CAPSTONE MINING CORP.

MINTO MINE

OPERATED BY MINTO EXPLORATIONS LTD.

Minto Mine Ground Control Plan—Underground Operations

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First Issue: July 2013

REVISION INFORMATION

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General Statement and Corporate Message

Capstone Mining Corp. Minto Mine maintains the Health and Safety of the people involved in activities at the mine as the primary value entrenched into everything we do. We strive for "Safe Production" by ensuring people clearly understand that no one is expected to work in substandard conditions, with substandard tools or put them self at risk in any way performing their duties at the Minto Mine. We maintain a Target: ZERO philosophy that believes all incidents are preventable and that every effort must be made to eliminate significant accidents and reduce minor incidents toward ZERO.

Introduction

The purpose of this Ground Control Plan—Underground Operations (GCP) is to provide a system for the management of the ground control strategy at Capstone Minto Mine Underground Operations. Underground operations have recently started at Minto, and this document will be updated as systems and processes are established at the mine.

The ground control plan shall:

- outline systems for evaluating, designing, maintaining, and monitoring excavation stability to prevent personal injury, damage to equipment or loss to process;
- present a structure that defines core responsibilities and accountabilities;
- develop and maintain a process for hazard identification and risk management with regard to ground control and geotechnical mine design; and
- introduce methods to effectively monitor and measure compliance to legislative regulations and corporate policy through audit and review processes.

The intent of the GCMP is therefore to articulate the strategies aimed at eliminating or minimising the risk of falls of ground or collapse in the underground operations which may result in fatalities, injuries, equipment damage or loss of production.

The GCP is a live document that will change continuously with new standards, technology, working procedures and annual reviews and applies to all personnel at the Minto Mine.

Document Layout

The GCP has three parts.

Part One: Design

This section discusses the processes undertaken to determine the excavation design parameters, support requirements, and proposed mining methods to be applied in the various underground ore zones. This includes a summary of the findings of field investigations and potential hazards related to geotechnical features and rock mass conditions, minimum ground support standards and practices to manage the predicted ground conditions and a process to continually modify the process and practices as required to manage changing ground conditions and any extraordinary geotechnical conditions encountered.

Part Two: Implementation

All personnel working in any areas where their safety can be influenced by rock mass conditions will be required to participate in a geotechnical hazard recognition training program and be made aware of the contents of the GCP. Supervisors will undergo further training focused on the fundamentals of the potential ground performance, recognition of the different ground classes and why certain support types and support practices are used in the different types of ground conditions and mining scenarios. Standard procedures for all underground mining activities have been developed.

Part Three: Verification

Ground conditions, support practices and support performance will be routinely evaluated by shift supervisors, technical staff and management. Procedures have been developed for the regular testing of support installation quality, support performance, as well as excavation performance through deformation monitoring. Internal and external reviews of prevailing ground conditions and the appropriateness of existing support standards will be conducted to ensure applicability of ground support standards.

All materials, including various internal reports and documents, used in the compilation of this document have been referenced where applicable and are summarized in Section 10 – References.

Accountability and Responsibilities

A register of all people with accountability and responsibility under this plan will lie with the Mine General Manager. Each nominated person will sign off as having read the plan and understand their accountability and responsibility.

General Manager

The General Manager has the overall responsibility for, and is the only official who may authorize the implementation, review and revision of, the GCP. The General Manager shall ensure that:

- suitably trained and qualified persons are formally appointed to the following positions:
  - Mine Manager;
  - Operations Superintendent;
  - Chief Engineer; and
  - Underground Safety / Training Coordinator;
- competent geotechnical engineers/geologists are appointed.

Mine Manager

The Mine Manager (or delegate) shall ensure that:

- the GCP is implemented and all regulatory requirements are met;
- adequate resources are allocated and competent technical and operational personnel are appointed.

Operations Superintendent

The Operations Superintendent (or delegate) shall ensure that:

- the GCP is implemented and complied with, and all the requirements are met;
- all geotechnical aspects are adequately considered in relation to design and operation of the mine;
- standard work procedures are implemented and work practices are regularly monitored;
- adequate training is given to all underground personnel;
- suitable equipment is supplied and maintained to the specifications required for quality ground control; and
- audit, review and quality assurance programs are carried out and documented regularly.

Mine General Foremen and Shift Supervisors

The Mine General Foreman and Shift Supervisors (or delegate) shall ensure that:

- the work sites and the travel ways are adequately supported through adherence to the ground control requirements set out in the layouts.;
- SWPs are implemented and monitored to ensure compliance;
- ensuring any unusual ground conditions are noted and brought to the attention of the engineering group;
- all personnel receive appropriate training;
- the designed support/ reinforcement is installed to the specified standards; and
- reports on ground falls, and minor variations in ground support levels are addressed and distributed as required.

Chief Engineer

The Chief Engineer (or delegate) shall ensure that:

- the GCP is implemented and updated when needed;

- competent geotechnical engineers/geologists are appointed;
- major geotechnical aspects are adequately considered in relation to mine design and planning;
- adequate training is given to the site based geotechnical engineers, geologists and mining engineers;
- training modules are developed and implemented through the site based Geotechnical Engineers/Ground Control Geologists in conjunction with the Underground Training Coordinator;
- monitoring, auditing, and testing systems are developed and maintained; and
- SWPs are developed, monitored, and modified when needed, in conjunction with the Health and Safety Department.

All Operational Personnel

All operational personnel shall ensure that:

- no work is undertaken without a plan;
- only work in line with current competencies is undertaken;
- SWPs are followed;
- ground conditions are inspected in line with Workplace Shift Inspections at every work site;
- ground conditions are monitored during the shift for the presence of rock noise and lose ground;
- if any rock noise is heard or the ground being worked is unsafe, withdraw and barricade the area, then immediately notify the Supervisor; and
- other relevant information in relation to ground conditions/support is reported back to the Shift Supervisor and Geotechnical Engineer.

Persons appointed to the above positions are presented in Table 1

Table 1: Responsibility and Accountabilities Register

Name	Position	Signature	Date
Ron Light	General Manager		July 22, 2013
Sebastien Tolgyesi	Mine Manager		July 22, 2013
Fred Bailey	Operations Superintendent		July 21/13
Pooya Mohseni	Chief Engineer	P.Eng	July 21, 2013
Ed Szkalej	Dumas Superintendent		July 21/13
Steeve Taylor	Underground Safety / Trainer		July 22/13

Reviewed By:

PERMIT TO PRACTICE
MINTO EXPLORATIONS LTD.
SIGNATURE
Date July 23rd, 2013
PERMIT NUMBER PP343
Association of Professional Engineers of Yukon

PROFESSIONAL
YUKON
S. L. TOLGYESI
TERRITORY
ENGINEER
July 23rd, 2013

Mandatory Requirements

- NO PERSON IS TO ENTER UNSUPPORTED GROUND. Supported (secured) ground is deemed to be ground where a complete ground support system has been applied as per required standards.
- All excavations must conform to, or exceed the minimum ground control standards specified in this document.
- All ground control work must follow established SWPs.
- All personnel must inspect ground conditions and check the adequacy of ground control when entering an underground heading/access/work area.
- All personnel must immediately report uncontrolled falls of ground and ground control hazards to their immediate supervisor who will be responsible for follow up and documentation.
- All reports of conditions requiring actions outside of standard work such as stopping to scale a piece of loose will be recorded in the Ground Control Log Book and followed-up with a documented Work Place Inspection (WPI) to ensure the efficacy of the remedial action.

Part One: Design

The overall mine design is determined by the geological, geotechnical, and hydrogeological data collected to characterize the Minto ore bodies. Data collected for use in mine design, and the design processes are detailed in this section.

1 Description of the Mine

The Minto Mine is located in the Whitehorse Mining District in the central Yukon Territory. The property is located approximately 240 km northwest of Whitehorse, the Yukon capital.

1.1 Overview and Mining History

Figure 1.1: Plan view of Minto Mine—underground and open pit operations

1.2 Geological Overview

The Minto Project is found in the north-northwest trending Carmacks Copper Belt along the eastern margin of the Yukon-Tanana Composite Terrain, which is comprised of several metamorphic assemblages and batholiths (Figure 1.3). The Belt is host to several intrusion-related Cu-Au mineralized hydrothermal systems.

The Minto Property and surrounding area are underlain by plutonic rocks of the Granite Mountain Batholith (Early Mesozoic Age) (Figure 1.3) that have intruded into the Yukon-Tanana Composite Terrain. They vary in composition from quartz diorite and granodiorite to quartz monzonite. The batholith is unconformably overlain by clastic sedimentary rocks thought to be the Tantalus Formation and andesitic to basaltic volcanic rocks of the Carmacks Group

The hypogene copper sulphide mineralization at Minto is hosted wholly within the Minto pluton, predominantly of granodiorite composition. Hood et al. (2008) distinguish three varieties of the intrusive rocks in the pluton. The first variety is a megacrystic K-feldspar granodiorite. It gradually ranges in mineralogy to quartz diorite and rarely to quartz monzonite or granite, typically maintaining a massive igneous texture. An exception occurs locally where weakly to strongly foliated granodiorite is seen in distinct sub-parallel zones several metres to tens of metres thick.

A second variety of igneous rock is a quartzo-feldspathic gneiss with centimeter-thick compositional layering and folded by centimetre to decimetre-scale disharmonic, gentle to isoclinal folds (Hood et al., 2008). The third variety of intrusive is a biotite-rich gneiss. MintoEx geologists consider all units to be similar in origin and are variably deformed equivalents of the same intrusion.

Copper sulphide mineralization is found in the rocks that have a structurally imposed fabric, ranging from a weak foliation to strongly developed gneissic banding. For this reason all core logging by the past and present operators separates the foliated to gneissic textured granodiorite as a distinctly discernible unit. It is generally believed by MintoEx geologists that the foliated granodiorite is just variably strained equivalents of the two primary granodiorite textures and not a separate lithology.

Other rock types, albeit volumetrically insignificant, include dykes of simple quartz-feldspar pegmatite, aplite; and an aphanitic textured intermediate composition rock. Bodies of all of these units are relatively thin and rarely exceed one metre core intersections. These dykes are relatively late, and observed contact relationships suggest they generally postdate the peak ductile deformation event; however some pegmatite and aplite bodies observed in a rock cut located north of the mill complex are openly folded.

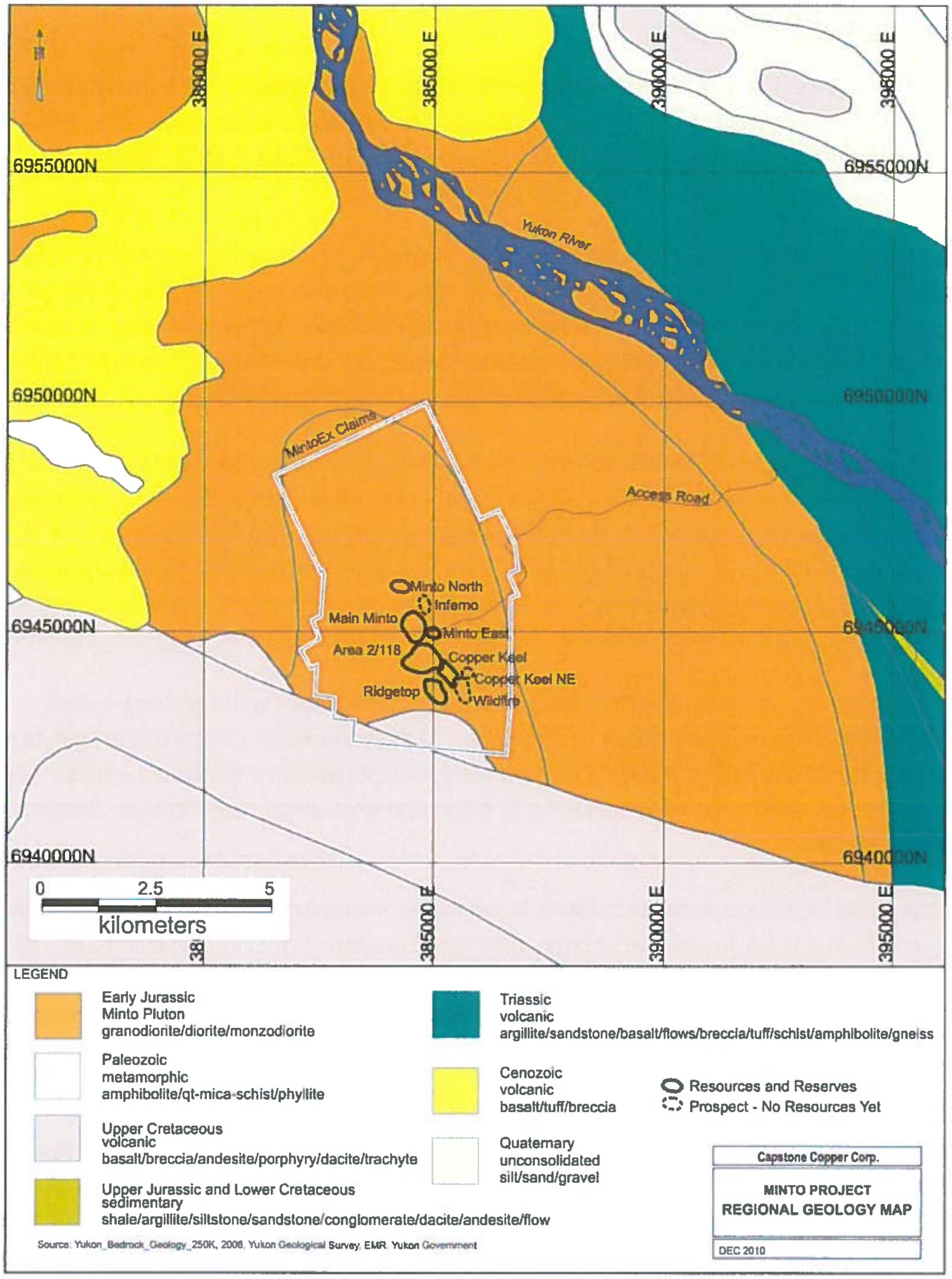


Figure 1.2: Regional Geology

1.3 Structure

There are both ductile and brittle phases of deformation around the Minto deposits. As noted above copper-sulphide mineralization is strongly associated with foliated granodiorite. This foliation is defined by the alignment of biotite in areas of weak to moderate strain and by the segregation of quartz and feldspar into bands in areas of higher strain, giving the rock a gneissic texture in very strongly deformed areas. The deformation zone forms sub-horizontal horizons within the more massive plutonic rocks of the region and can be traced laterally for more than 1,000 m in the drill core. They are often stacked in parallel to sub-parallel sequences. The regular, sub-horizontal nature of the deformation zones allows a high degree of predictability when planning diamond drilling campaigns.

Internally, the foliation exhibits highly variable orientations within individual deformation zones with the presence of small-scale folds. The foliation is often observed to be at a high angle to contacts with more massive textured rock units.

Late brittle fracturing and faulting is noted throughout the property. Some of these faults are significant from an economic standpoint. The Minto Creek fault (MC Fault) bisects the Minto Main deposit, dividing it into north and south areas and is modelled as dipping steeply north-northeast with an apparent left lateral reverse displacement. The northern block moved up and to the west relative to the southern block. Both the vertical and horizontal displacements are evident by offsets in the main zone mineralization and appear to be minimal. A lack of marker horizons in the plutonic rocks, however, makes it difficult to determine the absolute magnitude of the movement (Figure 1.4).

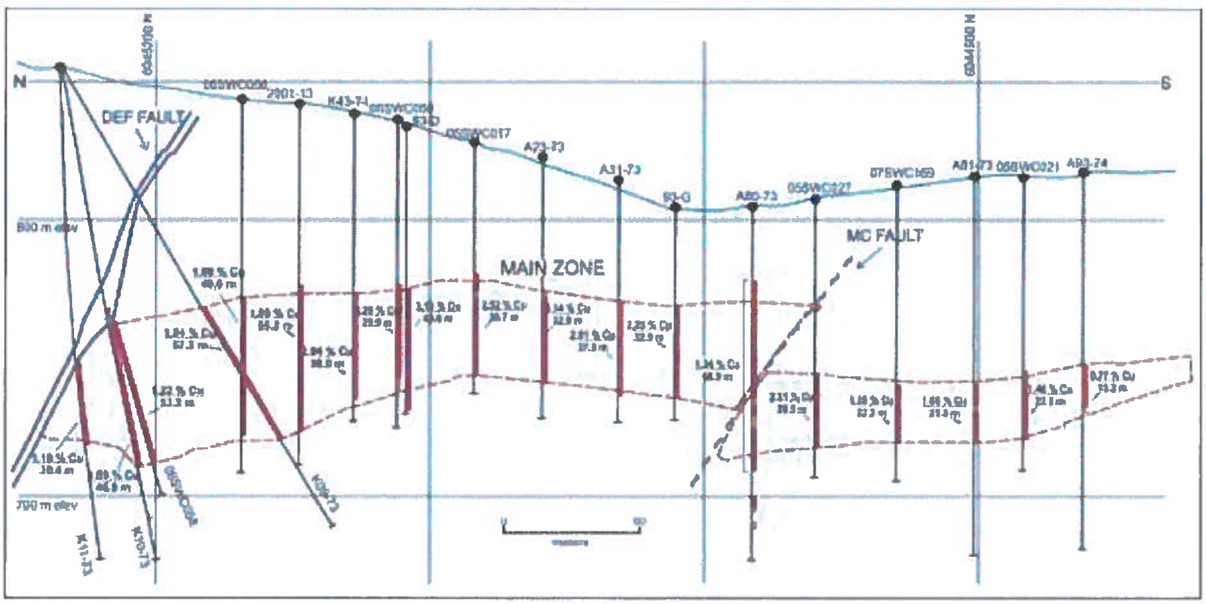


Figure 1.3: North- South Cross Section through Minto Main Deposit showing DEF Fault and MC Fault

The DEF fault defines the northern end of the Main deposit. It strikes more or less east-west and dips north-northwest and cuts off the main zone mineralization, as shown in Figure 1.4. The vertical orientation of most of the drilling is less than optimal to intersect steep to vertical faults. It may share a similar sense of movement to the MC fault, but a significant amount of displacement is inferred. Determining the magnitude of this displacement could lead to locating an extension of the main zone mineralization on the north side of the DEF fault. This late block faulting is noted throughout the Granite Mountain Batholith and in some instances a rotational component is noted as well. Tafti & Mortensen (2004) found the Cretaceous Age Tantalus Formation rotated up to 60° from horizontal in areas located south of the Minto deposit.

A zone of pervasive fracturing on the west side of the deposit limits ore grades in this direction. Limited historical drilling west of this structure did intersect some weak copper mineralization, although foliated horizons do not line up across this fracture zone. It is presumed to be one of the north-south faults that are part of the late brittle conjugate set.

The boundary between the Area 2 and Area 118 is an intermediate NE dipping fault. The displacement of the mineralization is significant. At least two parallel structures displace mineralized domains in Area 118.

The shear sense on this structure has not been analyzed in detail, but attempts to correlate ore zones across the main boundary fault are complicated by the difficulty in finding a specific characteristic to unambiguously identify the zones. The easiest zone to identify (based on mineralization and texture) is the "N" zone and it has up to 66 m of vertical throw across the boundary fault. Other zones show changes in thickness and orientation, suggesting the presence of pure strain and block rotation. A similar NW striking fault zone appears to be present that defines the northeastern boundary of the Ridgetop deposit, and defines the outcrop of Cretaceous conglomerate. The dip of this structure is unknown.

1.4 Rock Mass Characterization

1.4.1 Rock Types

Primary rock types at the Minto underground are listed below in decreasing order of volumetric significance.

- Granodiorite
  - Megacrystic K-feldspar
  - Quartofeldspathic gneiss
  - Biotite-rich gneiss
- Conglomerate
- Dykes of simple quartz-feldspar pegmatite, aplite; and aphanitic textured intermediate composition rock

For the majority of the rock mass assessments completed at Minto, Granodiorite was the major intersected unit. This unit has been separated based on geotechnical properties into fresh and weathered units.

1.4.2 Discontinuities

The same persistent J1 and J3/J4 joint sets seen in the Area 2 Pit west wall (as per the stereonet shown in Figure 1.5, summarized in Table 1.1) have been encountered in most of the currently exposed underground ramp, along with occasional local sub-horizontal sets. The jointing patterns visible in the ramp create conditions varying from moderately blocky, to very blocky, to wedge-prone, depending on the number of sets, local spacing, and persistence. Some discontinuities can be followed over many metres, eventually disappearing into the rockmass past the excavation boundaries. Numerous faults were also observed locally in the ramp, often oriented along the direction of sets J1 or J2 (around 80°/030° dip/dip direction).

Table 1.1: Summary of Updated Discontinuity Sets

Set ID	No.	Dip		Dip Direction		Comments
		Mean	Std. Dev.	Mean	Std. Dev.	
J1	43	54	9	45	18	Primary set in 787 m bench instabilities
J2	76	87	10	44	33	High concentration of persistent faults
J3	39	86	12	135	8	Secondary set in 787 m bench instabilities
J4	23	73	9	16	6	
J5	20	40	6	32	17	
J6	16	73	7	35	7	

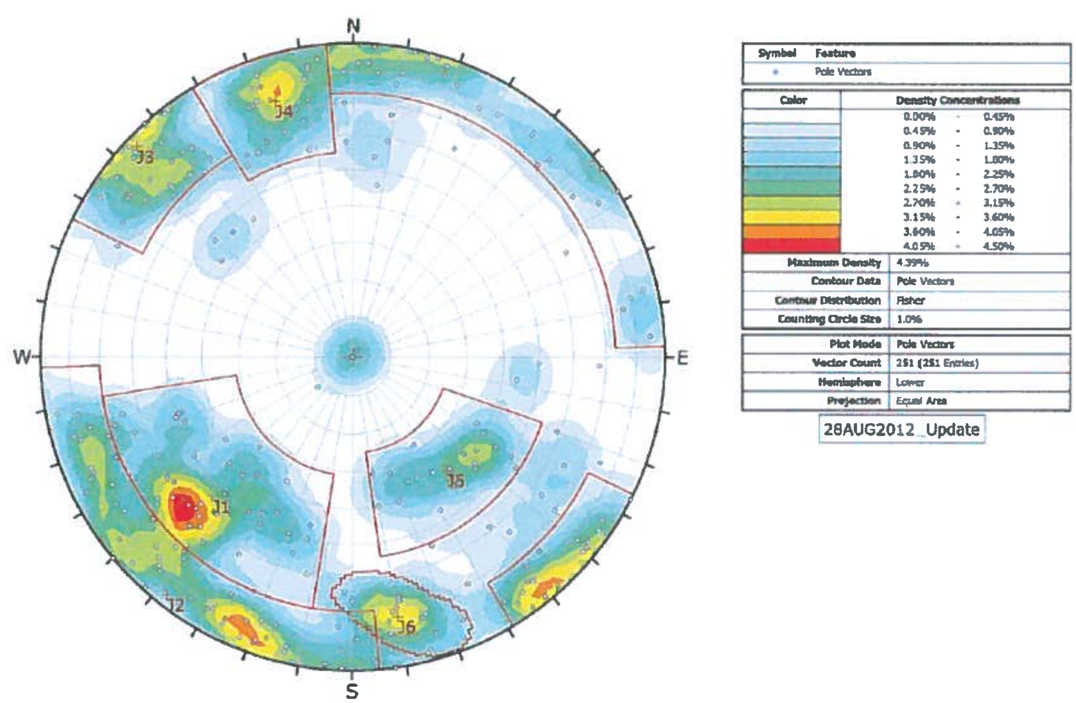


Figure 1.4: Lower hemisphere contoured pole plot of digitized discontinuities from LiDAR scans (SRK, 2012)

1.4.3 Basic and Advanced Mechanical Properties

The rock and material properties presented in Tables 1.2 through 1.5 have been summarized based on the results of several rock testing campaigns throughout the history of open pit mining and associated exploration drilling at Minto. The results of UCS, tri-axial, tensile, and direct shear testing are based on ISRM guidelines.

Table 1.2: Summary of testing for UCS and intact properties (all Minto mining areas)

Area	Lith	All UCS (MPa)		UCS (MPa) excluding defects		Young's Modulus (E (GPa)	Poisson's Ration	Density (kN/m^3)
		number	mean	number	mean			
Area 2	Fresh	7	76	4	108	47.3	0.228	26.5
	Weathered	5	40	5	40	14.9	0.084	25.8
Main	Fresh	14	46	8	62	37.9	0.206	25.9
	Fault	8	33	8	33	27.3	0.196	25.3
Minto North	Fresh	6	140	6	140			26.5
118	Fresh	7	134	6	144	57.9	0.260	26.4
	Weathered	1	88	1	88	50.5	0.220	26.1
Ridge Top	Fresh	6	113	6	113	53.9	0.262	26.3
	Weathered	4	96	4	96	52.5	0.294	26.0

Tri-axial compressive strength testing was conducted on six samples of core, under confining pressures (σ_3) ranging between 6.9 and 20.7 MPa (Table 1.3). Hoek-Brown and Mohr-Coulomb failure envelopes from the tri-axial and uniaxial data were calculated and are shown in Figure 1.6.

Table 1.3: Summary of tri-axial testing for all Minto mining areas

Drill hole ID	Sample Depth (m)	Unit Weight (kN/m3)	σ3 (MPa)	σ1 (MPa)
07SWC201	28.9	25.6	9.65	112.7
07SWC201	180.00	26.6	15.9	253.9
07SWC196	126.40	26.2	6.2	189.7
07SWC196	210.30	26.3	21.4	180.5
09SWC424	59.88	26.4	6.9	222.1
09SWC424	153.30	26.2	17.2	276.8
09SWC422	150.10	26.4	10.3	213.8
09SWC422	209.69	26.4	13.8	294.1
09SWC420	250.17	26.5	13.8	288.2
09SWC427	123.25	26.3	20.7	277.5

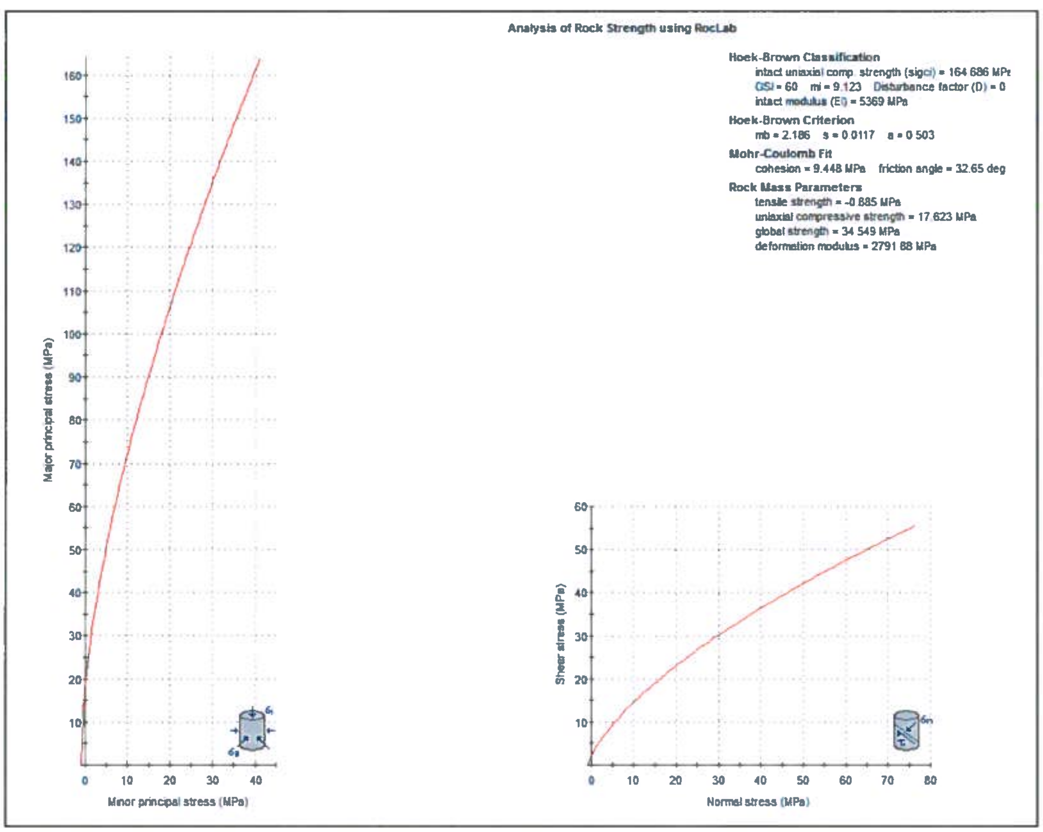


Figure 1.5: RocLab analysis of tri-axial testing for all Minto areas

Brazilian tensile strength (BTS) testing was conducted on five samples producing intact tensile strengths ranging from 7.2 to 10.8 MPa, with a mean value of 8.8 MPa (Table 1.4).

Table 1.4: Summary of Brazillian tensile strength testing for all Minto areas

Drill Hole ID	Sample Depth (m)	Tensile Strength (MPa)
09SWC422	150.10	10.8
09SWC422	271.90	9.4
09SWC420	161.03	7.6
09SWC429	150.11	7.2
09SWC431	37.20	8.9

Ten samples of naturally-occurring discontinuities encountered in the core were tested using four-point, small-scale direct shear tests to obtain discontinuity shear strength data, resulting in:

- Calculated friction angles (Φ) ranged from 33° to 46°, with a mean of 36°; and,
- Apparent cohesion values ranging from 1 to 22 kPa, with a mean of 10 kPa.

1.4.4 Stress Field – World Stress Map

Based on the world stress map (Figure 1.7; http://dc-app3-14.gfz-potsdam.de/index.html), the major stress orientation is likely to be in a north-east—south-west direction. An estimate of stress magnitude is not available, but based on the currently planned shallow depth of mining stress is not likely to be an issue.

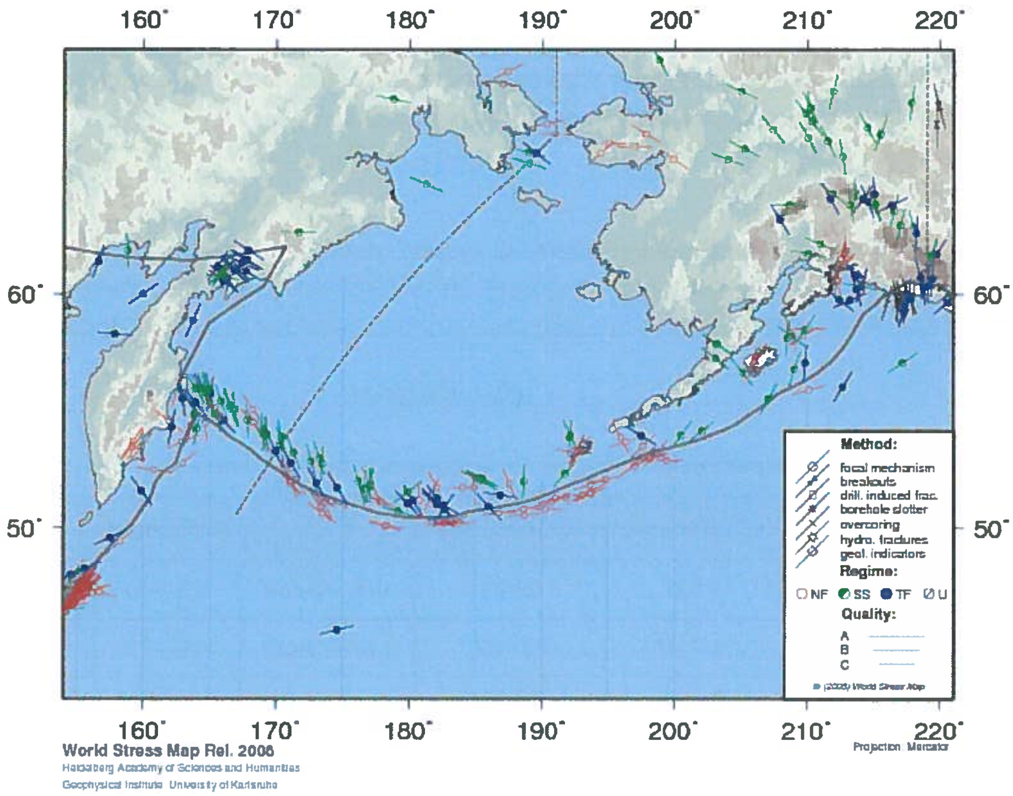


Figure 1.6: World Stress Map for Aleutian Arc

1.4.5 Geotechnical Domains

Through historical surface mining studies conducted at Minto it was determined that a relatively consistent geology supported the division of the materials into two basic domains based on weathering profiles i.e., weathered and fresh rock.

The weathered rock domain is typically characterized by relatively higher fracture frequencies, consistently lower intact rock strengths and zones of heavy alteration and oxidation as a result of moderate to heavy surface weathering and is typified by core that shows consistently lower RQD and IRMR values (summarized in Table 1.6). Consequentially, the weathered bedrock is of significantly lower geomechanical quality than the fresh rock which underlies it.

In general, the fresh rock is consistently a much more competent rock mass than the weathered bedrock, possessing relatively lower fracture frequencies and higher intact rock strengths. The fresh rock encountered is relatively massive and exhibits fewer signs of alteration and weathering when compared to the weathered rock and, consequently, possesses higher overall RQD and IRMR values.

The fresh rock domains contain intermittent zones of weaker material which typically correspond to intervals of increased fracturing, weathering and/or alteration, including minor fault zones and surface weathering.

Foliated granodiorite is encountered in the fresh rock and exhibits similar intact rock strength and rock mass properties as non-foliated granodiorite. The foliated zones are generally associated with mineralization. For geotechnical studies, the foliated and non-foliated rock was grouped together into their respective weathered or fresh domains.

1.4.6 Rock Mass Properties

Rock mass parameters based on Barton's Q system have been adopted for underground evaluation for use in empirical stability graphs for underground excavation design (Table 1.6). Bieniawski RMR (1989) values have been converted to Q values using the formula:

$$RMR=9 \ln Q+44$$

Table 1.5: Rock mass parameter summary for underground mining areas

Area	RQD Range	IRS Range	RMR Range	RMR Description	Q Range	Q Description
Area 2, 118, East	60-90	>100	58-79	Fair—Good	4.6—46	Fair—Good
Copper Keel	60 – 90	75 - 150	58 - 69	Fair—Good	4.6—16	Fair—Good
Wildfire	60-90	70-100	50-61	Fair	1.9—6.6	Poor—Fair

These rock mass parameters are expected to represent the majority of the ground encountered during mining at each area. Note that the Wildfire rock mass is considered to be of lower rock mass quality due to the shallow depth relative to other areas. Figure 1.7 provides representative core photos of typical ground. Major structures should be expected to intercept some areas of the underground mining as illustrated in Figure 1.8.

Figure 1.7: Area 2/Copper Keel representative core photos – general conditions

Figure 1.8: Area 2/Copper Keel core photos – brittle structures with clay gouge, core loss, and brittle damage zones.

1.5 Geotechnical Model

A Ground Conditions Model is being collated from the following information:

- Geotechnical drilling programs
- Geotechnical face mapping
- Survey pickups of structures
- Ground Conditions Observation Sheets (currently this is completed using the Ground Control Log Book)
- Ground Support Evaluation Forms
- Observations on ground conditions made by the Geotechnical Engineer during level inspections

This information is used to generate 3D models of key structures and geotechnical domains. The information will also be recorded on level plans kept by the Geotechnical Engineer to accumulate comprehensive data, understand the regional conditions of the ground and provide advance notice of potential adverse structure on mine layouts.

1.5.1 Face mapping

Underground geologists (and/or geomechanics specialists) will carry out face mapping for geological and geotechnical data, and structural classification. Faces are sketched on a mapping sheet and the required parameters are recorded accordingly. Drives within ore will be mapped for geology and structure as dictated by the mining method and filling sequence. Waste development drives will be mapped on a campaign basis. A combination of the Laubscher (1990) RMR classification and Barton (1989) Q-system classification will be used as deemed necessary. The face sheets are filed and stored in the geotechnical office. The data is used by the Geotechnical Engineers to verify the recommended support regime and design dimensions. Photographs of the mapped face will be taken as required.

1.5.2 Structural mapping

Structural orientation data is obtained by technical personnel on a regular basis through face mapping, and the collected data is stored in Excel spreadsheets and in Dips database format. Where additional information is required a campaign of window or line mapping may be used to supplement the information gathered from face mapping.

1.5.3 Geological Core Logging

All drill core is geologically logged using the standard Minto logging sheets and legend. This logging differentiates on rock type and stratigraphic unit, whilst recording structural, mineralogical and alteration features. All information is now captured digitally in an Access database, and drill logs are electronically drafted onto mine plans and sections.

1.5.4 Geotechnical Core Logging

Geotechnical core logging is performed as deemed necessary for new holes drilled in underground mining areas. The Laubscher (1990) RMR classification has been used for all exploration holes drilled into the underground and is used for all geotechnical core logging. This data is stored in an Access database, and is subsequently available for use in the geotech model. The files can also be extracted into excel spreadsheets for processing or manipulation. All directions are stated according to underground mine grid. All orientation data is in the format of Dip/Dip Direction.

1.6 Hydrogeology

Based on the first 600m of decline development, the groundwater flow rates have been observed to be minimal. A few small seeps have been encountered as the drift passed through areas of heavily jointed ground. Two ungrouted drill holes have been encountered, one of which produced water and has now been plugged. This drill hole produces an estimated 20 GPM at 20psi back pressure when allowed to flow by opening the valve on the plug.

Based on input from the lead hand of the water truck operating team (which provides water to the portal for drilling and removes water for dewatering purposes), the quantity of water brought to and removed from the portal was net neutral. Based on this information it is not expected that hydrogeology as it relates to the Minto Underground operations will be of major concern once an initial permanent dewatering system is in place. Experience in the Minto open pits shows that there are no significant groundwater concerns related to slope stability or the explosive type used on surface or underground..

1.6.1 Groundwater Levels

Water levels were measured in a number of diamond drill holes to locate the water table. This was typically found at depths of 15m to 30m below the natural ground surface (Hatch, 2006).

1.6.2 Rock Mass Permeability

Table 1.8 presents the rock mass permeability measurements completed by Golder (1974).

Table 1.6: Rock mass permeability values (Hatch, 2006 after Golder, 1974)

Lithology	Range (cm/sec)		Design Values (cm/s)
	Lower	Upper	
Highly weathered—near surface	9.0x10^6	1.5x10^4	5.0x10^6
Highly weathered—fault associated	5.3x10^6	7.0x10^6	6.0x10^6
Moderately weathered	4.7x10^6	8.4x10^6 (1)	6.0x10^6
Fresh rock	1.5x10^6	8.3x10^6 (1)	3.5x10^6

Note 1: Excludes results from shattered zones

1.6.3 Identified Risks

Ungrouted holes

Exploration and geotechnical drill holes that have not been grouted may provide connection to surface and ground water sources. Holes that are ungrouted are identified on the driving layouts.

Currently two un-grouted holes have been encountered in the waste ramp with little to no flow or impact to the operation from a geotechnical point of view. The second hole that was encountered is making very little water from the hanging wall intersection and an estimated 20gpm at a pressure of 20psi (50ft head) from the footwall intersection. This hole is currently plugged and in future may be used to provide process water for the underground operations.

Present knowledge indicates that un-grouted diamond drill holes will not be a major risk to the geotechnical stability of the workings, however this will continue to be monitored as additional holes are encountered.

2 Geotechnical Design Guidelines

2.1 Excavation Design Summary

Excavation design has been completed for man entry spans and pillars based on empirical guidelines adjusted to the (drill core based) anticipated rock mass characteristics at Area2, 118, Copper Keel and Wildfire. A summary of excavation dimensions is provided in Table 2.1, followed by the supporting analyses. Any deviation from these standard dimensions shall be reviewed prior to being implemented by a suitably qualified geotechnical engineer.

Table 2.1:Summary of excavation dimensions

Excavation	Dimensions	Comment
Development headings	5.0mWx5.0mH	Includes decline, panel access, breakaways
Production headings	5.0mWx5.0mH	Orebody cross cuts, slashed out to room span
Rooms	≤10m	Adjusted based on observed geotechnical conditions
Pillars	5.0mWx5.0mH	Ground support or backfill required for taller pillars
Vent Raises and Escape Ways	3.0mx3.0m (square)	>70° dip

2.2 Mining Method

The choice of mining method has been determined taking into consideration all of the known contextual factors of the Minto deposits. The main factors for determining an appropriate mining method are:

- The irregular geometry of the mineralization, varying thicknesses with 10 m average, and a 20° average dip angle which makes sub-level caving and open stoping mining methods less favorable for the deposit;
- The value of the ore, in most deposits cannot support the economics of a drift and fill method with cemented backfill;
- The pillar height over 10 m would require rockfill to provide pillar stability.

It was considered that the most suitable mining method for the Minto deposit would be a room and pillar (RAP) mining method. The method is simple and has numerous examples of success in low-dipping, moderately thick, shallow deposits with favourable rock conditions. The method allows excellent production capacity potential and relatively low cost while still providing mining flexibility and low dilution.

2.3 Design Tools

Empirical

Empirically-based design charts, including the NGI Q-system (Barton, 1996) Stability Graph method (Potvin and Hadjigeorgiou, 1998) and the critical span chart (Ouchi *et al,* 2004) have been used to design all mine openings.

Mechanistic

A mechanistic analysis is used where a potential instability mechanism is amenable to deterministic and kinematic assessment. For example this includes the loading of support due to instability from rock mass loosening or due to structurally defined blocks. It is desirable, and where data permits, to conduct a probabilistic assessment using the likely variability in key input parameters. RocScience Unwedge is used for probabilistic analyses.

Numerical Modeling

Computer simulations are used to assess mining induced stress changes. MAP3D is the primary numerical modelling package used for simulating mining induced three dimensional stress redistribution. Short, medium term and life of mine numerical modelling is undertaken as required. Additional software packages that are used for simulating mining ground conditions are RocScience Phase 2, and Itasca code FLAC 2D or FLAC 3D.

2.3.1 Stope dimensions and shapes

Man entry design spans have been reviewed based on the critical span curve presented in Ouchi et al. (2004), Figure 2.1, and the Q-system unsupported span limits Figure 2.2. The calculated back span for man entry excavations (Ouchi et al) was 9-14m. These spans lie on the boundary between stable and potentially unstable back conditions and should be considered as optimistic. The Q-system shows span limits of 6-11m however, these are somewhat conservative based on the selected ESR value of 1.6 (permanent mine openings). A design span limit of 10m is recommended for mining in areas of good rock mass quality. Spans will need to be limited where major structures, adverse small scale structure, or zones of lower rock mass quality are encountered.

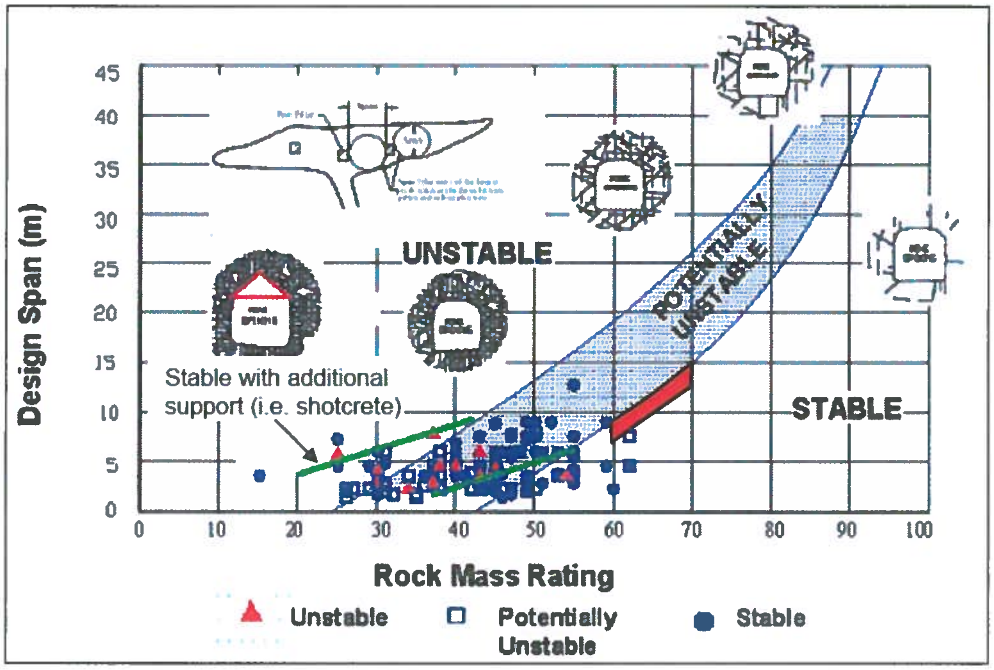


Figure 2.1: Critical span curve for man-entry excavations (Ouchi *et al*, 2004)

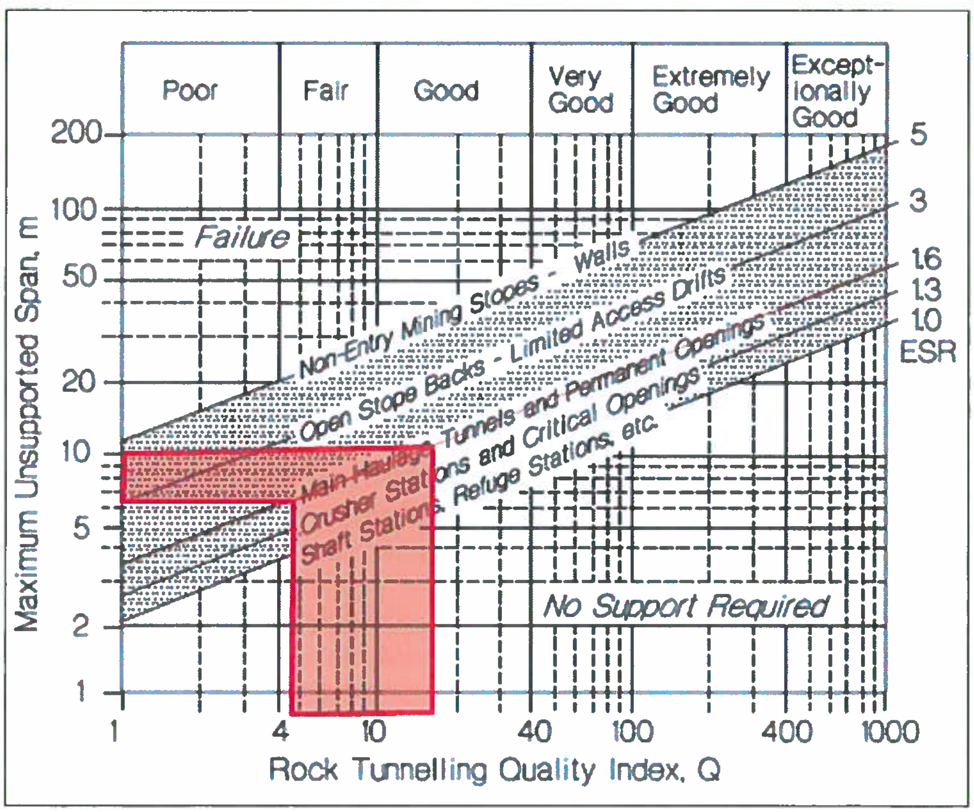


Figure 2.2: Q-system unsupported span limits for permanent openings (ESR=1.6)

2.3.2 Pillars

In panel pillar design is based on the tributary area method, using the methods developed by Hedley and Grant, Lunder and Pakalnis, and Stacey and Page.

2.3.3 Vertical Development

Vertical development (raising) will typically take place in waste material at an angle of around 70° to horizontal. They are used primarily for ventilation or escape-ways and are nominally 3 x 3 m, however, these may be larger to accommodate sufficient ventilation flow. Support standards for these excavations have been calculated using similar methods to the main development and production areas.

2.3.4 Large Excavations

Large excavations are designed on a case basis by the Geotechnical Engineer (or similarly qualified persons). Appropriate geotechnical investigations shall be completed prior to choosing a final location for each large excavation.

2.3.5 Crown Pillar

A crown pillar of sufficient thickness as determined by qualified geotechnical personnel will be left in any area where underground mining will take place under the shadow of open pit workings whether existing or planned. This does not preclude the mining of any area of crown pillar at an appropriate time near the end of the active life of both areas. Any crown pillar mining will also be designed in conjunction with and vetted by appropriately qualified geotechnical personnel.

2.3.6 Sill Pillars

If required, sill pillars are to be designed on a case basis by the Geotechnical Engineer (or similarly qualified persons). Appropriate geotechnical investigations will be completed prior to choosing a final location for each sill pillar.

2.4 Ground Support Design

The ground control philosophy at Minto Mine is that support/reinforcement is to be installed as appropriate to the requirements of the final use of the excavation, without compromising the safety of personnel entering these excavations. The mining method necessitates that all active mining areas need to be regularly checked for stability; mined out areas need to be checked on a less frequent basis for the life of mine. Where development headings are long term for access, air flow, or egress, they need to be supported as such.

2.4.1 Modes of Failure

Blocky ground and small wedge type failures have been observed in the backs and walls of the main decline formed by the dominant joint sets. The standard development ground support has been designed to account for typical wedges formed by the dominant joint sets. Ground support standards are contained within Appendix A.

2.4.2 Design and Analysis

The recommended support requirements for the development headings and production excavations are based on the Q Support Chart of Grimstad and Barton (1993), Laubscher (1984) guidelines and practical experience. The chart estimated values are tempered by the fact that the jointing and foliation orientations are not considered in the empirical guidelines (Figure 2.3).

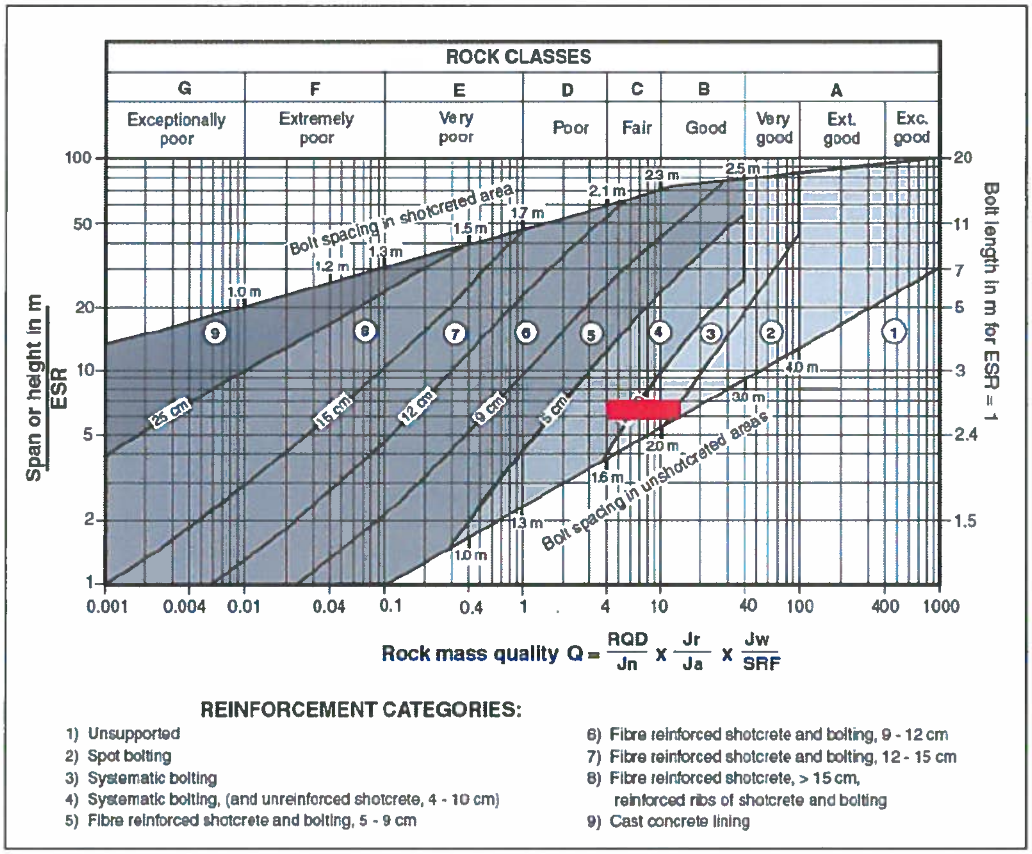


Figure 2.3: Recommended support requirements for the production excavations (Q Support Chart of Grimstad and Barton, 1993). Span = 10m, ESR = 1.6 (SRK, 2012)

2.4.3 Ground Support Standards

Minimum ground support standards have been developed using empirical design techniques, early experience in the Minto decline, and recommendations from geotechnical consultants. Support standards for development and production headings have been developed for two types of ground, as summarized in Tables 2.2 and 2.3 below. Detailed ground support drawings are provided in Appendix A.

Table 2.2: Ground support for development and production headings

Type		Span (m)	Primary Support	Comment
1	Development	5.0	8' rebar in back and shoulders 6' rebar in walls to 1.5m above floor 3' Split-sets (to secure mesh) 1.4m intra-ring x1.2m inter-ring spacing Galvanized weld wire mesh to 1.5m above floor	Life of mine infrastructure
2	Production	<6.0	6' rebar in back and walls to 1.5m above floor 3' Split-sets (to secure mesh) 1.4m intra-ring x1.2m inter-ring spacing Black weld wire mesh to 0.9m above floor	Non-permanent development i.e. stope and level access
3	Development	5.0	8' rebar in back and shoulders 6' rebar in walls to 1.5m above floor 3' Split-sets (to secure mesh) 12' Swellex in back and shoulders 1.4m intra-ring x1.2m inter-ring spacing Galvanized weld wire mesh to 0.9m above floor	Life of mine infrastructure
	Production	<7.0	8' rebar in back and shoulders 6' rebar in walls to 0.9m above floor 3' Split-sets (to secure mesh) 1.4m intra-ring x1.2m inter-ring spacing Black weld wire mesh to 0.9m above floor	
	Production	>7.0	3m Super Swellex in back and shoulders 6' rebar in walls to 0.9m above floor 3' Split-sets (to secure mesh) 1.4m intra-ring x1.2m inter-ring spacing Black weld wire mesh to 0.9m above floor	

Table 2.3: Intersection ground support for development and production headings

Type		Span (m)	Secondary Support (in addition to primary support)	Comment
1, 2, 3	Production / Development	<12.0	6m Super Swellex 1.8 x 1.8m spacing	Life of mine and non-permanent infrastructure
		<9.0	3m Super Swellex 1.8 x 1.8m spacing	

Table 2.4: Ground support for vertical infrastructure

Type		Span (m)	Primary Support	Comment
1	Circular	3.0	6' rebar 1.2m spacing	4' long mechanical rockbolts and black screen will be used in the face (the roof) to be supplemented if poor ground conditions are encountered during development.
2	Square	3.0	4' rebar 1.2m spacing Black weld wire mesh on walls	Support to be upgraded later based on the local ground conditions. 4' long mechanical rockbolts and black screen will be used in the face (the roof) to be supplemented if poor ground conditions are encountered during development.

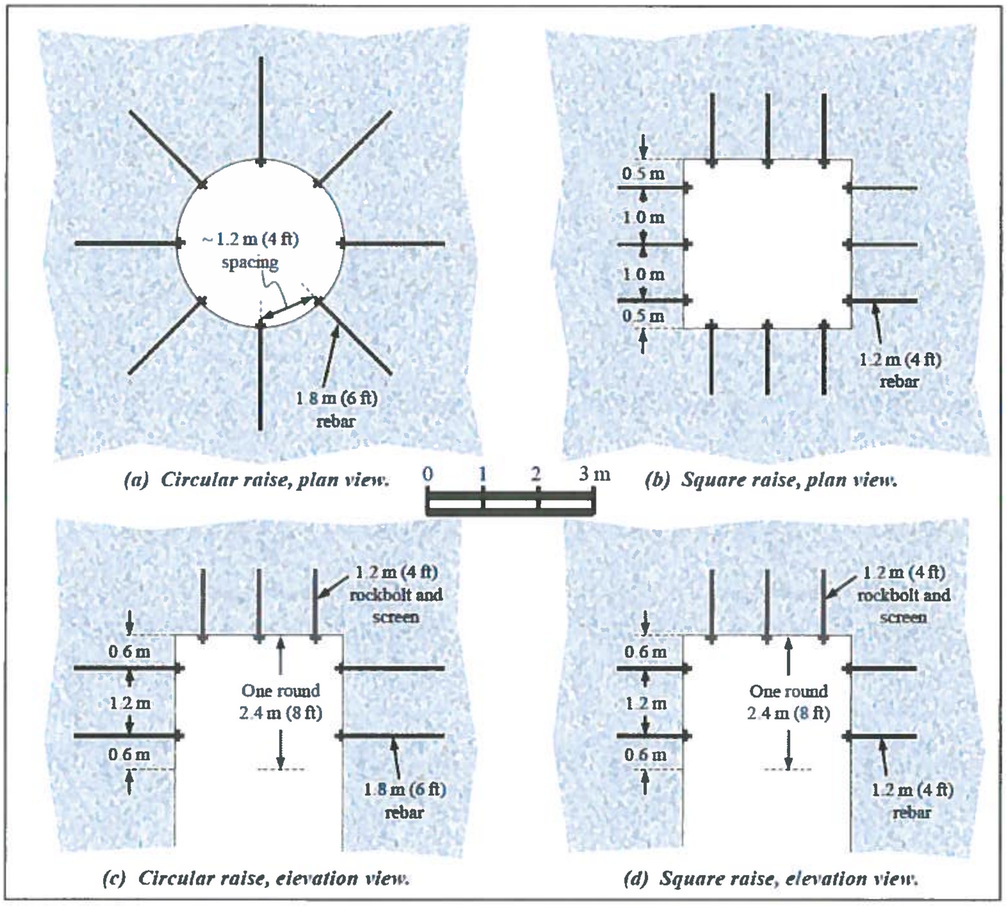


Figure 2.4: Schematics showing the proposed support layout for the circular and square raises

2.4.4 Intersection support requirements

For all intersections, additional support is required over and above the standard support requirements. For waste development and production areas, any span opened over the standard development width shall be supported with additional Swellex or Super-Swellex anchors (with expanded wire straps as required) throughout the intersection.

It is a requirement that permanent support, suitable to the final excavated dimensions, be installed prior to a cross-cut being taken. This would require the existing access drift to be mined two to three rounds past the planned location and the appropriate intersection support installed prior to taking the cross-cut. Once it has been taken, additional intersection support is installed within the area of the first two rounds of the cross-cut.

2.4.5 Materials Specification and Performance Criteria

All materials used for ground support will be certified to conform to CAN/CSA-M430-90 reaffirmed 2007.

Resin

Quality control of resins is carried out through:

- Inspection of storage facilities—store resin as per manufacturers recommendations.
- Ensuring that resin is out of direct sunlight.
- Ensuring that stock is rotated to allow it to be used within its use by date.

Rebar

- Hole diameter not exceeding 35mm for 22mm rebar
- 6ft and 8ft in length
- Plated with a dome plate minimum dimensions of 200mm x 200mm x 6mm.
- Bolts shall be installed full column with fast-set resin placed at the hole end. Depending on hole diameter, 2 - 26mm x 1200mm resin fast / slow for a 31mm diameter hole or 2 – 30mm x 1200mm resin fast / slow for 33-35 mm hole. It is essential that the fast-set resin be installed first followed by the slow.
- Insert the bolt using constant speed and maximum spin until the bearing plate contacts the roof. Continue to spin for additional 3-4 seconds then stop.
- Hold the bolt until minimum "hold time" is achieved, and then tension the bolt.

Hole diameters and lengths and resin types shall conform with the manufacturer's specifications. Good bolting practices must be continuously followed to insure that quality, high strength installations are achieved.

Split sets

- 6ft long 33mm diameter anchors
- 3ft long 33mm diameter anchors are present onsite for use with mesh only—these are NOT CONSIDERED A GROUND SUPPORT ELEMENT.
- Hole diameter 31 to 33mm.
- Plated with flat plate 200mm x 200mm.

Swellex

- PM24 inflatable anchors
- Hole diameter 43 to 52mm
- 8ft, 10ft, and 12ft lengths
- Plated with Swellex domed face plates 150 x 150mm (designed, manufactured, and tested according to ASTM F432-95 standards)
- 300 Bar inflation pressure

Hole diameters and lengths shall conform with the manufacturer's specifications. Hole diameter should be adjusted (within manufacturers specifications) to suit local ground conditions and achieve highest pull test loads.

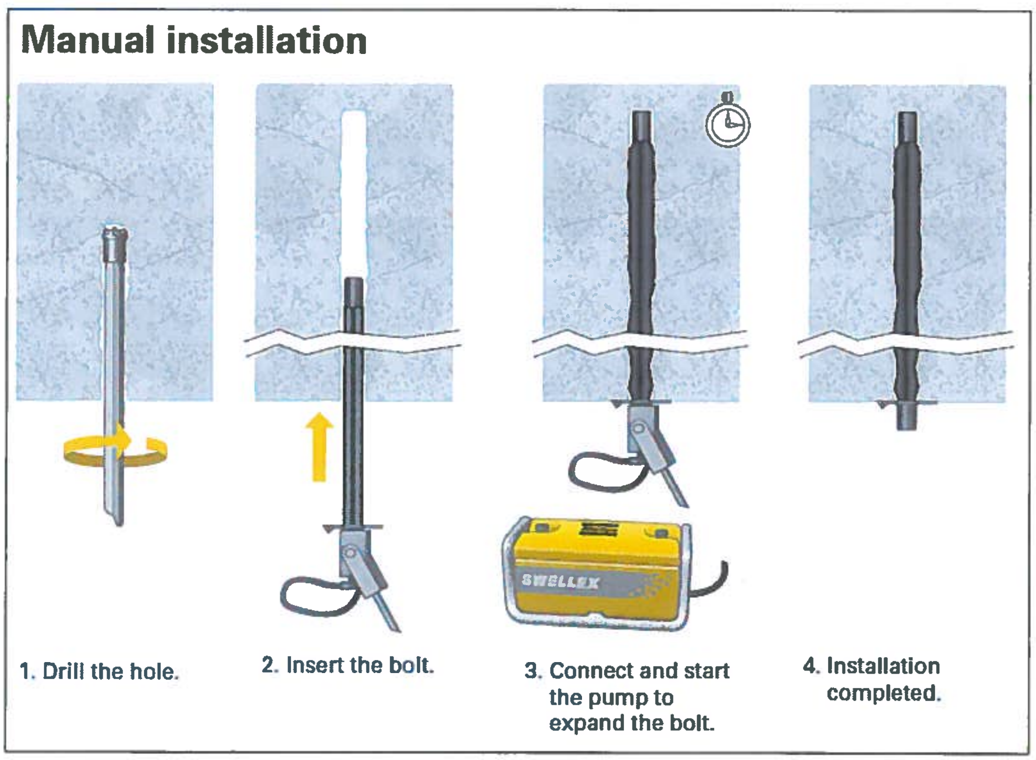


Figure 2.5: Manual installation of Swellex anchor (Atlas Copco, 2012)

Cable Anchor

Cable bolts consist of a wire mesh cable, sometimes with a "bird cage" bulge at regular intervals that is grouted into place and tensioned. This is considered an aggressive support and will be employed as determined by the Geotechnical Engineer based on ground quality and excavation size.

Mesh/Screen

Mesh is used in all development and production headings down to within 1.5m of the floor. Mesh is currently used with a 6-gauge wire with 4" opening; the mesh is supplied in 6ft x 10ft sheets. Installed mesh sheets overlap by three squares, and the mesh is further supported to the rock surface with short Split-set anchors (3ft). Push-on-plates can be used in conjunction with rebar to secure mesh.

Shotcrete

Shotcrete may be required to stabilize localized zones of poor ground and shall be installed at the direction of the technical staff.

The shotcrete shall meet the following specifications:

- Minimum thickness 75 mm or as directed.
- UCS 28MPa (minimum).
- The area should be scaled and washed prior to application.

2.5 Backfill

In the thicker parts of the ore zones, waste rock backfill will be used to provide support to tall slender pillars. Tall slender pillars will be developed following benching of the floor where orebody thicknesses are greater than 5.0m. As the tops of the pillars will no longer be accessible by mining equipment, fill will be required both for support and access reasons through mined-out areas.

Alternatively, fill can possibly be replaced with the specified ground support (grouted anchors, mesh, shotcrete).

2.6 Modifications – Minimum Design Standards

The responsibility for changes to the minimum design standard lies with the Mine Manager. The current design is based on data acquired from the mine itself and therefore represents the best information available for design purposes. The supervisors and workers performing the ground support are authorized to place additional ground support over and above the stated minimums if local conditions warrant but in all cases, the minimums must be adhered to. Any changes to the minimum design standards must be authorized by the Mine Manager and fully documented.

2.7 Review of Design Guidelines

In addition to regular ground inspections by miners, supervision and technical staff, a review of mine planning should be completed on a weekly basis to understand the effectiveness of the layout to minimize the intersection of poor rock mass conditions. Layout of planned cross-cuts, cut-outs, workshops, or any large intersections should be reviewed by an appropriately qualified engineer or geologist prior to mining of the heading. As a minimum this review should cover:

- The location of major structures and the likely rock mass conditions within the structures;
- Changes in geological conditions that warrant changes in the selected ground support;
- The recommended ground support for spans or openings outside those covered by the standard design; and
- Underground inspections to assess the locations of planned headings and suitability of the design.

2.8 Unusual Ground Conditions

The intent of the current Ground Control Standards as outlined in this document is that all potential ground conditions are addressed. In the event that conditions beyond those covered in the current version of the Ground Control Standards are encountered by an operator or anyone doing a routine inspection the area shall be roped off immediately and brought to the attention of the Shift Supervisor. The Shift Supervisor shall notify the Operations Superintendent and Chief Engineer (or delegates) who will arrange a review and appropriate corrective actions to be taken in dealing with the condition. The condition shall be noted in the Ground Control Log book as are all ground related issues in the underground workings. Note that workers always have the ability to pursue this avenue if they are unsure of the nature of the ground encountered; skilled rock bolting operators also have the option of installing additional support if deemed necessary.

Part Two: Implementation

3 Mining Context and Equipment

Mine Access

Access to the Minto underground mine is through the Minto South Portal located to the south-east of the Area 2 pit. Secondary egress will be through the planned escape-way via the Minto South Fresh Air Raise (Figure 3.1 and 3.2).

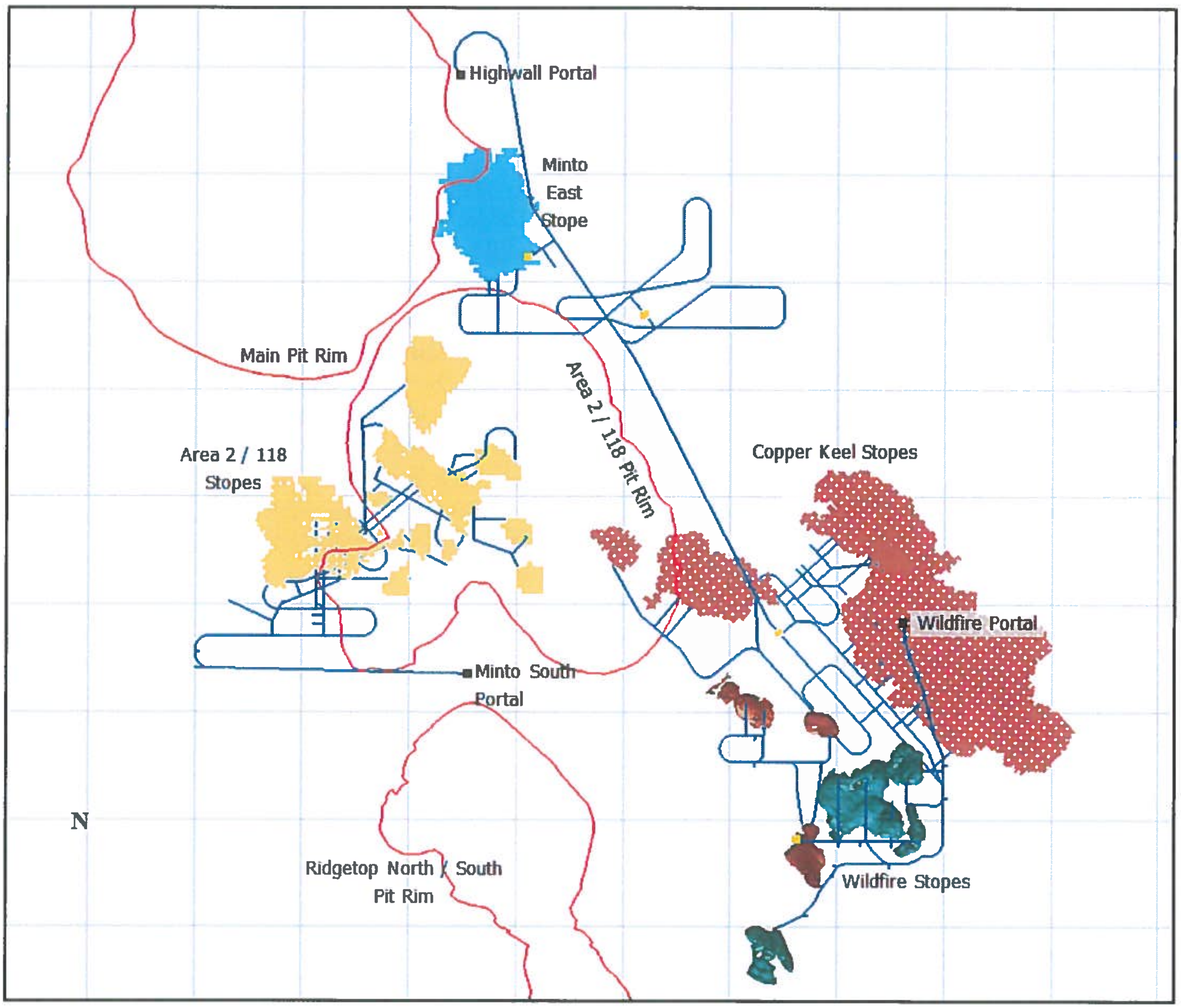


Figure 3.1: Mine access plan view showing location relative to surface mining areas

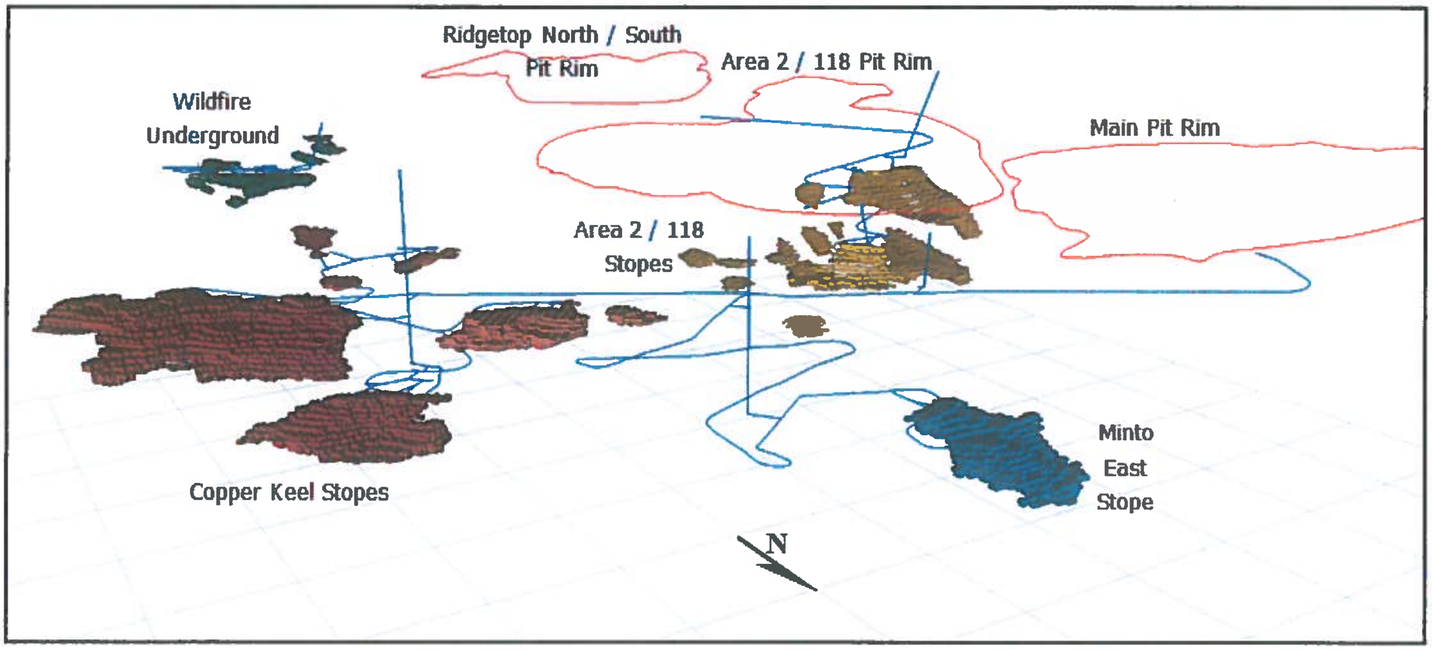


Figure 3.2: 3D isometric view (looking south-west) of Minto Mine underground

Stope Access

Stope access will be from cross-cuts from the main decline. In some cases, secondary declines will access more than one mining stope.

Mining Method Discussion

The primary mining methods to be employed are room and pillar, and post-pillar cut and fill. However, the stoping method is always open to variation and as each new orebody is encountered, defined and delineated, the best way to extract it will be examined. The success or failure of previous mining panels will always be considered in design.

3.1 Description of Room and Pillar Mining

RAP mining is an open stoping method that utilizes un-mined rock as pillars to support a series of rooms or small stopes around the pillars (Figure 3.3). The pillars can be under survey control or done in a more random manner depending on the geotechnical needs. It is usually advantageous to leave lower grade rock in pillars so higher grade material can be mined. Pillars can sometimes be mined on retreat to help improve the overall mining extraction.

At Minto, many of the mineralized zones are thicker than can be mined in a single pass. In these areas, a hanging wall (HW) cut will be made first, the back supported and then the bottom cut or bench taken out. This sequence enables the back to only be supported (rock bolted) once and would help the overall productivity. A two-boom development jumbo drill would be used for drilling both the initial HW drift and the bench. Benching is more efficient than drifting and thus has a lower mining cost per tonne.

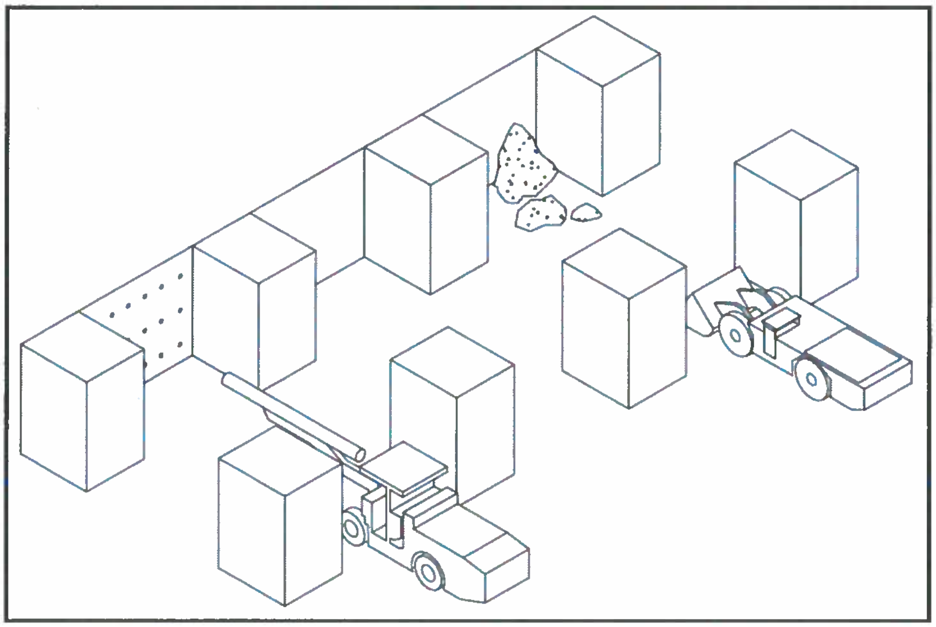


Figure 3.3: Simplified RAP Mining Method Illustration

3.2 Description of Post-Pillar Cut and Fill Mining

Post-pillar cut and fill ("PPCF", Figure 3.4) is a variation of cut and fill and has the advantage of being able to be used in thicker (plus 10 m), irregular-shaped deposits while keeping dilution and pillar sizes to a minimum.

PPCF stoping is done using development jumbos or jacklegs. It is typically started by driving a - 17% gradient decline access cross-cut from the main access decline on the footwall side of the mineralized zone, down to the bottom of the mining block.

The lowest two levels of each sub-level are mined in a room and pillar fashion with 15-20% of the ore remaining behind in regular, checker-board patterned pillars. An average typical face height (lift) is proposed to be 5 m.

Once mining of the two lifts is complete, the mined-out area would be filled with waste rock backfill obtained from the open pit or underground development.

To start the next lift, the access ramp would be slashed (breasted) at an appropriate gradient, up to plus 17%, to gain required elevation. The breasted waste rock would be left in place as a ramp. Once the ramp is re-established, room and pillar mining would begin again working off of the waste rock backfill.

In order to maintain strength and continuity, the pillars of each lift must be surveyed and positioned exactly over the pillars from the previous cut. The main disadvantage is that it is development-style mining and an entry method requiring rock support on every cut.

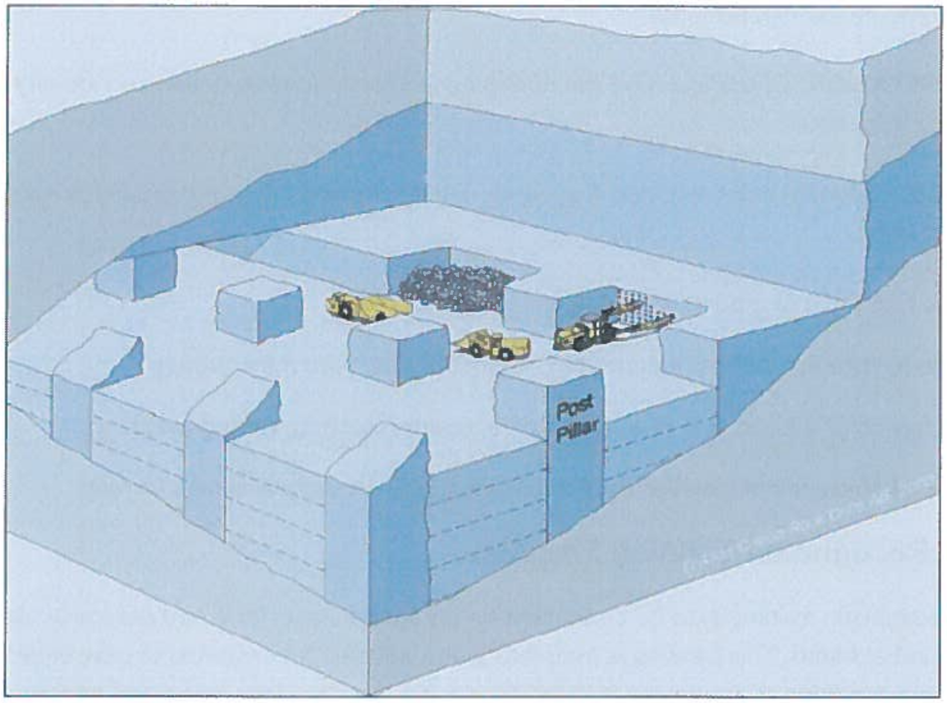


Figure 3.4: Simplified PPCF Mining Method Illustration (from Atlas Copco)

3.3 Equipment

The mining equipment available for ground control is provided in Table 3.1

Table 3.1: Equipment requirements for room and pillar mining

Description	Used to install
Jumbo (2-boom)	Swellex
Rockbolter	Rebar and Split-sets
Jackleg stoper	Rebar and Split-sets
Scissor Lift	Rebar and Split-sets

4 Risk Assessment and Management

Rockfalls and other ground control failures are a major hazard in the mining industry. Therefore an estimate of the risk arising from rockfall and other ground control hazards is to be included in all major development and stoping assessments.

The level of risk is estimated from three perspectives:

DESIGN: Conventional geotechnical analysis of bolting practice, seismic risk, stope designs, development designs and monitoring requirements. Risk assessment documentation is to be used to compute the risk estimate.

IMPLEMENTATION: Checklists filled out during each Workplace Inspection can identify developing hazards.

OUTCOME: Feedback from reported Accidents. These showed the major ground control risk categories to be:

- Stress fracturing of ground (including seismic response);
- Loosening ground (zones of more dense jointing, and older mine areas)
- Disturbance of ground due to activities of Operators (scaling, drilling, washing);
- Reduced efficiency of installed reinforcement due to procedural issues (errors).

4.1 Hazard Recognition Training Program

Hazard recognition training is to be conducted on an annual basis for every person working underground at Minto. This training is mandatory and will also be extended to new employees and will be a condition of employment. Specific training modules for scaling and ground support are presented at these sessions. Additional discussions on scaling and bolting practices are brought to the floor during the weekly safety huddles attended by the miners.

4.2 Hazard Recognition Responsibilities

The following sections are quoted directly from the Yukon Regulations Occupational Health and Safety Act (in effect from November 1, 2006).

Notice of hazards 15.12

(1) Where there is a non-continuous shift operation at a mine or project, the on-coming shift shall be warned of any abnormal condition affecting the safety of workers.

(2) The warning referenced in subsection (1) shall consist of a written record in a log book under the signature of the person in charge of the off-going shift and be read and countersigned by the person in charge of the on-coming shift before the workers are permitted to assume operations in the area indicated in the record.

(3) The log book referred to in subsection (2) shall be available on request to a joint health and safety committee representative, if any, and to a safety officer.

Underground Support 15.48

(1) Every adit, tunnel, stope, or other underground opening, where a worker may be support exposed to the danger of rock fall or rock burst while working or passing through, shall be supported by wooden or steel support structures, casing, lining, rock-bolts or combination of any of these to make the openings secure and safe.

Potential rock burst

(2) Where ground condition indicates that a rock burst or uncontrolled fall of ground may occur, the condition and the corrective action taken shall be recorded in writing in the daily log book and signed by the shift supervisor.

Work areas examined

(3) A competent person shall examine all working sections of an underground mine or project at least once during each shift.

Non-work areas examined

(4) Non-working sections of an underground mine or project that are not barricaded or to which access is not prevented shall be examined at least once a month.

Scaling tools

(5) An adequate quantity of properly dressed scaling bars, gads, and other equipment necessary for scaling shall be provided in working sections.

4.3 Ground Control Aspects - Communication

Communication of ground control issues and concerns among technical, operational and management staff, and between shifts takes place at several levels and includes:

- Shift boss log book;
- Contractor Superintendent directives;
- Ground control log book;
- Face to face meeting of the supervisors between shifts;
- Verbal communication by the crews on extended shift coverage;
- Telephone communications; and
- Weekly and monthly production meetings (predicted ground conditions).

4.4 Scaling

The requirement to mesh all development has negated the requirement to hand scale the current headings except for the walls below the mesh. This can be done from the ground and is carried out as required.

The blasting crew will also scale any loose from the basket of the blasting vehicle. They scale the face before commencing loading operations from the upper most row of holes to allow the removal of any loose material from the face as they proceed down.

Scaling bars are available on specified machines and located where required.

All the procedures and equipment are covered in the Standard Work Procedures.

4.4.1 Check Scaling Program

- A formal check-scaling program is conducted to ensure all accessible areas underground are check scaled at least annually for all major travel ways.
- Where it is found that an area contains considerable amounts of loose the Geotechnical Engineer or Operations Superintendent is to inspect the area and ascertain if more regular check scaling is required or if additional support is required.
- The check-scaling program is contained in the standard Ground Support Standards Folder with completed check-scaling level plans.

4.4.2 Tools and Equipment to Scale

The tools and equipment to be used for scaling are prescribed as follows:

- 8', 12', and 14' aluminum scaling bars with a chisel point attached to one end and rock deflectors
- Scissor lift
- Bolting platform
- Possibly staging

4.4.3 Responsibilities - Scaling

Scaling will only be undertaken by individuals that have undertaken hazard recognition training and who have been trained and certified in scaling procedures.

Hazard recognition training is to be conducted on an annual basis for every person working underground at Minto. This training is a mandatory requirement and will also be extended to new employees and will be a condition of employment. Specific training modules for scaling and ground support are presented at these sessions. Additional discussions on scaling and bolting practices are brought to the floor during the weekly safety huddles attended by the miners.

Mine Supervisors experienced in examining and testing for loose ground are designated to ensure that this standard is adhered to without exception. Records will be diligently kept of all scaling certification and training provided.

4.5 Incident Response and Emergency Preparedness

Minto Mine Emergency Response Plan documents the incident response and emergency preparedness procedure. This plan is updated annually by the Minto Health and Safety Department.

4.5.1 Falls of Ground

All rock fall incidents are documented in the Ground Control Log Book and fully investigated and archived as per site incident response procedures.

Details of all reported falls of ground are recorded electronically in the Rock Fall database, which can be found at the following location: X:\Mine Technical\33 - Ground Control Program\1 Underground - Ground Control Program\8 Incident Response, Emergency Preparedness\8.1 Ground Falls, Inquiry Procedure\Rock Fall Database. These details are also documented in an appropriate layer within the mine planning system software.

In the event of an incident involving injury or equipment damage, falls of ground are reported in accordance with the requirements of the Minto Incident Reporting System. The degree of investigation into each fall of ground will depend on many factors; however, the following items should be considered.

- General information: location, date and time, injuries, damage
- Location: depth below surface, excavation type, distance from active face
- Excavation details: age of excavation, dimensions, excavation shape, proximity to structure
- Ground support details: implemented support standard, rehabilitation, surface support
- Failure details: dimensions, failure mechanism, types of support failure
- Potential contributing factors: ground support, blasting, stress, ground condition, human factor
- Personnel exposure: time of occurrence, activity in area
- Possible preventative actions.

5 Workforce Training

It is a requirement that employees and contractors be trained in the use of relevant SWPs that apply to their work environment. As such SWPs should be linked to and used in competency-based training programs. Employees must be assessed in the workplace periodically on their understanding and compliance with SWPs. Task observations are done by the site trainers and supervisors to assess compliance with SWPs by personnel.

Regular presentations (a yearly basis as a minimum) on ground control issues are to be delivered to underground personnel by the Geotechnical Engineer (or his designate).

5.1.1 Training of Supervision

Geotechnical specific training will be presented to underground supervisors in formal sessions lead by the Geotechnical Engineer or other suitably qualified member of the Technical Services Group. This training will be site specific and cover all areas pertinent from a supervisory point of view such as: selection of support types, dealing with unusual ground conditions and supervisory reporting requirements in addition to the general training to be provided to the mining workforce.

5.1.2 Training of Workforce

Geotechnical specific training will be presented to the general underground workforce in formal sessions lead by the Underground Safety/Training Coordinator. This training will be site specific and will include identification of ground types, structural features such as wedges and blocks, recognition of loose, scaling, minimum support standards and reporting unusual conditions.

5.1.3 SWPs

Minto specific Safe Work Procedures are currently in development for the underground operations. The current development work is being performed by an independent contractor and as such this work is being completed under their existing SWP structure. As an established contractor, all required SWPs required for the work including those pertaining to Geotechnical aspects are reviewed and signed off by the contract employees upon induction to the Minto mine site. These existing SWPs will form the basis for all Minto SWPs under the direction of the Underground Safety/Training Coordinator.

Competency training will be in place and conducted by competent operators over a sufficient period of time as Minto personnel are brought on site. Documentation and control of these records will be the responsibility of the Underground Safety/Training Coordinator.

Part Three: Monitoring

6 General Practices and Procedures

6.1 Ground Inspections

Routine ground inspection will be conducted by miners, supervision and technical staff. Additionally, quality testing of ground support will be conducted to ascertain the effectiveness of installations in supporting the ground. Internal reviews of standards will be conducted to ensure applicability of ground support standards to evolving conditions as the mine matures.

The routine ground inspections conducted on a daily basis will be part of the workplace inspection each miner must conduct prior to beginning work. The Supervisors will also verify that the workplace inspection has been done by the miner and will also inspect the heading through the medium of the 5 point safety card program which is facilitated by the Minto Health and Safety Department.

6.1.1 Pillar Rating and Classification

Routine ground inspections will include a visual review of pillars to record the conditions due to loading on a pillar. If any change in pillar condition is noted, more regular and detailed inspections will be completed. Visual inspections by miners will be completed as pillars are developed, Pillars in identified higher risk areas (faulted ground, wider panel spans, high extraction areas) will be reviewed prior to the abandonment of a mining area. The ratings must also record items such as the geological setting of the pillar (through-going structure, faults, contacts etc.) and if any remedial measures (such as bolting or strapping) have been taken to support a pillar.

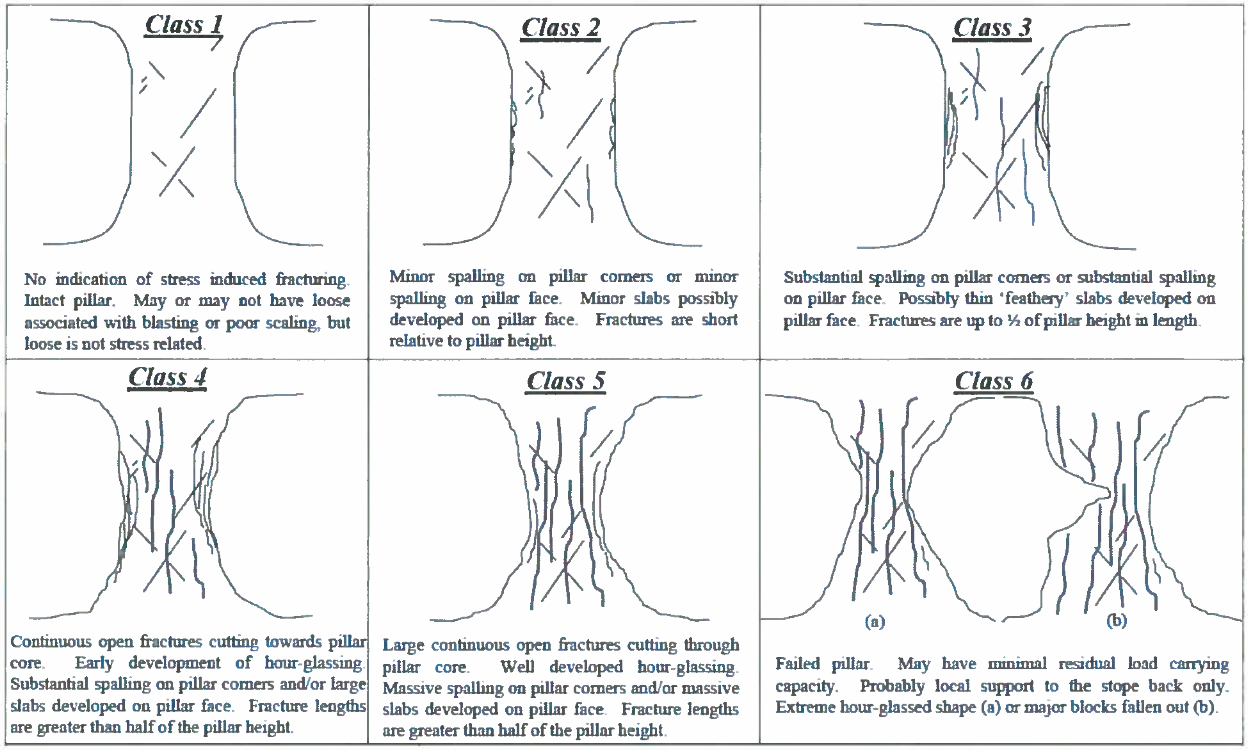


Figure 6.1: Schematics and descriptions for pillar condition rating system

6.2 Ground Control Log Book

The Ground Control Log Book is maintained as a live record of ground control related issues such as Falls Of Ground, incidents or accidents, remedial measures, etc. primarily to ensure the transfer of information between shifts and Engineering/Technical staff. Regularly updated plans of any areas where non routine ground control measures are required will be posted in an appropriate location in the start of shift meeting areas for reference and discussion.

6.3 Overbreak Measurement Program

Overbreak tolerances of 10% by volume are considered reasonable. Within the rooms, and while taking cross-cuts it will be critical to limit the overbreak as much as possible to avoid increasing the excavation span and decreasing the design pillar size. With reasonably careful drilling and conscientious loading practices, overbreak and loosening of the ground can be mitigated but not entirely eliminated.

Determination of overbreak to design specifications can be reconciled by comparing wireframe volume calculations based on 3D surveys to the designed layouts. Three dimensional wireframes will be constructed from the mine surveys and the volumes of the wireframes will be compared to the planned heading volumes as calculated from the planned mining layouts. The results of overbreak reconciliation will be recorded.

6.4 Design Effectiveness

The overbreak evaluation program will provide effective feedback on drilling and blasting practices and ground conditions. Other measurements to consider in assessing the effectiveness of the ground control management plan include but are not limited to: rehabilitation requirements, excavation deformation measurements, shotcrete cracking, accidents/incidents, fall of ground, fill dilution.

6.5 Excavation Surveys

Regular surveys of all workings will be carried out and transferred to electronic medium in a timely manner.

7 Instrumentation

Monitoring systems may be required, from simple regular visual checks to convergence points across strategic structures and extensometers into the rock.

7.1.1 Stress Measurements

No measurements of the virgin stress field have been carried out for Minto Mine.

Selected pillars and crowns may be instrumented to measure stress and deformation.

7.1.2 Convergence Measurements

The ground reaction to the changing stress conditions shall be monitored in each mining room and panel to assess the ground reaction to the effect of stress changes due to adjacent excavations. The following instruments are commonly used for measuring the ground reaction to mining.

- Wire extensometers – work by anchoring a length of steel fishing wire to the rock in a borehole. The other end is connected to a clock spring that keeps the wire taught. As the ground relaxes (cracks expand) or shears the wire is pulled into the borehole. The length pulled is recorded either via a mechanical odometer or a potentiometer.
- Rod extensometers – are the same as wire extensometers except the connection between anchor and readout head is solid, meaning there is less stretch and hence greater reliability but less tolerance for shear across the borehole.
- Tape extensometer – A specialist tape measure with a vernier is used measure the distance between pins in the wall or backs. Measuring an array of pins can be used to resolve the movement vectors.
- Smart cable – A SMART (Stretch Measurement to Assess Reinforcement Tension) cable is a cable bolt with a wire extensometer built in. It measures stretch of the cable, which knowing the Young's Modulus of the cable-grout system can be related to cable load.

- Tell tales – give an indication of ground movement by a colour coded mechanism. As the ground moves a wire anchored at the toe of the hole is pulled up the hole. This wire is attached to a drum that rotates showing displacement. Negligible amounts of movement are coloured green, small amounts yellow and orange and large displacements are red. Anyone passing a telltale can see at a glance what is happening up the hole.

7.1.3 Seismic Monitoring

Seismic measurement is not planned for Minto Mine.

7.1.4 Designing an instrumentation program

When designing an instrumentation program the instruments should be selected so as to answer specific questions. Some points to consider are as follows.

- What is the mechanism to be measured?
  - Change in shape of an excavation
  - Movement on a structure
  - Depth of ground movement
  - Stress change
  - Cablebolt plate loading
  - Seismicity
  - Ground relaxation
- Which instrument will record the active mechanism?
  - As referred to above
- Is access available to the area to install the instruments and take readings?
  - For instance to record shear along a structure the extensometer should be installed less than 45° to the structure and to cross the fault or shear. Is there a drive where this can be done from?
- If some instruments are lost will enough information be gained to achieve the aims of the monitoring program? Some dangers to watch out for are :
  - blasting
  - shear on structures can decapitate borehole instruments
  - groundwater causing corrosion or short circuiting electrical instruments
- Cost, reliability, and ease of installation
  - How will the data be recorded?

    - Manually or via data logger that is downloaded manually
    - Data logger that transmits data to engineers' desk
- How often is the data required?

8 Monitoring and QA/QC

8.1 Routine Ground Support Monitoring

Testing of ground support elements will be carried out according to Table 8.1.

Table 8.1: Recommended ground support testing frequency and specifications

Element	Testing Method	% of elements to be tested	Frequency	Required Anchorage (tonnes)
Resin Rebar	Spanner test	2	Monthly	
	Pull test—full column	1	Monthly	16
	Pull test—end encapsulation	As directed	As directed	10
Swellex	Pull test—full anchor	2	Monthly	10
	Pull test—end only	As directed	As directed	
Shotcrete	Cube tests			
	Flow test			
	Depth probe		Per application	
	Panel test		Per 50m^3 placed	
	Insitu cores			

The Engineering group shall keep records of the results on all the test work. Quality control results shall be communicated to operations personnel by means of a weekly memorandum. Areas of immediate concern shall be communicated daily as required.

8.1.1 Rockbolt Testing

The pressure gauge used should be read in units of pressure (Bar). Each test should record the equipment utilized noting the ram serial number/model number, to allow quality assurance to be completed.

Pull test with displacement measurements

1. Load the unit to approximately 30 Bar to remove any slack in the equipment.
2. Increase the pressure until a total displacement of 40mm has been recorded.

3. Readings of pressure and displacement are taken at increments of approximately 30 Bar or 5mm displacement, whichever occurs first, to a total of 50mm displacement.

Figure 8.1 shows the results of pull tests with displacement measurements for a number of support element types.

Pull test for failure load only

1. Load the unit to approximately 30 Bar to remove any slack in the equipment.
2. Increase the pressure and record the maximum pressure required to pull the support element. This number is the peak failure load.
3. Continue to pull the support element to the limit of the ram travel.

Pull test to design specification

1. Load the unit to approximately 30 Bar to remove any slack in the equipment.
2. Increase the Pressure until the design specification pressure has been reached (see Table 8.1).
3. If the support element fails before this value, record this number, and note the method of failure.
4. If the design specification pressure is reached, note this value, and end the test.

Post-test procedure

For split-set or Swellex anchor testing, the miner will cut the head off the bolt to retrieve the pull test collar. Alternatively, the miner will push the support anchor back into the hole (using a jackleg or stoper).

Test Documentation

Records of all tests are documented and maintained, then routed to appropriate personnel for review and application of any corrective measures.

All data should be recorded in a master pull test Excel spreadsheet, with test results checked against manufacturer specifications to verify a pass or fail for the support element. A memorandum should be issued following each set of pull testing stating the test locations, support elements tested, test results, and if required recommendations for rehabilitation.

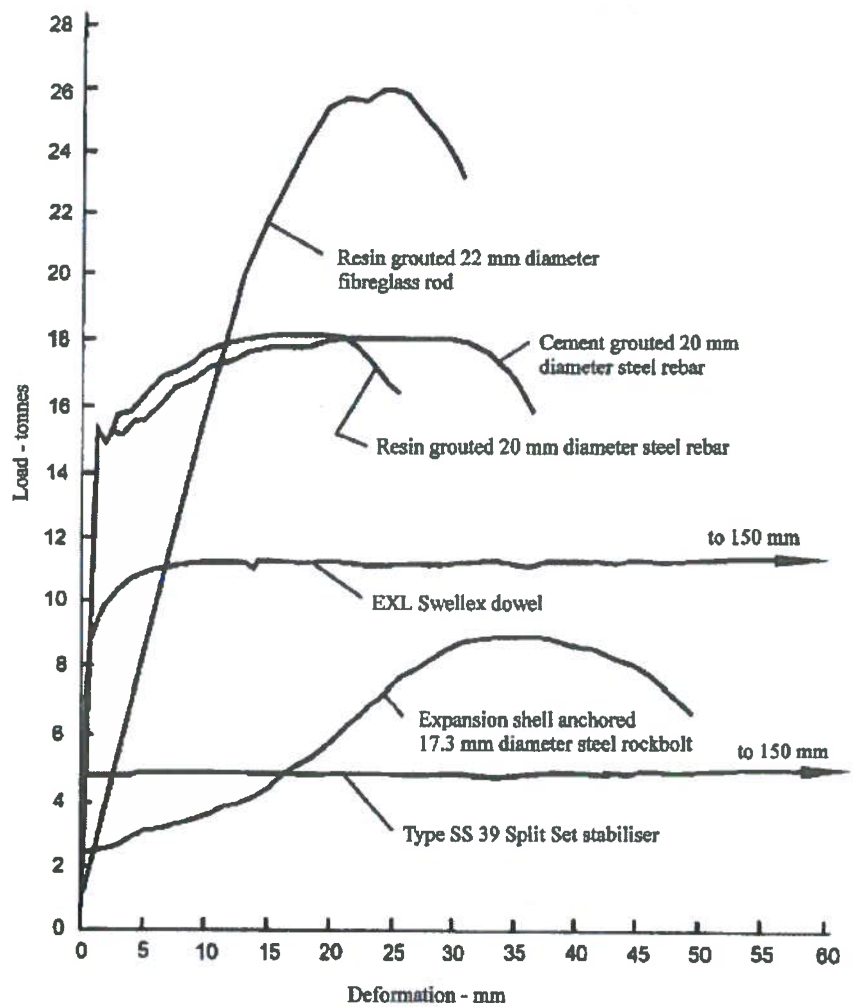


Figure 8.1: Load-deformation pull test results completed in a laboratory test environment (Hoek et al, 1995)

8.1.2 Non-compliance

Incidences of non-compliance will be evaluated on a case by case basis, assessed by a geotechnical engineer and remediated as required.

8.2 Fall of Ground Reports

The incident reports on falls of ground provide a means of monitoring ground conditions during the mine life. Changes in behaviour of the ground are apparent when comparing the number and type of incident in existing levels with previous levels. This information is collected in the Ground Control Log Book and documented electronically as noted in previous sections.

8.3 Ground Support Quality Assurance / Quality Control

8.3.1 Materials Management and Routine Testing

Regular checks are required to ensure that all ground support materials are of a suitable standard and quality, fit for intended purpose, and are stored in accordance with manufacturers' recommendations.

8.3.2 Task Observation

Task observations will be carried out by the Engineering group on ground support tasks on a regular basis.

- Rock bolting job observations.
- Shotcrete job observations and quality control testing are carried out according to relevant training manuals and SWPs.
- Scaling job observations.

The results of these task observations are maintained in paper copy in the Technical Services office as well as the master QA/QC spreadsheet.

9 Reporting and Document Management

Document Control

The Registered Mine Manager will ensure a review of the Ground Control Management Plan at the following milestones/occurrences:

- Immediately following a related injury to any employee / contractor / visitor;
- Immediately following a related near miss incident;
- As soon as practicable following any significant change in ground behaviour and excavation stability; or
- The introduction of any significant change in process or technology.

Following a review of the Ground Control Management Plan, the Mine Manager will ensure the review outcomes are communicated to the workforce and the Ground Control documentation is updated in a timely manner.

Random Audits

Random audits of ground control are conducted by the Mine Manager, or nominee to monitor compliance with the requirements of the Ground Support Standards and Safe Operating Practices.

9.1.1 External Audits

An independent audit of the Ground Control Management Plan is required at least every two years. Initially this independent review is to include an external consultant familiar with the development of GCP, but later could be an internal consultant accompanied by an appropriate person from a different operation within the group that is familiar with the use of GCP.

9.1.2 Conformance to Ground Control Management Plan

The Geotechnical Engineer's primary responsibility is checking conformance of the actual situation in operation with the Ground Control Management Plan.

9.1.3 Conformance to Regulatory Requirements

The Geotechnical Engineer is to ensure that any new legislation or developments that affect Best Practice in ground control are taken into account and where relevant, incorporated into the revised GCP. Mining legislation requires that the emphasis is on keeping track of new developments and design tools. This will involve liaison with internal and external consultants.

9.1.4 Implementation and Updating of the GCP

The GCP is jointly owned, maintained and updated by the Mine Manager and Chief Engineer, and is considered a 'living' document. The effectiveness of the GCP is monitored by the Mine Manager, Operations Superintendent and Chief Engineer. Yearly reviews include:

- The appropriateness of applicable SWPs;
- Changes in ground condition and excavation performance;
- Ground support/reinforcement materials and installation quality, and effectiveness; and
- Compliance with Regulatory Requirements.

10 References

Barton, N. R., Lien, R. and Lunde, J. (1974). "Engineering Classification of Rock Masses for the Design of Tunnel Support." Rock Mech. 6(4), 189-239.

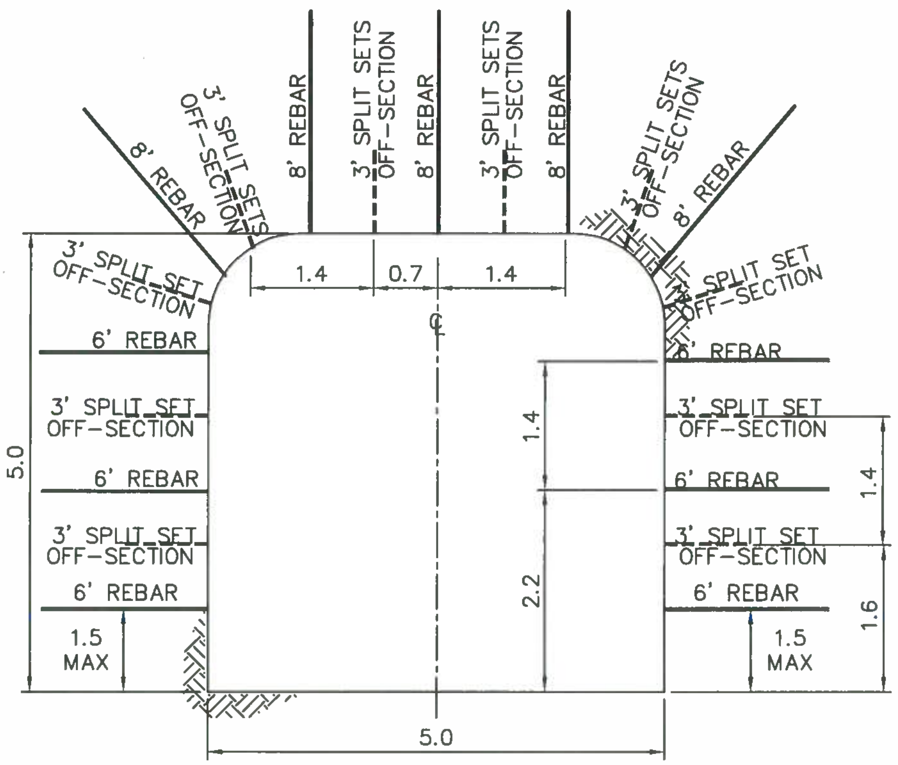
Barton, N.R. (2002). International Journal of Rock Mechanics and Mining Sciences (39), pp 185-216.

Laubscher, D. H. (1984). "Design Aspects and Effectiveness of Support Systems in Different Mining Conditions." Trans. Instn. Min. Metall. 93, A70-A82.

Laubscher DH (1990). "A geomechanics classification system for rating of rock mass in mine design". J S Afr Inst. Mining Metal 90(10):257-273

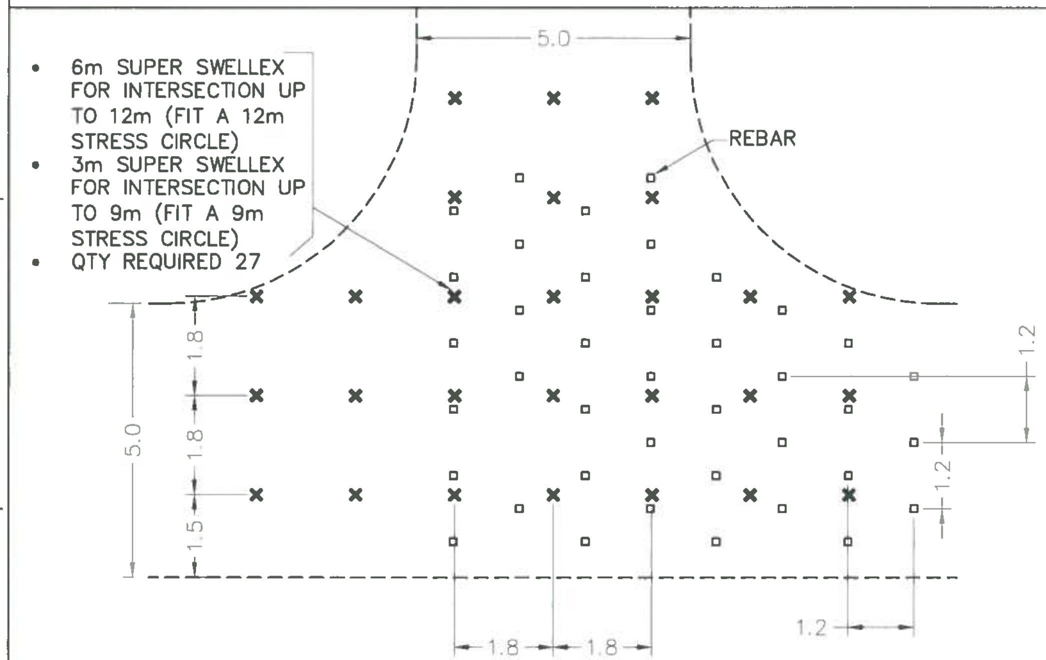
Ouchi, A.M., Pakalnis, R., and Brady, T.M. (2004). "Update of Span Design Curve for Weak Rock Masses." 2004 AGM-CIM Edmonton.

GROUND CONTROL TYPE 1



(EXCAVATIONS WITH 5m SPANS)
- 8' GROUTED REBAR (BACK AND SHOULDERS)
- 3' SPLIT SET & REBAR IN WALLS
- GALV. SCREEN BACK AND SHOULDERS LAST ROW 6' REBAR MAXIMUM 1.5m FROM BASE OF RAIL
- 3 SQUARE OVERLAP

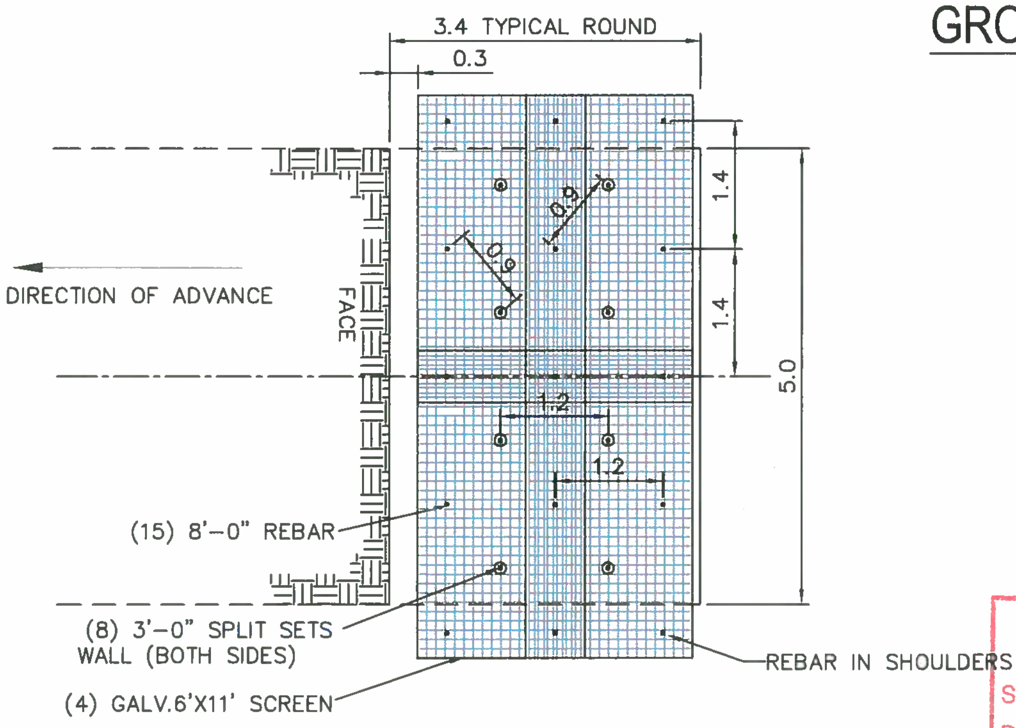
5mX5m TYPICAL DEVELOPMENT OPENING



- 6m SUPER SWELLEX FOR INTERSECTION UP TO 12m (FIT A 12m STRESS CIRCLE)
- 3m SUPER SWELLEX FOR INTERSECTION UP TO 9m (FIT A 9m STRESS CIRCLE)
- QTY REQUIRED 27

5mX5m TYPICAL DEVELOPMENT INTERSECTION

NOTE:
USE SAME PATTERN FOR BROW GROUND CONTROL



PLAN; 5mX5m TYPICAL DEVELOPMENT ROUND
6' X 11' [1.83 X 3.35] SCREEN

QUANTITIES – TOTAL
6X11 SCREEN

TOTAL PER 3.4M ROUND
10 SCREENS
(15) 8'-0" 30mm REBAR
(20) 3'-0" 35mm SPLIT SET
(18) 6'-0" 20mm REBAR

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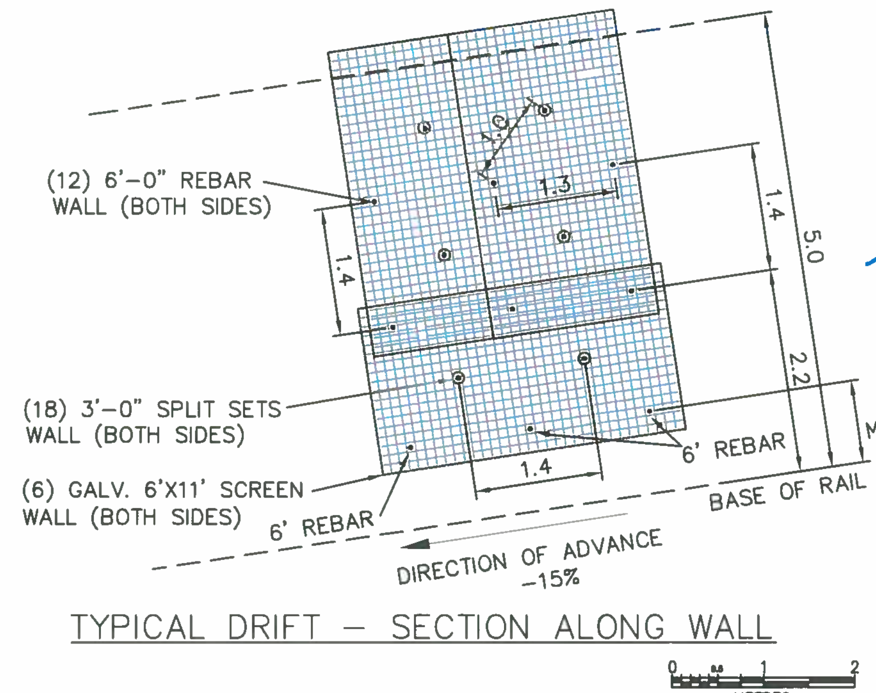
Association of Professional Engineers of Yukon

NOTE:
- REPORT ABNORMAL CONDTIONS
- MINIMUM STANDARD



TYPICAL DRIFT – SECTION ALONG WALL

0 1 2 METRES

PROFESSIONAL ENGINEER
YUKON TERRITORY
S.D. TOLGYESI
July 23, 2013

CAPSTONE MINING CORP.
MINTO MINE

Jul 22, 2013 – 5:32pm

PERMANENT DEVELOPMENT GROUND CONTROL TYPE 1
ie; 5mx5m MAIN RAMP

NO.	DESCRIPTION	DATE	BY
D	SCALED BOLTS ON SECTION	22JUL13	FWK
C	ISSUED FOR CONSTRUCTION	27APR13	DVL
B		05APR13	FWK
A	ISSUED FOR CONSTRUCTION	04MAR13	DJD

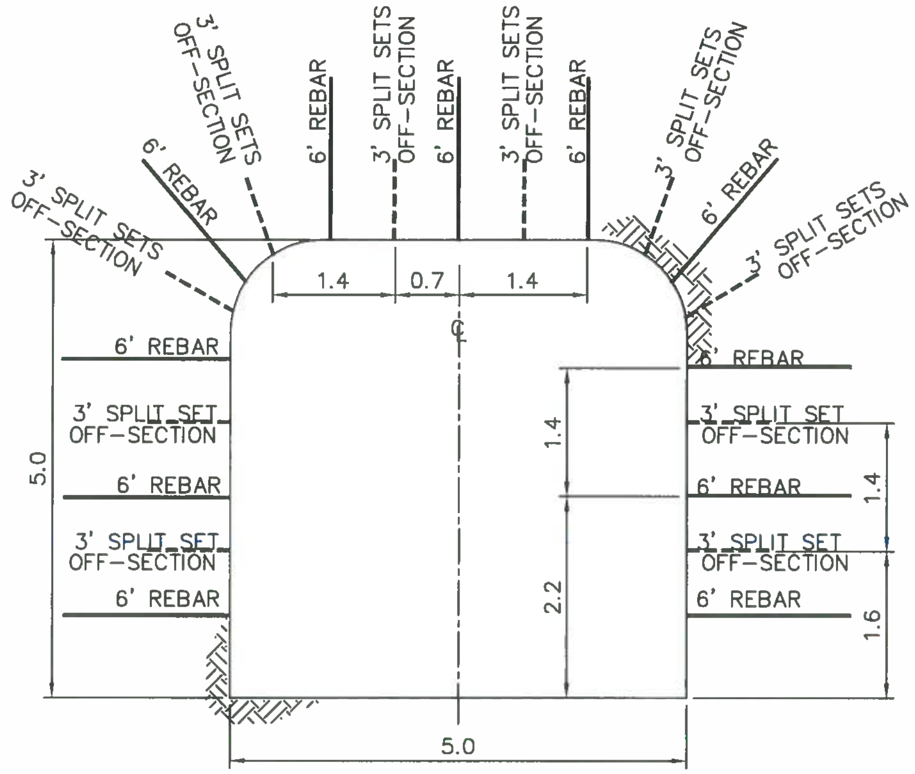
REVISIONS

DUMAS PROJECT MANAGER · MINTO PROJECT MANAGER · MINTO SITE REP. · GROUND CONTROL ENGINEER · MINTO GEOLOGY

PROJ. NO. 12024
SCALE: AS NOTED
DRAWN: DJD 10DEC12
UNDERGROUND GROUND SUPPORT STANDARDS – PERMANENT DEVELOPMENT PLAN & SECTIONS
SIZE D DRAWING NUMBER MINTO-001RMP-GRD-005A REV. D

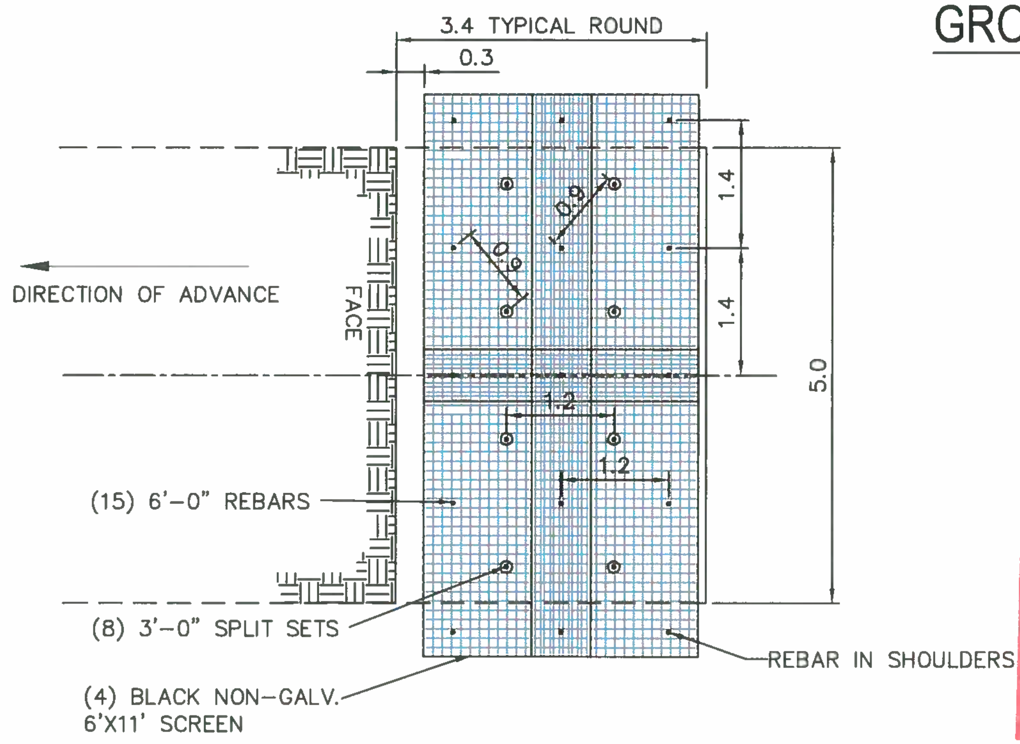
Jul 22, 2013 – 5:32pm \\MIN-DC-022\Underground\DUMAS – Mine Planning\Engineering\8_GRD – Ground Support\MINTO-001RMP-GRD-TYPE1.dwg

GROUND CONTROL TYPE 2



-6' SPLIT SET & REBAR IN WALL
-BLACK, (NON-GALV). SCREEN BACK AND SHOULDERS TO 0.9m FROM FLOOR
-3 SQUARE OVERLAP

DEVELOPMENT OPENING



PLAN; 5mX5m TYPICAL DEVELOPMENT ROUND
6' X 11' [1.83 X 3.35] SCREEN

QUANTITY

EXCAVATIONS WITH LESS THAN <6m SPANS USE 6' BOLTS
TOTAL PER 3.4M ROUND
10 SCREENS
(33) 6'-0" REBAR
(20) 3'-0" SPLIT SET

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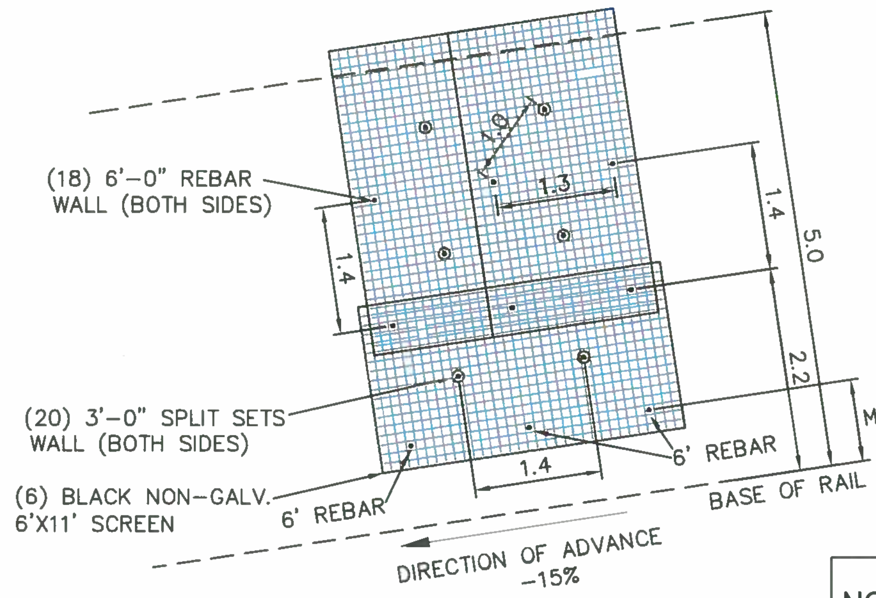
Date July 23rd, 2013
PERMIT NUMBER PP343
Association of Professional Engineers of Yukon

NOTE:
- REPORT ABNORMAL CONDTIONS
- MINIMUM STANDARD

PROFESSIONAL ENGINEER
YUKON TERRITORY
S. D. TOLGYESI
July 23rd, 2013



TYPICAL DRIFT – SECTION ALONG WALL

0 0.5 1 2
METRES

CAPSTONE MINING CORP.
MINTO MINE

Jul 22, 2013 – 5:43pm

NON-PERMANENT DEVELOPMENT
GROUND CONTROL - SPANS <6M TYPE 2
ie; STOPE, LEVEL ACCESS

NO.	DESCRIPTION	DATE	BY
C	SCALED BOLTS ON SECTION	22JUL13	FWK
B	ISSUED FOR CONSTRUCTION	11MAY13	FWK
A	ISSUED FOR CONSTRUCTION	04MAR13	DJD
	REVISIONS		

DUMAS PROJECT MANAGER | MINTO PROJECT MANAGER | MINTO SITE REP. | GROUND CONTROL ENGINEER | MINTO GEOLOGY

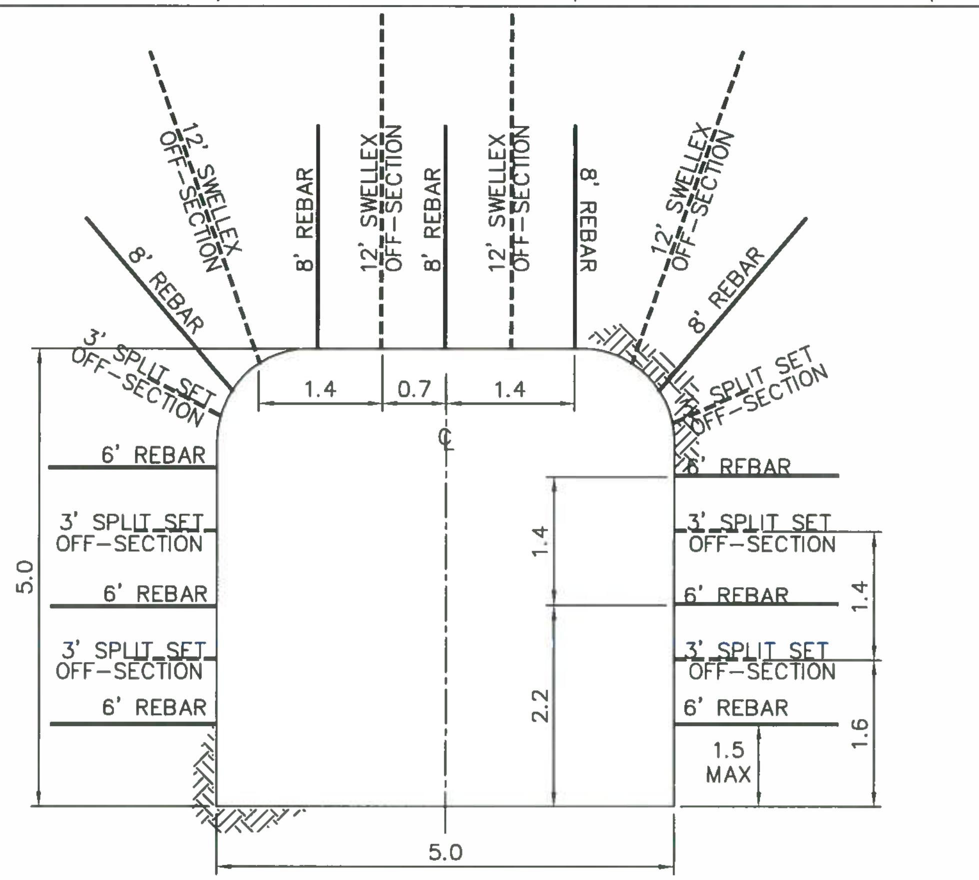
PROJ. NO.	12024
SCALE: AS NOTED	DATE
DESIGNED:	
DRAWN: DJD	10DEC12
CHECKED:	
APPROVED:	

UNDERGROUND
GROUND SUPPORT
NON-PERM. DEV. LESS THAN <6M SPAN
SECTIONS

SIZE	DRAWING NUMBER	REV.
D	MINTO-001RMP-GRD-006A	C

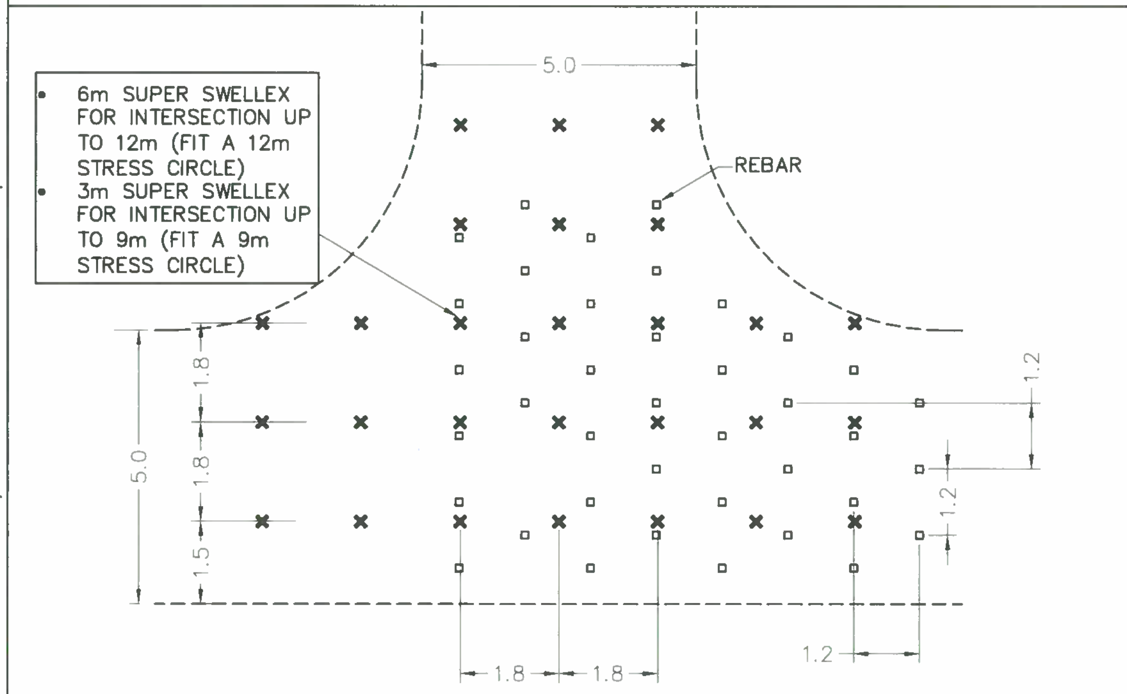
GROUND CONTROL TYPE 3

UNDER DIRECTION OF TECH SERVICES DEPT.
(main ramp)



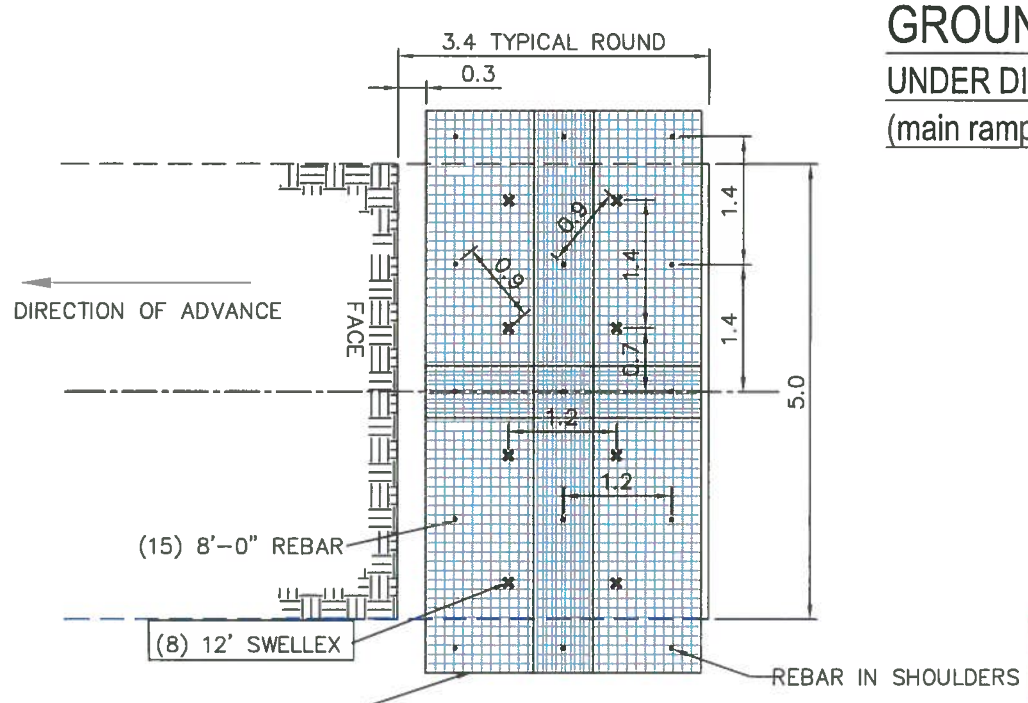
(EXCAVATIONS WITH 5m SPANS)
- 8' GROUTED REBAR (BACK AND SHOULDERS)
- 3' SPLIT SET & 6' REBAR IN WALLS
- GALV. SCREEN BACK AND SHOULDERS TO 0.9m FROM FLOOR
- 3 SQUARE OVERLAP

5mX5m TYPICAL DEVELOPMENT OPENING



5mX5m TYPICAL DEVELOPMENT INTERSECTION

NOTE:
USE SAME PATTERN FOR BROW GROUND CONTROL



PLAN: 5mX5m TYPICAL DEVELOPMENT ROUND
6' X 11' [1.83 X 3.35] GALVANIZED SCREEN

QUANTITIES – TOTAL
6X11 SCREEN

TOTAL PER 3.4M ROUND
10 SCREENS
(15) 8'-0" REBAR
(18) 6'-0" REBAR
(8) 12'-0" SWELLEX
(12) 3'-0" SPLIT SET

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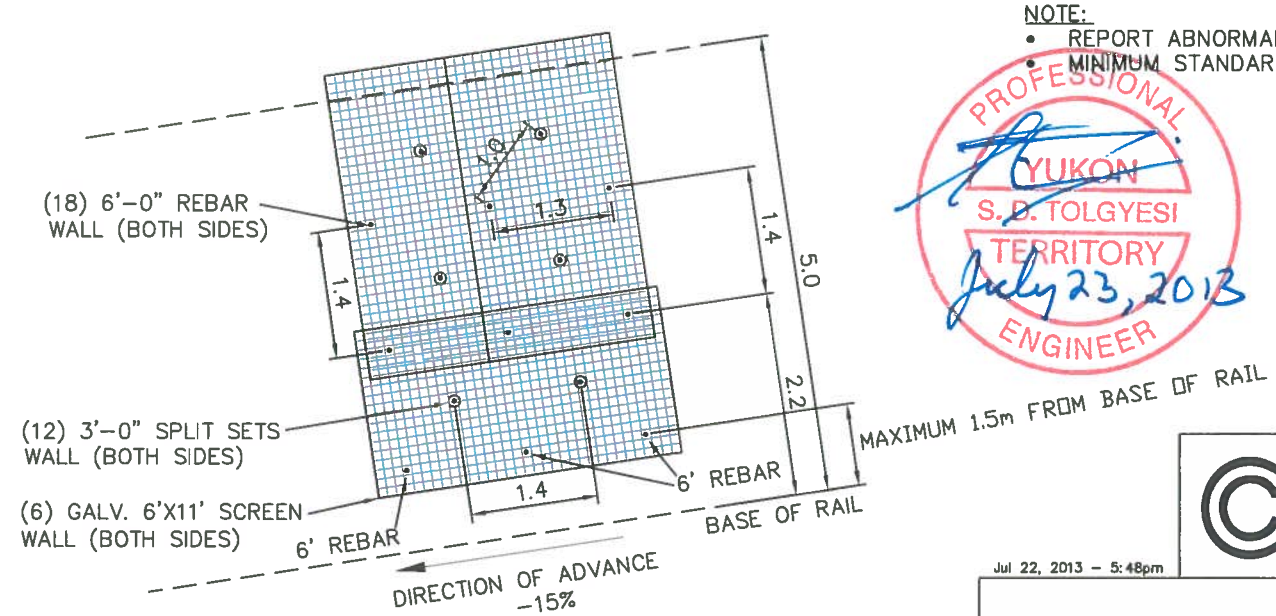
NOTE:
- REPORT ABNORMAL CONDTIONS
- MINIMUM STANDARD

PROFESSIONAL ENGINEER
YUKON TERRITORY
S. D. TOLGYESI
July 23, 2013



TYPICAL DRIFT – SECTION ALONG WALL

0 0.5 1 2
METRES

CAPSTONE MINING CORP.
MINTO MINE

Jul 22, 2013 – 5:48pm

PERMANENT DEVELOPMENT
GROUND CONTROL TYPE 3

NO.	DESCRIPTION	DATE	BY
D	ISSUED FOR CONSTRUCTION	20JULY13	FWK
C	ISSUED FOR CONSTRUCTION	27APR13	DVL
B	.	05APR13	FWK
A	ISSUED FOR CONSTRUCTION	04MAR13	DJD

REVISIONS

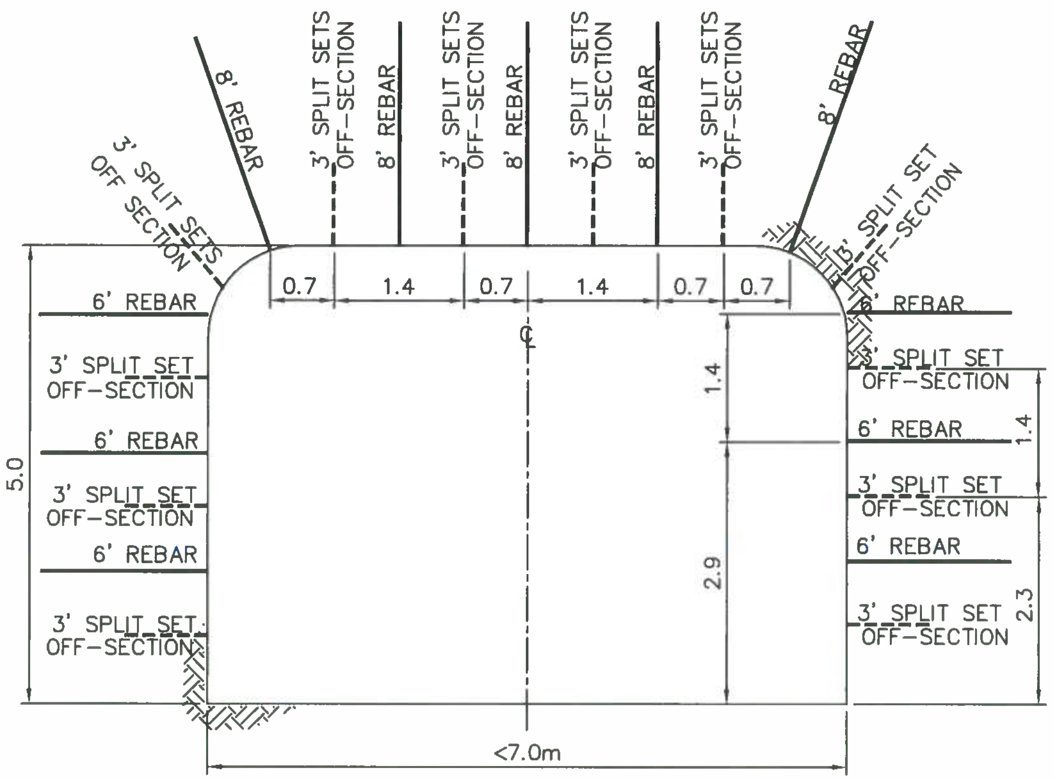
DUMAS PROJECT MANAGER · MINTO PROJECT MANAGER · MINTO SITE REP. · GROUND CONTROL ENGINEER · MINTO GEOLOGY

PROJ. NO. 12024
SCALE: AS NOTED
DRAWN: DJD — 01MAR13

UNDERGROUND
GROUND SUPPORT
STANDARDS – PERMANENT DEVELOPMENT
SECTIONS

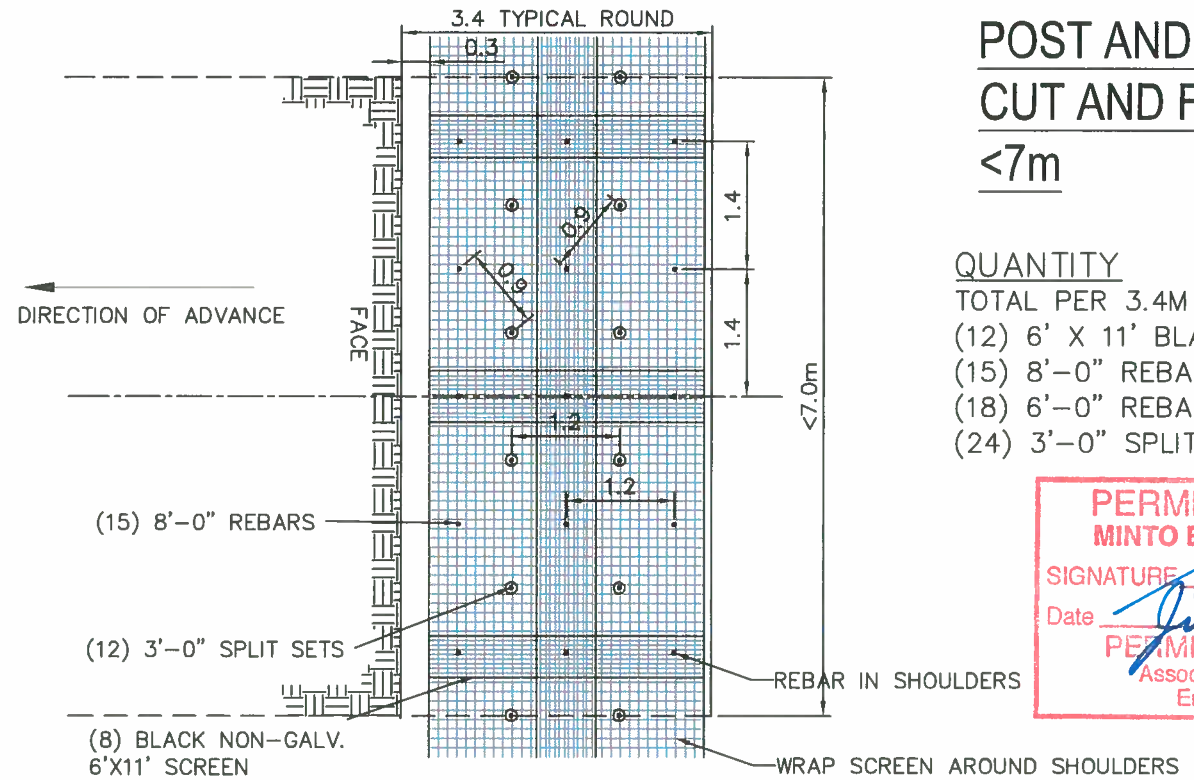
SIZE	DRAWING NUMBER	REV.
D	MINTO-001RMP-GRD-005B	D

POST AND PILLAR CUT AND FILL STOPES <7m



-3' SPLIT SET & 6' REBAR IN WALL
-BLACK, (NON-GALV). SCREEN BACK AND SHOULDERS TO 0.9m FROM FLOOR
-3 SQUARE OVERLAP

CUT OPENING



PLAN; 7mX5m STOPING ROUND
6' X 11' [1.83 X 3.35] SCREEN

QUANTITY
TOTAL PER 3.4M ROUND
(12) 6' X 11' BLACK NON-GALV. SCREENS
(15) 8'-0" REBAR
(18) 6'-0" REBAR
(24) 3'-0" SPLIT SET

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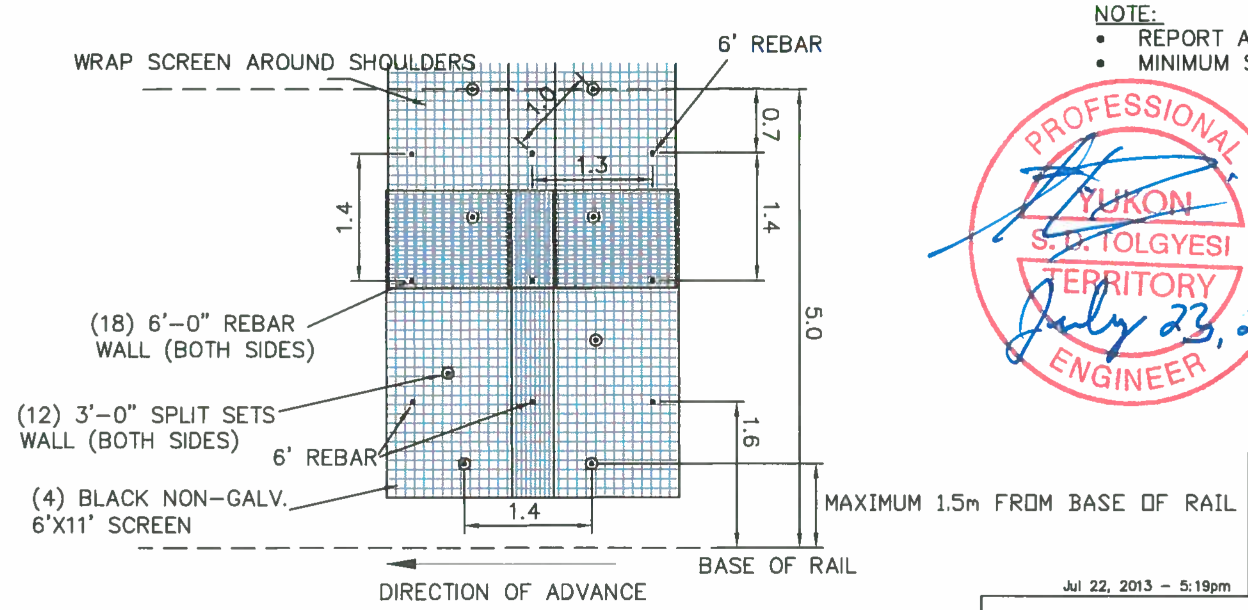


TYPICAL ROUND – SECTION ALONG WALL

0 0.5 1 2
METRES

NOTE:
- REPORT ABNORMAL CONDTIONS
- MINIMUM STANDARD

PROFESSIONAL
YUKON
S. D. TOLGYESI
TERRITORY
ENGINEER
July 23, 2013

CAPSTONE MINING CORP.
MINTO MINE

Jul 22, 2013 – 5:19pm

NON-PERMANENT POST & PILLAR, CUT & FILL STOPE GROUND CONTROL SPANS <7m

NO.	DESCRIPTION	DATE	BY
C	ISSUED FOR CONSTRUCTION	20JUL13	FWK
B	ISSUED FOR CONSTRUCTION	11MAY13	FWK
A	ISSUED FOR CONSTRUCTION	04MAR13	DJD

REVISIONS

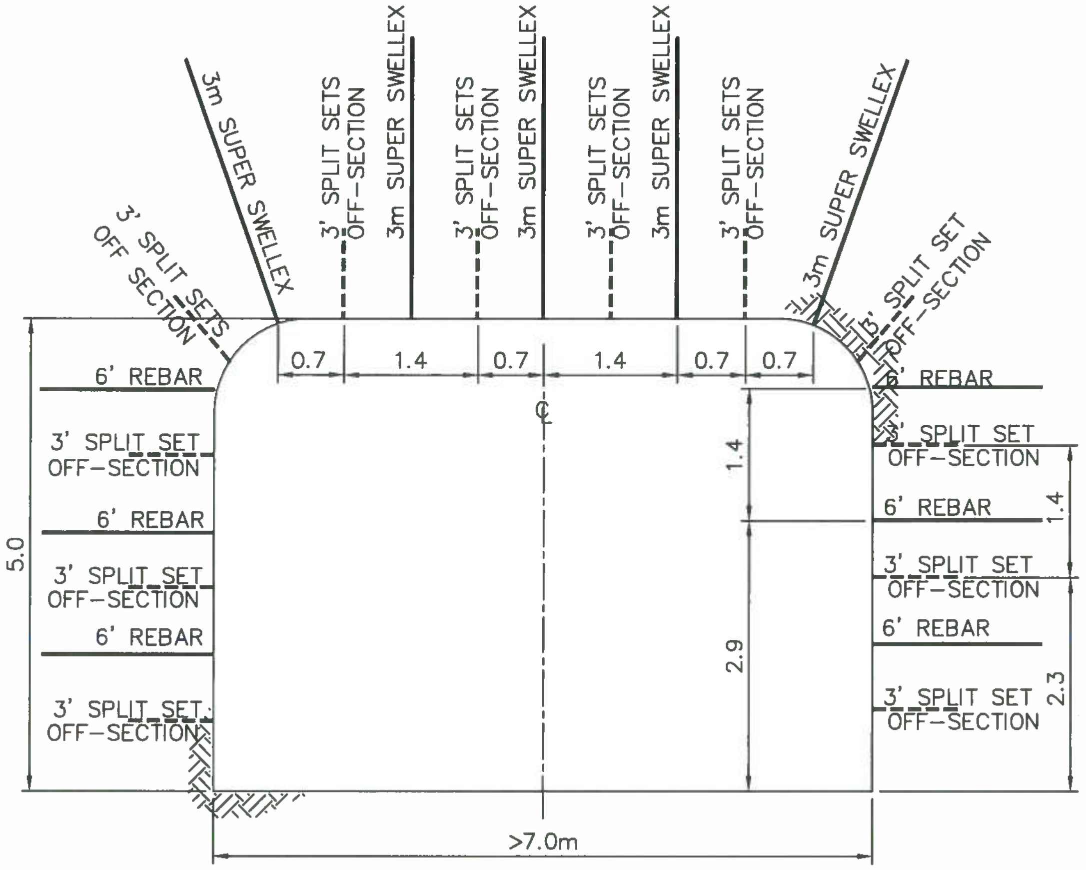
DUMAS PROJECT MANAGER | MINTO PROJECT MANAGER | MINTO SITE REP. | GROUND CONTROL ENGINEER | MINTO GEOLOGY

PROJ. NO. 12024
SCALE: AS NOTED
DESIGNED:
DRAWN: DJD 10DEC12
CHECKED:
APPROVED:

UNDERGROUND
GROUND SUPPORT
NON-PERM. STOPING. LESS THAN 7m SPAN
SECTIONS

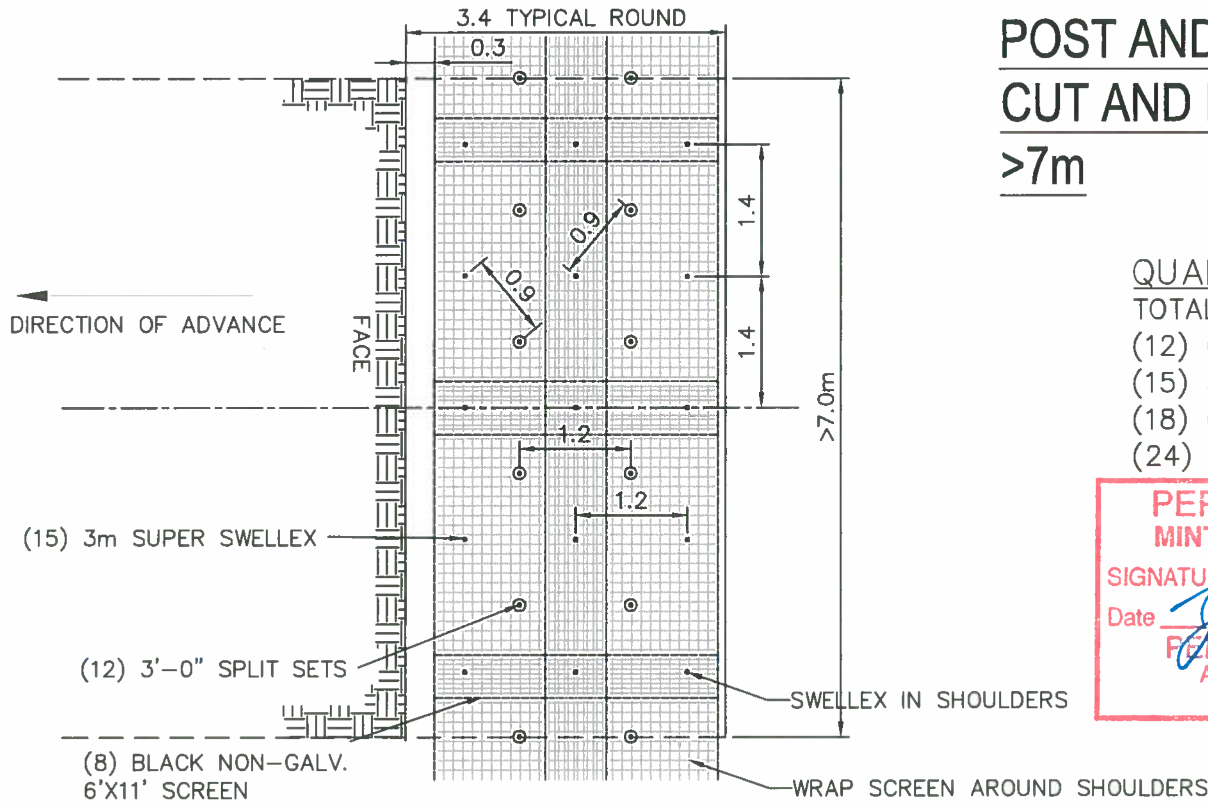
SIZE D | DRAWING NUMBER MINTO-001RMP-GRD-006B | REV. C

POST AND PILLAR CUT AND FILL STOPES >7m



-6' SPLIT SET & REBAR IN WALL
-BLACK, (NON-GALV). SCREEN BACK AND SHOULDERS TO 0.9m FROM FLOOR
-3 SQUARE OVERLAP

CUT OPENING



PLAN; 7mX5m STOPING ROUND
6' X 11' [1.83 X 3.35] SCREEN

QUANTITY

TOTAL PER 3.4M ROUND
(12) 6' X 11' BLACK NON-GALV. SCR
(15) 3m SUPER SWELLEX
(18) 6'-0" REBAR
(24) 3'-0" SPLIT SET

PERMIT TO PRACTICE
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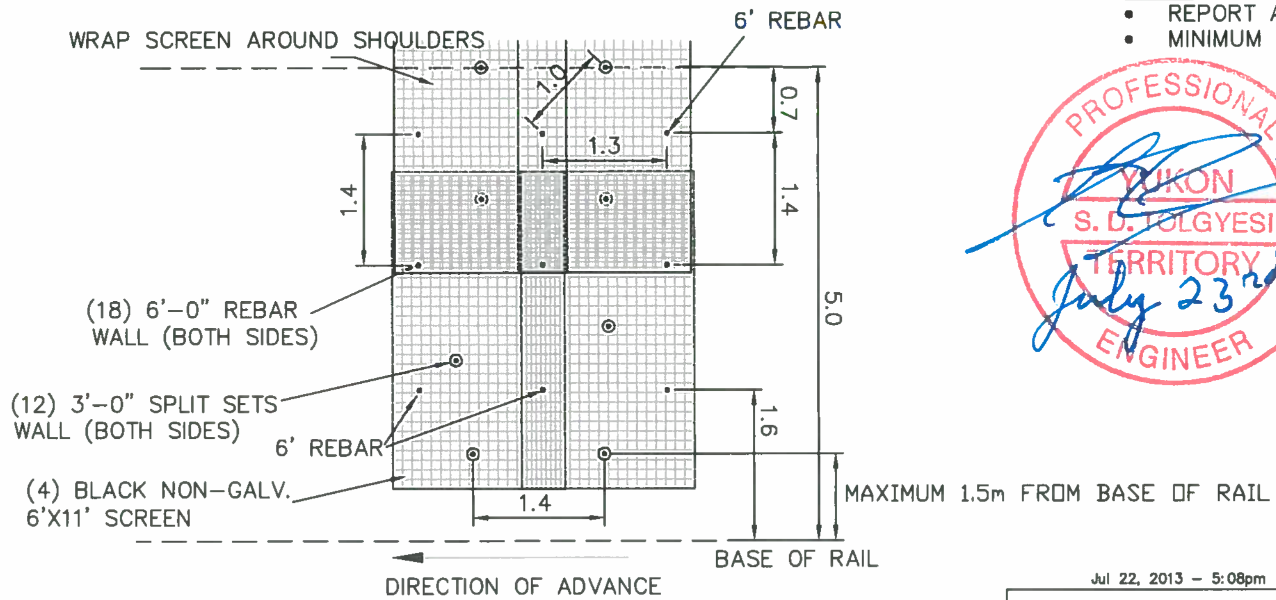
SIGNATURE
Date July 23rd 2013
PERMIT NUMBER PP343
Association of Professional Engineers of Yukon

NOTE:
- REPORT ABNORMAL CONDTIONS
- MINIMUM STANDARD



TYPICAL ROUND – SECTION ALONG WALL

0 0.5 1 2 METRES

PROFESSIONAL ENGINEER
YUKON TERRITORY
S. D. TOLGYESI
July 23rd, 2013

CAPSTONE MINING CORP.
MINTO MINE

Jul 22, 2013 – 5:08pm

NON-PERMANENT POST & PILLAR, CUT & FILL STOPE GROUND CONTROL SPANS >7m

NO.	DESCRIPTION	DATE	BY
C	BOLTS MODIFIED TO SCALE	JUL22l3	FWK
B	ISSUED FOR CONSTRUCTION	11MAY13	FWK
A	ISSUED FOR CONSTRUCTION	04MAR13	DJD

REVISIONS

DUMAS PROJECT MANAGER | MINTO PROJECT MANAGER | MINTO SITE REP. | GROUND CONTROL ENGINEER | MINTO GEOLOGY

PROJ. NO. 12024
SCALE: AS NOTED
DRAWN: DJD 10DEC12
UNDERGROUND GROUND SUPPORT NON-PERM. STOPING. GREATER THAN 7m SPAN SECTIONS
SIZE D DRAWING NUMBER MINTO-001RMP-GRD-006B1 REV. C