mg/L |
| Nitrite Nitrogen | N | 0.001 | mg/L |
| Dissolved Ortho-Phosphate | P | 0.005 | mg/L |
| **Dissolved Trace Metals** | | | |
| Aluminum | Al | 0.001 | mg/L |
| Antimony | Sb | 0.0001 | mg/L |
| Arsenic | As | 0.0001 | mg/L |
| Barium | Ba | 0.001 | mg/L |
| Boron | B | 0.008 | mg/L |
| Cadmium | Cd | 0.000017 | mg/L |
| Calcium | Ca | 0.05 | mg/L |
| Chromium | Cr | 0.0005 | mg/L |
| Cobalt | Co | 0.001 | mg/L |
| Copper | Cu | 0.0002 | mg/L |
| Iron | Fe | 0.005 | mg/L |
| Lead | Pb | 0.00005 | mg/L |
| Magnesium | Mg | 0.05 | mg/L |
| Manganese | Mn | 0.001 | mg/L |
| Molybdenum | Mo | 0.001 | mg/L |
| Nickel | Ni | 0.0005 | mg/L |
| Phosphorus | P | 0.1 | mg/L |
| Potassium | K | 1 | mg/L |
| Selenium | Se | 0.0005 | mg/L |
| Silicon | Si | 0.05 | mg/L |
| Silver | Ag | 0.00001 | mg/L |
| Sodium | Na | 0.05 | mg/L |
| Strontium | Sr | 0.001 | mg/L |
| Thallium | Tl | 0.0001 | mg/L |
| Vanadium | V | 0.001 | mg/L |
| Zinc | Zn | 0.001 | mg/L |

### 9.1.2 Go Creek Basin

Monitoring of groundwater conditions in the upper Go Creek basin focuses on monitoring the performance of the tailings facility, in particular the integrity of the Enviroliner system installed to prevent tailings water seepage. The objectives of the groundwater monitoring of the upper Go Creek basin are therefore to:

- provide information to delineate the direction of groundwater flow
- provide information to estimate the velocity and quantitative rate of groundwater flow
- continue to document baseline groundwater quality prior to operations and to monitor for any impacts to groundwater quality that result from operation of the tailings facility during operations and at closure

Existing groundwater monitoring well nests MW05-7A, MW05-7B and MW05-2A are located immediately downgradient of the proposed tailings facility and seepage collection pond. Unlike the Wolverine Creek groundwater wells, only the shallow alluvial and shallow bedrock conditions will be monitored; deeper bedrock installations are not warranted at these locations. Table 18 summarizes the well identification and depth of completion for each monitoring well in the upper Go Creek basin.

**Table 18. Go Creek Basin Groundwater Monitoring Wells**

| Well | Depth (m) | Stratigraphic Unit |
|---|---|---|
| MW05-1A | 22.9 | Shallow Bedrock |
| MW05-1B | 5.0 | Alluvial Overburden |
| MW05-2A | 22.9 | Shallow Bedrock |
| MW05-2B | 5.0 | Alluvial Overburden |
| MW05-7A | 30.2 | Shallow bedrock |
| MW05-7B | 4.6 | Alluvial Overburden |

Groundwater levels will be monitored on a quarterly basis, with static levels recorded prior to sampling. Because there are no dewatering activities in the area, monthly monitoring of groundwater levels are not warranted as compared to the Wolverine Creek basin. Data will be summarized and reported annually. Reports will include elevation versus time graphs, interpreted equipotentials and updated assessments of the groundwater flow.

Groundwater quality samples will also be collected quarterly. Wells will be purged prior to each sampling following static water level measurements to ensure representative samples are collected. Water quality parameter list will be as indicated in Table 17.

### 9.1.3 Summary of Groundwater Monitoring

Table 19 provides a summary of the proposed groundwater monitoring program for the Wolverine Creek and upper Go Creek basins including monitoring throughout the life-cycle of the Wolverine operation.

**Table 19. Summary of Groundwater Monitoring Program for Wolverine Creek and Go Creek Basins**

| Well Sites | Purpose | Pre-Construction | Construction | Operations | Closure | Post Closure |
|---|---|---|---|---|---|---|
| MW05-1A/B | Monitor upper reaches of Go Creek groundwater basin | Quarterly | Quarterly | Quarterly | Quarterly | Annual |
| MW05-2A/B | To monitor impact of tailings facility | Quarterly | Quarterly | Quarterly | Quarterly | Annual |
| MW05-3A/B | To monitor impact of underground and industrial complex | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW05-4A/B | To monitor impact of underground and industrial complex | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW05-5A/B | To monitor impact of underground and industrial complex | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW05-7A/B | To monitor impact of tailings facility | Quarterly | Quarterly | Quarterly | Quarterly | Annual |
| MW06-8 S/M/D | To monitor impact of underground | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW06-9 S/M | To monitor groundwater quality on west side of Wolverine Creek (not affected by operations) | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW06-10 S/M/D | To monitor impact of underground and industrial complex | Quarterly | Quarterly | Monthly | Quarterly | Annual |
| MW06-11 S | To monitor impact of underground and industrial complex | | | Monthly | | |
| MW06-12 S | To monitor impact of underground and industrial complex | | | Monthly | | |

## 9.2 Surface Water Monitoring

The surface water monitoring program for the Wolverine Project includes the monitoring of hydrologic flows and water quality at strategic locations and has been designed to meet the following objectives:

- continue to provide stream flow data specific to the mine site operations focusing on Go Creek and Wolverine Creek watersheds
- better constrain watershed base flows, particularly in Wolverine Creek
- document water quality in the receiving environment and to verify compliance during discharge periods from the water treatment facility
- provide data to update predictions of water quality impacts, and to support ongoing review of mine water and waste management strategies during operations and at closure

### 9.2.1 Surface Water Hydrology

A surface water hydrology monitoring network has been established for the Wolverine Project that provides continuous stream flow data for watercourses in the immediate vicinity of mine site operations as well as more regional coverage (Figures 17 and 18).

Stations W9 and W82 have been established on Wolverine Creek at the mouth and in the upper reaches immediately adjacent to the underground operations, respectively. These stations will be utilized to closely monitor the influence of underground dewatering on flow conditions in Wolverine Creek.

Monitoring of flow conditions in Go Creek occurs at stations W80 and W12 (). W80 represents the compliance monitoring point for seasonal water treatment plant discharges and flow conditions are closely monitored in conjunction with water quality conditions. Station W12 is also located on Go Creek, just upstream of the confluences of Money Creek and Pup Creek with Go Creek. This station has been historically monitored for flow and monitoring will continue throughout operations to provide data to permit refinements to site water balance conditions.

Regional hydrology is monitored via stations W21 on Nougha Creek and station W22 on Money Creek.

Each hydrology station is equipped with a continuous reading datalogger. Stations will receive at least two annual inspections, once immediately prior to freshet and again in the late summer fall prior to winter low flow conditions. During inspections, equipment will be calibrated. During the initial five years of the operation, stream gauging will occur at each station at least four times per year. Stream gauging data will be used to update each watercourse stage discharge curve. After the first five years, stream gauging will be limited to twice annually.

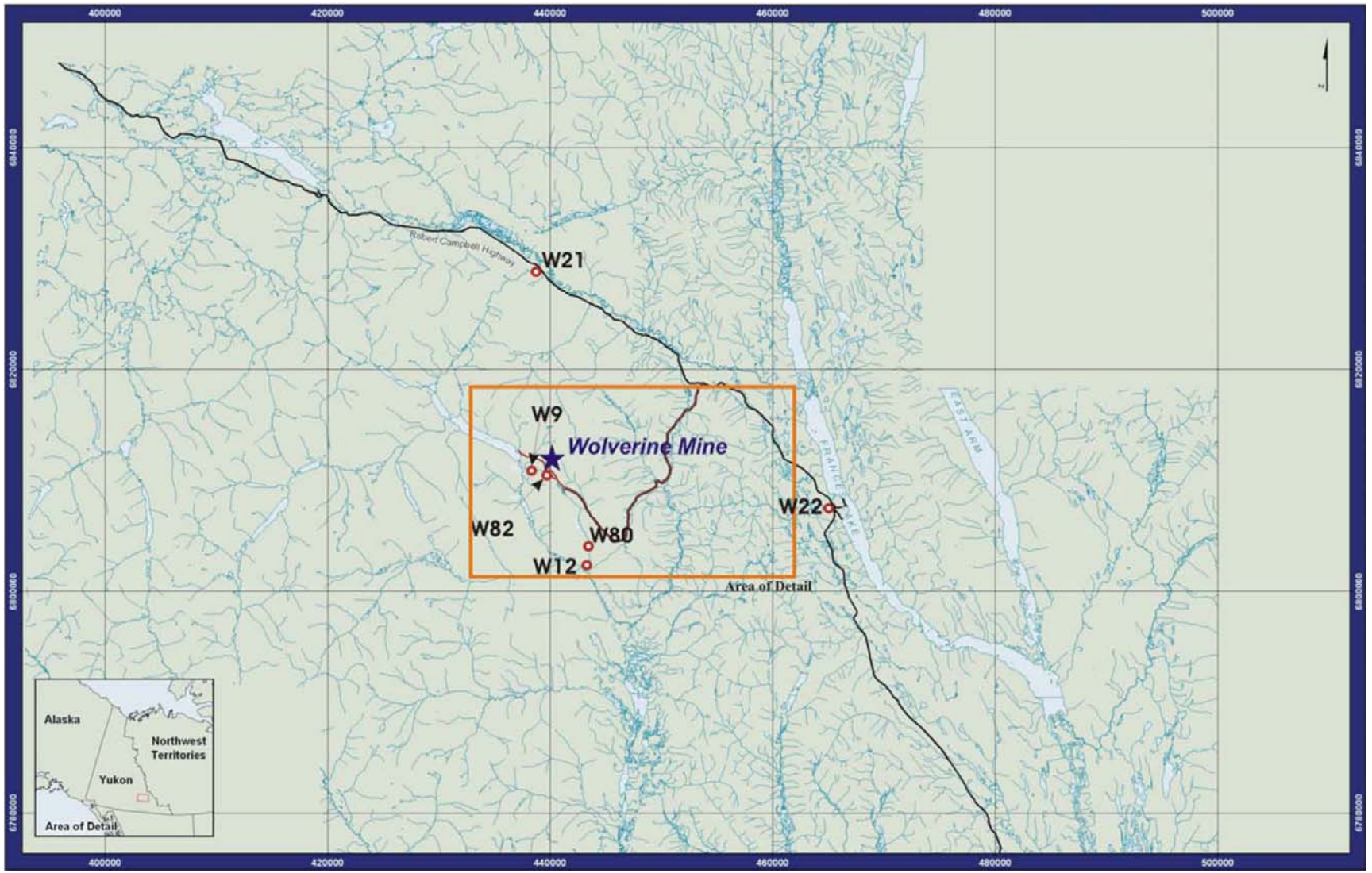



**Figure 17. Locations of Continuous Hydrology Monitoring Stations in the Immediate Vicinity of Wolverine Project Operations and Regional Stations**

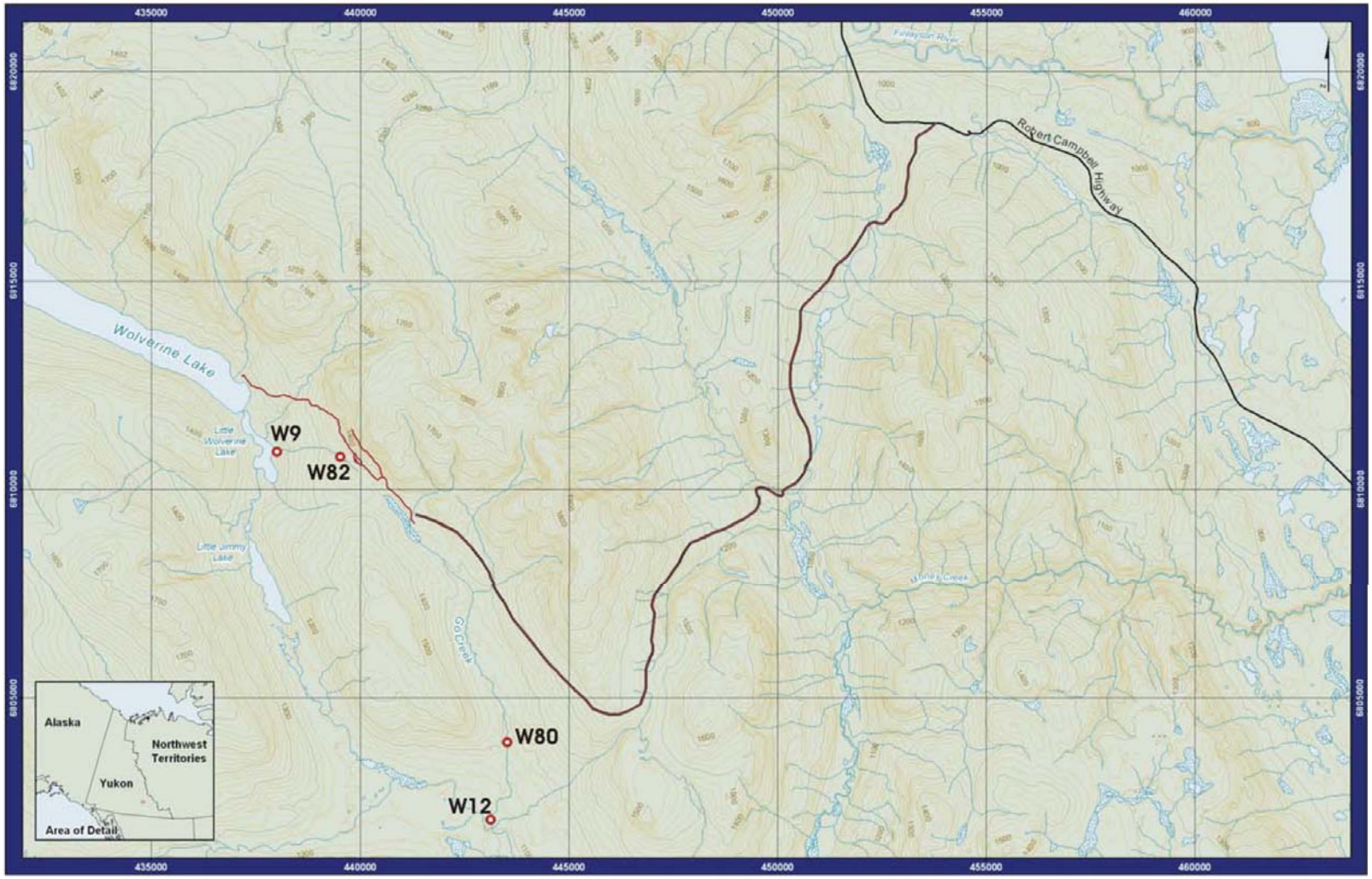



**Figure 18. Details of Station Locations of Continuous Hydrology Monitoring Stations in the Immediate Vicinity of the Wolverine Project**

### 9.2.2 Surface Water Quality

The following section presents the proposed monitoring program for receiving waters for the pre-construction, construction, operational and closure phases of the Wolverine Project. Both surface water and water treatment plant discharge monitoring programs are essential to the overall objective of obviating environmental impacts to the receiving environment and maintaining compliance with water quality objectives in Go Creek. In addition, water quality monitoring at key locations along the road route will also be maintained.

The water quality parameters and detection limits to be used in the monitoring program of the receiving surface waters are shown in Table 20 and are similar to those used for previous baseline surveys. Particular attention has been paid to achieving the lowest possible detection limits for key parameters including cadmium and selenium. The list of parameters may be modified at a future date to reflect site-specific conditions of the project.

Surface water quality monitoring stations have been established in all key watersheds of the project area including the Wolverine Creek - Wolverine Lake watershed (stations W1, W21, L1, W8, W82 and W9); Go Creek watershed (stations W31, W16, W15, W81, W80 and W12); Money Creek watershed (stations W14, W22 and W40) and along the road route (stations W71, W72 and W73) (Figures 19 and 20).

Table 21 provides a summary of the surface water monitoring program from pre-construction phase through to closure for all monitoring stations, including the monitoring of key components of the water management system. For all stations in the Wolverine, Go Creek, Money Creek and road route watersheds, surface water quality monitoring during the pre-construction, construction and operational phase of the mine will occur on a monthly basis. For the compliance monitoring point in Go Creek at station W80, water quality monitoring will occur daily during periods of active water treatment plant discharge.

During closure, stations will be sampled monthly, but only on a seasonal basis during the ice free period of May to October. The exceptions to this include stations W21, W8, W71, W72 and W73 where sampling during the closure period will be quarterly during the ice free period (Table 21).

Surface water quality monitoring of the key components of the water management system include monthly monitoring of the tailings impoundment water and daily sampling of the water treatment plant retention pond when the latter is operating during the ice-free period of May to October. Monitoring of the tailings impoundment and water treatment plant retention pond will be at the proposed frequency as long as these systems are operational, which will likely include the early phases of closure of the mine. The retention pond will be decommissioned at final closure and only seasonal (i.e., monthly during ice free periods) monitoring of the tailings impoundment will continue.

**Table 20. Surface Water Quality Monitoring Parameters and Detection Limits**

| Parameter | Symbol | Detection Limit | Units |
|---|---|---|---|
| **Physical Parameters** | | | |
| Conductivity | | 2 | µS/cm |
| Hardness | | 0.5 | mg/L |
| Total Suspended Solids | TSS | 4 | mg/L |
| Total Dissolved Solids | TDS | 10 | mg/L |
| pH | pH | 0.1 | pH |
| Turbidity | NTU | 0.1 | NTU |
| **Major Anions** | | | |
| Alkalinity-Total | $CaCO_3$ | 0.5 | mg/L |
| Bromide | Br | 0.1 | mg/L |
| Chloride | Cl | 0.5 | mg/L |
| Fluoride | F | 0.02 | mg/L |
| Sulphate | $SO_4$ | 0.5 | mg/L |
| **Nutrient Parameters** | | | |
| Ammonia Nitrogen | N | 0.005 | mg/L |
| Nitrate Nitrogen | N | 0.005 | mg/L |
| Nitrite Nitrogen | N | 0.001 | mg/L |
| Dissolved Ortho-Phosphate | P | 0.005 | mg/L |
| **Total and Dissolved Trace Metals** | | | |
| Aluminum | Al | 0.001 | mg/L |
| Antimony | Sb | 0.0001 | mg/L |
| Arsenic | As | 0.0001 | mg/L |
| Barium | Ba | 0.001 | mg/L |
| Boron | B | 0.008 | mg/L |
| Cadmium | Cd | 0.000017 | mg/L |
| Calcium | Ca | 0.05 | mg/L |
| Chromium | Cr | 0.0005 | mg/L |
| Cobalt | Co | 0.001 | mg/L |
| Copper | Cu | 0.0002 | mg/L |
| Iron | Fe | 0.005 | mg/L |
| Lead | Pb | 0.00005 | mg/L |
| Magnesium | Mg | 0.05 | mg/L |
| Manganese | Mn | 0.001 | mg/L |
| Molybdenum | Mo | 0.001 | mg/L |
| Nickel | Ni | 0.0005 | mg/L |
| Phosphorus | P | 0.1 | mg/L |
| Potassium | K | 1 | mg/L |
| Selenium | Se | 0.0005 | mg/L |
| Silicon | Si | 0.05 | mg/L |
| Silver | Ag | 0.00001 | mg/L |
| Sodium | Na | 0.05 | mg/L |
| Strontium | Sr | 0.001 | mg/L |
| Thallium | Tl | 0.0001 | mg/L |
| Vanadium | V | 0.001 | mg/L |
| Zinc | Zn | 0.001 | mg/L |

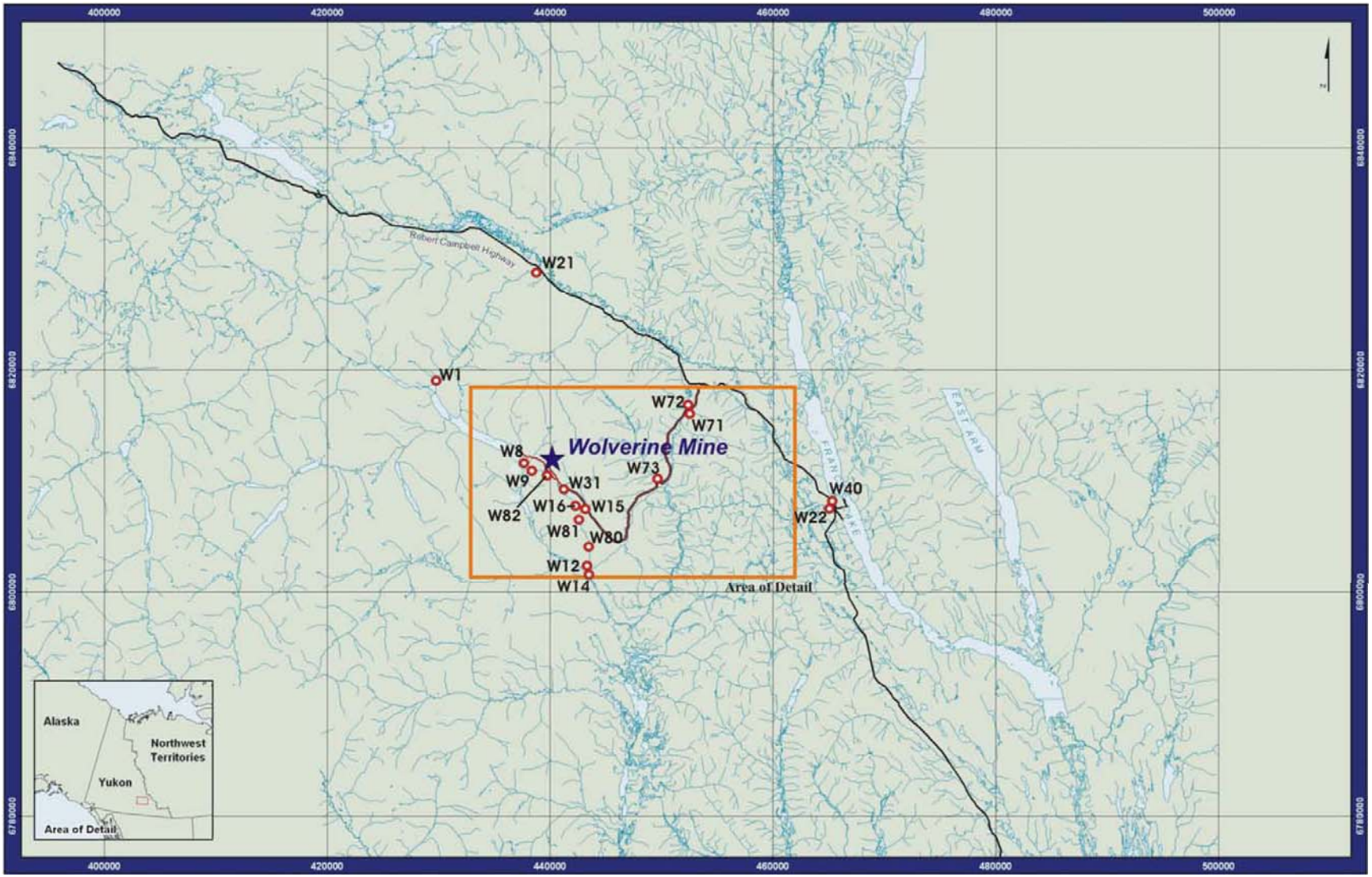



**Figure 19. Locations of Surface Water Quality Monitoring Stations for the Wolverine Project Operations and Along the Road Route**

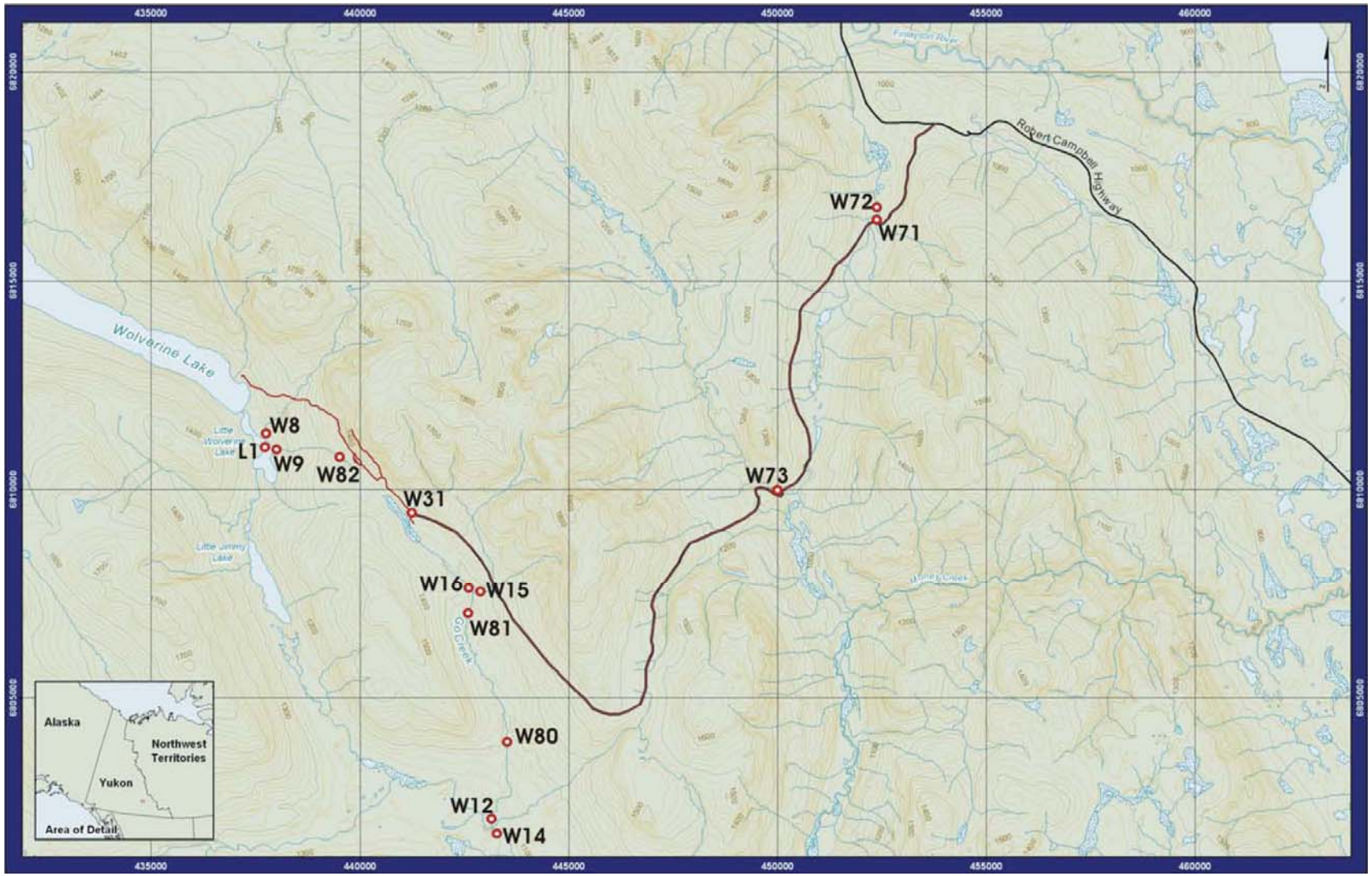



**Figure 20. Detail of Surface Water Quality Monitoring Stations in the Immediate Vicinity of Wolverine Project Operations and Along the Road Route**

**Table 21. Summary of Surface Water Monitoring Program for Wolverine Project**

| Site | Purpose | Pre-Construction | Construction | Operations | Closure |
|---|---|---|---|---|---|
| **Wolverine Watershed** | | | | | |
| W1 | Monitor water quality of Wolverine Lake | Monthly | Monthly | Monthly | Seasonal[1] |
| L1 | Monitor water quality of Little Wolverine Lake | Monthly | Monthly | Monthly | Seasonal |
| W21 | Monitor water quality of Nougha Creek | Monthly | Monthly | Monthly | Quarterly |
| W8 | Monitor water quality of Campbell Creek | Monthly | Monthly | Monthly | Quarterly |
| **Go Creek Watershed** | | | | | |
| W31 | Monitor upper reaches of Go Creek prior to tailings facility | Monthly | Monthly | Monthly | Seasonal |
| W16 | Monitor upper Go Creek immediately upstream of discharge location | Monthly | Monthly | Monthly | Seasonal |
| W15 | To monitor Hawkowl Creek prior to joining Go Creek | Monthly | Monthly | Monthly | Seasonal |
| W81 | 100 m downstream of confluence of Hawkowl Creek with Go Creek. Intermediate station in Go Creek monitoring influence of discharge | Monthly | Monthly | Monthly | Seasonal |
| W80 | Compliance point in Go Creek | Monthly | Monthly | Daily[2] | Seasonal |
| W12 | Go Creek prior to Money Creek | Monthly | Monthly | Monthly | Seasonal |
| **Money Creek Watershed** | | | | | |
| W14 | Monitor water quality in upper reaches of Money Creek | Monthly | Monthly | Monthly | Seasonal |
| W22 | Monitor water quality in Money Creek upstream of highway | Monthly | Monthly | Monthly | Seasonal |
| W40 | Monitor water quality in Money Creek downstream of highway | Monthly | Monthly | Monthly | Seasonal |
| **Road Route Monitoring** | | | | | |
| W71 | Monitor water quality at Pitch Creek road crossing | Monthly | Monthly | Monthly | Quarterly |
| W72 | Monitor water quality in Light Creek | Monthly | Monthly | Monthly | Quarterly |
| W73 | Monitor water quality at Bunker Creek road crossing | Monthly | Monthly | Monthly | Quarterly |
| **Water Management** | | | | | |
| Tailings Pond | To monitor water quality in the tailings impoundment | | | Monthly | Seasonal |
| Retention Pond | Monitor water quality in the retention pond | | | Daily[2] | |

**Notes:**
1: Seasonal monitoring during closure will include monthly monitoring during the ice free period of May to October
2: Daily monitoring during discharge periods during operations and early closure

# 10 Spill Contingency and Emergency Response Plan

The measures outlined in the following sections intend to minimize the potential impact to the environment following a fuel and/or chemical spill. The immediate priority is to ensure human safety and limit environmental damage, followed by the action plans to effectively implement the procedures/methods for spill containment and clean up and site remediation measures. The priority sequence is as follows:

- ensure safety: protect life and prevent injury
- protect the environment
- protect infrastructure
- minimize business activity disruption

The following subsections provide details pertaining to spill response equipment, action plans, and training, and specific information on spill containment.

## 10.1 Equipment

Spill kits will be located at the portal, camp and airstrip, as well as in heavy equipment. Kit contents generally contain oil sorbent pads, pillows and socks, granular sorbent, plug patties for instant leak stop, shovels, and protective equipment including gloves, goggles, and protective suits. All heavy equipment will be equipped with sorbent pads, granular sorbent and gloves, at a minimum.

Dry chemical fire extinguishers will be located near the fueling stations. The water truck can also be used in fire suppression activities and pumps are onsite at the upper portal for spill pumping and fire suppression activities.

The general steps required to be taken in the event of a spill are as follows:

- first responder/observer must ensure their safety and the safety of others
- shut off ignition sources (including electrical sources) and ensure no smoking
- identify and assess the spilled material
- report all spills immediately to site supervisor
- if safe, stop the source of the spill, contain the spill, and proceed with clean-up activities
- Environmental Coordinator will notify senior management immediately and contact the Yukon 24-hour Spill Report Hotline and Client Services and Inspections shortly thereafter once details are determined
- Environmental Coordinator will complete the Spill Report Form
- responsibilities for spill response are summarized in Table 22

**Table 22. Roles and Responsibilities for Spill Response**

| Position | Responsibilities |
|---|---|
| All Employees (First Observer) | • Assess the initial severity of the spill and safety concerns<br>• Identify the source of the spill<br>• Report all spills to Supervisor and Environmental Coordinator as soon as possible<br>• Determine the size of the spill and stop or contain it, if possible<br>• Participate in spill response as member of cleanup crew |
| Work Supervisors | • Contact the Mine Manager<br>• Gather facts of the spill<br>• Assist as required in spill response measures |
| Emergency Response Team | • Conduct cleanup of spills under direction of Mine Manager or Env. Coordinator<br>• Take appropriate response measures- deploy booms, absorbents and other equipment and materials as required<br>• Continue cleanup as directed by Mine Manager or Env. Coordinator |
| Mine Manager | • Assist in initial and ongoing response efforts<br>• Supervise Spill Response Team<br>• Ensure source of the spill has stopped and contain spill<br>• Record spill information<br>• Ensure co-ordination of equipment and manpower as needed<br>• Oversee the cleanup operation until it is satisfactorily completed<br>• Continue actions until relieved or supplemented by other supervisors<br>• Decide with Environmental Coordinator if mobilization of additional equipment or a contractor is warranted |
| Environmental Coordinator | • Ensure expeditious response and clean up of spill site and impacted areas<br>• Report the spill to the Yukon 24-Hour Spill Report Line and Client Services and Inspections<br>• Together with the Mine Manager, decide if additional equipment is required for containment and remedial activities<br>• Notify senior management<br>• Oversee completion and distribution of Spill Report<br>• Ensure investigation identifies measures to prevent similar spills |
| VP Environment and Community Affairs | • Is responsible for all communication with the media. Ensures that all press releases are accurate and in accordance with company policy<br>• Makes financial decisions on major expenses during large spill response |
| YZC Board of Directors | • Establishes corporate environmental policy based on the recommendations of the Environmental Management Committee |

## 10.2 Spill Response Training

Training and preparedness will be conducted in accordance with both Occupational Health and Safety Regulations and regional legislation. At a minimum, a first responder awareness level training program will be implemented with all key staff and contractors.

All personnel will receive training that includes instruction in spill recognition and assessment, spill hazards, spill reporting, communication procedures, clean-up measures and general emergency response.

Where contract fuel suppliers will be shipping fuels as outlined under the *Transportation of Dangerous Goods Act* and be received by an employee of YZC, these personnel must hold a valid Canadian Certificate of Training in the form of a wallet card. This person will be responsible for ensuring that the appropriate records are maintained and any incidents involving the shipper and or receiver are reported to the appropriate authorities.

## 10.3 Spill Containment, Clean-up and Disposal

The potential exists for spills of petroleum products and or various chemicals used at the Wolverine Mine. A spill will typically be in the form of a liquid. Various proven practical methods of containment and recovery are well documented for use in northern climates and are summarized below for each of the following areas: on land, snow, ice or in water. For additional technical information, consult the Environment Canada Report EPS 9/SP/2, December 1986.

### 10.3.1 Containment

For spills that occur on land, three methods of containment are summarized in Table 23.

Containment on snow is readily achieved and is very effective due to its absorbent quality. Liquid spills (petroleum) will become immobile within the snow pack and are easily removed for transport for recovery or disposal. The snow can be used to its advantage in construction of snow dykes/dams. Whenever possible, the snow pack should be left in place to avoid contaminating the underlying substrate.

Spills that occur on ice, from either direct spillage or migration to the ice, are greatly affected by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to that on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water.

A spill occurring on or into open water is very difficult to contain and every effort should be made to prevent the material from entering the water. If in the case of petroleum products, the material floats, then immediate deployment of surface booms should take place to control the spread of material.

**Table 23. Spill Containment Option for Land-based Spills**

| Containment Method | Details Pertaining to Method Application |
|---|---|
| Snow Dykes | Petroleum products spilling onto frozen snow covered ground may be contained by the construction of snow dykes. For smaller spills the dykes can be built with shovels while larger dykes will typically require the use of heavy equipment In freezing temperatures, water may be sprayed or poured over the dykes to further enhance the barrier. Synthetically lined dykes are more effective than just snow or snow and ice-lined dykes. The impermeability of dykes may be ensured by lining with a polyethylene plastic liner, plastic tarpaulin or similar synthetic material. |
| Sand or Gravel Dykes | During warmer months, containment dykes may be constructed from sand or gravel if these materials are available. For smaller spills, the dykes can be fashioned manually with shovels where as for larger spills, trucks or other heavy equipment (front-end loaders) will normally be required to handle sand and gravel. |
| Trenching or ditching | Used for containing and/or intercepting the flow of liquid spills on land. Ice, snow, loose sand, gravel and surface layers of organic material can usually be scraped or dug away until the underlying frozen substrate is reached. Effective in re-directing flow or simple containment prior to pumping or absorbing the spilled material. Trenching in solid frozen ground or rocky substrate is normally neither practical nor possible. |

Action plans for the clean up of fuels, oils and antifreeze in various environments are provided in Table 24.

**Table 24. Action Plan for Fuels, Oils and Antifreeze**

| | Spill Substance Type | | |
|---|---|---|---|
| **Location of Spill** | **Diesel, Hydraulic, Lube and Waste Oil** | **Gasoline and Jet B Aviation Fuel** | **Ethylene Glycol (Antifreeze)** |
| On Land | Do not flush into ditches or drainage systems.<br>Prevent entry into waterways and contain with berm or other barrier.<br>Remove small spills with sorbent pads. | Block entry into waterways with berms or other barrier.<br>Do not flush into ditches or drainage systems.<br>Do not contain spill if there is any chance of igniting vapours.<br>On shop floors and in work yards, apply particulate sorbents. | Block entry into waterways with berms or other barrier.<br>Do not flush into ditches or drainage systems.<br>Contain spill by dyking with earth or other barrier.<br>Remove minor spills with universal sorbent.<br>Remove large spills with pumps or vacuum equipment. |
| On Snow and Ice | Block entry into waterways and contain with berm or other barrier<br>Remove minor spills with sorbent pads or snow<br>Use ice augers and pump when feasible to recover diesel under ice.<br>Burn using Tiger Torches if unrecoverable by other methods, feasible and safe to do so. | Block entry into waterways with snow or other barrier.<br>Do not contain spill if there is any chance of igniting vapours.<br>In work yards, apply particulate sorbents. | Block entry into waterways with berms or other barrier.<br>Do not flush into ditches or drainage systems.<br>Contain spill by dyking with snow or other barrier.<br>Remove minor spills with universal sorbent.<br>Remove contaminated snow with shovels and mechanical equipment. |
| On Muskeg | Do not deploy personnel and equipment on marsh or vegetation.<br>Remove pooled oil with sorbent pads and/or skimmer.<br>Flush with low-pressure water to herd oil to collection point.<br>Burn only in localized areas, e.g., trenches, piles or windrows.<br>Do not burn if root systems can be damaged (low water table).<br>Minimize damage caused by equipment and excavation. | Do not deploy personnel and equipment on marsh or vegetation.<br>Remove pooled gasoline or Jet B with pumps.<br>Low pressure flushing can be tried to disperse small spills.<br>Burn carefully only in localized areas, e.g., trenches, piles or windrows.<br>Do not burn if root systems can be damaged (low water table).<br>Minimize damage caused by equipment and excavation. | Do not deploy personnel and equipment on marsh or vegetation.<br>Burning is not feasible.<br>Minimize damage caused by equipment and excavation. |
| On Water | Contain spill as close to release point as possible.<br>Use spill containment boom to concentrate slicks for recovery.<br>On small spills, use sorbent pads to pick up contained oil.<br>On larger spills, obtain and use skimmer on contained slicks.<br>Do not use sorbent booms/pads in fast currents and turbulent water.<br>Intercept moving slicks in quiet areas using sorbent booms. | Do not attempt to contain or remove spills.<br>Use booms to protect water intakes and sensitive areas. | Ethylene glycol sinks and mixes with water.<br>Isolate/confine spill by damming or diversion. |

### 10.3.2 Recovery

Spilled petroleum products contained within a dyked, trenched or boomed area should be recovered by pumping into a portable storage tank or drum. Pump and suction hoses should be screened to prevent snow, ice or debris from clogging the line or pump. Any remaining material may be absorbed by use of a variety of products, such as 3M brand Conweb and Phase III brand Oil Sponge.

The availability of shovels, rakes and pitchforks are invaluable in any spill clean-up and recovery operation. The use of heavy equipment for larger spill situations such as front-end loaders and haul trucks, make the removal of material easier.

### 10.3.3 Disposal

Petroleum products such as oil that have been recovered by pumping into a tank or drum, can often be reused. Currently, hydrocarbon contaminated materials are removed to either the burn area for ignition or to the land farm area.

The licensed land treatment farm is located adjacent to the airstrip as previously described. Soil is reclaimed through the process of bioremediation through tilling and the breakdown of hydrocarbons by naturally occurring bacteria. The process is most effective when soil temperatures range from 5 to 45ºC. Bioremediation in soil will work so long as the ground is not frozen.

### 10.3.4 Other Concerns

In the event that the accident/incident is in combination with a fire, extinguishing the fire may be required prior to initiating efforts to stop the spillage. In order to control the resulting runoff (in cases where water is used), and the subsequent spread of the spilled material, the spill site should be contained.

Petroleum and chemical fires have the potential to generate toxic fumes under poor combustion conditions. Approaching and dealing with any fire from upwind is recommended as well as caution with regard to breathing the vapours generated from the fire. A Self-Contained Breathing Apparatus (SCBA) should be used when situations warrant.

## 10.4 Reporting

The sequence of reporting that must be strictly followed to ensure that an efficient and effective response occurs, an accurate spill report is completed, and notifications to both YZC management and government agencies are done in a timely fashion is provided Figure 21.

Most major suppliers in the Yukon are members of the Transportation Emergency Assistance Plan (TEAP). One of the responsibilities of this organization is the sharing of resources, consumables, equipment and personnel in the event of a spill. The transporter of the fuel is responsible for contacting TEAP in the event of a spill.

The person who discovers the spill is considered the First Observer. That person identifies the source of the spill and reports to his or her direct supervisor who gathers the facts of the spill and contacts the Site Manager. The Site Manager records the spill information and passes it onto the Environmental Coordinator

who will oversee its completion and distribution. Table 25 provides a list of substances and quantities that currently constitutes a spill with the Yukon Government.

**Table 25. What constitutes a spill according to the Yukon Government**

| Substance Spilled | Specified Amount |
|---|---|
| 1. Explosives of Class 1 as defined in section 3.9 of the Federal Regulations | Any amount |
| 2. Flammable gases, of Division 1 of Class 2 as defined in section 3.11(a) of the Federal Regulations | Any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction |
| 3. Non-flammable gases of Division 2 of Class 2 as defined in section 3.11(d) of the Federal Regulations | Any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction |
| 4. Poisonous gases of Division 3 of Class 2 as defined in section 3.11(b) of the Federal Regulations | Any amount |
| 5. Corrosive gases of Division 4 of Class 2 as defined in section 3.11(c) of the Federal Regulations | Any amount |
| 6. Flammable liquids of Class 3 as defined in section 3.12 of the Federal Regulations | 200L |
| 7. Flammable solids of Class 4 as defined in section section 3.15 of the Federal Regulations | 25 kg |
| 8. Products or substances that are oxidizing substances of Division 1 of Class 5 as defined in sections 3.17(a) and 3.18(a) of the Federal Regulations | 50 kg or 50 L |
| 9. Products or substances that are organic compounds that contain the bivalen "-0-0-" structure of Division 2 of Class 5 as defined in sections 3.17(b) and 3.18(b) of the Federal Regulations | 1 kg or 1L |
| 10. Products or substances that are poisons of Division 1 of Class 6 as defined in sections 3.19(a) to (e) and 3.20(a) of the Federal Regulations | 5 kg or 5 L |
| 11. Organisms that are infectious or that are reasonable believed to be infectious and the toxins of these organisms as defined in sections 3.19(f) and 3.20(b) of the Federal Regulations | Any amount |
| 12. Radioactive materials of Class 7 as defined by section 3.24 of the Federal Regulations | Any discharge or a radiation level exceeding 10mSv/h at the package surface and 200 mSv/h at 1 m from the package surface |
| 13. Products or substances of Class 8 as defined by section 3.24 of the Federal Regulations | 5 kg or 5 L |
| 14. Miscellaneous products or substances of Division 1 of Class 9 as defined by sections 3.27(1) and 2(a) of the Federal Regulations | 50 kg or 50 L |
| 15. Miscellaneous products or substances of Division 2 of Class 9 as defined in section 3.27(1) and 2(b) of the Federal Regulations | 1 kg or 1 L |
| 16. Miscellaneous products or substances of Division 3 of Class 9 as defined in section 3.27(1) and 2(c) of the Federal Regulations | 5 kg or 5 L |
| 17. Special waste as defined in section 1 of the Special Waste Regulations of the Special Waste Regulations | Amounts specified in s. 3(1)(b) of the Special Waste Regulations |
| 18. A pesticide as defined in section 2 of the Environment Act, but not including those pesticides and fertilizers listed in Schedule 4 of the Pesticide Regulations | 5 kg or 5 L |
| 19. Pesticides and fertilizers listed in Schedule 4 of the Pesticide Regulations | Any amount |

Any spill matching these criteria must be reported to the 24-hour Spill Report Line and Client Services and Inspections. However, if in doubt as to whether the reporting criteria were met, the call should be placed as a precautionary measure.

The Environmental Coordinator reports the spill to YZC senior management and the 24-hour Spill Report Line and Client Services and Inspections. A verbal notification is to be made by telephone as soon as possible given the circumstances. A list of contact numbers will be readily available and kept up-to-date (Figure 22).

The following information shall be conveyed to the affected agencies through the 24-hour emergency Yukon Spill Response Line and Client Services and Inspections. This information will constitute verbal notification of the spill and should be documented on the Spill Reporting Form. The verbal report should include as much of the following information as is known at the time of the report (excerpt from the Implementation Guidelines for Part 8 of the *Canadian Environmental Protection Act, 1999* – Environmental Emergency Plans: Appendix 6: Notification and Reporting of Environmental Emergencies):

- the reporting person's name and telephone number at which the person can be immediately contacted
- the name of the person who owns or has the charge, management or control of the substance immediately before the environmental emergency
- the date and time of the release
- the location of the release
- the name/UN number of the substance released
- the estimated quantity of the substance released
- the means of containment (from which the substance was released) and a description of its condition
- the number of deaths and injuries resulting from the environmental emergency
- the surrounding area/environment affected and potential impact of the release (mobility of release and weather or geographic conditions at the site)
- a brief description of the circumstances leading to the release
- the cause of the release (if known)
- details of the actions taken or further actions contemplated (to contain, recover, clean up and dispose of the substance involved)
- the names of agencies notified or on-scene; and other pertinent information

The Canadian Transport Emergency Center (CANUTEC), a branch of Transport Canada, can also be contacted for 24 hr technical advice on Dangerous Goods. Other stakeholders such as the Ross River Dena Council and Liard First Nation will be notified.

A written report should be made to the Director, Environmental Protection, Pacific and Yukon Region, Environment Canada within 30 days of the spill occurrence. The following information should be included in the written report

(excerpt from the Implementation Guidelines for Part 8 of the *Canadian Environmental Protection Act, 1999* – Environmental Emergency Plans: Appendix 6: Notification and Reporting of Environmental Emergencies):

- the name and address of the person who owns or has the charge, management or control of the substance involved in the environmental emergency and the telephone number, including the area code, at which the person may be contacted
- the date, time and exact location of the release
- the name/UN number of the substance released
- the composition of the substance released showing, with respect to each substance involved, its concentration and total weight
- the estimated quantity of the substance released and the total quantity of substance in the means of containment before the release
- the duration of the release of the substance and its release rate
- the means of containment (from which the substance was released) and a description of its condition
- the number of deaths and injuries resulting from the environmental emergency
- the surrounding area/environment affected and potential impact of release (mobility of release, weather or geographic conditions at the site, long-term environmental impacts)
- a complete sequence of events before and after the environmental emergency (including the cause of the release, if known)
- the names of agencies notified or on-scene at the time of the release
- all measures taken pursuant to CEPA 1999 paragraph 201(1)(b) and (c) (regarding protection of the environment and public safety and notification to any member of the public adversely affected by the environmental emergency)
- all measures to be taken to prevent similar releases

**Figure 21. Spill Reporting and Response Procedure**

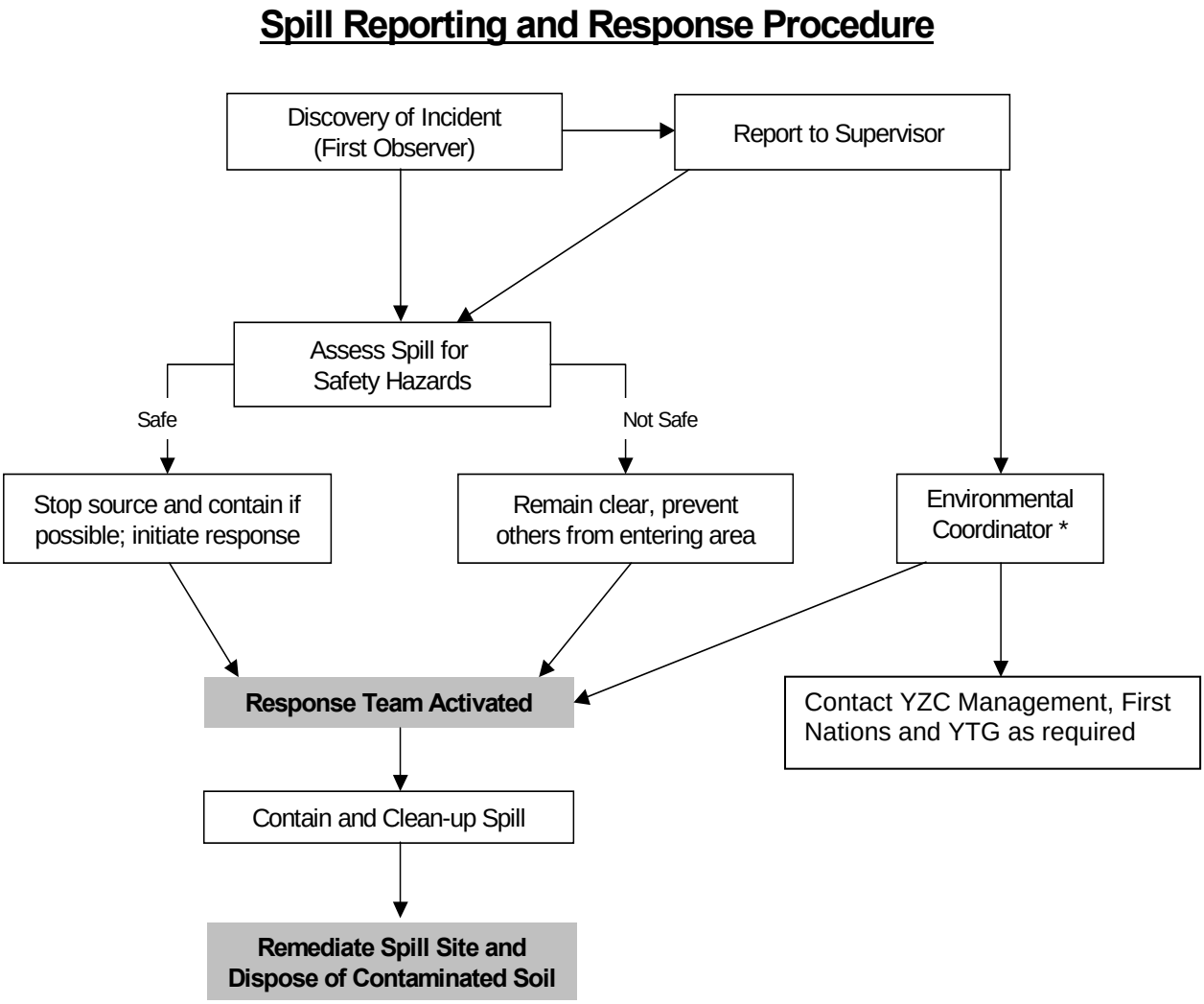


**Figure 22. Wolverine Project Emergency Contact Numbers**

**Wolverine Project**
**Emergency Telephone Contacts**

| | |
|---|---|
| **Yukon Zinc Corporation Contacts:** | |
| President and CEO, Harlan Meade | (604) 682-5474 ext 228 |
| Chief Operating Officer, Ray Mah | (604) 682-5474 ext 313 |
| VP Environment & Community Affairs, Pamela Ladyman | (604) 682-5474 ext 246 |
| | (604) 644-7655 (cell) |
| **First Nation Contacts:** | |
| Ross River Dena Council, Testloa Smith | (867) 969-2097 |
| Liard First Nation, Laurie Allen | (867) 536-2912 |
| **Spill Reporting Yukon Government Contacts:** | |
| 24-hour Yukon Spill Line | (867) 667-7244 |
| Client Services and Inspections | (867) 456-3882 |
| Watson Lake District Conservation Officer | (867) 536-7363 |
| Whitehorse District Conservation Officer | (867) 667-5221 |
| Environmental Inspections Branch | (867) 667-3436 |
| Mine Rescue Station | (867) 667-5450 |
| **Federal Government Contacts:** | |
| Department of Fisheries and Oceans | (867) 393-6722 |
| Environment Canada (Whitehorse) | (867) 667-3400 |
| Transport Canada (CANUTEC 24-hour Service) | (613) 996-6666 |
| **Regional Emergency Numbers:** | |
| **Hospital** | |
| Watson Lake | (867) 536-4444 |
| Whitehorse | (867) 393-8700 |
| Watson Lake Health Unit | (867) 536-7834 |
| **Ambulance** | |
| Watson Lake | (867) 536-4444 |
| **Fire Department** | |
| Watson Lake | (867) 536-2222 |
| Whitehorse | (867) 668-8699 or 668-2462 |
| **Police** | |
| Watson Lake | (867) 536-5555 |
| Whitehorse | (867) 667-5555 |
| **Laboratories** (Vancouver) | |
| ASL Chemex | (604) 984-0221 |
| ALS Environmental | (604) 253-4188 |
| Maxxam Analytics Inc | (604) 444-4808 |

**Figure 23. Wolverine Project Spill Reporting Form**

## Wolverine Project Spill Reporting Form

1) Date of Incident: _____ Time: _____

2) Spill Type: (check) Oil ____Gasoline ____Diesel _____Other (name) _____
3) Source and Cause: _____

_____

4) Volume: _____(Liters/gallons)

5) Spill Location: _____

6) GPS Coordinates: _____(N)_____(E)

7) Cause of Incident (e.g.: broken hose): _____

8) Weather Conditions: Temperature _____ Wind Direction/Speed _____ Conditions _____

9) Hazards to human life or health: _____

10) Known or Anticipated Environmental Effects: _____

11) Nearest Waterbody and Distance: _____

12) Fire Hazard: Yes ___ No ___

13) Supervisor Onsite: _____

14) Contractor Involved: Yes ___ No ___ Name(s): _____

15) Action taken to date: Containment: _____

Clean up: _____

16) Volume Recovered: _____(Liters/gallons)

17) Subsequent Actions Required: _____

18) Future Preventative Measures: _____

19) Additional Comments_____

_____

20) Reported by:
Name: _____ Title: _____ Company_____

21) Reported to:
Name: _____ Organization: _____ Phone:_____

Reported to:
Name: _____ Organization: _____ Phone:_____

Reported to:
Name: _____ Organization: _____ Phone:_____

## 10.5 Emergency Response

The major purpose of the Emergency Response Plan (ERP) is to provide a course of action for accidents, release of expected hazardous/toxic substances (primarily covered under the spill contingency plan), system failure, or other emergency situation arising during mine construction and operations.

This plan briefly defines the responsibilities of key personnel and outlines general procedures to be followed when responding to emergencies in a way that will avoid or reduce health and safety risks, and minimize trauma, safety hazards and environmental damage.

The scope of the ERP encompasses the extent of Wolverine operations including:

- the access road
- the airstrip
- camp facilities

Typical emergencies situations to be dealt with in this plan include:

- medical emergencies
- missing persons
- fires and explosions
- natural disasters
- site evacuation

This ERP does not include details of a response to a catastrophic event and all the external agencies and services that will likely be involved. In the event of a major emergency, it is expected that local government, crown corporations and other territorial agencies, the federal and territorial emergency response programs as well as private sector support organizations in the region of the mine will be involved and will respond according to their capabilities and own emergency plans. A coordinated joint emergency response effort is expected in such a situation.

The ERP applies to all site employees: mine personnel, contractor management and supervisors, subcontractor supervisors, as well as employees of contractors transporting, handling & transferring hazardous/toxic materials on site.

***Training***

All personnel receive training that includes instruction in general emergency response, spill contingency measures and communication procedures. Training for preparedness is conducted in accordance with both Occupational Health and Safety Regulations and regional legislation. At a minimum, a first responder awareness level training program is implemented with all key staff and contractors. Once in production, Emergency Response Team members will undergo more rigorous training and will be appropriately tested and certified in relevant emergency response procedures.

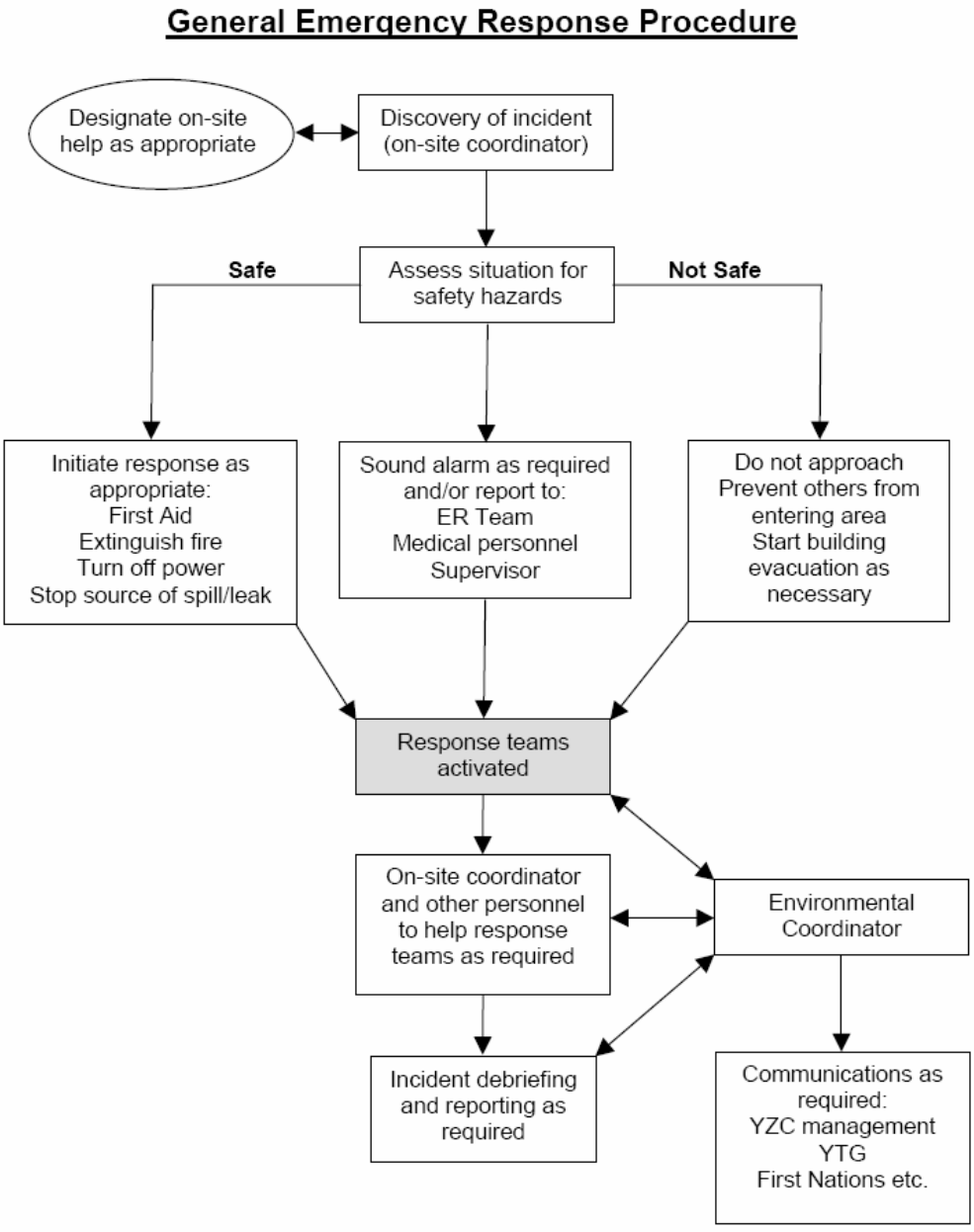
***Material Safety Data Sheets (MSDS)***

A complete inventory of chemicals and the Material Safety Data Sheets (MSDS) of all materials transported, stored and used on-site is available in the Environmental Supervisor's Office, Safety Supervisor's Office, and First Aid centre at the portal area.

**Emergency Response Situations**

For all situations, the first person on the scene of an emergency is designated the On-Scene Coordinator until such time as the Security Officer, Environmental or Safety Supervisor or Management delegates someone else and releases him/her of this duty. The general emergency response procedure is outlined in Figure 24.

**Figure 24. General Emergency Response Procedures**



**Appendix A**

**Figure 1**

**Wolverine All-Weather Access Road km 0 to km 24.0**

**Yukon Engineering Services**

**January 2007 (revised April 5, 2007)**

# FIGURE 1

Drawings For

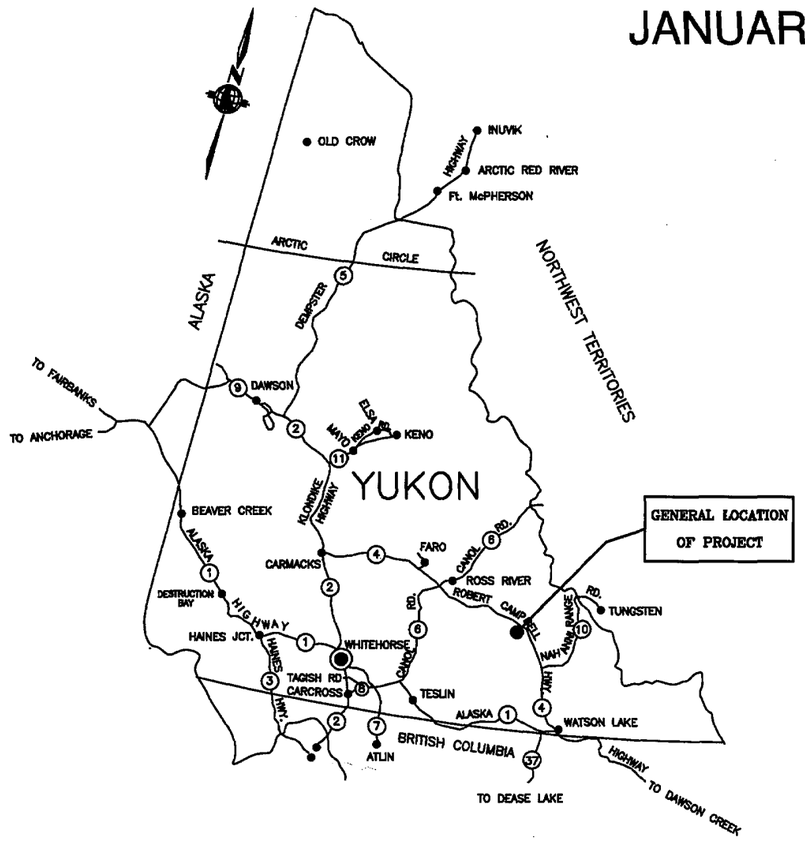
# WOLVERINE ALL WEATHER ACCESS ROAD

## km 0.0 to km 24.0

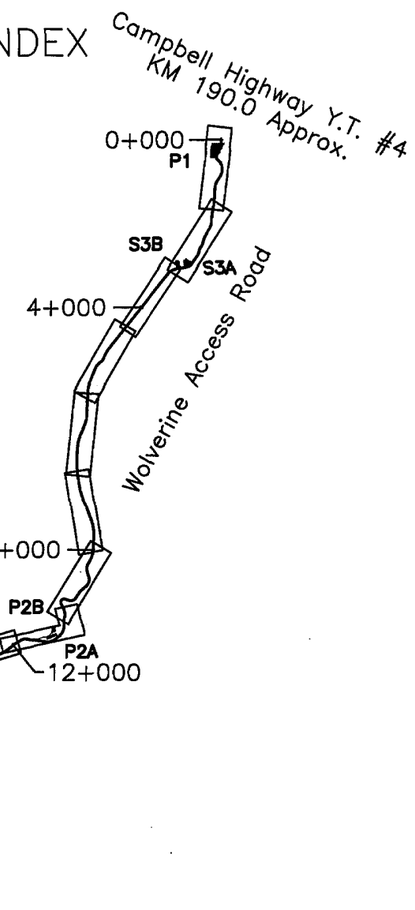
ISSUED FOR CONSTRUCTION

JANUARY 2007

| 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** |




## SHEET INDEX




LIST OF DRAWINGS:

PLAN/PROFILE SHEETS:

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

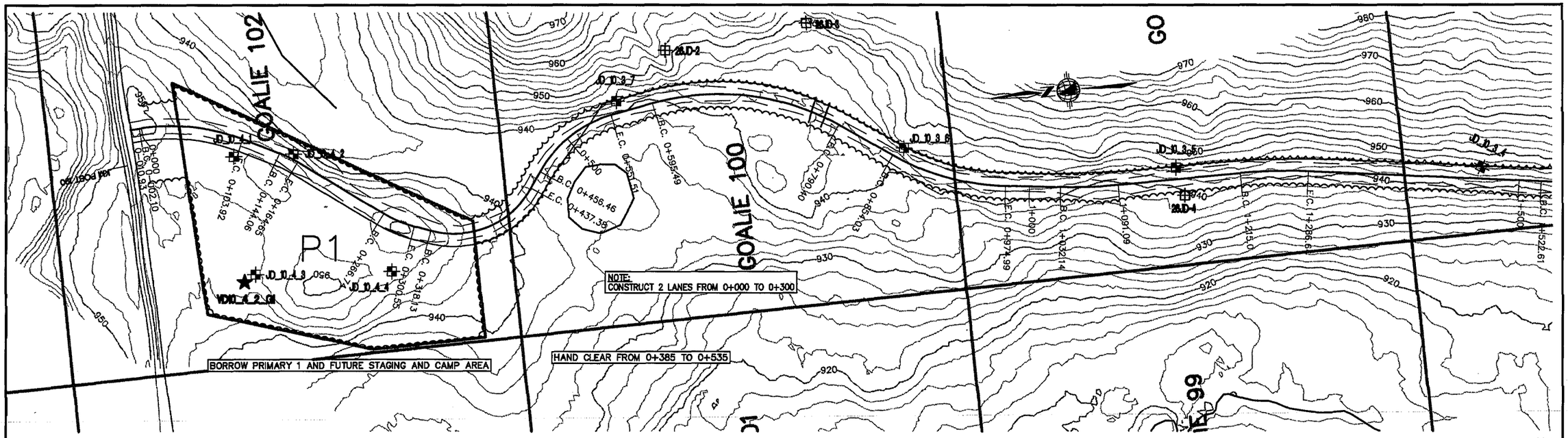
BUNKER CREEK CROSSING:

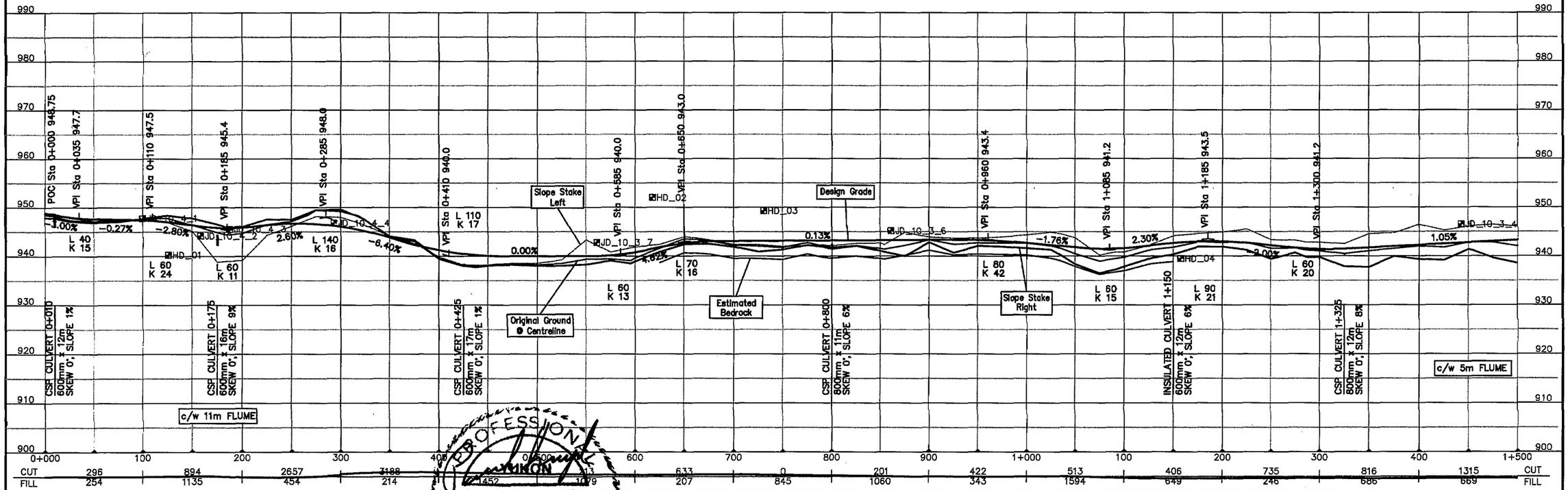
BUNKER - GENERAL LAYOUT - PLAN/PROFILE SHEET - BUNKER CK BRIDGE
3751-SK-601 - GENERAL ARRANGEMENT (AE)
3751-SK-602 - STEEL GIRDER DETAILS SHEET 1 (AE)
3751-SK-603 - STEEL GIRDER DETAILS SHEET 2 (AE)
BW 02-07001 - BIN WALL BRIDGE ABUTMENT DESIGN (ARMTEC)
BW 02-07002 - BIN TYPE RETAINING WALL BACKFILL 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)

Yukon Zinc CORPORATION

YES
YUKON ENGINEERING SERVICES

E06015_4_PP.dwg Jan.12/07




LEGEND:
- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26.D-9 HAND DUG TESTPITS
- 120697-TP01 TESTPITS
- WR08-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | ISSUE/REVISIONS | | |

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 5 | REVISED HWY ACCESS PK | PK | 04/06/01 |
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |
| | ISSUE/REVISIONS | | |

PROFESSIONAL ENGINEER
YUKON
PAUL J. KNYSH
TERRITORY
07/04/06

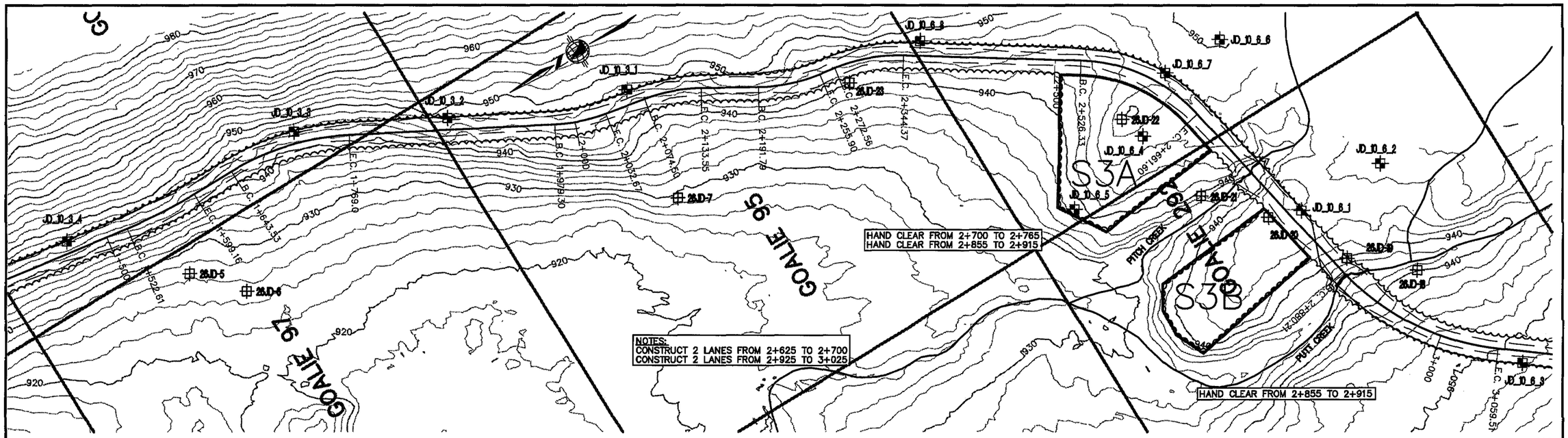
| SECTION: | |
|---|---|
| SCALE: 1:4000-H 1:800-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| ED6015_4_PP.DWG | ED6015 | km 0 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 0 TO KM 1.5
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE 1 ROAD
- 26JD-9 HAND DUG TESTPITS
- 120097-TP01 TESTPITS
- WR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER — PAUL J. KNYSH — TERRITORY — 27/04/06

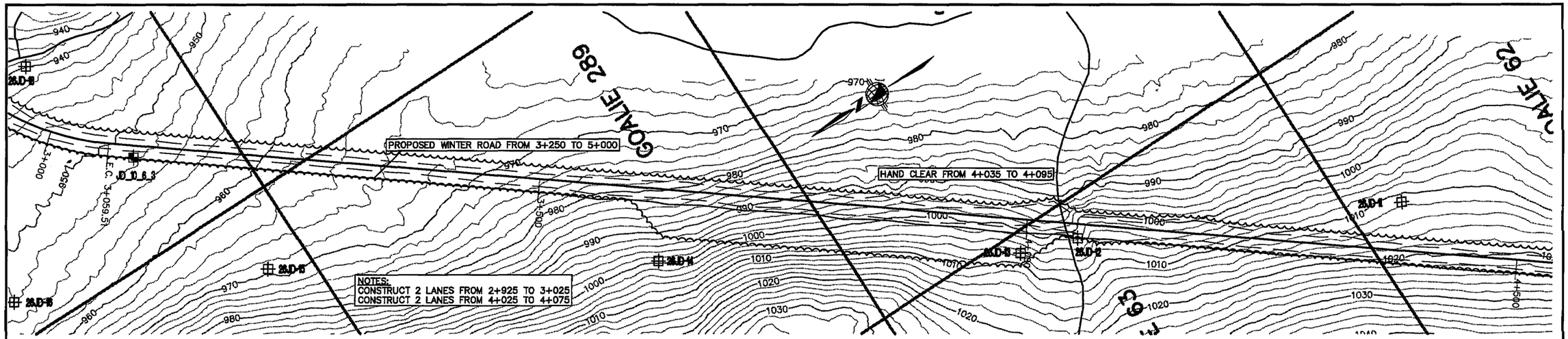
| SECTION: | DATE |
|---|---|
| SCALE: 1:4000–H 1:800–V | |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GDC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

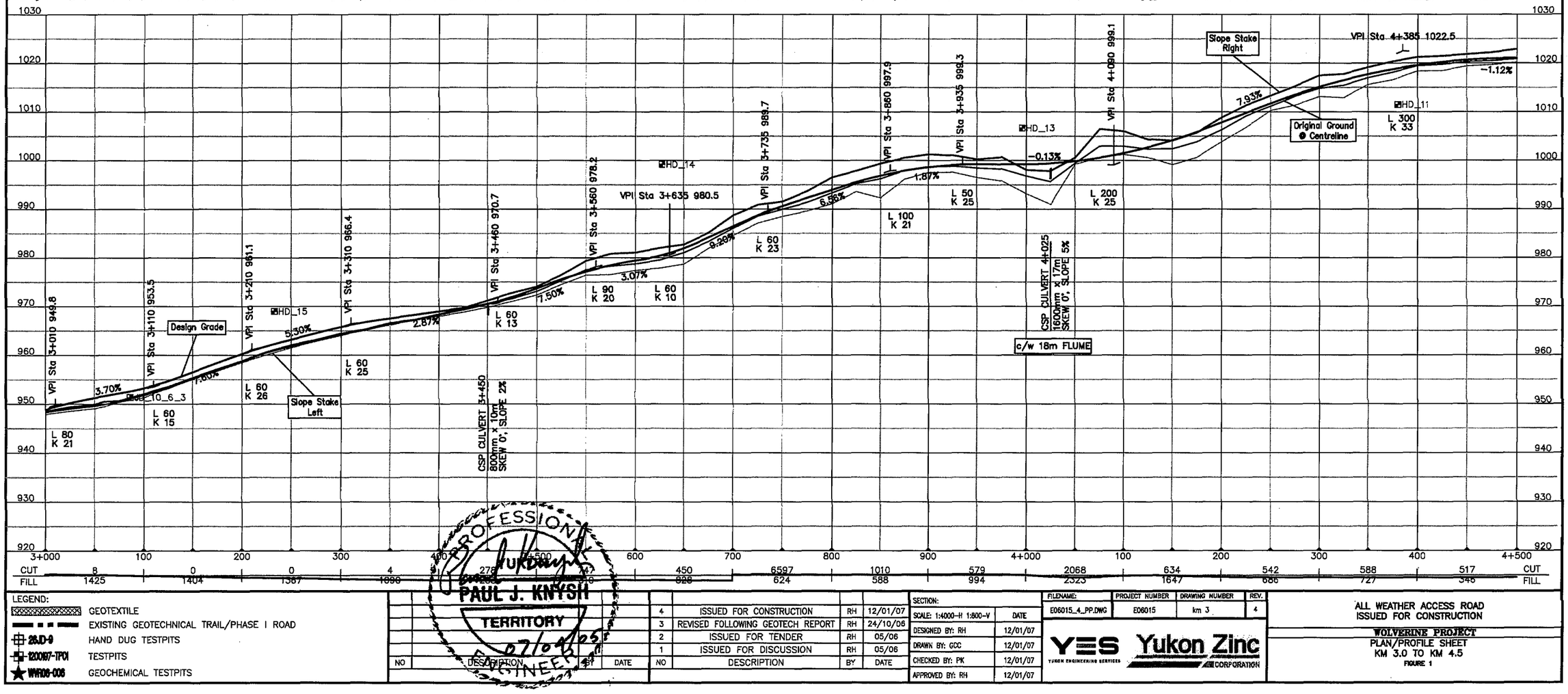
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 1.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 1.5 TO KM 3.0
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 25JD-9 HAND DUG TESTPITS
- 12DD07-TPDI TESTPITS
- WWR06-006 GEOCHEMICAL TESTPITS

PROFESSIONAL ENGINEER
PAUL J. KNYSH
TERRITORY
07/09/05

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

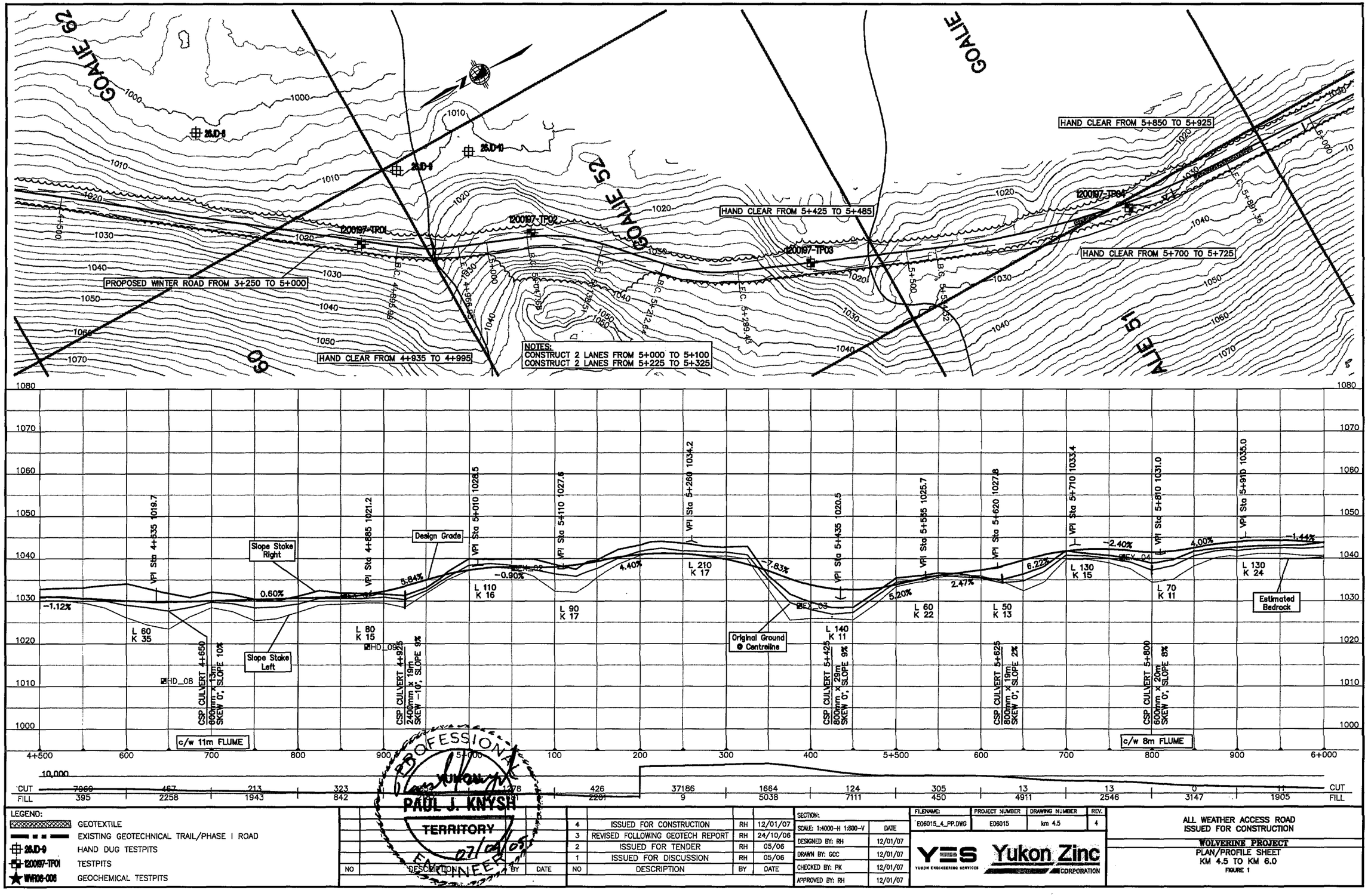
| SECTION: | |
|---|---|
| SCALE: 1:4000-H 1:800-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 3 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 3.0 TO KM 4.5
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 200197-TP01 TESTPITS
- WWR06-008 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER — YUKON TERRITORY — PAUL J. KNYSH — 07/12/05

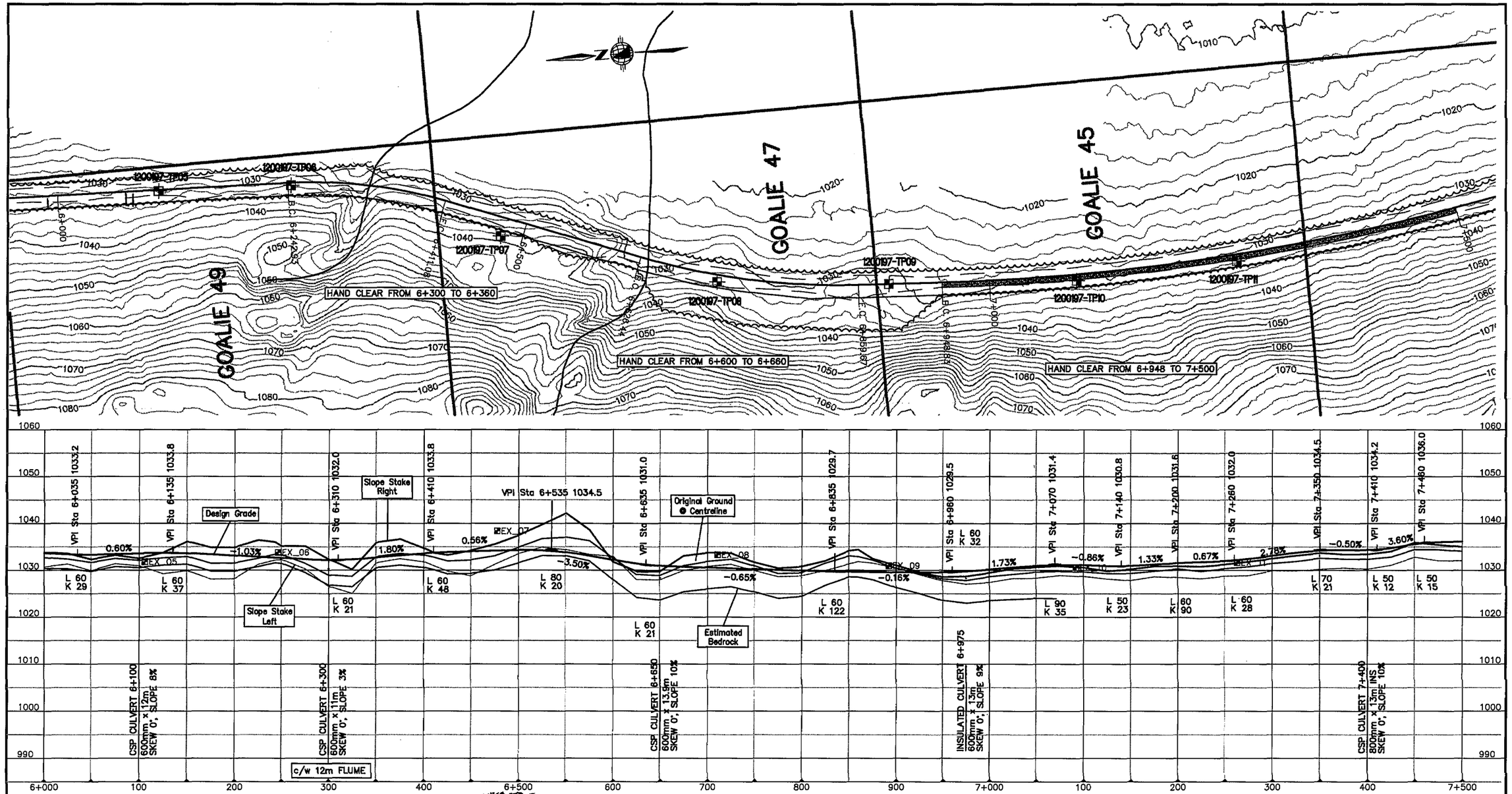
| SECTION: | |
|---|---|
| SCALE: 1:4000-H 1:800-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 4.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 4.5 TO KM 6.0
FIGURE 1

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FILL | | 1393 | 1866 | 1276 | 2393 | 1256 | 221 | 55 | 979 | 1408 | 1468 | 1684 | 2029 | 1988 | FILL |

LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 28JD-9 HAND DUG TESTPITS
- 200197-TP01 TESTPITS
- WWR06-006 GEOCHEMICAL TESTPITS

PROFESSIONAL ENGINEER — YUKON TERRITORY — PAUL J. KNYSH — 07/01/05

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

| SECTION: | |
|---|---|
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

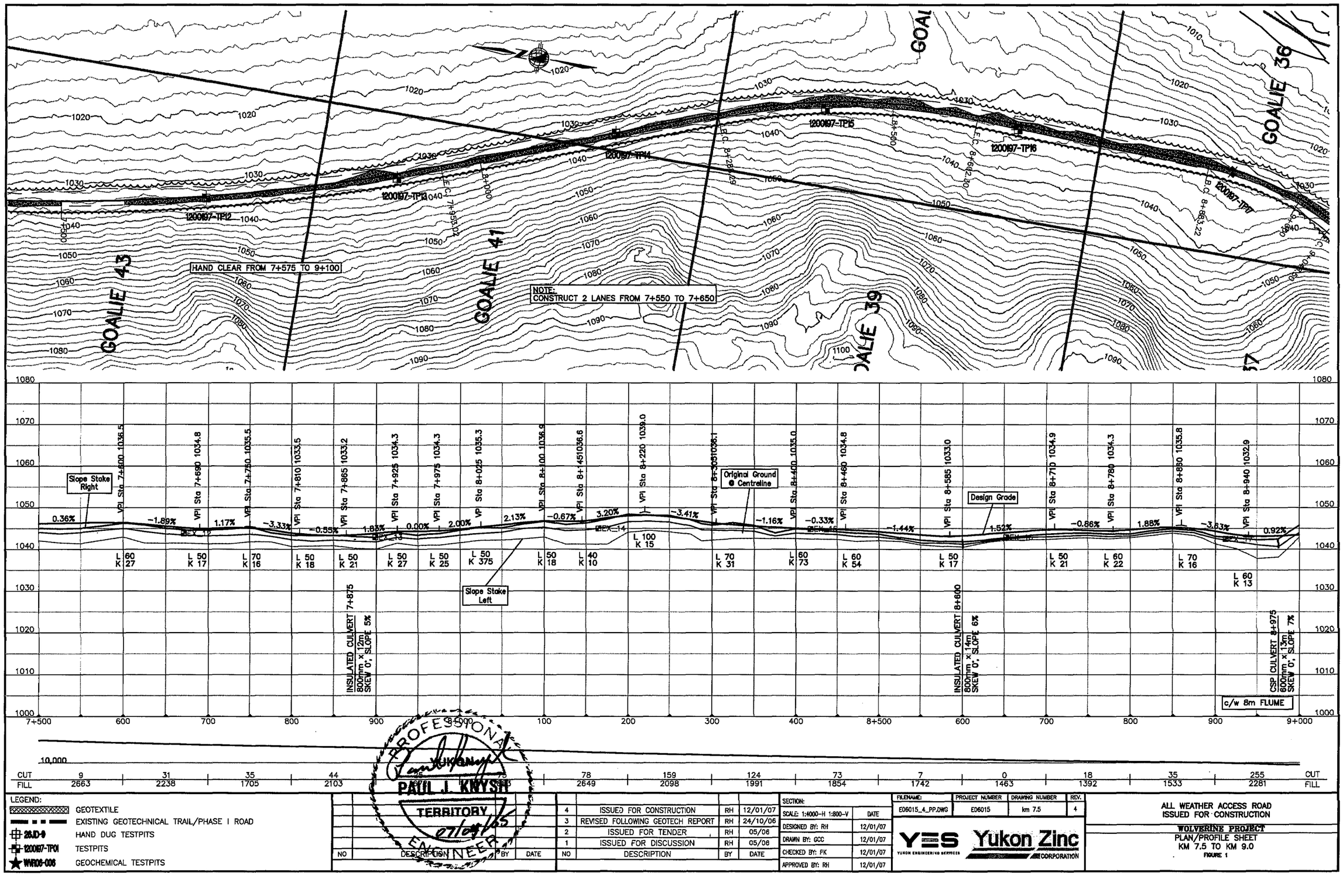
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 6 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

**WOLVERINE PROJECT**

PLAN/PROFILE SHEET
KM 6.0 TO KM 7.5
FIGURE 1

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 1200697-TP01 TESTPITS
- WWD6-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER
PAUL J. KWYSH
TERRITORY
07/09/05

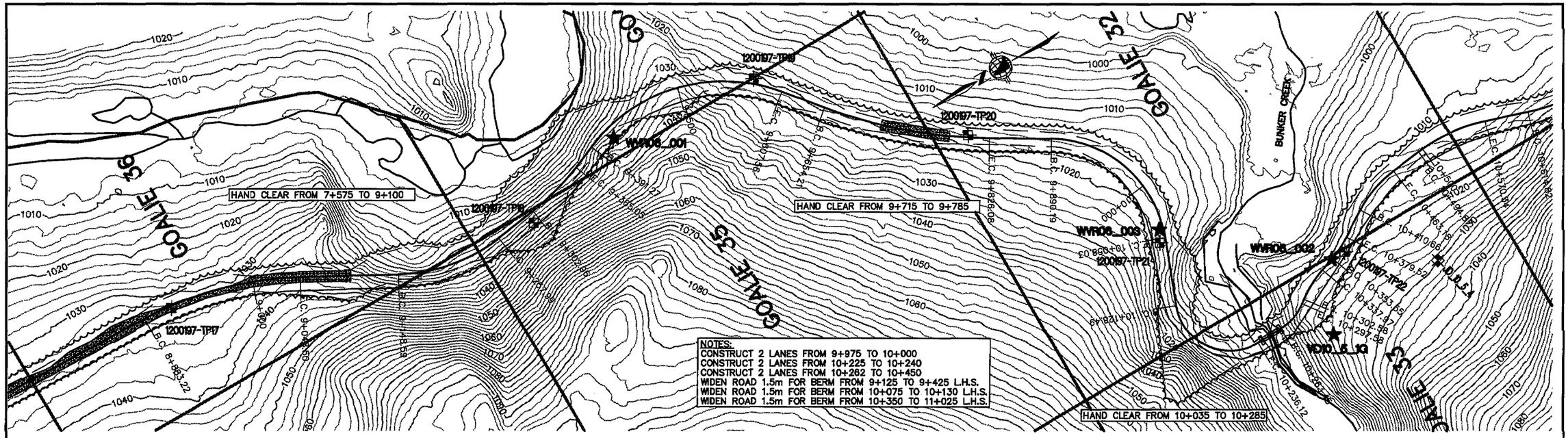
| SECTION: | |
|---|---|
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

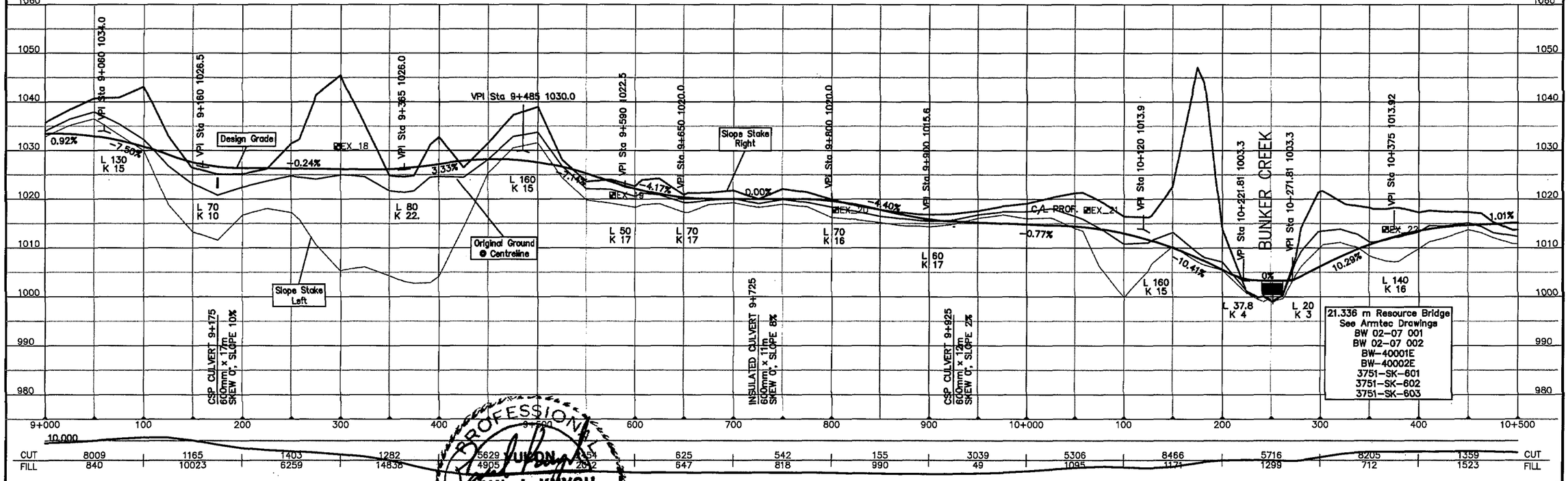
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 7.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 7.5 TO KM 9.0
FIGURE 1




LEGEND:
- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 25JD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WWR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER — PAUL J. KNYSH — TERRITORY — 07/04/05

| SECTION: | DATE |
|---|---|
| SCALE: 1:4000–H 1:800–V | |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

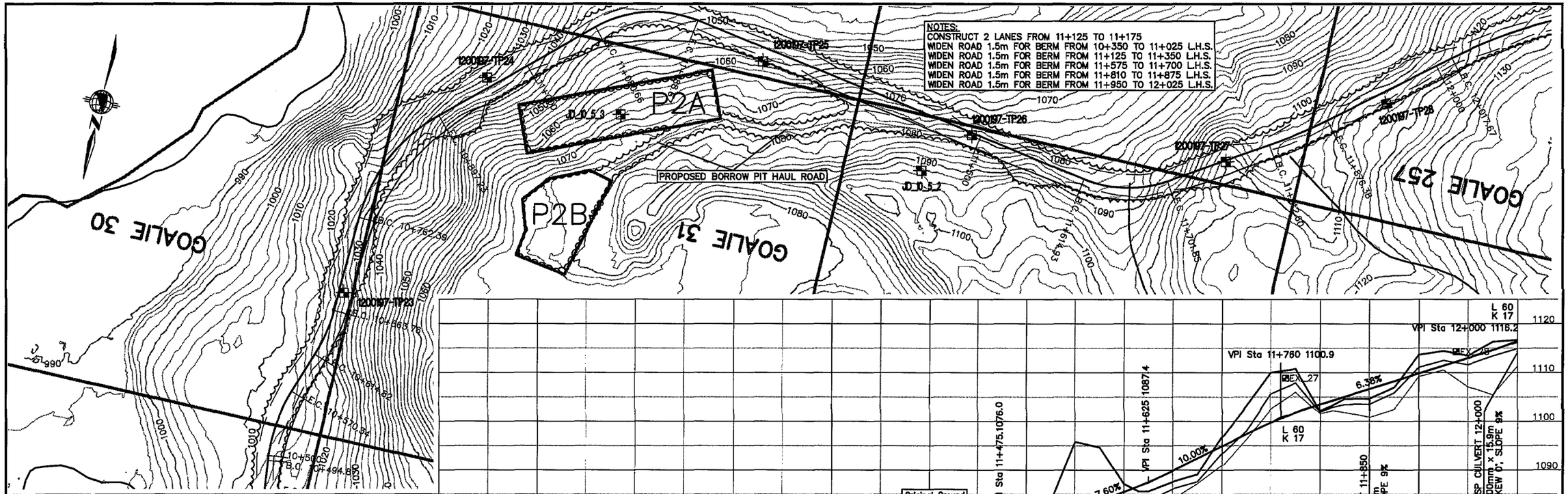
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 9 | 4 |

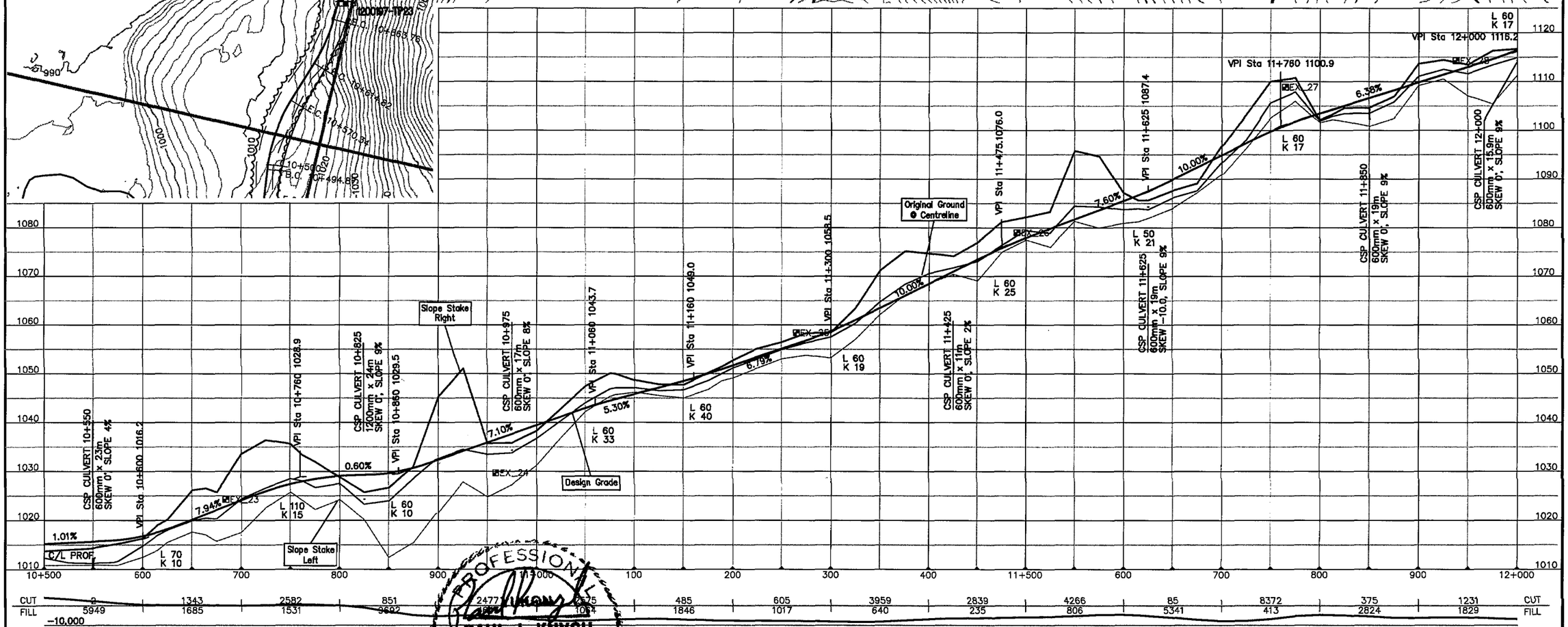
YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 9.0 TO KM 10.5
FIGURE 1

NOTES:
CONSTRUCT 2 LANES FROM 11+125 TO 11+175
WIDEN ROAD 1.5m FOR BERM FROM 10+350 TO 11+025 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 11+125 TO 11+350 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 11+575 TO 11+700 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 11+810 TO 11+875 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 11+950 TO 12+025 L.H.S.




LEGEND:
- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 2MJD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WVR06-006 GEOCHEMICAL TESTPITS

PROFESSIONAL ENGINEER
PAUL J. KNYSH
TERRITORY
07/dec/05

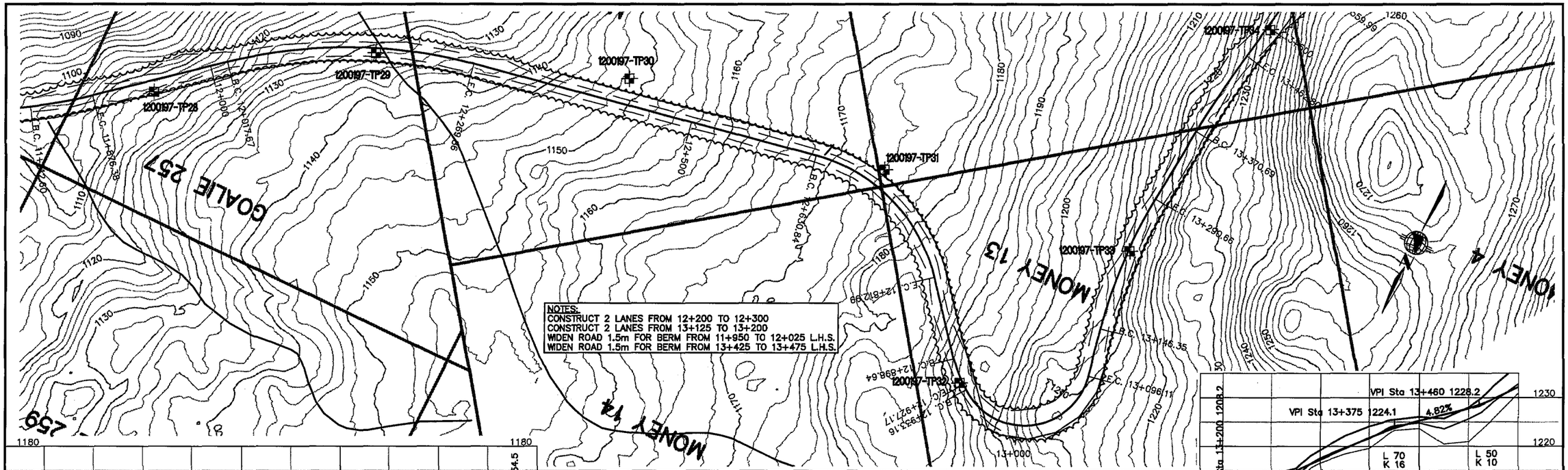
| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

| SECTION: | |
|---|---|
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 10.5 | 4 |

YES YUKON ENGINEERING SERVICES
Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION
WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 10.5 TO KM 12.0
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER YUKON PAUL J. KNYSH TERRITORY 27/04/05

| SECTION: | DATE |
|---|---|
| SCALE: 1:4000-H 1:800-V | |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 12 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

**WOLVERINE PROJECT**
PLAN/PROFILE SHEET
KM 12.0 TO KM 13.5
FIGURE 1

NOTES:
CONSTRUCT 2 LANES FROM 14+225 TO 14+275
CONSTRUCT 2 LANES FROM 14+975 TO 15+050
WIDEN ROAD 1.5m FOR BERM FROM 13+650 TO 13+800 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 13+90 TO 14+075 L.H.S.
WIDEN ROAD 1.5m FOR BERM FROM 14+150 TO 14+825 L.H.S.

HAND CLEAR 14+940 TO 15+000
HAND CLEAR 15+070 TO 15+130

MONEY 2
MONEY 1
MONEY 30
CHIP CREEK

200197-TP04
200197-TP35
200197-TP36
WWR06_004
200197-TP37
200197-TP38
200197-TP39
200197-TP40

VPI Sta 13+560 1238.2
VPI Sta 13+700 1245.2
VPI Sta 13+920 1265.5
VPI Sta 14+040 1273.6
VPI Sta 14+150 1284.6
VPI Sta 14+250 1289.2
VPI Sta 14+375 1298.5
VPI Sta 14+530 1312.2
VPI Sta 14+675 1326.7
VPI Sta 14+775 1331.2
VPI Sta 14+920 1345.7

Original Ground @ Centreline
Slope Stake Right
Slope Stake Left
Design Grade
Estimated Bedrock

5.00%
10%
9.23%
6.75%
4.60%
8.24%
10.00%
8.18%
4.50%
3.33%

L 80 K 16
L 60 K 14
L 70 K 28
L 80 K 15
L 60 K 16
L 60 K 18
L 60
L 60 K 33
L 90 K 16
L 50 K 10
L 110 K 17

EX_34
EX_35
EX_36
EX_37
EX_38
EX_39
EX_40

CSP CULVERT 13+700
1000mm x 32m
SKEW 0°, SLOPE 13%

CSP CULVERT 14+200
800mm x 17m
SKEW 0°, SLOPE 9%

CSP CULVERT 14+475
800mm x 16m
SKEW 0°, SLOPE 10%

CSP CULVERT 15+000
800mm x 15m
SKEW 0°, SLOPE 9%

| | 13+500 | 600 | 700 | 800 | 900 | 100 | 200 | 300 | 400 | 14+500 | 600 | 700 | 800 | 900 | 15+000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUT | 5209 | 1450 | 70 | 11516 | 3025 | 573 | 1277 | 2796 | 104 | 1884 | 1509 | 9651 | 4775 | | |
| FILL | 4 | 4269 | 11548 | 85 | 1814 | 1411 | 1508 | 2486 | 4436 | 2547 | 1023 | 268 | 274 | | |

−10,000

LEGEND:
- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 200197-TP01 TESTPITS
- WWR06-006 GEOCHEMICAL TESTPITS

PROFESSIONAL ENGINEER
PAUL J. KNYSH
TERRITORY
31/01/08

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

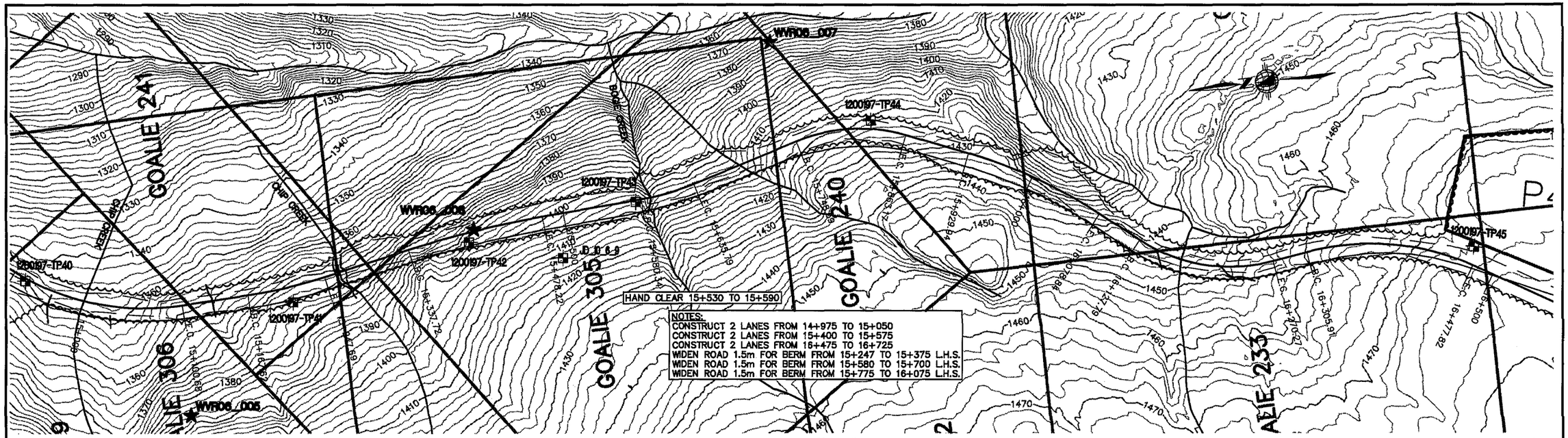
| SECTION: | |
|---|---|
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

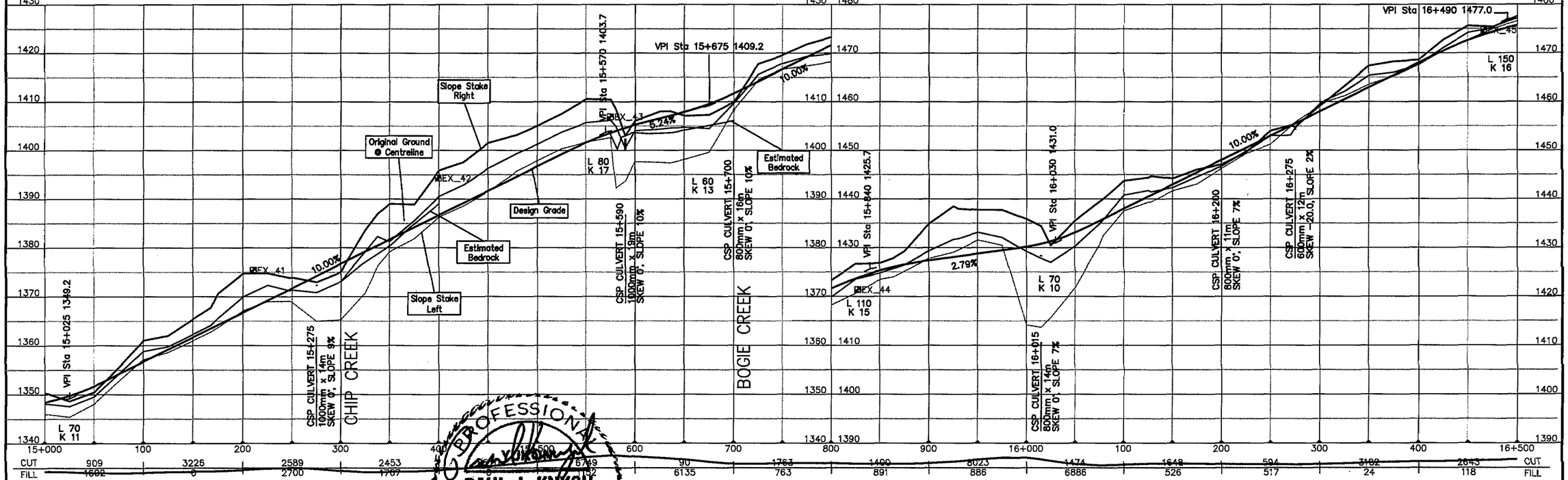
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 13.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 13.5 TO KM 15
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 2ALD-9 HAND DUG TESTPITS
- 120197-TP01 TESTPITS
- WVR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

| SECTION: | |
|---|---|
| SCALE: 1:4000-H 1:800-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

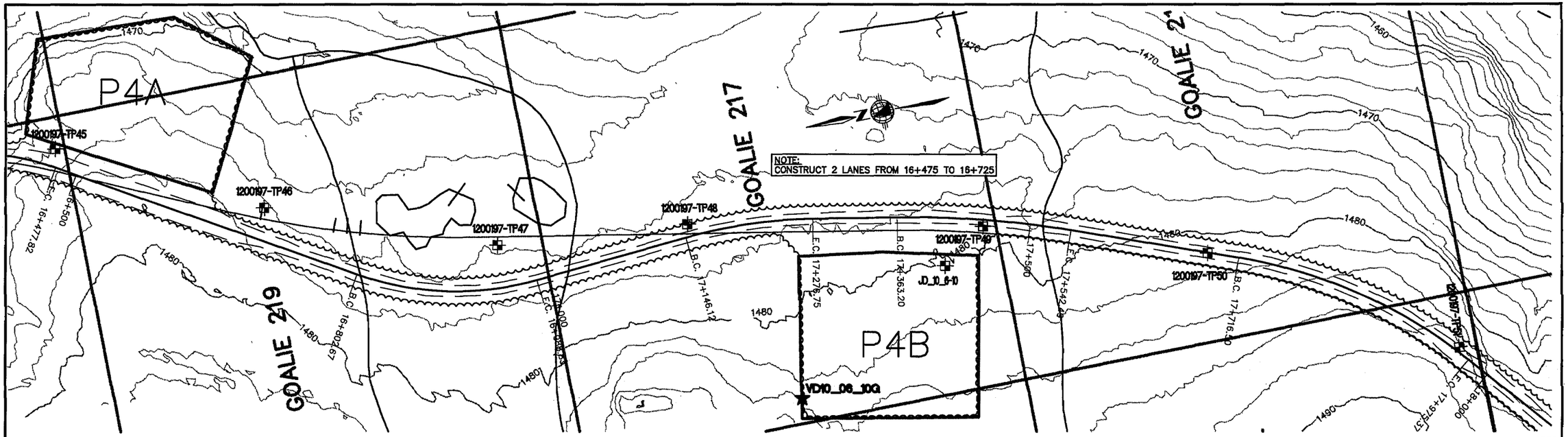
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 15 | 4 |

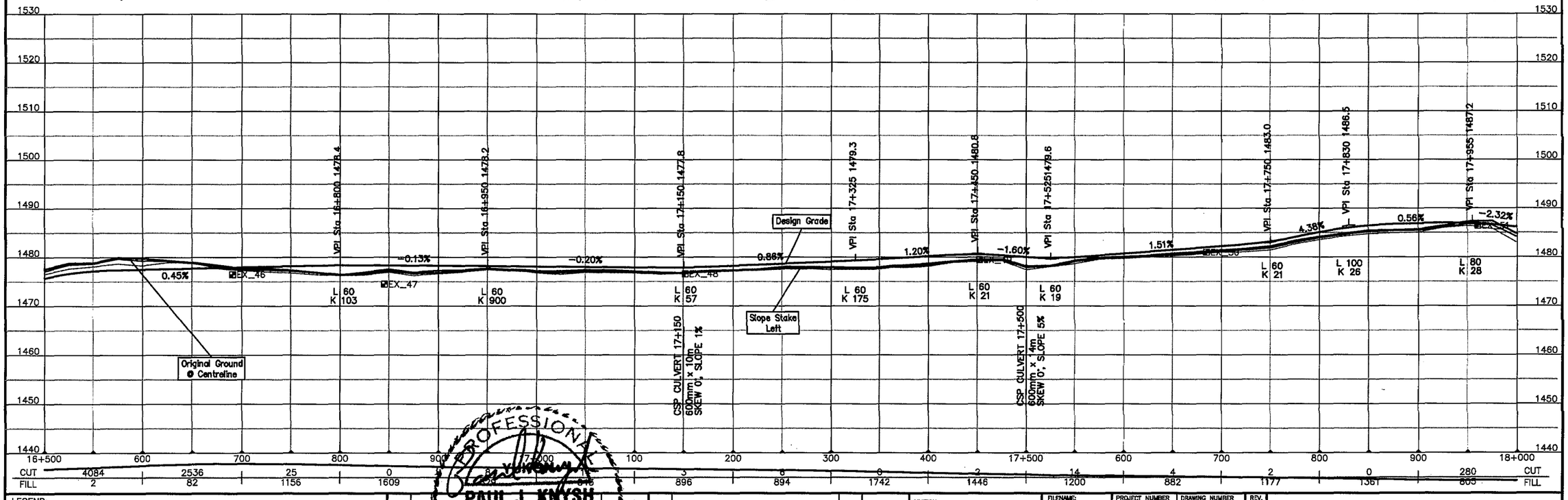
YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 15 TO KM 16.5
FIGURE 1

PROFESSIONAL ENGINEER — YUKON TERRITORY — PAUL J. KNYSH — 07/04/05




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WRR08-008 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER
PAUL J. KNYSH
TERRITORY
07694 95

| | |
|---|---|
| SECTION: | |
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 16.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 16.5 TO KM 18.0
FIGURE 1

LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WVR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER — YUKON TERRITORY — PAUL J. KNYSH — 07/04/04

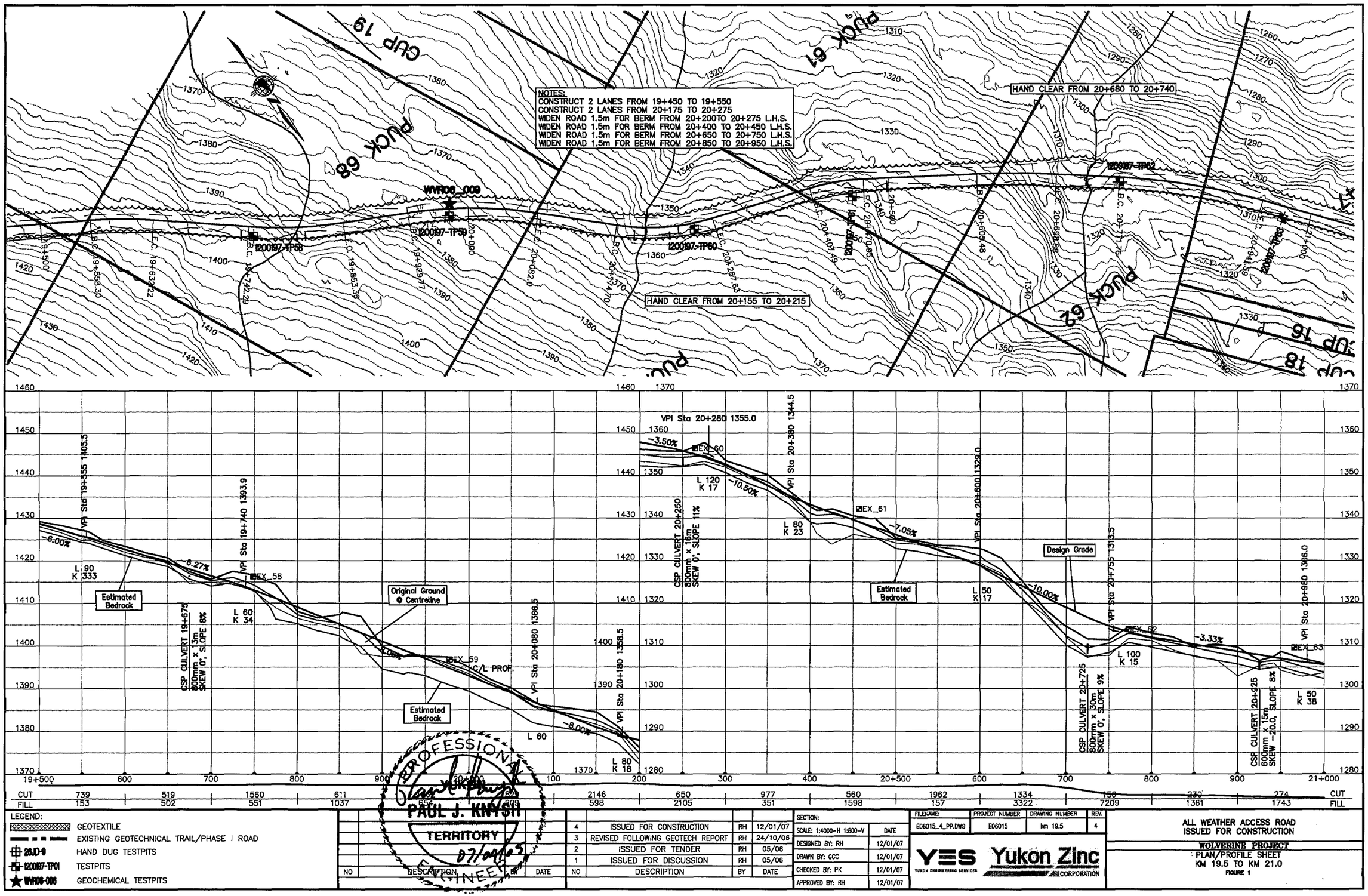
| SECTION: | |
|---|---|
| SCALE: 1:4000–H 1:800–V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 18 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 18.0 TO KM 19.5
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26.D-9 HAND DUG TESTPITS
- 120097-TP01 TESTPITS
- WVR06-008 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | DATE |
|---|---|---|
| | | |

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER
PAUL J. KNYSH
TERRITORY
07/oct/05

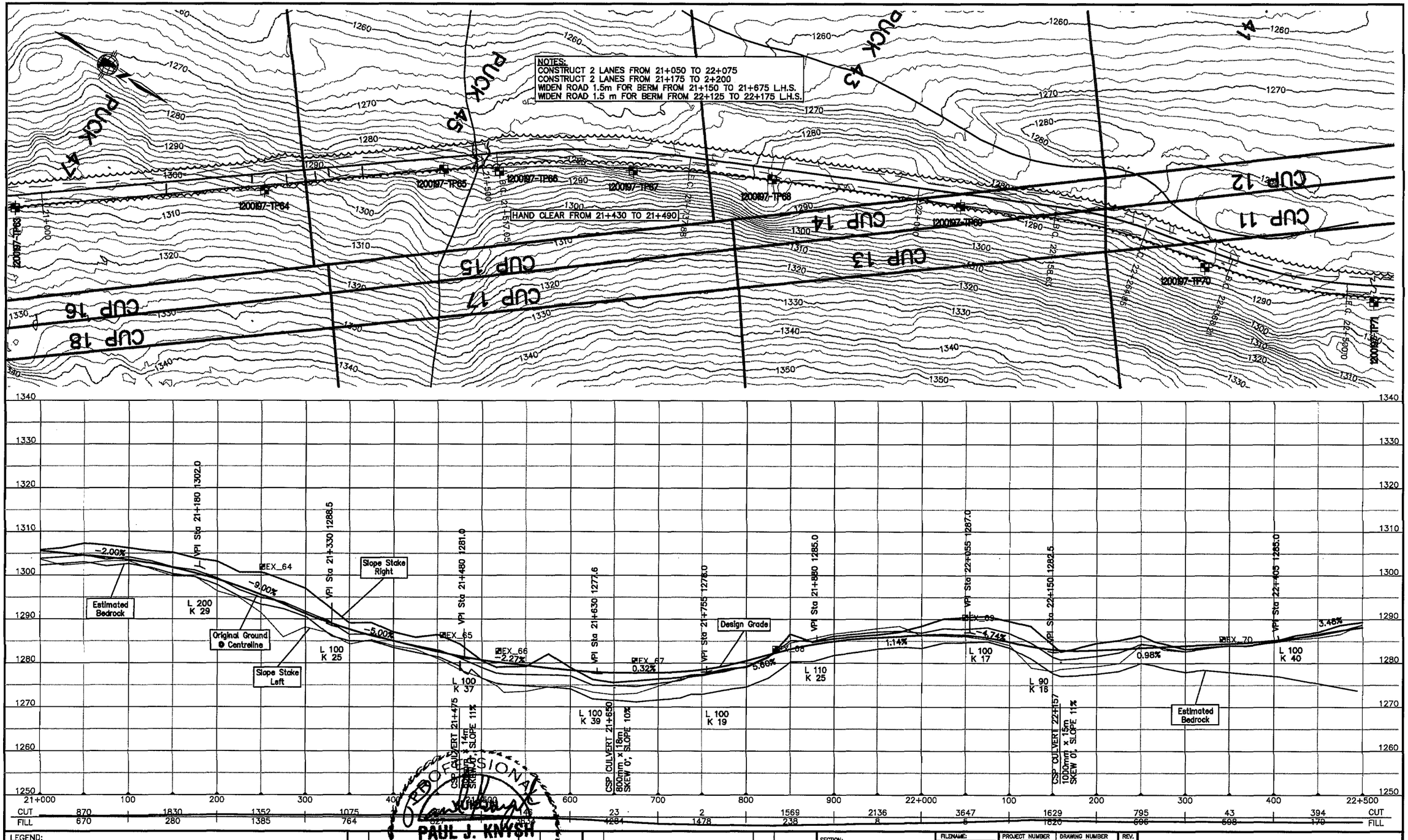
| SECTION: | |
|---|---|
| SCALE: 1:4000-H 1:600-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 19.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 19.5 TO KM 21.0
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 26JD-9 HAND DUG TESTPITS
- 200197-TP01 TESTPITS
- WWR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER — PAUL J. KNYSH — TERRITORY — 07/04/05

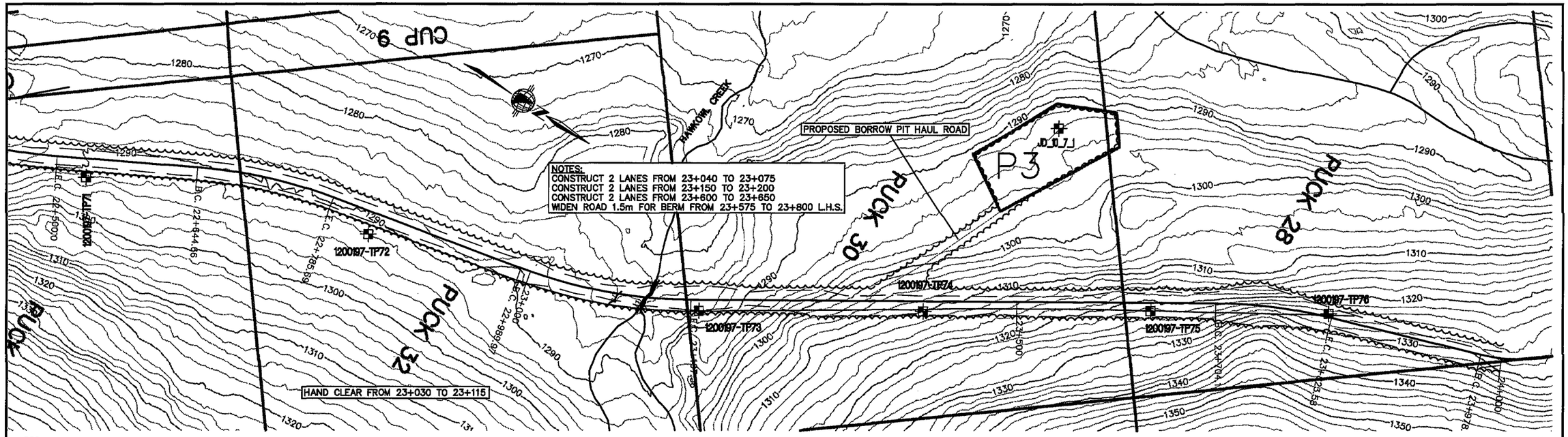
| | |
|---|---|
| SECTION: | |
| SCALE: 1:4000-H 1:800-V | DATE |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

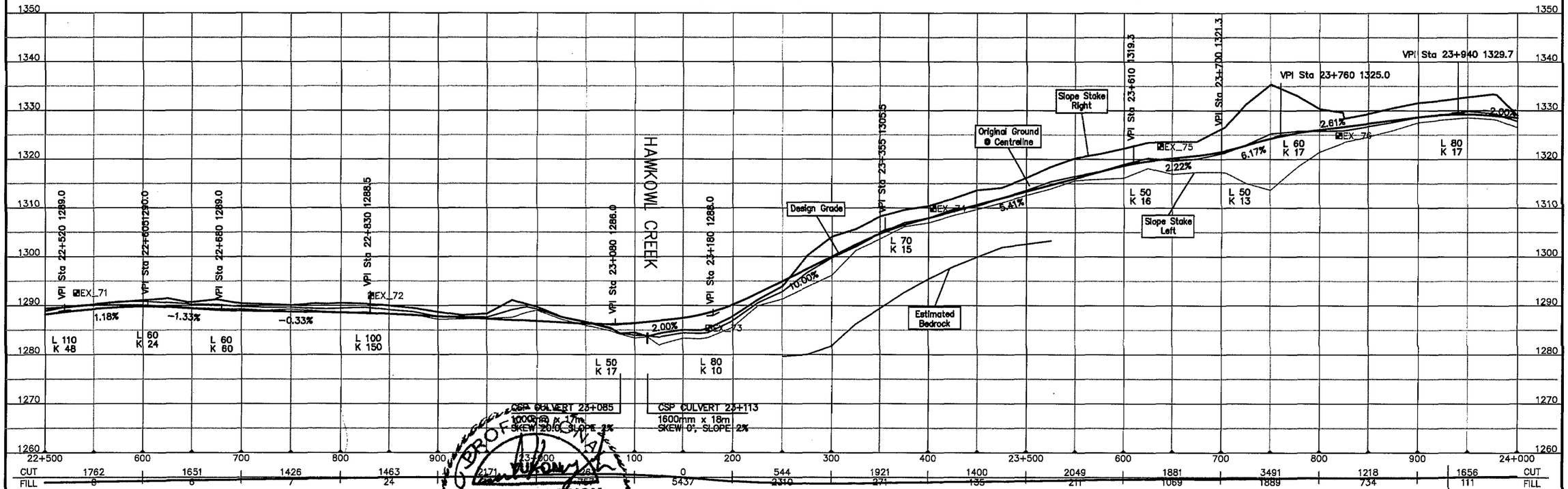
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 21 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 21.0 TO KM 22.5
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PHASE I ROAD
- 25.D-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 4 | ISSUED FOR CONSTRUCTION | RH | 12/01/07 |
| 3 | REVISED FOLLOWING GEOTECH REPORT | RH | 24/10/06 |
| 2 | ISSUED FOR TENDER | RH | 05/06 |
| 1 | ISSUED FOR DISCUSSION | RH | 05/06 |

PROFESSIONAL ENGINEER
YUKON TERRITORY
PAUL J. KNYSH
27/04/05

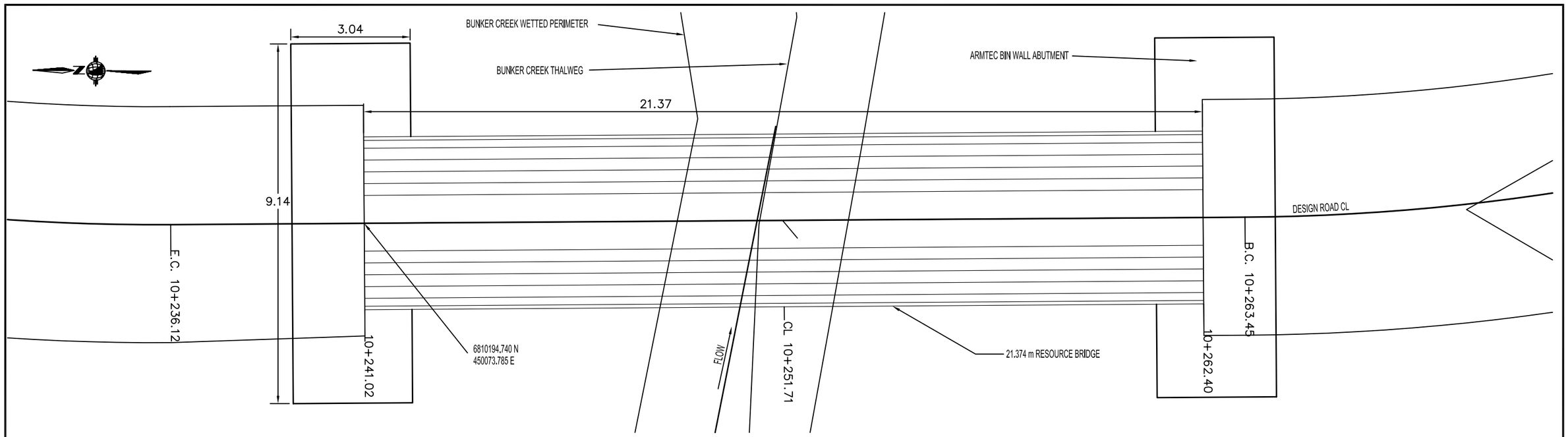
| SECTION: | DATE |
|---|---|
| SCALE: 1:4000–H 1:800–V | |
| DESIGNED BY: RH | 12/01/07 |
| DRAWN BY: GCC | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: RH | 12/01/07 |

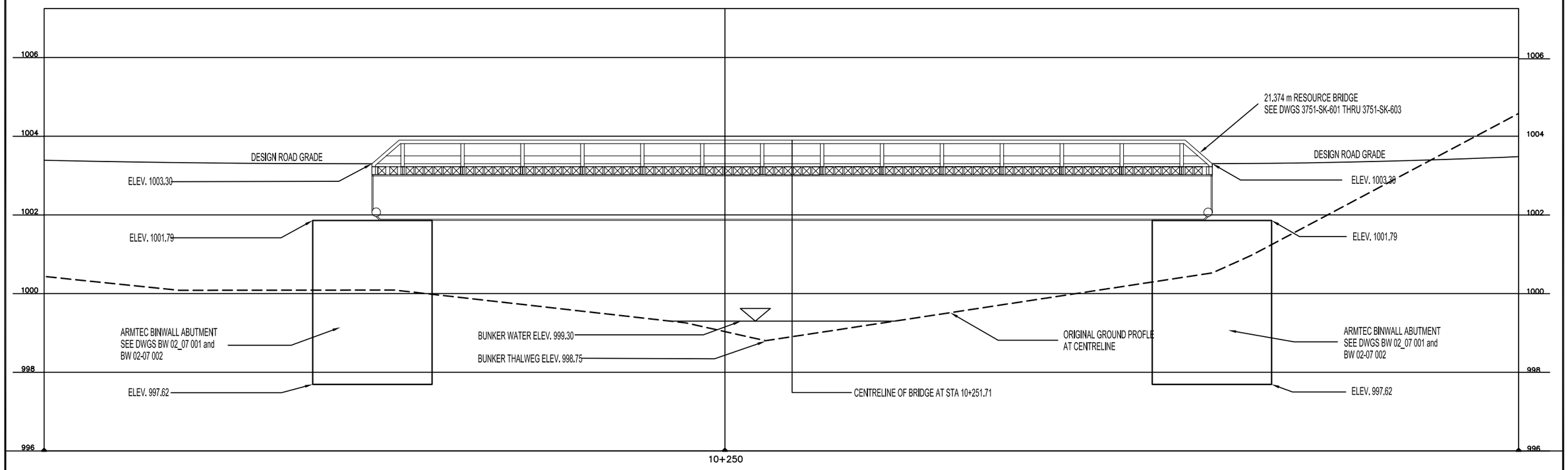
| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| E06015_4_PP.DWG | E06015 | km 22.5 | 4 |

YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

WOLVERINE PROJECT
PLAN/PROFILE SHEET
KM 22.5 TO KM 24.0
FIGURE 1




LEGEND:

- GEOTEXTILE
- EXISTING GEOTECHNICAL TRAIL/PROPOSED WINTER ROAD
- 26JD-9 HAND DUG TESTPITS
- 1200197-TP01 TESTPITS
- WVR06-006 GEOCHEMICAL TESTPITS

| NO | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| 1 | ISSUED FOR DISCUSSION | EWN | 01/07 |

| SECTION: | |
|---|---|
| SCALE: 1:100 | DATE |
| DESIGNED BY: EWN | 12/01/07 |
| DRAWN BY: EWN | 12/01/07 |
| CHECKED BY: PK | 12/01/07 |
| APPROVED BY: EG | 12/01/07 |

| FILENAME: | PROJECT NUMBER | DRAWING NUMBER | REV. |
|---|---|---|---|
| BUNKER.DWG | E06015 | BRIDGE PP | 1 |

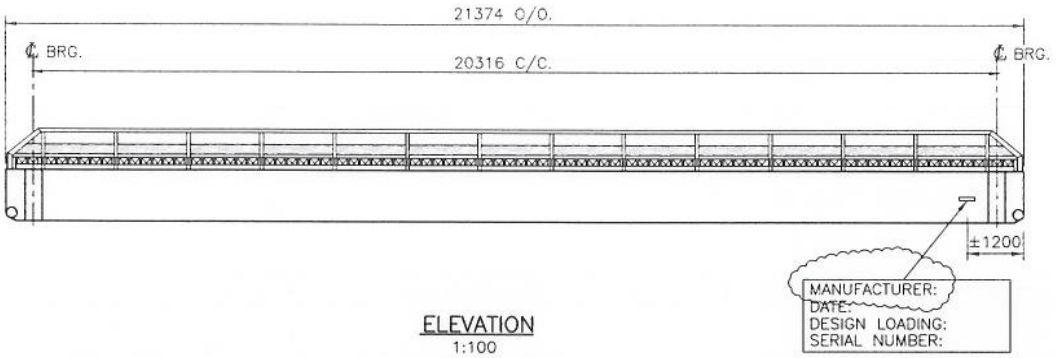
YES YUKON ENGINEERING SERVICES — Yukon Zinc CORPORATION

ALL WEATHER ACCESS ROAD
ISSUED FOR CONSTRUCTION

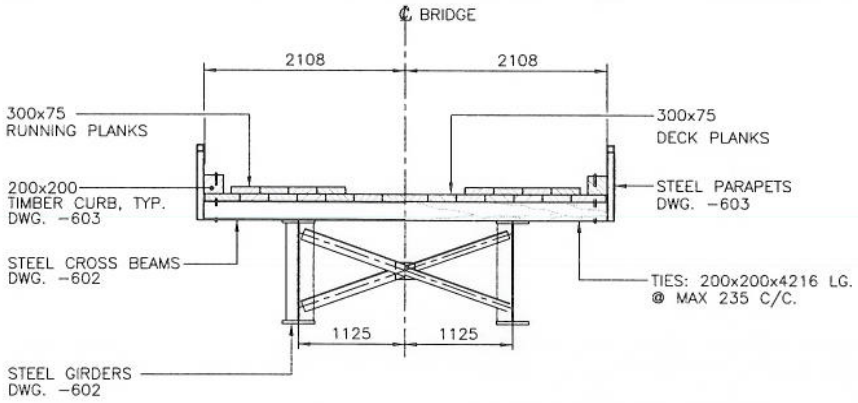
**WOLVERINE PROJECT**

PLAN/PROFILE SHEET
BUNKER CK BRIDGE

AUTOCADD DRAWING No. 3751-601




ELEVATION
1:100

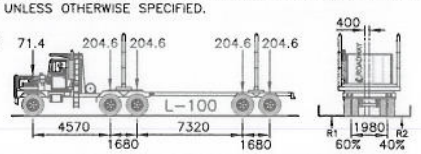



1/2 DIAPHRAGM SECTION
1:50

1/2 TYPICAL SECTION
1:50

## NOTES

1. FOR INSTALLATION BY OTHERS, ONTO SUBSTRUCTURE BY OTHERS, NO RESPONSIBILITY CAN BE ACCEPTED FOR WORK BY OTHERS.
2. DESIGN: CAN/CSA-S6-88 (MODIFIED).
   LOADING: L100 (90,680kg. G.V.W.) e=400, DIST.=60/40.
3. DESIGN LIFE: 50 YEARS (EXCEPT DECK).
4. FATIGUE: 500,000 CYCLES.
5. STEEL: CSA G40.21M GRADE 350AT CAT. 3 (PLATE)
   GRADE 350A (ANGLES)
   GRADE 350W (HSS & W-SECTIONS)
   FABRICATE GIRDERS AS FRACTURE CRITICAL MEMBERS.
   NON-WEATHERING STEEL SECTIONS TO BE PAINTED USING APPROVED PAINT SYSTEM
6. WELDING: CSA W59, WELDS TO BE 6mm FILLET WELDS U/N., X-RAY TENSION FLANGE BUTT WELDS, STEEL FABRICATORS SHALL BE QUALIFIED TO CSA W47.1, DIV. 1 OR DIV. 2
7. PIPE: ASTM A252 GRADE 2.
8. BOLTS: ASTM A325 TYPE 3 M22 U/N. JOB INSPECTION TORQUE 810 Nm
9. DECK HARDWARE: HOT DIP GALVANIZED OR GRADE 350A, BOLTS ASTM A307 GALVANIZED.
10. DECK CONSTRUCTION: TO MOF DWG. NOS. ENG-94-1-01,02,04 EXCEPT AS NOTED.
11. TIMBER: SPF NO. 2 GRADE OR BETTER, ROUGH SAWN. TIES AND DECK PLANKS TO BE CCA TREATED; CURBS & RUNNING PLANKS, UNTREATED.
12. BRIDGE IDENTIFICATION: THE BRIDGE SHALL HAVE ITS LOAD RATING, DATE OF MANUFACTURE, MANUFACTURER'S NAME, AND THE SERIAL NUMBER CLEARLY STAMPED ON. PLATE FIXED TO ONE SIDE OF THE STRUCTURE. THE HEIGHT OF LETTERING USED SHALL BE A MINIMUM OF 60mm UNLESS OTHERWISE SPECIFIED.
13. DESIGN TRUCK:




PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
Signature
Date
PERMIT NUMBER: P 3979
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

| REV | DATE Y | M | D | REVISION DESCRIPTION | ENG | DWN |
|---|---|---|---|---|---|---|
| 1 | 00 | 10 | 31 | PARAPET END & DECK LENGTH REV'D | TA | FZ |
| 2 | 04 | 01 | 05 | UPDATED TITLE & DIM REV'D | M.S. | P.L. |
| 3 | 04 | 09 | 27 | GENERAL REVISION | AY | CKL |

21.336m OILFIELD PORTABLE
GENERAL ARRANGEMENT

ASSOCIATED ENGINEERING

| | |
|---|---|
| DESIGN: | M.R.S. |
| CHECK: | M.G.J. |
| DRAWN: | M.D-J |
| DATE: | JANUARY 2004 |
| SCALE: | AS SHOWN |
| JOB No. | 993751 |
| DWG. No. | 3751-SK-601 |
| | 3 |

ALL DRAWINGS SUPERSEDED PRIOR TO REVISION

X-REF. ATTACHMENTS:

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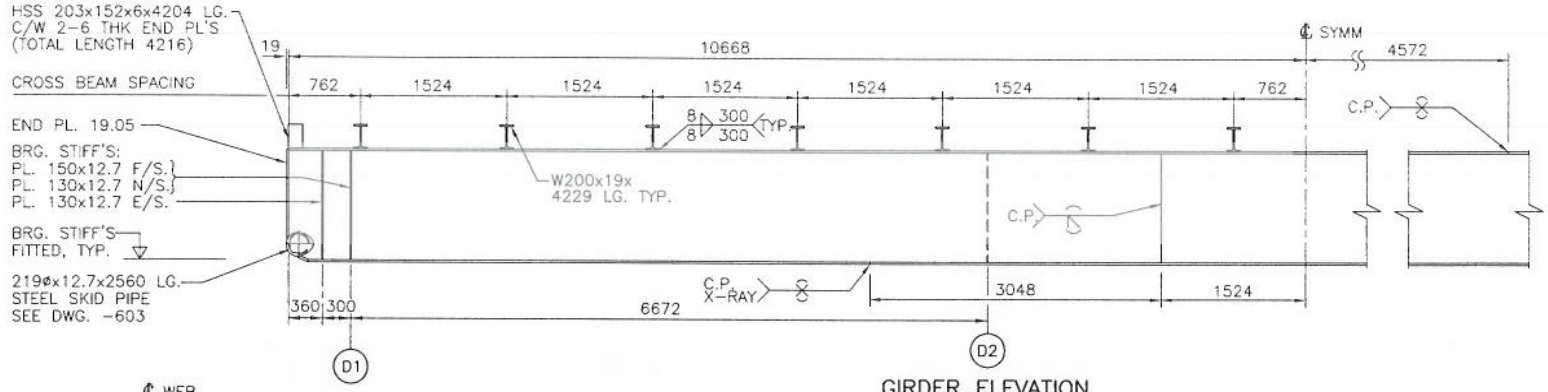
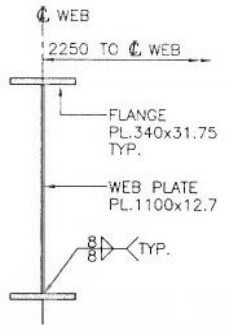
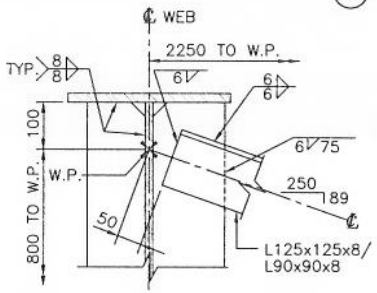


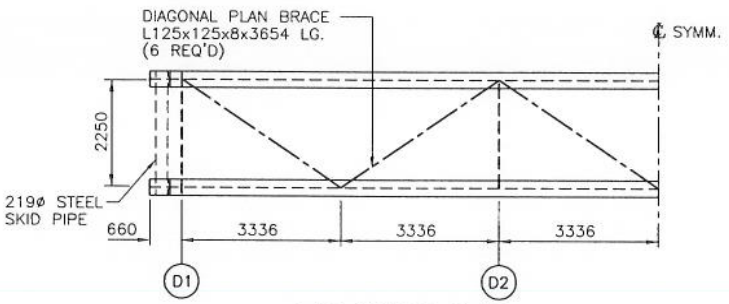

GIRDER ELEVATION
1:50



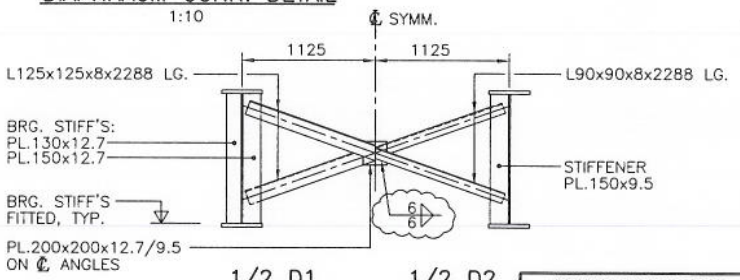

TYP. GIRDER SECTION
1:25




DIAPHRAGM CONN. DETAIL
1:10

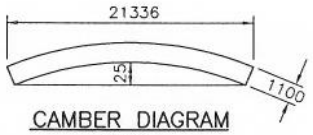



1/2 GIRDER PLAN
NTS

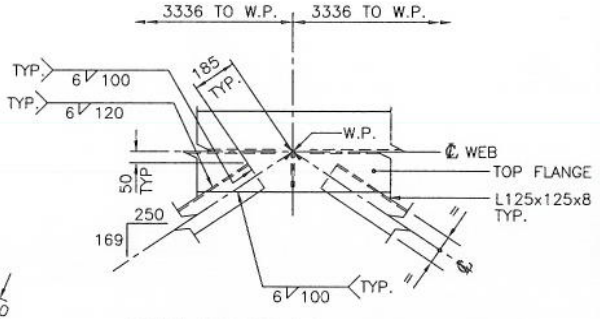



1/2 D1 (2 REQ'D)  1/2 D2 (2 REQ'D)

DIAPHRAGM DETAILS
1:40




CAMBER DIAGRAM
N.T.S.




PLAN BRACE CONNECTION DETAILS
1:20

**PERMIT TO PRACTICE**
ASSOCIATED ENGINEERING ALBERTA LTD.
Signature _____
Date _____
**PERMIT NUMBER: P 3979**
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

| REV | DATE Y | M | D | REVISION DESCRIPTION | ENG | DWN |
|---|---|---|---|---|---|---|
| 1 | 00 | 06 | 20 | END PL'S ADDED | SR | FZ |
| 2 | 00 | 10 | 19 | END CROSS BEAM REV'D | TA | FZ |
| 3 | 04 | 01 | 05 | UPDATED TITLE | M.S. | P.L. |
| 4 | 04 | 09 | 27 | GENERAL REVISION | AY | CKL |
| 5 | 04 | 12 | 14 | FILLER PLATE WELD | AY | AY |

21.336m OILFIELD PORTABLE
STEEL GIRDER DETAILS – SHT.1

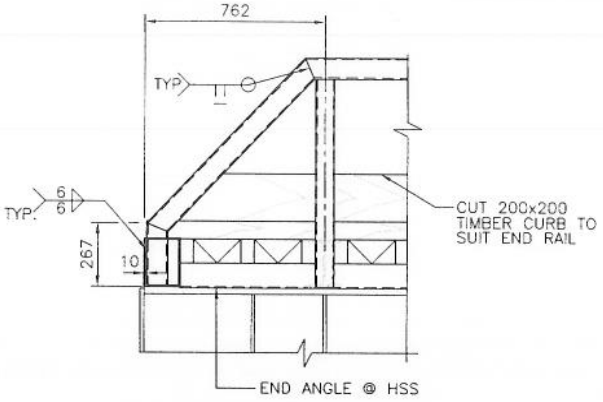
ASSOCIATED ENGINEERING

| | |
|---|---|
| DESIGN: | M.R.S. |
| CHECK: | SC |
| DRAWN: | M.D-J |
| DATE: | JANUARY 2004 |
| SCALE: | AS SHOWN |
| JOB No. | 993751 |
| DWG. No. | 3751-SK-602 |
| | 5 |

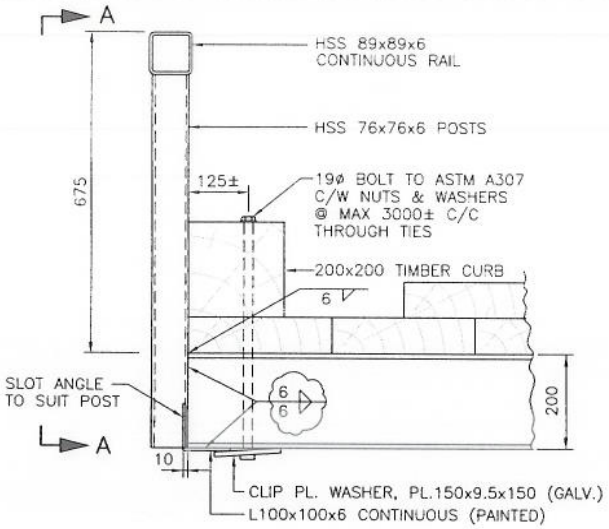
ALL DRAWINGS SUPERCEEDED PRIOR TO REVISION 5

X-REF. ATTACHMENTS:

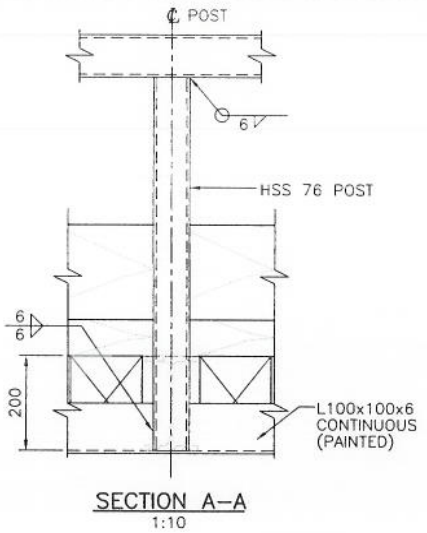
AUTOCADD DRAWING No. 3751SK603.dwg



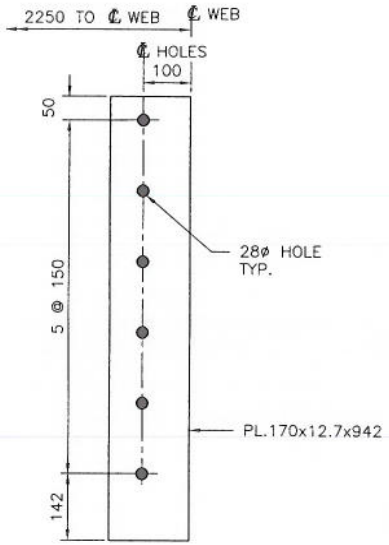

PARAPET DETAIL AT ENDS
1:20



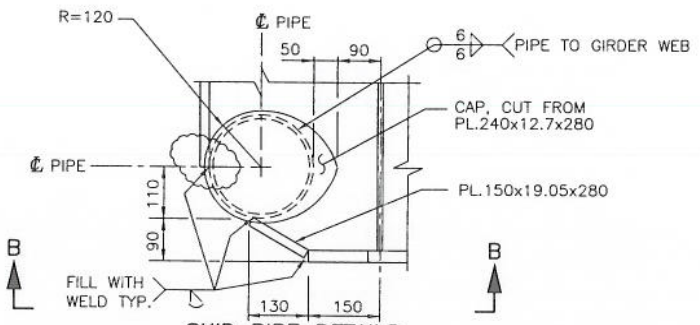

PARAPET DETAIL
1:10



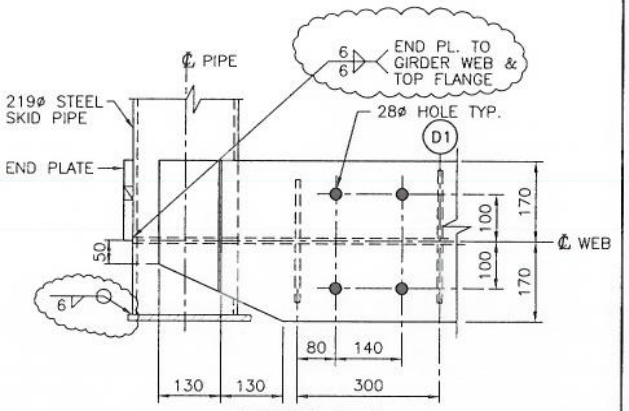

SECTION A–A
1:10




END PLATE DETAIL
1:10 (4 REQ'D)




SKID PIPE DETAILS
1:10




SECTION B–B
1:10

**PERMIT TO PRACTICE**
ASSOCIATED ENGINEERING ALBERTA LTD.
Signature _____
Date _____
**PERMIT NUMBER: P 3979**
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

| REV | DATE Y | M | D | REVISION DESCRIPTION | ENG | DWN |
|---|---|---|---|---|---|---|
| 1 | 00 | 06 | 16 | PARAPET DETAIL | TA | MD |
| 2 | 00 | 06 | 22 | PARAPET END REV'D | SR | FZ |
| 3 | 00 | 10 | 19 | PARAPET END REV'D | TA | FZ |
| 4 | 04 | 01 | 05 | UPDATED TITLE | M.S. | P.L. |
| 5 | 04 | 09 | 27 | GENERAL REVISION | AY | CKL |

21.336m OILFIELD PORTABLE
STEEL GRIDER DETAILS – SHT.2

ASSOCIATED ENGINEERING

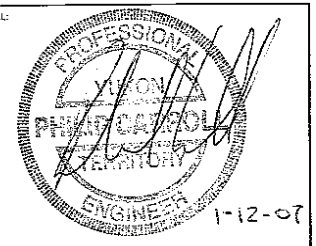
ALL DRAWINGS SUPERSEDED PRIOR TO REVISION 5

| | |
|---|---|
| DESIGN: | M.R.S. |
| CHECK: | SC |
| DRAWN: | M.D–J |
| DATE: | JANUARY 2004 |
| SCALE: | AS SHOWN |
| JOB No. | 993751 |
| DWG. No. | 3751–SK–603 |
| | 5 |

X–REF. ATTACHMENTS:

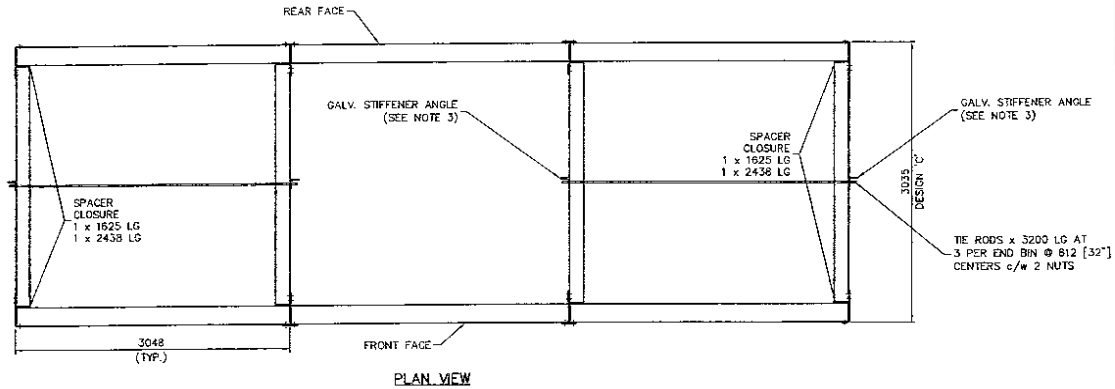
**PRELIMINARY**
**NOT FOR FINAL DESIGN OR CONSTRUCTION PURPOSES**

ENGINEER'S SEAL:

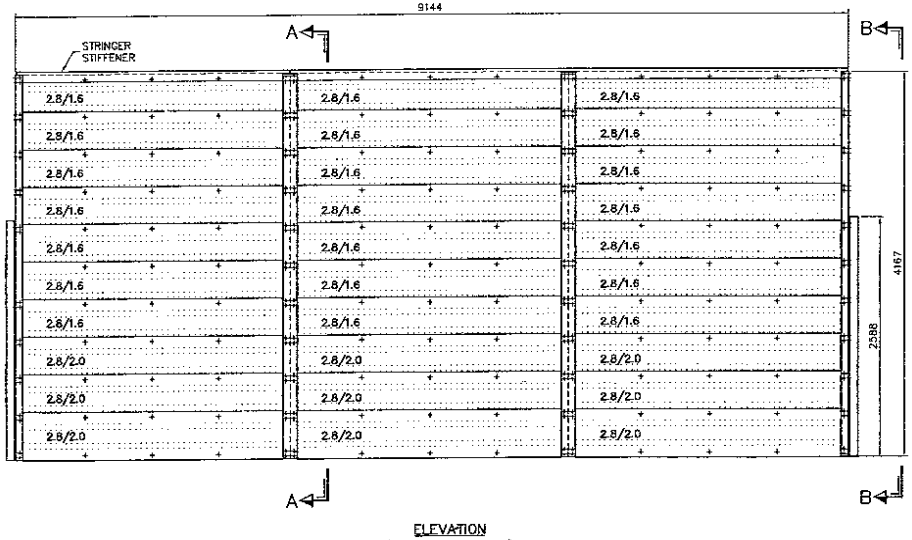



THE ENGINEER'S SEAL CERTIFIES THE ARMTEC BIN-TYPE RETAINING WALL TO BE ADEQUATE AS A GRAVITY RETAINING WALL. THIS SEAL DOES NOT CERTIFY THE BINS AGAINST FAILURE DUE TO EXCESS DIFFERENTIAL SETTLEMENT, FAULTY INSTALLATION OR GLOBAL INSTABILITY.

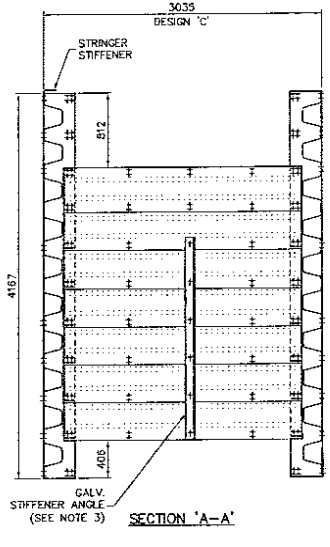
PLEASE NOTE THIS DRAWING IS PRELIMINARY IN NATURE AND ADDITIONAL STRUCTURAL DETAILS WILL BE ADDED UPON PREPARATION OF APPROVAL DRAWINGS AFTER RECEIPT OF ORDER.



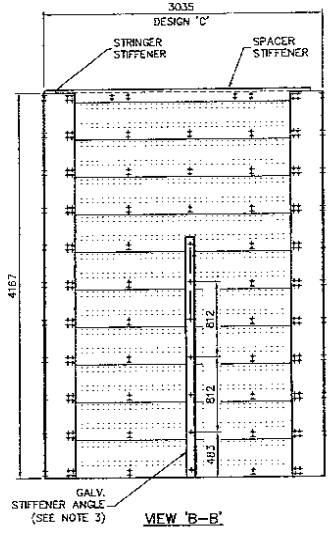

PLAN VIEW




ELEVATION
(FRONT FACE OF WALL)




SECTION 'A-A'




VIEW 'B-B'

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED.
2. ALL STRINGER THICKNESSES ARE AS NOTED ON ELEVATION VIEW
   ie 2.8/1.6
   - 1.6 — REAR STRINGER
   - 2.8 — FRONT STRINGER
3. FIELD ENLARGE HOLES IN END SPACERS FOR TIE RODS USING STIFFENER ANGLE AS TEMPLATE.

REFERENCE DWGS:

BW-40001 STANDARD DETAILS & COMPONENTS
BW-40002 STANDARD DEPTH & HEIGHT COMBINATIONS

| NO. | DATE | DESCRIPTION OF REVISION | BY | CK'D |
|---|---|---|---|---|
| 0 | 07/01/11 | ISSUED FOR COMMENTS | DL | KA |



BUNKER CREEK

BIN-WALL BRIDGE ABUTMENT
DESIGN 'C' (3035 DEEP)
4167 HIGH x 9144 WIDE

DATE 07/01/09
DRAWN D. LOWE
CHECKED K. AIRD
REVIEWED
SCALE N.T.S.
INQUIRY NO. BW-02-07
DRAWING NO. BW 02-07 001
REV 0
SHEET 1 OF 2

TAG NO.
QUANTITY 2
WT

armtec
ARMTEC LIMITED PARTNERSHIP

## INSTALLATION INSTRUCTIONS

THESE INSTALLATION INSTRUCTIONS ARE INTENDED TO BE USED IN CONJUNCTION WITH THE ENGINEER'S SPECIFICATIONS AND DRAWINGS.

## BACKFILL INSTRUCTIONS

1) BACKFILL MATERIAL TO BE WELL-GRADED FREE-DRAINING GRANULAR 'B' MATERIAL.

2) BACKFILL SHOULD BE PLACED IN 200 mm LAYERS (MAX) AND COMPACTED TO 95 PERCENT STANDARD PROCTOR DENSITY.

3) THE HEIGHT OF BACKFILL INSIDE THE BINS SHOULD BE AT LEAST 400 mm GREATER THAN THE BACKFILL BEHIND THE BINS DURING THE BACKFILLING OPERATION.

4) FILL ALL CORRUGATIONS IN SPACERS AND STRINGERS, BUT CARE MUST BE EXERCISED TO AVOID DAMAGING THE STRINGERS WITH DUMPING OR COMPACTING EQUIPMENT, WHICH SHOULD BE KEPT AT LEAST 300 mm FROM THE FRONT STRINGERS.

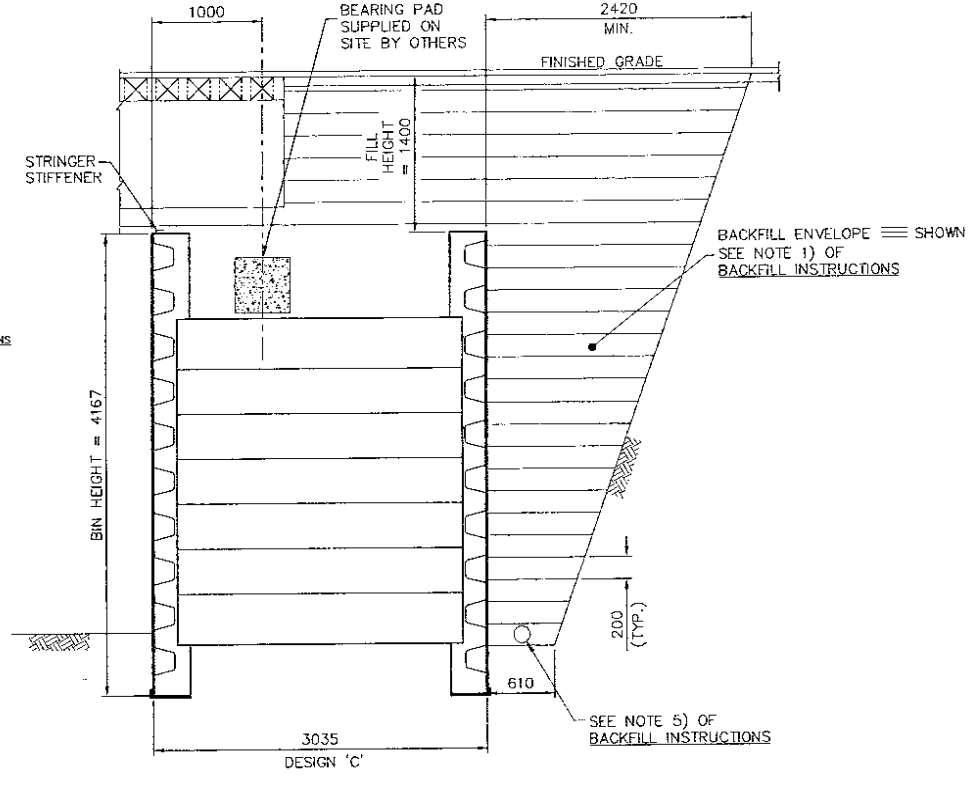
5) IT IS RECOMMENDED TO INSTALL A CONTINUOUS 250 mm DIA. x 1.6 mm PERFORATED CSP c/w FILTER SOCK BEHIND ALL WALLS.

6) A MINIMUM CUSHION ARCH OF 200 mm THICK NON-COMPACTED GRANULAR MATERIAL MUST BE PLACED UNDER THE GRADE PLATES.

7) REFER TO BIN-TYPE RETAINING WALLS TYPE 2 INSTALLATION INSTRUCTIONS BOOKLET FOR ADDITIONAL ASSEMBLY AND BACKFILL PROCEDURES.

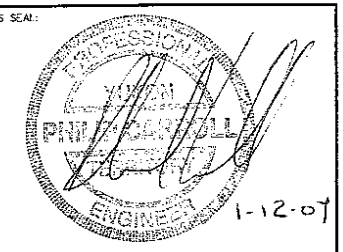
## DESIGN NOTES

1) THE DESIGN PROCEDURE TO DETERMINE THE STABILITY OF THE BINS FOLLOWS THE COULOMB WEDGE ANALYSIS. LATERAL EARTH PRESSURES ON THE WALL ARE BASED ON THE EQUILIBRIUM OF A FAILURE WEDGE OF SOIL BEHIND THE BIN. THE PRINCIPAL ASSUMPTIONS OF THIS METHOD ARE:
   - i. THE BACKFILL TO BE A GOOD QUALITY, FREE DRAINING, EVENLY GRADED GRANULAR MATERIAL POSSESSING A MINIMUM INTERNAL FRICTION ANGLE = 33°. BACKFILL DENSITY = 19 kN/m³ AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
   - ii. FAILURE PLANE IS ALONG A STRAIGHT LINE ORIGINATING FROM THE HEEL OF THE BIN.
   - iii. FRICTION FORCES ARE ASSUMED TO BE DISTRIBUTED UNIFORMLY ALONG THE FAILURE PLANE AND SIMILARLY ALONG THE REAR WALL OF THE BIN.
   - iv. THE FAILURE WEDGE IS ASSUMED TO BE A RIGID BODY.
   - v. FAILURE IS A 2-DIMENSIONAL PROBLEM BUT A UNIT LENGTH OF WALL AND BACKFILL IS CONSIDERED FOR ANALYSIS.
   - vi. THE PROVIDED DESIGN IS FOR THE BIN-WALL ONLY AND ASSUMES THAT THE GLOBAL SLOPE STABILITY IS CERTIFIED BY A GEOTECHNICAL CONSULTANT.
2) MINIMUM FACTORS OF SAFETY AGAINST OVERTURNING AND SLIDING ARE 2.0 AND 1.5 RESPECTIVELY.
3) DESIGN PARAMETERS
   - LIVE LOAD CL-625 (OR EQUIVALENT)
   - DEAD LOAD REACTION IS 334 kN
   - BRIDGE SPAN IS 21.336 m
   - FILL HEIGHT IS 1.4m
4) GRADE PLATES FOR VERTICAL CONNECTORS MUST BE FOUNDED ON A YIELDING FOUNDATION. ROCK OR UNYIELDING SOIL MUST BE REMOVED FOR AN AREA OF 600 mm x 600 mm x 200 mm DEPTH AND REPLACED WITH A 200 mm THICK LAYER OF UNCOMPACTED FILL.
5) BINS ARE VERTICAL.
6) MAXIMUM ANTICIPATED BEARING PRESSURE REQUIRED TO SUPPORT BIN-WALL = 210 kPa
7) FOR WALLS CONSTRUCTED ALONG WATERWAYS, EMBEDMENT DEPTHS (FOUNDATION DEPTH) MUST BE ESTABLISHED BELOW POTENTIAL SCOUR DEPTHS TO PREVENT ANY LOSS OF MATERIALS RETAINED BY OR SUPPORTING THE BIN. SELECTION OF AN APPROPRIATE EMBEDMENT DEPTH AND DESIGN OF SCOUR PROTECTION FOR THIS APPLICATION IS BY OTHERS.
8) THE OWNER OR THEIR GEOTECHNICAL CONSULTANT MUST QUALIFY SITE CONDITIONS TO MEET OR EXCEED THE ABOVE REQUIREMENTS.




TYPICAL BIN-WALL ABUTMENT SECTION
4167 HIGH

ENGINEER'S SEAL:




THE ENGINEER'S SEAL CERTIFIES THE ARMTEC BIN-TYPE RETAINING WALL TO BE ADEQUATE AS A GRAVITY RETAINING WALL. THIS SEAL DOES NOT CERTIFY THE BINS AGAINST FAILURE DUE TO EXCESS DIFFERENTIAL SETTLEMENT, FAULTY INSTALLATION OR GLOBAL INSTABILITY.

PLEASE NOTE THIS DRAWING IS PRELIMINARY IN NATURE AND ADDITIONAL STRUCTURAL DETAILS WILL BE ADDED UPON PREPARATION OF APPROVAL DRAWINGS AFTER RECEIPT OF ORDER.

**PRELIMINARY**
**NOT FOR FINAL DESIGN OR CONSTRUCTION PURPOSES**

NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED.

| NO. | DATE | DESCRIPTION OF REVISION | BY | CK'D |
|---|---|---|---|---|
| 0 | 07/01/11 | ISSUED FOR COMMENTS | DL | KA |

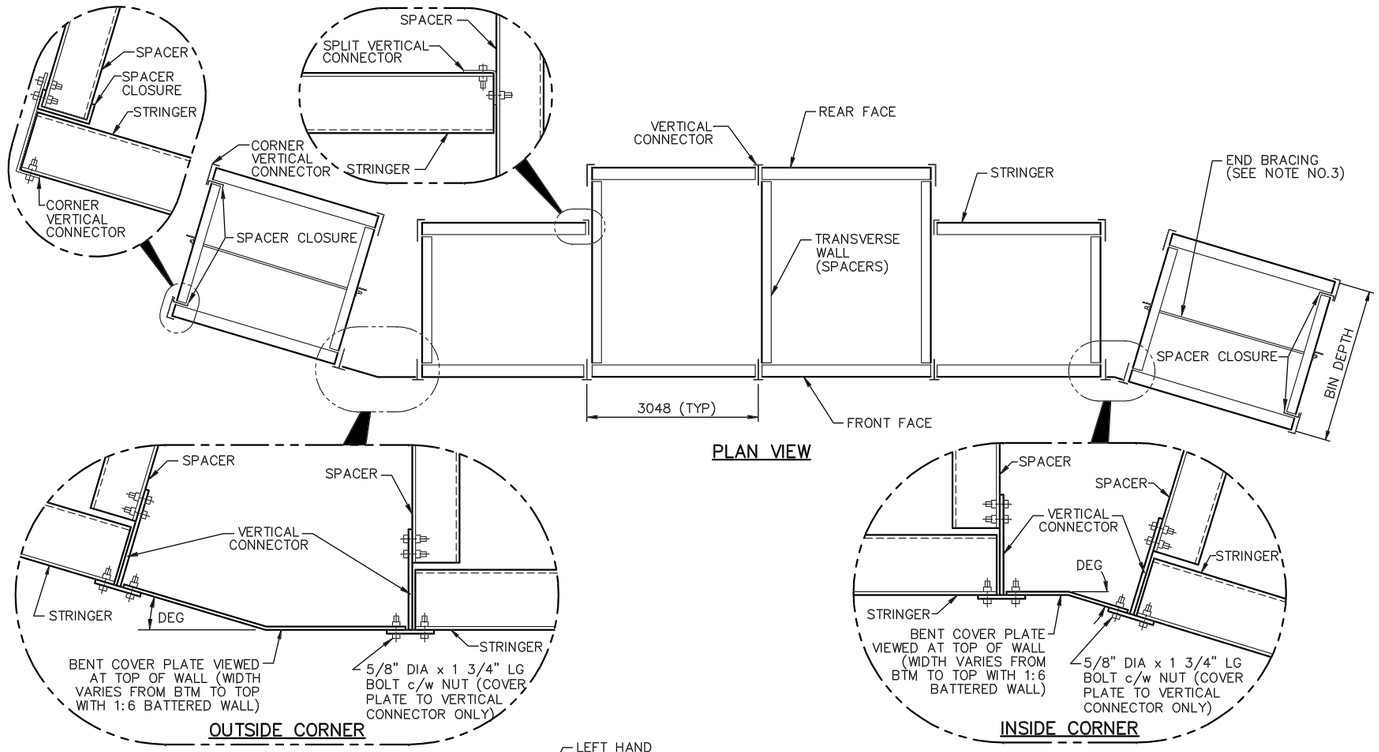


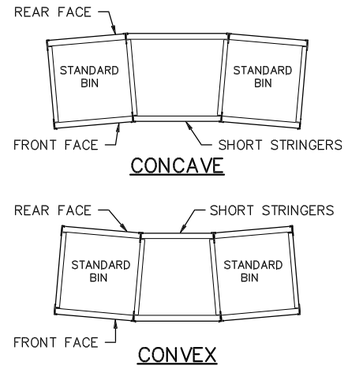
BUNKER CREEK

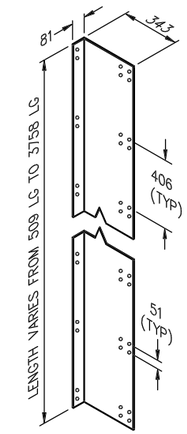
BIN-TYPE RETAINING WALL BACKFILL INSTRUCTIONS & DESIGN NOTES FOR DESIGN 'C' BIN-WALL ABUTMENTS

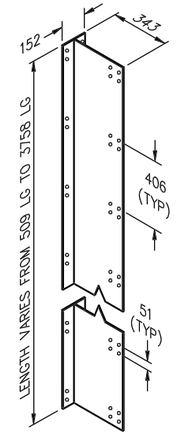
DATE 07/01/09
DRAWN D. LOWE
CHECKED K. AIRD
REVIEWED
SCALE N.T.S.
ENQUIRY NO. BW-02-07
TAG NO.
QUANTITY
DRAWING NO. BW 02-07 002 REV 0
WT
SHEET 2 OF 2

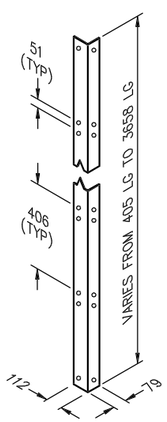
armtec
ARMTEC LIMITED PARTNERSHIP

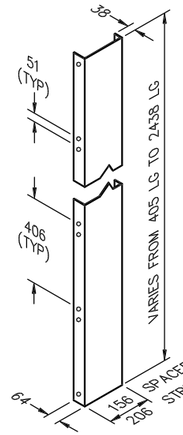


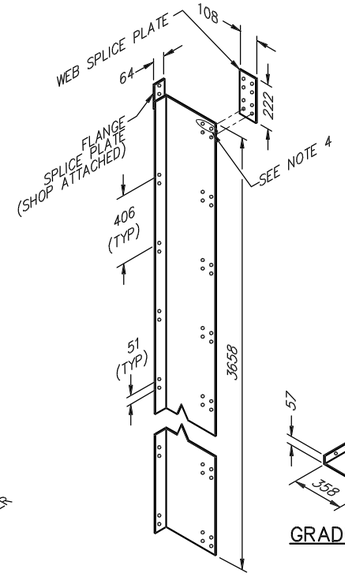



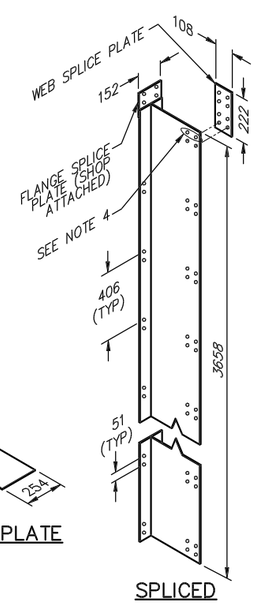



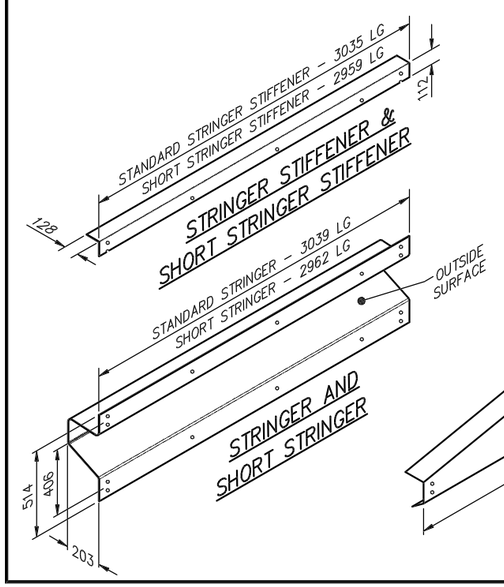



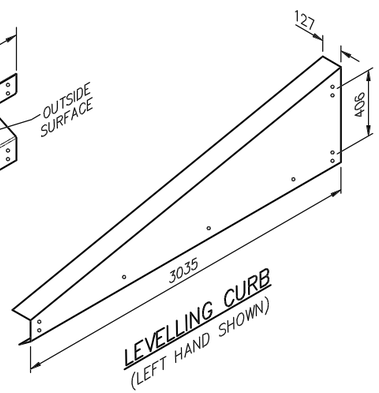



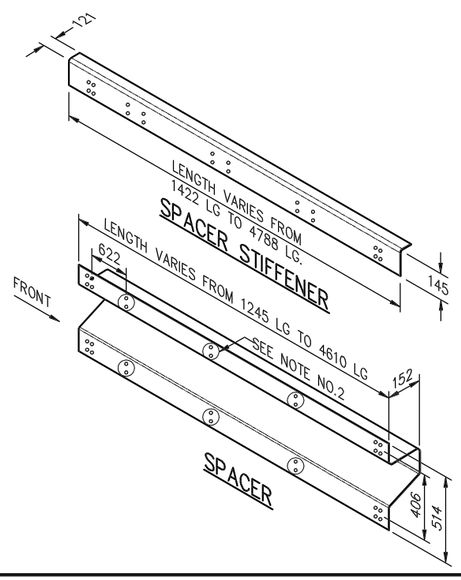







NOTES

1. SPECIAL VERTICAL CONNECTORS ARE USED ON WALLS HIGHER THAN 3758. FOR THESE WALLS THE VERTICAL CONNECTORS WILL CONTAIN TWO OR MORE PIECES. THE 3658 LG SPECIAL VERTICAL CONNECTOR SHOULD BE USED FIRST, WITH THE ATTACHED SPLICE PLATE AT THE TOP. SPECIAL CORNER VERTICAL CONNECTORS ARE USED EITHER THE SAME OR WITH THE SPLICE PLATE AT THE BOTTOM, DEPENDING ON WHETHER IT IS ON A LEFT OR RIGHT HAND CORNER. SEE DWG BW–40002E FOR MAKE–UP.
2. ONLY ONE OF THE TWO HOLES SHOWN THUS ⊙ IN THE SPACERS IS USED FOR BOLTING THE SPACERS TOGETHER EXCEPT FOR THE END WALLS WHERE BOTH HOLES ARE USED.
3. IN CERTAIN CONDITIONS THE END BIN(S) WILL REQUIRE BRACING SEE CHART ON DWG NO. BW–40002E
4. BOLT WEB SPLICE WITH 6 – 5/8" DIA. x 1 1/4" LG BIN–WALL BOLT AND NUT. (TOP TWO HOLES ARE NOT FILLED ON SPLICED CORNER VERTICAL AND VERTICAL CONNECTOR WEBS)
5. ALL BOLTS & NUTS ARE 5/8" DIA x 1 1/4" LG UNLESS NOTED
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED.

| NO. | DATE | DESCRIPTION OF REVISION | BY | CK'D |
|---|---|---|---|---|
| 4 | 01/11/08 | UPDATED DRAWING | TCB | |
| 3 | AUG 29/96 | ADDED NOTE 4 | D.L. | K.A. |
| 2 | DEC 7/87 | NEW DWG NO, REV CO NAME & ADDED LEVELLING CURB DTL | K.A. | |



# BIN TYPE RETAINING WALL TYPE 2 STANDARD DETAILS AND COMPONENTS

| | |
|---|---|
| DATE | |
| DRAWN | |
| CHECKED | |
| REVIEWED | |
| APPROVED | |
| SCALE | N.T.S. |
| DRAWING NO. | BW–40001E |
| REV. | 4 |

**CORNER VERTICAL & VERTICAL CONNECTORS GREATER THAN 3758 LG ARE BUILT UP AS FOLLOWS (UNLESS NOTED)**

4167 LG –1x3658
1x509
1 WEB SPLICE PLATE

4572 LG –1x3658
1x914
1 WEB SPLICE PLATE

4977 LG –1x3658
1x1320
1 WEB SPLICE PLATE

5386 LG –1x3658
1x1728
1 WEB SPLICE PLATE

5791 LG –1x3658
1x2134
1 WEB SPLICE PLATE

6197 LG –1x3658
1x2539
1 WEB SPLICE PLATE

6605 LG –1x3658
1x2947
1 WEB SPLICE PLATE

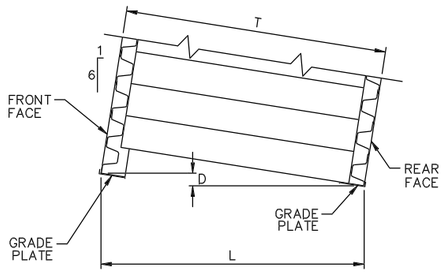
7010 LG –1x3658
1x3353
1 WEB SPLICE PLATE

7416 LG –1x3658
1x3758
1 WEB SPLICE PLATE

7824 LG –2x3658
1x509
2 WEB SPLICE PLATES

8320 LG –2x3658
1x914
2 WEB SPLICE PLATES

8635 LG –2x3658
1x1320
2 WEB SPLICE PLATES




## GRADE PLATE PLACEMENT

| WALL DESIGN | DIMENSIONS | | |
|---|---|---|---|
| | T | D | L |
| A | 1689 | –124 * | 1734 |
| B | 2362 | –13 * | 2397 |
| C | 3035 | 98 | 3064 |
| D | 3708 | 210 | 3724 |
| E | 4382 | 318 | 4391 |
| F | 5055 | 429 | 5055 |

* FRONT GRADE PLATE LOWER THAN REAR PLATE

## MAXIMUM HEIGHTS AND LOADS FOR UNBRACED SPACER WALLS

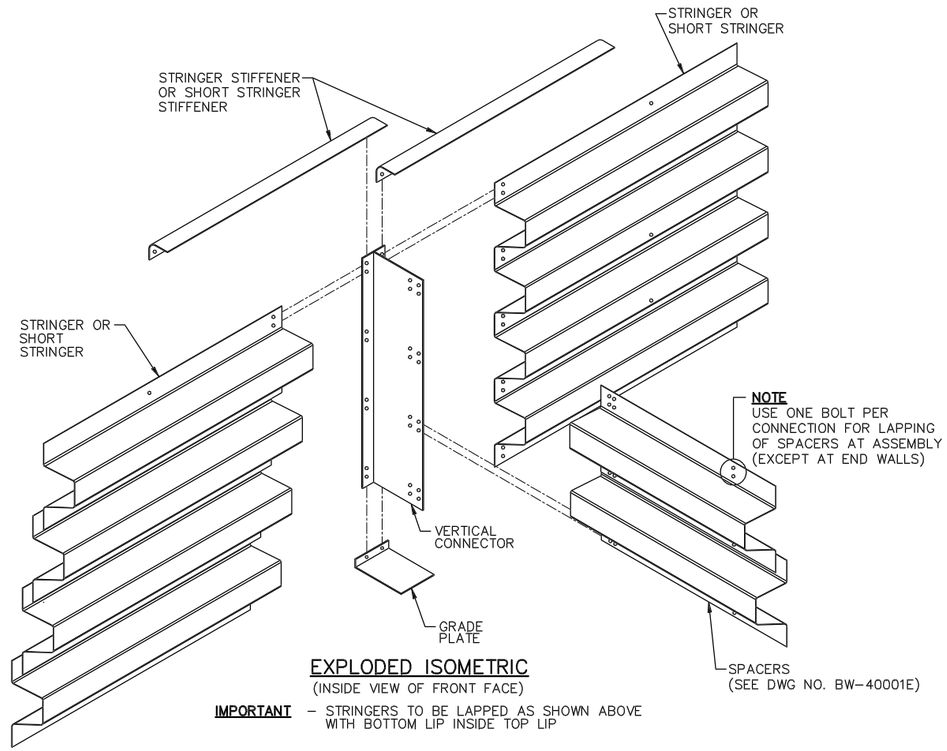
| BIN DESIGN | (p max) ALLOWABLE | | MAXIMUM HEIGHT WITHOUT BRACING | |
|---|---|---|---|---|
| | psf | k Pa | ft | mm |
| A | 1728 | 83 | 48.0 | 14630 |
| B | 728 | 35 | 20.2 | 6160 |
| C | 498 | 24 | 13.8 | 4215 |
| D | 438 | 21 | 12.2 | 3715 |
| E | 301 | 14 | 8.4 | 2550 |
| F | 220 | 11 | 6.1 | 1860 |

MAXIMUM ALLOWABLE PRESSURE ON EXPOSED SPACER WALLS (p max) BASED ON LENGTH OF SPACER AND SECTION MODULUS.

MAXIMUM HEIGHT WITHOUT BRACING BASED ON SOIL DENSITY = 19 kN/m³ (120pcf) AND Φ=33° AND NO LIVE LOAD SURCHARGES.

## STRINGER LOCATION & PART NO.

| FRONT WALL STRINGER LOCATION | REAR WALL STRINGER LOCATION | THK mm | PART NO. STANDARD STRINGER 3039 LG | PART NO. SHORT STRINGER 2962 LG |
|---|---|---|---|---|
| 1 THROUGH 8 | 1 THROUGH 6 | 1.6 | WSA1601 | WSB1601 |
| 9 THROUGH 12 | 7 THROUGH 10 | 2.0 | WSA2001 | WSB2001 |
| 13 THROUGH 19 | 11 THROUGH 17 | 2.8 | WSA2801 | WSB2801 |
| 20 AND 21 | 18 AND 19 | 3.5 | WSA3501 | WSB3501 |

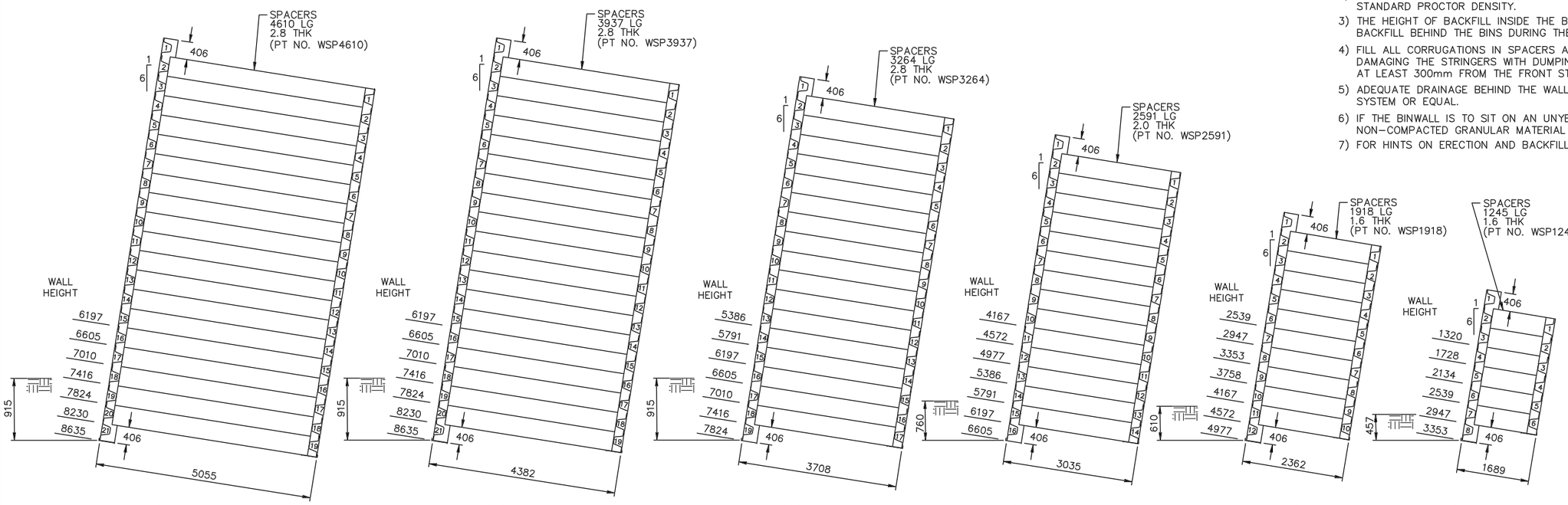



## EXPLODED ISOMETRIC
(INSIDE VIEW OF FRONT FACE)

**IMPORTANT** – STRINGERS TO BE LAPPED AS SHOWN ABOVE WITH BOTTOM LIP INSIDE TOP LIP

NOTES

1) BACKFILL MATERIAL TO BE WELL–GRADED FREE–DRAINING GRANULAR MATERIAL, WITH LARGEST PARTICLES IN THE 75mm (MAX) RANGE AND NOT MORE THAN 10 PERCENT FINES PASSING THE NO.200 SIEVE (0.075mm).
2) BACKFILL SHOULD BE PLACED IN 200mm LAYERS (MAX) AND COMPACTED TO 95 PERCENT STANDARD PROCTOR DENSITY.
3) THE HEIGHT OF BACKFILL INSIDE THE BINS SHOULD BE AT LEAST 400mm GREATER THAN THE BACKFILL BEHIND THE BINS DURING THE BACKFILLING OPERATIONS.
4) FILL ALL CORRUGATIONS IN SPACERS AND STRINGERS, BUT CARE MUST BE EXERCISED TO AVOID DAMAGING THE STRINGERS WITH DUMPING OR COMPACTING EQUIPMENT, WHICH SHOULD BE KEPT AT LEAST 300mm FROM THE FRONT STRINGERS.
5) ADEQUATE DRAINAGE BEHIND THE WALL MUST BE ENSURED BY USING A PERFORATED CSP DRAINAGE SYSTEM OR EQUAL.
6) IF THE BINWALL IS TO SIT ON AN UNYEILDING FOUNDATION, A MINIMUM CUSHION OF 200mm THICK NON–COMPACTED GRANULAR MATERIAL MUST BE PLACED UNDER THE GRADE PLATES.
7) FOR HINTS ON ERECTION AND BACKFILL SEQUENCE SEE THE SUPPLIED ARMTEC INSTALLATION MANUAL.




| NO. | DATE | DESCRIPTION OF REVISION | BY | CK'D |
|---|---|---|---|---|
| 2 | DEC 7/87 | NEW DRAWING NO. & REVISED COMPANY NAME | K.A. | |



BIN–TYPE RETAINING WALL
TYPE 2
STANDARD DEPTH & HEIGHT COMBINATIONS

DATE
DRAWN
CHECKED
REVIEWED
APPROVED
SCALE

armtec LIMITED

DRAWING NO. BW–40002E
REV. 2

## Appendix B

## Permit #1560 for Resource Access

## From Robert Campbell Highway km 189+965

$100.00 Fee - ☒ Paid
Receipt No : 633819
Policy Number 3.2
*Original To File: 3550-20*

COPY

Permit # 1560
Date: January 15, 2007
*(If rejected or withdrawn, note it here)*
*Revise: November 2002*

# PERMIT FOR CONSTRUCTION OR MODIFICATION OF ACCESS

## 1. *Applicant: Name, Address, Phone, Fax and/or Email:*

| | |
|---|---|
| Yukon Zinc Corporation | Att: Pamela Ladyman |
| 701-475 Howe Street | Phone: (604) 682-5474 Ext: 246 |
| Vancouver, B.C. V6C 2B3 | Fax: (604) 682-5404 |

## 2. *Type of Access Requested:*

Resource Access

## 3. *Location of Access:*

Campbell Highway Km 189+965 LHS ***(Tuchitua Section)***

***Note:*** Notwithstanding proposed plans access shall be constructed at location noted above in order maximize sight distance.

**4. This permit is granted subject to the list of attached Standard Conditions, Special Conditions and Standard Drawing # 03030-8 and 03030-9 (Table C)**

This form is to be attached to the application form, along with the standard drawings.

| | | DATE |
|---|---|---|
| A/Superintendent Maintenance. & Planning | | 07/03/12 Date |
| Director, Transportation Engineering | | 07/03/06 Date |

| | | |
|---|---|---|
| A/Director, Transportation Maintenance | C Hawood Signature | May. 17-07 Approval Date |

Distribution List:
1 copy - Applicant / 1 copy - Road Foreman / 1 copy – Area Superintendent

# ACCESS TO A HIGHWAY
# STANDARD CONDITIONS

**Permission is subject to the following conditions:**

1. The access shall be located and built in accordance with the attached Departmental standards with strong consideration given to the appearance of the highway corridor. Every attempt must be made to limit disturbance to the natural environment.

2. An access permit does not imply that direct access to the highway shall be available at all times. Realignment of the highway or the provision of alternate access by way of a frontage or service road in the future may necessitate cutting off the direct access to the highway, and the permittee shall have no claim against the Government of Yukon arising out of such change.

3. Maintenance of the access is the responsibility of the applicant. This encompasses an access as beginning from the shoulder of the road being accessed.

4. It may be necessary to relocate the access to enable improvements to be made to the highway.

5. The cost of relocation or adjustment of electrical or communication utilities or a pipeline of any sort shall be borne by the applicant.

6. Any crossing beneath an overhead utility line shall have, at a minimum; the clearance required in the Canadian Electrical code and shall be approved by the appropriate utility authority.

7. Permission to have an access to the highway does not in any way give the applicant any right, interest, estate, or easement over the land on which the access is to be built. The permission is a privilege and not a right and the Government of Yukon reserves the right to withhold or remove the permission at any time without any compensation to the applicant.

8. An access permit does not excuse violation of any regulation, bylaw, or act, which may affect this project.

9. An access permit approves only the development contained herein; a further application is required for any changes or additions.

10. The applicant may have Government of Yukon Maintenance forces construct the access under third party charges or the applicant may elect to construct the access using his own forces. If the applicant decides to construct the access using his own forces, he must construct the access as per the standard conditions and standard design.

11. The design standard for the requested type of access is attached to this permit.

12. All costs involved with construction of any access will be borne by the developer, including the supply and installation of culverts. The Developer shall ensure that:

    a) the safety, economy, and convenience of the traveling public is recognized at all times and all traffic control is undertaken by the permittee to the satisfaction of the Director, Transportation Maintenance Branch;

    b) where the said works are in the proximity of any bridge, culvert, ditch, or other existing work, such work shall be properly maintained and supported in such a manner as to not interfere with its proper function. Upon the completion of the said works, any bridge, culvert, ditch, or other existing work interfered with shall be completely restored to its original condition;

    c) the permittee shall, at all times, accept full responsibility for any accident that may occur, or damage that may be done to any person or property whatsoever, caused directly or indirectly by the said works, and shall save harmless and keep indemnified the Department from all claims and demands whatsoever in respect of the works;

    d) prior to proceeding with any excavation, the permittee will be responsible for notifying any utility company whose installation may be close to or affected by the work;

    e) during construction, any mud, soil, debris, or other foreign material tracked onto the highway from the access (or accesses) shall be removed by the permittee at his expense, at least daily, or at any time the material unduly inconveniences traffic;

    f) the access is built in accordance with the attached standard. Any change without prior consent in writing from the Director, Transportation Maintenance Branch, shall render the permit void and will result in immediate removal or alterations at the applicant's expense;

    g) the access (or accesses) shall be graveled to an extent satisfactory to the Director, Transportation Maintenance Branch;

    h) the applicant is to conform to all Territorial and Federal regulations.

    i) the applicant is to obtain all associated permits, land use, burning, and any other permits required.

13. An access road constructed by the applicant must pass a final inspection by the Road Foreman to ensure the standard conditions and design standard have been met. The applicant must inform the Road Foreman when the access is completed.

    (a) If the constructed access is rejected the applicant will then be informed in writing of the work necessary to correct the access road deficiencies. The applicant will have 60 calendar days to correct the deficiencies or Highway Maintenance will proceed as in section 13(b).

    (b) If the applicant does not comply with section 13 or 13(a), Maintenance forces may remove any material deposited on the right-of-way by the applicant. The

applicant will be charged all associated costs with the removal of this material. If the applicant fails to comply, after notification, the Foreman also has the option to correct the accesses deficiencies and charge the applicant third party rates for work performed.

(c) If the applicant replies with a plan of action, which does not meet with the approval of the Road Foreman, he will be informed in writing that the access will be dealt with as per item 13(b).

14. If the permit is for a temporary access, the access shall be removed and the area restored to its original condition by the expiry date shown on the permit at the applicant's expense.

15. The permit will become null and void if the access has not been constructed within 12 months of the permit issue, or if the constructed access has not passed inspection by Transportation Maintenance and the necessary corrections have not been completed.

16. Access Road is subject to future relocation if necessary due to development of gravel/borrow pit.

17. The applicant shall be aware that buried utility lines may exist in the right of way. It is the applicant's responsibility to have these lines located and marked The Yukon Government will not be held responsible for any damage done to any utility caused by work done under this permit.

---

**Special Conditions:**

1. Applicant is required to remove the brush and trees within the Right-of-way, 200m north and south LHS of proposed access to improve sight distance.

2. The applicant must maintain the site distance by regular upkeep of brushing, failure to do so will result in maintenance forces removing the brush and the applicant will be charged all associated costs.

3. The applicant will require approval for the brushing and site distance from Road Foreman prior to constructing the access.

Materials

1. Where there is a benefit to increase site distance, the applicant or his contractor will be permitted to utilize material from the right-of-way ditch to construct the access.
2. If material from the right-of way ditch is utilized the applicant is responsible to insure that the terrain is leveled and drainage is not compromised.

I have read and understood the above conditions for this permit and will perform the work according to the conditions. (Please sign and return this page by fax or mail to the address below.)

**Applicant's Name:** Pamela Ladyman

**Applicant's Signature:** [signature]

**Date:** March 27, 2007

**Transportation Maintenance Branch (W-12)**
9029 Quartz Road, Building 275, Whitehorse, Yukon Y1A 4P9
Phone: (867) 667-5159 Fax: (867) 667-3648

## ROAD USE TABLE

| USUAL VEHICLE TYPE USING ACCESS | SURFACE WIDTH | | STORAGE LENGTH | FILLET RADIUS |
|---|---|---|---|---|
| | ONE LANE TRAFFIC | TWO LANE TRAFFIC | | |
| (A) PICKUP TRUCK | 5.5 | 8.5 | 6.0 | 8.0 |
| (B) SINGLE UNIT DELIVERY | 6.0 | 9.5 | 9.0 | 15.0 |
| (C) LARGE TRUCK | 6.0 | 10.5 | 20.0 | 17.0 |

Yukon
Highways and Public Works

Transportation Engineering Branch

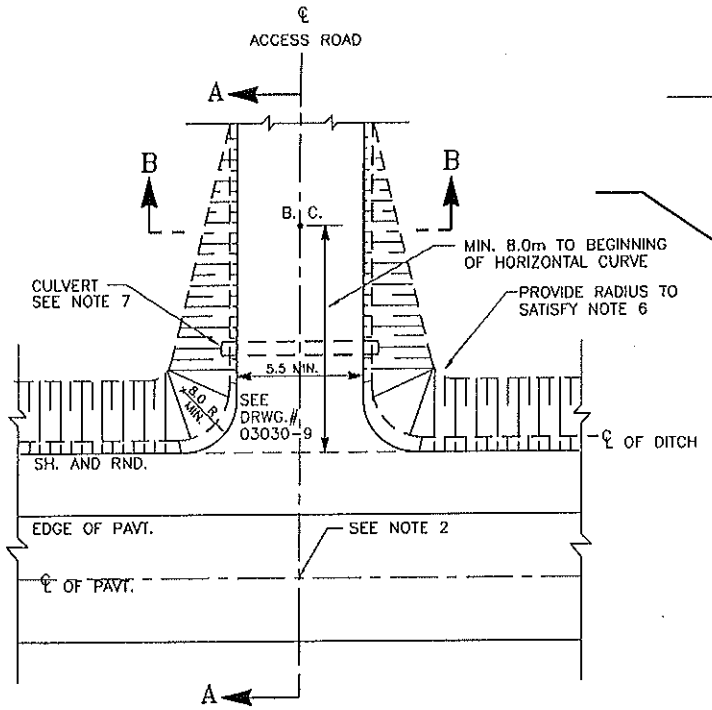
DRAWING TITLE

**RESOURCE ROAD**

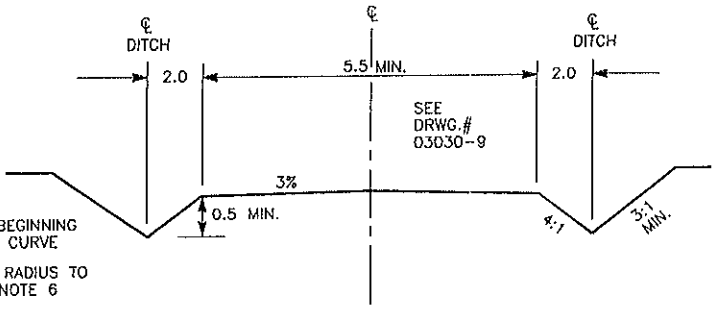
**DESIGN GUIDELINES**

| | |
|---|---|
| designed: | G.B. |
| drawn: | ysd |
| app'd: | |
| date: | Mar. 2003 |
| scale: | N/A |
| drwg: | 03030–9 |

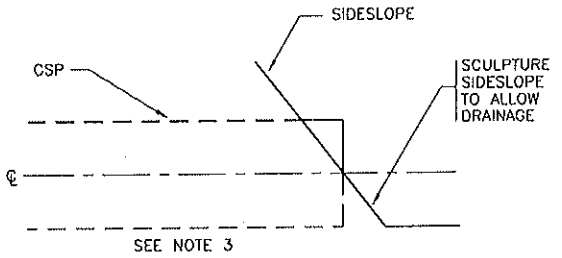
#1560



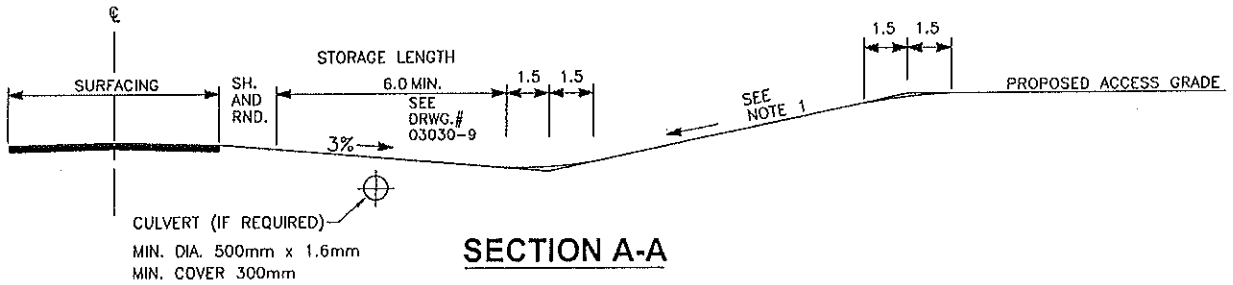

PLAN




SECTION B-B




CULVERT END DETAIL




SECTION A-A

NOTES

1. MAXIMUM GRADIENT IS 10% FOR ACCESS ROAD.
2. ACCESS ROAD TO BE BUILT AT 90° TO THE CENTRE OF THE HIGHWAY. ANGLES BETWEEN 70° TO 110° MAY BE ALLOWED IN EXCEPTIONAL CIRCUMSTANCES AND ONLY WITH THE PERMISSION OF GOVERNMENT OF THE YUKON.
3. CULVERT ENDS TO EXTEND TO A POINT WHERE SIDESLOPE INTERSECTS CENTRELINE OF CSP. SEE CULVERT END DETAIL.
4. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
5. ANY ACCESS WHICH IS PROPOSED TO CONNECT TO THE HIGHWAY ON A HORIZONTAL CURVE SHALL BE EVALUATED, BUT WILL NOT NORMALLY BE ALLOWED WHERE THE SUPERELEVATION RATE EXCEEDS 0.040m/m.
6. ADDITIONAL CUTTING OF THE HIGHWAY BACKSLOPE MAY BE REQUIRED TO PROVIDE ADEQUATE VISIBILITY.
7. CULVERT SHALL BE LOCATED SO THAT DRAINAGE IS NOT BLOCKED.

Yukon
Highways and Public Works

Transportation Engineering Branch

DRAWING TITLE

**RESOURCE ACCESS**

**IN EARTH CUT**

| | |
|---|---|
| designed: | YTG |
| drawn: | ysd |
| app'd: | |
| date: | Mar. 2003 |
| scale: | N.T.S. |
| drwg: | 03030-8 |

# Appendix C

## Borrow site ABA Testing Results and

## Project Granular Material Requirements

**Acid Base Accounting Results for Borrow Sites Materials Located near the Airstrip**

| Parameter | Unit | TP05-72 | TP05-75 | TP05-78 | TP05-81 |
|---|---|---|---|---|---|
| Paste pH | - | 8.45 | 8.80 | 7.89 | 7.62 |
| Rinse pH | - | 5.88 | 7.54 | 6.12 | 5.7 |
| Total Sulphur | %S | 0.06 | 0.08 | 0.09 | 0.02 |
| Sulphate Sulphur | %S | 0.005 | 0.005 | 0.005 | 0.005 |
| Sulphide Sulphur | %S | 0.005 | 0.005 | 0.005 | 0.005 |
| Insoluble Sulphur | %S | 0.06 | 0.08 | 0.09 | 0.02 |
| AP | kg CaCO3/t | 0.15 | 0.15 | 0.15 | 0.15 |
| Modified Sobek NP | kg CaCO3/t | 3.1 | 5.1 | 2.6 | 0.2 |
| Total Carbon | % C | 0.14 | 0.21 | 0.43 | 0.25 |
| Total Inorganic Carbon | % C | *0.005* | *0.005* | *0.005* | *0.005* |
| Carb NP | kg CaCO3/t | *0.4* | *0.4* | *0.4* | *0.4* |
| Net Sobek NP | kg CaCO3/t | 3.1 | 5.1 | 2.6 | 0.2 |
| Sobek NPR | - | 20.67 | 34.00 | 17.33 | 1.33 |
| Carb NPR | - | 2.67 | 2.67 | 2.67 | 2.67 |

**Note:** Values in *italics* were reported by the laboratory as less than their detection limit and are shown here at one-half the detection limit.

**Quantities of Granular Material Required for Construction and Maintenance Activities**

| Description | Manufactured Product | Raw Material |
|---|---|---|
| Granular Surfacing for Road Construction | 50,000 $m^3$ | 60,000 $m^3$ |
| Granular Surfacing for Road Maintenance | 20,000 $m^3$ | 25,000 $m^3$ |
| Culvert Bedding and Backfill | 8,000 $m^3$ | 10,000 $m^3$ |
| Common Borrow for Construction | 50,000 $m^3$ | 50,000 $m^3$ |
| Concrete Aggregate (Industrial Complex) | 2,000 $m^3$ | 5,000 $m^3$ |
| **Totals** | **130,000 $m^3$** | **150,000 $m^3$** |