Appendix 19: Eagle Gold Access Road Report

# **APPENDIX 19**

Eagle Gold Access Road Report





# **DESIGN REPORT**

Victoria Gold Corp

## Eagle Gold Project: Access Road

**NOVEMBER 2010** 

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### **1.0 Introduction**

Victoria Gold Corporation (VIT) is the owner of the Eagle Gold Property, located within the Mayo Mining District of Central Yukon. This property was obtained in 2009 by VIT through the acquisition of StrataGold, and has historically been called Dublin Gulch. Course gold was first found there in 1889 by Thomas Haggart who, in 1896, built the first cabin on the gulch and gave it its name. It is believed the road was constructed in 1940 to facilitate mineral exploration in the Dublin Gulch area. The left limit of Haggart Creek (east) borders a large Na-Cho Nyak Dun First Nation land claim parcel.

Yukon Engineering Services (YES) was engaged by New Millenuim Mining Ltd. in 1996 to investigate road access options to the mine property, and through that process produced the *Dublin Gulch Access Road Design Brief Report* (YES 1996 Report). In the fall of 2009 YES was retained by Victoria Gold Corp. to update the YES 1996 Report, and provide recommendations with which VIT could approach the Yukon Government Department of Highways and Public Works (YG HPW), and enter into discussions regarding access requirements, permitting and regulatory approvals. That updated design brief was provided in January 2010 as the YES 2010 *Draft Report*.

As a result of the discussions between VIT and YG HPW the decision was made to proceed with the upgrading of the existing Haggart Creek Road from the South McQuesten River Bridge to the mine property as a one lane two way radio controlled access, with the improvements as identified in the Draft Report.

This report summarizes the outcome of these discussions and the progress achieved to date.

### 2.0 Background

The Eagle Gold Project is located at approximately kilometer 45 on the South McQuesten/ Haggart Creek Road (YG # 325), located off the Silver Trail north of Mayo, Yukon. The original design for access to the Eagle Gold Property was completed in 1996 for New Millennium Mining Ltd., and presented two options based on the reconstruction of the road to a full 8 metre width (see Appendix A):

**Option 1:** South McQuesten Route - Utilizing and upgrading the South McQuesten Road for approximately 23 km to the South McQuesten River Bridge, then utilizing and upgrading the Haggart Creek Road for approximately 22 km.

**Option 2: Mount Haldane Route** - Constructing along the old Mt. Haldane Route for 16.9 km to the South McQuesten River Bridge, then utilizing and upgrading the Haggart Creek Road for approximately 22 kms to the mine site.

Originally, the Mount Haldane option was selected because of the total distance that would be shortened to the mine site. This route consisted of a road starting near Halfway Lakes on the Silver Trail, traversing the west side of Mt. Haldane and rejoining the existing access road near the South McQuesten River Bridge. Since 1996, however, the Haldane route has not been utilized, and is now overgrown and returned to an almost natural state.

The Yukon Government has put considerable effort over the past few years into upgrading and maintaining the section of the South McQuesten Road (SMR) from the Silver Trail to the crossing of the South McQuesten River, and in August of 2010 completed the reconstruction of the abutments and decking of the bridge.

The Haggart Creek Road (HCR) portion of the access road is considered an unmaintained public resource road and maintenance of this section has been undertaken by the local mining interests on an as needed basis.

Based on our discussions with VIT and the current condition of the South McQuesten Route maintained by YG, only the Haggart Creek Road upgrades, from the river crossing to the mine property, were considered in the 2010 Draft Report, and will be considered in this report.

### 3.0 Existing Road Access

Currently the mine is accessed by the South McQuesten Road (SMR) starting at kilometer 87.2 of the Silver Trail. The Silver Trail is an 80 km/hr year-round gravel road which provides access to the Community of Keno and other mining activity in the area. The SMR is a seasonal road which is in generally fair condition.

The Yukon Government currently maintains the SMR between the Silver Trail and the South McQuesten River Bridge (approx. Km 23), which is approximately half of the 45 km route. In the summer of 2009 the Yukon Government undertook some further maintenance upgrades of this section of the road, consisting of brushing, grading, culvert installation and miscellaneous drainage improvements. As a result of the 2009 upgrades this section of the road would not require significant upgrades for project use, although some minor improvements may be required to ensure year round and winter operation.

Of major importance, at approximately km 23 of the South McQuesten Road, the SMR crosses the South McQuesten River. This Bailey structure has been upgraded by YG this past summer with new abutments, bridge decking, and approaches. YG HPW will continue to maintain the SMR portion of the access to the property.

Between the bridge and the mine site maintenance is performed on an as and when required basis by local placer miners or VIT. Throughout this section, the HCR requires upgrading to safely

carry the anticipated increased traffic that will result from continuing exploration, the proposed mine development and eventual eight year mining project life.

### 4.0 Engineering Tasks

We noted during our site visit in the fall of 2009 and again in the spring of 2010 that the HCR section showed signs of structural failures, poor drainage, and areas of sub standard geometry. In general, the major issue for this section of the road is drainage. Although, during dry periods, this road is suitable for travel in standard pickup trucks, larger equipment or travel during spring runoff/rainfall may make this road difficult to travel.

In order to improve the level of service and increase safety on this section of the road, YES proposed the following options for consideration.

**Option 1.** Implementation of radio controlled single lane access utilizing the existing grade, with general improvements throughout to the drainage and sight lines, the construction of sufficient turnouts along the grade to ensure safe passage, and the realignment of three road sections to improve grade and safety.

**Option 2.** Overall road upgrades. YES proposed a phased approach to upgrading the road to the full 1996 design two lane road suitable for year round access as follows:

- Minor upgrading, to facilitate further exploration work,
- Additional upgrading to support increased traffic for mine construction,
- Final upgrades, if required, for mine operation.

In the spring of 2010 VIT met with YG HPW seeking specific information and guidance from HPW on the access road which would assist VIT in developing the proposed scope of the Project Proposal for consideration by YESAB, and to help ensure their Proposal was consistent with the regulatory requirements and expectations. HPW agreed with YES' evaluation that further significant upgrades would not be required from the Silver Trail to the South McQuesten Bridge (SMB) to support project use. Any additional improvements needed for all season use would be relatively minor, not requiring additional regulatory approvals.

HPW confirmed that the SMB would be upgraded in 2010 to current load standards (as opposed to highway limits) and would remain subject to seasonal restrictions. In addition, HPW supported the approach in principle proposed by YES and Victoria Gold to upgrade and improve the road from the bridge to the mine site as proposed above within the preliminary engineering evaluation, to utilize the existing road as a single-lane, radio controlled access road, with additional turnouts and safety measures included. As well, three sections of the road will be upgraded based on the realignments identified above in Option 1 of the Draft Report, along with the overall upgrades described above. Given the historical low public use of this area, the safety measures proposed, and the relatively modest life span (10 years) of the project, it was felt that the considerable costs associated with expanding the road to a full two lanes 8 metre width would not be warranted. As

well, a positive benefit of limiting the potential footprint of the project by maintaining a single lane width along Haggart Creek would be realized.

### **5.0 Design Parameters**

In order to properly design upgrades to the Haggart Creek Road (HCR), Yukon Engineering Services has assigned vehicle types and volumes in order to classify the proposed upgrades. YES considers the volume of proposed traffic on this road to be low and within YG's legal axle limits for Gross Vehicle Weight (GVW). We have been provided the following:

General assumptions:

- the estimated project life is 10 years, including approximately the first two years of construction;
- the mine will operate year round;
- turn-arounds of personnel expected to occur approximately every two weeks. Personnel will, for the most part travel from Mayo to the mine site by bus (approximately 100-120 round trips per year);
- heavier loads will occur going into the mine site, lighter loads will occur returning,
- largest vehicles will be B-Train (fuel), trucks with long loads (steel members, crane components, wide loads (truck boxes, tanks, Pre Fabricated camp modules);
- loads would be adjusted for seasonal load restrictions, and volumes would coincide with construction and operational needs.

Construction period (16-18 months, up to two years):

- approximately 1500-1800 semi-trailer (round trip) loads over the construction period;
- approximately 10-20 1 tonne to 5 tonne trucks per day on the average, or 600-800 round trips over the construction period;
- approximately 10 passenger car or pickup trucks per day;
- estimates do not include traffic for exploration programs or public / tourism users;
- higher traffic volumes would be expected during peak construction times, seasonally, and trip numbers would depend on the location of the construction camp.

Operations (estimated 7 years)

• Total truck loads are estimated at 1944 trucks per year (round trips), based on an average year where 18.6M tonnes of rock are moved. As with the estimates for the construction period, these numbers do not account for potential seasonal load limits, which would determine potential truck size and load types.

The design work completed considered the following specific geometric design considerations. All parameters fall under the Transportation Association of Canada (TAC) design standards for Low Volume Roads (LVR 50), one-lane two-way roads, and acceptable engineering practice.

Description of Design Parameter	TAC	Achieved							
Minimum Radius Horizontal Curves	80 m	(170 m targeted, with 150 m Radius the lowest achieved,							
		except within proposed revision areas, suggesting a 40							
		km/hr horizontal alignment Design, with one "Reduce							
		Speed" to 40 km/hr sign.)							
Maximum Gradient (Mountainous TAC)	10-14%	(9.9% suggesting a 70 km/hr vertical alignment Design, with one more "Reduce Speed" to 40 km/hr sign)							
Minimum K Value (Sag)	12	Governed by comfort control. (Lowest Sag K Option 1 = 20, Option 2 = 11							
Minimum K Value (Crest)	18	Governed by stopping sight distance (85m), a driver's eye							
Refer to Plans <u>Appendix A</u>		height of 1.05m (passenger car), and height of object (tail							
		light, small animal) of 0.38m. (Lowest Crest $K = 21.1$ ,							
		suggesting 70 km/hr posting.)							
Minimum Length of Vertical Curve (Sag)	50 m	Lowest 60 m, as original design speed.							
Minimum Length of Vertical Curve (Crest)	50 m	Lowest 80 m, to better complement Stopping Sight Distance.							
Maximum Rate of Super Elevation on Curves	6% / 8%	8% used throughout, except on grades of greater							
-		than 8% in loaded (towards mine site) direction, then 6%							
		used. This is to lessen side-slipping and spinning out of							
		loaded trucks on steep grades in the winter time.							
Road width	5 m	5 metres. This allows for one 3m traveled lane, plus,							
		two, 1m shoulders.							
Side Slopes (Cut)	3H:1V	3H:1V							
Back Slopes (Cut)	2H:1V	2H:1V Cuts less than 5m in height.							
		1.5H:1V Cuts greater than 5m in height.							
		1H:1V Cuts in competent, rippable schist.							
Fill Slopes	2H:1V	2H:1V Fills less than 5m in height.							
		1.5H:1V Fills greater than 5m in height.							
Surfacing Gravel Thickness	N/A	100mm. YTG specification Granular Surfacing "A".							
Subbase Granular Thickness	N/A	Varies from 0mm - 350mm. YTG specification Granular							
		Subbase "E" (Gran "E")							

### 6.0 Soil and Other Design Conditions

EBA Engineering Consultants Ltd. completed a field test-pitting and centerline drilling program of both routing options as part of the 1996 design process. As there has been little to no development along the road since the field testing this geotechnical report is considered valid. As well, we assume the data presented by EBA in the 1996 report would be suitable for preliminary transmission line designers. The detailed 1996 geotechnical report is included in Appendix C.

Borrow pits were investigated within the original geotechnical report; however, the majority of the sources investigated were located on the SMR and within the first 4 kilometers of the HCR. This has necessitated a further geotechnical investigation to:

- ensure constructability of the three revision areas as per the design;
- assess the availability of suitable sub base and road surfacing materials along the HCR;
- and confirm the soil conditions at Haggart Creek and Secret Creeks for culvert and headwall/wing wall installation.

A 2010 geotechnical investigation program has been designed and will be completed in November of 2010. This work required a YESAB District Office screening. The application was submitted in August and the required approvals and permits have been received.

It is known that schist rock is located under or adjacent to the road for the section from the South McQuesten River to the mine site. This has been verified both from site inspections and from the original geotechnical investigation in 1996. As such, the depth of cut within the original road design was a major driving factor within the design. Generally refusal rock was encountered 3 - 4 m below the surface.

Transmission line construction may be affected by this schist rock if the poles are not able to be drilled for placement. Further geotechnical testing on the schist may be required.

Reducing the design road from the full two lane RLU 60 classification with an 8 metre road top to the one-lane two-way 5 metre top LVR 50 with pullouts, and utilizing the existing structure wherever practical, will significantly reduce the required borrow material and disturbance. Other considerations influencing the proposed construction include:

• Portions of the existing road grade have been built on the side slopes using the cut and fill method. The caterpillar tractor simply cut into the side slope and rolled the fill into the trees below, stabilizing the grade. This has resulted in steep slopes both above and below the road grade with a narrowed road top. Care will be taken to pull down the high side to provide sufficient width for ditching, and where required, pullouts. This material, where suitable, will be used for fill material.

- Unsuitable cut material will be placed along the toe of existing or constructed slopes to encourage vegetation, or used to re-contour and reclaim exhausted borrow areas.
- No pullouts will be constructed or fill material placed that will encroach on the creek.
- The 1996 geotechnical investigation along the HCR road encountered no permafrost in the constructed grade. Test pits within the South McQuesten River valley did however encounter permafrost and visible ice. The 2010 program will further define potential borrow sources for grade raising and surfacing materials. It should be noted that in newer road sections where granular materials are encountered in the subgrade, only surfacing is required.
- Road sections near the SMB have experienced flooding or high ground water in the past and is the predominant cause of the structural failures noted. Culvert installation or replacement, along with grade raising where required and improved ditching will stabilize these locations.

### 7.0 Road Upgrades

### 7.1 Yukon Government Road Upgrades

During the summer of 2009 the Yukon Government completed a number of upgrades to the South McQuesten road between the Silver Trail and the crossing of the South McQuesten River. These upgrades where part of the Resource Access Road Program (RARP) and included approximately \$100,000 for:

- Grading of the road;
- Brushing to improve sightlines;
- Minor ditching;
- Culvert installation.

With these improvements the access road to the South McQuesten River is now capable of handling larger loads with regards to horizontal and vertical geometry. During a November 2009 site visit YES did not note any signs of structural problems, but it can be assumed that during spring thaw and freshet that load restriction will be necessary. It was also noted that the culverts installed are quite small and may not have adequate capacity. Additional work may be required by YG on this section of the road to obtain a year round operational status.

### 7.2 South McQuesten Bridge Upgrade

In August of 2010 work was completed on the South McQuesten Bridge that included removal of the 27.5 metre Bailey bridge, replacement of the abutments to raise and lengthen the structure, replacement of the bridge decking.

### 8.0 Proposed Upgrades

### 8.1 Proposed Haggart Creek Road Upgrades

As noted in 4.0 above, HPW supported the approach to utilize the existing road as a single lane, radio controlled access road, with additional turnouts and safety measures included, along with the construction of three revisions to improve grade and horizontal alignment as well as move the road away from Haggart Creek, along with the general upgrading of the entire length of the road from the bridge to the mine site.

#### 8.1.1 General Maintenance Upgrades 2011

This general upgrading will include

- increasing the width of the clearing within the right of way to increase sight lines for the safety of the vehicles as well as to allow more light and air movement to reach the road surface to aid in the melting or drying of the road bed to obtain a longer season or reduced down time.
- both the repair and replacement of damaged or undersized culverts as well as the installation of additional culverts in selected areas to improve the drainage of the road bed.
- installation of new and maintenance of the existing ditching along the roadway to ensure the road bed does not become saturated with ground water.
- where required, importing fill and raising the road grade through selected areas to ensure a stronger base for the traffic.
- the construction of pullouts are required to provide vehicles the space to stop in order for an oncoming vehicle to pass.
- manufacture and installation of 100 mm surfacing gravel throughout the length of the road.

Typical road sections are provided in Appendix A.

### 8.1.2 Proposed Realignment Upgrades

We have identified three areas through site inspection and evaluating the 1996 design which we consider a priority to improve the horizontal and vertical alignment elements of the road, and have listed them in order of priority. These realignment sections have been set out on the ground, surveyed, and a preliminary design completed. A further geotechnical investigation of these routes is necessary, however, to examine soil and constructability issues, and evaluate the usability of materials from the cuts for embankment construction. The assumption made in the preliminary design for each section was that the excavated materials would be used for road

embankment, and no borrow pits would be required. The planned November 2010 investigation will also identify the depth to bedrock, and the presence of permafrost, which could influence the vertical design grade of the access road and future power line construction,. Appendix A contains drawings of the three realignment areas. Advancement of the construction of the revision segments will be determined after the completion of the geotechnical investigation.

#### Km 25+800 to 26+500

This section of road currently dips down into a creek with grades as steep as 15%, and curve radii of 26m. The re-alignment will result in the removal of 4 curves and a maximum gradient of 8.8%, with horizontal curves of 170m, and 300m radius, eliminating the need for trucks to chain up in wet and frozen conditions. One new culvert is anticipated and one culvert replacement (2000mm) at Secret Creek with headwall and wingwall installation and rip-rap protection at inlet and outlet (see 8.1.5 Secret Creek Upgrade). This revision would require approximately 5,300 m<sup>3</sup> of common excavation and 4700 m<sup>3</sup> of fill material.

#### Km 23+000 to 23+600

This section of road dips down into a creek with grades as steep as 15%. This section requires re-alignment and culvert replacement (1200mm) with rip-rap protection at inlet and outlet. This revision would require approximately 4400 m3 of common excavation and 4100 m3 of embankment. This would result in reducing the grade from the creek to the top of the hill, improving both sightlines and driving conditions.

#### Km 19+400 to 20+500

This section rises up from the McQuesten River valley and winds up to the start of the Haggart Creek Valley. There are sharp curves with limited visibility and radii of 27m. Improvements to this area would help large loads in wet and frozen conditions. The earthworks for this section would be approximately 5700 m3 of cut and 5300 m3 of road embankment and the installation of 2-600mm culverts.

#### 8.1.3 Radio Control One Lane Access Road Upgrade

This option assumes only certain sections of the road would be upgraded and the entire access road from the South McQuesten Bridge to the mine site would become a one-lane, two-way radio controlled access road. This would involve the installation of kilometer markers along the entire alignment and signage to direct the use of radios and appropriate channels. Pullouts would be constructed thus alleviating the need to re-construct the road to a full two lane width with a higher TAC standard for the proposed 10 year project duration.

#### **Radio Controlled Roads**

#### Entrance Sign

- Located where it can be easily read and contain the following information
  - Road name
  - Frequency of the radio channel
  - Calling protocol
  - Load Restrictions
  - Primary User Name
  - Contact Phone Number
- Placed where the two lane public road finishes and changes to the radio protocol
- Adequate pullout in front of the sign to allow for the user to stop and safely read it

#### Km Marker Boards

- Marker boards would be placed one kilometre apart
- Visible from both directions

#### **Radio Calling Protocol**

- 1. "Up" and "Down" used to identify the direction of travel.
  - Up, assigned to direction of increasing kilometre signs,
  - Down, assigned to direction of decreasing kilometre signs.
- 2. Order of calling procedures; "vehicle type, kilometre location and travel direction".
- 3. Must call situations when traveling up and down.
  - When leaving and entering the road,
  - When stopping and parking on the road, and again when you resume,
  - Whenever you encounter a vehicle traveling without a radio.
- 4. Never pass any vehicle without notifying them on the radio and receiving the "OK" or seeing them pull over.
- 5. Avoid distractions while monitoring the road channel.
  - No unnecessary radio talk,
  - Avoid noise distractions.
  - Stay on designated road channel at all times while traveling.

Local residents and local placer miners are known to use this road and may not have the radio equipment to comply with this requirement. Sourcing and selection of suitable radio equipment will occur prior to the commencement.

The total estimated cost for Option 1 is \$1.2 million and should result in approximately the same level of services as the YG maintained road from the Silver Trail to the crossing of the South McQuesten River.

As these roads are open to the public, it may be necessary to achieve this level of upgrades in order to increase safety along them. This would be especially important during the construction and mining stages when vehicle traffic will be at its highest.

#### 8.1.4 Haggart Creek Crossing Upgrade

The existing culverts and embankment located at Haggart Creek are in good repair but do not meet the required 1:100 year flood event standard. The recommendation for this location is the installation of a suitably sized overflow culvert to the north of the existing culverts. This will exceed the design standard and cause no disturbance to the existing fish habitat and wetted stream area. See Appendix E: Haggart and Secret Creek Recommendations. Conceptual design drawings are provided in Appendix A. Detailed design and construction drawing will be presented upon the completion of the geotechnical program.

#### 8.1.5 Secret Creek Upgrade

The existing culvert is too short for the embankment in place resulting in a narrow road top and sloughing of embankment materials into both Secret and Haggart Creeks. The capacity of the culvert does not meet design standards. The recommendation for this location includes the installation of a properly sized culvert(s) and overflow pipe complete with head and wing walls. See Appendix E: Haggart and Secret Creek Recommendations. Conceptual design drawings are provided in Appendix A. Detailed design and construction drawing will be presented upon the completion of the geotechnical program.

### 8.1.6 South McQuesten Parking Area

Consultations with the First Nation of Na Cho Nyak Dun and residents of the Village of Mayo have led to a request for a parking area near the South McQuesten bridge to facilitate both traditional and recreational activities at the river. A suitable pull off area has been identified that could accommodate 5 to 6 vehicles and boat trailers on either side of the road, to the north of the bridge. Work required to complete the proposed parking area includes simple fill and grading.

#### 8.2.0 Slope Stabilization Areas

The *Eagle Gold 2010 Fish and Fish Habitat Baseline Report* identifies 12 areas of "Road Encroachment" (RE) along the existing access route. Road encroachment is defined as locations where the bank of the creek is within 30 metres of the centerline of the road. The proximity of the slope of the constructed road to the creek could be of concern to fish habitat where the slope of the road fill is steep and embankment materials may slough into the creek, or the base of the fill is eroded by the scour action of the creek.

RE1 to RE3 are located from station 21+250 to 21+600, where the access road has entered the Haggart Creek Valley. Although the creek is as near as 15 metres from the road, the slopes are well vegetated and stabilized. The stream bed in these areas is comprised of a heavier cobble that does not appear to be eroded. No stabilization works are necessary at this time.

RE4 is located at approximately station 26+000 where there is a large 1800mm culvert carrying the flow of Secret Creek through the road and into Haggart Creek. This culvert installation is of concern due to the shortness of the pipe and potential road material sloughing into the creek. This location has been further investigated and is discussed further in *8.1.5 Secret Creek Upgrade*. The installation of headwalls and wing walls on both the inlet and outlet will be required to carry the design event flow, provide a safe crossing, and prevent materials from sloughing into the creeks.

RE5 and RE6 are located at 29+050 and 29+300. The road slope at RE5 is heavily vegetated and stable. The slope at RE6 is less vegetated but appears stable and the heavier cobble at the toe shows no sign of scour. No stabilization works are necessary at this time.

At RE7 (sta. 31+150), RE8 (sta. 31+750), RE9 (sta. 32+100), RE10 (sta. 32+950), and RE11 (sta. 33+300) the road bed is separated from the top of the creek bank by a strip of natural vegetation and does not impact the creek. No stabilization works are necessary at this time.

RE12 is located at approximately sta. 35+200 in an area that has been previously mined, and the road fill slopes down from the shoulder of the road to the edge of Haggart Creek and a man made settlement or recirculation pond. The road alignment could possibly be shifted away from the creek into the stockpiled material, and, if required, cobble material or rip rap placed along the toe of the slope. No stabilization works are necessary at this time.

### **8.2.1** Borrow Source Requirements

The objective of the subgrade design of the Haggart Creek portion is to take advantage of the sidehill terrain as much as possible, in order to allow construction with little hauling of embankment material, and by strategically locating side-borrows (ditch widenings) and quarries where possible. Borrow material required to complete the construction will include:

- 10,000 m3 of road base material for general upgrades and grade raising;
- 10,000 m3 of base material for pullouts;
- 1000 m3 of culvert bedding material for culvert installation;
- 16,000 m3 of road surfacing material.

#### 8.2.2 Construction Staging Areas

It is anticipated that local contractors and forces within the Mayo area will be utilized to complete the planned road upgrades and no construction camp facilities are required along the access road. Areas may be required however for the temporary storage of culvert materials and equipment parking. There are a few suitable locations that could be utilized as laydown areas. The first would be at the South McQuesten Bridge (station 16+950) on the north side of the river. This area will be re-graded and utilized as a parking area after completion of the road upgrades. The second suitable location would be at the cleared area south east of Secret Creek. This area located at approximately station 26+000 has been used in the past by placer miners as a camp. The third possible staging area is located north of the Haggart Creek crossing at station 35+000. This area has been extensively mined in the past and has many cleared areas.

#### **8.2.3** Construction Schedule

General maintenance of the Haggart Creek Road is ongoing in order to provide continued access to the Eagle Gold site for exploration and environmental monitoring activities.

The repair and maintenance upgrade of the culvert at Secret Creek is critical for slope stabilization of the road and the protection of fish and fish habitat downstream, as it is currently in a state of disrepair. The addition of the overflow culvert at Haggart Creek is also a necessary item for maintenance and repair as it is currently undersized for a 1:100 year event, and poses a risk to fish and fish habitat downstream. VIT anticipates completion of the repair and maintenance to the above noted culverts in spring of 2011, upon obtention of required permits.

Users of the road would benefit from the improved safety offered by the installation of the proposed pullouts in the near term. VIT will propose this work, along with general drainage ditching improvements, be carried out following the completion of the culvert repairs during the 2011 season.

### 9.0 Road Maintenance

The Yukon Territorial Government will maintain the South McQuesten River portion of the access road to the bridge at the South McQuesten River. From the bridge to the mine operations maintenance will be performed by a local contractor engaged by VIT. Road maintenance is essential to ensure user safety, preserve the existing condition of the road, and ensure convenient and efficient travel to the project area. Roads that are not properly maintained are susceptible to failure from vehicular and environmental impacts. The road maintenance includes:

#### Summer/Fall Months:

- Ensure all culverts are delineated;
- Removal of deadfall and brushing along the cleared right-of-way;
- Repair potholes and ruts and reblade washboard areas;
- Ensure that there is proper drainage off of the road structure (uniform crown of 3%);
- Ditches pulled where needed and are clear and clean of obstructions;
- Culverts are operating and draining correctly.

#### Winter/Spring Months:

- Removal of snow from the driving surface and pullouts;
- Sanding and scarifying the road surface;
- Ensure that there is proper drainage off of the road structure;
- Steaming of culverts as required to maintain adequate flow.

In addition to the seasonal maintenance requirements the following should also be maintained on an as needed basis:

- Clearly visible km signs;
- Road signage;
- Identification and reconstruction of road structure failure;
- Removal of large rocks that may have fallen onto the road surface or been bladed up during the reshaping.

As with many infrastructure investments, low initial cost can mean high maintenance costs, and thus high overall Whole Life Costs. To reduce the maintenance burden of LVRs to affordable and sustainable levels, the routes should be designed to minimize the maintenance burden to realistically achievable and economic levels. Recommendations to achieve low cost maintenance of LVR will be carefully considered:

- Establish the ownership and responsibility for the route;
- Design for low maintenance, using appropriate and affordable standards for the category of route and traffic;
- Use local resources in the construction and maintenance (materials, labour, skills, enterprises, communities, intermediate equipment) to provide local socio-economic benefits;
- Mobilize central government, local government and community funds and resources where possible;
- Monitor the maintenance work and discuss ways to improve it through dialogue with the implementers and stakeholders;
- Inform stakeholders regularly of the maintenance performance; including resources consumed and output achieved.

It is estimated that the yearly maintenance costs for the Haggart Creek Section will be in the range of \$80,000 to \$100,000.

### **10.0 Transmission Line Route**

A review of the topographic and terrain type for the installation of a transmission line was assessed using a pole height of 9.15m (30') and an average tree height of 12.1m (40'). Based on our discussions with VIT we understand the proposed structure would be a single pole, 69 kV line running from the Silver Trail and South McQuesten Road intersection, along the SMR and HCR, to the mine site, within addition clearing along the existing road. We have attached a typical road section with power line drawing in Appendix A.

Soil conditions along the South McQuesten Road range from cuts through schist and silty glacial till to ice rich permafrost. The side hill area near Haggart Creek shows signs of schist overlaid with silt. It may be possible to install the poles using the conventional drill method, though further geotechnical testing is recommended prior to completion of detailed engineering design.

The location of the transmission line will be dictated by the topography and generally the line will be on the outside of the curve to provide extra clearance for guy wires. The line would remain on that side of the road until the road alignment dictates a switch. In the Haggart Creek area it is anticipated that the transmission line would remain on the high side as the creek is quite close to the existing and proposed road. Creek crossings should not require any special treatment, and the spans would not change dramatically.

Our assessment shows that there are routes available for such a transmission line. VIT has requested that YES provide mapping and digital terrain files to Yukon Energy Corp. to investigate possible alignments from the Silver Trail to the Eagle Gold Property. As well, Stantec Transmission & Distribution has been retained to develop a conceptual design of the preferred transmission route.

### **11.0 Digital Terrain Mapping and Updated Drawings**

Over the course of carrying out the updated design works for the road, as well as completing various surveys along the HCR up to the mine site, all the historic digital files were recoordinated from NAD 27 datum to NAD 83 values. This included the original digital terrain models generated from the orthophoto mapping and original ground truthing and surveys. All current project data is collected in NAD 83 values.

### 12.0 Closing

As Victoria Gold Corp. proceeds with mining permitting and development, a reliable safe road access to the site will become a major consideration. Based on our review of the 1996 work and our recent site inspections we recommend VIT undertake the initial steps as described in Option 1 with the upgrading and improvements to complete a one-lane two-way radio controlled road. As the initial step, clearing the road right of way will have a dramatic effect to improve safety on the road.

We thank Victoria Gold Corp. for providing the opportunity for Yukon Engineering Services to support their efforts on the Eagle Gold Property, and mining in the Yukon. We are open to discussion based on this report. Please feel free to contact the undersigned at any time.

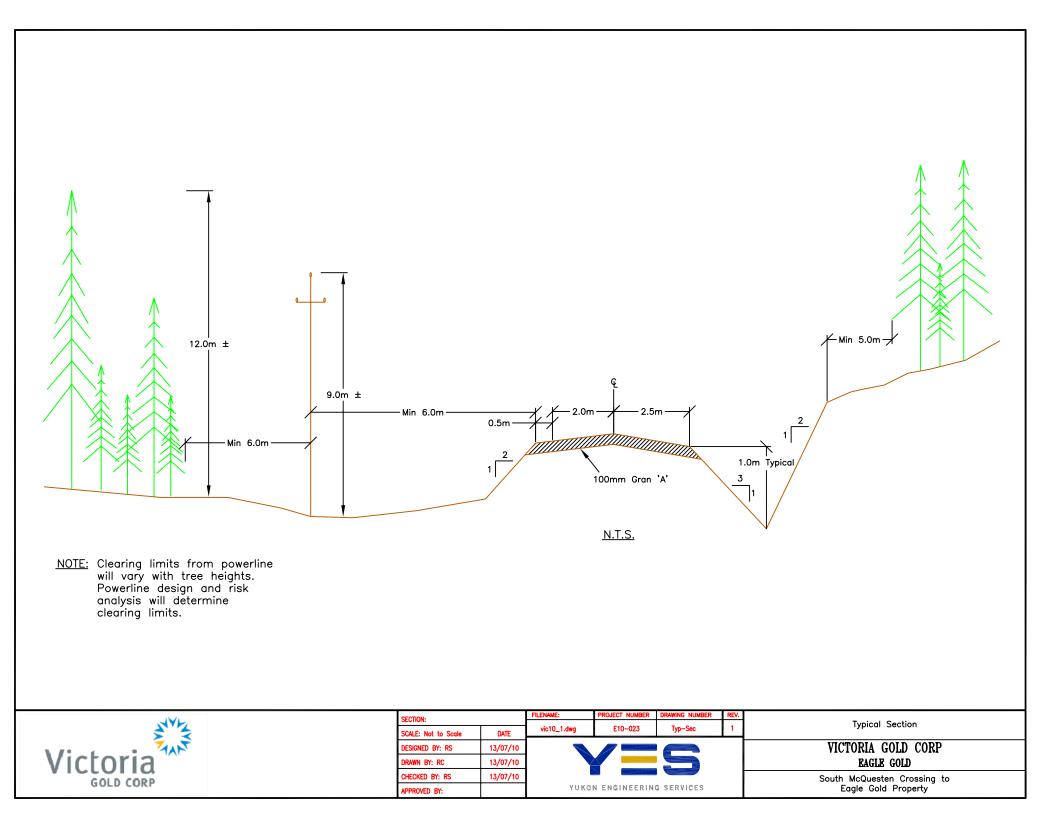
Sincerely,

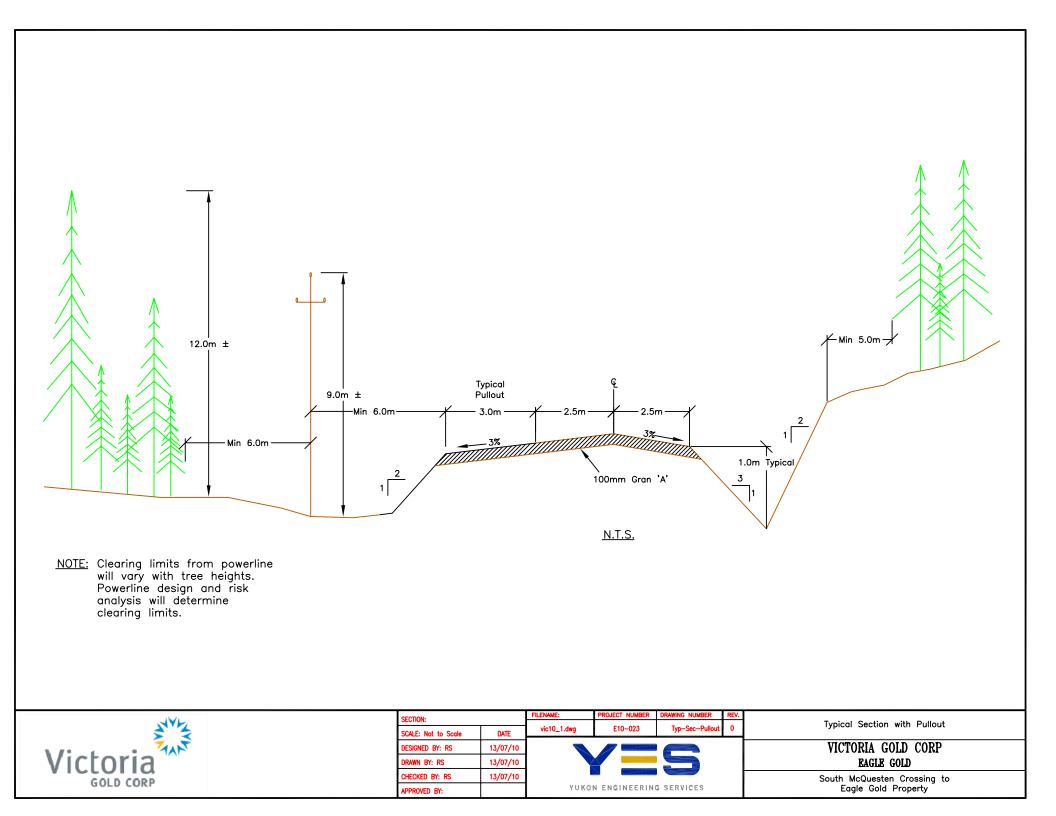
Ray A. Black

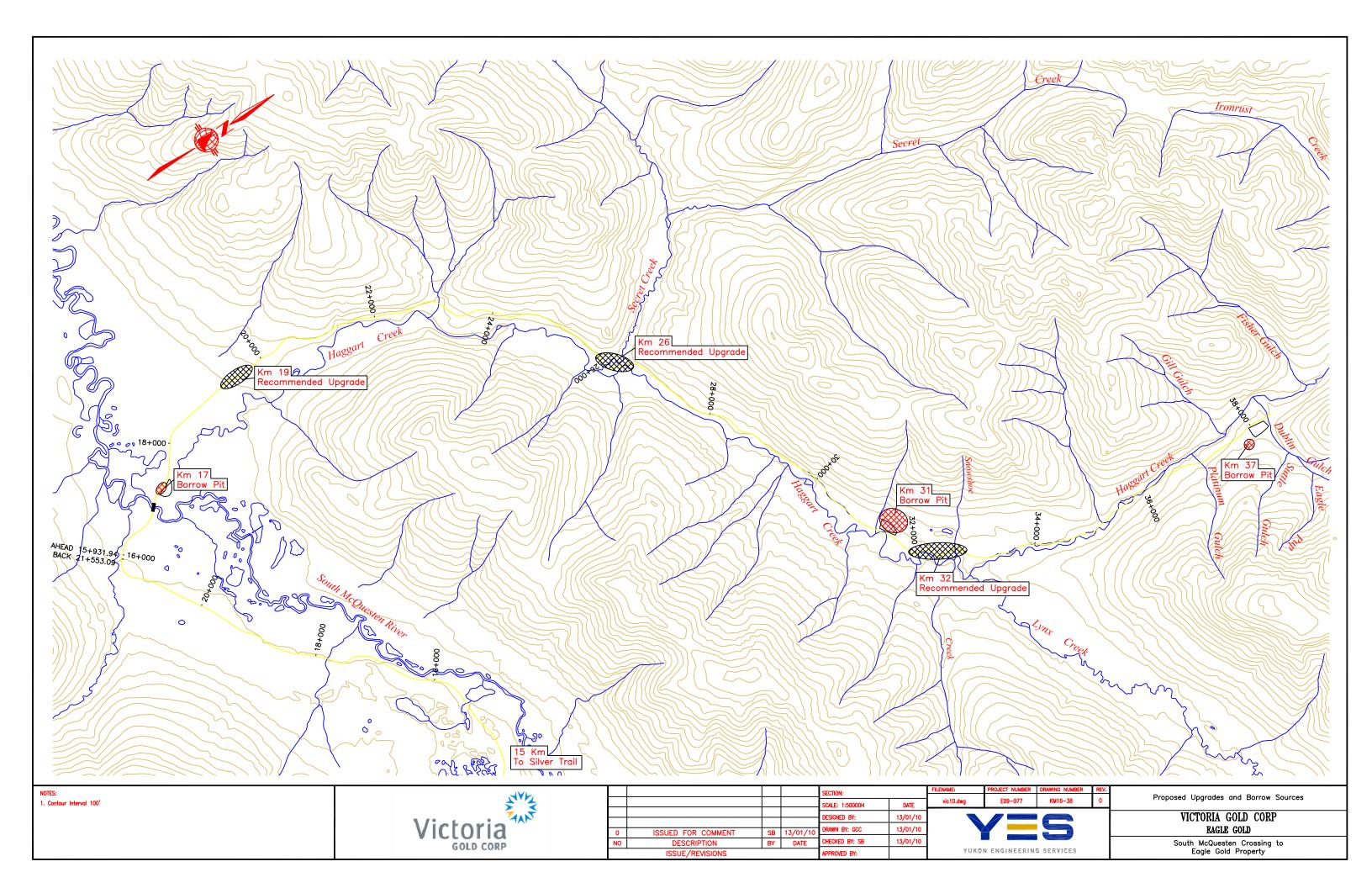
Roy A. Slade, C.S.T. Yukon Engineering Services

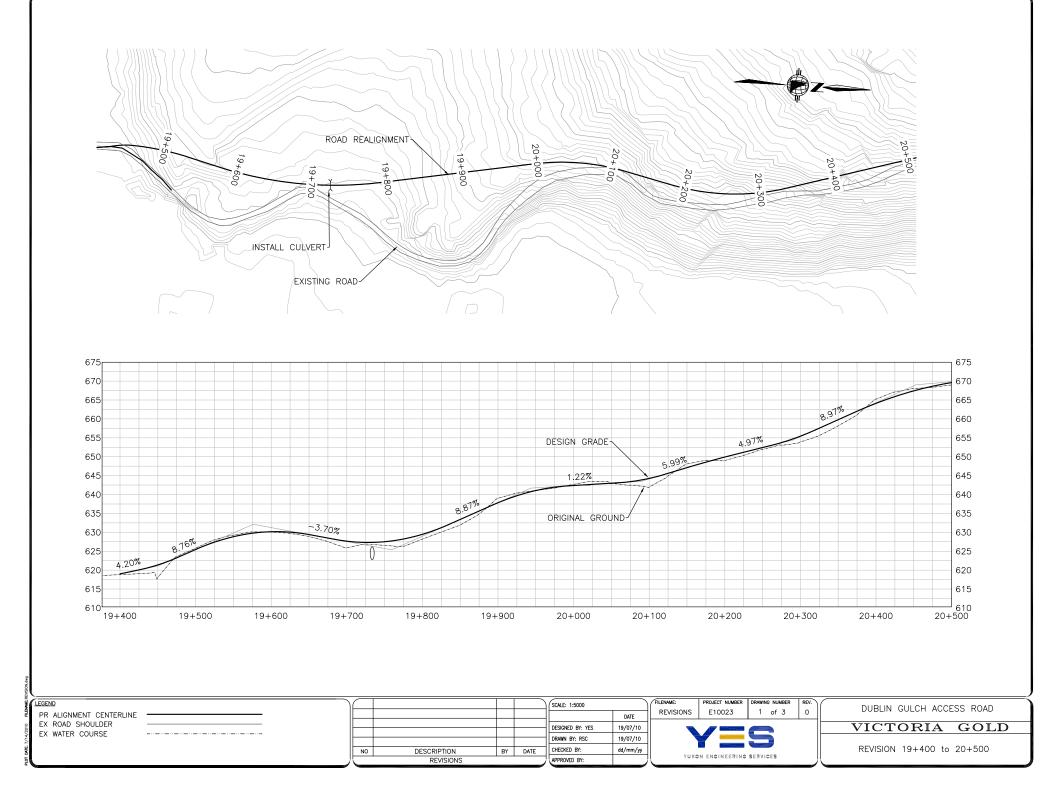
### **APPENDIX A: Drawings**

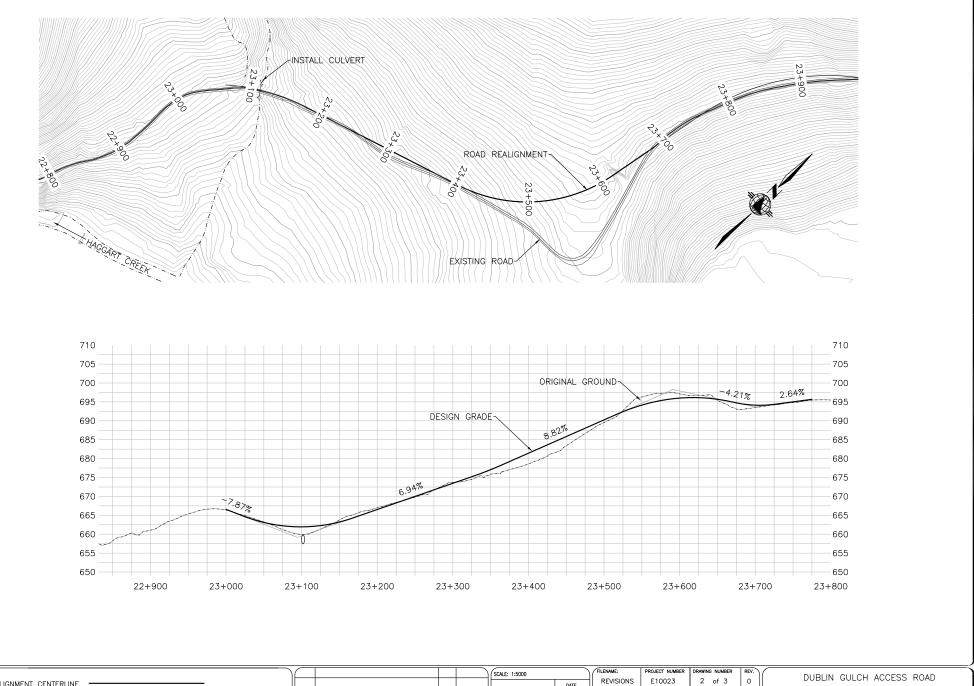
Typical Road Cross Section Typical Road Cross Section with Pullout Revision Areas Overall with Proposed Borrow Revision Areas Plan / Profile Haggart Creek Conceptual Secret Creek Conceptual Preliminary Plan / Profile Drawings







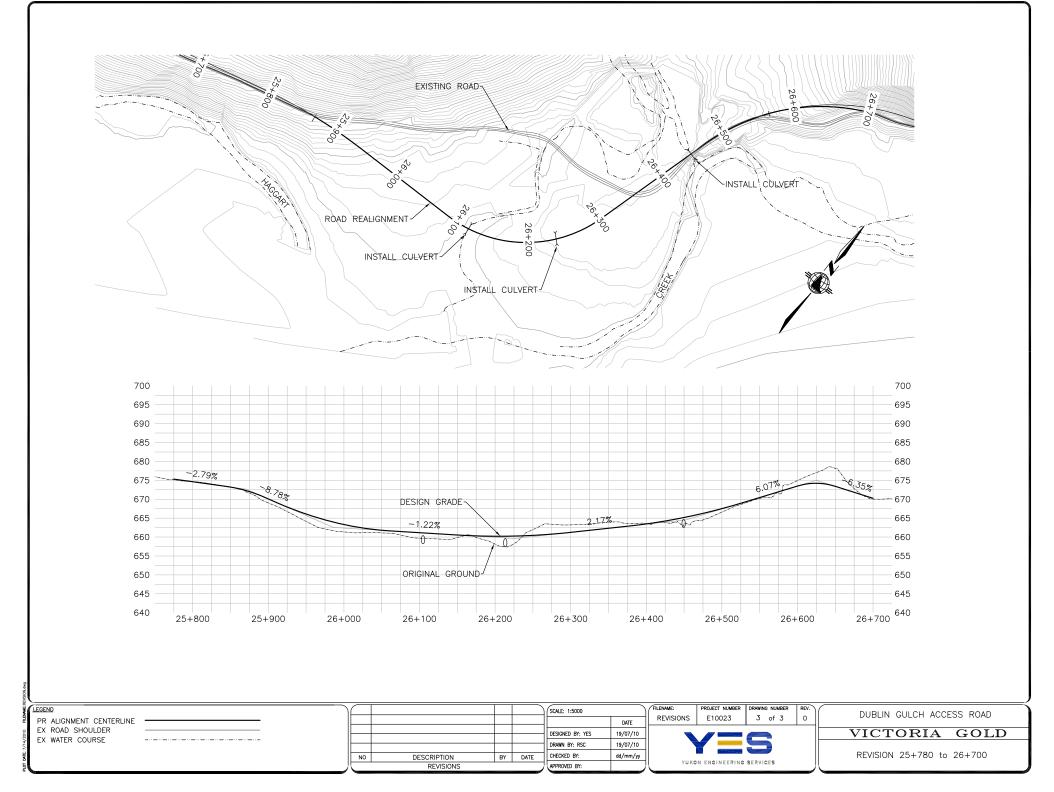


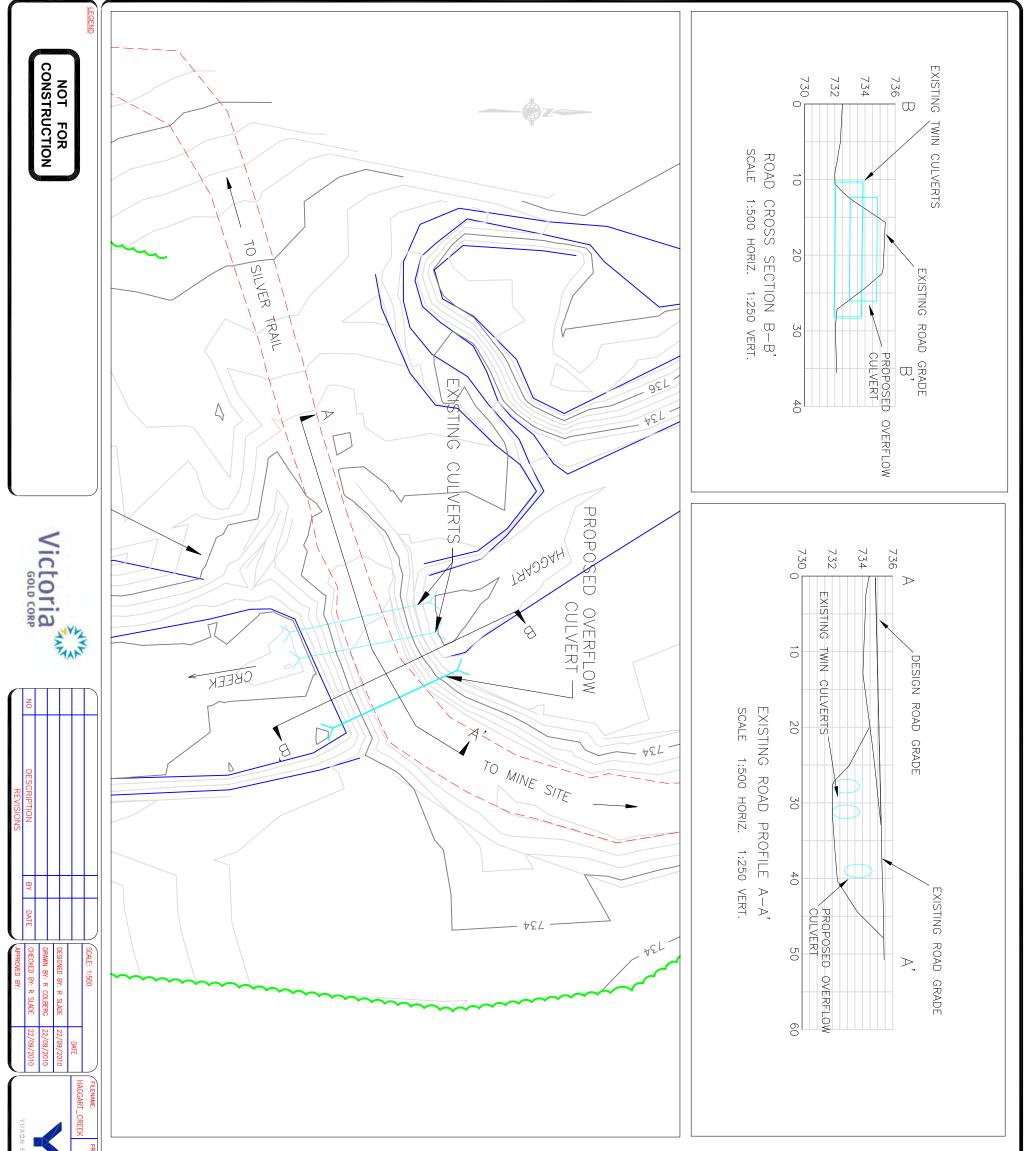


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VICTORIA GOLD

REVISION 23+075 to 23+700





# NOTES:

- PROPOSED CULVERT LOCATION, LENGTH, AND SIZING TO BE DETERMINED BY CONTRIBUTING DRAINAGE AREA CALCULATIONS TO A 1:100 YEAR EVENT.
- RIP RAP GRADUATION FOR SLOPE ARMOURING AND INLET SCOUR PROTECTION SUBJECT TO MAXIMUM STREAM VELOCITY CALCULATIONS AT A 1:100 YEAR EVENT.
   FINAL DESIGN TO BE DETERMINED SUBJECT TO GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS.
- 4. SILT FENCING TO BE EMPLOYED DURING INSTALLATION AS REQUIRED.
- NO MACHINE CLEARING TO BE EMPLOYED WITHIN 30 METRES OF THE WETTED PERIMETER (OHWM).
   DETAILED DESIGNS WILL BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE YUKON, AND SUBMITTED TO THE APPROPRIATE AGENCCIES PRIOR TO CONSTRUCTION.

 $\left( \int \right)$ 

EAGLE GOLD PROJECT

CONCEPTUAL DESIGN

HAGGART CREEK CROSSING

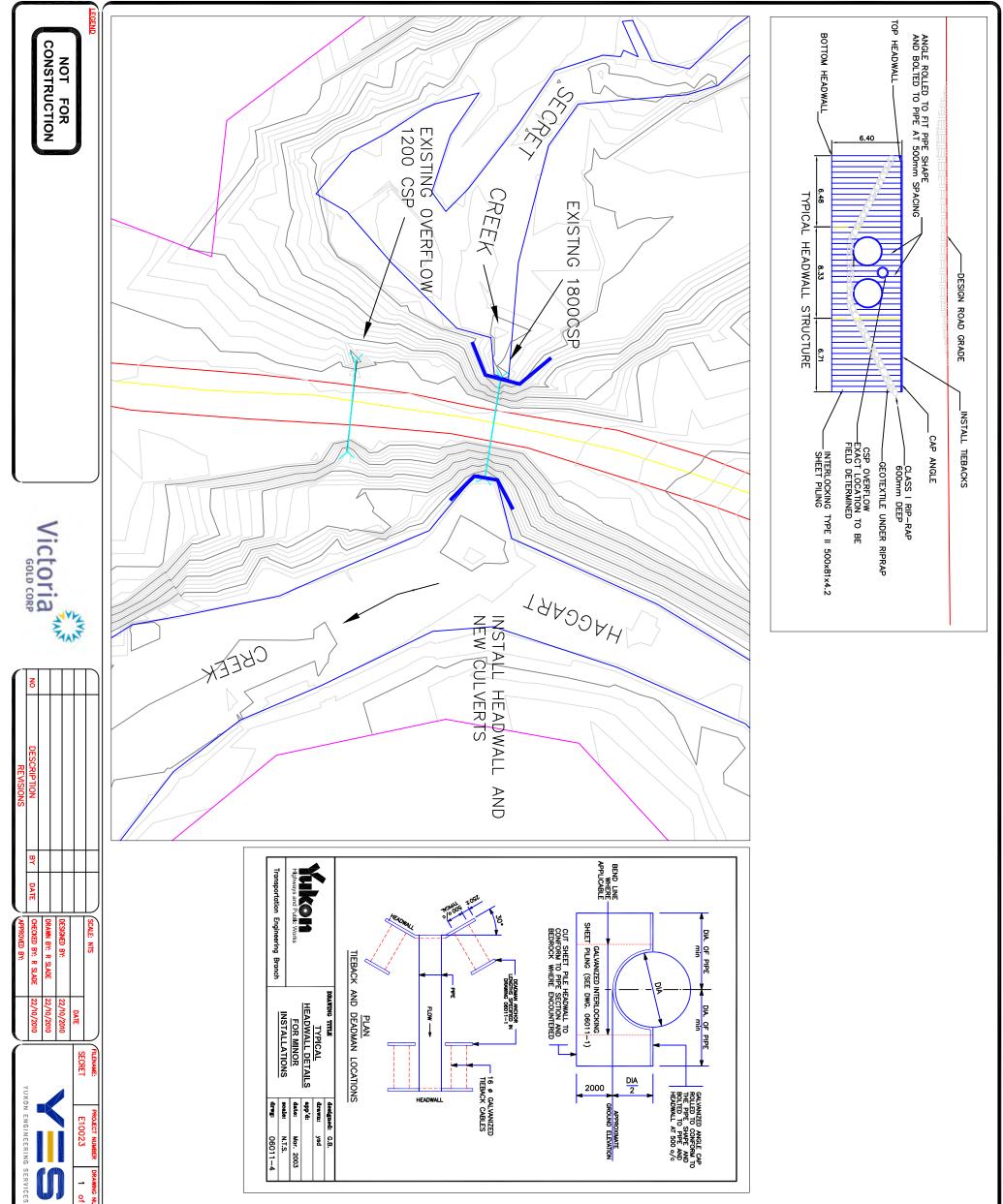
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CONCEPTUAL DESIGN

EAGLE GOLD PROJECT

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SECRET CREEK CROSSING

1. CULVERT SIZING TO BE DETERMINED BY CONTRIBUTING DRAINAGE AREA CALCULATIONS TO A 1:100 YEAR FLOOD EVENT.

NOTES:

- EXACT LOCATION OF PIPE AND HEADWALL STRUCTURES AND EXTENT OF CHANNEL WORKS TO BE DETERMINED UPON COMPLETION OF THE GEOTECHNICAL INVESTIGATION AND DETAILED DESIGN.
- 3. GEOTEXTILE REQUIRED UNDER RIP-RAP

- RIP RAP GRADUATION TO BE CONFIRMED SUBJECT TO MAXIMUM STREAM VELOCITY CALCULATIONS AT A 1:100 YEAR FLOOR EVENT.
   SILT FENCING TO BE EMPLOYED DURING INSTALLATION AS REQUIRED.
   NO MACHINE CLEARING TO BE EMPLOYED MITHIN 30 METRES OF THE WETTED PERIMTER (OHM).
   CREEK CHANNEL WORK: DO NOT DISTURB EXISTING CREEK CHANNEL BEYOND LIMITS REQUIRED FOR CONSTRUCTION OF WORKS. CONSTRUCT STREAMBED AND SUBSLOPES OF CHANNEL TO LINES AND GRADES APPROVED BY CHOINES OF CHANNEL ENGINEER REGISTERED IN THE YUKON, AND SUBMITTED TO THE APPROPRIATE AGENCIES PRIOR TO CONSTRUCTION.

**APPENDIX B: 1996 Detailed Design Report** 

November 14, 1996

Our File: DESBRF-1.DOC

Rescan Engineering Ltd. PO Box 8 - Suite 900 1140 West Pender St. Vancouver, B.C. V6E 4G1

Attention: Mr. Adam Majorkiewicz, P.Eng. Project Manager

Dear Sir:

#### Regarding: Dublin Gulch Access Road - Final Design Brief

Please find enclosed our **Final Design Brief Report and Recommendations** for the Dublin Gulch Access Road Options Project. As requested by Mr. Hans Smit of New Millennium Mining Ltd., the following initial distribution list is being used:

- 3 New Millennium Mining Ltd.Sally Howson, Hans Smit, Stephen Stine
- 2 Hallam, Knight, Piesold Bob Hallam, Susan Blundell
- 1 Rescan Engineering Ltd. Adam Majorkiewicz

As well, digital copies of the master Acad drawing design file is being sent to HKP, as are MSOffice files of this report, EBA's report (Appendix B) ,and appendices.

The design phase has considered socio-economic factors, traditional use, environmental issues, soils conditions, capital cost and O & M Costs. Based on the Benefit - Cost Analysis comparison with respect to the two Option Routes, using MicroBENCOST analysis, economic measures such as Internal Rate of Return (IRR), Net Present Value (NPV), and User Benefits favor the Mount Haldane Option 2 Route. A summary of this analysis appears in Section 4. Based on this analysis and considering the above mentioned factors, we **strongly recommend the Option 2** Alignment, Mount Haldane Route.

Should you have any questions concerning this report or its contents, kindly contact the undersigned.

Yours truly,

Rob Harvey President ENCLOSURES

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## 1.0 Introduction

### **1.1 Project Description**

New Millennium Mining Ltd. (NMML) is a wholly owned subsidiary of First Dynasty Mines Ltd., the previous operators of the Dublin Gulch Project. NMML is in its Final Feasibility and Permitting stage for its Dublin Gulch Heap Leach Gold Mine development north of Mayo, YT.

### **1.2 Existing Access Road Description**

The Dublin Gulch property is located some 45 km up the South McQuesten Road and Haggart Creek placer mining Access Road. The S. McQuesten Road is accessed via the Silver Trail. Both are maintained by the Government of Yukon, though the S. McQuesten Road is in poor repair, and was not built to acceptable public standards. The Silver Trail is an 80 km/hr year-round gravel road, typically 8.5m in width, and has undergone improvements in recent years.

The Haggart Creek placer Access Road requires considerable upgrading for safe, reliable continual use for the public, existing placer miners, and for the Dublin Gulch Mine.

The South McQuesten Road (SMR) requires less upgrading, with widening, improvement of some curves, replacement of existing culverts, ditching, line-of-sight improvements and grade raising through low, wet areas.

As an option to the SMR, (Option 1) NMML is considering re-constructing the Haldane Road, Option 2, which departs from the Silver Trail at Halfway Lakes (some 8 km south of the SMR/Silver Trail intersection), and ascends up the side of Mt. Haldane, then down into the Ross Creek valley to the South McQuesten River valley.

At approximately km 22.9 of the SMR, and km 16.9 of the Haldane alignment (Option 2) either route crosses the South McQuesten River. There is currently a Bailey Bridge at this location, which is maintained by YTG. This structure is in poor repair, and requires either:

- upgrading with a mid-span pier support, replacement of abutments, and extension to outside of the river channel, or:
- replacement with a new 120' (36.6 m) clear span structure, with piling abutments.

Estimates have been secured for both bridge alternatives, and range from \$150,000 for upgrading, to \$220,000 for replacement of the structure. **Bridge construction work will be under a separate contract.** 

### **1.3 Engineering Project Task**

New Millennium Mining Ltd. and Rescan Engineering Ltd., retained Yukon Engineering Services to:

Undertake a pre-design of the two options for an acceptable access road from the Silver Trail to the Dublin Gulch Mine Site:

- Option 1 Utilizing and upgrading the South McQuesten Road for 22.9 km to the South McQuesten River Bridge, then utilizing and upgrading the Haggart Creek Road for 21.9 km.
- Option 2 Constructing along the old Mt. Haldane Route for 16.9 km to the South McQuesten River Bridge, then utilizing and upgrading the Haggart Creek Road for 21.9 km.

The pre-design information is reflected in our Sept. 3, 1996 *Letter Report Recommendation*. This Preliminary Report concluded that Option 2 was the preferred option, from both the NMML perspective, and from environmental as well as First Nations perspectives.

As a result, NMML instructed Yukon Engineering Services to:

- undertake ground surface and drainage inventory data collection, and a control survey for both options, in order to:
- complete a Detailed Design, as well as Detailed cost estimates of both Options, respecting the minimum 60 km/hr design requirements for the project.
- undertake a soils interpretation to develop and complete an informed soils testing program for both options.
- complete Detailed Plans of Option 2, and to:
- develop and provide this *Design Brief Report*, explaining the design issues, investigations and design processes carried out for both options, and carry out Preliminary Class "C" Cost Estimates for both Options.

Our Sept. 3, 1996 Letter Report Recommendation included an Evaluation Matrix which scored Option 2 slightly ahead of Option 1, based principally on Environmental, Socio-economic and Traditional Use considerations. We have re-done the Evaluation Matrix with current information, and include it as Appendix K.

### 2.0 Design Issues and Process

NMML's Dublin Gulch Project is expected to have demands similar to that experienced by Loki Gold / Viceroy's Brewery Creek Project. Project issues which are critical to the design of an access from the Silver Trail include:

- Camp provided at mine site. Turnarounds of personnel expected to occur approximately every two weeks. Personnel will, for the most part travel from Mayo to the mine site by bus.
  - Approximately 8 semi-trailer loads plus bus loads per day, on the average.
  - Approximately 12 mid-size, single axle trucks (1 tonne to 5 tonne) expected per day.
- Approximately 30 passenger car or pickup trucks per day.
- Heavier loads will occur going into the mine site, lighter loads will occur returning. (*This affects different super-elevation on uphill curves for each direction*.)

The mine operating season will be year-around with stripping, mining, ore placement and leaching occurring in the summer months of May through to October, and waste mining and leaching being carried out in the months of November through April.

# 2.1 Design Parameters

The following Design Parameters were selected with respect to this project and its requirements. All parameters fall under the *Transportation Association of Canada* (TAC) design standard of **R**ural Local Undivided 60 (**RLU 60**), and good engineering practice.

Description of Design Parameter	TAC	Achieved
Minimum Radius Horizontal Curves	120 m	(170 m targeted, with 150 m Radius the lowest achieved,
Refer to Plans <u>Appendix A</u>		occurring only once on Haggart Creek Section, Option 1 & Option 2, suggesting a 70 km/hr horizontal
alignment		Design, with one "Reduce Speed" to 60
km/hr sign.)		
Minimum Length of Spiral "A" Value	80 m	Spiral transitions were not used, as they serve little purpose
Refer to Plans <u>Appendix A</u>		on gravel roads. Most YTG C&TS program Designers have ceased using spirals.
Maximum Gradient (Mountainous TAC)	11%	(9.9% Option 1, 10.6%, 10.4% and 9.9% on Option 2,
Refer to Plans <u>Appendix A</u>	11/0	suggesting a 70 km/hr vertical alignment Design, with one more "Reduce Speed" to 60 km/hr sign for Option 1, and three more for Option 2.)
Minimum K Value (Sag)	10	Governed by comfort control. (Lowest Sag K Option 1 =
Refer to Plans <u>Appendix A</u>		20, Option $2 = 11$ , suggesting one more "Reduce Speed" to
		60 km/hr sign for Option 2, and none for Option 1.)
Minimum K Value (Crest)	13.4	Governed by stopping sight distance (85m), a driver's eye
Refer to Plans <u>Appendix A</u>		height of 1.05m (passenger car), and height of object (tail
		light, small animal) of 0.38m. (Lowest Crest K Option 1 =
		21.1, Option $2 = 31.7$ , suggesting 70 km/hr posting.)
Minimum Length of Vertical Curve (Sag)	60 m	Lowest 60 m, as original design speed.
Refer to Plans <u>Appendix A</u>		
Minimum Length of Vertical Curve (Crest)	60 m	Lowest 80 m, to better complement Stopping Sight Distance.
Refer to Plans <u>Appendix A</u>		
	6% / 8%	8% used throughout, except on grades of greater
		than 8% in loaded (towards mine site) direction, then 6% used. This is to lessen side-slipping and spinning out of loaded trucks on steep grades in the winter time.
Road width	9 m	8 metres. This allows for two, 3m traveled lanes, plus,
Refer to Typical Sections <u>Appendix C</u>		two, 1m shoulders. Where fills are greater than 7m in
(Includes 0.5m each side for optional rounding)		height, an additional 0.5m width is added to the width on
State Sharrage (Cred)	211.137	that side to accommodate possible guide rail installation.
Side Slopes (Cut)	3H:1V	3H:1V
Refer to Typical Sections <u>Appendix C</u>	ALL 137	
Back Slopes (Cut)	2H:1V	2H:1V Cuts less than 5m in height.
Refer to Typical Sections <u>Appendix C</u>		1.5H:1V Cuts greater than 5m in height.
Fill Slopes	2H:1V	<ul><li>1H:1V Cuts in competent, rippable schist.</li><li>2H:1V Fills less than 5m in height.</li></ul>
<b>Fill Slopes</b> <i>Refer to Typical Sections<u>Appendix C</u></i>	2 <b>П.</b> 1 V	1.5H:1V Fills greater than 5m in height.
Surfacing Gravel Thickness	N/A	100mm. YTG specification Granular Surfacing "A".
Refer to EBA Soils Report <u>Appendix B</u>	1 N/ / A	roomini. 110 specification Oranulai Surfacilig A.
Subbase Granular Thickness	N/A	Varies from 0mm - 350mm. YTG specification Granular
Refer to EBA Soils Report <u>Appendix B</u>	1 N/ / A	Subbase "E" (Gran "E")
Minimum Angle at Perpendicular Intersection	n 70°	$70^{\circ}$ at Silver Trail, Option 1 and Option 2.
winning Angle at respendicular intersection	170	70 at Shver Hall, Option I allo Option 2.

### 2.2 Other Design Considerations

### 2.2.1 Soils Conditions

EBA Engineering Consultants Ltd. completed a field test-pitting and centerline drilling program, as part of this design process. Their report is included here as Appendix B.

"Depth of cut" is of critical economic importance on the Haggart Creek portion of Option 1, and both the Haldane and Haggart Creek portions of Option 2. This is due to the proximity of schist rock to the surface,. The test pitting program previously mentioned, determined that while refusal (inability to dig further) varied from area to area, that refusal was generally encountered at 3 to 4m vertical from the surface.

As test pitting was completed by a Caterpillar<sup>TM</sup> 225 Excavator, and actual excavation during construction would be done by equipment with upwards of three times the breakout force, factors were used to determine the most likely depth to competent bedrock. A factor of 1.5 was applied to all refusal depths on a pit by pit basis.

From this "boring" file, a sub-surface was developed in the design database. This sub-surface was used as an objective for limit of excavation in all cuts. Where our design cross-section unavoidably intercepted the "rock" sub-surface, "Excavation Rock" was calculated below the intercept, for design, balance, and contract payment purposes.

Typically, on projects of this sort, a shrinkage factor of 15% is expected from excavation to embankment. Due to the volume of plate-like schist encountered, we have estimated shrinkage to be 10%, except where drilling and blasting are required, where we have estimated a swell of 10% from excavation to embankment.

### 2.2.2 Hauling of Embankment

Economy of Design and Construction is achievable without compromising either the Design Standards employed, or the safety of the traveling public. This is done, in the case of an efficient Mass Haul Design, by re-iterative adjustment of the horizontal and (especially) vertical alignments, and by strategically locating side-borrows (ditch widenings) and quarries where possible.

The objective of the subgrade design of the Haggart Creek portion of Option 1, and both the Haldane and Haggart Creek portions of Option 2 was to take advantage of the sidehill terrain as much as possible, in order to allow construction with little hauling of embankment material, and in the case of the SMR portion of Option 1, to shorten the haul lengths.

### 2.2.3 Major Alignment Revisions

There is only one major alignment revision planned for Option 1.

Km 0.5 to km 2.6 of Option 1 on the SMR portion is a major revision. The original road in this area was constructed to access the Elsa Air strip. The South McQuesten Road was then obviously built as an extension of this air strip access, with an abrupt change of direction, from a NE to SSW direction, resulting in a "switch-back" corner.

We have designed a much shorter compound curve descent from the Silver Trail to km 2.6 of the SMR. The revised Kilometre at this point is km 1.3. While this is descending a north-west facing slope, and some solufluction is evident, and in spite of the -9.9% gradient of the hill, we recommend this revision for the 1.3 km savings in length, and as a means to avoid the Trapper's cabin at (old) km 1. (Referred to as "SM#3" in S. Greer's, 1996 South McQuesten Archaeology /Heritage Report.).

Through this revision, except for stripping of organic material, all material excavated will be used in subgrade construction of the adjacent embankment. This will be over-laid with 350mm of Granular "E" and 100mm of Surfacing Granular "A". Special sub-cut treatment will also be applied at the transitions.

Option 2 incorporates many minor alignment revisions (where the design centreline deviates from the existing trail for more than 100m). These are shown clearly on the plans in Appendix A, under separate cover. Critical among these minor revisions, however is a required revision near km 0.7.

Josef Volf and Louise Volf currently hold a "Recreational Long Term Lease", bisected by a 30m road easement for the Haldane Trail. YES has had conversations with Mr. Volf wherein he has requested that should Option 2 be built, NMML divert the road towards the back (east limit) of Squatter Application 63A, as depicted in Appendix A herein.

## 2.2.4 Clearing & Grubbing

An assessment of the tree cover and terrain along both options suggests that there are three types of Clearing operations to be employed on this project. These are reflected in the Cost Estimates (Appendix I).

Clearing & Grubbing	Machine Clearing of trees <150mm in diameter, & Grubbing of organic root mat. Disposal of trees to be by burning, or hauling to an approved disposal site. Grub piles to be placed outside of the embankment area on the low side, and groomed against the slope during the cleanup process. Hand Clearing and salvage of trees >150mm in diameter. (Salvaged product to be bucked into 1200mm lengths and piled along the edges of clearing for later pickup by locals, or along the trail for immediate pickup by locals.) Disposal will require a Land Use Permit and a Fire Permit.
Hand Clearing	Hand Clearing and salvage of trees >150mm in diameter. No grubbing to be done. This applies to areas within 30m of a stream or lake, or in areas of extremely steep sidehill, where grubbing will be carried down with the excavation. (Salvage to be done as in Clearing & Grubbing.)
Merchantable Clearing	Machine and Hand logging of larger diameter trees along the Haldane Road. It is recommended that this be done by a logging subcontractor, and that product be commercially disposed to the contractor's best advantage.

Except in Hand Clearing areas, and for the first 3 km of Option 2, we have included:

- 10m buffer between the design toe of fill and design clearing limits, for storage and grooming of grubbing and stripping, during the cleanup process.
- 4m between the top of cut and design clearing limits, to avoid undermining of roots, and resulting timber falling onto the road.

# 2.2.5 Quarry Sources

Quarry sources required for this project are listed in Appendix F, for both options 1 and 2. EBA Engineering Consultants Ltd. has completed test pitting in all quarries, and finds them good sources for their respective applications. Their report is included as Appendix B.

### 2.2.6 Culverts

A detailed drainage design has been completed for this project. The following parameters were used in the design of culverts:

Minimum diameter	600mm	
Maximum gradient	6%	inlet to outlet
Maximum Camber gradient	10%	centreline to outlet
Culvert Type	CSP	Corrugated Steel Pipe, helical c/w annular
		collars. All parts to be galvanized and constructed as per YTG specification.
Minimum wall thickness	1.6mm	varies with diameter, up to 2mm for 2000mm diameter.

We recommend complete removal of all culverts currently along both Option alignments, as they are in poor repair and do not function well, with the exception of the triple 600mm CSP (c/w grates) at the Beaver Dam Pond near km 10.5 on Option 1. These will be extended to the right (north/outlet side).

- Culverts for Option 2 are shown on the plans in Appendix A.
- A detailed Culvert Summary Report is included for both options in Appendix E.

### 3.0 Construction

The quantities established through our design process suggest that all work can be completed in one season by a medium to large contractor. We estimate a phased schedule approximating:

Feb. 01/97 - Mar 30/97	Bridge Construction
Feb. 15/97 - May 15/97	Clearing, Grubbing and some Subgrade Construction.
May 15/97 - Aug. 31/97	Subgrade, Drainage and Subbase Construction.
Aug. 31/97 - Oct. 15/97	Crushing, Surfacing and Cleanup Operations.

Optionally, initial capital expenditure can be partially deferred away from startup costs by constructing only the S. McQuesten Bridge and the Haggart Creek section fo road in Year 1 of the project, and postponing either the Mt. Haldane Section (Option 2) or SMR Section (Option 1) until Year 2 - 4. (This plan would call for approximately \$150,000 of patching, widening, and grade raise of the SMR section in Year 1.) If selected, this option would require a schedule of:

Feb. 01/97 - Mar. 30/97	Bridge Construction
Feb. 15/97 - April 15/97	Clearing, Grubbing and some Subgrade Construction.
Apr. 15/97 - Aug. 01/97	Subgrade, Drainage and Subbase Construction.
Aug. 01/97 - Sept. 01/97	Crushing, Surfacing and Cleanup Operations.

### **3.1** Construction Camp

We estimate that 40 people will be employed on this project at its peak, including the Contractor's and Engineer's personnel. One 40 person camp will accommodate all people employed on the project, through all phases. Should more accommodation be required for short periods, this will likely be obtained from Half Way Lakes or from Mayo facilities. The most suitable camp location is near km 15.0 of the Option 2 Alignment. This is recommended due to:

- Location some 200m from Ross Creek.
- Good access to potable water.
- Apparently favorable soils for septic percolation.
- Roughly the mid-point of both Options 1 and 2.
- Existing clearings and large level areas.
- Far enough back from Ross Creek and from S. McQuesten River.

We recommend that a cistern well and pump be situated within the camp area itself, as the volume of potable water required is expected to be approximately 7,000 litres per day, or 1,700,000 litres over the duration of the project. Either an open sewage lagoon or closed septic system will be required for the construction camp. Appropriate Land Use Permits must be secured.

### 3.2 Equipment and Fuel Required

Our projections indicate that 1,500,000 litres of fuel will be used in the construction of the Dublin Gulch Access Road. Please refer to Appendix H for a detailed breakdown of anticipated equipment and fuel.

Fuel will be imported to the project by commercial supplier/carriers, in approved highway transport trailer units, and pumped into the project approved On Site Storage Facility. On site storage will consist of one central 30,000 to 50,000 litre Approved Steel Tank.

- This central fuel tank will be situated within an approved fuel containment dike (lined with either an impervious clay material, or a geo-membrane liner, and backfilled with sand or screened gravel) which will have a capacity equal to the capacity of the tank. The tank will not be situated within 100m of a water course.
- Roving fuel and/or service trucks will obtain fuel from the central fuel tank, one to three times daily.
- Fuel cleanup devices such as Sorbal<sup>™</sup> batts and pads, shovels and buckets will be kept at the Central Tank location and in the roving Fuel/Service Trucks.

Appropriate Land Use Permits must be secured.

### 4.0 Construction Cost Estimates

Identical effort has been used for both Options 1 and 2, in calculating quantities, and in developing complete cost comparisons for all items. Plans have been developed for Option 2, and NOT Option 1, only because the outcome of our Letter Report Recommendation favored Option 2. Plans for Option 1 can be developed in a short time (approx. 3 weeks), if required.

The following are our Class "C" Construction Cost Estimates for both Options 1 and 2. For detailed breakdowns in spreadsheet format, please refer to Appendix I.

Option 1	South McQuesten Road and Haggart Creek Trail	\$7,090,380
Option 2	Haldane Road and Haggart Creek Trail	\$7,871,932

### 4.1 Maintenance Cost Estimates

Yearly anticipated maintenance costs are similar for the two options with the higher cost being associated with Option 1.

Option 1	South McQuesten Road and Haggart Creek Trail	\$127,150
Option 2	Haldane Road and Haggart Creek Trail	\$119,380

#### 4.3 Benefit - Cost Analysis

The Benefit - Cost Analysis was done using the MicroBENCOST program. The two alignment options were analyzed over a 10 year period; Option 1 considered as the existing route in the upgraded state with Option 2 considered as the proposed route. The analysis output is summarized below, with additional economic measures contained in Appendix J.

- Total Discounted User Benefits is \$7.195 million.
- Discounted Saving in Maintenance costs for Option 2 is \$256,000.00
- Fuel Consumption Savings of approximately 908,000 liters.
- Net Present Value of \$3.078 million.
- Netted Benefit cost Ratio of 1.4
- Internal Rate of Return of 12.23%

### 5.0 Closing and Recommendations

The information included herein was developed using good and acceptable Engineering and Management practices. Its use is restricted to permitting and Pre-Engineering applications, as it in no way represents Tender Documents or information to be used for Tendering or Contracting without the express written consent of Yukon Engineering Services.

With the detail developed through this design process, and the more accurate cost estimating procedures, we state herein that Option 1 will be less costly to construct. As identified in our Evaluation Matrix (Appendix K), however, Traditional Use, Environmental Issues and Operating costs favor Option 2, with the weighting values applied.

### Our recommendation is to plan to construct Option 2.

In the event that questions arise concerning this Design Brief Report, its content or implications, kindly contact either of the under-signed representatives.

Yours truly, Yukon Engineering Services

Yukon Engineering Services

Rob Harvey President & Project Designer John M. Grainger, P.Eng. Project Engineer

APPENDICES

/CA

# Appendix A:

- Option 2 Plans Under Separate Cover
- Squatter Application #63 and Long Term Lease

# **Appendix B:**

• Geotechnical Assessment of Dublin Gulch Access Road Mt. Haldane Option and South McQuesten Options for First Dynasty Mines, near Mayo, YT Appendix L Letters From MRRC, SRS, & BM

# **Miscellaneous Appendices:**

Appendix D - Clearing Report Summary Appendix E - Culvert Summary Appendix F - Quarry Requirements Summary Appendix G - Overhaul Summary Appendix H - Project Equipment and Fuel Summary Appendix I - Class "C" Cost Estimate Appendix J - Summary Benefits, Costs, and Economic Measures Appendix K - Evaluation Matrix Appendix L - Letters From MRRC, SRS, & BM

**APPENDIX C: 1996 Geotechnical Report** 

GEOTECNICAL REPORT Dublin Gulch Mine Access Road S.McQuesten and Mt.Haldane Options north of Mayo, Yukon

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0201-96-12289

October, 1996



October 7, 1996

Yukon Engineering Services Ltd. Calcite Business Centre Unit 1, 151 Industrial Road Whitehorse, YT Y1A 2V3

EBA File: 0201-96-12289

Attention: Mr. Rob Harvey

Dear Rob:

Subject:

Geotechnical Assessment of Dublin Gulch Mine Access Road Mt. Haldane Option and South McQuesten Road Option for First Dynasty Mines, near Mayo, YT

This report summarizes the recently completed geotechnical assessments of the two alternatives proposed for the upgrading of the access road into First Dynasty's Dublin Gulch Mine north of Mayo, YT.

The first option evaluated was the 16.5 km long Mt. Haldane Lookout Road, starting at approximately km 77 (Halfway Lakes) of the Silver Trail, and ending at about km 23.8 at the South McQuesten River Bridge. One of the main advantages to this route is that it shortens the one-way trip to the mine by about 16 km (as compared to the existing South McQuesten route). One potential construction materials borrow pit at about km 16.5 was also evaluated as part of this study. Several other potential borrow sources near the beginning of the road at the Silver Trail were not examined due to Land Use Permit restrictions.

The second option evaluated was the existing South McQuesten Road from km 0 (at approximately km 87 of the Silver Trail) into the Dublin Gulch property at about km 42. Nine (9) borrow sources at km 7.4, 15.2, 17.5, 22.6, 24.5, 25.3, 26.4, 26.7, and the Secret Creek tailings at km 33 were also examined. Land Use Permit restrictions prevented the evaluation of potential sources between km 10 to 12.

# **1.0 GEOTECHNICAL SITE INVESTIGATION**

# 1.1 South McQuesten Road and South McQuesten River Bridge

Centreline drilling on the South McQuesten Road was completed on August 22 and 26, 1996, during which a total of 27 boreholes were completed. This includes one deep and one shallow borehole drilled at each abutment of the South McQuesten River bridge site on August 25 and 26. A CME 750 drill, using both solid shaft and hollow stem augers, was contracted from Midnight Sun Drilling Co. Ltd. in Whitehorse to complete the drilling program. Soil samples were taken at regular intervals in all boreholes and returned to EBA's Whitehorse laboratory for classification testing. The bridge site geotechnical information was submitted on September 3/96, and is not included herein.



The potential borrow sites identified on the basis of airphoto interpretation were also tested on August 24 and 28, 1996. Three testpits to about 4.5 m depth were advanced at each prospective site, access permitting. Soil samples were taken at regular intervals in all testpits and returned to EBA's Whitehorse laboratory for classification testing.

The locations of all boreholes and testpits are shown on Figure 1, following. A senior technologist from EBA's Whitehorse Office supervised the drilling and testpitting program. All borehole and testpit logs, including laboratory test data, completed for the South McQuesten Road are included in Appendix A.

# 1.2 Mt. Haldane Lookout Road

A total of 12 testpits were excavated along a revised centreline of the Mt. Haldane Lookout Road on August 23 and 24, 1996. In addition, three (3) testpits were also excavated in one proposed borrow area at about km 16.5, near the north junction with the South McQuesten Road. Soil samples were taken at regular intervals in all testpits and returned to EBA's Whitehorse laboratory for classification testing. The locations of all testpits is shown on Figure 2, following.

A senior technologist from EBA's Whitehorse Office supervised the drilling and testpitting program. All testpit logs and laboratory test data completed for the Mt. Haldane Lookout Road are included in Appendix B.

# 2.0 CONSTRUCTION RECOMMENDATIONS

# 2.1 South McQuesten Road Option

# 2.1.1 Road Structure Design

Soil conditions along the South McQuesten Road range from cuts through schist and silty glacial till, to ice-rich permafrost. The section from about km 26 to the Mine property requires the most effort with respect to subgrade preparation and surfacing. The first 26 km (approx.) from the Silver Trail has been well used, and is maintained by the Yukon Government.

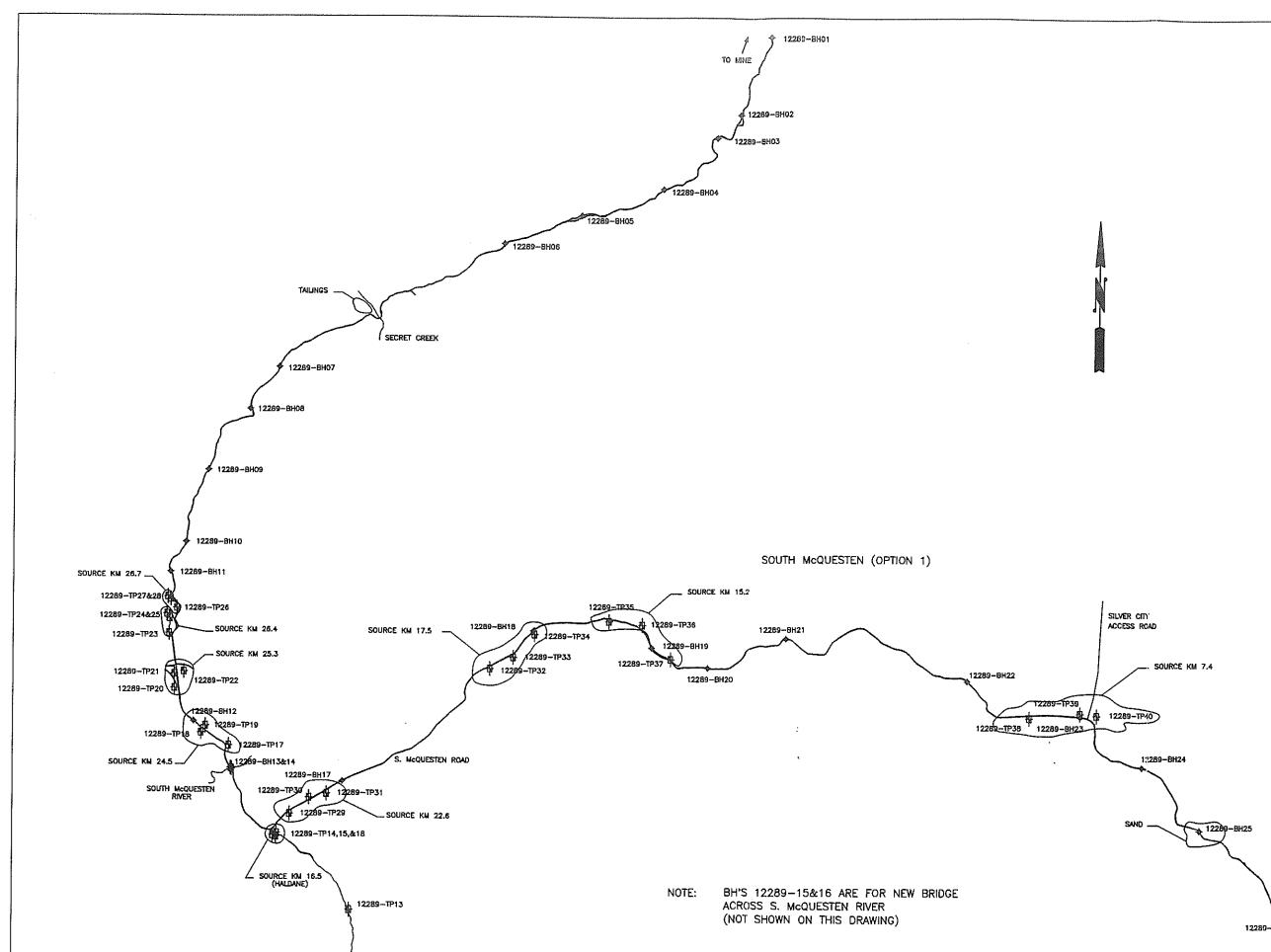
For the purposes of road structure design, it has been assumed that 20 trucks per day will use the reconstructed access road. The following road structure applies:

### Table 2.1.1 Recommended Road Structure Design South McQuesten Road Option

Approximate km Range	Minimum Granular Structure
0 - 26	100 mm crushed gravel surface (Granular A)
	over
	250 mm pit run granular base (Granular E)
26 - 46	100 mm crushed gravel surface (Granular A)
	over
	350 mm pit run granular base (Granular E)

Note: In all cases the road subgrade and all imported materials must be compacted to at least 98% of Standard Proctor maximum dry density (ASTM D698). Granular A and Granular E refer to Yukon Government Highways specifications.





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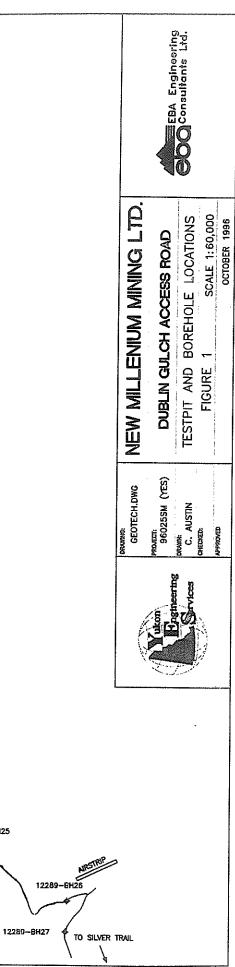
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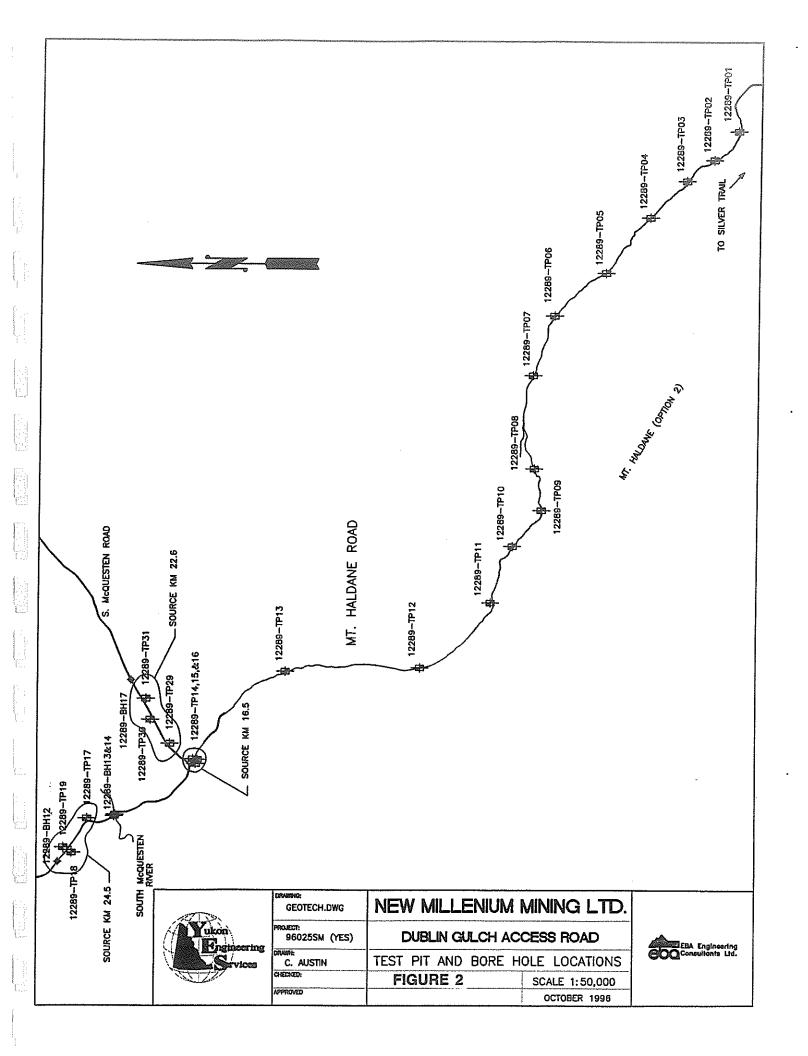
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### 2.1.3 Borrow Source Evaluation

The following Table summarizes the borrow materials evaluated along the South McQuesten Road, and recommendations for their use:

km Post	Soil/Permafrost Description	Recommendations
7.4	GRAVEL AND SAND	Gravel in west end of deposit, sand to the east.
(TP's 38/39/40)	to SAND	Keep pit development on the west end.
15.2	SILTY SAND over GRAVEL	Not recommended due to thick silty sand
(TP's 35/36/37)	AND SAND	overburden (up to 1.8 m)
17.5	SAND AND GRAVEL	Recommended for development - up to 0.8 m
(TP's 32/33/34)		overburden may have to be stripped
22.6	SANDY GRAVEL	Recommended for development - up to 0.5 m
(TP's 29/30/31)		silty sand overburden
24.5	SAND AND SILT	Not recommended due to high water table and
(TP's 17/18/19)		permafrost - small deposit of granular at N end
25.3	GRAVEL AND SAND	Recommended but up to 1.2 m of sand and silt
(TP's 20/21/22)		overburden may have to be stripped
26.4	SILT-Permafrost	Not recommended
(TP's 23/24/25)		
26.7	GRAVEL AND SAND	In existing borrow pit - small deposit of
(TP's 26/27/28)		granular materials remain near TP 26
33.0	Secret Creek Tailings	Suitable for subgrade construction. The high
		concentration of soft schist fragments will
		result in particle breakdown when used for
		surfacing. This infers that road will be
		"greasy" when wet and "dusty" when dry.
ļ		(see Trial Crush and L.A. Abrasion test results after the Site Plan in Appendix A)
Minesite	Tailings	Not sampled or tested, but probably similar to
		Secret Creek Tailings

# Table 2.1.3 Summary of Prospective Borrow Sources South McQuesten Road Option

### 2.2 <u>Mt. Haldane Lookout Road Option</u>

### 2.2.1 Road Structure Design

Soil conditions along the Mt. Haldane Lookout Road range from granular cuts and fills through permafrost fens for the first three kilometres or so, and then changing to sidehill cuts through thin colluvium over schist bedrock. Nearer to the junction with the South McQuesten Road, soil conditions change to granular materials with ice-poor permafrost on the north-west facing section (km 13 to 16), and unfrozen granular materials at the junction.



For the purposes of road structure design, it has been assumed that 20 trucks per day will use the reconstructed access road. The following road structure applies:

Recommended	able 2.2.1 Road Structure Design Lookout Road Option
Approximate km Range	Minimum Granular Structure
0 - 3	100 mm crushed gravel surface (Granular A)
	over
	250 mm pit run granular base (Granular E)
3 - 13	100 mm crushed gravel surface (Granular A)
	over
	compacted schist bedrock subgrade
13 - 16.5	100 mm crushed gravel surface (Granular A)
	over
	350 mm pit run granular base (Granular E)

Note: In all cases the road subgrade and all imported materials must be compacted to at least 98% of Standard Proctor maximum dry density (ASTM D698). Granular A and Granular E refer to Yukon Government Highways specifications.

2.2.2 Borrow Source Evaluation

The following Table summarizes the one borrow material source evaluated along the Mt. Haldane Lookout Road, and presents general recommendations for it's use:

### Table 2.2.2 Summary of Prospective Borrow Sources Mt. Haldane Lookout Road Option

km Post	Soil/Permafrost Description	Recommendations
16.5	SANDY GRAVEL	Recommended for use - up to 0.8 m silty
(TP's 14/15/16)		overburden to be stripped

There will be significant side hill cuts during construction of this route -- all the schist materials excavated will be acceptable for road fill. Vibratory "pad foot" or "grid" type packers will be required to break up the larger rock fragments into acceptable fill materials.

# 3.0 GEOTEXTILE AND MINIMUM FILL THICKNESS REQUIREMENTS

The placement of geotextile (Trevira Spunbond 018/200, or approved alternate) is recommended in all areas of new construction where permafrost or wet subgrade conditions are encountered. In these cases, the organics should not be stripped, and a minimum fill thickness of 1.5 m applies, plus surfacing with Granular A. The fill should be tapered at the transition into the existing road -- vertical cuts at transitions must be avoided in all cases.



# 4.0 DRAINAGE

Drainage conditions throughout the majority of the South McQuesten Road are poor at the present time. The soft conditions encountered from poor drainage control are further aggravated by thawing permafrost at several locations. This drainage must be improved by ditching and the installation of culverts, at as many locations as possible.

The Mt. Haldane Lookout Road was observed to contain a few "washouts". Although drainage problems on this side hill cut are not as severe as on the South McQuesten Road, proper ditching and new culvert installations will be required.

Glaciation will also be a problem in several locations -- all culverts should be provided with a means of thawing ice, as appropriate.

# 5.0 CONSTRUCTION INSPECTION

It is strongly recommended that all geotechnical aspects of construction be monitored by a qualified geotechnical engineer or his/her representative. The design information presented in this report is of a general nature, and there will be instances develop where field decisions are required for the purposes of adding or deleting geotextile, and reducing or increasing the granular fill thicknesses to correspond to existing subgrade conditions.

I trust this report satisfies your design requirements at this time. Please contact the undersigned if you require clarification of any item, or additional information.

Yours truly, EBA Engineering Consultants Ltd. OFESSION WGINE J. Richard Trimble, P.Eng. Project Director, Yukon Region

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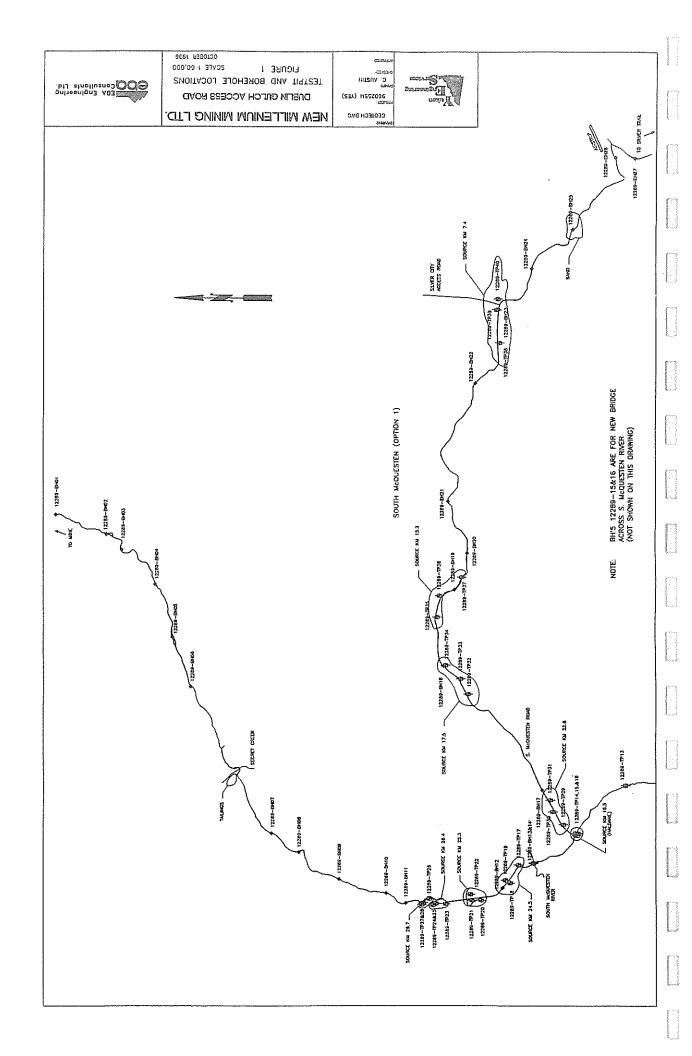


# APPENDIX A

South McQuesten Road Option

Centreline Drilling Borehole Logs and Borrow Source Testpit Logs (including laboratory test data)





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<b>4.</b> 0 - - - -		4					■ 14	4.0
- - 5.0						ND OF BOREHOLE @ 4.5 m — possible water table at 3.5 m — some slough	- 16	6.0
]	EB	A	Eng	ine	eri	ng Consultants Ltd.	LOGGED BY: JSB COMPLETION DEPTH: 4.5 m	
	5		C			horse. Yukon	REVIEWED BY: JRT COMPLETE: 96/08/22 Fig. No: Page 1 of	<u> </u>
5/10/04 D7	3444	(YUKON	-5)	111	يداران	HULDE, LUNVII	Fig. No: Page 1 of	1

				E ACC		rd DPTION	CLIENT: YUKON EN					*****************		*****		· · · · · · · · · · · · · · · · · · ·	<u>289–B</u> 06–1228	
			UKON	·			UTM ZONE: 8 N70						ELEV					
AMP				GR	AØ	NO RECOVE			75 mr		0N		RELE			Πο	ISTURBED	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	<u> </u>		SOIL SYMBOL		SOIL CRIPTION		STA 20	NDARD 40	PENETI 60 I.C.	Ration 28 80 Liqu.		20 20 20 20 20	PERCEI 40 PERCE 40 RCENT 5 40 PERCE	NT GRAV 60 NT SAN 60 SILT OR 60 NT CLA	/EL 80 D 80 FINES & 80 Y ♦	DEPTH(ft)
0.0					<u> </u>	SAND – silty, some	gravel, trace of		10	20	30	40		20	40	<u>60</u>	08	= 0.0
		1				organics; fine sand; fine gr	e to medium grained ained, angular grave pact; olive brown	l; 		0								2.0
1.0						— no organics	below 0.8 m											
		2							0									
.0						— colour chang	es to dark grey											6.0 
0		3								0								10.0
						– becomes gro	velly below 3.3 m											12.0
O		4								ø								14.0
0						END OF BOREHOLE @ — no water — little slough												16.0
ł	EE	SA	Eng			ing Consulta ehorse, Yukon	ants Ltd.	LOGGED E REVIEWED Fig. No:								)EPTH: /08/:	4.5 m 22 Page 1	of 1

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NEAR		· · · · · · · · · · · · · · · · · · ·					M ZONE: 8 N7093		4541	126	.62		1	ELEV						
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DEPTH(m)	Σ	Ž	SPT(N)		SYMBOL	l SC	)IL									• PER	CENT S	SAND @	)	12
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	$\left[ \right]$				0				10	)	20	, 30	40		20	\$PER 4	Cent ( n <i>i</i>	CLAY 🔷 60	80	
0.0						SAND AND GRAVEL - sor	ne silt;													E 0.0
+						uniform sand and	gravel; angulor;													E
ŀ						loose; damp; light	t greyish brown													Ē
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						fine grained sand	soft: moist:													
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- 3.0					┝	END OF BOREHOLE @ 3.0	m			·										E 10.0
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			_			horse, Yukon	E	Fig. No:		5111						.L. 3	0/00	the second second	age 1	of 1
95/10/04 07:	36祖(	YUNCH	-5)									•••••							- 94 1	<u> </u>

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			YUK			- 110		·		*******	NE: 8 N70									VATIC		<i>i.</i> uz	01-3	20-1	2203	
AMP					GR/	40			RECOVER		STANDARD				n SP					BAR		 ]	Πn	ISTUR	RED	
DEPTH(m)	SAMPLE TYPE	2			nsc	SOIL SYMBOL			( N	SOIL RIPT						D PEI	NETRA 60			2	© PE 0 0 0 ERCE 0	ERCEN 40 ERCEN 40 ENT SI 40 ERCED	T GRAN 60 IT SAN 60 LT OR 60	/EL == 80 10 @ 80 FINES 80	)	DEPTH(ft)
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							SAND -	fine to gravel; browni	mediur compa sh grey	n graine ct; damp	m sand; d angular o to moist; ne silt belo		~~~~~		······································											2.0
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)								clayey, moist, y		f sand, :	soft,								***							- 12.0
		4					FND OF	- BOREH	<u>01 F @</u>	4.5 m					ø											- 14.0
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Summermum		-		e acc		and the second	CLIENT: YUKON ENG								eori	ehol	E N(	): 1	228	<u> 89–8</u>	H08
5				·	RD (	DPTION	DRILL: CME 75 C/W										****	020	1-96	5-1228	19
NEAR SAMP				GR/	. <u></u>	NO RECOVER	UTM ZONE: 8 N709			5008 5 mn			Г	 ∏∏ Cr		ATIO			1.00		1070-000-000-00-00-00-00-00-00-00-00-00-0
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Ê	λFE	2			SYMBOL		SOIL			20	4(	0	60	80		- 20	) 4 O PEF	Û.	60	80	-  -
DEPTH(m)	Ц	님	SPT(N)	nsc	SYN										<u> </u>	20	) 4	0	60	80	E -
囚	AMP	SAMPLE NO	S		SOIL	DESC	RIPTION		۶U	STIC		M.C.		LIQUI		20	4	0	60	NES & 80	DEPTH(f()
0.0			ļ	ļ					r	10	20	)	30	40	ĺ	20	♦PEF 4	icent 0	CLAY 60	© 80	
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-					E	ND OF BOREHOLE @ 4 — no water	.5 m														
-						- little slough															
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	קי	A	<u> </u>			ng Conquito	nta Ita	LOGGED	BY:	JSB	÷	<u>; ;</u>		:		HPLE	<u>: i</u> Tion	DEP	TH: 4	<u>: :  </u> .5 m	:
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6/10/04 07:	<u> Kam</u>	(YUKOX	i-5)	W.	uite	<u>horse, Yukon</u>		Fig. No:			·····		-	······					1	Page 1	of 1

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	*****		YUKO		UN PL	OPTION	DRILL: CME 75 C/V UTM ZONE: 8 N70								UJEC VATIO		): 02	201-	96-1	2269	
AMPL					ZAØ	NO RECOVER	- Instanting of the second				SPOO	18.1	m		L BAR				ISTUR	orn	
		Γ	1		BOL		SOIL		20			PENETF 60		8	2	■ P( 0 ● P	40 PERCE 40	IT GRA 60 NT SAI 60	©8 03 ©8 08		DEPTH(ft)
	SAMPI	SAMF	S.		SOILS	DESC	RIPTION		ilast I		{	.C. ≥		QUID -1	2	<u>0</u> ∳F	40 PERCE	60 NT CL/	¥∳		DEPT
.0	_				_	   SAND — gravelly, son	ne silt well araded		1(	<u>)</u>	20	30	40		2	0	40	60	08		0.0
		1				sand; fine to	medium grained loose to compact;			0											
										****						******					- 2.0
0		2								0											4.0
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						length of auge	le schist below ganics throughout r, from original												1		- 12.0
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						END OF BOREHOLE @ — no water — little slough	4.Ə M							*****						<u> </u>	- 16.0
F	ĽΒ	SA	En	gin	eer	ing Consulta	nts Ltd	LOGGED I											: 4.5	m	
-		-				ehorse. Yukon		REVIEWED Fig. No:	BY:	JRI				<u> </u>	OMPL	ETE.	: 96	/08/			
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					RD (		5 C/W SOLD S		-							020	1-96	-122	89
5			YUKOI				3 N7089192.67						ELEV			(****			
SAMP		11P T	e 1	GR/	18 T	NO RECOVERY STAN	dard pen. 🗧			n SPC		RATION 5	RREL			لأناسا		TURBEI	)
	ЪС Д	9			d	0.011			20	40				20	4	1Û	GRAVEL 60	80	
DEPTH(m)		SAMPLE NO	SPT(N)	S	SYMBOL	SOIL								20	© PEF		SAND ( 60	© 80	DEPTH(ft)
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	SAI	5			SolL		, V	F			<b>.</b>		-	20			60 CLAY∢	80 >	
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Ĺ						uniform, angular sand; fine	., to												E
-						medium grained, elongated o	gravel;												
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DUBLIN GULCH MINE ACCI km 20.3, S. MCQUESTEN		CLIENT: YUKON ENGIN	and the second				WARDEN BOARD AND AND AND AND AND AND AND AND AND AN	REHOLE	COLOR MANAGEMENT		<u>39-BH</u>	
NEAR MAYO, YUKON	KU UF NUN	DRILL: CME 75 C/W S UTM ZONE: 8 N7088	and the second se					UJEUT I EVATION:		<u>(01-90</u>	-12289	
SAMPLE TYPE	B Z NO RECOVER	and an end of the second se			SPOON	1				וצום 🎵	TURBED	
DEPTH(m) SAMPLE TYPE SAMPLE NO SPT(N) USC	201	SOIL CRIPTION			DARD PE 40 M.C	ENETRA 60		20 20 20 ▲ PER 20	PERCEN 40 PERCE 40 ICENT S 40	IT GRAVEL 60 NT SAND « 60 ILT OR FIN	80 80 80 80 VES A 80	DEPTH(ft)
0.0	SAND AND GRAVEL -	trace to some silt.		10	20	30	40		40	60	80	0.0
- 1	well graded s sub—rounded	and; well graded gravel; loose to noist; greyish brown		\$								- 2.0
- 1.0	— trace of silt I	below 1.0 m										- 4.0
- 2.0												- 6.0
3	— becomes silly — colour change — less gravel be	s to grey below 2.7 n	n	0.								- 8.0
- 3.0	END OF BOREHOLE @ — no woter — some slough	3.0 m										- 10.0
- 4.0												• 12.0
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	ering Consulta uitehorse. Yukon	unts Ltu.	REVIEWED   Fig. No:		T			OMPLET		/08/22		
6/10/04 07:41AU (YURON-5)	IIIGHUIDE, IURUH		114, INU.								Page 1 c	<u>×1</u>

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NEAR		·····					8 N7086317.74					6-11		EVAT						
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$\sim$	Ы				님	0.077			1 STAI 20	NUARL	PENE 6(	TRATION	0		20	40	F GRAV 60	80		
μĘ	K		$\widehat{z}$	0	SYMBOL	SOIL									● P 20	ERCEN 40	IT SAN 60			(£)
DEPTH(m)	PLE	SAMPLE NO	SPT(N)	nsc		ΠΕΩΟΙΟΦΙΑ	<b>1 1 1</b>		~~~~						PERCE			80 FINES 2		DEPTH(ft)
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- 0.0						SAND AND GRAVEL - some silt,	well graded,												Ē	0.0
ŀ						compact, moist, brown													Ē	
ľ		4				SAND — silty; fine grained sand;	soft:												E	-
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						sand; fine to medium grain	ned												F	
						gravel; loose; saturated; m														
-		3				greyish brown		6	,										Ē	
- 3,0					╞	END OF BOREHOLE @ 3.0 m													Ē	
-						<ul> <li>possible water table at 2.0</li> </ul>	ъm I												-	10.0
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				E ACC		rd Esten R. Bridge	CLIENT: YUKON ENG								*****			<u>89–B</u>	and the second
IEAR N			· · · · · · · · · · · · · · · · · · ·		របបួប	ESTEN K. DRIDGE	DRILL: CME 75 C/V UTM ZONE: 8 N70					<u> </u>		EVATIO		): 020	21-90	6-1228	5
AMPL				GR/	\8	NO RECOVER					SP00					Γ		STURBED	
(m)		SAMPLE NO	SPT(N)	nsc	SOIL SYMBOL		SOIL CRIPTION	<u> </u>		STAN 20		ENETRV 60	ATION IN 100		© PE 20	RCENT 40 ERCEN 40 NT SIL 40	GRAVE 60 T Sand 60 T OR F 60	1 80 80 80 FINES ▲ 80	DEPTH(ft)
0.0					ļ					10	20	30	40		10 10	ERCEN	t clay 60	\$ 80	
		1				SAND AND GRAVEL (F silt; well grade sub-rounded olive brown	ILL) — trace to son ed sand; well gradec gravel; compact; m	1	0										
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		2				– becomes moi	st to wet below 1.2	m	0										
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5	******				ICQU	esten R. Bridge	DRILL: CME 75 C/V						P	ROJEC	T NO	0201	-96-12	2289
š			YUKO				UTM ZONE: 8 N70							EVAT				
SAM	PLE		Έ Τ	GR/	1 /B	NO RECOVER	Y 🔀 STANDARD I	PEN.			SPOON			el bai			] DISTURI	BED
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DEPTH(m)	Ž		E	0	SYMBOL		SOIL								@ PE	RCENT	SAND @	
	Ц	J-L	SPT(N)	nsc	\∑					_							60 80 Or Fines .	T T
	SAMPLE TYPE	SAMPLE NO			Soll	DESC	RIPTION		PLASTI L	с 	0.H	•	liquid 		20	40	60 80	
0.0				ļ	<u> </u>				1	)	20	30	40		9PE 20	rcent 40	CLAY 🐟 50 80	
- 0.0						SAND (FILL) — gravel	y, some silt; coars	e										= 0.0
ŀ						grained sub-ro	fine to medium ounded gravel; moi:											E
Ľ		1				olive	bunded gravel, mole	э <b>с</b> ,										Ē
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- 1.0											ļļ			ļ.,				Ē
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Ľ				ĺ	ľ	SAND — silty, trace of	aravel, trace of											
ŀ						organics; fine g	rained; moist; grey											
╞				ĺ		brown												E 6.0
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1	7R	Α.	гuб			ng Consulta	nts Ltd.	REVIEWE						OMPL	ETE:	DEP1 36/08	n: 3.0 n /22	<u>ו</u>
6/11/08 08	1444	NUX094	-5)	W]	nite	<u>horse, Yukon</u>		Fig. No:		·								1 of 1
-1 - 1 - 1 - 00		1-21-MIT	<b>~</b> /															

IEAR WRYDY, YURCM       UTM 2016: S 10/08/0578.51 E449789.76       IEAR WRYD, WICM       IEAR WRYD, WICM         SAMPLE TIPE       Glava       I to actuberr       Statuouxo pa.       Fram SPace Purpletions       BFPC201600: Control       BFPC201600: Contro       BFPC201600: Contro	DUBLI				·		······	CLIENT: YUKON ENG		
SMPLE TYPE         Market Streams         Image: Stre	\$					ICQU	ESTEN R. BRIDGE			
End         Solid         Solid         Bit Media Presentation						18				
Ex         Solution         DESCRIPTION         Prome         Duescience         Duescience <thduescience< th="">         Duescience</thduescience<>						1			STANDARD PENETRATION DEPERCENT GRAVEL	
Ex         Solution         DESCRIPTION         Prome         Duescience         Duescience <thduescience< th="">         Duescience</thduescience<>	Ê	F	8			В		SUIL		⇒ <sup>⊥</sup>
Ex         Solution         DESCRIPTION         Prome         Duescience         Duescience <thduescience< th="">         Duescience</thduescience<>	TH(	Щ	닐	T(N)	SC	SYW			20 40 60 80 20 40 60 80	Ēlr
0.0         1         5AND - sily, trace of cloy; fine grained uniform sand; soft; set; greyish brown         0         20         60         61         50           2.2         19         - color change to grey balow 0.5 m - weter table of 0.7 m sond; fine to medium grained gravet; losse; suturdet; grey         0         <	DEP	Å	AMF	R I			DESC	RIPTION	PLASTIC M.C. LIQUID 20 40 60 80	
0.00         1         SAND - silly, trace of cloy, fine grained uniform sand, soft, wel; greysin         0.00 <t< td=""><td></td><td>5</td><td>10</td><td></td><td></td><td>Š</td><td></td><td></td><td></td><td>-</td></t<>		5	10			Š				-
20       22       19       brown       60       60         38       23       7       sond: fine to medium grained gravely balow 0.5 m       60       60         50       4       8       gravel; loss: solutrukd; grey       1100       1100         50       50       50       500       500       1100       1100         50       500       500       500       500       1100       1100         500       500       500       500       500       1100       1100         500       500       500       500       500       500       500       500         1100       500       500       500       500       500       500       500       500         1100       500	0.0		1							হু ি
-2.0       2       0	E 1							soft; wet; greyish	[*************************************	
-30       max       3       7         -40	2.0	Z	2	19				on to arou halow NE		ŧ
40         5         sod: fine to medium grained growt; loose; solutoted; grey         1	- 		_	-			— water table a	t 0.7 m		
4       8       growel; loose; saturated; grey       6       6         5:0       5:0       5:0       5:0       5:0       5:0         7:0       - bccornes growelly ond fine growelly		2	J	1						
-5.0       -5.0	- 4.0			a					E	
-5.0       -becomes growelly and fine grained below 1.2 m         -7.0       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace of fine growelly and fine grained       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m         -trace to some silt at 3.0 m       -trace to some silt at 3.0 m	- 5.0		4	0				oilty, ongroe grainer		1
7.0       - trace to some silt at 3.0 m         9.0       - trace of fine gravel at 3.0 m         9.0       - wey difficult to pull centre rod         9.0       - switch to CPT of 6 m         11.0       - density increases at 18 m         15.0       - density increases at 18 m         18.0       - density increases at 18 m         18.0       - density increases at 18 m         19.0       - density increases at	6.0									
-a.0       - troce of fine grovel of 3.0 m         -a.0       - medium groined; uniform         -vey difficult to pull center rod       - switch to CPT ot 6 m         -11.0       - switch to CPT ot 6 m         -11.0       - density increases ot 18 m         - density increases ot 18 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         END OF BORCHOLE @ 25.6 m       - density increases ot 18 m         Baso       - density increases ot 18 m </td <td></td> <td></td> <td>ĺ</td> <td></td> <td></td> <td></td> <td></td> <td>and this grants</td> <td>E4</td> <td></td>			ĺ					and this grants	E4	
-a.0       - urcce of fine gravel of 3.0 m       - meedum gravel, uniform         -switch to CPT of 6 m       - wery difficult to pull centre rod       - switch to CPT of 6 m         11.0       - wery difficult to pull centre rod       - switch to CPT of 6 m         11.0       - density increases of 18 m         15.0       - density increases of 18 m     <										4.0
90       - wey difficult to pull centre rod       - switch to CPT at 6 m       500         110       - switch to CPT at 6 m       500         110       - switch to CPT at 6 m       500         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - density increoses at 18 m         110       - density increoses at 18 m       - dens	- B.O								E 21	6.0
100       - switch to CPT of 6 m         110       - density increases of 18 m         110       - state of the state	- 9.0						— meaium grain — very difficult i	ea; uniform		1 2.
110       1	10.0						- switch to CPT	ot 6 m	······································	N)
110       - density increases at 18 m										
130       - density increases at 18 m         140       - density increases at 18 m         150       - density increases at 18 m         180       - density increases at 18 m	- 11.0									
130       140       140       140       140       140         150       150       150       160       150       160       150         180       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       - density increases at 18 m       - density increases at 18 m       - density increases at 18 m         180       <	- 12.0									1
14.0       15.0       50.0	-130								······································	
15.0       - density increases at 18 m         18.0       - density increases at 18 m						ľ				<i></i>
160       - density increases of 18 m         180       - density increases of 18 m	- 14.0				ľ					1
160       - density increases at 18 m         180       - density increases at 18 m	- 15.0								······································	¥.,
17.0       - density increases at 18 m         18.0       - density increases at 18 m         19.0       - density increases at 18 m         10.0       - density increases at 18 m	- 16.0									3
18.0       - density increases at 18 m         19.0       - density increases at 18 m         20.0       - density increases at 18 m         21.0       - density increases at 18 m         22.0       - density increases at 18 m         23.0       - density increases at 18 m         25.0       - density increases at 18 m         26.0       - ensity increases at 18 m         27.0       - ensity increases at 18 m </td <td></td>										
18.0       - density increases at 18 m         18.0       - density increases at 18 m         20.0       - 66.0         21.0       - 66.0         22.0       - 66.0         23.0       - 66.0         24.0       - 77.0         25.0       -	- 17.0								handa 🐨 and	
19.0       20.0       E02.0       E	- 18.0						– density increa	ses at 18 m		****
200       21.0       22.0       22.0       23.0       23.0       23.0       24.0       77.0	- 19.0						donary morea	, ,		
21.0       22.0       56.0       56.0         22.0       77.0       77.0       77.0         23.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0         25.0       77.0	- 20.0									.0
22.0       23.0       23.0       77.0       77.0       77.0         23.0       24.0       77.0       77.0       77.0       77.0         25.0       77.0       77.0       77.0       77.0       77.0       77.0         25.0       77.0 <t< td=""><td></td><td>j</td><td></td><td></td><td></td><td></td><td></td><td></td><td>······</td><td></td></t<>		j							······	
22.0       23.0       23.0       23.0       23.0       24.0       27.0       27.0       27.0       27.0       27.0       27.0       28.0       29.0       98.0	- 21.0									2.0
24.0       24.0       76.0       77.0         25.0       25.0       77.0       77.0       77.0         25.0       25.0       77.0       77.0       77.0         25.0       25.0       25.0       77.0       77.0         25.0       25.0       25.0       77.0       77.0         25.0       25.0       25.0       25.0       77.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.0         25.0       25.0       25.0       25.0       25.6         25.0       25.0       25.6       25.6       25.6         25.0       25.0       25.6       25.6       25.6         25.0	- 22.0									
24.0       25.0       25.0       25.0       26.0	- 23.0									
25.0       END OF BOREHOLE @ 25.6 m         26.0       END OF BOREHOLE @ 25.6 m         27.0       NOTE: Hole drilled through sand bar at niver level.         28.0       90.0         29.0       90.0         30.0       94.0         EBA Engineering Consultants Ltd.       LOGGED BY: JSB         COMPLETION DEPTH: 25.6 m         REVIEWED BY: JRT       COMPLETIE: 96/08/26         Fig. No:       Prope 1 of 1										1 ĝ.
25.0       25.0       END OF BOREHOLE @ 25.6 m       84.0         26.0       END OF BOREHOLE @ 25.6 m       86.0       86.0         27.0       Image: State of the state of	- 24.0									1 %.
28.0       27.0       NOTE: Hole drilled through sand bar at niver level.       88.0       88.0       90.0       90.0       90.0       90.0       92.0 <td>- 25.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	- 25.0									
27.0       28.0       NOTE: Hole drilled through sand bar at niver level.       88.0       88.0         28.0       90.0       90.0       90.0       90.0       90.0         29.0       30.0       EBA Engineering Consultants Ltd.       LOGGED BY: JSB       COMPLETION DEPTH: 25.6 m         REVIEWED BY: JRT       COMPLETE: 96/08/26       Fig. No:       Page 1 of 1	- 25.0					F	END OF BOREHOLE @	25.6 m		¥.
28.0 29.0 30.0 EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon Elogged BY: JSB Reviewed BY: JSB Reviewed BY: JSB COMPLETION DEPTH: 25.6 m Reviewed BY: JSB Fig. No: Poge 1 of 1	- 27.0						NOTE: Hole drilled thro			1
29.0 30.0 EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon EBA Engineering Consultants Ltd. Whitehorse, Yukon Elogged BY: JSB COMPLETION DEPTH: 25.6 m REVIEWED BY: JRT COMPLETE: 96/08/26 Fig. No: Poge 1 of 1							river level.			
EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon Yu	- 28.0									×.
EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon	- 29.0									
EDA Engineering Consultants Ltd.     REVIEWED BY: JRT     COMPLETE: 96/08/26       Whitehorse, Yukon     Fig. No:     Page 1 of 1	30.0									N [
Whitehorse, Yukon Fig. No: Poge 1 of 1	म	'R	A	End	rine	er	ing Consults	ints Itd		
11/05 D8:1540 (09130 }	-+-		<b></b> .	6			<b>v</b>	aroo nou.		
	711/08 08:	5AH	(07130	7	17	<u>111 L t</u>	LIUIDE, IUNUII		prig. No. 1 Page 1 of	

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· · · · · · · · · · · · · · · · · · ·			·····		ICQU	esten R. Bridge	DRILL: CME 75 C/W						ROJECT		0201	-96	-122	89	
NEAR							UTM ZONE: 8 N701		_			I	EVATIO			<u> </u>			
SAMPI	L <u>L</u>    1-		. [	GR/	1.0		r 🛛 🔀 standard f	PEN.	75 mm				EL BAR						
	Ы	의			Ы	_			10	20	PENETRAT 30	40	2	■ PER( 20 4	0	60	80		
Į₽	T T T	Z   Li	$\widehat{z}$	U	SYMBOL		SOIL		♦ C( 20	DNE PEP 40	IETRATICI 60	\$0 80	2			SAND 4 60	≥ 80		(ft)
DEPTH(m)	SAMPLE	SAMPLE NO	SPT(N)	nsc		השפת	RIPTION		PLASTIC				AF	PERCEN	t silt	OR FIN			DEPTH(ft)
ā	SAN	S	-,		SOIL	סמתת	METION			. IA 	v. }		2			60 Clay 4	80	_	Ы
E 0.0							11 1		10	20	30	40	2	<u>v</u> 4		60	80		
1.0						GRAVEL AND SAND (FI	Jravel; coarse grain	ed							}	·		E	. 0.0 - 2.0
						sand; moist; c	ompact; greyish bro	swn								·····		E	- 4.0
2.0						– soft, easy dril	ing				····	····	· · · · · · · · · · · · · · · · · · ·			·····		E	- 6.0 - 8.0
E- 3.0		İ				SAND — silty, trace of	aravel: brown			•••••						····			- 0.0 - 10.0
E- 4.0						- water table at	3.0 m											Ē	12.0
5.0						— sand filling ho												Ē	- 14.0
																<u>.</u>		E	· 16.0 · 18.0
6.0		Ē				- switch to CPT	at 6 m depth		<b>A</b>										20.0
7.0									•	٠						<u>.</u>	<u>.</u>	E	22.0
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19.0										*	> •			•••••••				··	60.0 62.0
					┝	END OF BOREHOLE @	10.5 m	······			<b>*</b>						ļļ.		64.0
- 20.0						NOTE: Hole drilled thro												Ē	66.0
- 21.0		Ì				raad.											ļ	···	68.0
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30.0				1														E s	96.0
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-	Ł		88			horse, Yukon		REVIEWE Fig. No:	d by: Jr	KI			COMPL	ete: 9	16/08				
5/11/03 08:1	7AH (O	PI30)		<u>11</u>	111 LC	ALUIDE, LUKUH		TUA' NO.					······································		<del></del>	P	,ade	1 of	1

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**********			UKON	and the second second	<u>к</u> 0.	OPTION	DRILL: CME 75 C/ UTM ZONE: 8 N70				CONTRACTOR OF THE OWNER				VATION		020	1-90	-1228	<u>y</u>
				GR							SPOC		m		L BARR		ſ	Пле	URBED	
	1	SAMPLE NO	T	nsc	SOIL SYMBOL		SOIL RIPTION		E		DARD I 40 M	PENETR 60 .C.	ATION I 80 LIC		20 20 20 & FE 20	I PER PEP A RCEN	Cent 10 XCENT 10 T SILT 10	GRAVEL GO SAND ( GO OR FII	80 80 80 ¥ES▲ 80	DEPTH(ft)
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		1				grained sand;	fine to medium ounded gravel;				0									
.0						sond; compact	ravel; coarse grai	ned .												- 2.0
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0								•	·····	· · · · · · · · · · · · · · · · · · ·										6.0
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)														-		·····	***	***************************************		- 12.0
		4																		- 14.0
,				•		· / 11		LOGGED	RY						OMPLE	TION		)TLI. Z		- 15.0
ł	ĽΒ	A	Eng			ing Consulta	nts Ltd.	REVIEWE			T			Ċ	OMPLE	TE: 9	0 <u>0</u> 26/0	8/27	w m	
		TUKON		W	hite	<u>ehorse, Yukon</u>		Fiq. No:											Paqe 1	of 1

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B				ie acc			JKON ENGINEERING							****			Contraction (1997)	a starting of the second s	·BH18
2	*****		MCQU YUKOI		RD.		E 75 C/W SOLID S									0: 02	201-9	36-12	289
SAM				GR/	А П		: 8 N7087774 E4 Tandard pen. 듣			6 n SPC	<b></b>			EVAT					
	, <u>c</u>	<u></u>			T							LU TRATIO		el ba			IT GRAV	ISTURB	ED I
l 📻	YPF	12			SYMBOL	TIO2			20	40	6	<u> </u>	0	ļ	20	40	60 NT SAI	80	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	nsc	X	SOIL									20	40	60	80	DEPTH(ft)
DEP	MP	AMF	հ		SOIL	DESCRIPTI	ON	FLAS	STIC	!	1.C.		LIQUID		. PERC 20	Ent s 40	ilt or 60	FINES & 80	
-	NS:	ျပ			S		011	ł	10	20	<del>ہ</del> ۔ 3(				٩	PERCE	NT CLA	Y∳	
0.0	1					GRAVEL AND SAND - trace of s	ilt, well				<u></u>	) 4	u i		20	40	<u>60</u>	80	1 = 0.0
ŀ						graded, sub-rounded gra	ivel: coarse												Ē
-						grained sand; compact; (	lamp; grey												E
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·	FR	A	Enc	rine	eri	ng Consultants Lt	d LOGGED					·····		OMP	LETIC	NDE	PTH:	3.0 m	E
-						horse, Yukon		d by	: JR	T			[	OMP	ETE	: 96/	/08/2	7	
55/10/08 D.	537AU	(TUNOH	-5)	ţţ .	աւշ	HOIDE, IUKUII	Fiq. No:								-			Paqe	1 of 1

				E ACC			ent: Yukon Engineer Ll: CME 75 C/W Sol								*************	****	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>89-</u> 6-12	BH19
NEAR							ZONE: 8 N7087511								JECT /ATION		UZL	]]5	12	.03
SAMP	LE I	TYP	E	GR/	Ĩ	NO RECOVERY	Standard pen.		75 I	mm : STAND	SPOD			RREL	BARR	EL 3 PER(	CENT	GRAV	STURBI El III 80	ED
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	nsc	SOIL SYMBOL	SO DESCRI		P	LAST		М.		LIQU		20 & PE 20	© PEF 4 RCEN 4	io T sili Io	60 T OR 60	80 FINES ▲ 80	DEPTH(ft)
0.0	S		L		S		1 F F F F F F F F F F F F F F F F F F F			0	20	30	40	_	20	PEF 4	RCENT 10	T CLA 60	40 80	
		1				SAND — trace of silt;fine sand; firm; damp;		•	·····											
1.0						SAND AND GRAVEL — trac graded sand; well sub—rounded grav grey														- 2.0
		2						<b>.</b>												4.0 
2.0		3				— 0.3 m thick layer — becomes gravelly	below 2.0 m				•									5.0
						<ul> <li>silt content increa below 2.0 m</li> </ul>	ses slightly													8.0
3.0		4				END OF BOREHOLE @ 3.0 — no water	m		•											
.0																				12.0
																				14.0
.0				-																16.0
]	ΞE	3A	En			ing Consultant		GGED E Viewed			<u>г</u>				ompli ompli				<u>3.0 n</u> 27	n
0/04 07						ehorse, Yukon		. No:												1 of 1

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<u></u>				IE ACC			CLIENT: YUKON ENG						<u></u>	BORE					3H2O
km 1 NEAR					RD (	DPTION	DRILL: CME 75 C/W									0: 02	01-9	6-122	89
SAMP				V GR/	NB.	NO RECOVER	UTM ZONE: 8 N701 Y X STANDARD F				7.39 SP00	NI I		eleva Rrel B				STURBE	n
DEPTH(m)	<u> </u>	SAMPLE NO	1		SOIL SYMBOL	( 	SOIL RIPTION			I STANI 20		ENETRA 60			20 20 20 20 A PERC 20	ERCEN 40 PERCEN 40 ENT SI 40	f grave 60 IT sane 60	1 = 80 80 80 1NES & 80	DEPTH(ft)
0.0		1				grained sand;	ounded gravel; coar compact; damp; br	rse o₩n	<i>.</i>	10	20	30	40		20	40	60	80	
- - 1.0						— colour change below 0.5 m — colour change	s to light grey s to brown below 0	.9 m											
		2				grinding and h 1.2 m	ard drilling belo <del>w</del>		6										4.0
- - 2.0 -																			
- - - - 3.0		3							•			······································							8.0
- 3.U						END OF BOREHOLE @ — no water	3.0 m	·····											
- 																			
																			14.0
5.0								LOGGED	₽V.	921					ם בתי			7.0	16.0
ł	ĽΒ	A	Eng			ing Consulta	nts Ltd.	REVIEWE	D B1	138 (: JR1							PIH: 08/27	3.0 m	
8/10/04 07	SIAN	(TLRO)	5)	W	hite	<u>horse, Yukon</u>	······	Fiq. No:								-1		Page	1 of 1

															REHC					-BH2	
NEAR				*******	KU (	DPTION DRILL: CME 75 ( UTM ZONE: 8 N								<u> </u>	VATIO		): 02	01-5	96-12	2289	
SAMPI				GR/	<u>۱</u>	🗌 NO RECOVERY 🔀 STANDA		7	5 m	лSP	DON			RREI		REL	[		ISTUR	BED	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	nsc	SOIL SYMBOL	SOIL DESCRIPTION				4(	) м.с.	60	110N (2) 80 LIQ		<u>:</u> الھ	20 © F 20 PERC 20 © F	40 PERCEN 40 ENT SI 40 ERCED	60 (t cla	80 0 @ 80 FINES 80 Y @	<b>A</b>	DEPTH(ft)
0.0						SAND AND GRAVEL - trace of silt; co	arse		10	20	1	30	40			20	40	60	80	E	0.0
-		1				grained sand; fine to medium grained gravel; compact; damp	o; grey	0												multun	2.0
- 1.0						- some gravel below 0.7 m - sand becomes well graded at	17 m											·····			LLV "
		2				— sona neconies #411 diaaga al		0												սահուսու	4.0
- 2.0						— becomes gravelly below 1.6 m														مسلمسمي	6.0
																				<u>nılınını</u>	8.0
- 3.0		3						D												<u>Luuuluuuu</u>	νισμουργικά (* 1998) "Αυχουργικά (* 1998) "Αυχουργ
						END OF BOREHOLE @ 3.0 m — no water															10.0
4.0																				milionali	12.0
																					4.0
5.0																				<u>i</u> F	6.0
			-	-		ing Consultants Ltd. chorse. Yukon	LOGGED REVIEWE Fig. No:	DE										:PTH: /08//		m e 1 of	
10/04 07:5	5274	ര്ഷന	1-5)	••••		nanan ana mananinka an								<u> </u>						- 1 VI	لسنس

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				STEN F	ND OF													0201	1-96	i-122	89
SAMP			YUKON F	GRA		UTM ZONE: 8 N701					18 SPOC	381		EL Crre	EVAT					TURBEI	······
	T.				T					AND/	RD I		LILI TRATION		<u>т</u> ве				J UIS SRAVE		,
(e	TYPF	2			SYMBOL	SOIL			20		40	60			 	20	- 41	0	60 Sand	80	-
DEPTH(m)	1		SPT(N)	nsc	SYM N											20	- 41	)	60	80	E -
DEP	SAMPI F	SAMPLE NO	5		SOIL	DESCRIPTION		PU	ASTIC	;	Ņ.	.C.	U	QUID	4	20	- 4(	)	60	NES 🛆 80	DEPTH(ft)
	S				S			1	10		( 20	≥ 30	40	-		20	PER 4(	Cent )	CLAY 60	\$ 80	
0.0						SAND — trace of gravel, trace of silt;													Ī		E 0.0
ŀ						medium to coarse grained sand; grained gravel; firm; moist;	fine														Ē
Ļ		1				brownish grey															
-																					Ę
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1.0										-									T.		<b>E</b>
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-		-						9 											ļļ.		E
-					ŀ	SAND AND GRAVEL - trace of silt; coarse															Ē
F						grained sand; well graded gravel;															E
-						compact; damp; grey															E- 6.0
- 2.0																			<b>.</b>		Ļ
-																					1
-																					Ē
																					E- 8.0
-						<ul> <li>hard drilling and grinding below</li> <li>2.5 m</li> </ul>															Ē
						2.5 11															
-		3					6	•													111
— 3.0						END OF BOREHOLE @ ?.? m	······································	<u>.</u>													.E. 10.0
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E	ΞE	3A	Eng	gine	eri	ing Consultants Ltd.	LOGGED REVIEWE	D R	i JS	ษ IRT									TH: 3 3/27	3.0 m	
			-			ehorse, Yukon	Fig. No:	- 0						L	i u n'i l'		_, J	5/ 10		Page 1	of 1
6/10/04 07:	JUN	(TLAO)	(5)																		

km 7.0, S. MCQUESTEN RD OPTION     DRILL: CME 75 C/W SOLID SHAFT AUGERS       NEAR MAYO, YUKON     UTM ZONE: 8 N7086426.38 E463424       SAMPLE TYPE     GRAB     NO RECOVERY     STANDARD PEN.       STANDARD PEN     STANDARD PEN     STANDARD PEN	PROJECT NO: 0201-96-12289 ELEVATION:
SAMPLE TYPE GRAD IN NO RECOVERY STANDARD PEN. 75 mm SPOON	
	CRREL BARREL DISTURBED
Image: Second state     Image: Second st	السلامي المراجع
SAND - trace of silt; medium grained,	
uniform sand; firm; damp to moist; 1 1	 
- 1.0 - fine to medium grained gravel below 1.2 m	4.0
- 2.0	
- gravel becomes well graded around 2.2 m	-8.0
3.0 Solution and a second seco	10.0
4.0	
	14.0
5.0 FPA Engine oning Consultants It d LOGGED BY: JSB	
EDA Engineering consultants Ltd. REMEWED BY: JRT	COMPLETION DEPTH: 3.0 m COMPLETE: 96/08/27
Whitehorse, Yukon Fig. No:	Page 1 of 1

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				STEN I	rd ol	PTION		RILL: CME 75 C/V								PROJI	ECT	NO:	0201	-96-1	2289
ē			YUKO					TM ZONE: 8 N70							1	ELEV/					
SAMI	<u>'LE</u>		' <u>E</u>	GR	AB	i	NO RECOVERY	STANDARD	יפא. 📃		5 ៣៣				Cr	RELE			سياتك الم	DISTUR	BED
	Ŀ	10								l	esta 20	NDAR 41	d pei D	NETRAI 60	10N 🔳 80		20	I PER( 4	:Ent Gi 0 (	AVEL II KO 8(	
DEPTH(m)	SAMPLE TYPE	ĬŽ	SPT(N)		SYMBOL		S	DIL									(	PER	CENT S	AND 🔿	
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Ξ	AMF	NA MA	ា		SOIL		DESCR	<b>IPTION</b>		PLA	STIC		M.C.		liqui		20	ACENI 4	0 6	o 80	
	S	1.			N.					ŀ	10	20	-@- `	30	40		~	PER	CENT O	LAY	
0.0			-			SAND -	- gravelly, some	silt: well araded			1		,	1	40		20	4	06	0 80	: = 0.0
							sand; well grade	d sub-rounded													Ē
-							gravel; compact;	moist; grey													E
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F		1									<i>,</i> ,,,			•••••••	••••••			••••••			
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F							becomes silty be some fine to me	low 2.5 m													
							ravel below 2.5														E
F		3				3		11				l									144
- 3.0		Ĭ			-																Ē
-						end of	BOREHOLE @ 3.0	) m													E 10.0
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		-1					<u>Yukon</u>	is did.	REVIEWE	DΒ	: JR	<b>?</b> T				СОМ	PLET	E: 9	6/08,		
96/10/04 07.	5544	(YLXO)	-5)	14.	uirg	HUISE.			Fig. No:		****				-					Pag	e 1 of 1

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KM 4. NEAR				sten 1 J	<u> </u>	211014		LL: CME 75 C/W					S				JECT /ATION		020	<u>11–9</u>	6-122	289
SAMP				GR	4FI	ND RECOVE		STANDARD F					200N		 ∏∏C					Tin	STURBE	
	Γ	SAMPLE NO	T	nsc	SOIL SYMBOL	Econol I	S0.	······			STA 20	NDAR 41	D PO D M.C.	ietr/ 60	110N = 80 UQU		20 20 ▲ PE 20	I PER	40 RCENI 40 IT SILI 40 RCENI	GRAVI 60 1 Sani 60 1 OR 1 60 1 Clay	EL 80 80 80 FINES ▲ 80 7	H(ft)
0.0						SAND — gravelly, tro	ice of	silt: conrse			10	20	)	30	40	_	20		40 1	<u>60</u> ;	80	E 0.0
		1				grained sand	; fine		;			······································		· · · · · · · · · · · · · · · · · · ·			······································					
1.0		2				— gravel conte becomes coa	nt inci rser g	reases and prained below 0.	6 m	¢			*****									2.0
		3				SAND – silty; fine g soft; moist to	rained wet;	uniform sand; dark grey				0						*****				4.0
.0						- moisture co	ntent	increases with														6,0
						depth																8.0
0		4				END OF BOREHOLE @	3.0	m				9										
						— no water			••													
																						12.0
									•••	······			·····									14.0
2						-			1000000	pw												16.0
F	ĽΒ	A	Eng			ing Consulta	ants	s Ltd.	LOGGED REVIEWE								MPLE MPLE				3.0 m 7	
		TUKON		W	<u>hite</u>	<u>ehorse, Yukon</u>			Fig. No:												, Page	1 of 1

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§				IE ACC			CLIENT: YUKON ENG							BOI	REHO	le n	0: 1)	2289-	-BH26
§				sten f	rd O		DRILL: CME 75 C/W							PR	)JECT	" NO:		-96-12	
3			YUKO				UTM ZONE: B N702		all		····				VATIC				
SAM	PLE	IYP T	L	GR/	\0 T		STANDARD P	'EN. E			SPO			CRRE				DISTURD	ED
	Ŀ DĽ	10			5	-	0.11			1 STAN 20	IDARD 40		TRATION ) 80		2	0	icent gi 40 6	0B 0X	
DEPTH(m)	SAMPLE TYPI	] <del>Z</del>   щ	SPT(N)	nsc	SYMBOL	5	OIL							T	2	@ PE	RCENT S	AND @ 0 80	3
EPTI	l dV	Ē	SP1	19	N L	הביכרו	RIPTION		PLA	5117	8	<b>H.C.</b>	11	ן מוטג	۵F	ERCEN	and the second se	DR FINES &	DEPTH(ft)
	SAN	S			Sol	וסמצע			104   -  -			≋.v. .⊕		-1	2		40 <u>6</u> RCENT C		원
0.0	+	╆				SAND — gravelly (schis	+\			10	20	30	40	<u> </u>	2	<u>)    </u>	40 6		
t						graded sand; fir	ne to medium												E 0.0
-		1				grained, flat elo	ngated and			)									
┢						sub-rounded gr	avels; compact; de	ımp;											
t						brownish grey			····>								·····		E
																			E-20
$\mathbf{F}$																			
- 1.0																			
F									····†	$\mathbf{T}$	1								····-E
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F					ŀ	ORGANIC ROOT MAT - r	notlets and wood												Ē
ļ						chips; soft; mois													
╞						<ul> <li>becomes black</li> </ul>	topsoil below 1.8 r	n											E- 6.0
- 2.0		-																	Ē
[		3												•					
F																			
ŀ					ŀ	SAND — gravelly, silty; v	vell araded sand												E-8.0
ŀ						fine to medium of	grained, flat		ļ			1			† T				<u>-</u>
ŀ						elongated gravels	s (schist); compac	t											Ē
		4				moist; mattled ye and grey	ellowish brown												
- 3.0	Щ				-						•								
-						END OF BOREHOLE @ 3. — no water	Um												E- 10.0
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T	UL.	л 1	ппя				IS LLU.	REVIEWE						CO	MPLE	TE: 9	6/08/	/27	
8/10/0+ 07	57AU	(YLKOH	-5)	W 1	ше	<u>horse, Yukon</u>		Fiq. No:										Page	1 of 1

				e acc Sten f								BORE				289-1	a series a series of the serie
	• • • • • • • • • • • • • • • • • • • •				VU Ur										201	96-122	.03
NEAR MAYO, YUKON       UTM ZONE: 8 N7083109.41 E467099.72       ELEVATION:         SAMPLE TYPE       GRAB       NO RECOVERY       STANDARD FEN.       T5 mm SP00N       []] CREL BARREL       []] DISTURBED         (I) UTM ZONE: 8 N7083109.41 E467099.72       ELEVATION:         SAMPLE TYPE       GRAB       INO RECOVERY       STANDARD FEN.       T5 mm SP00N       []] CREL BARREL       []] DISTURBED         (I) UTM ZONE: 8 N7083109.41 E467099.72       ELEVATION:         SAMPLE TYPE       GRAB       INO RECOVERY       STANDARD PEN.       TO STURED         (I) UTM ZONE: 8 STANDARD PEN.       STANDARD PENETRATION IM COLSPAN       STANDARD PENETRATION IM COLSPAN         (I) UTM ZONE: S       SOIL       Im STANDARD PENETRATION IM COLSPAN         IDESCRIPTION       IDESCRIPTION         IDESCRIPTION       IDESCRIPTION         IDESCRIPTION       IDESCRIPTION         IDESCRIPTION       IDESCRIPTION         IDESCRIPTION       IDESCRIPTION<																	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	nsc	SOIL SYMBOL			20 ASTIC	40	60 I.C.	0 <u>80</u> LIQUI	D	20 20 A PER 20 \$	40 PERCE 40 CENT : 40 PERCI	60 ENT SAN 60 SILT OR 60 ENT CL/	80 80 80 FINES ▲ 80	DEPTH(#)
0.0						SAND — gravelly, some silt; well grade	d I			00	-40		20	40	50	80	E 0.0
		1				sub—rounded gravel; compact;	moist;										
1.0						<ul> <li>becomes silty; some fine grain gravel below 0.7 m</li> </ul>	ed										2.0
		2						•									4.0
.0						<ul> <li>moisture content decreases slightly below 2.2 m</li> <li>gravel content increases and becomes coarser below 2.2 m</li> </ul>											
.0		3				- becomes some silt below 2.2 r		•									
						END OF BOREHOLE @ 3.0 m — no water — little slough						*****					
																	12.0
0																	14.0
																	16.0
5.0     EBA Engineering Consultants Ltd.     LOGGED BY: JSB     COMPLETION DEPTH: 3.0 m       REMEWED BY: JRT     COMPLETE: 96/08/27       Fig. No:     Poge 1 of 1																	
EBA Engineering Consultants Ltd. LOGGED BY: JSB COMPLETION DEPTH: 3.0 m REMEWED BY: JRT COMPLETE: 96/08/27																	

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					CESS RD - BORROW	CLIENT: YUKON EN				ICES			TEST					-TP1	17
[			·····		OPTION	EXCAVATOR: CAT 2										0201	-96-′	12289	
§			UKON			UTM ZONE: 8 N7	)85932.3	2 E	149	774.3			ELEV	ATION	:				
DEPTH(m)	1	SAMPLE NO	1	SOIL SYMBOL	AB NO RECOVER SO DESCRI	[L			<u>10</u>	20	PENETR 30	ation = 40 Liqui	0	20 20	40 PERC 40	ENT S ENT S SILT O	AVEL 0 80 AND 0 80 R FINES 0 80	)	DEPTH(ft)
	SA	S		S		1 11011		-1	10	20	© 30	 40				ENT C	LAY 🗞		0
0.0					ORGANIC ROOT MAT									20	-10			Ē	0.0
		1			SILT — sandy, trace of clay grained, moist, brow	r; fine rnish grey			· · · · · · · · · · · · · · · · · · ·			•							- 2.0
- - 1.0																			- 20
					– permsfrost; visible i	ce <5% @ 1.5 m												ىلىسىسلىس	- 4.0
- - 2.D -					— becomes easier to a	dig below 1.9 m				· · · · · · · · · · · · · · · · · · ·						······			- 6.0
- -		2			END OF TESTPIT @ 2.4 m — no water — no slough				*****		٥								- 8.0
- 3.0 -															,			dama dama	· 10.0
													*						12.0
- 4.0 - -											•••••								14.0
																		مايمىيىيا يومىيى	15.0
	TR	Δ	Ena	in4	eering Consulta	nta Itd	LOGGE					: :		MPLET	: FION	<u>: :</u> Dept	<u>:</u> H: 2.4	<u>: F</u> m	··
	чD	<u>п</u>	ung			шь ши.	REVIEW		BY:	JRT			COI	MPLE	E: 9	6/08	/25		
6/10/08 DI	:5044	(TUXC)	-T5}	ĥ	<u>hitehorse, Yukon</u>		Fig. No	): 									Ρα	qe 1 of	f 1

						ESS RD - BORROW	CLIENT: YUKON (				RVIC	ES					 PIT				erstatten and a second second	-TP	*011040W/www.whitewara.com
m 24. EAR N			-		SILA	OPTION	EXCAVATOR: CAT UTM ZONE: 8 N				40.74	776	-				 		02	01-1	96-1	2289	
AMPL					GR	AB NO RECOVER	L	/060134.	.07	<u> </u>	190.	20.0	) 					1;					
···· 1	T	SAMPLE NO	<u> </u>	SCU SCU	SOIL SYMBOL	SO DESCRI	IL		P		) C	20 k	4.C.	30		2 QVID -I	20 20 ▲ PEF 20	4 9 PEF 4 3 3 3 4 3 9 PEF	o Cent O T Sil O Rcent	60 F CLA	80 0 @ 80 FINES 80	۵.	DEPTH(ft)
0.0	+					ORGANIC ROOT MAT				<u> (</u>	)	20	3		40		20	4	0	<u>60</u> !	<u>80</u>		= 0.0
1.0		1				SILT — sandy, fine grained brownish grey	, moist,				······································												2.0
																	 						- 4.0
₽ Q		2				SAND AND GRAVEL - trace graded; loose; satur - water table at 1.6	ated; grey		•														¥ 
				аль		END OF TESTPIT @ 2.0 m — water at 2.0 m — no slough								· · · · · · · · · · · · · · · · · · ·									-8.0
				-												******							- 10.0
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上 +:30 +6				Ŭ		eering Consulta <u>Mitehorse, Yukon</u>	nts Ltd.	REVI Fig.	E₩	ED E							MPLE				25	m qe 1	of 1

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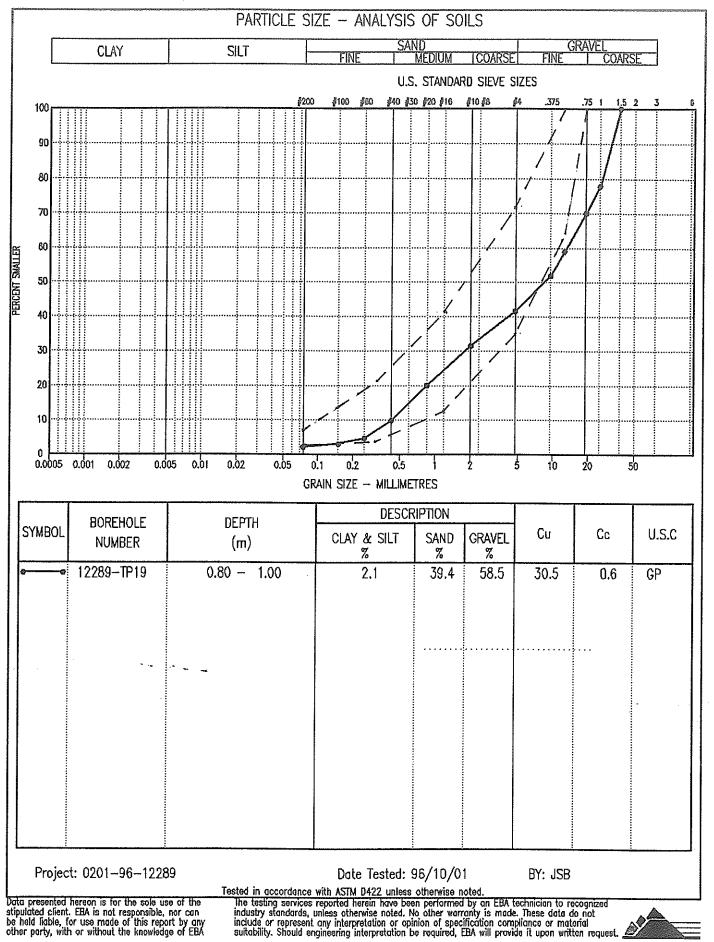
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					CESS RD - BORROW SOU	CLIENT: YUKON ENG	SINEERIN	GS	ERV	ICES	2009 (2000) (2000) 2009 (2000) (2000)			TES	st pi	T NO.		122	89-	TP19
i					I Option	EXCAVATOR: CAT 22								PR	DJEC	t no	020	1-9	6-12	289
			(UKON			UTM ZONE: 8 N70	86244.6	3 E	449	394.	37			ELE	VATI	:NC				
SAMF	'LE	TYP	E	GR	AB NO RECOVER	ť														
	Ы			2				1	i STA 10	NDARC 20		ETRAT 30	10N 🔳 40)		20	© PER	Cent ( 10	SRAVEI 60	L 🖬 80	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO		SYMBOL	SO	II.										@ PEI	RENT	SAND	0	
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	AMI	SAN		SOIL	DESCRI	PTION		PLAS	TIC		M.C.		LIQU		20	) 4	0	60	80	DEPTH(ft)
	S			S					10	20	@ 7	xo	40		20		rcent D	CLAY 60		
- 0.0					ORGANIC ROOT MAT			]										00	80	= 0.0
ŀ																				Ē
ŀ					SAND — some gravel, som				¢											Ē
ŀ					grained sand; fine l															Ē
Ì					grained gravel; com brownish	ipaci; moist												·		Ę
[																				2.0
+					SAND AND GRAVEL - trace															
-		2			grained sand; well g	jraded		0						۵		6				
1.0   ¥					sub—rounded gravel saturated; grey	; loose;														È
Ę ≠					- water at 1.1 m															
-																				E 4.0
- ·					END OF TESTPIT @ 1.2 m															Ē
-					— woter at 1.1 m — slough below 0.3 m															<u>F</u>
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1 F	ΞB	A 1	Enø	ine	eering Consulta	nts Itd	LOGGE		Y: J	SB				CC	OMPL	ETION	I DEP	TH:	1.2 m	
			6		hitehorse, Yukon	TOO DOU.	REVIEW		BY:	JRT					JMPL	ETE:	96/0	8/2		
1 <u>.</u> 96/11/12 09:	42A.4	(YUKON-	-15}	11	THECHOISE, TUKOII		Fig. No	L,								*****	···-		Page	1 of 1

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Lunmonter					CESS RD - BORROW SOU	CLIENT: YUKON ENG				ices						f NO:			39-T	and the second sec
					I OPTION	EXCAVATOR: CAT 22											0201	1-96	-1226	39
SAMP			UKON			UTM ZONE: 8 N708	36842.1	E44	1889	92.7	6			ELE	VATIO	)N:				uj
	SAMPLE TYPE		<u>_</u>	SOIL SYMBOL	AB NO RECOVER SO DESCRI	IL		PLAS 1	10	20	M.C.	0	DN ■ 40 ⊔QUI 	D	20 20 ▲ P 20	© PEF 4 ERCEN 4 & PEF	CENT 9 0 1 Silt 0 1 1 1 1 1 1 1 1	60 Sand © 60 Or Fin 60 Clay @	80 80 ES ▲ 80	DEPTH(ft)
0.0					ORGANIC ROOT MAT					20	-21		40		20	4		30	80	= 0.0
- - - - - - -		1			SAND AND SILT - fine grai greyish brown - cobbly below 0.2 - major sloughing be GRAVEL - sandy, trace of graded, sub-rounde grained sand; loose	m elow 0.2 m silt; well ed gravel; coarse				¢										2.0
- 1.0 - -		2			moist; mottled grey	and brown		•							4					4.0
- - - - 2.0																				6.0
														•••						8.0 1
- 3.0 - -		3			END OF TESTPIT @ 3.0 m — no water — major slough		0													10.0
- - - - 4.0																				12.0
																				14.0
- - 5.0		A .		•			LOGGE		<u>.</u>	58						FTION	I DEP	TU. 7	A	16.0
F	εB	A	Eng		eering Consulta	nts Ltd.	REVIEW				·						96/0		<u>vm</u>	
6/11/12 09:	4344	(YUNON	-15}	W	<u>hitehorse, Yukon</u>		Fig. No											and the second second	Page 1	of 1

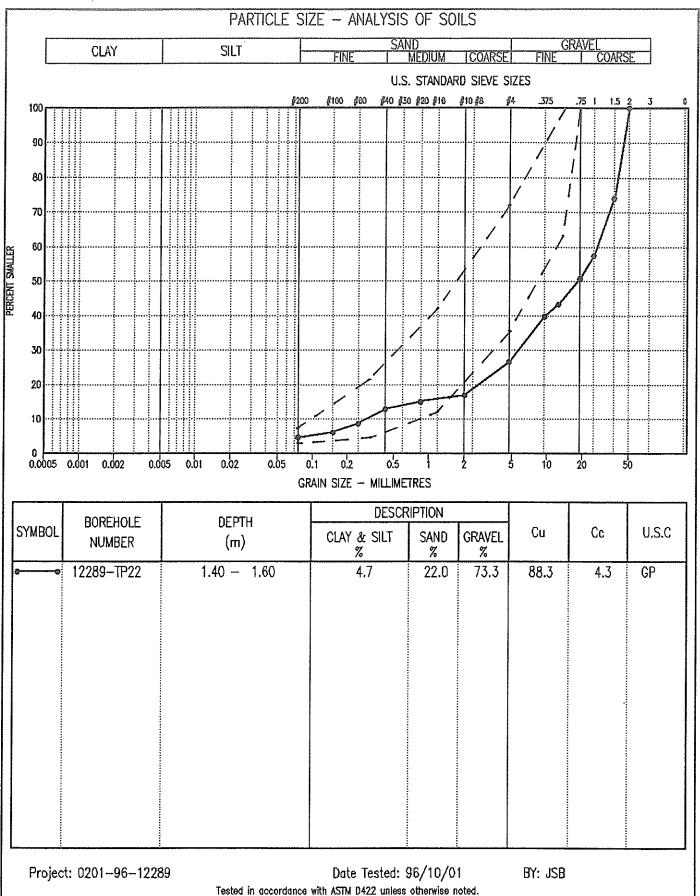
					ESS RD - BORROW	CLIENT: YUKON				VICI	ES			······		PIT 1				-TP21
			UKON		OPTION	EXCAVATOR: CAT				898	8 67					EUT NTION		201-	96-12	209
		TYP		GR			17007000.	U-7	Lin		0.07			[6		100				
	SAMPLE TYPE		T	SOIL SYMBOL	SC DESCR	IL		PL	10 ASTIC		20 M.(	30				20 20 ▲ PER 20	PERCEN 40 PERCE 40 CENT S 40 PERCE	60 NT SAN 60 ILT OR 60	80 10 © 80 FINES A 80	DEPTH(ft)
.0					ORGANIC ROOT MAT - tra	e of clav			10		20	30	40			20	40	60	80	<u>= 0.0</u>
		1			SAND AND SILT – fine gro to wet; mottled gro	ined; soft; moist														- 20
0					GRAVEL AND SAND — trace graded rounded gra grained sand; loose — sloughing below 1.	ivel; coarse ; damp; grey														4.0
0																				
		2						0												8.0
		3			END OF TESTPIT @ 3.2 m — no water			٩												
					— sloughing below 1.	2 m														
																				- 14.0
								*****			** * * * * * * * * * * * * * * * * * * *				****					16.0
	- 75	}A	End	rin	eering Consulta	nts Itd	LOGO												1: 3.2	n
Т	بله	'n	TIF		hitehorse, Yukon		REVII Fig.		DB	Y: J	RT	-				MPLE	TE: 91	5/08,		
4 06:	4544	(YUKO	N-15)	•	HILCHOLDE, LUKUII		Įnų,	nų.							<u> </u>				гug	e 1 of 1

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Semannessen			NAME OF TAXABLE PARTY.		CESS RD - BORROW SOU	CLIENT: YUKON ENG	INEERIN	IG	SER	VICE	ES .	~~~~		.	TEST	P∏	NO:	1	2289	-TF	>22
					I OPTION	EXCAVATOR: CAT 22												0201	-96-1	12289	3
P			rukon			UTM ZONE: 8 N70	37106.8	32	E44	904	3.29	)			ELEV	ΛΟΠ	;				
SAMF	T			GR T	AB 🗌 NO RECOVER	Ϋ́			<u>ت</u> ې 📾	ANDA	ISD E	DENET	RATION		<u> </u>	B	DEDA		AVEL 💷		
	<u>Y</u> PF	9		턿		TT	-			FOUD F	20	30	4		<u> </u>	20	- 4(	) 6	0 8	)	
DEPTH(m)	SAMPI F TYPI	SAMPLE NO	usc	SYMBOL	SC											20	PER( 4(	CENTS/		)	DEPTH(ft)
EPI	MPI	MP	5	L L L	DESCR	IPTION		PU	ASTIC		M.	C.	l	ncnid	-	A PER 20	CENT 40		r Fines		
	NS S	S		SOIL		II IIVI1					(	>			<b> </b>	\$	PER	CENT C	AY 🗇		
0.0					ORGANIC ROOT MAT			-	10	1	20	30	4			20	40	6	<u>) 8(</u>	)	E 0.0
[		1										<b>a</b>									Ē
+					SAND AND SILT - fine gra	ined; soft; wet;						•									Ē
ł					greyish brown			ļ													
Ē.					GRAVEL AND SAND - trace	e of silt; well		····;							<b>;</b>						Ē
ŀ					graded, rounded gr	avel; coarse															E- 2.0
F					graded sand; comp	act; damp; grey															
- 1.0																					Ē
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96/11/12 D9	4444	(TURON	-15)	W	<u>hitehorse, Yukon</u>		Fig. N	0;							<u> </u>				Pa	je 1	of 1

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Data presented hereon is for the sole use of the stipulated client. EBA is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of EBA The testing services reported herein have been performed by an EBA technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, EBA will provide it upon written request.

E					ESS ROAD - BORROW	CLIENT: YUKON ENG			RVK	CES				f pit		Contraction of the second second	289	Charles and the second s
E		CARL BARRIER		STEN	OPTION	EXCAVATOR: CAT 22		******		~~ ~						0201-	-96-12	289
SAMP			UKON	GR	AB NO RECOVER	UTM ZONE: 8 N708	717.32	2 E4	488	02.9	}		ELE\	/ΑΠΟΙ	1:	*************	······	
	SAMPLE TYPE F	<u> </u>		SYMBOL	SO DESCRI	IL		I I PLAST	0	20	PENETR 30 .C.	ATION E 40 Liqui		20 20 ▲ PEI	40 PERC 40 RCENT	ent sa 60 Silt or	80 ND © 80	DEPTH(ft)
	SAN	S		SOIL		FIION					>		`	20 20	→ PERC	ENT CL	AY &	
- 0.0					ORGANIC ROOT MAT			1	<u>u</u>	20	30	40		20	40	60	80	E 0.0
- - - - - -					SAND — gravelly, some silt sand; fine to mediu elongated particles; moist; greyish brown	m grained, flat, firm; damp to	·····	•										2.0
-																		4.0
- - - 20 -		2			GRAVEL AND SAND - trace graded sub-rounded grained sand; comp SAND - silty; fine grained; brownish grey	l gravel; coarse act; damp; grey	<b>a</b>											
-		3								ø								8.0
- 3.0		4			END OF TESTPIT @ 3.2 m — no water			ę										
- - - 					— no slough													
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E	ΞB	A	Enø	ine	eering Consulta	nts Ltd.	LOGGE										1: 3.2 n	
			_		<u>hitehorse. Yukon</u>		Fig. No		ינוט	117.1				IMPLE	.ICI 9	6/08,		1 of 1
8/10/04 06:	47AU	(YLKO)	1-15}	<u> </u>	IIIDOHOLDE, IUAUII		1114.110										ruye	

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		TYPI		GR			/06/955.	32 1	-9-4C	2013	.10			ELEVAT				بيدير متيارية فارتدا ومتقدي	
	SAMPLE TYPE		- ISC	SOIL SYMBOL	SC DESCR	)IL			ST/ 10	NDAF 2	o pe 0 M.C	30	10N @ 40 Liquid	2	20 © PE PERCEI 20	40 RCENT 40 1T SILT 40	GRAVEL 60 SAND & 60 OR FIN 60 CLAY &	80 80 80 80 80	DEPTH(ft)
0.0					ORGANIC ROOT MAT				10	2	0	30	40	2	0	40	60	80	E 0.0
		9			SILT AND SAND — fine gro permfrost, visible i — very difficult to di	ce>15%					•					·····			
1.0					END OF TESTPIT @ 0.5 m — no water — no slough — frozen, visible ice>					******									2.0
							•												4.0
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		A I			eering Consulta <u>hitehorse, Yukon</u>	mis Lta.		WED			ľ						08/25		of 1

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No. of Concession, Name

P					ESS RD - BORROW	CLIENT: YUKON EN				ICES	}	,	~~~~~~	1	TEST	PIT	NO:	12	2289	9-TI	P25
					OPTION	EXCAVATOR: CAT 2												0201-	-96	1228	9
NEAR						UTM ZONE: 8 N7	088027.8	9 E	448	769.	4			E	ELEVi	\TIOI	1:				
DEPTH(m)		SAMPLE NO	nsc	SOIL SYMBOL	AB NO RECOVER SO DESCR]	IL		PLAS	10	NDARI 20	d pe ) M.C.	30	atkon e 40 Liq	NID		20 20	40 • PER( 40	ENT SA 60 Silt of	ND @ ND @ 1 8	10 10	DEPTH(ft)
	SA	Ś		SC		11011		<u> </u>	10	20	@-	70	40	ł		<	PERC	ENT CL	AY 💩		
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-					SILT AND SAND — fine grai permfrost, visible ic — very difficult to dig	xe>15%										·····					2.0
- - 1.0					END OF TESTPIT @ 0.5 m - no water - no slough																
-					– frozen, visible ice>	15%															4.0
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E	EB,	A ]	Eng	ine	ering Consulta	nts Ltd.	LOGGEI REVIEW								COM		TION TE · O	Depth 6/08/	1: 0.5	m	
			-		<u>hitehorse. Yukon</u>		Fig. No		. 10	UELI					10UM		12. 9	0/00/		ge 1	of 1
6/10/04 06:	50 <del>1</del> 4 (	YLINGH	-15}											_							

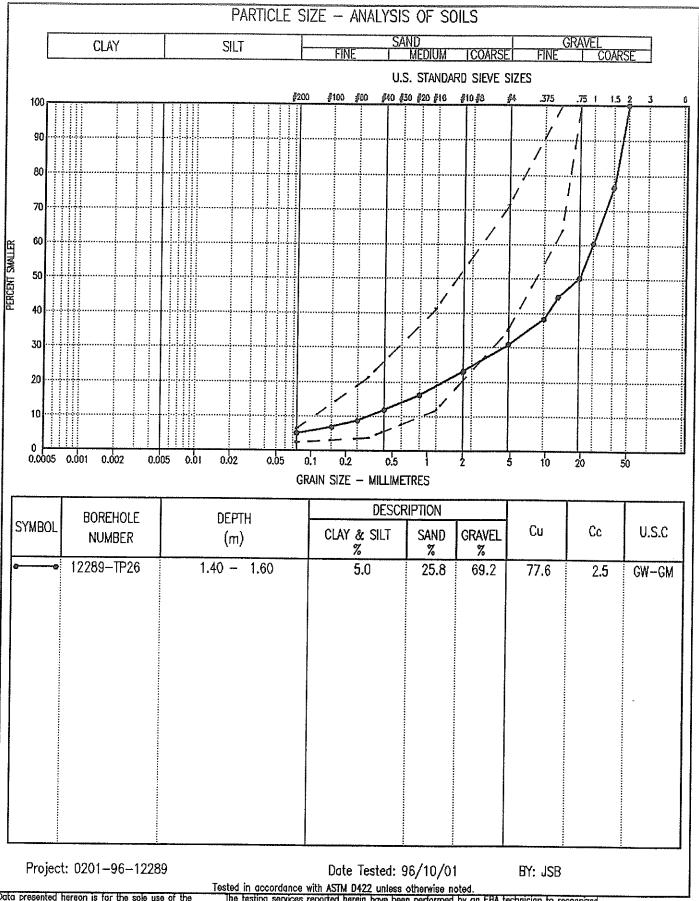
			·····		CESS RD BORROW OPT	CLIENT: YUKON ENG EXCAVATOR: CAT 22			ICES		*		iest i Proje			*****		)—TP2( 12289	3
Ear	MA'	YO, `	YUKON			UTM ZONE: 8 N708			924.	74			ELEVA'						*****
			T	GR				■ STA 10	NDARD 20	) Pen	etrati Ko		T	⊠ F 20	YERCEN 40	60	VEL 🛛	0	
UEP1H(m)	SAMPLE TYPE	SAMPLE NO	nsc	SOIL SYMBOL		DIL 21PTION	PL.	ASTIC		M.C.		liquid		20	PERCE 40 CENT S 40	60	) 8 { FINES		DEPTH(ft)
	S	<sup>o</sup>		S				10	20	-@ 3	Û	40		20	PERCE 40	NT CL 60	AY N 8		
9.0		1			SAND — gravelly, some s sand; fine to med	ilt; well graded ium graded gravel		0											0.0
					SAND — some silt; fine g moist; light greyis	rained; firm; h brown													
					GRAVEL AND SAND — trac graded, sub—roun grained sand; corr	ded gravel; coarse													2.0
0					brownish grey	way, ugup,													4.0
		2											<b>*</b>	•			· 🗃 · · · · ·		
,																			5.0
		– cobbly with some b 2.0 m			<ul> <li>cobbly with some</li> <li>2.0 m</li> </ul>	boulders below				*****									10
		_				· · · · ·												<u></u>	~~
		3		-	END OF TESTPIT @ 3.0 m		0						<b>A</b>	0					0.0
					– no water – no slough														0.0
																			2.0
																		<u>unninu</u>	
				-															4.0
 		Δ	 Fno		eering Consult	anta Itd	LOGGED						СОМ	PLET	10N [	DEPTH	+: 3.0	E 10 E 10 M	5.0
1.	LL.	n .	BIIB		hitehorse, Yukon	ants Ltu.	REVIEWE	) BY:	JRT				СОМ	PLET	E: 98	6/08	/25	ige 1 of	

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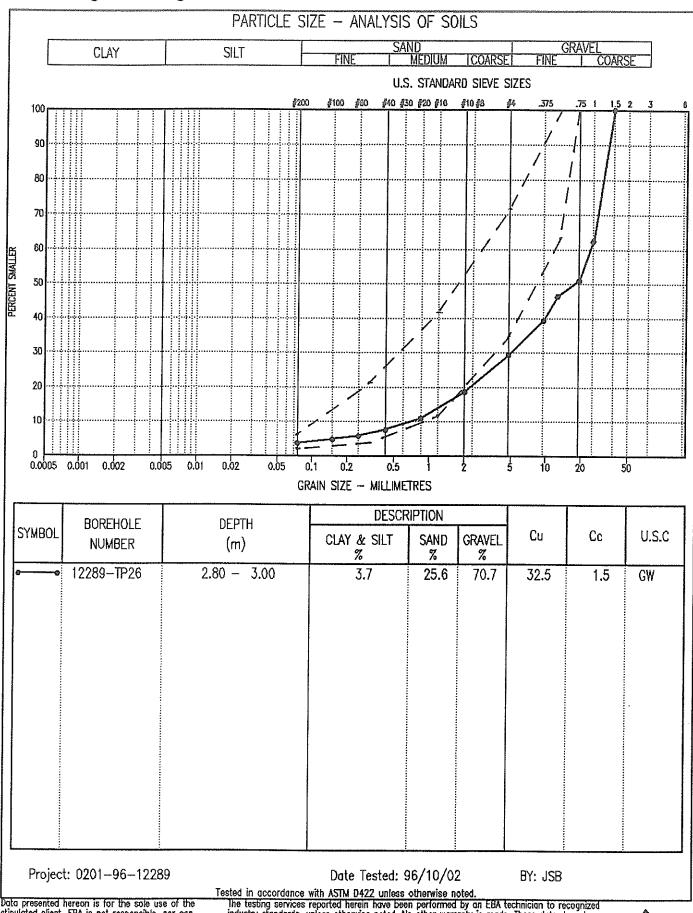
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Saman		and the second second			CESS RD - BORROW	CLIENT: YUKON EN				ICES				TES	r pr	NO:	1	228	39-1	P27
					I OPTION	EXCAVATOR: CAT 2							1980 (acc. 1944) age	And an art of the same			020	1-96	-122	89
SAM		the second second second second second second second second second second second second second second second s	rukon	GR		UTM ZONE: 8 N70	88304.3	14 E	448	783.	24	47/0/10-0-4		ELE\	/ATIO	N:		17-17-14-14-14-14-14-14		
	1	T	1	Ī					i stai 10	VDARO 20		ETRATI 30	0N 🖻 40		20	4	0 I	RAVEL I 60	80	
DEPTH(m)	L L	Ц Ц	nsc	SYMBOL	SO										20	4	0 (		80	DEPTH(ft)
DEP	AMPI	SAMF		Soll	DESCRI	PTION		FLAS	TC		M.C.		LIQUI		20	4	D (		80	
	<u>_</u>	<b> </b>	<u> </u>	S				}	10	20	-©	0	40		20	\$ Per 4	CENT (	CLAY 🔷 GO	80	
0.0					ORGANIC ROOT MAT															E 0.0
		1			SAND AND SILT — fine grai greyish brown — colour changes to					****	٩									ասհոս
-		2			below 0.4 m						•									
1					<ul> <li>trace fo fine graine below 0.4 m</li> </ul>	a gravei														
- 1.0					END OF TESTPIT @ 0.7 m (	(refusal)								-					+	
-			-		— no water — permafrost, visible	ice >10%														4.0 E
																				يانيىن
-																				
- 2.0																				6.0 
-																				ulu.
																				E-8.0
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3.0 -																				E 10.0
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5.0				<u> </u>	· ~		LOGGE		/· .ic	<u>.</u>							DCD		7 -	E 16.0
]	7B	A	Eng		ering Consulta	nts Ltd.	REVIEW	/ED	BY:	JRT							DEP 1 16/08	H: 0. 3/25	/ M	
6/10/04 05	-52AN	(TLACH	-15)	Ŵ	<u>hitehorse. Yukon</u>		Fig. No	); 											age 1	of 1

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			ESS RD - BORROW	CLIENT: YUKON EN	****		RVI	CES					PIT I		****	And the product of the product of	-TP28
n 26.7, S. EAR MAYO,			OPTION	EXCAVATOR: CAT 2: UTM ZONE: 8 N70			100	270 (	\1		***************************************		EGT Ation		201-	96-12	2289
MPLE TY		GR			00200.94		- YLX	129.0	/				AIIUN	•		1711-11-11-11-11-11-11-11-11-11-11-11-11	
UEPTIN(M) SAMPLE TYPE	1	SOIL SYMBOL	SC DESCR	)IL	F			20	PENE 34	TRATIO D	N Ø 40 Liquid		20 20 A PER 20	40	60 VT SAN 60 LT OR 60	80 10 € 80 FINES ⊿ 80	PTH(ft)
						<u></u> 1	0	20	3(	)	40		_ <u>20</u>	PERCE 40	NI CL4 60	¥⊗ 80	
.0 1 2			ORGANIC ROOT MAT SAND – silty, trace of gro grained sand; fine soft; moist to wet; – becomes gravelly, below 0.4 m – permafrost visible	grained gravel; greyish brown larger grained		•	•		·····								2.0
			— no water — some slough														
																	6.0
								*****									-8.0
																	10.0
																*	12.0
																	14.0
FRA	Fng	-in/	eering Consulta	unts Itd	LOGGEI	) Bi	<u>/: J</u> :	SB								: 0.6	- 16.0 
ШDН	ыця			uns Ltu.	REVIEW		BY:	JRT						TE: 96		25	
	08-15}	Yş	<u>hitehorse, Yukon</u>		Fig. No	Ļ	• • <b>•</b> • •• •• •					<u> </u>		-		Pag	e 1 of 1

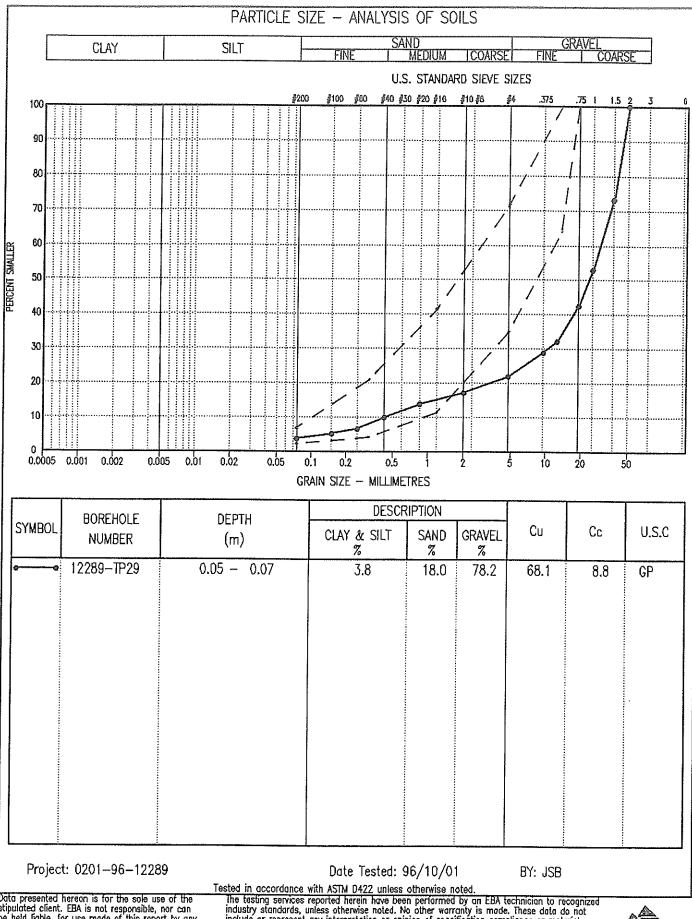
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2					CESS RD - BORROW SOU	CLIENT: YUKON ENG				ICES	3			 	t pr		*****	****		-TP29
					I OPTION	EXCAVATOR: CAT 22								 			: 02	01	96-12	289
SAMP			YUKON F	GR		UTM ZONE: 8 N708	4851.1	σE	450	/66	./3			٤LE	VATIO	: Ж:				
	SAMPLE TYPE		T	SOIL SYMBOL	SO DESCRI	IL		PLAS	10	NDAR 21	D PE	30	ATION 4		20 20 ▲ P 20	@ PE ERCEI	40 RCEN 40 VT SIL 40	60	80 0 @ 80 FINES ▲ 80	DEPTH(ft)
0.0	S			0	ADALUA DAAT MAT			-1 	10	20	)	30	4(		20	♦ PE	RCEN 40	T CLAN 60	/ � 80	
-					ORGANIC ROOT MAT SAND – some silt to silty;	fine proiped:														E 0.0
					soft; moist; light br	own								 						
- - - - 1.0		1			GRAVEL — sandy, trace of graded, sub-rounde grained sand; very of grey	d gravel; coarse compact; damp;	6		· · · · · · · · · · · · · · · · · · ·					 <b>A</b>	۵					2.0
-		2			- some cobble throug	jnout (estpit														4.0
- - 																				6.0
																				8.0
- - 3.0 - -		3			END OF TESTPIT @ 3.0 m — no water — no slough															10.0
																			-	
4.0																				14.0
- - - 5.0													*****	 **********						16.0
E	ΞB	A	Eng	ine	eering Consulta	nts Ltd.	LOGGE											PTH: 08/2	3.0 r	n
6711/12 @:			_		<u>hitehorse, Yukon</u>		Fig. No			9111						فسا است			Page	1 of 1

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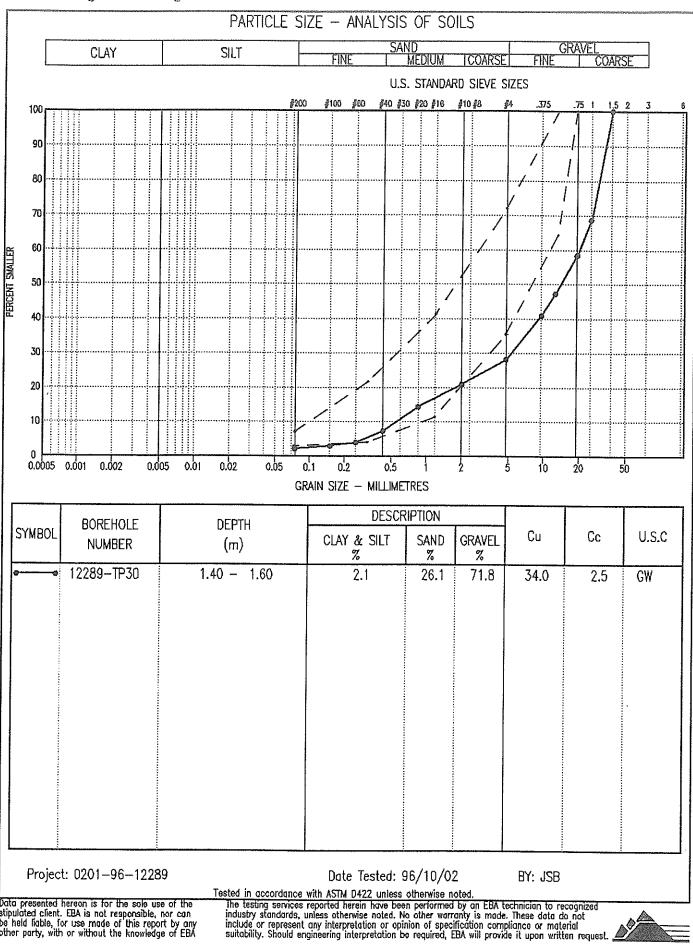


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	*****				CESS ROAD - BORROW S	CLIENT: YUKON ENGIN			RVI	CES			-	iest I	PIT N	0:	122	289-	-TP30
[					I OPTION	EXCAVATOR: CAT 225											2019	6-12	289
			YUKON			UTM ZONE: 8 N7085	108.32	. E4	510	80.8	9		]	ELEVA	TION:				
DEPTH(m)	SAMPLE TYPE F	Ī	T	SOIL SYMBOL	1	IL		I LAST	0	20	PENET 30 I.C. 30	Ű		A	20 @   20 . PERC 20	40 Percen 40 Ent Sil 40 Percen	T GRAVE 60 T Sand 60 T OR F 60 T Clay	80 80 1NES ▲ 80	DEPTH(ft)
0.0					ORGANIC ROOT MAT					20		40			20	40		80	E 0.0
-					SAND — same silt ta silty; soft; moist; light br	own	r												malm
- - 1.0		1			GRAVEL — sandy, trace of graded, sub—rounde sand; compact; dan — some cobbles below	ed gravel; coarse np; grey	9												2.0
-		2					ø							<b>4</b>				<b></b>	4.0
- - - - 2.0																			6.0
R																			8.0
- 3.0 -		3			END OF TESTPIT @ 3.0 m — no water — no slough		•												10.0
- - - - - -																			E 
							•••••					1							E 
- - - 5.0				-			OGGEI			ρ				001				7.0	16.0
ł	ιB	A	Eng		eering Consulta		EVIEW										EPTH: 708/2		1
16/11/12 (B);	4744	(YUKO)	-15}	M	<u>hitehorse, Yukon</u>	F	iq. No												<b>1</b> of 1

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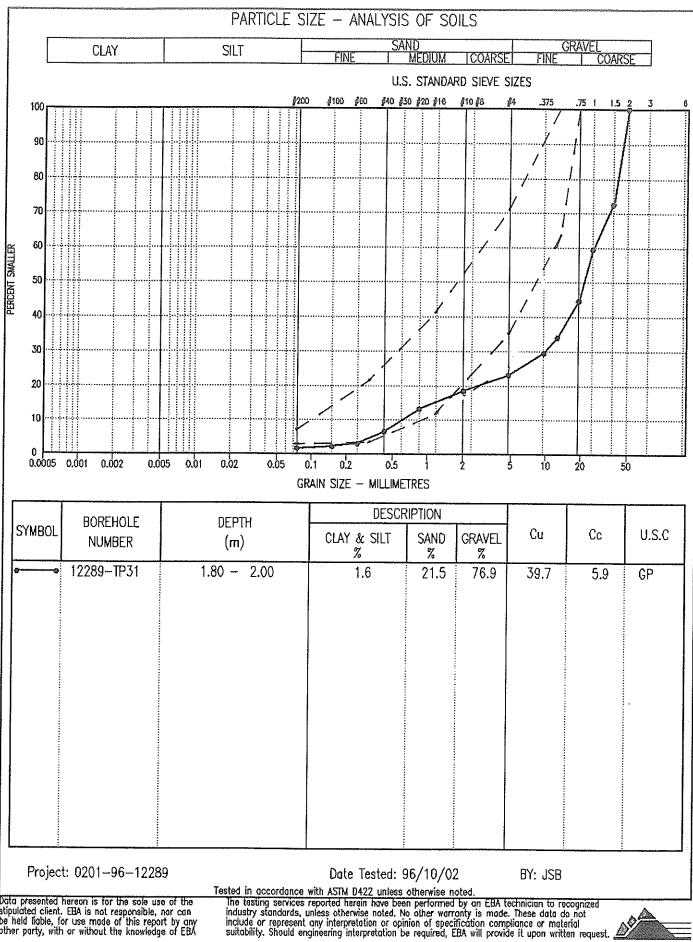
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					CESS ROAD - BORROW S	CLIENT: YUKON EN			RVI	CES			TE	st pi	t No	*	12289	-TP31
					I OPTION	EXCAVATOR: CAT 2							_!			: 020	1-96-	12289
Į						UTM ZONE: 8 N7(	)85167.4	8 E4	513	60.2	3			evati	ON:			
SAMF	L			SYMBOL 5	AB 🛛 NO RECOVEI	∝)][_		2013 1	STAN O	DARD 20	PENETI 30	ration 📾 40		2	0	40	SAVEL III 60 8 SAND @	
DEPTH(m)	SAMPI F TYPI	SAMPLE NO	nsc	SOIL SYN	DESCR	IPTION		PLAST	Ю	W	I.C.	LIOU		2( ▲ F 2(	) PERCEI )	40 1T SILT 40	60 8 OR FINES 60 80	A E
0.0	0.	1		<u> </u>					0	20	30	40		20		RCENT 40	CLAY (\$ 60 8(	)
					ORGANIC ROOT MAT													E 0.0
					SAND - silty													սսևս
		1			GRAVEL — sandy, trace of graded, sub-round grained sand; very	ed gravel; coarse	e	<b></b>										E 2.0
- - 1.0					grey — cobble throughout	testpit												
-																		- 4.0
-					<ul> <li>0.2 m thick layer grained, uniform so</li> </ul>	of medium Ind at 1.4 m												
		2					e							•				E 6.0
2.0 - -							***		,					· · · · ·				
-																		8.0
-																		hurdu
- 3.0 -		3		-	END OF TESTPIT @ 3.0 m	1992	•											10.0
-					— no water — no slough		-											<u></u>
							0.00											E 12.0
  4.0																		
-									****									E 14.0
- -																		
- -		-												******				16.0
<u>5.0</u>	 7.0			<u> </u>	· a	) <b>Т</b> ІЗ	LOGGE		10	<u> </u>							TH: 3.0	F
ł	7F	ίÅ	Eng		eering Consulta	ints Ltd.	REVIEW	/ED 8				···· · ·	С С	OMPL	ETE:	96/0	<u>ап: 3.0</u> 8/29	161
6/11/12 09;	48AM	(YUXO	4-15>	W	<u>hitehorse, Yukon</u>		Fiq. No	):										ne 1 of 1

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					CESS RD - BORROW	CLIENT: YUKON E				CES				TES	î pit	NO	:	122	289-	-TP32
p					OPTION	EXCAVATOR: CAT											: 02(		16-12	
			UKON			UTM ZONE: 8 N7	087168.7	8 E	4539	945.	97			ELE	VATIO	N:				
DEPTH(m)	1	SAMPLE NO	<u>_</u>	SYMBOL B	AB <u>NO RECOVER</u> SO			22	I STAH 10	idard 20	) PEN	ietrat 30	110N 📾 40		20 20	e PE	ICENT 40 RCENT 40	GRAVE 60 SAND 60	1 = 80 9 © 80	(11)
DEPT	SAMPLI	SAMPL	Ň	SOIL S'	DESCR	IPTION		PLAS H			M.C.	70		D	∆ PE	RCEN	IT SILT	r or f	INES ▲ 80 ♦ 80	DEPTH(ft)
0.0					ORGANIC ROOT MAT				10	20		30	40		20		10	60	80	E 0.0
-		1			SAND — trace of silt; fine grained sand; firm;	moist; grey		٢												under on
- - - - 1.0					GRAVEL AND SAND — trace graded, sub-rounde compact; damp; gra	ed gravel;					· · · · · · · · · · · · · · · · · · ·								L	- 2.0
2																				4.0
- - 2.0		2	nn de la companya de la companya de la companya de la companya de la companya de la companya de la companya de				\$													6.0
											· · · · · · · · · · · · · · · · · · ·									
- 3.0		3			END OF TESTPIT @ 3.0 m		•		***********************											
					<ul> <li>no water</li> <li>some slough</li> </ul>															
									***************											12.0
<b>→ 4.0</b>																				E
5.0																				
E	CB.	A I	Eng	ine	ering Consulta	nts Ltd.	LOCGE							CO	MPLE	TION	1 DEI	PTH:	3.0 n	1
			-		hitehorse, Yukon		REVIEW Fig. No		01.	าเป					MPLE	IL:	96/(	8/2		1 of 1
6/10/05 12:	3444 (	TUXOH-	-15)											l					1 996	

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					CESS RD - BORROW SOU	CLIENT: YUKON EN			RVI	CES				EST PI				_	39—TF i=1228	
			YUKOI			UTM ZONE: 8 N70			543	28.8	8			LEVATI			1201	-30	12,20,	0
		TYP			AB NO RECOVER	1									V::.					
DEPTH(m)	SAMPLE TYPE	NO		BOL		)IL	F	1 1/1/1/1 1/1/1/1/1/1/1/1/1/1/1/1/1/1/1	о К	20  /	PENETI 30 I.C.		io Liquid I	2 2 A f 2	0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40 PERCI 40 ENT : 40 PERC	ENT S ENT S SILT ( ENT C	30 CLAY ∢	80 80 IES ▲ 80	DEPTH(ft)
0.0	+			+	ORGANIC ROOT MAT				0	20	30	4	0	20	<u>)</u>	40	6	10 1 1	80	E 0.0
		1			SILT — sandy; fine grained reddish brown	d; soft; moist;										•				2.0
.0					GRAVEL — sandy, trace of graded, sub—round grained sand; com — sloughing below 0.	ed grovel; coarse pact; damp; grey														
D																				6.0
		2			END OF TESTPIT @ 2.5 m		<b>.</b>													8.0
0					— no water — major sloughing be	elow 0.5 m	(****													10.0
)																				12.0
						,											\$**** <b>(</b>			- 14.0
				•			LOGGEI	ים ר	4. 10								NED		2.5 m	- 16.0
	ЕE	3A	Enj		eering Consulta	ants Ltd.	REVIEW							COMP						
			1-13}		Whitehorse, Yukon	··· ·····	Fig. No											· /	Page 1	of 1

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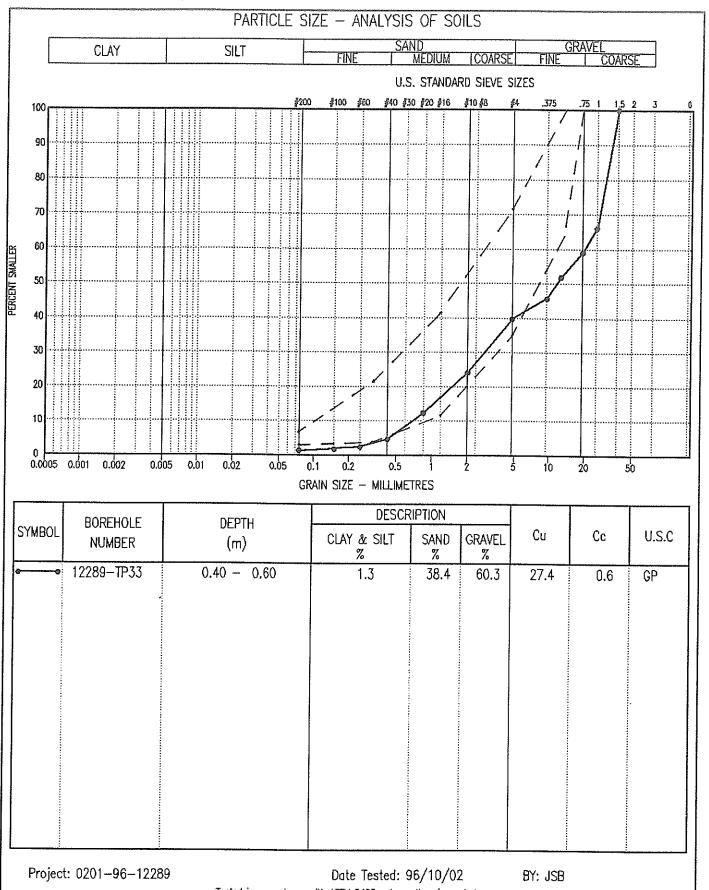
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					CESS RD - BORROW	CLIENT: YUKON EN				CES				est pπ		****		-TP34	1
					1 OPTION	EXCAVATOR: CAT 2								ROJECT		0201-	-961	12289	
SAMP			YUKON		AB NO RECOVER	UTM ZONE: 8 N7	28/717.4	8 L	4548	564.1	6			LEVATIO	N:				
	SAMPLE TYPF	1	T	SOIL SYMBOL	SO DESCRI	IL			10	20	PENET 30 1.C.		N III 40 LIQUID	20 20 & PE 20	40 D PERC 40 RCENT 40	ENT SA 60 SILT OI	ND () ) 8( R FINES ) 8(		DEPIH(ft)
0.0			<u> </u>		ORGANIC ROOT MAT				10	20	30	- 4	40 1	20	40		) 8( ) 8(	<u>)   - (</u>	0.0
					SAND — silty, some gravel sand; fine to mediu gravel; soft; moist; GRAVEL — sandy, trace af graded, sub—rounde ta compact; damp;	m grained reddish brown silt; well ed gravel; loose moist; grey		•									-	<u>nundeunu</u>	2.0
1.0		2			<ul> <li>cobbly with some t</li> <li>0.2 to 0.5 m</li> <li>grovel becomes fin</li> <li>grained below 0.5 t</li> </ul>	e ta medium		٩											4.0
0									******									<u>6</u> 6	5.0
		3																8	.0
					END OF TESTPIT @ 3.0 m — no water — some slough below	0.2 m													0.0
																			2.0
							•••••												4.0
									V. P	en en								. F	5.0
I	ΞE	BA	Eng		eering Consulta	nts Ltd.	LOGGE REVIEV							COMPLI				m	_
		<del>a (yuxo</del>		Ţ	<u>Yhitehorse, Yukon</u>		Fig. N									-/ 50		qe 1 of	1

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3					CESS RD - BDRROW	CLIENT: YUKON ENG			VICE	S			TEST					-TP35
§					I OPTION	EXCAVATOR: CAT 22										201-	96-12	289
			YUKON			UTM ZONE: 8 N70	87932.09	E45	5841	.33			ELEVA	TION:				••••••••••
SAMF	Τ.	]	1	명				⊠ S° 10	randai 2		NETRAT 30	ЮN 📾 40		20	40	IT GRAV	80	1
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	usc	SYMBOL	S0									20	40	nt san 60	80	DEPTH(ft)
DEP	AMP	SAME		SOL	DESCRI	PTION	F	LASTIC	;	M.C.		LIGUI(	,	20	40	60	FINES A 80	
0.0	Ľ.	1			ADALUA DAAT WAT	· · · · · · · · · · · · · · · · · · ·		10	2	0	30	40		20	40	NT CLA 60	Y & Y 80	
					ORGANIC ROOT MAT													E 0.0
F					SAND — silty, fine grained; yellowish brown	soft; moist;							*********					
		1																E E-20
Ľ					GRAVEL - sandy, trace of	ailt: wall												
- 1.0					graded, sub—rounde	d gravel; coarse												
ŀ					grained sand; very ( grey	,												4.0
-					<ul> <li>cobbly with some b</li> <li>0.2 m</li> </ul>	oulders below												
-																		
		2						0										
- 2.0																		- 6.0
-					— possible water table	at 2.6 m												
-																		
. Į		3			— frozen at 2.7 m		• <1+7	·, <b>,</b>		0			,,					E-8.0
-				-	SAND – some silt to silty; (	ine grained,				Ť								
					uniform sond; moist	to wet; grey												
-					END OF TESTPIT @ 2.7 m — water at 2.6 m													E 10.0
-					– little slough													n n n
-																		
-																		E 12.0
4.0																		
-													•••••		·····			
																		E 14.0
																		huu
5.0																		E 16.0
	ΞB	A	Eng	ine	eering Consulta	nts Ltd.	LOGGED			· · ·		: : !					: 2.7 n	<u></u> า
			-		hitehorse, Yukon		REVIEWE		: JR1					PLETE	: 96	/08/2		1 of 1
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					CESS ROAD - BORROW	CLIENT: YUKON ENG		·····	ICES			TEST				289-1	the second second second second second second second second second second second second second second second s
					I OPTION	EXCAVATOR: CAT 22									201-{	)6-122	89
ilak Samp			YUKON			UTM ZONE: 8 N70	37874.66 E	456	368.0	4		ELEVA	TION.	:			
	SAMPLE TYPE	<u> </u>		SYMBOL 5	AB NO RECOVER	IL		10	NDARD 20	PENETR 30	ation II 40		20 20	40 PERCE 40	t craw 60 Nt sane 60	80 ) @ 80	DEPTH(ft)
DEP	SAMP	SAM		SOIL	DESCRI	IPTION	PLA H	STIC		1.C. ©	UQVIC 	·	<u>20</u>	40 PERCE	60 NT CLAY	FINES ▲ 80 ′ �	DEP
0.0					ORGANIC ROOT MAT			10	20	30	40		20	40	60	80	E 0.0
					SAND — silty; fine grained; light yellowish brow	; firm; moist; n											
		1						٢									2.0
1.0																	
2.0		2			GRAVEL AND SAND — trace graded, sub—rounde grained sand; very (	d gravel; coarse	•					•					6.0
					grey - cobbly below 1.8 m												8.0
		3			SAND AND SILT — trace of grained, uniform san grained, sub—rounde moist; dark grey	nd; fine		¢	1								······································
5.0					END OF TESTPIT @ 3.0 m — no water — little to no slough							451					10.0
									• • •								12.0
.0							•••••										un tritter
																	14.0
														*****			16.0
<u>5.0  </u> T	<u></u> תק	 >	<u> </u>	 	amina Carall		LOGGED	BY: J	<u>i i</u> ISB	; [		СОМ	IPI F	i i Tion f	)ЕРТН•	3.0 m	<u>F</u>
Ł	<u>ר</u> ק	iΑ	Ľηβ		eering Consulta	nts Ltd.	REVIEWED								/08/2		
1414 117	ការម	(YLKC)	-15)	ţ	<u> Yhitehorse, Yukon</u>		Fig. No:									Page	1 of 1

Annual Contraction of Contract

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5					CESS ROAD - BORRDW	CLIENT: YUKON EN	GINEERIN	GS	ERVI	ICES	ì	********		וד	est f	n Tr	10:	12	289-	TP37
ş	*****	••••••			N OPTION	EXCAVATOR: CAT 2													96-12	
<u> </u>			YUKON			UTM ZONE: 8 N70	87328.0	6 E	4568	828	.57			El	EVAT	10N:				
SAMF	ΊΕ Τ	IYF T	<u>ነ</u>	GF	RAD NO RECOVER	Y			074	10.15	0 00		71611							
	<u>, PF</u>	0		6		77			1 STAP 10	NDAR	D PE )	NETR <sup>I</sup> 30	tion ₪ 40			20	40	T GRAV 60	80	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO	usc	SYMBOL	SO	11									2	©   20	PERCE 40	nt san 60	D @ 80	ר ≣ר
EPT	Id N		≌	L S	DESCRI	ΙΡΤΊΛΝ		PLAS	TIC		M.C.	_	LIQ	ן חונ	۵	PERC	ent s	ILT OR	FINES 🛦	DEPTH(ft)
	SAI	5		SolL				<u> </u>						+	4	2 <u>0</u> ©	40 PERCE	60 NT CLA	80 Y⊜	
0.0	┢	<u> </u>			ORGANIC ROOT MAT				10	20	) ;	30	40	+	2	20	40	60	80	<u> </u>
F																				Ē
$\mathbf{F}$					SAND - grovelly, some sill	t; well graded														
Ł		1			sand; well graded, s gravel; firm; moist;	light grev	e													
ŀ					g. = , ,			1	*****		1							····		
ŀ																				E 2.0
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- 1.0																				<u>E</u>
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-			<u> </u>																	1
																				···· <u>E</u>
						_*II. 11														Ē
		2			GRAVEL — sandy, trace of groded, sub-rounde		۲													E 6,0
- 2.0					grained sand; comp	oct; damp; grey														E
-																				5
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-																				Ē
-											. <u>.</u>									
-																				
-					— possible water table	at 2.9 m														
- 3.0		3			- possible wuter table	ul 2.0 m	Ø													Ē
- 0.0					END OF TESTPIT @ 3.0 m									•••	11		Î			<u>-</u> 10.0
-					— water at 2.8 m — sloughing throughou	it tootoit														Ē
-					- sloughing throughou	ι τεστριτ														E
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5/10/04 073	17AM	IYLKO?	1-15)	W	<u> Ihitehorse, Yukon</u>	····	Fig. No													1 of 1

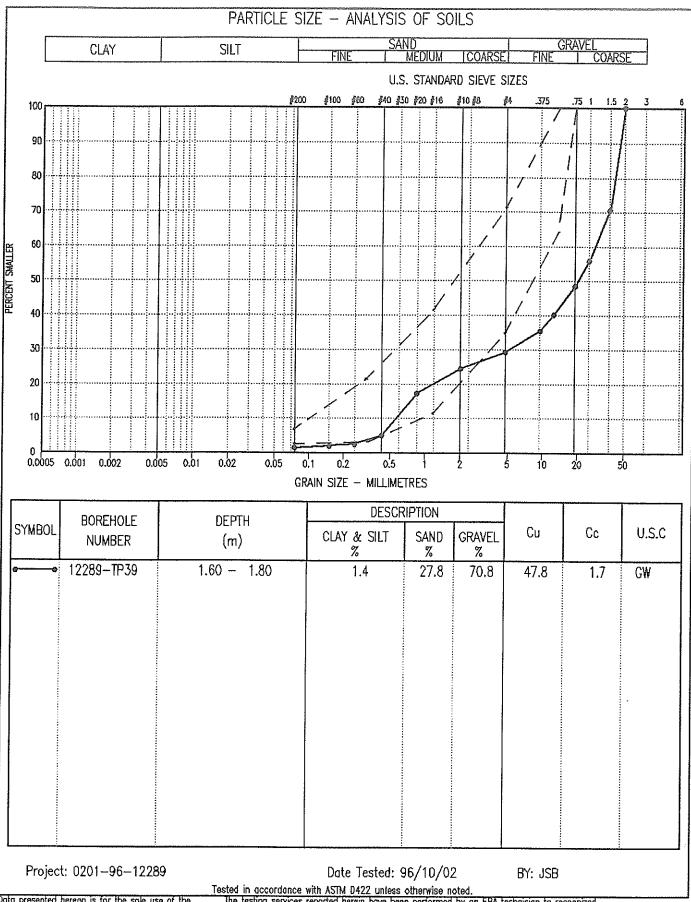
			· · · · · · · · · · · · · · · · · · ·		CESS RD - BORROW	CLIENT: YUKON EN				ICES	)				r pr			****	9-T	
	•••••				OPTION	EXCAVATOR: CAT 2										NO: (	)201-	-96-	·1228	9
			/UKON			UTM ZONE: 8 N70	86400.98	3 E	462	614.	.31			ELE	VATIOI	V:				
DEPTH(m)	SAMPLE TYPE	1		SOIL SYMBOL	AB NO RECOVER SC DESCR	IL			I STA 10 5tic	20		NETRAI 30	Tion III 40 Llouid	> 	20 20 ▲ PEI 20	PERCE 40 9 PERCI 40 RCENT : 40	60 ENT SA 60 SILT OF 60	ND @ ND @ R FINE	80 80	DEPTH(ft)
	S			S				F	10	20	-0- )	30	40		20	PERC 40	ent Cl 60	AY 🗞	30	]
0.0					ORGANIC ROOT MAT															E 0.0
		1			SAND — trace of silt; mec uniform sand; firm	ium grained; moist; grey														
0					SAND AND GRAVEL — trace grained sand; fine groined gravel; con	to medium npact; damp; grey														20
					— coarser gravels be	low 1.0 m														4.0
		2						0												سيابس
)							,													6.0 E
																				8.0
		3																		
					END OF TESTPIT @ 3.0 m — no water — some sloughing thr	oughout testpit														10.0
									*****	*****	******							****		12.0
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<u>ן</u> ד	 רדי	<u> </u>	<u>L</u>				LOGGE	DF	<u>.</u> ЗҮ: ,I	: SB				L Icr	)MPI F	TION	DEDI	H: 3	0 m	E
Ľ	ιB	δA	Eng		eering Consulta	ints Ltd.	REVIEW	/ED								TE: 9			<u>v 111</u>	
1 872	13415	(YUKØY	1741	Y	<u> Ihitehorse, Yukon</u>		Fig. No	);											age 1	of 1

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§					CESS ROAD - BORROW S	CLIENT: YUKON ENG			RVICE	ES	**************************************		TEST	PIT I	10:	12	289-	-TP39
				TEN	OPTION	EXCAVATOR: CAT 22										201-	96-12	289
NEAR						UTM ZONE: 8 N70	86474.0	5 E46	342	0.67			ELEV	NOIT/	:			
DEPTH(m)		Q	nsc	SOIL SYMBOL	AB NO RECOVER SO DESCRI	IL		<u>10</u> PLASTIC	;	20 M.C	30	1110N (2) 40 11QVII		20 20 A PER 20	40 PERCE 40 CENT S 40	IT CRA 60 NT SAN 60 ILT OR 60 NT CLA	80 ID @ 80 FINES ▲ 80	DEPTH(ft)
0.0					ORGANIC ROOT MAT		·	10		20	30	40		20	40	60	80	= 0.0
1		1			SAND — some silt; fine to sand; soft; moist; g GRAVEL — sandy, trace of graded, sub—rounde	reyish brown silt; well		······		٥								2.0
- - - - -					well graded sand, co moist, grey	ompact,			**				***					- 4.0
- - - - - 2.0		2					•							Ø				
- - - -					— grovel becomes fine groined below 2.2 m	e to medium												8.0
- 3.0 - - - -		3			END OF TESTPIT @ 3.0 m — water at 2.7 m — some sloughing belo	w 3.0 m		•										10.0
- 4.0							(,											- 12.0
																		14.0
5.0									100					0				16.0
E	ĽΒΙ	A I	ing		ering Consulta	nts Ltd.	LOGGED			T						epth: /08/:	3.0 m 29	
/11/12 09:	KANI (I	IUKÕH-	-15)	W	<u>hitehorse, Yukon</u>		Fig. No											1 of 1

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# EBA Engineering



Data presented hereon is for the sole use of the stipulated client. EBA is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of EBA The testing services reported herein have been performed by an EBA technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, EBA will provide it upon written request.

·					CESS RD - BORROW	CLIENT: YUKON ENG			VICE:	S			TEST PF					-TP40
1					OPTION	EXCAVATOR: CAT 22							PROJEC		): 02	01-	96-12	289
NEAR I						UTM ZONE: 8 N708	36443.62	2 E46	3681	.96			ELEVATIO	DN:				
SAMPL	Ŀ		E I	GR I	RAB NO RECOVER	Y			*****		NCTOA	TION 🖂			DAFU	7 ATA	<u> </u>	
	TYPE	0		5		**		10	ANDAP	10 PE	30	40 	20	)	40	r crav 60	80	
DEPTH(m)	≧	SAMPLE NO		SYMBOL	SO								20	@ Pl )	ercen 40	it san 60	D @ 80	DEPTH(ft)
EP 1	SAMPLE	ЧЧ	usc	رم ا	DESCRI	ΌͲΙΩΝΙ	F	PLASTIC		M.C		LIQUIC	A P	ERCE	NT SI	LT OR	FINES A	
ā	SAN	S		SolL		IT HON					•		<u>20</u>		40 FRCEN	60 (T CLA)	<u>80</u>	<sup>1</sup> 2
0.0					ORGANIC ROOT MAT			10	2	0	30	40	20	 	40	60	80	= 0.0
-					ORGANIC ROUT MAT													
					SAND - trace of silt; fine	to medium												
-		1			grained			•										Ē
┝					uniform sand; soft	to firm; moist;												
					grey													E-2.0
						1												E
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.					END OF TESTPIT @ 3.0 m - no water													E 10.0
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	קי	٨	 ፑъሪ	rin	paring Consults	nta Itd	LOGGEI				<u></u>	1	COMPL	ETIC	DN D	EPTH	: 3.0 (	<u>г</u> М
Ц	ιD	Н	<u>ع</u> 11ن		eering Consulta	шіз ціа.	REVIEW		': JR	T			COMPL				29	
710 404 0730		(41 H D)		γγ	<u> Mitehorse, Yukon</u>		Fig. No	);									Pag	et of 1

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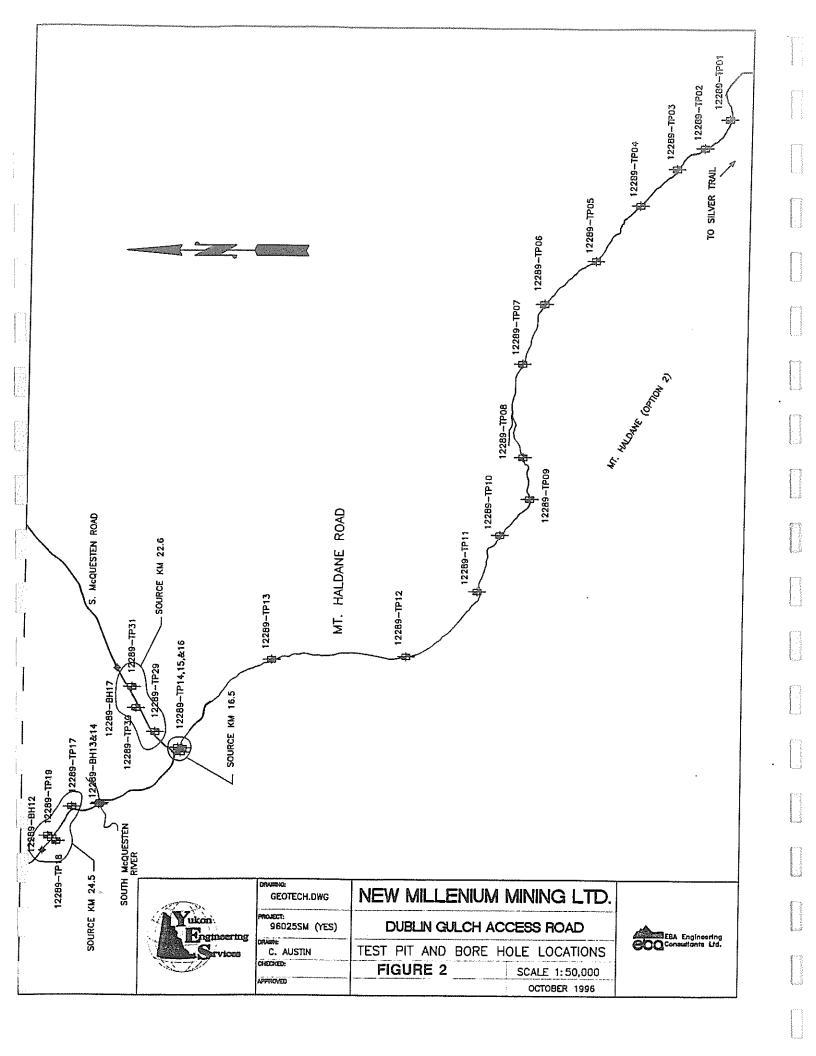
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#### **APPENDIX B**

Mt. Haldane Lookout Road Option

Sidehill Cut Testpit Logs and Borrow Source Testpit Logs (including laboratory test data)





elongate growles; dense, light greyteh brown BEDROCK (Schist) - weathered for 1.6 m, competent blow this depth - larger sized rock (shole) below 1.0 m - less breakage during excavation - less breakage during excavation - becoming difficult to excavate at 2.0 m depth - so - becoming difficult to excavate at 2.0 m depth - no water - no sloughing - so EBA Engineering Consultants Ltd. EBA Engineering Consultants Ltd. - tesp Yukon -	2					CESS RD - SIDE HILL	CLIENT: YUKON EN			RVIC	ES			TEST	n Tiq	10:	12	289	-TP	01
SAMPLE TYPE         Income         In	Summer and a second sec					DOKOUT RD. OPTION	······································										201-	-96-1	2289	
E         B         SOIL         B         SOIL         B </td <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>77406.5</td> <td>5 E4</td> <td>588.</td> <td>33.88</td> <td>}</td> <td></td> <td>ELEVA</td> <td>TION</td> <td>:</td> <td>********</td> <td></td> <td></td> <td></td>		-						77406.5	5 E4	588.	33.88	}		ELEVA	TION	:	********			
B       B       B       DESCRIPTION       Portic u.c. u.co.		L		T	T							ENETRA 30			20	40	60	80		¢
00         10         20         20         40         20         700 <sup>-11</sup> color doll with solution of the soluti	DEPTH(	AMPLE .	SAMPLE	nsc	SOIL SYM				PLASTI	с	M.	C.	LIQU![		20 V PER( 20	40 Cent S 40	60 1LT OR 60	80 Fines / 80	<u>۵</u>	рертн(1
SMD       growely, silty: fld, shaly:         element       element         1       BEDROCK (Schist) - weathered for 1.6 m, competent below this depth         -10       -10         2       - larger sized rock (shale) below         1.0       - less breakage during excavation         -20       - less breakage during excavation         -20       - becoming difficult to excavate at 2.0 m depth         -3.0       - becoming difficult to excavate at 2.0 m depth         -3.0       - no stoughing         -4.0       - no stoughing         -5.0       - no stoughing         -1.0       - no stoughing			<u> </u>		<u> </u>				10	)	20	30	40		20					
Competent below this depth     - larger sized rock (shale) below     1.0 m     - less breokage during excavation     - less breokage during excavation     - becoming difficult to excavate     at 2.0 m depth     - becoming difficult to excavate     at 2.0 m depth     - no water     - no water     - no sloughing     - no sloughing     - to	-		1			elongated gravels; c greyish brown	lense, light		0											0.0
						competent below thi	s depth										-0			- 2.0
<ul> <li>- less breakage during excavation</li> <li>- less breakage during excavation</li> <li>- becoming difficult to excavate at 2.0 m depth</li> <li>- becoming difficult to excavate at 2.0 m depth</li> <li>- an o water</li> <li>- no water</li> <li>- no sloughing</li> <li>- tess breakage during excavation</li> <li>- becoming difficult to excavate at 2.0 m depth</li> <li>- an o water</li> <li>- no sloughing</li> <li>- tess breakage during excavation</li> <li>- becoming difficult to excavate at 2.0 m depth</li> <li>- an o water</li> <li>- no sloughing</li> <li>- tess breakage during excavation</li> <li>- an o water</li> <li>- no sloughing</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- an o water</li> <li>- no sloughing</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li>- tess breakage during excavate at 2.0 m depth</li> <li></li></ul>	- 1.0 -		2			– larger sized rock (s 1.0 m	hale) below													- 4.0
-20 -20 -20 -20 -20 -20 -20 -20	-					— less breakage durin	g excavation													-
-30 -30 -30 -30 -30 -30 -30 -30	- - 2.0						o excavate													- 6.0
-3.0 - no sloughing -3.0 - no sloughing -4.0	-						JRABLE ROCK;													- 8.0
-4.0 -4.0 -4.0 -4.0 -4.0 -4.0 -4.0 -4.0 -5.0 EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon EBA Engineering Consultants Ltd. EDGGED BY: JSB COMPLETION DEPTH: 2.7 m REVIEWED BY: JRT COMPLETE: 96/08/23 Fig. No: EDGGED BY: JRT COMPLETE: 96/08/23 EDGGED BY: JRT EDGGED BY: JRT E						— no water														- 10.0
5.0     Image: Solution of the second state of the second st	-																			- 12.0
EBA Engineering Consultants Ltd. Whitehorse, Yukon Whitehorse, Yukon																				- 14.0
TEDA Engineering consultants Ltd. REVIEWED BY: JRT COMPLETE: 96/08/23 Whitehorse, Yukon Fig. No:	5.0		F																F	· 16.0
Whitehorse, Yukon Fig. No:	E	ĽΒ	A	Eng	ine	eering Consultat	nts Ltd.												m	
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	Access RD - Side Hill Ie Lookout RD Option	CLIENT: YUKON ENG		RVICES			EST PIT N		<u>12289-TI</u>	and a second statement of the second s
AR MAYO, YUKON		EXCAVATOR: CAT 225 UTM ZONE: 8 N707		13486	78	·····	LEVATION:		1-96-1228	9
WPLE TYPE	GRAB NO RECOVEL		//20.14 L10			<u> </u>		•		
LE NO PLE NO USC		IL	PLAST	C i	30 N.C. ●	40 Liquid	20 20 ▲ PERC 20	Percent 40 2ent silt 40 Percent	60         80           SAND @         60           60         80           0R FINES ▲         60           60         80           CLAY ◆	DEPTH(ft)
2.0	ORGANIC ROOT MAT		10	20	30	40	20	40	60 80	= 0.0
1	SAND — silty, rootlets; fin firm; light brown	e grained;		•						2.0
.0	BEDROCK (Schist) — weat competent below this	hered for 2.1 m, s depth								4.0
0										6.0
	— becoming difficult at 2.5 m depth	to excavate								- 8.0
	END OF TESTPIT @ 3.0 m — no water — no slough	(refusal)								10.0
									· · · · · · · · · · · · · · · · · · ·	12.0
										- 14.0
										- 16.0
EBA Engi	neering Consulta	ants Ltd.	LOGGED BY				COMPLET	ION DEF	TH: 3.0 m	
	Whitehorse, Yukon		Fig. No:	II JKI			LUMPLEI	E: 96/0	18/23 Page 1	
EBA Engi	at 2.5 m depth END OF TESTPIT @ 3.0 m - no water - no slough	(refusal)	REVIEWED B				COMPLET	ION DEF E: 96/0		10.0

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3		·····			Cess RD - Side Hill	CLIENT: YUKON ENG	INEERI	NG S	ERV	ICES			71192000000000000000000	TES	r Prr	NO:	1	228	9-TI	203
for a second sec					okout RD option	EXCAVATOR: CAT 22								· · · · · · · · · · · · · · · · · · ·			0201	-96-	·1228	9
F			YUKON			UTM ZONE: 8 N707	78088.	23 E	458	191.	76			ELE	VATIO	N:	•		<del></del>	
DEPTH(m)	1	SAMPLE NO	<b>6</b>	SOIL SYMBOL	AB 🛛 NO RECOVER SO DESCRI	IL		PLAS H	<u>10</u> атк	20	M.C.	30	110N @ 40 110VI	D	20 20 ▲ PE 20	4 © PER 4 RCENT 4	D (CENT S D (CENT S D (CENT C CENT (C	iand (*) 10 10 10 10 11 10 11 11 11 11 11 11 11	80 30 S & 30	DEPTH(ft)
0.0					ORGANIC ROOT MAT				10	20	-	<u>30</u>	40		20	4(	) 6 :		30	= 0.0
-		1			SAND — gravelly, silty; flat gravels; (shale); so	, elongated ft; moist		•	4											2.0
- 1.0 - - - -					BEDROCK (Schict) — weath competent below th — becomes larger and depth below 0.4 m	is depth	•••••••••••••••••••••••••••••••••••••••													4.0
- 2.0 -											·····			• • • • • • • • • • • • • • • • • • • •						6.0
- 3.0		3			end of testp11 @ 2,9 m (	refusal)														- 8.0
					— no water — no slough	,														10.0
-: - - 4_0																				- 12.0
-																				- 14.0
5.0				<u>.                                    </u>	• • • · ·				<u>v. 1</u>	20						TION	DEDT			10.0
ŀ	ĽВ	A	Eng		eering Consulta	nts Ltd.	LOGG										DEP1 36/08	H: 2.9 1/23	) M	
6/10/08 03:	1546	(TUROF	1-15)	W	<u>hitehorse, Yukon</u>		Fig. N	0:							·				ige 1	of 1

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				 CESS RD - SIDE HILL	CLIENT: YUKON EN			VICE	5			···	ST PIT		*******		<u> 39–TF</u>	Parameter and an and an and an and
		*****	HALDA (UKON	 DOKOUT RD OPTION	EXCAVATOR: CAT 2			7700	<u>n</u> /		····			·	0201	1-96	-1228	
		TYPI		 AB NO RECOVER	UTM ZONE: 8 N70	78508,00	E40	7709	.0%				EVATIO	N.				
DEPTH(m)	SAMPLE TYPE	Q	1		IL	PI	10 _ASTK	2	0 M.C.	30			20 20 & PE 20	I PERC 4( D PERC 4( RCENT 4( \$ PER	) CENT ( ) SILT ( )	60 SAND 4 60 OR FIN 60 CLAY 4	80 80 IES ▲ 80	DEPTH(ft)
).0	-			 ORGANIC ROOT MAT			10	2	0	30	40		20	40	) ( :	60	80	= 0.0
		Ĩ		SAND — gravelly, silty; fine grained elongated g moist; medium grey	ravel; soft;			•						· · · · · · · · · · · · · · · · · · ·				2.0
.0		2		— colour changes to below 1.5 m	blackish grey		•••••											4.0
.0				BEDROCK (Schist) — weath competent below th														6.0
																		8,0
0		3		END OF TESTPIT @ 3.2 m ( — no water — no slough	refusal)	••••												- 10.0
)		· · · · · · · · · · · · · · · · · · ·		<u>- 0.00</u> g/												,		- 12.0
																		- 14.0
)					n													- 16.0
]	EE	}A	Eng	eering Consulta	nts Ltd.	LOGGED			T				COMPL COMPL					
		TUNCA	_	<u> Mitehorse, Yukon</u>		Fig. No:											, Page 1	of 1

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March 1997 Annual VIII

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B					DOKOUT RD OPTION									<u>}</u>					
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-	AMPLE TYPE         Move         [] IN DECORPORT           (a)         (b)         (c)																		
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+	B       B       B       DESCRIPTION       PLSTC       MC.       UOUD       COUNCED BY BASE ADD ADD ADD ADD ADD ADD ADD ADD ADD AD																		
F					elongated gravel; so	oft; moist;			····•			·····				ļ			<u>E</u>
					-														E-20
╞					SAND — gravelly, some si	t; coarse													
F					grained sand; well g elongated argvel: fir	iraded flat,													E.
- 1.0						m, moist,													Ē
-					– becomes coarser w	ith depth													
F	0       10       20       30       40       20       40       80       00         1       SAND - silty, some gravel; fine grained elongated gravel; soft; moist; light brown       40       60																		
[	7. HT HUDNE LOGKOUT RD CPTION         EXCENTION:         PROJECT NO: 0201-06-12203           AMO, TUKON         UTR ZORE: 8 A7079133.44 E56073.20         TECMTOR:           IL TYPE         Million Recovery         SOLL         Intervention           IL TYPE         Million Recovery         Intervention         Intervention           IL TYPE         Million Recovery         Intervention         Intervention         Intervention           IL TYPE         Million Recovery         Intervention         Intervention         Intervention         Intervention           IL TYPE         Million Recovery         Intervention         Intervention         Intervention         Intervention         Intervention           IL TYPE         Million Recovery         Intervention         Intervention         Intervention         Intervention         Intervention         Intervention           II Soll         DESCRIPTION         Intervention         Intervention         Intervention         Intervention         Intervention         Intervention           II SAND - sity, some grueit, fine gruined sont, well groaded for, displate grower, soit, moist, gray         Intervention         Intervention         Intervention         Intervention           II PROCK - weathered for 0.4 m becoming competent below this depth         Intervention         Intervention																		
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- 2.0					competent below thi	s depth											ļ		
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				F	END OF TESTPIT @ 2.2 m (	refusal)													Ē
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Ľ	11)	<u> </u>	-TIR		÷	IILS LLU.			3Y: J	IRT								23	
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					CESS ROAD - SIDE HIL	LLIENT: YUKON ENG				CES				TEST			****	**************************************		P06	]
				*****	)okout RD. Option	EXCAVATOR: CAT 22								PROJ			0201	-96-	-1221	39	
SAME			rukon F	GR	AB NO RECOVER	UTM ZONE: 8 N707	9803.30	> £4	\$56	420.	55			ELEVA	\1101	V:					_
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Γ <sub>ε</sub>	7 7 PF	2		SYMBOL	SO	TT	-		10	20		30	40		20	40 > PERC	6	0 ;	80		
DEPTH(m)	L	SAMPLE NO	usc	SYN S											20	40	6	0 1	80	DEPTH(ft)	
B	SAMPLE	SAM		SOL	DESCRI	PTION	F	PLAS	TIC		M.C.		LIQUID		20	RCENT 40	6	) (	S▲ 60	DEP	
		2		د ا					10	20	-0	XO	40		20 <sup>(</sup>	> PERC 40	ent ci 61	LAY 🗇 )	30		
- 0.0					ORGANIC ROOT MAT	- I														<u> </u>	
-		1			SILT — some sand, trace of fine grained, moist,	of gravel, firm			۲											Ē	
ļ.					brownish grey	111112															6
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L																				E- 2.0	
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t		2																			
-				ŀ																	
-			Í		GRAVEL — silty, some sand angular gravel, med		Ĩ													E	
-					grained sand, moist															Ē	1
-					compact, grey															E 6.0	· .
- 2.0					— cobby ond boulde	rs below 1.5 m				••••					••••••	•••••				Ē	
-																				Ē	-
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- 3.0				-	BEDROCK (Schist) - weath	red but becoming														E - 10.0	11
-					more competent with	n depth														E	(T)
-																					
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-					END OF TESTPIT @ 3.5 m (i	refusal)														Ē	
-					— no water — little slough															E- 12.0 E	
-					intio siongii																67
- 4.0															·····				····		
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5.0								<u> </u>				į									
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6/10/08 03	. 12 6 17	(YIE/Arr		W	hitehorse, Yukon		Fig. No	_						1.00%					age 1	of 1	ş
er aror ou		1. 5.1217																			hada a de la de

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					cess road — side hil	CLIENT: YUKON EN	GINEERIN	IG SE	RVI	CES				T	EST	PΠ	NO:	1	228	9-T	P07
					Lookout RD option	EXCAVATOR: CAT 2	25 BACK	HOE					*******	F	ROJE	CT	NO:		731/20074-0400	-1228	ACCOMMENTATION AND A DESCRIPTION OF A DE
5			UKON			UTM ZONE: 8 N7	080076.1	2 C4	556	534.8	33			16	LEVA	TION	1:				an a rannan di Akini iliya kung
SAMI		TYP	Ë [	GF	RAB NO RECOVER	<i>,</i>															
	Ц			2				20 1	STAN 10	idafo 20	PEN	etra 30	TKON E 40			20	PERCI 40	NT GR 6		1 80	
DEPTH(m)	SAMPLE TYPE	SAMPLE NO		SYMBOL	SO SO	П.	ſ	<u>,</u>		<u></u>						¢	PERC	ent s	AND @		12
E	Щ		nsc	2													40 20ENT	SILT 0		<u>80</u> S A	DEPTH(ft)
B	AMF	SAW		SOIL	DESCRI	PTION		FLAST	ГС		M.C.		ЦQ	UD		20	40	6	0 1	80	
	ß			S				1	0	20	-@2	30	40			20 <sup>(</sup>	PERC 40	ENT C	LAY 🗞 D	80	
- 0.0					ORGANIC ROOT MAT															Ī	E 0.0
ŀ					SAND arguelly game -!!!	· · · · · · · · · · · · · · · · · · ·															Ē
F					SAND — gravelly, some silt sand; fine to mediu																<u>F</u>
Ľ		1			angular gravel; com	pact: saturated:		٩													E
-					brawnish grey											1				÷	-E E 2.0
-																					Ē
ŀ																					
- 1.0																					L L
-																					
ŀ					SAND AND SILT — trace of	clar fine															E- 4.0
		2			grained; mattled gre																
F		2			permafrost	-						)									Ē
-					— permafrost to 2.0 r	n (no visible															Ē
F					ice); cold and hard	to break apart															
t																					E 6.0
- 2.0		ľ																			
-					SAND - gravelly, some silt;	well															
ŀ					graded sand; well gr and elongated grave	aded, angular Is loope to															Ē
Ē					compact; moist; dar	k arev															Ē
Ļ					<ul> <li>cabbly and some be</li> </ul>	ulders between															E-8.0
-					2.0 and 3.1 m																
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- 3.0				ĺ			,				ļ							ļ			
ŀ				╞	SILT — sondy, fine grained;	noff: maint.															E 10.0
-					olive brawn	son, moist;															Ē
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╞																					
ţ																					12.0
Ë		4								a											
- 4.0				╞	END OF TESTPIT @ 4.0 m													ļļ			-
F					- water from upper 0,	1 to 1.2 m															
[ ]					<ul> <li>some sloughing from</li> </ul>																- 14.0
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									-												
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5.0				<u> </u>	• • •		LOGGE		1.10				<u> </u>					DEPT	<u> </u>	<u> </u>	<u> </u>
-	ĽВ	Α.	Eng		eering Consulta	nts Ltd.	REVIEY								COM	PLE	TE: 9	0EPT 6/08	11: 4.4 723	vm	
AN 76 A 200	131	60-12		M	<u> Ahitehorse, Yukon</u>		Fig. No													age 1	of 1
76/10/03 D	1.124	(ILKO)	-12}																		

				 	ess RD - Side Hill	CLIENT: YUKON ENG				ICES				 Πq				89-T	The second second second second second
			HALD/ YUKO		OKOUT RD. OPTION	EXCAVATOR: CAT 22				4000	 ? "			 		020	19(	5-1228	39
		TYP		 GRA	9 NO RECOVER	UTM ZONE: 8 N708	0046.17	' Ľ'	454	400.t	57			ATION	:				
	SAMPLE TYPE F	Γ	1			DIL	F	 ₹AS ⊢	10 TIC		M.C.	<u>50</u>	40 LIQUID	20 20 ▲ PEF 20	4( PER( 4( CENT 4( 4(	) CENT ) SILT ) CENT	<u>60</u> Clay∢	80 80 80 ¥ES ▲ 80	DEPTH(ft)
0.0				 ╉	ORGANIC ROOT MAT			1	<u>10</u>	20			40	20	40	) i	<u>60</u>	80	E 0.0
					SAND — silty, gravelly; fin fine to medium gra gravel; firm; moist; brown	e grained; sined elongated i light greyish		•									······································		20
.0					BEDROCK (Schist) — weat becoming compete	hered for 1.9m, nt below this depth													4.0
.0		2			— less breakage duri	ng excavation		0											6,0
					END OF TESTPIT @ 2.2 m — no water — some slough	(refusal)						• • • • • • • • • • • • • • • • • • •							8.0
D																			10.0
											· · · · · · · · · · · · · · · · · · ·						,		12.0
								·····						 					14.0
							LOGGEI	) B	Y: 1	SB				MPIF		DFF	-TH-	2.2 m	16.0
F	ĽΒ	A	Еn		ering Consulta	ants Ltd.	REVIEW	ΈD						MPLE				4	
		(TUXON		 Ŵ.	<u>hitehorse. Yukon</u>		Fig. No	):										Page	of 1

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Į					Cess RD - Side Hill	CLIENT: YUKON ENG			/ICES			TEST F	۲Π NO:	1	2289-	-TPO9
					LOOKOUT RD OPTION	EXCAVATOR: CAT 22							· · · · · · · · · · · · · · · · · · ·	: 0201	-96-12	2289
			/UKON			UTM ZONE: 8 N707	79950.5	5 E45.	856.4			ELEVAT	10N:			
SAMF	1	1	1			*****		■ ST/ 10	NDARD 20	PENETR/ 30	NTION 📾 40		20 4	CENT GR 10 6 RCENT S/	0 80	
DEPTH(m)	MPLE T	SAMPLE NO	nsc	SOIL SYMBOL	DESCR			PLASTIC	M	.C.	LIQUID	۵	20 4 PERCEN	10 61	0 80 R FINES &	DEPTH(ft)
0.0	SA	S S		S				10	20	≥	 (		♦ PE	RCENT CI	AY 🔶	
- 0.0					ORGANIC ROOT MAT											E 0.0
-					SAND AND SILT — some g moist, firm, browist	avel, fine graines, 1 grey										<u>undun</u>
-		1			2			¢	()				ò			2.0
- - 1.0																
-					BEDROCK (Schist) – weath becoming competer	nered for 2.2 m, at at 2.5 m										E 4.0
		2			– less breakage durir	ng excovation										
- - 2.0																6.0
																8.0
- 3.0					END OF TESTPIT @ 2.7 m ( — no water — major sloughing	refusal)	·									
-																E 10.0
- -: -						đ										E 12.0
` 4.0  -																
																E 14.0
		-														16.0
5.0					• ~ •	·		D BY:				100UT			4.07	F
_	ĽĖ	SA	Eng		eering Consulta	nts Ltd.		NED BY		••••••••••••••••••••••••••••••••••••••	···· ··· ··			96/08	H: 2.7 i /24	11
96/10/08 Q3	-51444	M & A	-153	M	<u>hitehorse, Yukon</u>		Fig. N									e 1 of 1

						D - SIDE HIL		: YUKON ENGI			ERVI	CES				<u>}</u>	'ST PI					9-TI	www.www.www.
m 9.8 EAR M		· · · · ·			LOOKOL	it rd option		ATOR: CAT 225 ONE: 8 N7080			1577		70							201-	-96-	-1228	9
AMPL					RAB		RECOVERY		1550.92	. Ľ4	.000	)//	70			<u> </u> El	EVATI	UIA:				• • • • • • • • • •	
(m) TVnr	YPE S	SAMPLE NO	nsc	SOIL SYMBOL			SOIL SCRIPTI	ON	F	LASI	IO TIC	20	M.C.	30	10N 20 40 UQ	סונ	2) 2)	0 © ( ) PERC )	ERCEN 40 PERCEP 40 ENT SI 40 PERCEI	60 11 SA 60 LT OR 60	) 8 ND @ } 8 R FINE L 8 AY ⊕	80 80 S & 80	DEPTH(ft)
3.0					SAND	- silty aray	velly; fine graine	d sand:		1	0	20		<u>30</u> i i	40		20	)	40	60	<u> </u>	<u>30</u>	<u> </u>
		1				sub-round medium gr maist, brov	ed and angular ained gravel; co	fine to mpact		¢													2.0
.0																							
		2			BEDRO		- weathered fo competent at 2.1				0									****			4.0
0	3	5			-	- less breakc	age during exca	vation		9													6.0
																							8.0
)						F TESTPIT @	3.2 m (refusol)	)				, , , , , , , , , , , , , , , , , , ,				••••							10.0
					_	little slough	1 from 1.2 to 2.	5 m															- 12.0
																							- 14.0
										*****	******											******	- 16.0
	R۸		 	rin		ng Con	sultants	Lt4	LOGGEI				<u></u>		<u> </u>		COMP					2 m	-
Ľ.	υE	r 1	лтБ			horse. Yu		ци.	REVIEW Fig. No		BY:	JRT					COMP	LETI	E: 96	/08,		age 1	
	AH (YI	ROH-	-15}	····· 1	<u>, 111 P. P. P</u>				1119- 110	·										<u></u>		uya I	

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					Lookout RD. Option	EXCAVATOR: CAT 2							PROJE		): 02	01-9	06-12	289
£			rukon		····	UTM ZONE: 8 N7	080618.4	14 E45	2633	3.06			ELEVA	tion:		······		
DEPTH(m)	SAMPLE TYPE		1	SOIL SYMBOL	AB NO RECOVER SO DESCRI	IL	, ,	PLASTIC	2	rd P1 20 M.C	30	TION (2) 40 LIQUID		20 20 20 PERCE 20	rcent 40 Frcen 40 NT Sil 40 Ercen	60 1 Sani 60 T OR I 60	80 80 7INES ▲ 80	DEPTH(ft)
0.0	-		<u> </u>		ORGANIC ROOT MAT			10	2	20	30	40		20	40	60	<u>80</u>	. 0.0
		1			SAND — silty, trace of gra grained sand; fine t grained, sub—round firm; moist; grey — some cobbles below	o medium ed gravel;												2.0
		2			— no gravel below 1.4 — colour changes to r					•								4.0
- - 2.0					below 1.4 m BEDROCK (Schist) — weath competent at 2.8 m	eres far 1.4 m,												6.0
		3																
- 3.0					— less breakage during	j excavation												
- - - - <b>*</b> 4.0											······································							12.0
-					END OF TESTPIT @ 4.2 m (r — no water — major slough below	·												14.0
5.0																		E 16.0
E	EB.	A ]	Eng	ine	ering Consultat	nts Ltd.	LOGGE										4.2 m	
			_		hitehorse, Yukon		Fig. No		. arti				COMF	LCIE:	96/1	J8/2		1.6.
6/10/08 83:	2444	YUROH	-15}	11	ALLOUIDE, LUNUII		114.14	J.									Page	1 of 1

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				ess RD - Side Hill	CLIENT: YUKON EN				/ICES		*****		est pit			CHARGE WORKS AND ADDRESS OF	39–TF	CALCULATION CONTRACTOR STATES
				Lookout RD Option	EXCAVATOR: CAT 2					-	(ANN -7-7)))))))))))))))))))))))))))))))))		ROJECT	COLOR COLOR	020	1-96	-1228	}
NEAR MAY			GR		UTM ZONE: 8 N7	081554.	01 8	:451	776.	7		lE	LEVATIO	N:			101017/061074/06-0	
	SAMPLE NO	nsc	SOIL SYMBOL	SO DESCRI	IL			IN ST/	20	) pene 3		on e 40 Liquid	<u>20</u> 20	4 © PER 4	io RCENT 0 T SILT	Ravel 60 Sand 4 60 Or Fin 60	80 80	DEPTH(ft)
	0		2				ŀ	10	20	® 34	0	 40	20	I PEF	RCENT 0	CLAY 🔇 60	80	
0.0	1			SAND — silty, some gravel sand; well graded e gravel (shale) — some cobble below	longated				٥									0.0
- 1.0																		2.0
				BEDROCK (Schist) — weath competent at 2.0 m — less breakage durin	1													4.0
2.0																		6.0
						•												- 8.0
3.0				END OF TESTPIT @ 2.8 m ( no water no slough	reiusai)													10.0
4.0						••										·····		- 12.0
						••												- 14.0
5.0			•					ąγ.	-P2I				COMPL	TION		<u>, 117. (</u>	) 8 m	- 15.0
EBł	A I	Eng		eering Consulta	nts Ltd.	REVI	EWED						COMPL					
	TLKON-	721	И	<u> Ihitehorse, Yukon</u>		Fiq.	No:										Page 1	of 1

		and the second second			CESS RD - SIDE HILL	CLIENT: YUKON ENG				ICES				1	IEST	DI	NO:		122	289-	TP13
	_			******	LOOKOUT RD OPTION	EXCAVATOR: CAT 225												02(	)19	6-12	289
f			YUKON			UTM ZONE: 8 N708	3328.3	9 E4	451	723.	26			16	LEV	ATTO	:				
SAMI	<u>1</u> 1£	<u>۱۲۲</u>		GR	AB 🛛 NO RECOVERY	·										·					
	Ш	0		Ч					ista 10	NDARI 20		NETRA 30	.TION E 40			20	PER( 4		GRAVE 60	1.	
DEPTH(m)	SAMPLE TYPI	SAMPLE NO		SYMBOL	SO.	[L	-								1	¢	) PER	CENT	SAND	0	╡≆
L E	PLF	PL	nsc	5												20 A PFF	4 CENT	-	60 08 F	80 TNES &	DEPTH(#)
H	MM	SA		SOIL	DESCRI	PTION		PLAS	IIC		M.C.		Ц(	NID		20	4	0	60	60	
	Ľ	Į		Ľ				1	10	20		30	40	7		20	PER 4	icent D	CLAY 60	\$ 80	
- 0.0					ORGANIC ROOT MAT													ļ			E 0.0
╞					SAND — gravelly, silty; well	l.															Ē
F					fine to medium grai			ļ													F
Ĺ		1			gravels; firm; damp;	light brown															Ē
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t																					Ē
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ŀ					GRAVEL AND SAND - trace	of silt: well															E 4.0
Ľ					graded, sub-rounder																
ŀ		2			graded sand; loose;	damp; mottled		<b>.</b>													È
-					grey and brown																
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F																					E- 6.0
- 2.0			ŀ											į							Ē
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		3			— permafrost — very li	ttle visible															Ē
-					ice lenses, less than	5%	,				ļ			ļ							= - 8.0
F				-	SILT - some sand, trace of	clay: frozen															Ē
					(no visible ice); grey	0.033, 1102.011						,									E-
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- 3.0																			ļļ.		È
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i → 4.0				h	END OF TESTPIT @ 4.0 m (re	fusal)															<u>F</u>
					– no water																Ē
╞╴│					- some slough from 1.	2 to 3.8 m															E- 14.0
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5.0																					E 16.0
	קק	Λ.	[] [] []	ind	aning Congulta		LOGGE	) By	. J.	SB SB	:	:	: 1		COL	IPLE	; Non	DFF	TH	4.0 m	<del>.</del>
	UĽ	н.	ыпg		eering Consulta	ILS LLU.	REVIEW	ED I								IPLE					
96/10/08 03	2644	(TUXON	-15}	W	<u>hitehorse, Yukon</u>		Fiq. No	:												Page	1 of 1

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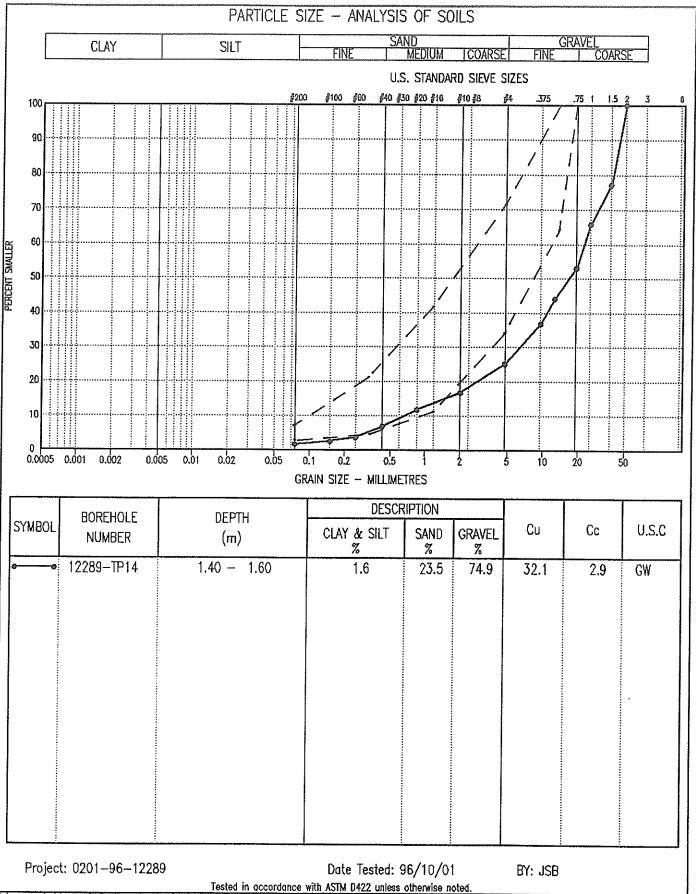
- Frank

km 15.5, MT. HALDANE LOOKOUT RD OPTION EXCAVATOR: CAT 22									CES			ļ_	теят ргт но: 12289-ТР14							
									50.0		<u> </u>		PROJECT NO: 0201-96-12289							
	· · · · · ·					492.27	Ŀ	505	52.6	4			LEVA	IION	:				····	
LE TYPE LE TYPE JSC SYMROI				SC	II.		ייייי זעק רו		20 M	<u>30</u> .C.	4(	) IQUID —I		20 40 € © PERCENT S 20 40 € ▲ PERCENT SILT C 20 40 €			8 VD @ 8 FINES 8 XY @	0 : ▲ 0	DEPTH(ft)	
				ORGANIC ROOT MAT			1		20	30	40	)		20	40	<u>60</u>	8	0	= 0.0	
	1			SAND — silty, some gravel sand; fine to media gravel; firm; damp; — becomes gravelly	ım grained yellawish brown vith depth		•												2.0	
	-			GRAVEL — sandy, some sil sub—rounded grave sand, compact, ma	t, well graded I, well graded		×													
	3			<ul> <li>cobbly, some bouk</li> <li>becomes coarser w</li> </ul>	vith depth at 1.0 m	·@·								9					4.0	
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	4							*****										unitering 10.0		
				END OF TESTPIT @ 3.2 m — no water — little slough																
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72	A	гnб	-	eering Consulta Thitehorse, Yukon	unts Ltd.		ED										/24		of 1	
	SAMPLE TYPE TIME TYPE	A	A	A A A A A A A A A A A A A A A A A A A	5.5, MT. HALDANE LOOKOUT RD OPTION         MAYO, YUKON         LE TYPE         GRAB         NO RECOVER         SO         DESCRI         SO         SO         NO RECOVER         SO         SO <t< td=""><td>3.5, MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225         MAYO, YUKON       UTM ZONE: 8 N7084         LE TYPE       GRAB       NO RECOVERY         I       Image: Solid structure       SOIL DESCRIPTION         I       Image: Solid structure       ORGANIC ROOT MAT         I       Image: Solid structure       SAND - sity, some gravel, well graded sand; fine to medium grained gravel; firm; damp; yellowish brown - becomes gravely with depth         I       Image: Solid structure       GRAVEL - sandy, some sit, well graded sub-rounded gravel, well graded sand, compact, moist to wet, brownish grey         I       Image: Solid structure       GRAVEL - sandy, some boulders below 1.0 m         I       Image: Solid structure       Image: Solid structure         I       Image: Solid structure       Image: Solid structure</td><td>3.5, MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 BACKH         MATO, YUKON       UTM ZONE: 3 N7084492.27         LE TYPE       GRAB         SOIL       DESCRIPTION         I       I         I       I         I       ORGANIC ROOT MAT         SAND - silty, some grovel, well groded sand; fine to medium grained gravel; firm; domp; yellowish brown - becomes gravelly with depth         I       ORGANIC ROOT MAT         I       GRAVEL - sandy, some silt, well graded sub-rounded gravel, well graded sub-rounded gravel, well graded sub-rounded gravel, well graded sub-counced gravel, well graded sub-counced gravel, well graded sub-counce soluters below 1.0 m         I       END OF TESTPIT @ 3.2 m - no water         I       END OF TESTPIT @ 3.2 m - no water         I       END OF TESTPIT @ 3.2 m - no water         I       It is slough</td><td>3.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 EACKHOE         MAYO, YUKON       UTM ZONE: 3 N7084492.27 E4         LE TYPE       GRAB       SOIL         DESCRIPTION       PUSS         SAND - sifty, some gravel, well groded       sand; fine to medium groined         gravet, firm, domp; yellowish brown       - becomes gravel, well groded         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       GRAVEL - sondy, some gravel, well groded         sand; fine to medium grained       gravet, firm, domp; yellowish brown         - becomes sourcely with depth       •         CRAVEL - sondy, some silt, well graded       sand, compact, moist ta wet, brownish grey         - cobbly, some boulders below 1.0 m       -         3       - trace of silt below 1.0 m         - trace of silt below 1.0 m       -         - ittle slough       -         - ittle slough       -</td><td>35. MT. HALDANE LOOKOUT RD OPTION       EXCMATOR: CAT 225 EACKHOE         MAYO, YUKON       UTM ZONE: 3 N7084492.27 E4505         LE TYPE       GRAB       No RECOVERY         SOIL       DESCRIPTION         PUST       ORGANIC ROOT MAT         1       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       ORGANIC ROOT MAT         4       GRAVEL - sandy, some gravel, well graded sand; fine to medium grained gravel, well graded sub-rounded gravel, well graded         3       END OF TESTPIT @ 3.2 m         - cobbly, some boulders below 1.0 m         - becomes orser with depth at 1.0 m         - trace of silt below 1.0 m         - no water         - little slough</td><td>3.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 BACKHOE         MAYO, YUKON       UTM ZONE: B N7084492.27 E450552.6         LE TYPE       Image: Construction of the construction of the</td><td>1.5.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 EACKHOE         MNO, YUKON       UTM ZONE: 8 N7084492.27 E450552.64         LE TYPE       GRAB       No RECOVERV         AND - Silty, some grovel, well graded       astrahamo PEEII         1       ORGANIC ROOT MAT       rustic M.C.         2       ORGANIC ROOT MAT       rustic damp or endum grained gravel, well graded sub-rounded growel, well graded sub - cobby, some boulders below 1.0 m         3       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m         - trace of silt below 1.0 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m         2.3       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m         - little slough       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m</td><td>1       EXCAVATOR: CAT 225 EACKHOE         MYO, YUKON       UTH ZONE: 3 NY084492.27 E450552.04         LE TYPE       GRAP         2       DESCRIPTION         1       0         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       GRAVEL - sandy, some growel, well graded sand; fine to medium grained gravet, firm; damp; yellowish brown - becomes gravely with depth         6       GRAVEL - sandy, some sitt, well graded sand, compact, moist ta wet, brownish grey         3       CRAVEL - sandy, some sitt, well graded sand, compact, moist ta wet, brownish grey         4       END OF TESTPIT @ 3.2 m - no water         3       END OF TESTPIT @ 3.2 m - no water         -       little slough</td><td>1       EXCLATOR: CAT 225 BACKHOE       1         MAYO, YUKON       UTA ZONE: 8 N7084492.27 E450552.64       1         LE TYPE       GRAB       NO RECOVERY       IF STADLARD PELEARTON IS         LE TYPE       GRAB       SOIL       PUSTIC M.C. 100/00         LE TYPE       GRAA       ORGANIC ROOT MAT       IF STADLARD PELEARTON IS         1       ORGANIC ROOT MAT       PUSTIC M.G. 100/00       PUSTIC M.G. 100/00         2       ORGANIC ROOT MAT       If an an an an an an an an an an an an an</td><td>1       EXCAVATOR: CAT 225 EACKHOE       PROLE         MANO, YUKON       UTA ZONE: 8 N7064492.27 E450552.64       ELDVA         E TYPE       GRAB       Image: Construction of the construle of the construle of the construction of</td><td>1       EXCAMATOR: CAT 225 BACKHOE       PROJECT         MAXO, YUKON       UM ZONE: 8 N7084492.27 E450552.64       ELEVATION         MAXO, YUKON       DESCRIPTION       III 20 10 00 000000000000000000000000000</td><td>35. MT. HALDANE LOCKOUT RD OPTION       EXCANATOR: CAT 225 BACKHOE       PROJECT NC: 0         MANO, YUKON       UTM ZONE: B N7084492.27 E450552.04       ELEVATION: ELEVAT</td><td>25.5. MT. HALDANE LOCKOUT RD OPTION       EXCMATOR: CNT 225 BACKIOE       PROJECT NC: 0201- ELEVATION:         MADD, YUKON       UIN ZONE: 3 N7064/92.27 E450552.64       ELEVATION:         ET YPEE       BIG GAB       Z MORECOVERY       EVENDADE DELEVATION:         BIG GAB       SOIL       DESCRIPTION       In 0.20 30 40 20 40 00 00 - 0.20 40 20 00 - 0.20 40 20 00 - 0.20 40 20 - 0.20 40 - 0.20</td><td>25. MT. HALDANE LOCKOUT RU OPTION       EXCRATOR: CAT 225 EACKIGE       PROJECT NC: N201-80- LEVATION:         MAND, YUKKAW       UTIL ZONE: 3 N7084492.27 EAC6052.04       ELEVATION:         ELEVATION:       DESCRIPTION       10.000 20.000 E         BES       SOIL, DESCRIPTION       10.000 20.000 E       20.000 E         BES       SOIL, DESCRIPTION       10.000 20.000 E       20.000 E         BES       ORGANIC ROOT MAT       10.000 0.000 E       20.000 E         SAND - sity, some gravel, well graded sond- fine to medium grained gravel, fine to medium grained sond- fine to medium graded sond- conset with depth       0         1       ORGANIC ROOT MAT       0</td></t<> <td>55. MT. HALDANE LOOKOUT RU OPTION       EXCARTOR: CAT 225 BACKHOE       PROJECT No: 0201-96-1222         WATO, TURON       UIN: ZONE: 6 N7062-422.27 EXS055.64       ELEVATOR:         ELEVATOR:       DESCRIPTION       EVANOP.422.27 EXS055.64       ELEVATOR:         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1222         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In SUMMAR PORTHONING         Image: State in Summary in Summary Summar</td>	3.5, MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225         MAYO, YUKON       UTM ZONE: 8 N7084         LE TYPE       GRAB       NO RECOVERY         I       Image: Solid structure       SOIL DESCRIPTION         I       Image: Solid structure       ORGANIC ROOT MAT         I       Image: Solid structure       SAND - sity, some gravel, well graded sand; fine to medium grained gravel; firm; damp; yellowish brown - becomes gravely with depth         I       Image: Solid structure       GRAVEL - sandy, some sit, well graded sub-rounded gravel, well graded sand, compact, moist to wet, brownish grey         I       Image: Solid structure       GRAVEL - sandy, some boulders below 1.0 m         I       Image: Solid structure       Image: Solid structure         I       Image: Solid structure       Image: Solid structure	3.5, MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 BACKH         MATO, YUKON       UTM ZONE: 3 N7084492.27         LE TYPE       GRAB         SOIL       DESCRIPTION         I       I         I       I         I       ORGANIC ROOT MAT         SAND - silty, some grovel, well groded sand; fine to medium grained gravel; firm; domp; yellowish brown - becomes gravelly with depth         I       ORGANIC ROOT MAT         I       GRAVEL - sandy, some silt, well graded sub-rounded gravel, well graded sub-rounded gravel, well graded sub-rounded gravel, well graded sub-counced gravel, well graded sub-counced gravel, well graded sub-counce soluters below 1.0 m         I       END OF TESTPIT @ 3.2 m - no water         I       END OF TESTPIT @ 3.2 m - no water         I       END OF TESTPIT @ 3.2 m - no water         I       It is slough	3.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 EACKHOE         MAYO, YUKON       UTM ZONE: 3 N7084492.27 E4         LE TYPE       GRAB       SOIL         DESCRIPTION       PUSS         SAND - sifty, some gravel, well groded       sand; fine to medium groined         gravet, firm, domp; yellowish brown       - becomes gravel, well groded         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       GRAVEL - sondy, some gravel, well groded         sand; fine to medium grained       gravet, firm, domp; yellowish brown         - becomes sourcely with depth       •         CRAVEL - sondy, some silt, well graded       sand, compact, moist ta wet, brownish grey         - cobbly, some boulders below 1.0 m       -         3       - trace of silt below 1.0 m         - trace of silt below 1.0 m       -         - ittle slough       -         - ittle slough       -	35. MT. HALDANE LOOKOUT RD OPTION       EXCMATOR: CAT 225 EACKHOE         MAYO, YUKON       UTM ZONE: 3 N7084492.27 E4505         LE TYPE       GRAB       No RECOVERY         SOIL       DESCRIPTION         PUST       ORGANIC ROOT MAT         1       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       ORGANIC ROOT MAT         4       GRAVEL - sandy, some gravel, well graded sand; fine to medium grained gravel, well graded sub-rounded gravel, well graded         3       END OF TESTPIT @ 3.2 m         - cobbly, some boulders below 1.0 m         - becomes orser with depth at 1.0 m         - trace of silt below 1.0 m         - no water         - little slough	3.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 BACKHOE         MAYO, YUKON       UTM ZONE: B N7084492.27 E450552.6         LE TYPE       Image: Construction of the construction of the	1.5.5. MT. HALDANE LOOKOUT RD OPTION       EXCAVATOR: CAT 225 EACKHOE         MNO, YUKON       UTM ZONE: 8 N7084492.27 E450552.64         LE TYPE       GRAB       No RECOVERV         AND - Silty, some grovel, well graded       astrahamo PEEII         1       ORGANIC ROOT MAT       rustic M.C.         2       ORGANIC ROOT MAT       rustic damp or endum grained gravel, well graded sub-rounded growel, well graded sub - cobby, some boulders below 1.0 m         3       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m         - trace of silt below 1.0 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m         2.3       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m         - little slough       END OF TESTPTI © 3.2 m       rusce of silt below 1.0 m       rusce of silt below 1.0 m	1       EXCAVATOR: CAT 225 EACKHOE         MYO, YUKON       UTH ZONE: 3 NY084492.27 E450552.04         LE TYPE       GRAP         2       DESCRIPTION         1       0         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         2       ORGANIC ROOT MAT         3       GRAVEL - sandy, some growel, well graded sand; fine to medium grained gravet, firm; damp; yellowish brown - becomes gravely with depth         6       GRAVEL - sandy, some sitt, well graded sand, compact, moist ta wet, brownish grey         3       CRAVEL - sandy, some sitt, well graded sand, compact, moist ta wet, brownish grey         4       END OF TESTPIT @ 3.2 m - no water         3       END OF TESTPIT @ 3.2 m - no water         -       little slough	1       EXCLATOR: CAT 225 BACKHOE       1         MAYO, YUKON       UTA ZONE: 8 N7084492.27 E450552.64       1         LE TYPE       GRAB       NO RECOVERY       IF STADLARD PELEARTON IS         LE TYPE       GRAB       SOIL       PUSTIC M.C. 100/00         LE TYPE       GRAA       ORGANIC ROOT MAT       IF STADLARD PELEARTON IS         1       ORGANIC ROOT MAT       PUSTIC M.G. 100/00       PUSTIC M.G. 100/00         2       ORGANIC ROOT MAT       If an an an an an an an an an an an an an	1       EXCAVATOR: CAT 225 EACKHOE       PROLE         MANO, YUKON       UTA ZONE: 8 N7064492.27 E450552.64       ELDVA         E TYPE       GRAB       Image: Construction of the construle of the construle of the construction of	1       EXCAMATOR: CAT 225 BACKHOE       PROJECT         MAXO, YUKON       UM ZONE: 8 N7084492.27 E450552.64       ELEVATION         MAXO, YUKON       DESCRIPTION       III 20 10 00 000000000000000000000000000	35. MT. HALDANE LOCKOUT RD OPTION       EXCANATOR: CAT 225 BACKHOE       PROJECT NC: 0         MANO, YUKON       UTM ZONE: B N7084492.27 E450552.04       ELEVATION: ELEVAT	25.5. MT. HALDANE LOCKOUT RD OPTION       EXCMATOR: CNT 225 BACKIOE       PROJECT NC: 0201- ELEVATION:         MADD, YUKON       UIN ZONE: 3 N7064/92.27 E450552.64       ELEVATION:         ET YPEE       BIG GAB       Z MORECOVERY       EVENDADE DELEVATION:         BIG GAB       SOIL       DESCRIPTION       In 0.20 30 40 20 40 00 00 - 0.20 40 20 00 - 0.20 40 20 00 - 0.20 40 20 - 0.20 40 - 0.20	25. MT. HALDANE LOCKOUT RU OPTION       EXCRATOR: CAT 225 EACKIGE       PROJECT NC: N201-80- LEVATION:         MAND, YUKKAW       UTIL ZONE: 3 N7084492.27 EAC6052.04       ELEVATION:         ELEVATION:       DESCRIPTION       10.000 20.000 E         BES       SOIL, DESCRIPTION       10.000 20.000 E       20.000 E         BES       SOIL, DESCRIPTION       10.000 20.000 E       20.000 E         BES       ORGANIC ROOT MAT       10.000 0.000 E       20.000 E         SAND - sity, some gravel, well graded sond- fine to medium grained gravel, fine to medium grained sond- fine to medium graded sond- conset with depth       0         1       ORGANIC ROOT MAT       0	55. MT. HALDANE LOOKOUT RU OPTION       EXCARTOR: CAT 225 BACKHOE       PROJECT No: 0201-96-1222         WATO, TURON       UIN: ZONE: 6 N7062-422.27 EXS055.64       ELEVATOR:         ELEVATOR:       DESCRIPTION       EVANOP.422.27 EXS055.64       ELEVATOR:         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1222         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In PROJECT No: 0201-96-1224         ELEVATOR:       DESCRIPTION       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In SUMMAR PORTHONING       In SUMMAR PORTHONING         Image: State in Summary in Summary Summar	

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# EBA Engineering



Data presented hereon is for the sole use of the stipulated client. EBA is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of EBA Tested in accordance with ASTM D422 unless otherwise noted. The testing services reported herein have been performed by an EBA technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, EBA will provide it upon written request.

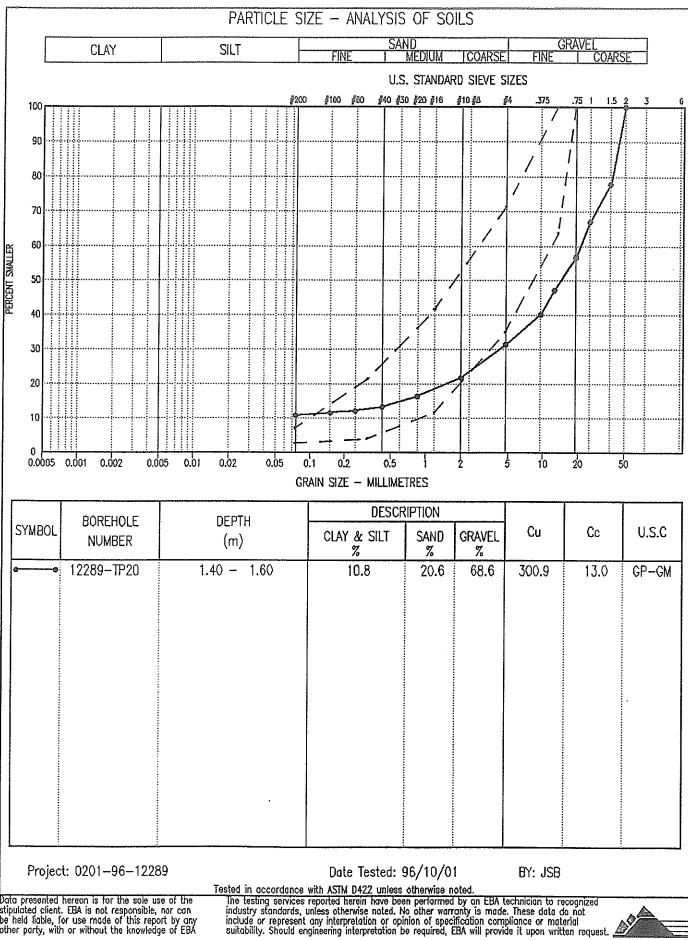


DUBLIN GULCH MINE ACCESS RD - BORROW CLIENT: YUKON ENG								VICES				теят ріт no: 12289-TP15							
km         15.5, MT. HALDANE LOOKOUT RD OPTION         EXCAVATOR: CAT 22           NEAR MAYO, YUKON         UTM ZONE: 8 N703								ACKHOE PROJECT NO: 0201-96-12289											
				···	UTM ZONE: 8 N708	4514.29	E45	0498.	83		[	ELEVATIO	N:						
DEPTH(m)	SAMPLE IYPE T		BOL	NO RECOVER SO DESCRI	IL.	PI	10 LASTK	;	3 M.C.	04	0 LIQUID —I	20 20 ▲ PE 20	DEPTH(ft)						
.0				ORGANIC ROOT MAT			10	20	30	) 4	0	20	4	0	60	80	= 0.0		
	1			SAND — silty, some gravel, grained sand, fine t grained gravel; firm yellowish brown GRAVEL — sandy, trace of	o medium ; damp;			•									2.0		
				graded, sub-rounde sand; loase; damp; - sloughing below 0.5	d grovel; coarse grey														
)	2					0											6.0		
																	8.0		
	3	77 Marca 1997		END OF TESTPIT @ 3.0 m — no water — major slough		0											10.0		
																	12.0		
																	- 14.0		
						LOGGED										ГО	- 16.0		
E	BA	En		eering Consulta	nts Ltd.	REVIEWE Fig. No:	ED B					COMPL COMPL	ETE:	96/0	-1H: \ )8/24	<u>2.0 m</u>			
Whitehorse, Yukon												COMPLETE: 96/08/24 Page 1 of 1							

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E-management and a second					CESS RD - BORROW	CLIENT: YUKON ENG				/ICES	S					PIT I			2289		
			****		Lookout RD option	EXCAVATOR: CAT 22												0201	-96-	1228	9
			YUKON			UTM ZONE: 8 N70	84549.0	7 E	450	560	.52			E	LEVA	TION	;			101000000000000000000000000000000000000	
SAMF	1 <u>1</u>			GR	AB 🛛 🖂 NO RECOVER	<u>ኛ</u>			- 074	LIFLAT	VD 01		17011-				0000		NA 67		
	Ld.			Ч		. * *			10 10	NUAN	0 Pł 0	-NETRO 30	410 ATTON 40		-	20	4(	) (	WVEL 🖬 60 8	0	
DEPTH(m)	TVPI	SAMPLE NO	nsc	SOIL SYMBOL	SC SC	)IL										20	PER( 40		iand @ Ko 8	0	DEPTH(ft)
	SAMPI F	WPI	S	N.	DESCR	ΙΡΤΙΛΝ		PLASTIC M.C.			KQU	מו	4	∆ PER	CENT	SILT (	)r fines	Δ	Ē		
	SA	5		SO		11 11014		┢╍				<u> </u>				<u>20</u>	40 PER(		10 8 XAY (\$	<u> </u>	
0.0					SAND AND GRAVEL - som	e silt well araded		i	10	20	0 i	30	40			20	40	6	08	<u>)</u>	E 0.0
Ľ					sand; well graded,	sub-rounded															Ē
ŀ					gravel; compact; d	amp; grey															<u> </u>
ŀ		1							٥												E
[		]			SAND – some silt; fine gr	ained, uniform			Ì	()·						1					
					sand; firm; damp;	light brown															E-20
Ę																					
- 1.0						-11			ļ												Ē
ŀ					GRAVEL — sandy, trace of graded, sub—round	siit; weii ed aravel: coarse															
F					graded sand; comp	act; damp; grey															4.0 F
ŀ					- cobbly below 0.6 r	n															E
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# EBA Engineering



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# EBA Engineering

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**APPENDIX D:** Cost Estimates

## HAGGART CREEK ROAD COST ESTIMATES

The following cost estimates are Class "C".

1.	General Road Upgrades, South McQuesten Bridge to Haggart Cree	ek Crossing
	-clearing 12 metre added throughout - 25.2 ha. @ \$12,000/ha.	\$302,400
	-culvert extension and installation – 400 metres @ \$900/m	\$360,000
	-grade raising, ditching, pullout construction, signage, etc. –	\$250,000
	-surfacing 100 mm crushed gravel- 12,000 m3 @ \$35.00/m3-	\$420,000
2.	Revision Sections	

	2.1	Km 25+800 to Km 26+500	\$200,000
	2.2	Km 23+000 to Km 23+600	\$225,000
	2.3	Km 19+400 to Km 20+500	\$170,000
3.	Haggart	Creek Overflow Culvert	\$ 50,000
4.	Secret C	reek Culvert, Headwall and Wingwalls	\$200,000
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То	tal Estima	ate	\$2,177,400

Sincerely yours,

Ray A. Blide

Roy A. Slade, CST. Managing Partner and COO Yukon Engineering Services Inc.

**APPENDIX E: Haggart and Secret Creek Recommendations** 

### Introduction

As part of the mandate to improve the Haggart Crrek Road (SMR), Yukon Engineering Services Inc. enlisted the support of SNC Lavalin, Montreal and Vancouver, M & M office for improvement recommendations of the site stability and capacity of the existing culvert structure at Secret Creek and the twin culverts crossing at Haggart Creek.

## **Secret Creek**

### **Observations at Secret Creek Site**

It is understood that the creek on the day (July 22, 2010) of visit is at a low flow, such that the water level at the culvert is approximately one third the diameter. As the water level coincides with the corrosion line, this would be the normal flow for quite a long period. At about half of the diameter, there is another line of corrosion mark, indicating the normal high water level and anything above that would indicate floods of long return periods (Photograph 1). Above that, there is a general sign of corrosion that the galvanizing has depleted and the steel plate is rusted. At both inlet and outlet, there are signs of torn metal and slight deformation at edge, indicating possible settlement of fill and culvert itself. It is also an indication of a bedding defect.

The side slopes at inlet form a prominent U shape arrangement with the culvert at the tip of the U. The invert of the creek immediately in front of the inlet is deepened into a stilling pond and the water is pretty calm. At the outlet, the side slopes form a sharp V and the discharge is quite turbulent with potential scouring and erosion of side slopes.

Along the top edge of the inlet head slopes, there is a prominent crack line in the fill, indicating settlement of the newly maintained head slope. The gradient of the slope appears to be greater than 1:1, and the road surface above forms a noticeable restriction. Painted rubble is placed along the top of the slope as a warning to vehicle traffic.





## Analysis

The instability of the road surface is a direct result of insufficient length of the culvert that forces steep head and side slopes. That in turn, as a result of erosion, has resulted in the loss of road surface. During high water, the side slopes would be subject to progressive erosion as the stilling pond would not be sufficient to slow down the flow. At the outlet, the flow would be more severe during high flows and so the risk of erosion would be more severe.

### Proposed Improvement

- Install sufficiently sized culvert to carry 100 year event
- Improve the stream beds by installing scour protection at inlet and outlet.
- Install crib walls along both side slopes of inlet and outlet to protect side slope from erosion, and keep the slope above the wall more gentle, possibly 1V:1.5H.
- Install head walls across the culvert at both inlet and outlet so as to tie them across. Keep head slopes more gentle, at 1V:1.5H.
- Maintain vegetation cover over all slopes to improve surface washout.
- Install reflective markers or railing along both sides of roadway for improved safety.

## **Haggart Creek**

## **Observation at Haggart Creek Site**

The creek bed is filled with an embankment to form a roadway which is wider than the adjacent sections. The fill is well maintained and shows no sign of distress. The inlet head slope is armored with riprap above the water level while natural vegetation is starting to take root on the outlet head slope.

Of the two culverts, the smaller and older one is badly deformed at outlet. Both culverts are only mildly corroded at the flow mark. Inlet flow is turbulent but the flow outlet is calm. The main flow apparently is carried by the newer and larger culvert but the inlet





water is already half way full. All side slopes of the creek appear well maintained and show indications of major river training effort.

## Analysis

According to hydrological data, the creek/culvert system does not appear to handle the 1:100 year flood.

## Proposed Improvement

Pending a geotechnical investigation, this site could be improved with either:

- 1. a bridge installation adjacent to the existing road, and subsequently removal of the embankment and existing culverts across the stream bed, freeing the stream for the higher flow of 1 in 100 year flood event.
- The bridge would be a steel Bailey bridge with floor beams and timber deck; capable of carrying one lane traffic with the heaviest vehicle being the fully loaded B-train fuel truck.
- The girders would be supported by pre-cast concrete pile cap and steel screw piles. Foundation configuration is subject to geotechnical investigation results and recommendations.
- Install riprap around abutment to protect washout in high flood periods.
- The above proposal is based on small components capable of delivery to site and assembled without the use of heavy lifting equipment.
- For optimum efficiency, one bore hole would be drilled in each abutment location.
- 2. or, the addition of an overflow culvert. It appears from the site visit that the existing culverts are handling the present flow quite well and if additional capacity is needed, could be provided by an additional culvert. This new culvert could be pushed through the existing fill with the invert above the present water level, thus avoiding in-stream work which would impact on the fish habitat.

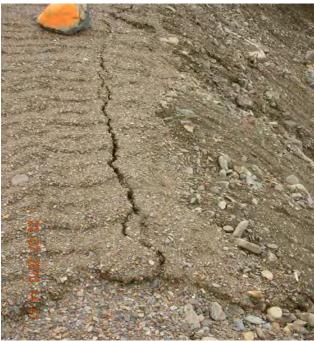




- Based on the discharge capacity of the existing culverts, determine the size of additional culvert which would act as overflow culvert for high flood water only.
- Improve scour resistance of stream invert at inlets to existing culverts by installing riprap.



Photograph 1 Secret Creek - Inlet



Photograph 2 Secret Creek - Fill failing







Photograph 3 Secret Creek – Outlet to Haggart Creek



Photograph 4 Haggart Creek - Inlet







Photograph 5 Haggart Creek - Outlet



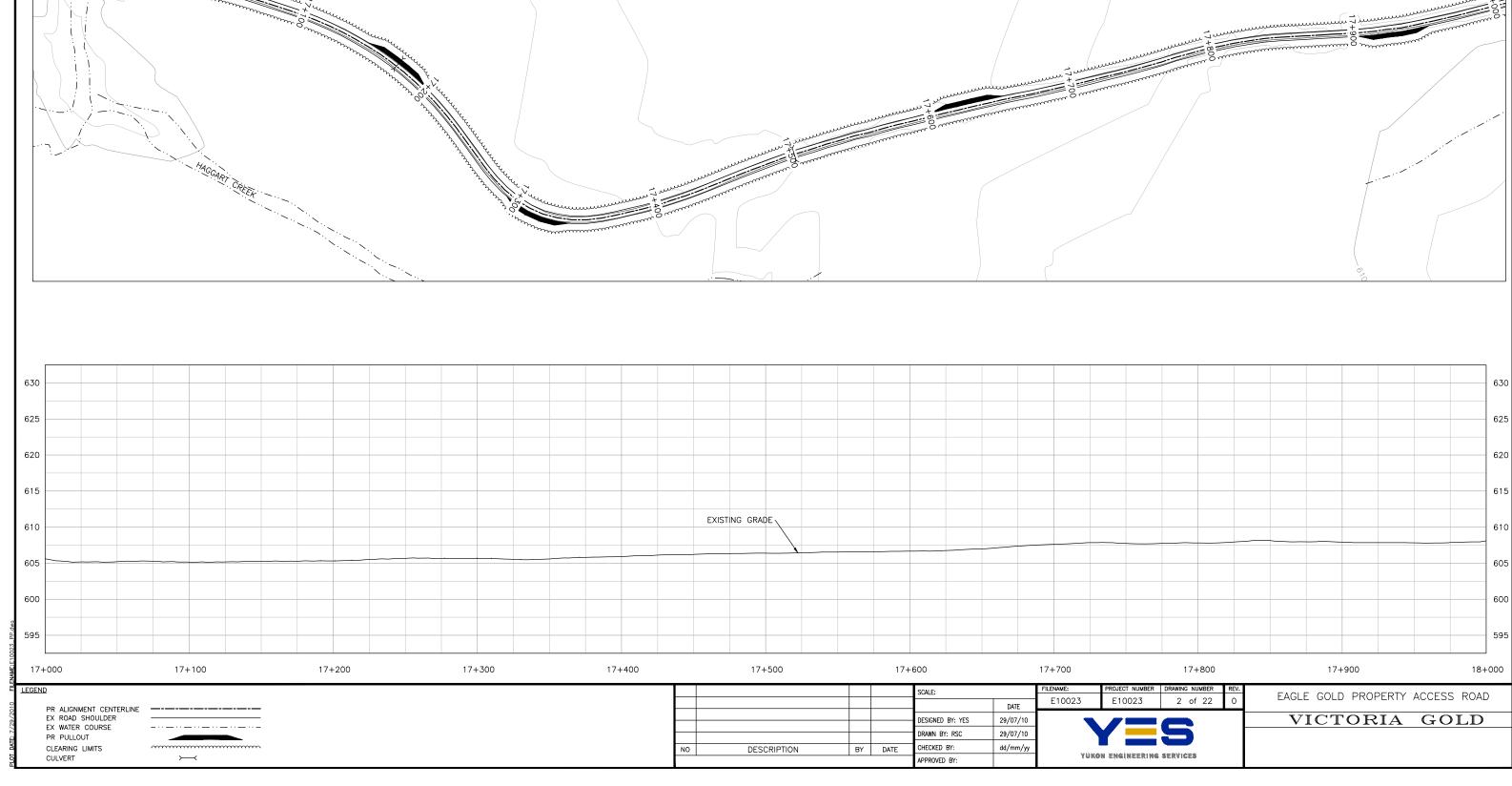
Photograph 6 Proposed location of overflow CSP

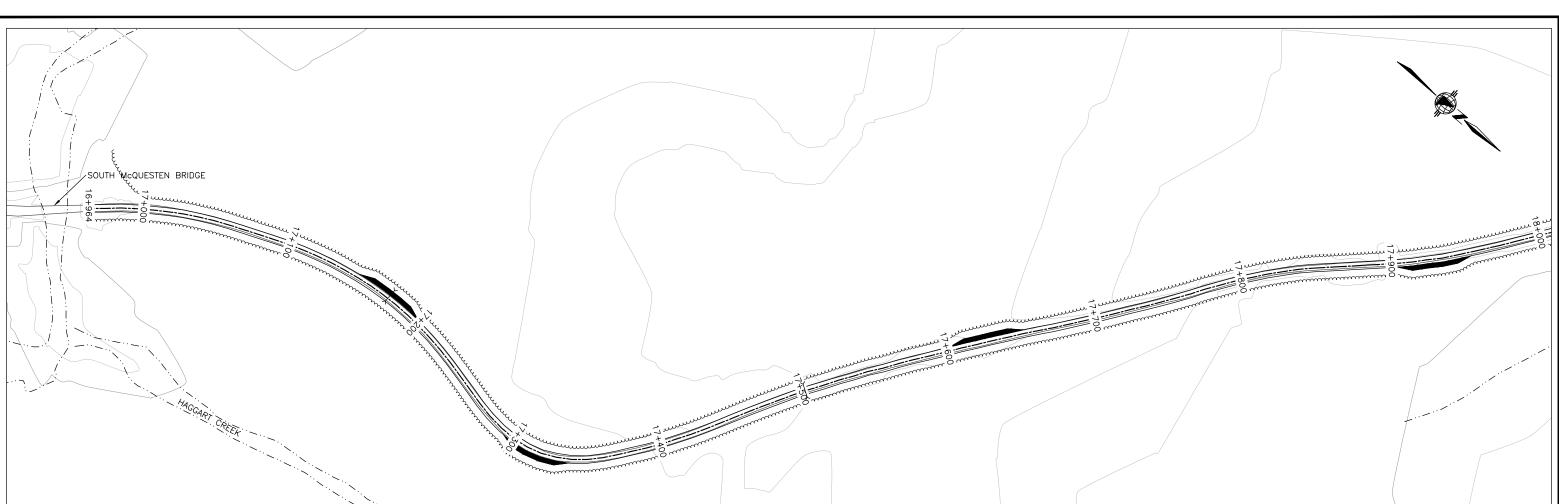




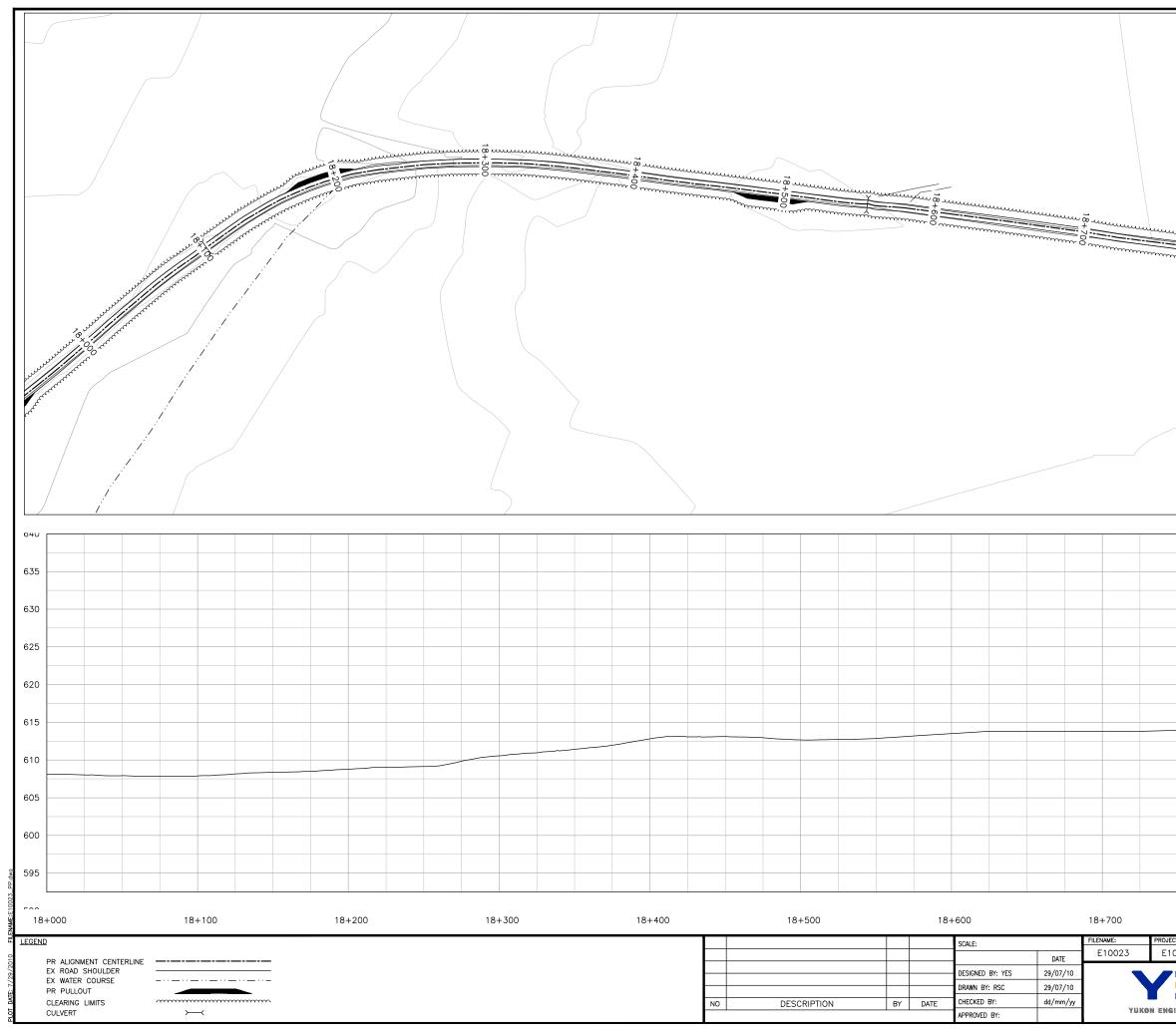
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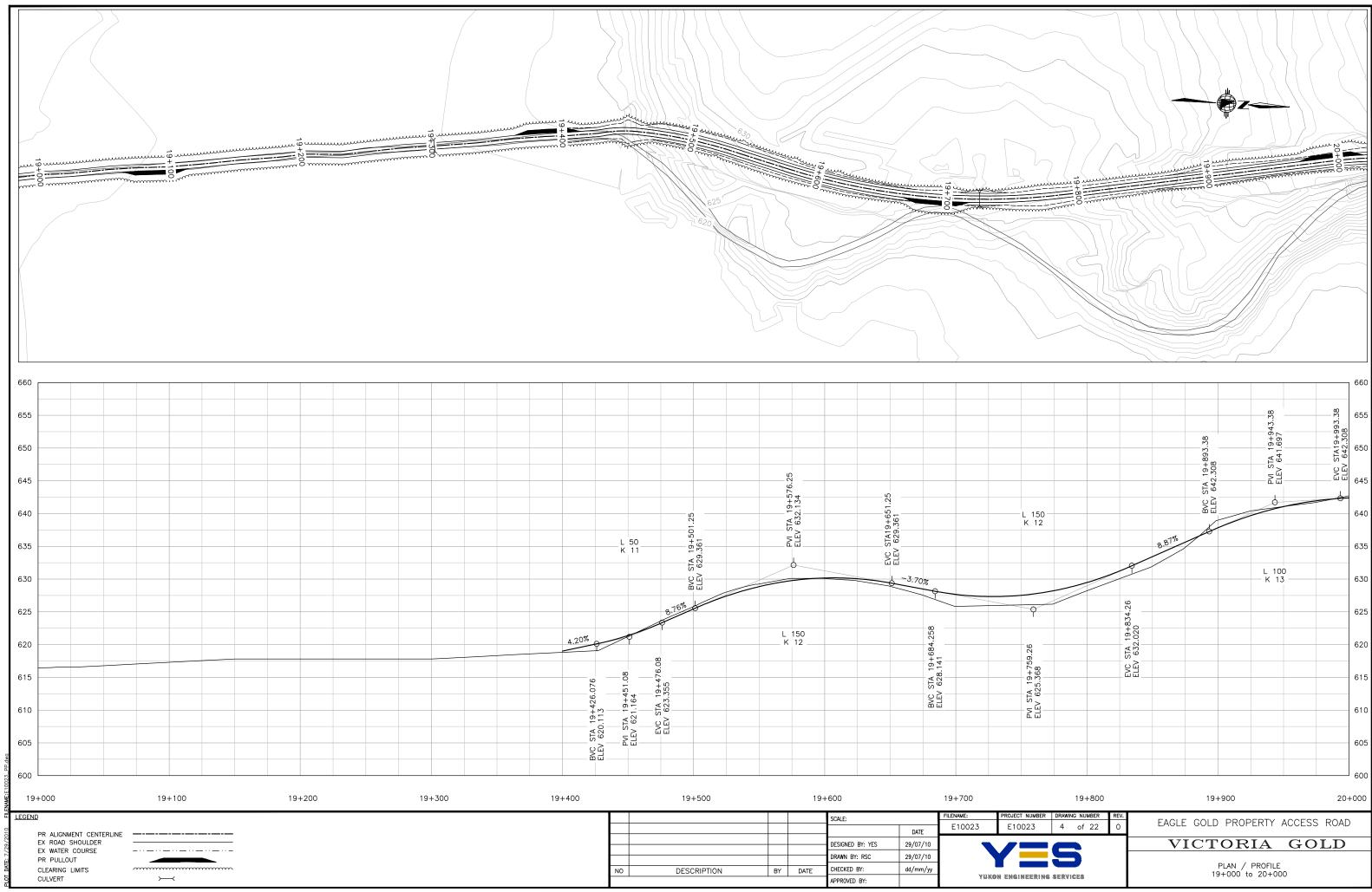


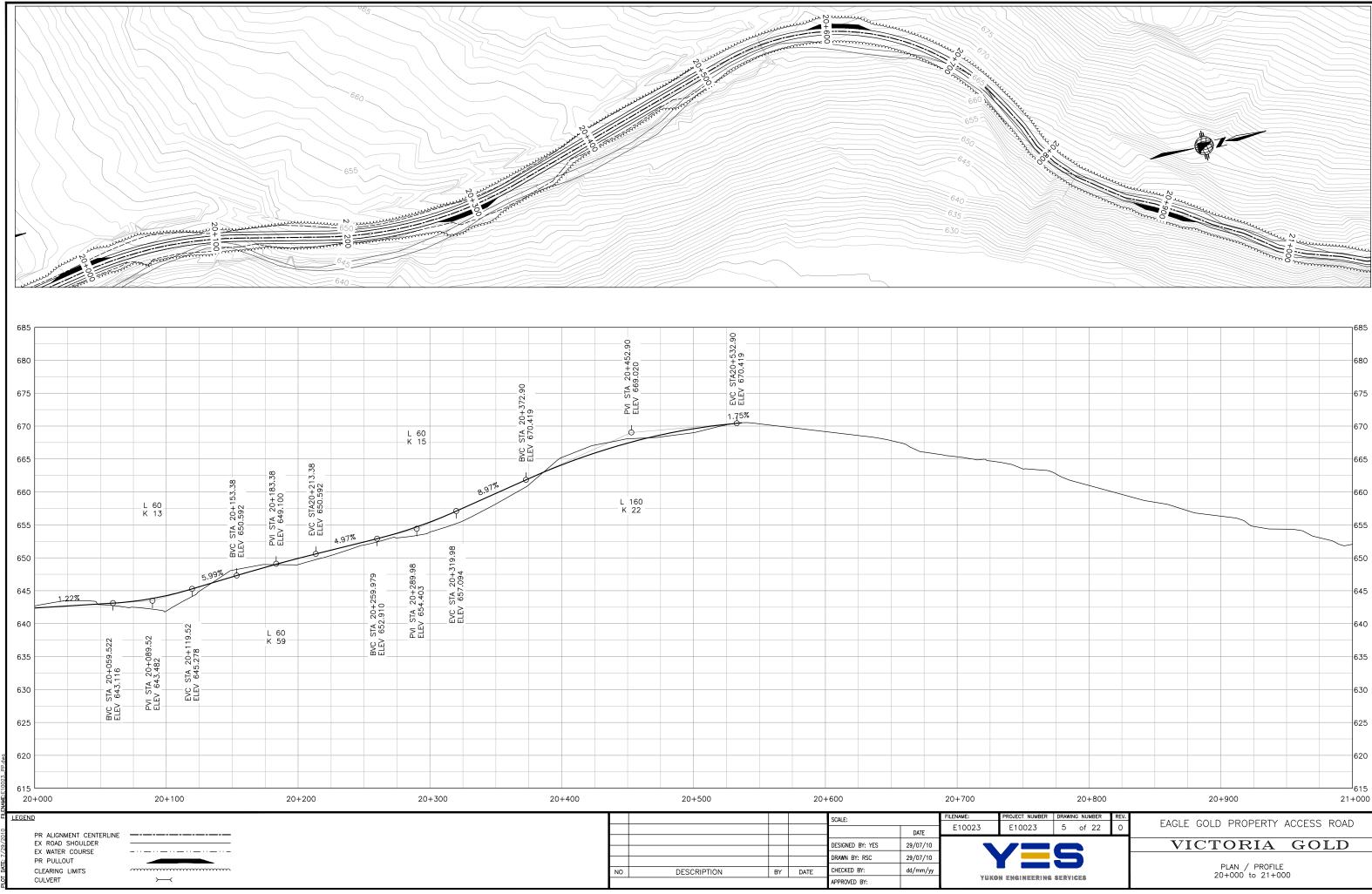




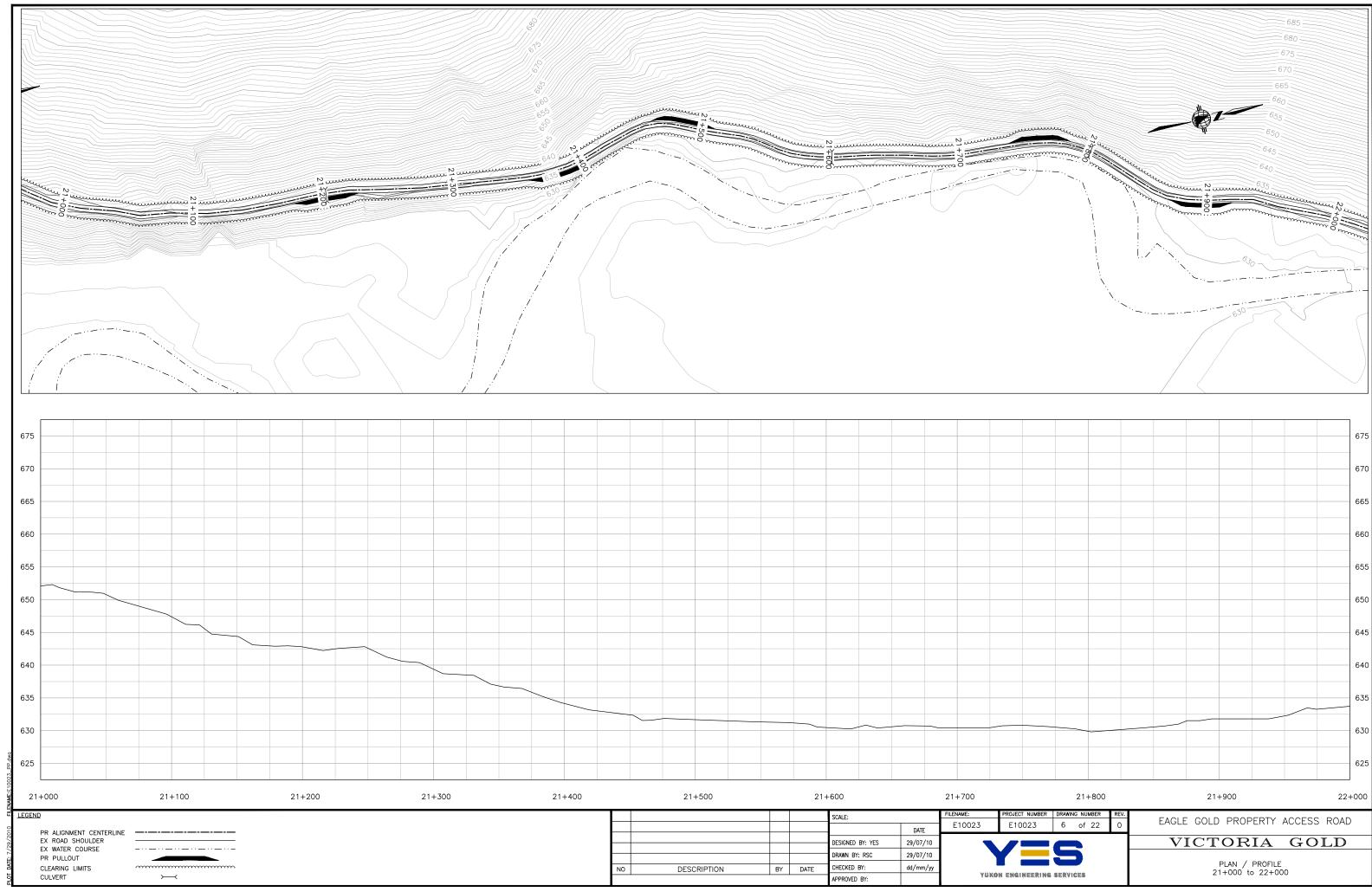
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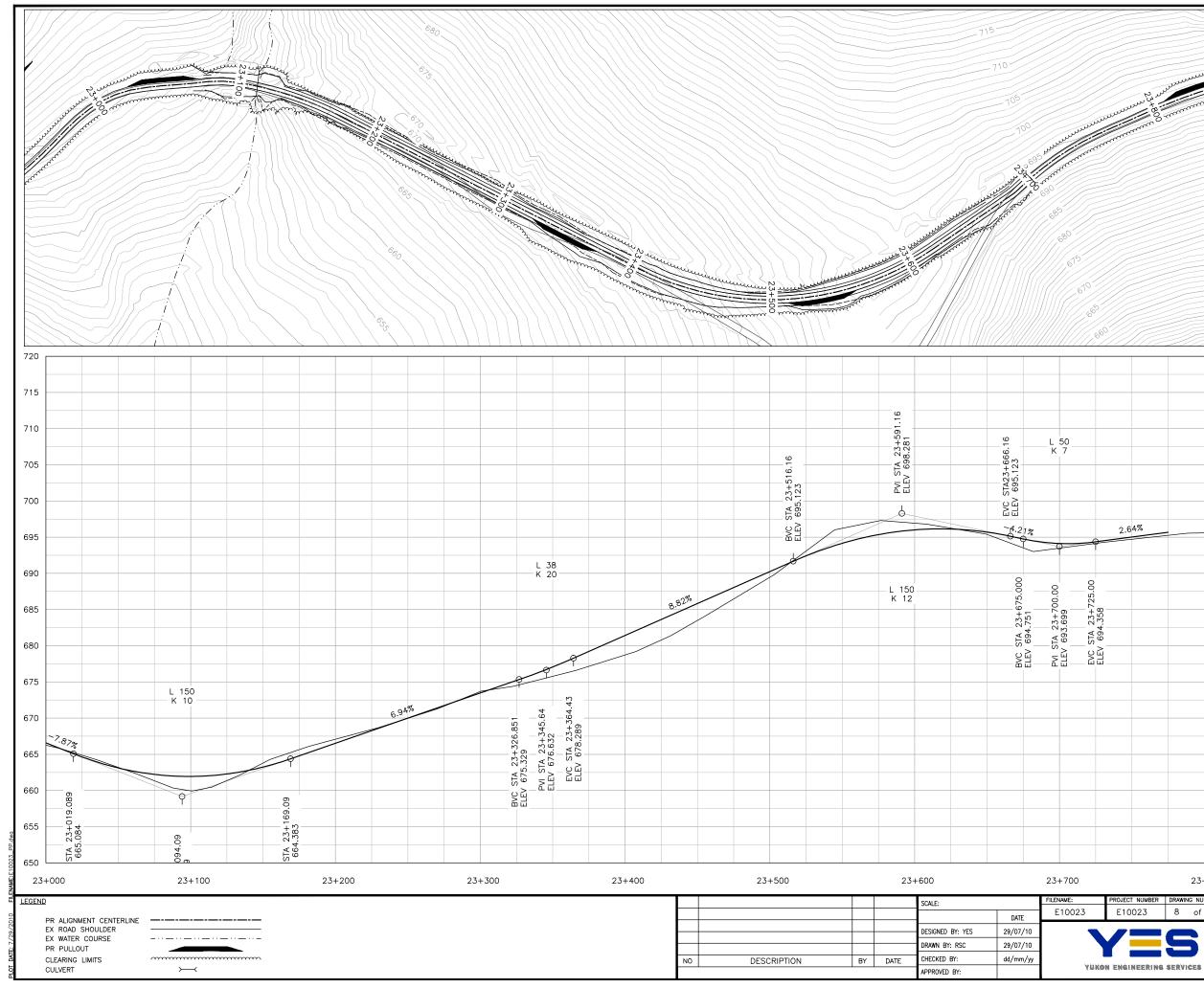




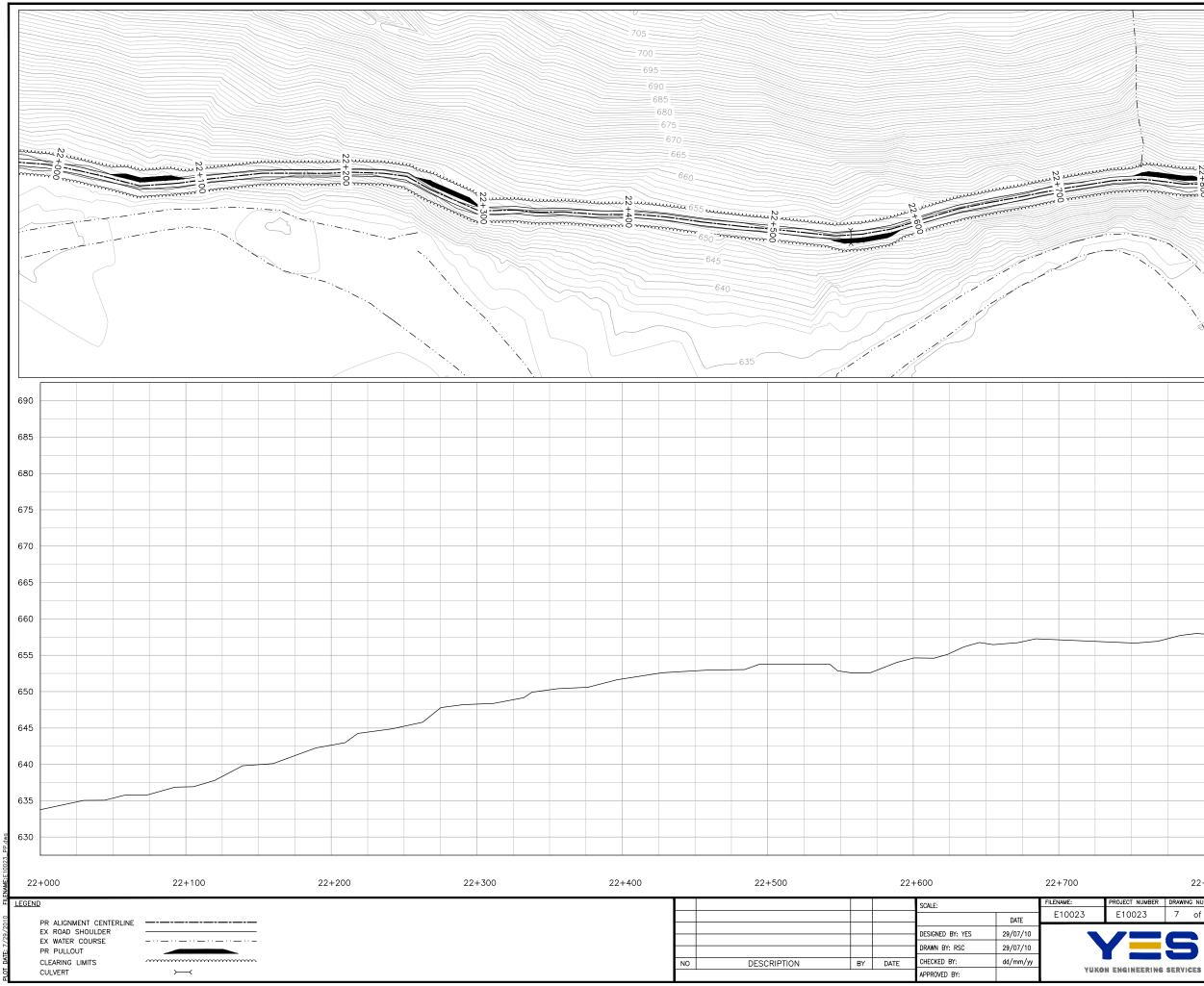
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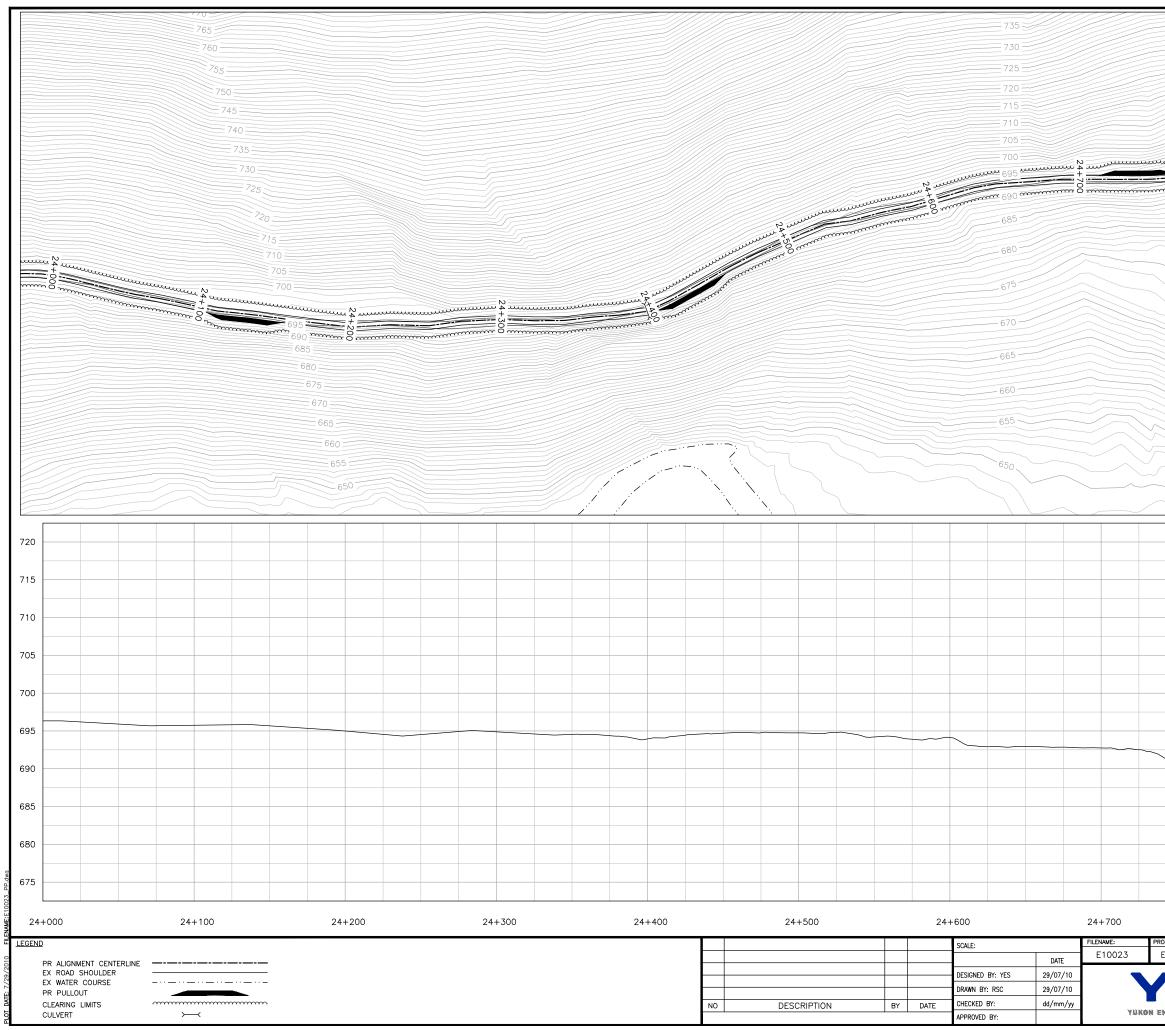
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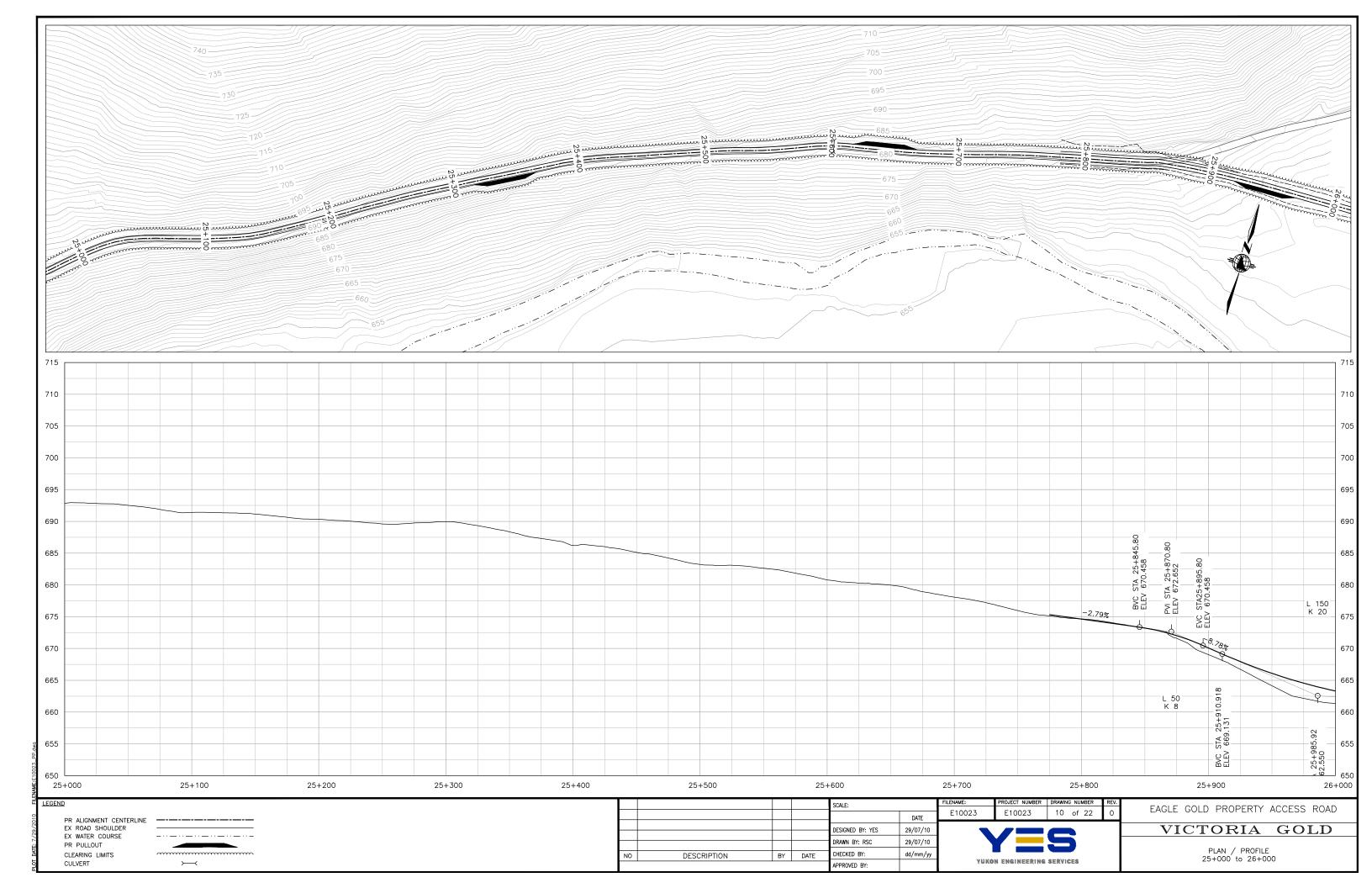
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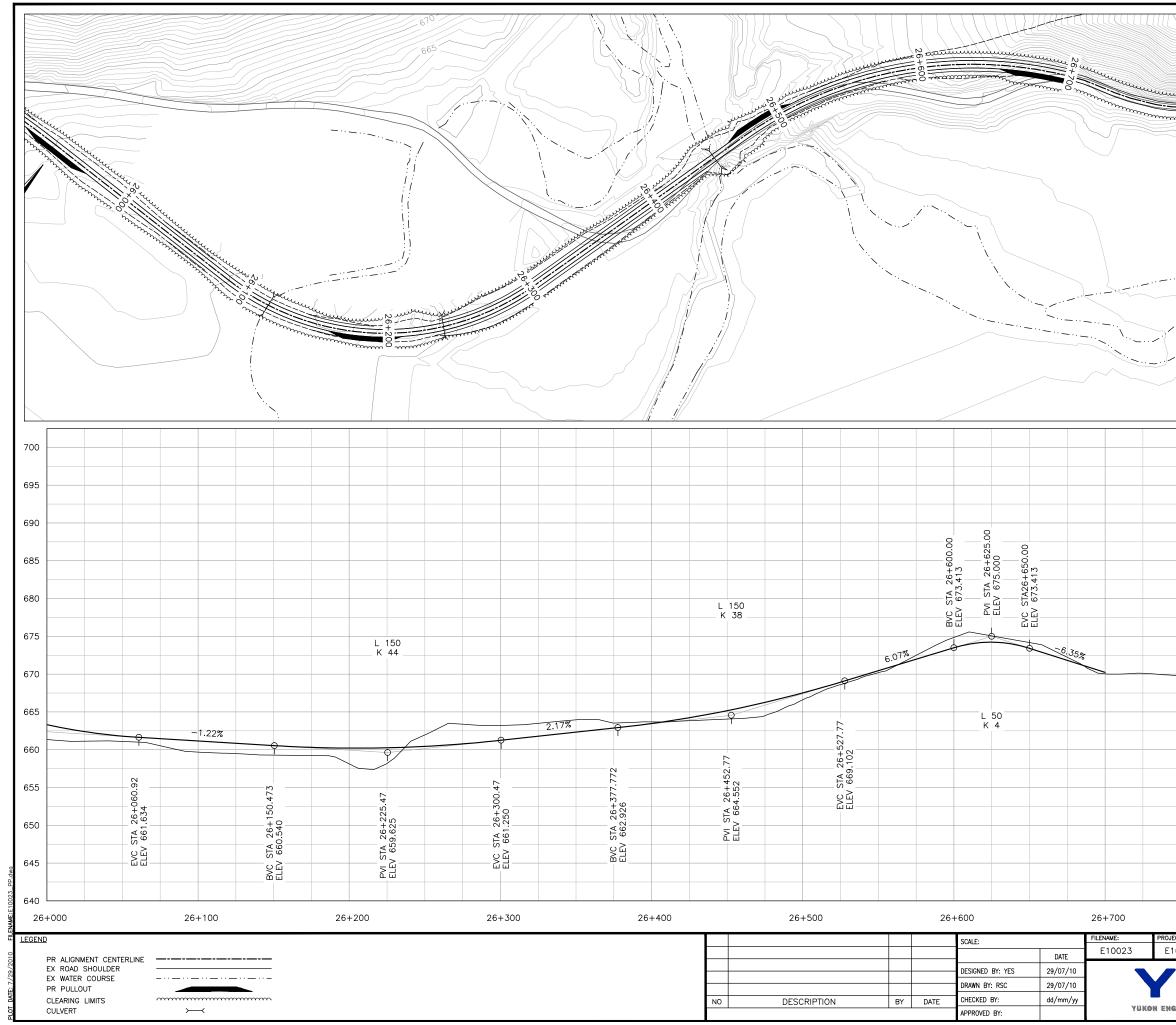


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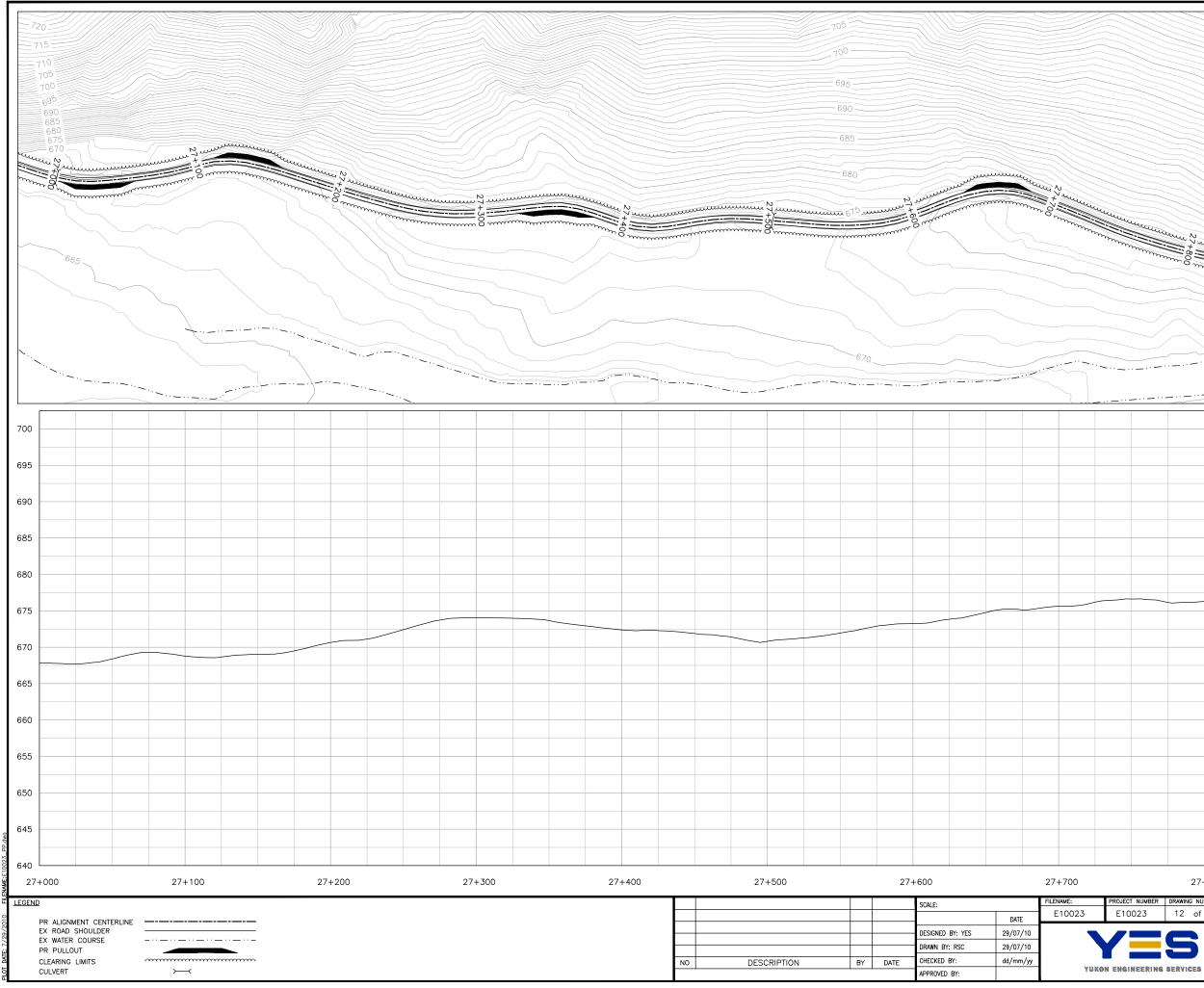


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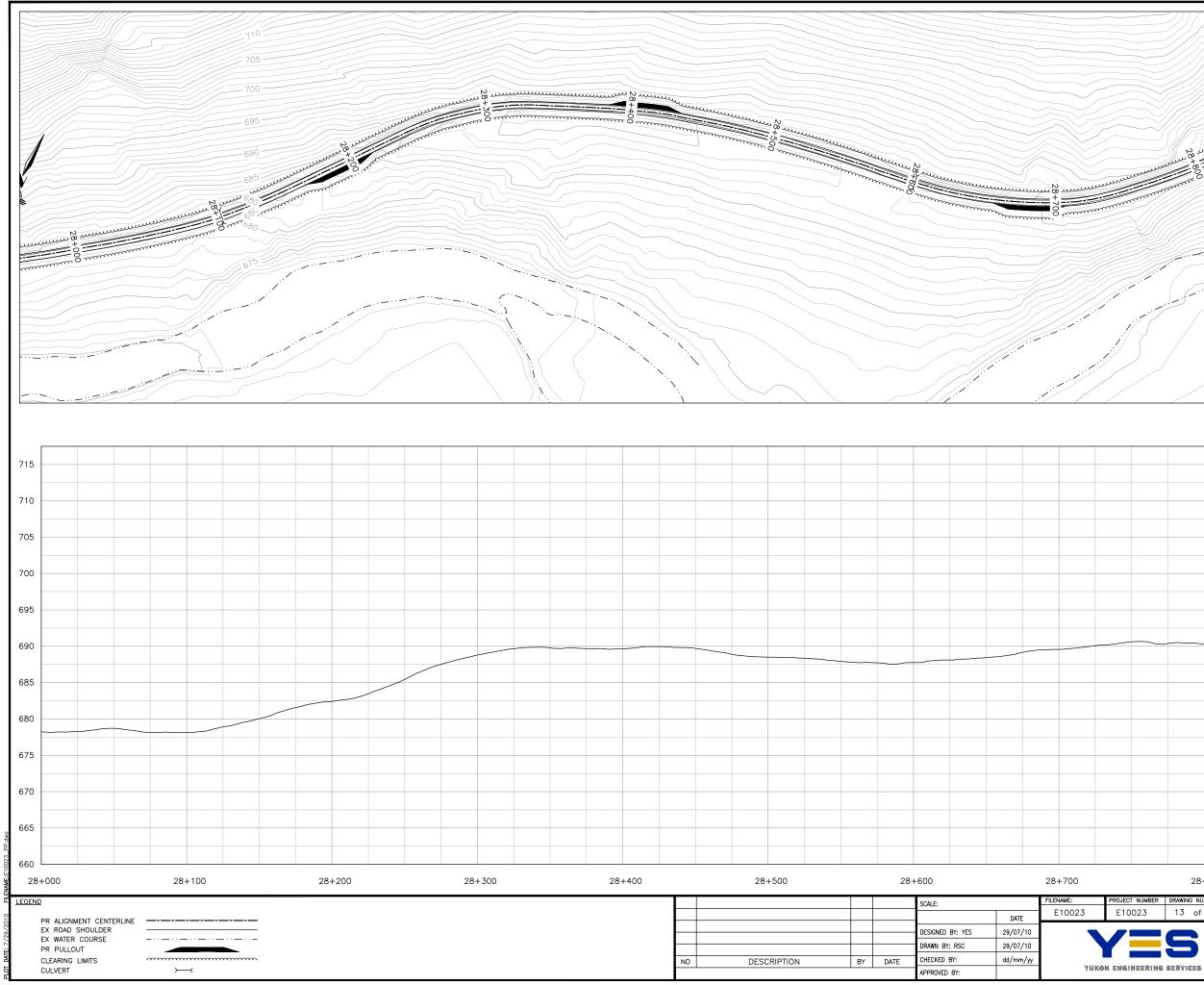




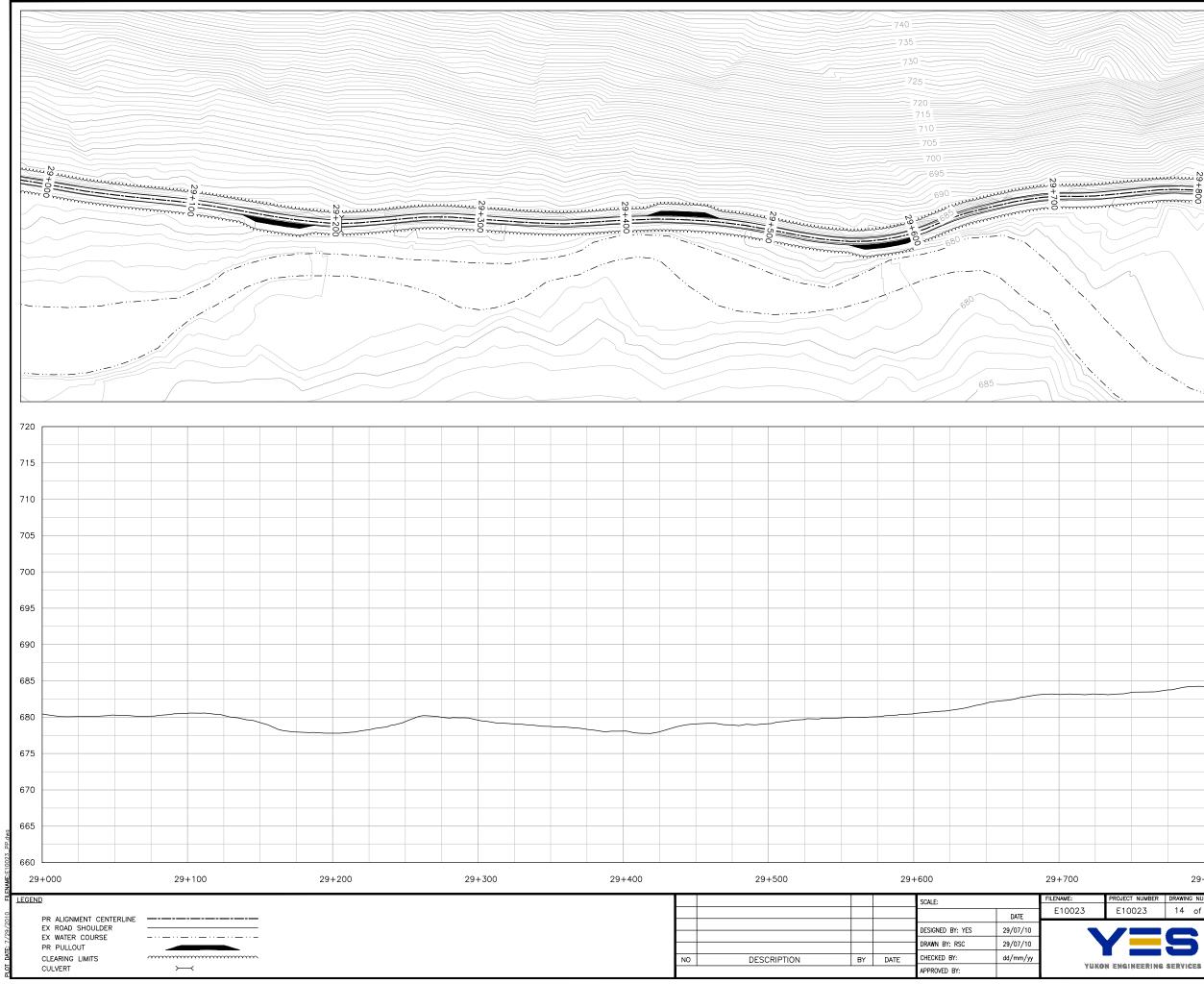
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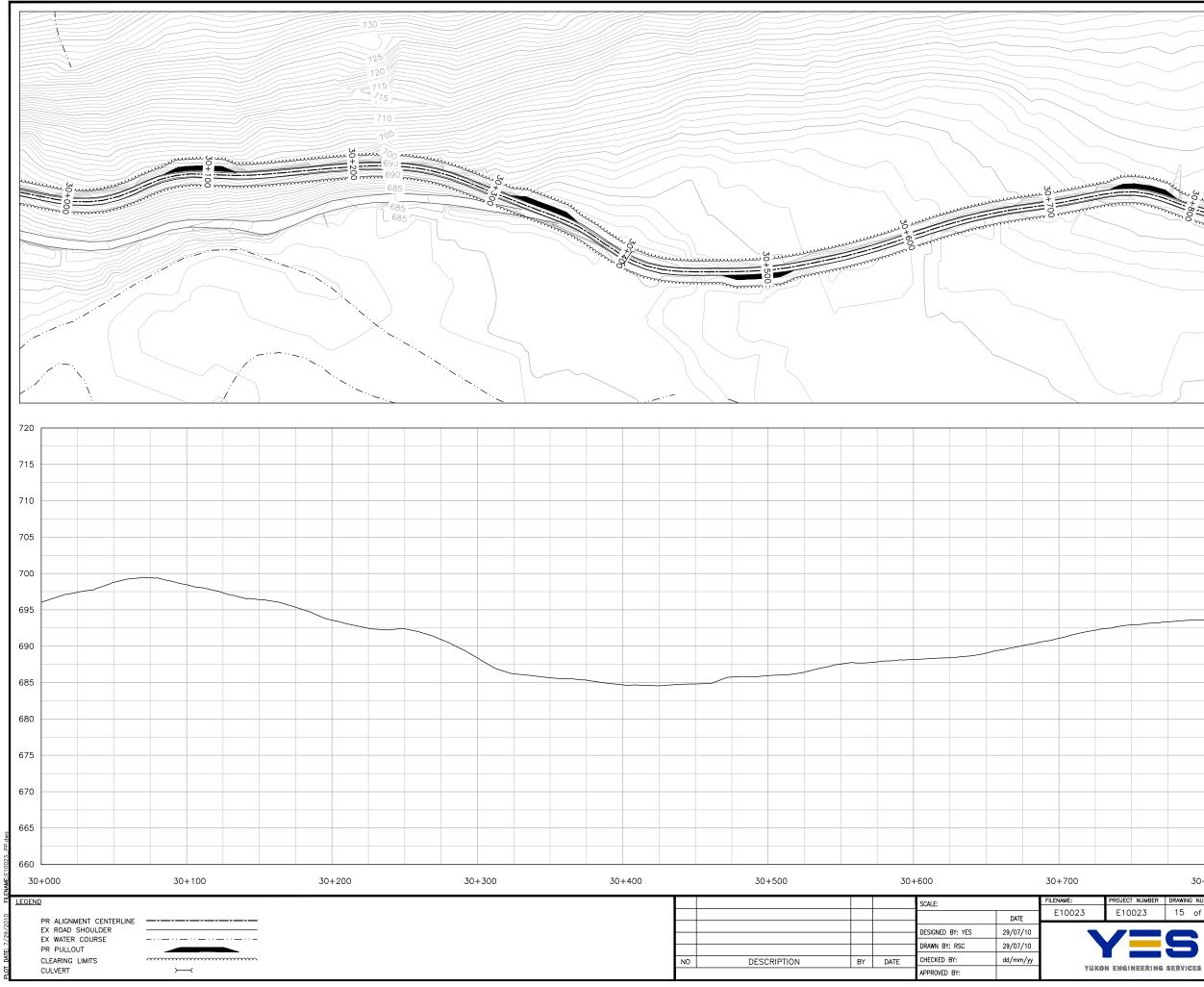
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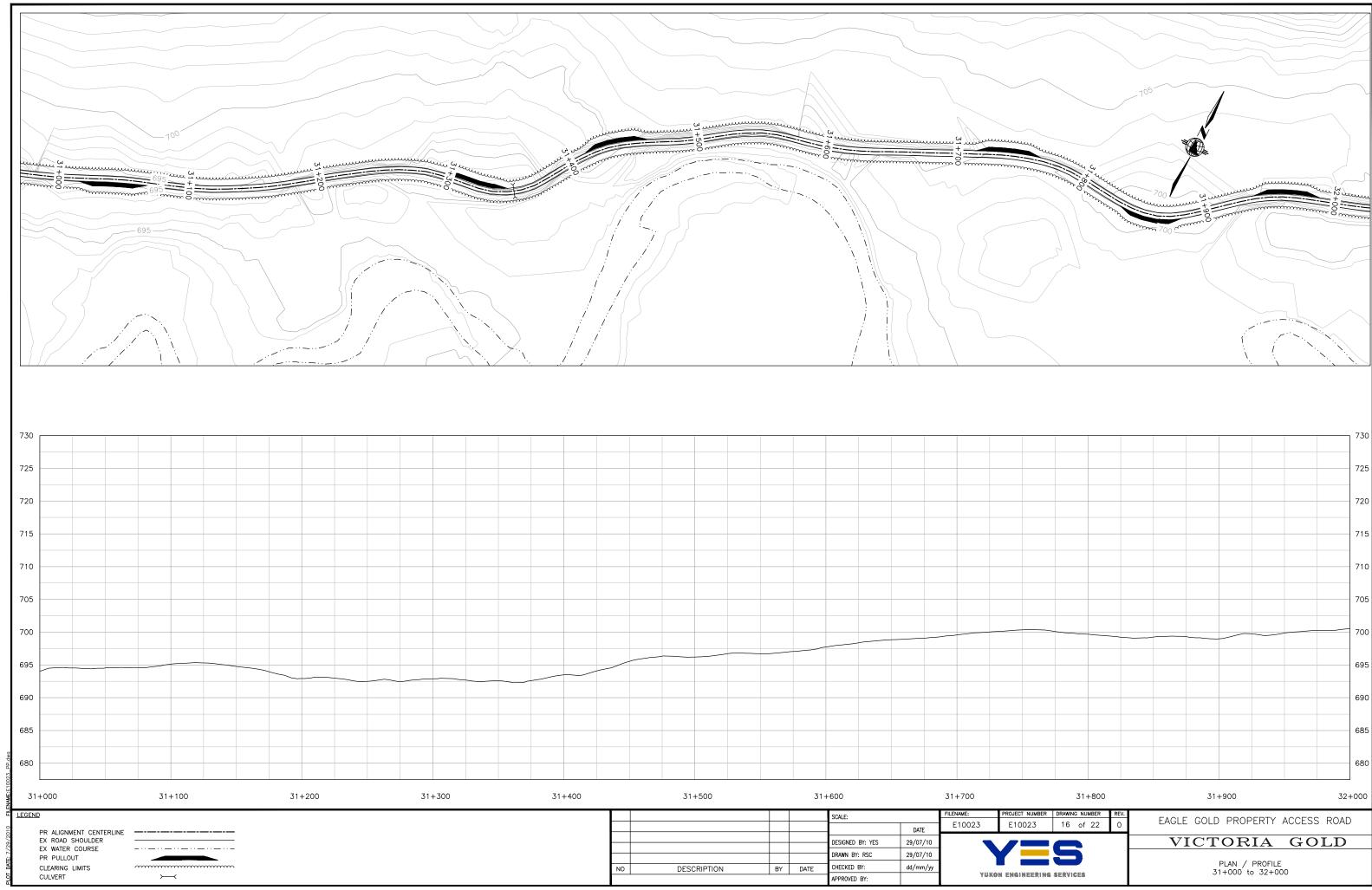
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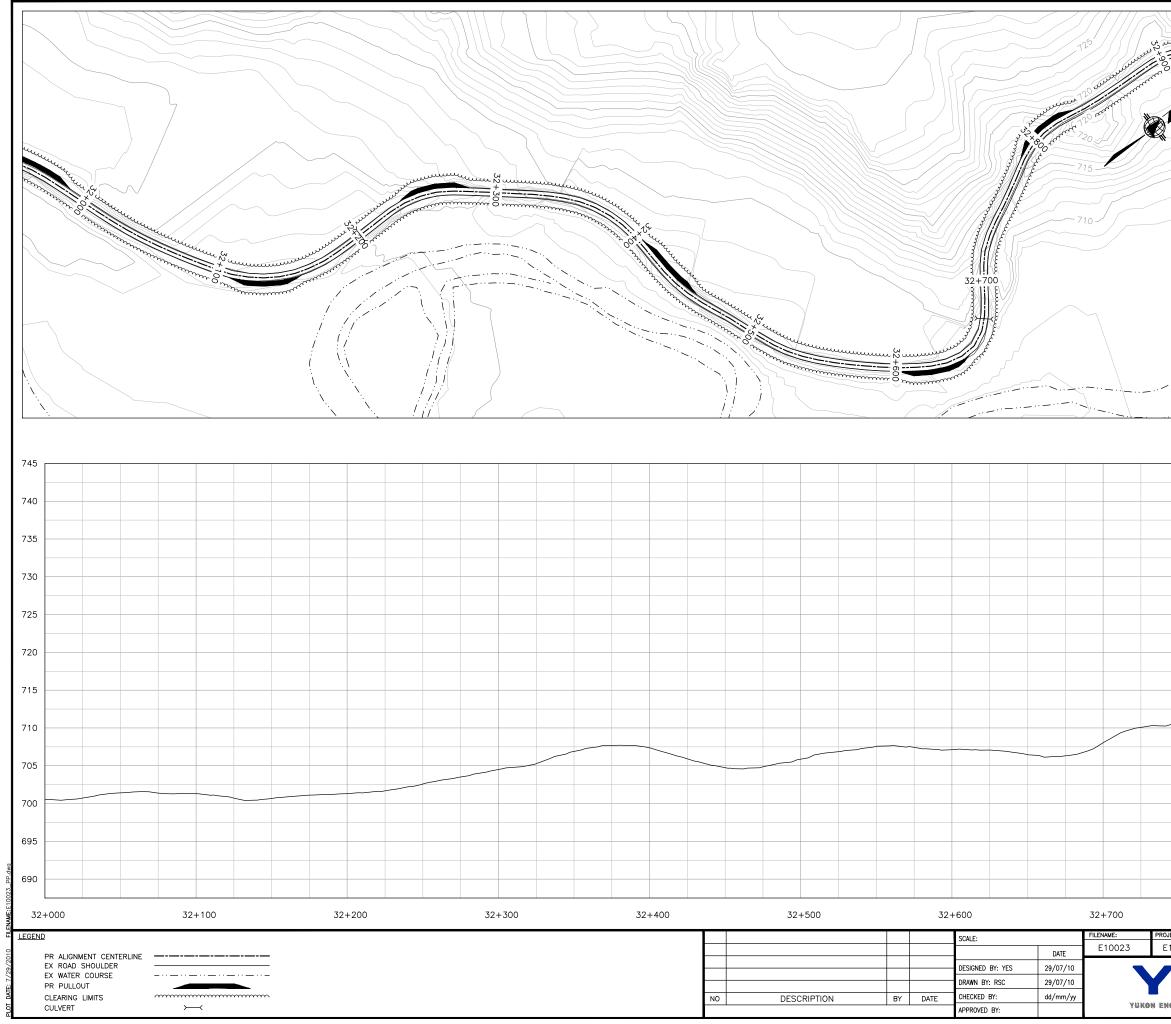
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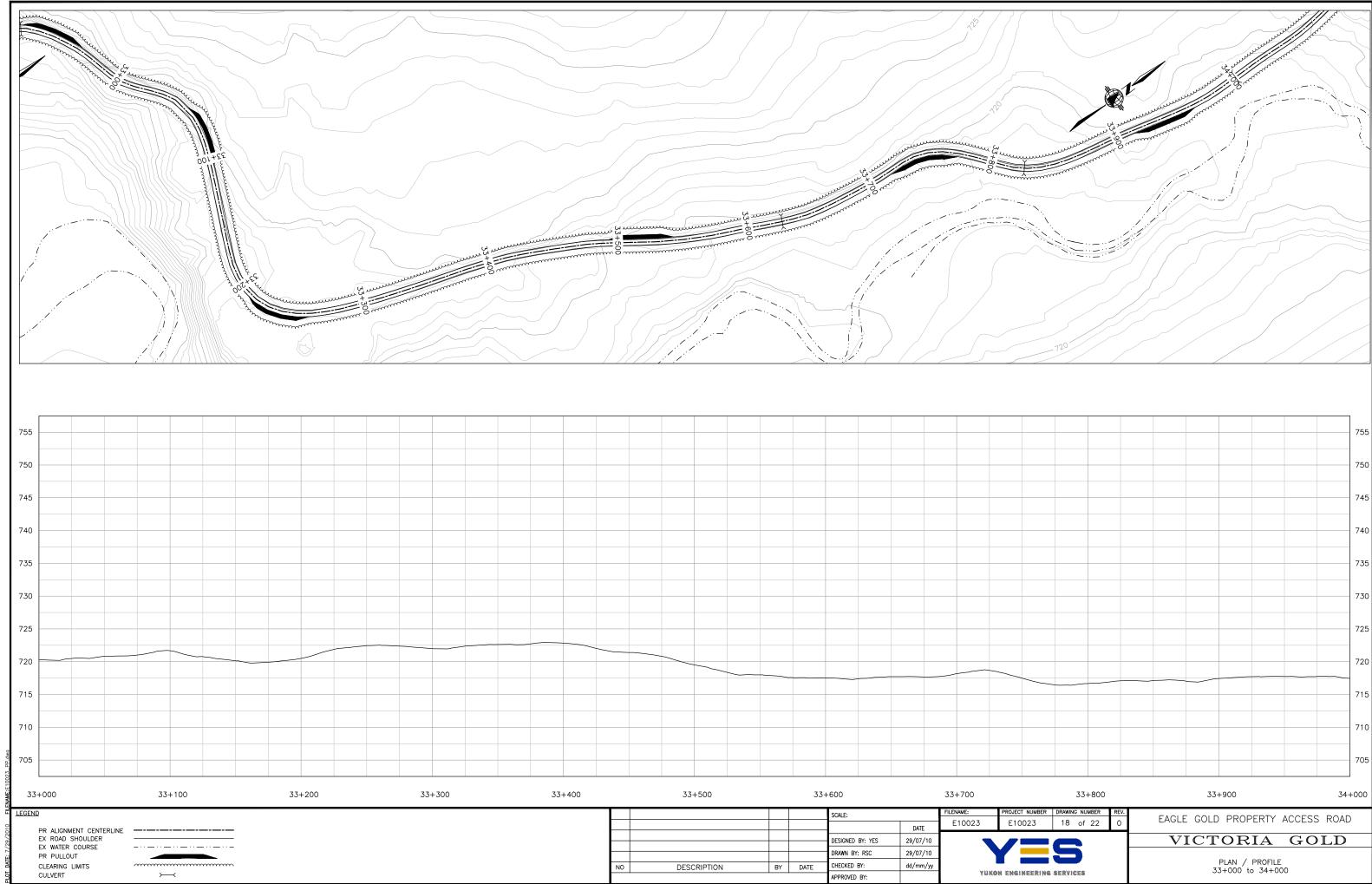
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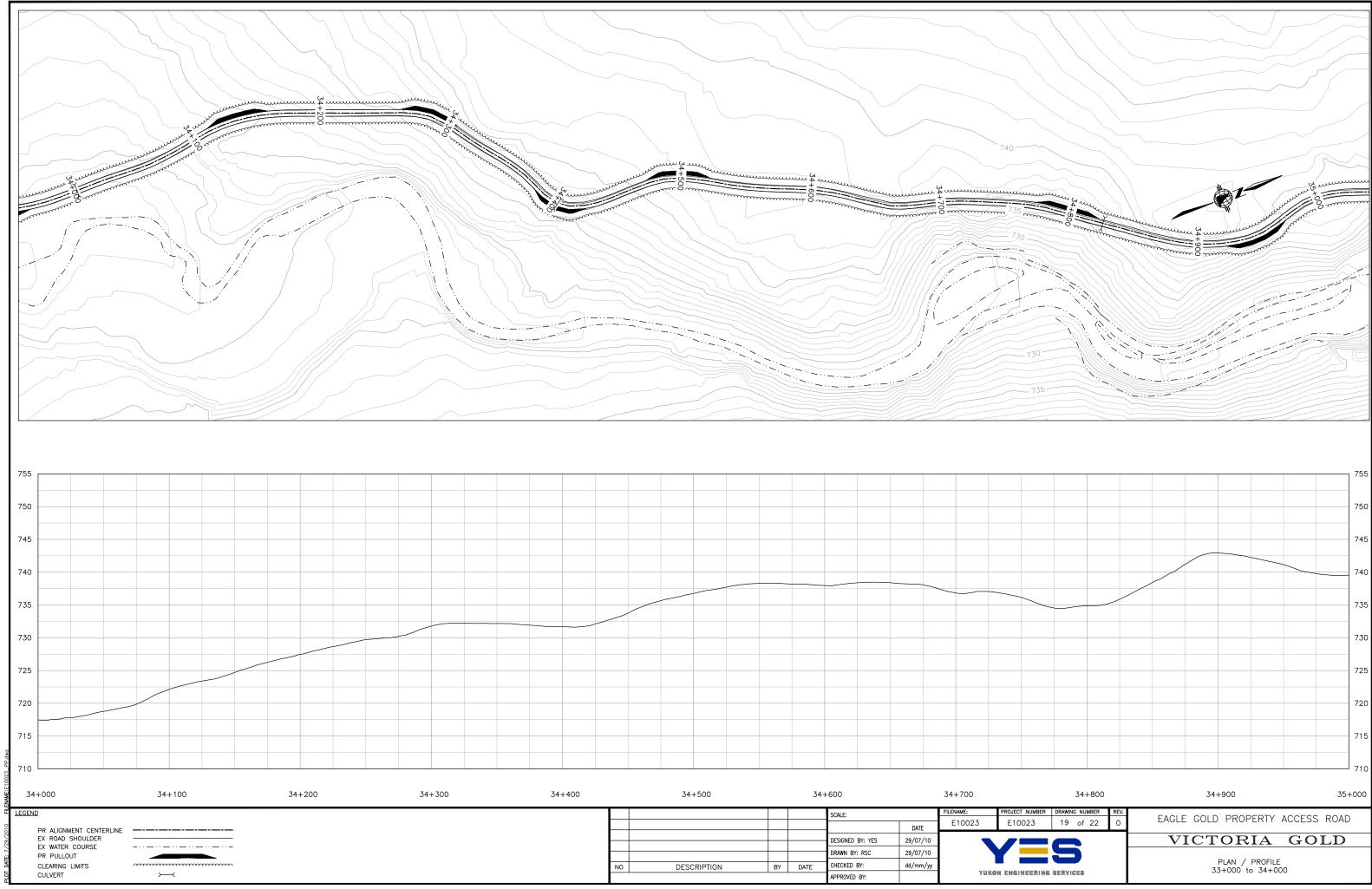
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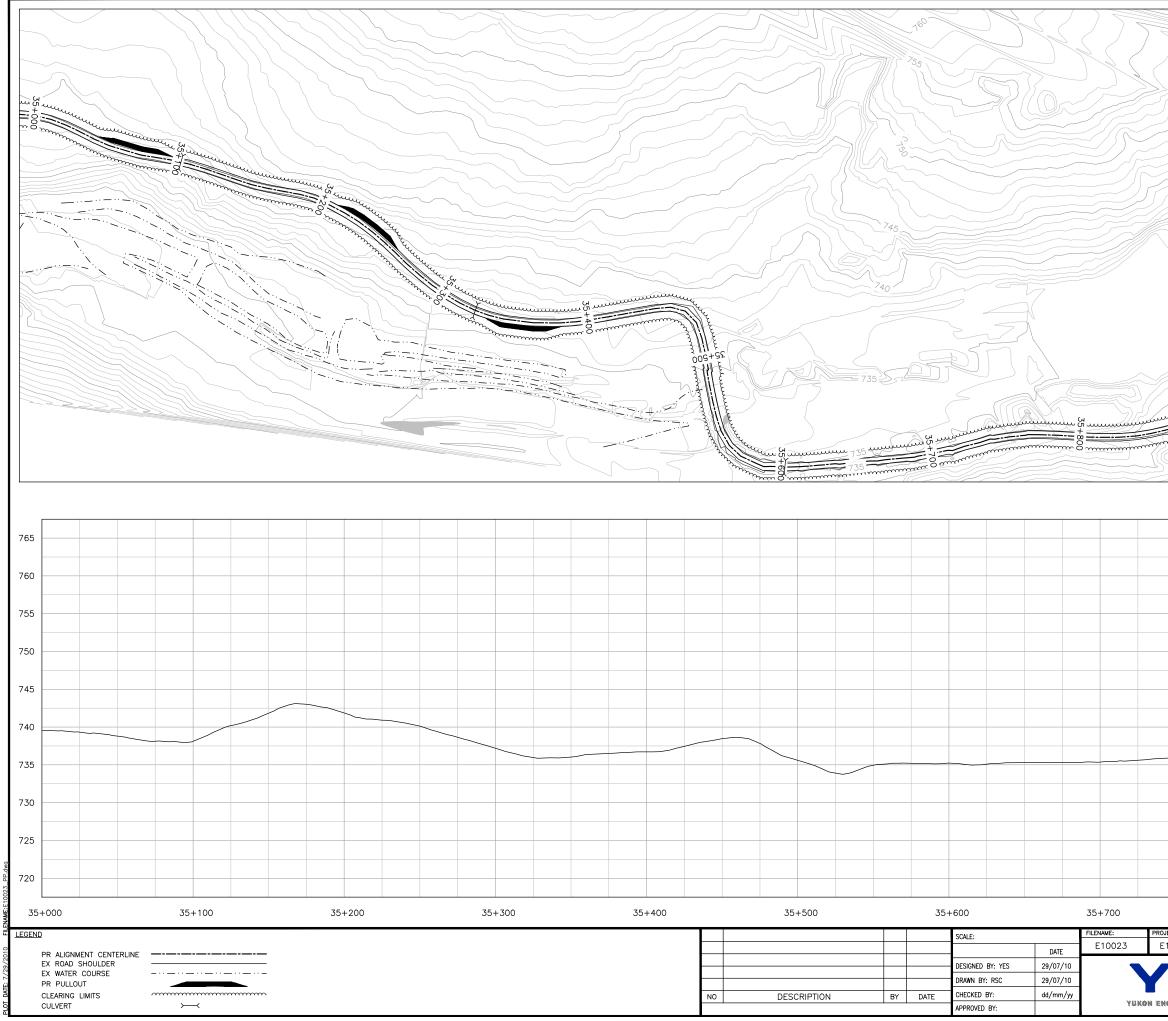


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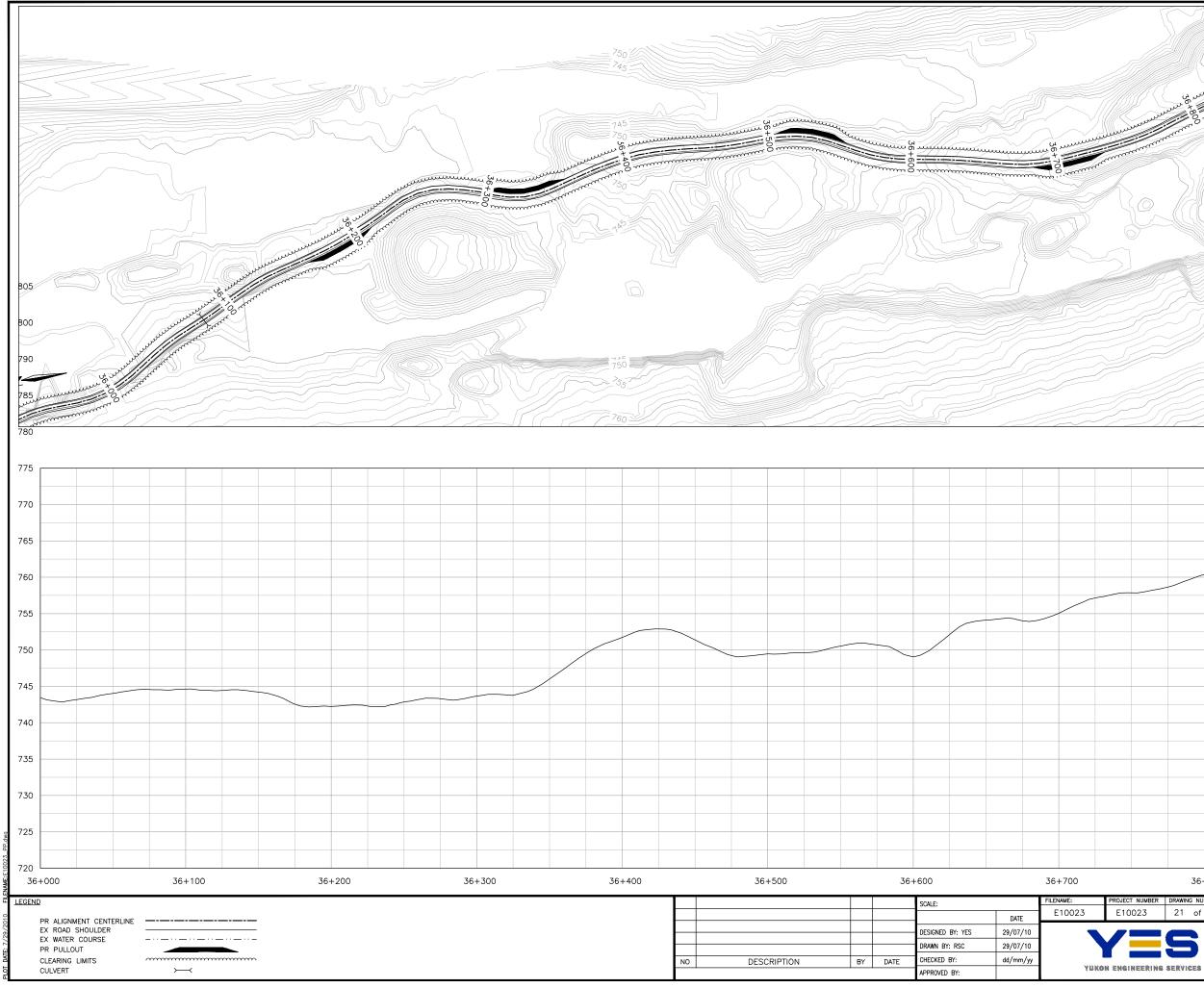


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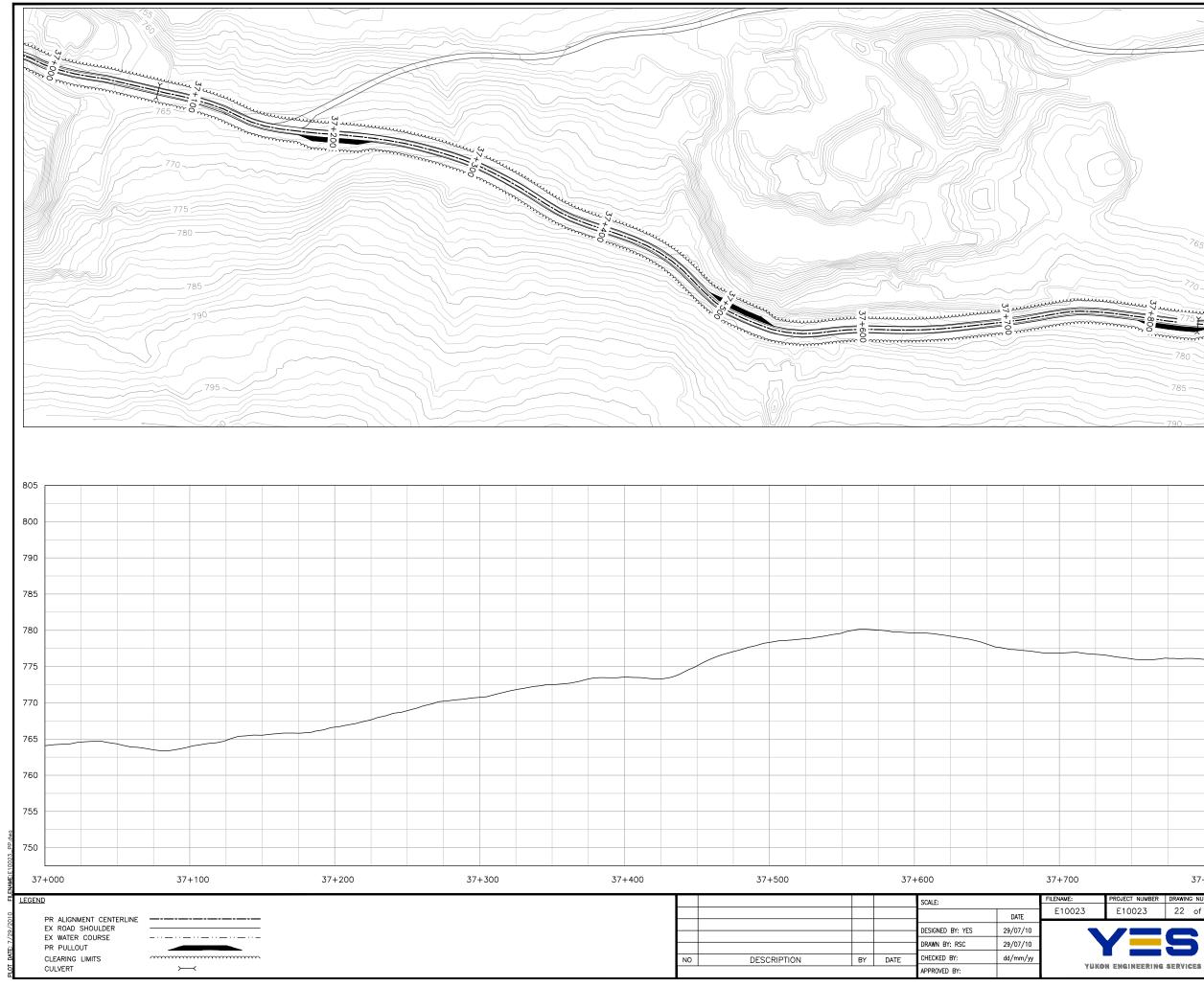
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