Minto Explorations Ltd.
Whitehorse, Yukon

ISSUED FOR USE

GEOTECHNICAL DESIGN
PROPOSED RECLAMATION OVERBURDEN DUMP
MINTO MINE, YUKON

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1.0 INTRODUCTION

1.1 GENERAL

The Minto Mine is a copper-gold mine located about 240 km north of Whitehorse, Yukon and is owned and operated by Minto Explorations Ltd. (Minto). The general location of the Minto Mine, along with its specific structures, is shown in Figure 1. The mine is being developed as an open pit mining operation and has been in production since June 2007. Development of the Area 1 Open Pit commenced with stripping in April 2006, and currently operates on an ongoing basis with either ore being stockpiled for processing and/or waste materials being disposed of at one of the waste dumps. There are currently two waste dumps permitted at the Minto Mine - the Main Waste Dump (MWD), and the Ice-Rich Overburden Dump (IROD). The MWD is used to store both non ice-rich overburden and waste rock materials. The IROD is to be used for storing ice-rich overburden. To date, Minto has only used the MWD for waste from the open pit.

Minto has proposed the design and construction of a third waste dump, immediately west of the MWD, for the storage of non ice-rich overburden for possible use in future reclamation. Consequently, EBA Engineering Consultants Ltd. (EBA) was retained by Minto to undertake the geotechnical design of this third waste dump, the Reclamation Overburden Dump (ROD).

This design report presents the geotechnical design of the proposed ROD. Background information involving the proposed ROD, findings of several geotechnical characterization programs, which EBA conducted in 1997, 2005 and most recently January 2008, and analytical work associated with the geotechnical design of the ROD are summarized within this report. Furthermore, construction and monitoring recommendations for the ROD are also included.

EBA received approval from Minto to proceed with the geotechnical design of the ROD in December 2007.

This report is subject to the General Conditions provided in Appendix A.

1.2 SCOPE OF WORK

EBA's scope of work was specifically the geotechnical design of the proposed ROD, and did not include detailed waste deposition planning.

1.3 REPORT FORMAT

This geotechnical design report is contained in one volume and presents the main text together with the figures and appendices.

2.0 BACKGROUND INFORMATION

2.1 REQUIREMENT FOR A RECLAMATION OVERBURDEN DUMP

As recommended in EBA's design report (EBA, 1998a), "Geotechnical Evaluation, Proposed Main Waste Dump" dated April 1998, current mining operations for the MWD construction have been completed with the finer grained non ice-rich overburden material being placed within the interior of the MWD and only coarser free draining waste rock placed around the perimeter. This practice was recommended and is being used to ensure the long term stability of the structure; it did not account for the potential reuse of the finer grained overburden material for reclamation purpose.

The construction of the proposed ROD will allow reuse of this overburden material for mine reclamation purposes.

2.2 SCHEDULE OF ACTIVITIES TO DATE

The following information summarizes the main activities involving the proposed ROD that occurred prior to the completion of this design report.

- Minto provided EBA with the layout, geometry and associated volume of the proposed ROD, as shown in Figure 2 (labelled "original Reclamation Overburden Dump layout provided by Minto"). Minto's assumptions for this layout and geometry included the placement of approximately 10 m lifts with a 30 m berm setback to yield an overall slope of 2.5H:1V. The structure was reported to contain approximately 550,000 m^3 of material.
- EBA reviewed the existing geotechnical information for the proposed ROD site and the overburden material to be stockpiled within the dump and issued the letter report (EBA, 2007), "Proposed Reclamation Overburden Dump, Minto Mine, YT" dated December 13, 2007. This letter report summarized the available geotechnical information and indicated that based on this information, the proposed ROD could be designed as an engineered structure at this location.
- Minto provided EBA with two samples of the typical overburden material to be stored within the proposed ROD. These samples were collected by Minto from the Area 1 Open Pit on December 10, 2007. These samples were sent to EBA's Edmonton laboratory for strength determination testing. Results from the testing would not be available until mid to end January 2008.
- Minto submitted a letter to Yukon Government – Energy, Mines and Resources (EMR) entitled "Re: QML-0001 Notification of need to start a Reclamation Material Stockpile (RMS)" dated December 12, 2007 and a copy of EBA, 2007. Minto's letter discussed the immediate use of the proposed ROD as current open pit development planning required the removal of the overburden material from the south portion of the pit. With Minto's current waste dump permitting, this overburden material would be placed within the MWD and encapsulated with waste rock and lost to future reuse.

- On December 14, 2007, a meeting was held between EMR, Minto, and EBA to discuss the use and design of the proposed ROD.
- EMR issued the letter, "Temporary Approval for Reclamation Overburden Dump, Minto Mine", dated December 20, 2007. This letter stipulated conditions for the temporary approval of the proposed ROD layout provided by Minto.
- At the time of this report, no overburden material has been placed within the proposed ROD.

2.3 DESIGN INFORMATION

EBA developed the geotechnical design for the proposed ROD from the following background information:

- A drawing supplied by Minto on December 6, 2007 that detailed the proposed layout, geometry, and associated volume, and
- Several conversations and meetings with Minto involving the ROD's construction and intended use.

In addition, EBA also used the following information from EBA's files:

- A 1998 report (EBA, 1998a) entitled "Geotechnical Evaluation, Proposed Main Waste Dump" summarizing the geotechnical design of the MWD;
- A 1998 report (EBA, 1998b) entitled "1997 Geotechnical Program and Construction Inspection Reports" detailing the 1997 geotechnical investigations ;
- A 2006 report (EBA, 2006a) entitled "Geotechnical Design, Ice-Rich Overburden Dump" summarizing the geotechnical design of the IROD; and
- A 2006 letter report (EBA, 2006b) entitled "Addendum to Geotechnical (Open Pit) Feasibility Study" detailing a geotechnical investigation of the overburden material in the south portion of the open pit in the fall 2005.

3.0 RECLAMATION OVERBURDEN SOURCING AND CHARACTERIZATION

3.1 OVERBURDEN SOURCING

The current open pit development plan indicates that approximately 370,000 m^3 (insitu) of overburden will be excavated from the south portion of the Area 1 Open Pit and placed within a current waste dump. This south portion of the Area 1 Open Pit is referred to as Phase 2 of the Area 1 Open Pit.

This overburden could be stored in the proposed ROD and used for reclamation purposes, as required. It is understood that the overburden material would be excavated the pit between January 2008 and April 2008.

Figure 2 identifies the location of the Phase 2, Area 1 Open Pit which is the source of the overburden.

3.2 OVERBURDEN CHARACTERIZATION

EBA has undertaken two separate characterization programs to evaluate the geotechnical properties of overburden located in the south portion of the Area 1 Open Pit. The first program was completed in November 2005 and formed part of EBA, 2006b. The second program was completed in January 2008 to supplement the data required for the ROD design.

3.2.1 2005 Overburden Characterization Program

The 2005 overburden characterization program included five boreholes drilled in the south portion of the Area 1 Open Pit. Figure 2 shows the location of these boreholes, 1200173-042 through -045B. Borehole logs summarizing the soil and ground ice descriptions, as well as the laboratory index testing (moisture content, particle size distribution, and Atterberg limit determinations) are presented in Appendix B. Individual particle size distribution results are also presented in Appendix B with the associated borehole log. Frozen bulk densities were also recorded for select permafrost samples.

A 25 mm PVC pipe was installed in Borehole 1200173-042 to enable the installation of a ground temperature cable at a later date. This cable would be used to determine the ground temperature profile within the south portion of the Area 1 Open Pit. The cable was installed on March 8, 2006.

3.2.1.1 Moisture Content Determination

A total of 114 moisture content determinations were undertaken. Figure C.1, in Appendix C, graphically summarizes the moisture content versus elevation for each borehole and provides the overall combined maximum, minimum, average and standard deviation values. The overall combined average moisture content along with the upper and lower standard deviation values are also presented in Figure C.1.

The moisture content results varied throughout the depth of each borehole and corresponding elevations. No correlation between the moisture content and elevation can be derived from this data.

3.2.1.2 Particle Size Distribution

A total of 24 particle size distribution determinations were completed. Table C.1, in Appendix C, summarizes the particle size distribution versus elevation for each borehole in tabular form and provides the overall combined maximum, minimum, average and standard deviation values for each particle size classification (Clay, Silt, Sand, and Gravel).

The particle size distribution results varied throughout the depth of each borehole and corresponding elevations. No correlation between the particle size distribution and elevation can be derived from this data.

3.2.1.3 Atterberg Limit Determination

A total of eight Atterberg limit determinations were completed. Table C.1, in Appendix C, summarizes the Atterberg limit versus elevation for each borehole in tabular form and provides the overall combined maximum, minimum, average and standard deviation values for the liquid limit, plastic limit, and plasticity index.

The Atterberg limit results indicate a fairly consistent plasticity index from the ground surface to elevation 795 m. Results from elevation 772 m to 774 m are also consistent but elevated from those above.

3.2.1.4 Measured Frozen Bulk Density

A total of 14 frozen bulk density determinations were completed. Figure C.2 graphically summarizes the 85% of measured bulk density versus elevation for each borehole and provides the overall combined maximum, minimum, average and standard deviation values for the 85 % of measured bulk density results. Figure C.3 graphically summarizes moisture content versus 85 % of measured bulk density for each sample. The 85 % of measured bulk density is being used to evaluate the measured bulk densities to account for field measurement corrections. Figure C.2 and C.3 are presented in Appendix C.

The bulk density results varied throughout the depth of each borehole and corresponding elevations. No correlation between the frozen bulk density and elevation can be derived from this data.

Figure C.3 shows the expected inverse relationship between moisture content and frozen bulk density.

3.2.1.5 Ground Temperature Profile

Readings from the ground temperature cable installed in Borehole 1200173-042 were obtained on five occasions between March 24 and October 29, 2006. The ground temperature profiles from these readings are presented graphically in Figure C.4, Appendix C.

The readings indicate a relatively uniform ground temperature of close to -0.6ºC at depth and seasonal warming over the top 10 m. The active layer depth was up to 2 m.

3.2.2 2008 Overburden Characterization Program

Minto provided two overburden samples, 08-ROD-OB01 and –OB02, in December 2007 for laboratory strength parameter testing for the proposed ROD design. Both samples were from the south portion of the Area 1 Open Pit as shown in Figure 2. The first sample was from the eastern section of the 796 m bench while the other sample came from the west end of the 808 m bench.

The following tests were undertaken at EBA's Edmonton laboratory:

- Particle size distributions (sieve and hydrometer analyses),
- Moisture density relationship (proctor at standard effort), and
- Direct shear tests.

3.2.2.1 Laboratory Test Results

A summary of the laboratory test results is presented in Table 1. The individual laboratory test results are attached in Appendix D.

TABLE 1: LABORATORY TEST RESULTS – 2008 OVERBURDEN SAMPLES

Sample	Type of Test	Results
08-ROD-OB01	Particle Size Distribution	Clay: 18 %, Silt: 30 %, Sand: 14 %, Gravel: 38 %
	Moisture Density Relationship	Maximum Dry Density (standard effort): 1780 kg/m^3 Optimum Moisture Content: 15.5 %
	Direct Shear Tests	Tested at 85 % MDD - Peak Strength: $\theta' = 26.7°$, $c' = 13.5$ kPa Tested at 90 % MDD - Peak Strength: $\theta' = 27.7°$, $c' = 8.3$ kPa
08-ROD-OB02	Particle Size Distribution	Clay: 8 %, Silt: 18 %, Sand: 15 %, Gravel: 59 %[(1)]

Note: [(1)] Laboratory result affected by the presence of one large gravel particle.

3.2.3 Summary of Overburden Geotechnical Characteristics

The above testing programs have found the overburden material typically comprises non-plastic silty sand or sandy silt to low plastic silty clay. These soils are typical of the colluvium that blankets the hillsides in the area.. Particle size distribution results are highly variable but average to a material comprised of approximately 13 % clay, 38 % silt, 33 % sand and 16 % gravel sized particles. The moisture content results ranged from 5.6 % to 57.9 % with an average of 20.4 % and standard deviation of 9.4 %.

The Atterberg limit results give an indication of the mechanical sensitivity of the overburden material at different moisture contents. The plastic limit (PL) defines the moisture content at which the material changes from being a semisolid to a plastic state and the liquid limit (LL) defines the moisture content at which the material changes from a plastic state to a liquid state. The Atterberg limit results indicated that for the material between the ground surface and elevation 795 m the plastic limit, liquid limit and plasticity index averaged 15, 21 and 6, respectively. Materials with these characteristic parameters are expected to behave as granular, non cohesive soils. The results from elevation 772 m to 775 m indicated elevated values of 24, 42, and 18, respectively. With an average moisture content of 20 %, roughly half of the overburden material excavated from above elevation 795 m will be around its liquid limit when it thaws within the dump. Consequently, trafficability in summer conditions could be impaired.

The moisture density relationship determined an optimum moisture content of 15.5% at a maximum dry density (MDD) (standard effort) of 1780 kg/m^3. With an average moisture content of 20%, the overburden material will typically be above its optimum moisture content.

Direct shear tests undertaken at 85 % and 90 % of MDD determined an internal angle of friction of 26.7º and 27.7º and a cohesion intercept of 13.5 kPa and 8.3 kPa at peak shear strength, respectively. Testing was completed at 85 % and 90 % of MDD to represent the loose state of the dumped frozen overburden material during construction of the dump.

None of the 14 bulk density results were below the 1.7 Mg/m^3 threshold set as the "non ice-rich/ice-rich classification". Therefore, all of these samples are considered non ice-rich. Interpolating the results presented in Figure C.3, a moisture content greater than 36 % would indicate the presence of ice-rich overburden (bulk density less than 1.7 Mg/m^3).

Of the 114 moisture content results, only six were in excess of the interpolated intersection of the 1.7 Mg/m^3 limit, which would indicate ice-rich material. Therefore, in general terms, the majority of overburden sampled would be considered non ice-rich.

4.0 RECLAMATION OVERBURDEN DUMP SITE CHARACTERIZATION

4.1 SITE CHARACTERIZATION PROGRAMS

EBA has undertaken two separate site characterization programs to evaluate the geotechnical properties of the proposed ROD foundation located adjacent to the MWD. The first program was completed in September and October 1997 (EBA, 1998b) and formed part of the geotechnical evaluation of the MWD (EBA, 1998a). The second program was completed in January 2008 to supplement the data required for the ROD design.

4.1.1 1997 Site Characterization Program

The 1997 site characterization program included seven boreholes drilled within the vicinity of the proposed ROD location and two testpits excavated within colluvium material at the MWD. Four of the seven boreholes are located within the proposed ROD footprint while the remaining three are located east of the footprint. Figure 2 shows the location of these seven boreholes, 97-G17 through –G23, and two testpits, 97-TP01 and –TP02. Borehole logs summarizing the soil and ground ice descriptions, as well as the laboratory index testing (moisture content, particle size distribution, and Atterberg limit determinations) are presented in Appendix E. Individual particle size distribution results are also presented in Appendix E with the associated borehole log.

Relatively undisturbed Shelby tube samples were obtained from Testpit 97-TP01 and –TP02. Two Shelby tubes were recovered from a depth of 0.3 m to 0.6 m (1 to 2 feet) from Testpit 97-TP01 and two Shelby tubes were taken from Testpit 97-TP02 between 1.0 m to 1.2 m (3 and 4 feet). Laboratory tests conducted on these samples include:

- Particle size distributions (sieve and hydrometer analyses),
- Atterberg limit determination, and
- Direct shear tests.

4.1.1.1 Laboratory Test Results – Shelby Tube Samples

A summary of the laboratory test results for the Shelby tube samples from Testpit 97-TP01 and –TP02 is presented in Table 2. The individual laboratory test results are attached in Appendix F.

TABLE 2: LABORATORY TEST RESULTS – 1997 SHELBY TUBE SAMPLES		
Sample	Type of Test	Results
97-TP01	Particle Size Distribution	(1A) Clay: 8.9 %, Silt: 41.4 %, Sand: 43.0 %, Gravel: 6.7 % (1B) Clay: 7.2 %, Silt: 31.7 %, Sand: 40.4 %, Gravel: 20.7 %
	Atterberg Limits	Plastic Limit: 12, Liquid Limit: 17, Plasticity Index: 5
	Direct Shear Tests	Peak Strength: θ´ = 35º Residual Strength: θ´ = 28º
97-TP02	Particle Size Distribution	(2A) Clay: 18.6 %, Silt: 28.0 %, Sand: 25.5 %, Gravel: 27.9 % (2B) Clay: 21.7 %, Silt: 32.9 %, Sand: 27.7 %, Gravel: 17.7 %
	Atterberg Limits	Plastic Limit: 15, Liquid Limit: 28, Plasticity Index: 13
	Direct Shear Tests	Peak Strength: θ´ = 30º Residual Strength: θ´ = 25º

4.1.2 2008 Site Characterization Program

The 2008 site characterization program was completed to provide additional subsurface information within the vicinity of the proposed ROD. The program consisted of a testpitting program in which three testpits were excavated up to a depth of 4.5 m. Figure 2 shows the location of these testpits, 08-ROD-TP01 through –TP03. Testpit logs summarizing the soil and ground ice descriptions, as well as the laboratory index testing (moisture content) are presented in Appendix G. Individual particle size distribution results are also presented in Appendix G with the associated testpit log.

5.0 SITE CONDITIONS

5.1 SURFACE FEATURES

The proposed ROD site is located over gently sloping (about 3º to 4º, or 17H:1V) terrain in the upper portion of a valley, and is directly west of the MWD and 60 m upslope of the IROD access road. The Pelly laydown site is located approximately 240 m downslope in the southeast direction. The IROD is located 320 m south.

The proposed ROD footprint is located on a northwest facing slope on the east side of the upper valley. The terrain steepens to the north and west of the proposed ROD site. Topographic information presented in Figure 2 indicates the presence of several small ephemeral creeks that converge to the middle of this upper valley roughly 30 m to the southwest of the proposed ROD footprint. These creeks collect the surface runoff water and route it down the mountain side. Three ephemeral creeks are shown within the proposed ROD footprint; one originates roughly 150 m northwest of the dump and runs through the upper portion of the dump while the other two originate within the MWD and

run through the bottom portion. One of the creeks (farthest east) that originate within the MWD has been disrupted by overburden fill placement within that dump.

The site and adjacent area has sparse to locally dense tree cover. The area was subject to a forest fire in 1995 that has resulted in areas of fallen trees with deciduous species regrowth.

5.2 SUBSURFACE CONDITIONS

The geotechnical site characterizations indicate that the subsurface conditions within the proposed ROD footprint generally comprise a thin veneer of peat and vegetation overlying a silty sand colluvium overlying residual soil (residuum).

The area to the south, towards the middle of this upper valley, generally comprise of a thin veneer of peat and vegetation overlying fine-grained sand and silt overlying coarser-grained sand with some silt and gravel. These soils are believed to be of colluvial origin and underlain by residual soil.

Throughout the mine site these residual soils grade into weathered bedrock (granodiorite).

5.2.1 Groundwater

Groundwater was noted between 1.2 m and 2.1 m at 97-G19 and at 1.5 m at 97-G22 during the site characterizations. No other borehole or testpit completed within the vicinity of the proposed ROD site identified groundwater.

5.2.2 Permafrost

Permafrost was encountered in one of the four boreholes, 97-G23, located within the proposed ROD footprint. The observed ice contents in this borehole were logged as Nf (Ice not visible – poorly bonded or friable) with moisture content results less than 15%. These moisture results are consistent with the overlying unfrozen soils at that location and indicate a non ice-rich material. The active layer at the time of drilling, September 14, 1997, was 5.1 m.

Permafrost was also encountered in Testpit 08-ROD-TP01 through –TP03, at varying depths. The observed ice contents in the three testpits typically ranged from Nbn (Ice not visible – well bonded) to visible ice at 5% to 15% of the total volume. The moisture contents ranged between 11.6 % and 31.0 %. These moisture results are consistent with the overlying unfrozen soils at that location and indicate a non ice-rich material. The maximum recorded active layer thickness was about 1.8 m on January 10, 2008.

5.2.3 Bedrock

Depths to competent bedrock (granodiorite) are unknown as all of the boreholes and testpits within the vicinity of the proposed ROD terminated in the colluvial soils. Weathered bedrock outcrops are present within the vicinity of the IROD and MWD.

6.0 RECLAMATION OVERBURDEN DUMP DESIGN

6.1 DESIGN CONSIDERATIONS

The primary considerations for the geotechnical design of the proposed Reclamation Overburden Dump are summarized below.

- The proposed ROD geometry could be maintained over a relatively short period of time as the overburden material will likely be reused for reclamation purposes. Consequently, the design life of the structure will be re-evaluated within five years.
- The volume of unused overburden to be permanently stored within the ROD is unknown.
- Minto's construction plan to utilize two benches to place the overburden material at an angle of repose (when frozen) will minimize time and effort flattening the slope angle of the dump sideslope, while providing a shallower overall slope angle.
- Localized shallow slip surface failures and sloughing of the 1.5H:1V sideslopes as the overburden thaws are expected and acceptable as long as the overall dump stability is maintained.
- Based on the occurrence of these shallow slip surface failures and sloughing, the proposed ROD footprint has been offset 60 m from the IROD access road and 30 m from the main ephemeral creek southwest of the dump. Furthermore, the construction of the 30 m wide 890 m bench will act as a catchment area in the event of sloughing of the 900 m bench.
- If required, slope remediation of the sloughed material can be completed during the design life of the structure. This adaptive management approach could entail flattening the sideslopes or constructing a waste rock shell in any problematic areas.
- Dependant on the volume of the unused material and final closure planning, the overburden should be recontoured with flatter sideslopes or an external toe berm or shell comprised of waste rock material could be incorporated into the closure design.

6.2 LAYOUT AND GEOMETRY

The original proposed ROD layout provided by Minto in December 2007 has been modified to alleviate several construction issues that would have arisen if the ROD was constructed at that specific location – specifically, permafrost and the main ephemeral stream located down the middle of the valley. The new layout of the proposed ROD is shown in Figure 2.

The geometry of the dump will be a crescent shaped structure with two main benches, one at elevation 890 m and the other at elevation 900 m, as shown in Figure 2 and 3. The 890 m bench will have a 30 m crest width. The 900 m bench is the ultimate elevation of the dump. Each bench will have a 1.5H:1V sideslope. The overall sideslope of the proposed

ROD will be 2.75H:1V. The maximum thickness of the overburden will be in the order of 20 m.

The proposed ROD will be able to contain approximately 479,000 m^3 of material. Based on the 370,000 m^3 (insitu) of overburden to be excavated from the Phase 2 Area 1 Open Pit, there will be adequate storage volume with normal bulking factors.

6.3 STABILITY EVALUATION

6.3.1 Analysis Methodology

Limit equilibrium analyses were conducted to determine the factor of safety against slope failure during construction and maintenance of the dump. All analyses were conducted using the commercially available two-dimensional, limit equilibrium software, SLOPE/W (Geo-Slope International Ltd., GeoStudio 2007 (Version 7.03)). The principles underlying the method of limit equilibrium analyses of slope stability are as follows:

- A slip mechanism is postulated;
- The shear resistance required to equilibrate the assumed slip mechanism is calculated by means of statics;
- The calculated shear resistance required for equilibrium is compared with the available shear strength in terms of factor of safety; and
- The slip surface with the lowest factor of safety is determined through iteration.

A factor of safety is used to account for the uncertainty and variability in the strength and porewater pressure parameters, and to limit deformations.

Earthquake loading has been modeled using pseudostatic peak horizontal ground acceleration.

6.3.1.1 Analyzed Profile

Stability analyses were carried out for a typical profile of the proposed ROD. The foundation at this location was inferred to be silt and sand with varying percentages of gravel, grading into coarser material. Although permafrost was only encountered within the south corner of the 890 m bench (97-G23 and 08-ROD-TP01), its presence was incorporated into the stability evaluation. The depth to permafrost was assumed to range from 2 m to 5 m beneath the overall sideslope. The alignment 2 profile presented in Figure 4 summarizes the typical profile used in the analyses.

6.3.1.2 Failure Scenarios

Two scenarios were evaluated for assessing the dump stability. Scenario 1 assessed the overall dump stability based on a deeper failure plane cutting through the dump to the permafrost interface in the foundation soil. The failure would then follow the permafrost interface and exit below the toe of the slope. The presence of the permafrost in the foundation soils will not greatly affect the overall dump stability as it is considered non ice-rich and thaw stable. It has been postulated, based on previous EBA experience, that some thaw at the base of the active layer will occur and that the shear strength acting along the thawed frozen interface will be a controlling factor in the overall dump design. For purposes of the limit equilibrium analyses, the underlying permafrost is considered much stronger than the unfrozen soil; therefore, the risk of shear failure through the frozen ground was not analysed.

Scenario 2 assessed the stability of the overburden material itself. The proposed ROD construction plan involves 1.5H:1V sideslopes for the 890 m and 900 m bench with an overall 2.75H:1V slope for the structure. It is anticipated that these 1.5H:1V sideslopes will exhibit localized shallow slip surface failures and sloughing once the material thaws in the summer resulting in flatter slopes. The extent of sloughing will be dependent on the moisture content and strength characteristics of the overburden material placed within the dump in the vicinity of the sideslope. Stability analyses were completed based on relatively shallow failures through the 890 m bench and a deep seated failure through the 900 m bench. All failures were forced to exit through the toe of the slope.

6.3.2 Design Criteria

The guidelines for minimum design factor of safety have been adopted from the British Columbia Interim Guidelines for Investigation and Design of Mine Dumps (Waste Rock Design Manual).

The design criteria adopted from the guidelines are included in Table 3.

TABLE 3: DESIGN FACTORS OF SAFETY

Stability Condition	Minimum Design Factor of Safety
Long Term Stability	1.3
Seismic (Pseudostatic) Stability	1.1

The Waste Rock Design Manual recommends that seismic stability should be evaluated using pseudostatic horizontal accelerations that correspond to a 10% probability of exceedance in 50 years. When work was originally undertaken on the MWD in the mid 1990's, the Canadian Geological Survey Pacific Geosciences Centre provided a value for the

peak horizontal acceleration for the project site of 0.15 g. An updated value for the site has been provided by the Pacific Geosciences Centre and the current peak horizontal acceleration that corresponds to a 10% probability of exceedance in 50 years is 0.055 g. The reasoning for the decrease in the peak ground acceleration provided by the Pacific Geosciences Centre is that seismic data collection has increased substantially in the Yukon in recent years. A better understanding of ground motion and improved modelling has resulted in revised predictions, which are considered to be more accurate and representative for the project area.

6.3.3 Material Properties

The material properties chosen for the overburden and foundation materials in the stability analyses are presented in Table 4. The properties for the materials were selected based on the completed laboratory testing, and properties used in the design of the existing facilities on the site.

TABLE 4: MATERIAL PROPERTIES USED IN STABILITY ANALYSES

Material	Angle of Internal Friction (º)	Cohesion (kPa)	Unit Weight (kN/m³)
Overburden	25	--	18
Active Layer	28	--	18
Permafrost	--	--	--

6.3.3.1 Overburden

The shear strength parameters, internal friction angle and cohesion, were determined by evaluating the results of direct shear tests on samples of overburden material. Sample 08-ROD-OB01 was sampled from the actual overburden to be placed within the dump. Direct shear testing of this sample was undertaken at 85 % and 90 % of MDD to represent the loose state of the dumped frozen overburden material during construction of the dump. Results indicated an internal angle of shearing resistance of approximately 27º and a cohesion intercept between 8.3 kPa and 13.5 kPa at peak shear strength. These test results were evaluated with the direct shear tests from samples from 97-TP01 and –TP02. These testpits were not located within the Area 1 Open Pit; however, the material is of similar nature to the overburden. The results from samples from 97-TP01 and –TP02 are presented in Table 2.

Based on these results and evaluation, strength parameters of $\theta' = 25º$ and $c' = 0$ kPa were used for the stability analyses.

6.3.3.2 Active Layer

The active layer soils are typically a silty sand or silt and sand with trace to some gravel. This material is believed to be representative of the colluvium found at Testpit 97-TP01. Direct shear testing of a silty sand colluvium sample from Testpit 97-TP01 indicates this material could exhibit strain-softening behaviour with a peak friction angle of 35º and a residual friction angle of 28º.

Based on these results, strength parameters of $\theta' = 28^\circ$ and $c' = 0$ kPa were used for the stability analyses.

6.3.3.3 Permafrost

The permafrost soil found beneath the south corner of the proposed ROD is typically a silty sand with some gravel. For the purpose of these analyses, this material has been modelled to act as bedrock to force the critical failure surface to the contact of the thawed and frozen material.

6.3.4 Porewater Pressure Conditions

6.3.4.1 Natural Stratigraphy

The geotechnical drilling and testpitting at this site suggests that the existing active layer was relatively dry; however, free flowing water was noted at two locations. Therefore, it is possible that a shallow perched groundwater table may exist for short periods of the year.

A groundwater table at the original ground surface was used for the stability analyses.

6.3.4.2 Overburden

The potential for a phreatic surface developing within the dump was not considered due to the following:

- The overburden will be placed in a loose state which will allow for any free water within the dump to drain with the slow rate of thaw of the overburden; and
- If required, a diversion berm will be constructed upstream of the dump to control surface run-on water.

6.3.5 Stability Analyses

6.3.5.1 Scenario 1 – Static and Pseudostatic (Earthquake) Cases for Foundation Soils

The results of the minimum factors of safety calculated during the static and pseudostatic stability analyses for Scenario 1 are summarized in Table 5. Figure 4 presents the typical profile used for the analyses and the resulting critical slip surfaces.

TABLE 5: SUMMARY OF STABILITY ANALYSES RESULTS – SCENARIO 1		
Case		Minimum Factor of Safety of the ROD
1	Static, deep seated failure from the 900 m bench toe to the permafrost contact, failure of the 890 m bench	1.9
2	Static, relatively shallow failure through the 890 m bench to the permafrost contact, failure commences approx. 10 m offset from 890 m bench crest	1.3
3	Pseudostatic, deep seated failure from the 900 m bench toe to the permafrost contact, failure of the 890 m bench	1.6
4	Pseudostatic, relatively shallow failure through the 890 m bench to the permafrost contact, failure commences approx. 10 m offset from 890 m bench crest	1.1

6.3.5.2 Scenario 2 – Static and Pseudostatic (Earthquake) Cases for Overburden Only

The results of the minimum factors of safety calculated during the static and pseudostatic stability analyses for Scenario 2 are summarized in Table 6. Figure 5 presents the typical profile used for the analyses and the resulting critical slip surfaces.

TABLE 6: SUMMARY OF STABILITY ANALYSES RESULTS – SCENARIO 2		
Case		Minimum Factor of Safety of the ROD
5	Static, deep seated failure from the 900 m bench toe to the permafrost contact, failure of the 890 m bench	1.7
6	Static, relatively shallow seated failure through the 890 m bench to the slope toe, failure of approximately half of 890 m bench	1.3
7	Static, relatively shallow failure through the 890 m bench to the slope toe, failure commences approx. 6 m offset from 890 m bench crest	1.0
8	Pseudostatic, deep seated failure from the 900 m bench toe to the permafrost contact, failure of the 890 m bench	1.4
9	Pseudostatic, relatively shallow seated failure through the 890 m bench to the slope toe, failure of approximately half of 890 m bench	1.1

6.3.5.3 Scenario 1 and 2 – Discussion

With the exception of Case 7, these results indicate that the factor of safety for the overall dump stability based on the failure planes through the foundation soils and the overburden

material itself (Scenario 1 and 2, respectively) exceed the design criteria in both the static and pseudostatic condition.

For failure planes through the foundation soils (Scenario 1), Case 1 and 3 determined the factor of safety against a deep seated failure that would mobilize the entire 890 m bench material to be 1.9 for the static analyses and 1.6 for the pseudostatic analyses. Case 2 and 4 determined that the minimum 1.3 (static) and 1.1 (pseudostatic) factor of safety is achieved approximately 10 m upslope of the 890 m bench crest. These results indicate that slip surface failures with factors of safety less than 1.3 are present between the 890 m crest and this 10 m offset. The mobilization of this material will not affect the overall dump stability.

For failure planes through the overburden (Scenario 2), Case 5 and 8 determined the factor of safety against a deep seated failure that would mobilize the entire 890 m bench material to be 1.7 for static analyses and 1.4 for pseudostatic analyses. Case 6 and 9 determined that the minimum 1.3 (static) and 1.1 (pseudostatic) factor of safety is achieved approximately 15 m upslope of the 890 m bench crest.

Case 7 indicates that the overburden material approaches unity (static) at approximately 6 m upslope of the 890 m bench crest. This indicates that based on the soil parameters used in the analyses, as the overburden material thaws it will have shallow slip failures and sloughing over time until the crest of the slope reaches this offset. Should this be the case, a resulting sideslope of 1.9H:1V would be created from the original 1.5H:1V slope. These shallow slip failures and sloughing will occur with the 900 m bench sideslope as well. If both the 890 m and 900 m 1.5H:1V sideslope naturally flattens to approximately 1.9H:1V, the 890 m bench crest width will be reduced to roughly 10 m.

To achieve the design criteria factors of safety, 1.3 (static) and 1.1 (pseudostatic), for the 890 m and 900 m overburden sideslopes and limit the potential of shallow slip failures and sloughing, the sideslopes would require flattening from 1.5H:1V to 2.75H:1V. Given the design life of this dump and its intended use, the construction of 2.75H:1V sideslopes are not likely warranted. This is also based on the fact that the overall dump stability meets the design criteria and that buffer zones have been incorporated into its design to contain shallow surface failures.

EBA recommends an adaptive management approach of visually monitoring the dump's crests and toes as the overburden thaws and regularly after that could provide an effective means of noting potential areas of instability that could be remediated before failure.

Slope remediation of the sloughed material areas can be completed during the design life of the structure. This could entail flattening the sideslopes or constructing a waste rock shell in the area of instability, if necessary.

To initiate remediation of areas of instability that exceed the expected distance of slope movement, the intermediate buffer limit, as presented in Figure 5, has been incorporated into the design. Should any overburden material encroach on the intermediate buffer limit

the affected sideslope and bench must be repaired to the satisfaction of the Geotechnical Engineer.

6.3.5.4 Liquefaction Potential

Liquefaction potential of the overburden was assessed by comparing the Atterberg limit results to empirical relationships developed for assessment of liquefiable soil types as presented in Seed et al., 2003. Based on the limited available data, the unfrozen overburden material is considered potentially susceptible to cyclically induced liquefaction. This is a result of the fact that the water content on the unfrozen overburden is expected to be greater than 85 % of the material's liquid limit.

Additional information of the characteristics of the unfrozen overburden material placed within the dump is required to further assess potential for liquefaction. This information involves measuring the density of the inplace material (currently expected to be loose), determining its moisture content (whether the material drains once thawed), and completing index testing of the overburden (particle size distribution and Atterberg limits). This information would need to be collected in the summer of 2008 once the overburden material thaws.

Another approach to this potential issue is to assume that the overburden material will liquefy and design the dump accordingly. One option could involve constructing a waste rock shell or toe berm on the exterior slope of the dump to provide some additional lateral constraint against any instability within the overburden slope. This approach would result in the construction of a dump similar to the MWD. This construction method does not allow for easy reuse of the material; and this reuse is the main reason for the proposed ROD.

As indicated, the potential susceptibility of the overburden to liquefaction commences once the material thaws within the dump; therefore, placement of frozen overburden in the winter/spring of 2008 is not a concern. A summer 2008 characterization program is recommended to further assess whether or not the overburden material is liquefiable under the design earthquake. If this program is not completed, a waste rock shell or toe berm on the exterior slope of the dump must be constructed prior to May 2009.

7.0 SURFACE WATER MANAGEMENT

As previously indicated, the topographic information presented in Figure 2 indicates the presence of several small ephemeral creeks that converge to the middle of the upper valley roughly 30 m to the southwest of the proposed ROD footprint. These creeks collect the surface runoff water and route it down the mountain side. Three ephemeral creeks are shown within the proposed ROD footprint; one originates roughly 150 m northwest of the dump and runs through the upper portion of the dump while the other two originate within the MWD and run through the bottom portion. One of the creeks (farthest east) that

originate within the MWD has been disrupted by overburden fill placement within that dump.

Neither these creeks nor any other natural drainage courses were able to be seen during the 2008 site characterization due to the presence of snow cover.

Three site reconnaissance visits, one prior to spring freshet, one at spring freshet and other in the summer 2008, are required to evaluate whether an upstream diversion berm to limit the volume of run-on water through the dump is required. This berm would divert run-on water from the catchment area above the dump to the main ephemeral creek.

It is understood that surface water ponds along the IROD access road downstream of the proposed ROD site during the summer months. The ponded water should be monitored and removed should it encroach within 40 m of the design toe.

Localized erosion of the dump slope is expected and not a concern for the overall stability of the dump. Any areas of consistent localized erosion that causes significant material transport should be remediated.

8.0 CONSTRUCTION RECOMMENDATIONS

General construction recommendations for the ROD are summarized below.

- Subgrade preparation for the proposed ROD is not required. The organic mat should remain undisturbed.
- The particle size distribution and moisture content of the overburden to be stored within the ROD is highly variable; however, if overburden material of low moisture content and/or coarser grained is sourced during pit development it should be used within the exterior slope on the dump.
- Minto must monitor the overburden material to determine whether it should be stored within the ROD (non ice-rich) or IROD (ice-rich).
- A monitoring program must be incorporated to provide photographs and record (as built) information of the construction progress.
- Regular visual inspections by Minto should be completed to note potential areas of instability.
- The intermediate buffer limit, presented in Figure 5, must be monitored. Should sloughed material encroach upon this limit, slope remediation must be completed by either flattening the sideslopes or constructing a waste rock shell in the area of instability.
- Construction should be completed in freezing conditions to aid with trafficability. As indicated in Section 3.2.3, trafficability of the overburden material will be hampered as the soil thaws.

- Removal of the overburden material must be completed in a manor that provides safe working conditions.

9.0 PERFORMANCE MONITORING

Performance monitoring is an integral part of the design, construction, and operation of the ROD. This section describes a recommended minimum monitoring program for the construction and operation phases of the dump.

The results of the monitoring program can be the basis of an adaptive management process that continually reviews the operation of the dump.

A monitoring program must be incorporated to provide photographs and record (as built) information of the construction progress.

9.1 VISUAL MONITORING

It is understood that the proposed dump will be constructed in the winter of 2008 when the overburden waste soils are frozen. Field observations and performance monitoring should be completed in the spring/summer of 2008 to evaluate the dump performance once the materials thaw. This monitoring should continue on a monthly basis and include the following:

- Inspection of the external slopes for any signs of distress;
- Inspection of the crest of the dump for any signs of transverse cracking; and
- Inspection of the dump toe for any signs of seepage from the base.

EBA recommends visual monitoring of the dump's crests and toes as the overburden thaws and regularly after that could provide an effective means of noting potential areas of instability that could be remediated before failure.

The intermediate buffer limit, as presented in Figure 5, must be monitored on a regular basis. Should any overburden material encroach on the intermediate buffer limit the effected sideslope and bench must be repaired to the satisfaction of the Geotechnical Engineer.

Any ponded water along the IROD access road should be monitored and removed if it comes within 40 m of the ROD design toe.

9.2 OVERBURDEN MATERIAL MONITORING

Monitoring of the overburden waste soils should be completed during open pit development to ensure only non ice-rich overburden waste is placed in the proposed Reclamation Overburden Dump. Ice-rich waste should be placed in the Ice-Rich Overburden Dump.

9.3 DEFORMATION SURVEYS

The breaklines (crest and toes) of the ROD should be surveyed at the completion of each main construction phase to determine the record (as built) geometry and to establish a basis for determining future deformations. These same breaklines should be resurveyed and reviewed in June and September of each year, or periodically at the discretion of the Geotechnical Engineer, to monitor deformation movements.

10.0 ANNUAL INSPECTION

It is recommended that an annual site inspection be conducted by the Geotechnical Engineer during the operational period to document the performance of the ROD. The specific tasks of these visits include:

- Inspection of the external slopes for any signs of distress;
- Inspection of the crest of the dump for any signs of transverse cracking;
- Inspection of the dump for any signs of seepage from the base;
- Review of survey data to confirm conformance with design assumptions; and
- Preparation of an annual report that summarizes the data and provides recommendations for maintenance or modification to the dump.

11.0 LIMITATIONS

Geological conditions are innately variable and are seldom spatially uniform. At the time of this report, information on stratigraphy at the project was at identified borehole locations from past studies. In order to develop recommendations from this information, it is necessary to make some assumptions concerning conditions other than at the specifically tested locations. Adequate monitoring should be provided during construction to check that these assumptions are reasonable.

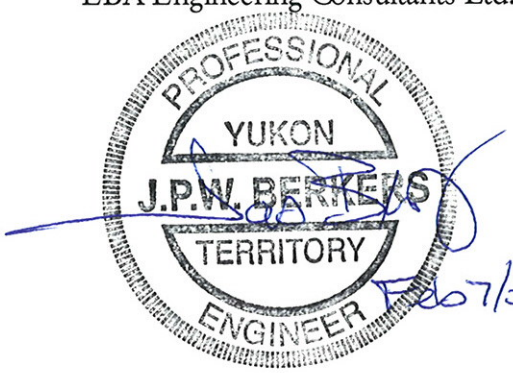
The recommendations prepared and presented in this report are based on the geotechnical data gathered by EBA from previous reports and the current laboratory testing and site characterization program The provided data, in the form of geotechnical boreholes and associated laboratory index property test results, has been supplemented by EBA's direct observations of the site.

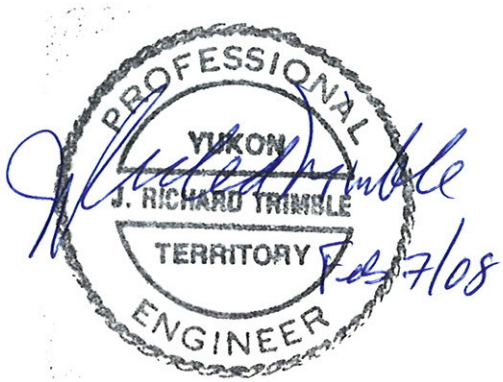
This report and the recommendations contained in it are intended for the sole use of Minto Explorations Ltd. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report if the information presented in this report is used or relied upon by any party other than that specified above for the proposed ROD. Any such unauthorized use of this report is at the sole risk of the user. Additional information regarding the use of this report is presented in the attached General Conditions, which form a part of this report.

12.0 CLOSURE

EBA trusts that this report satisfies your requirements. Please do not hesitate to contact the undersigned should you have any questions or comments.

Respectfully Submitted,
EBA Engineering Consultants Ltd.





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REFERENCES

EBA, 1998a. "Geotechnical Evaluation, Proposed Main Waste Dump". Minto Explorations Ltd. Minto Mine, Yukon. (EBA Project No. 0201-11509, dated April 1998).

EBA, 1998b. "1997 Geotechnical Program and Construction Inspection Reports". Minto Explorations Ltd. Minto Mine, Yukon. (EBA Project No. 0201-11509, dated February 1998).

Seed et al., 2003. "Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework". College of Engineering. University of California. Berkeley. Report No. EERC 2003-06.

EBA, 2006a. "Geotechnical Design, Ice-Rich Overburden Dump". Minto Explorations Ltd. Minto Mine, Yukon. (EBA Project No. 1200173, dated January 2006).

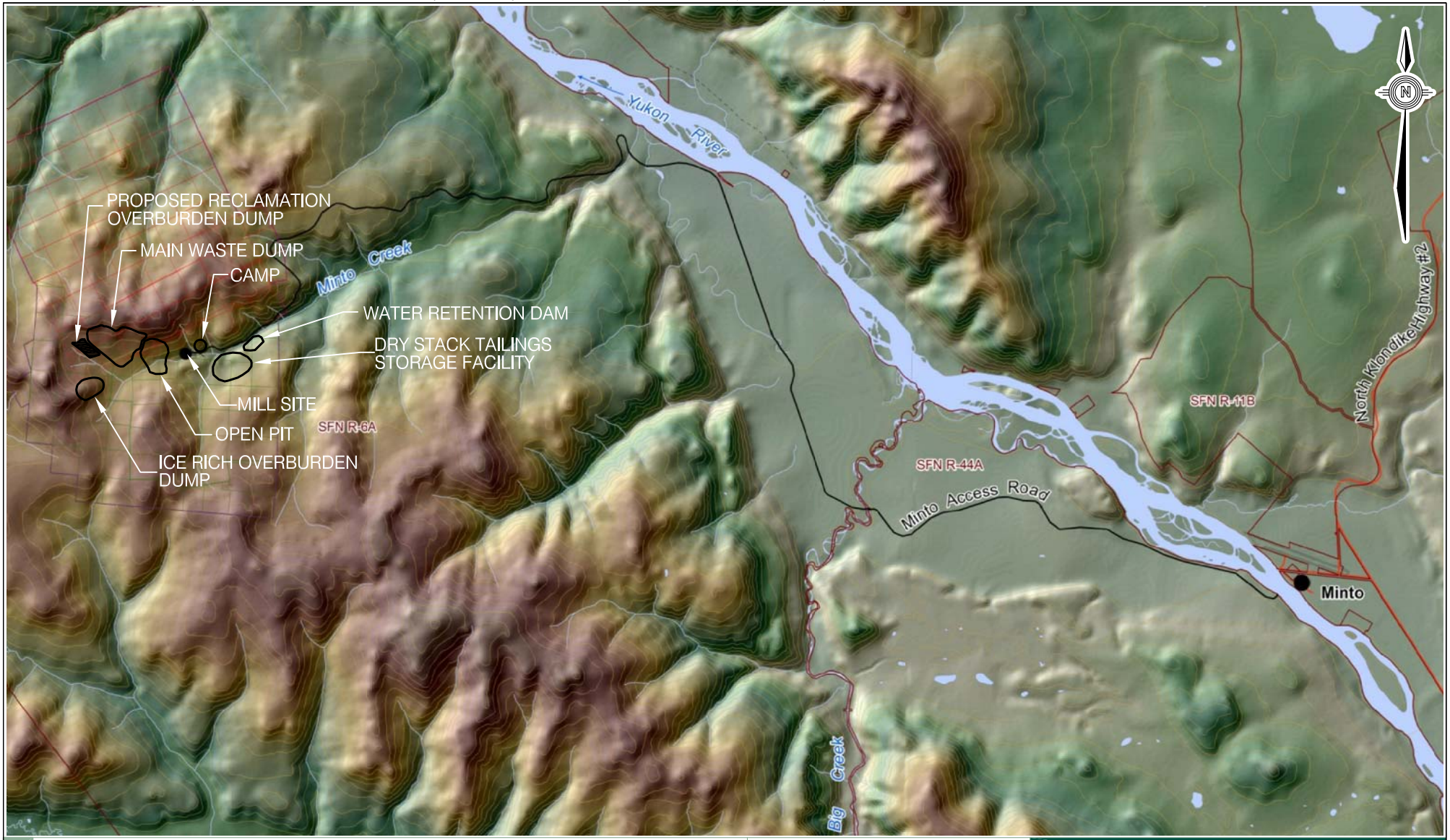
EBA, 2006b. "Addendum to Geotechnical (Open Pit) Feasibility Study". Minto Explorations Ltd. Minto Mine, Yukon. (EBA Project No. 1200173, dated May 25, 2006).

EMR, 2007. "Temporary Approval for Reclamation Overburden Dump, Minto Mine". Minto Explorations Ltd. Minto Mine, Yukon. (QML-0001, dated December 20, 2007).

Minto, 2007. "Re: QML-0001, Notification of need to start Reclamation Material Stockpile (RMS)". Government Yukon – Energy, Mines and Resources. Minto Mine, Yukon. (QML-0001, dated December 12, 2007).

EBA, 2007. "Proposed Reclamation Overburden Dump, Minto Mine, YT". Minto Explorations Ltd. Minto Mine, Yukon. (EBA Project No. W14101068.004, dated December 13, 2007).

FIGURES



1000m 0 1000m 2000m 3000m 4000m

BAR SCALE

CLIENT

Minto Explorations Ltd.

Proposed Reclamation Overburden Dump
Minto Mine, YT

Location Plan

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.004	KJT	JSB/JRT	0

OFFICE	DATE
EBA-WHSE	February 6, 2008

Figure 1

ALIGNMENT 2

ALIGNMENT 1

PROPOSED RECLAMATION OVERBURDEN DUMP

ORIGINAL RECLAMATION OVERBURDEN DUMP LAYOUT PROVIDED BY MINTO

900 m BENCH

890 m BENCH

97-G21

97-G20

97-G22

97-G23

97-G19

97-G18

97-G17

08-ROD-TP03

08-ROD-TP01

08-ROD-TP02

MAIN WASTE DUMP

DESIGN CREST

DESIGN TOE

97-TP2

97-TP1

AREA 1 OPEN PIT

PELLY LAYDOWN

08-ROD-0B01

08-ROD-0B02

AREA 1 PHASE 2

1200173-045B (P-GT-08)

1200173-045 (P-GT-08)

1200173-044 P-GT-06

1200173-042 P-GT-07

1200173-043 P-GT-05

ULTIMATE AREA 1 OPEN PIT

ICE RICH OVERBURDEN DUMP

N

LEGEND

■	08-ROD-TP01	2008 SITE CHARACTERIZATION PROGRAM
⊕	97-G22	1997 SITE CHARACTERIZATION PROGRAM
⊞	97-TP01	1997 SITE CHARACTERIZATION PROGRAM
▲	08-ROD-0B01	2008 OVERBURDEN CHARACTERIZATION PROGRAM
◉	1200173-044	2005 OVERBURDEN CHARACTERIZATION PROGRAM

0 100 250 500 metres

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Proposed Reclamation Overburden Dump
Minto Mine, YT

Plan View

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.004	JMP	JPB	0
OFFICE: EBA-WHSE	DATE: February 6, 2008		

Figure 2

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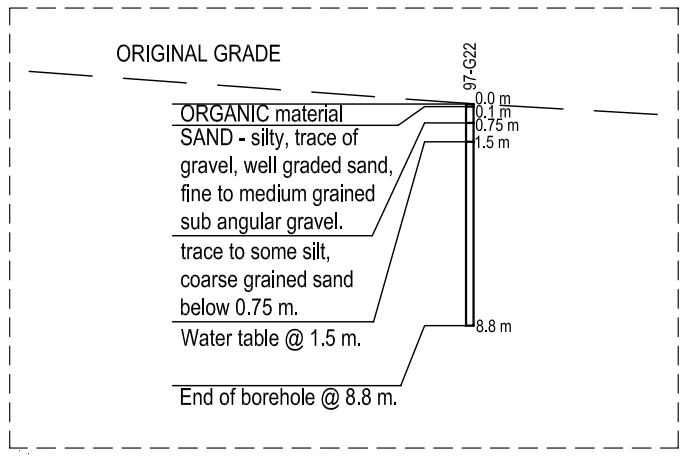

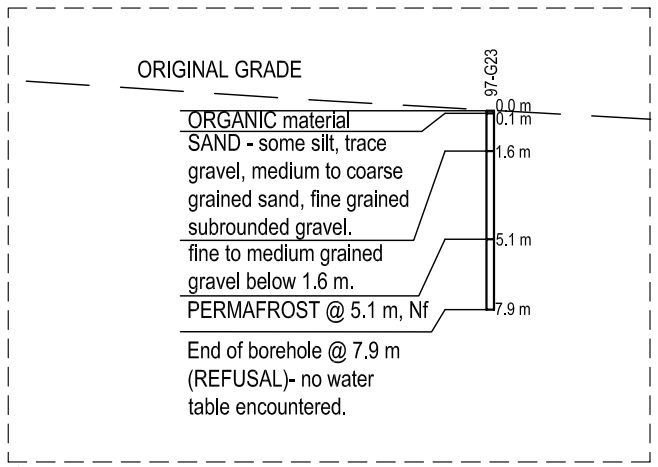

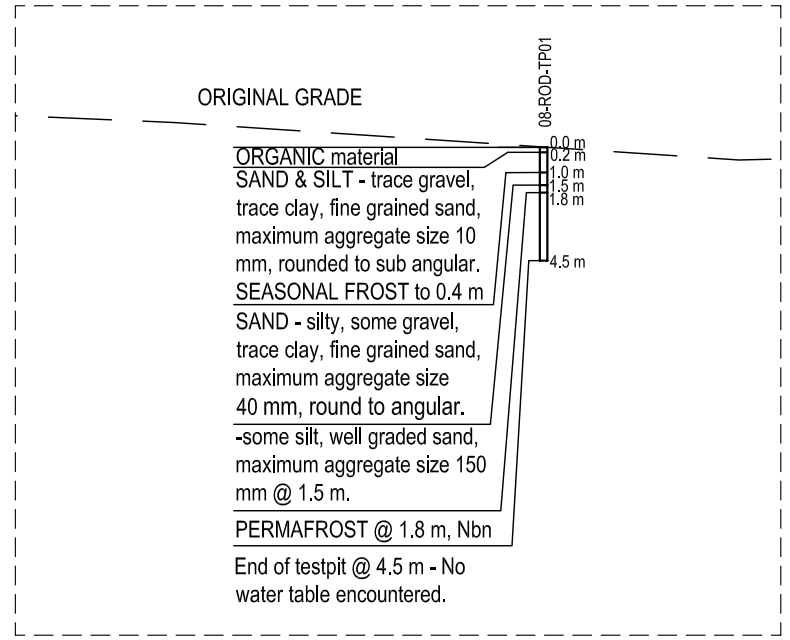

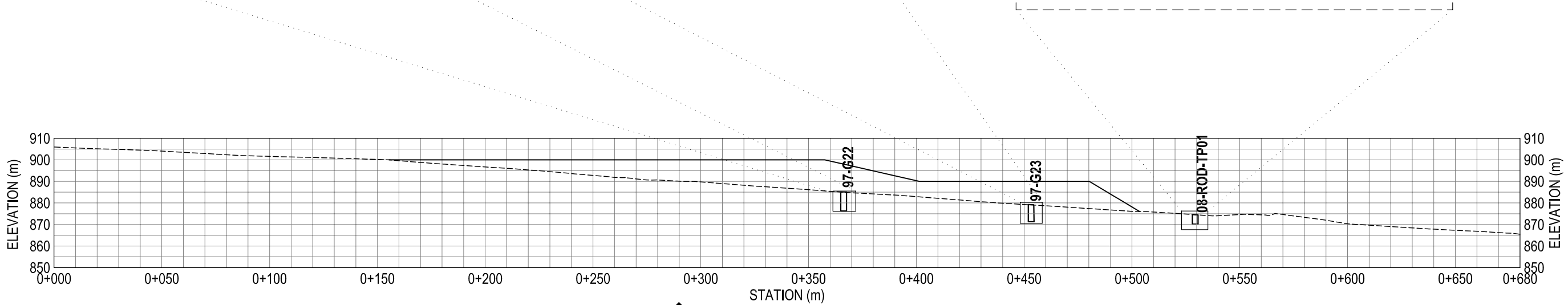

1
2 Alignment 1 Profile

SCALE 1:2,000

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Proposed Reclamation Overburden Dump
Minto Mine, YT

Alignment 1 Profile

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.004	KJT	JPB	0

OFFICE: EBA-WHSE

DATE: February 6, 2008

Figure 3

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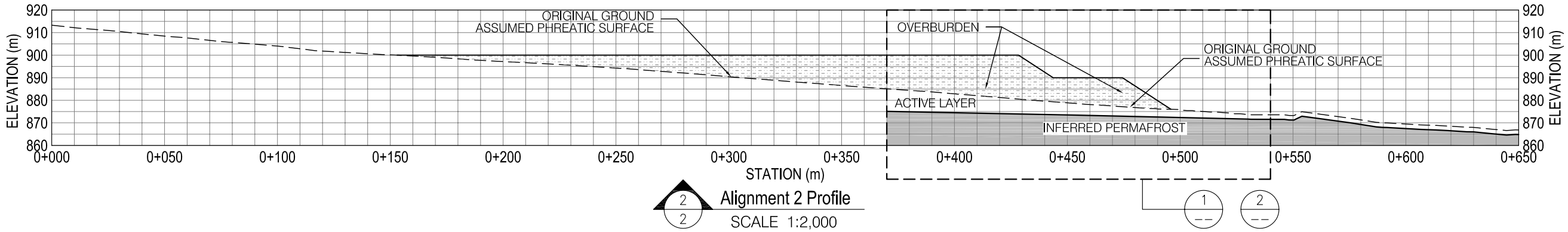


2 / 2 Alignment 2 Profile

SCALE 1:2,000

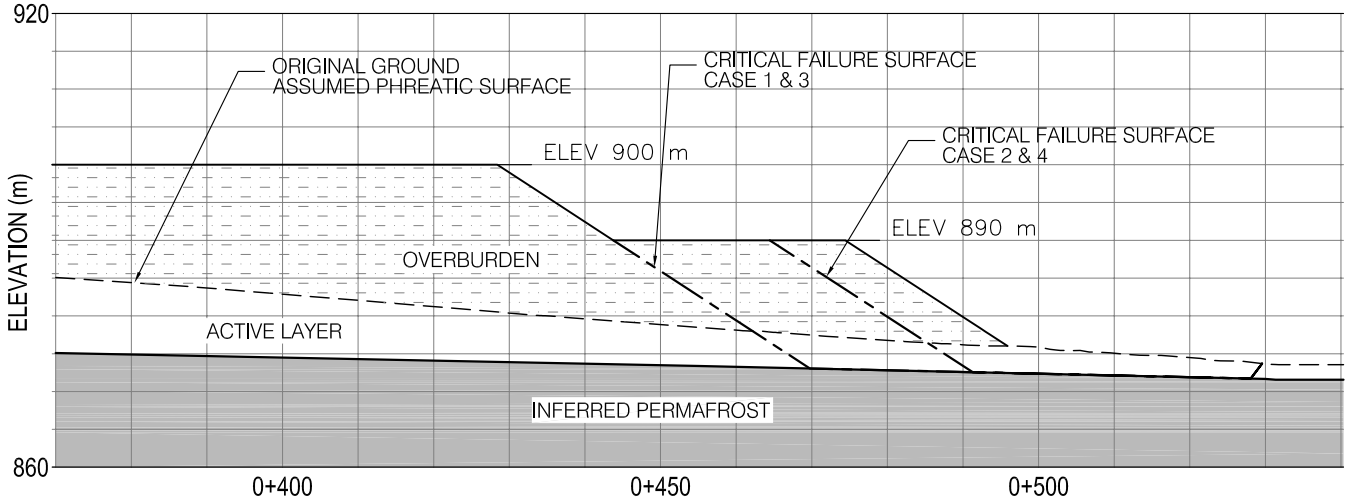
SOIL PARAMETERS			
MATERIAL	BULK DENSITY (kN/m3)	FRICTION ANGLE (DEGREES)	COHESION (kPa)
OVERBURDEN	18.0	25	0
ACTIVE LAYER	18.0	28	0
PERMAFROST	--	--	--

SCENARIO 1

CASE	STABILITY ANALYSIS	MINIMUM FACTOR OF SAFETY
1	STATIC	1.9
2	STATIC	1.3
3	EARTHQUAKE (PSEUDOSTATIC)	1.6
4	EARTHQUAKE (PSEUDOSTATIC)	1.1

SCENARIO 2

CASE	STABILITY ANALYSIS	MINIMUM FACTOR OF SAFETY
5	STATIC	1.7
6	STATIC	1.3
7	STATIC	1.0
8	EARTHQUAKE (PSEUDOSTATIC)	1.4
9	EARTHQUAKE (PSEUDOSTATIC)	1.1



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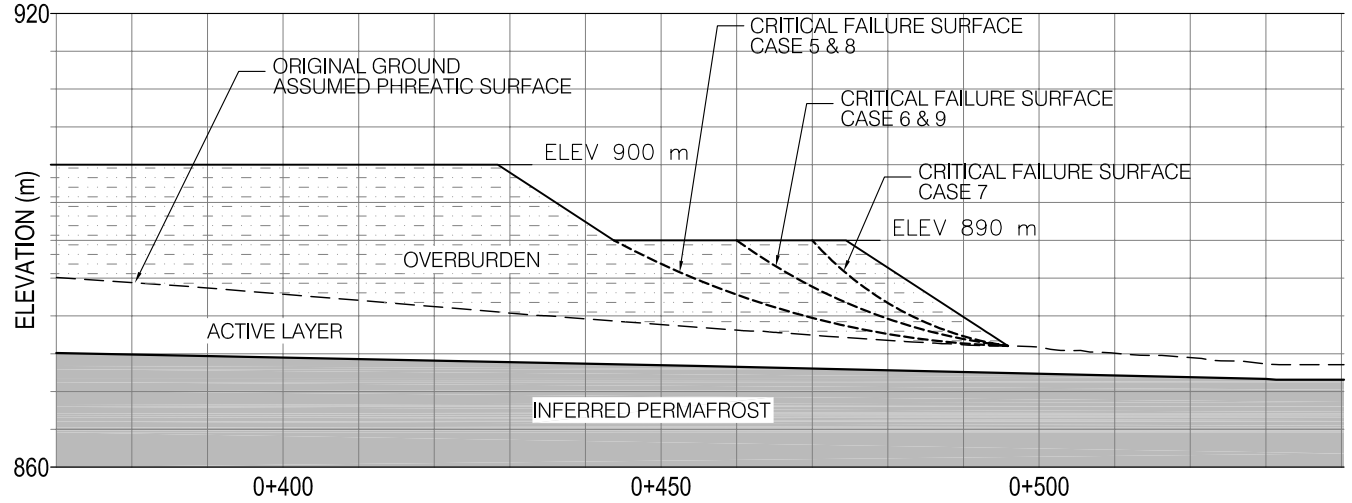

2 / -- SCENARIO 2 DETAIL

SCALE 1:1,000

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Proposed Reclamation Overburden Dump
Minto Mine, YT

Stability Analyses
Scenarios 1 & 2

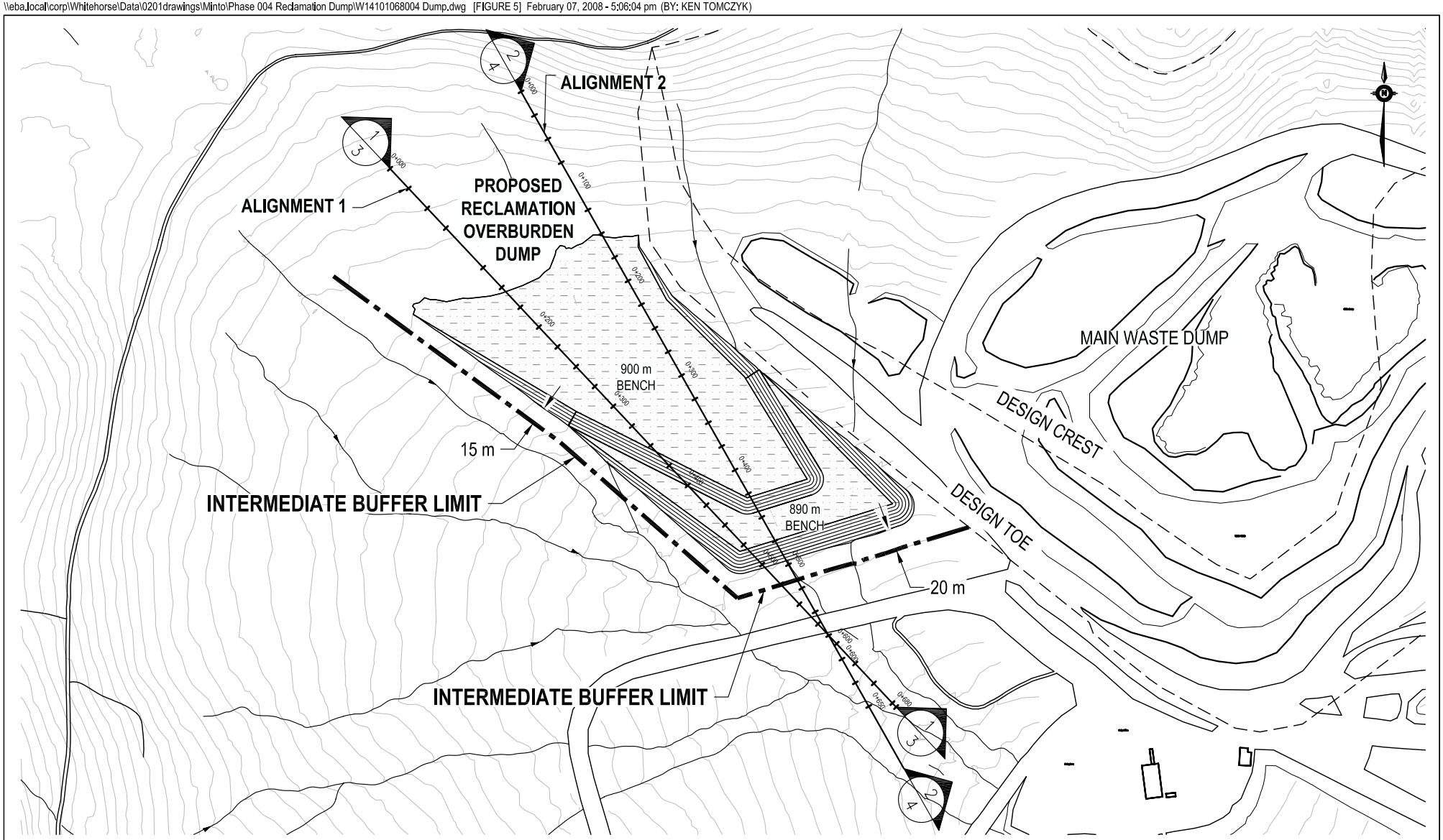
EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.004	KJT	JPB	0

OFFICE: EBA-WHSE

DATE: February 6, 2008

Figure 4



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Proposed Reclamation Overburden Dump
Minto Mine, YT

Plan View
Intermediate Buffer Limit

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.004 W14101068004 Dump.dwg	KJT	JPB	0
OFFICE: EBA-WHSE	DATE: February 7, 2008		

Figure 5

APPENDIX

APPENDIX A GENERAL CONDITIONS

GEOTECHNICAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

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2.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

3.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

4.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

5.0 SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgmental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

6.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

7.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

8.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

9.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

10.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

11.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

12.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the client's expense upon written request, otherwise samples will be discarded.

13.0 STANDARD OF CARE

Services performed by EBA for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

14.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

15.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

APPENDIX

APPENDIX B 2005 OVERBURDEN CHARACTERIZATION PROGRAM - BOREHOLE LOGS

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-042
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944772.3 E384660.54	ELEVATION: 819.64 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ▤ NQ ▥ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0			ORGANIC ROOT MAT	
1.0			SILT – some sand, fine grained, dark brown	
2.0				
3.0			– becomes sand, silty around 3.0 m	
4.0			– sand is fine to medium grained	Vx, trace 5–10%
5.0			– trace of fine to medium grained gravel below 3.7 m	
6.0			– silt, trace sand from 4.8 m to 5.2 m	
7.0			– SAND is well graded below 5.2 m	
8.0			– becomes gravelly, fine to medium grained around 5.2 m	
9.0			– colour changes to medium grey	
10.0			– some silt to silty	
11.0			– trace of fine angular gravel from 6.0 to 6.4 m	Vr, Vs 10–15% 75–100 mm apart 2–5 mm thick
12.0			– coarser gravels encountered from 8.5 m to 13.7 m	
13.0			– sand becomes coarser and angular around 10.0 m	
14.0			– cobble present from 14.3 m – 15.2 m	
15.0				Vs, 10–15%
16.0				
17.0				
18.0				
19.0				
20.0				Ice lens 100 mm thick, spaced 100–150 mm
21.0			13.7 m depth through to at least 24.0 m	
22.0			– silt content increases, some sand to sandy, fine grained around 20.1 m	
23.0				
24.0				
25.0			– gravel from 24.7 – 26.2 m has caused drilling to wash majority of other solids and possible ice out of the core	
26.0				Vs, trace <5%
27.0			– poor recovery in this section but may be zone containing mainly gravels	Vs, 10–15% 50–100 mm apart 2–5 mm thick
28.0			– becomes silt, some sand, some clay, trace of gravel	
29.0			– cobble encountered from 27.5 m – 32.0 m from 100–300 mm in size	
30.0				
31.0				
32.0				
33.0				
34.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2689.0, 2687.0, 2685.0, 2683.0, 2681.0, 2679.0, 2677.0, 2675.0, 2673.0, 2671.0, 2669.0, 2667.0, 2665.0, 2663.0, 2661.0, 2659.0, 2657.0, 2655.0, 2653.0, 2651.0, 2649.0, 2647.0, 2645.0, 2643.0, 2641.0, 2639.0, 2637.0, 2635.0, 2633.0, 2631.0, 2629.0, 2627.0, 2625.0, 2623.0, 2621.0, 2619.0, 2617.0, 2615.0, 2613.0, 2611.0, 2609.0, 2607.0, 2605.0, 2603.0, 2601.0, 2599.0, 2597.0, 2595.0, 2593.0, 2591.0, 2589.0, 2587.0, 2585.0, 2583.0, 2581.0, 2579.0

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LOGGED BY: JSB
REVIEWED BY: JRT

COMPLETION DEPTH: 56.39 m
COMPLETE:

06/01/16 04:02PM (YUKONP65)

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-042
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944772.3 E384660.54	ELEVATION: 819.64 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ▤ NQ ▥ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
34.0				
35.0				
36.0				
37.0			– trace to some gravel from 36.6 m to 37.8 m	
38.0			– some gravel below 36.6 m	
39.0				
40.0			– sand becomes fine grained from 39.6 to 41.1 m	Vs, 5–10%, Vx,< 5%
41.0			– silty, trace of fine gravel, trace of clay between 39.6 to 41.1 m	
42.0			– colour becomes dark grey	
43.0			– becomes silt, clayey, trace fo sand around 43.0 m	Vs < 2 mm thick 100–200 mm apart
44.0			– colour changes to medium grey	
45.0			– trace of fine to medium grained gravel, intermittently spaced at 200 to 300 mm below 44.5 m	
46.0				
47.0				
48.0				
49.0				
50.0				
51.0			– becomes some gravel, fine to medium grained below 50.6 m	
52.0			BEDROCK (GRANITE) – poor quality, high fractures and oxidizing	
53.0				
54.0				
55.0				
56.0				
57.0			END OF BOREHOLE 56.7 m	
58.0			– no water encountered at time of drilling	
59.0				
60.0				
61.0				
62.0				
63.0				
64.0				
65.0				
66.0				
67.0				
68.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2577.0, 2575.0, 2573.0, 2571.0, 2569.0, 2567.0, 2565.0, 2563.0, 2561.0, 2559.0, 2557.0, 2555.0, 2553.0, 2551.0, 2549.0, 2547.0, 2545.0, 2543.0, 2541.0, 2539.0, 2537.0, 2535.0, 2533.0, 2531.0, 2529.0, 2527.0, 2525.0, 2523.0, 2521.0, 2519.0, 2517.0, 2515.0, 2513.0, 2511.0, 2509.0, 2507.0, 2505.0, 2503.0, 2501.0, 2499.0, 2497.0, 2495.0, 2493.0, 2491.0, 2489.0, 2487.0, 2485.0, 2483.0, 2481.0, 2479.0, 2477.0, 2475.0, 2473.0, 2471.0, 2469.0, 2467.0

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LOGGED BY: JSB
REVIEWED BY: JRT

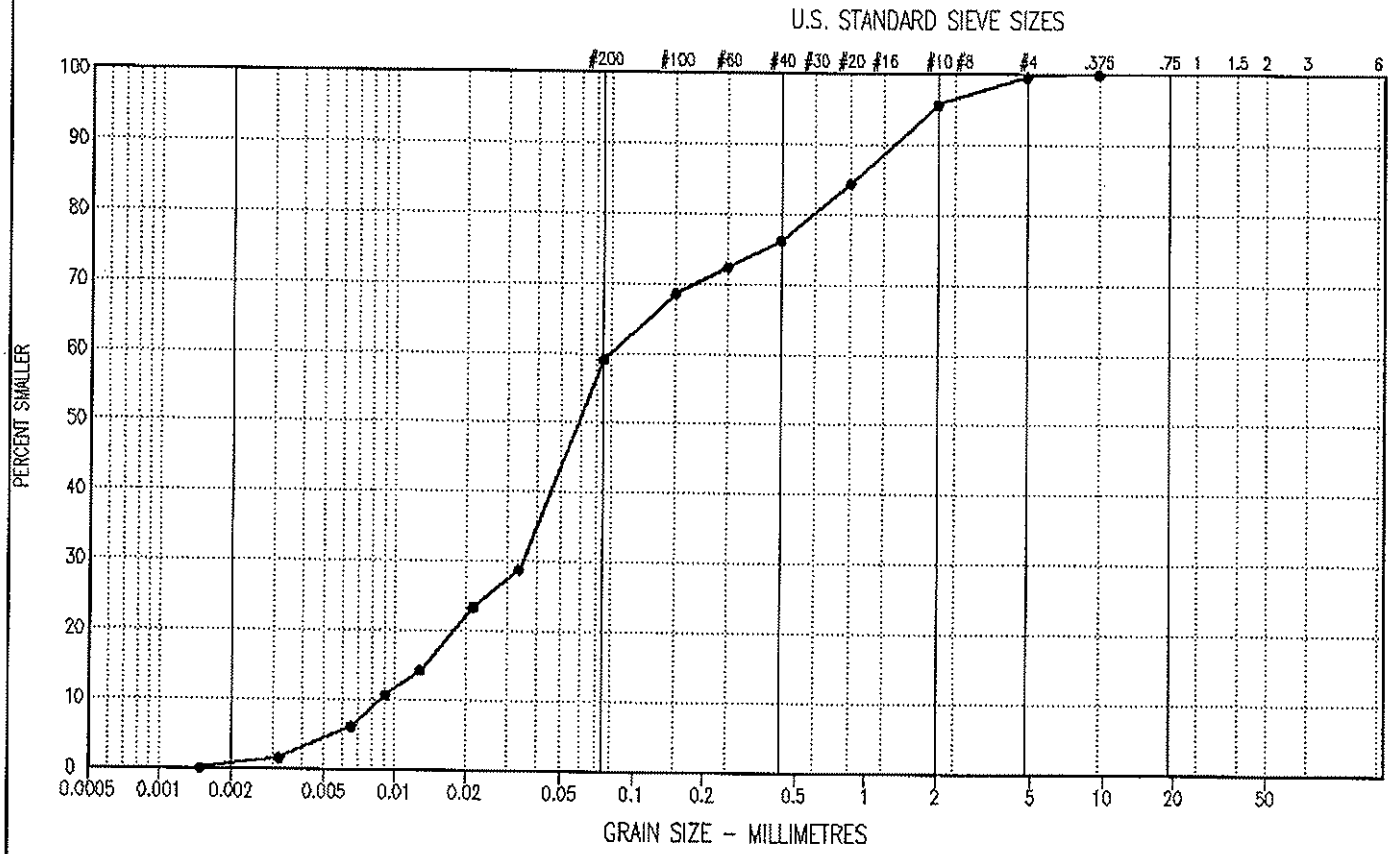
COMPLETION DEPTH: 56.39 m
COMPLETE:

05/01/16 04:02PM [YUKONP65]

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-042	5.00 – 5.20	0.0	59	40	1	9.4	1.7	

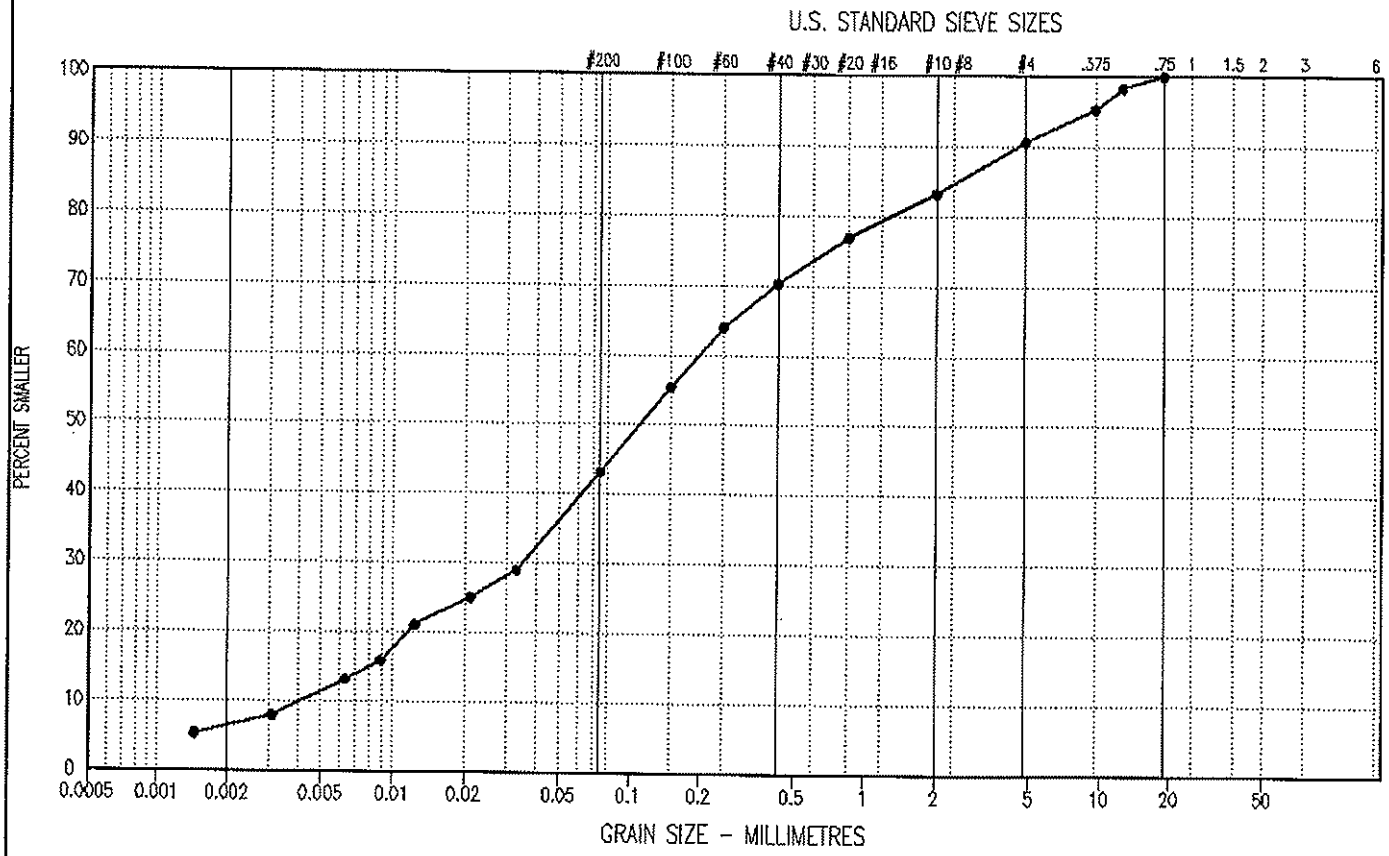
Project: 0201-1200173 Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-042	15.00 – 15.20	6.0	37	47	10	46.1	1.5	SM

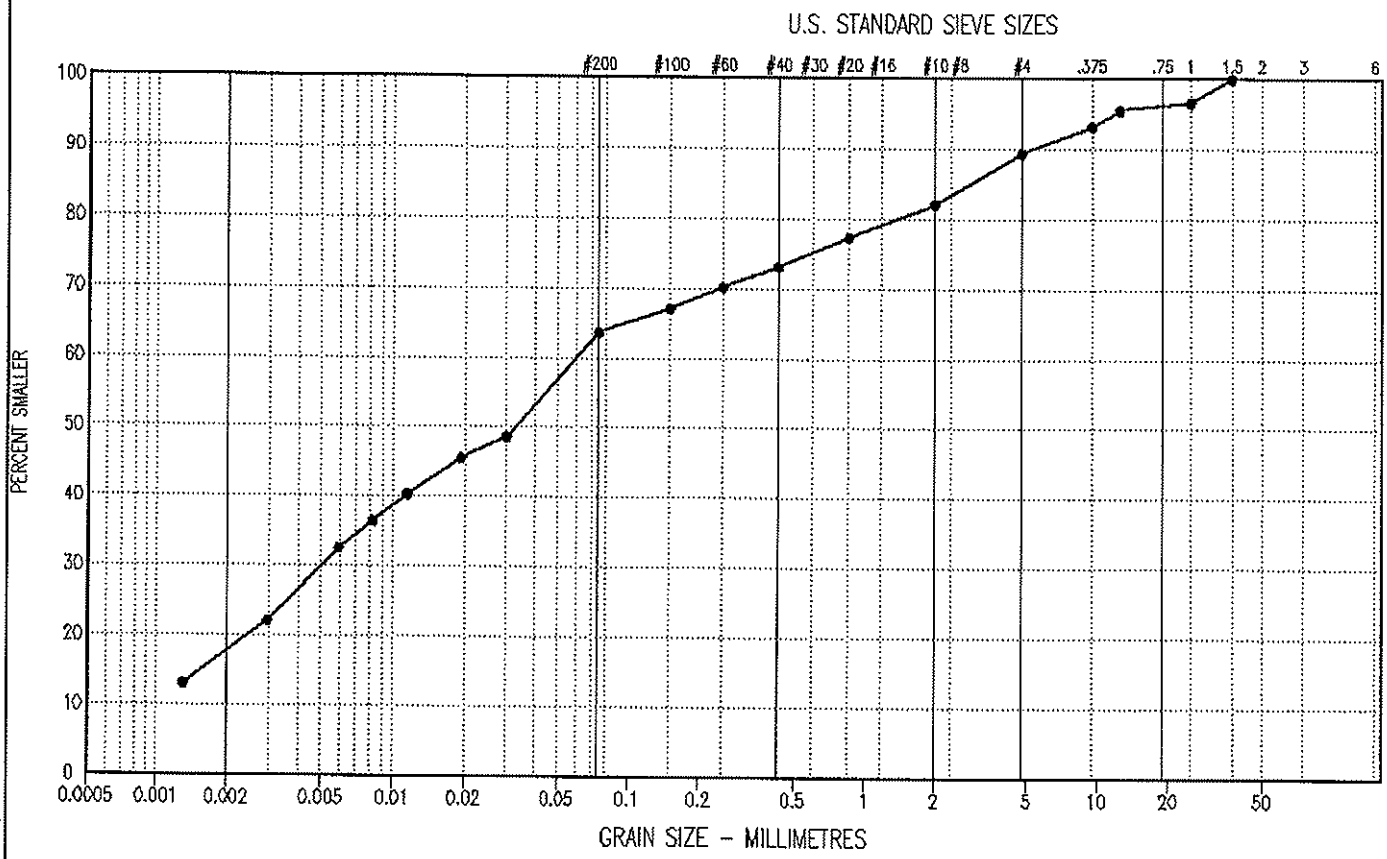
Project: 0201-1200173 Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-042	24.50 – 24.70	16.0	47	26	11	–	–	

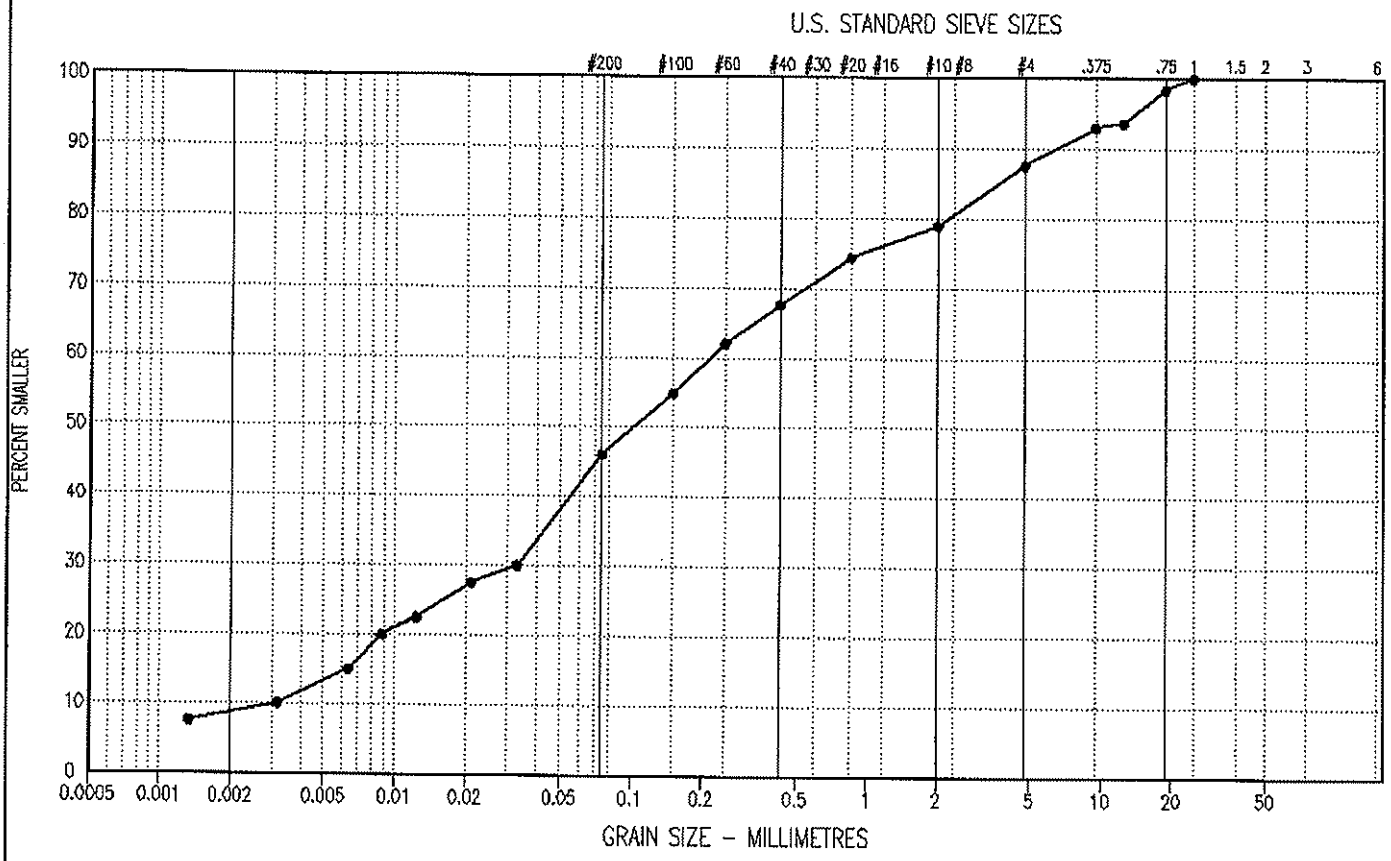
Project: 0201-1200173 Date Tested: 05/12/08 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-042	35.40 – 35.55	8.0	38	41	13	69.7	1.6	SM

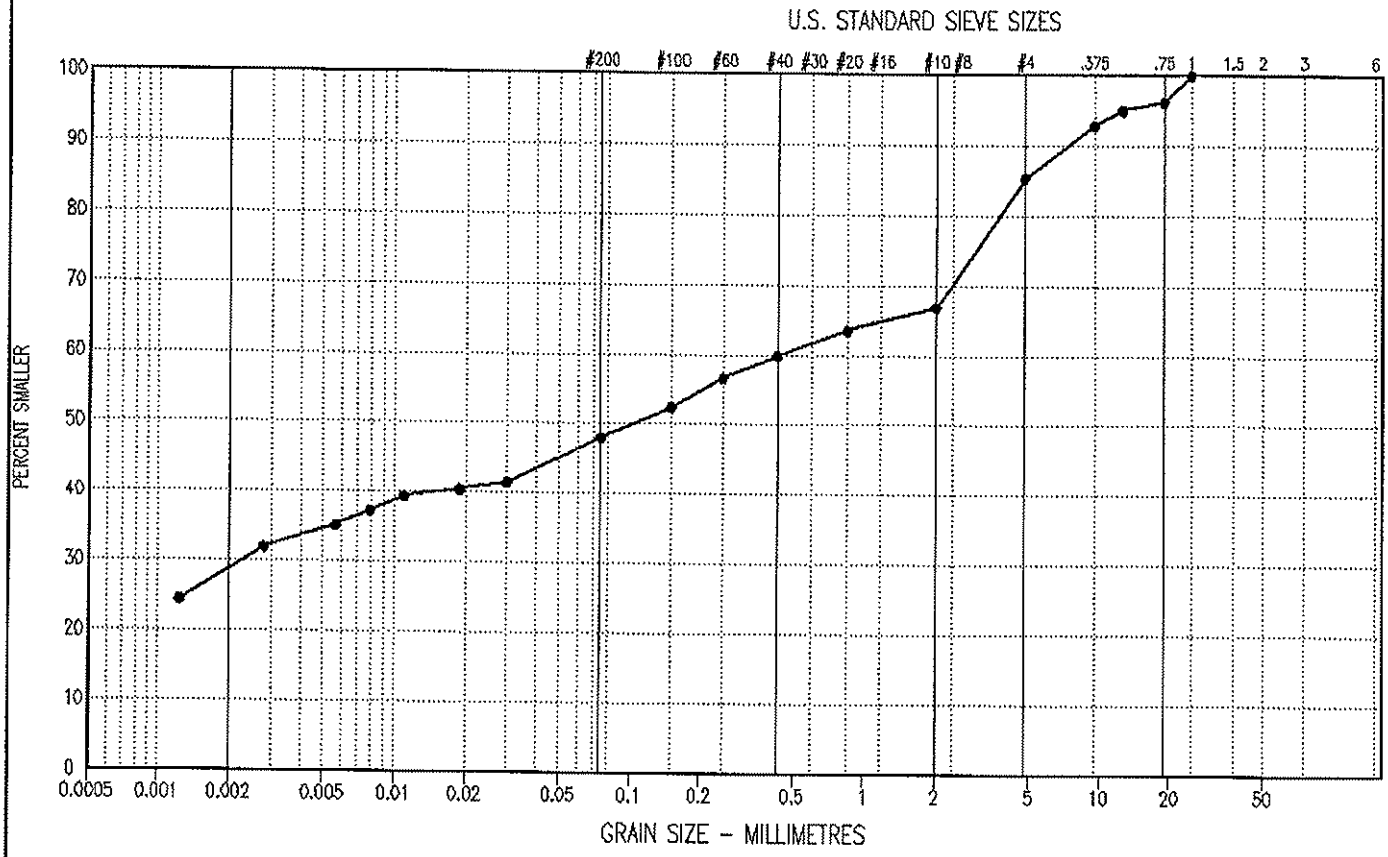
Project: 0201-1200173 Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-042	50.00 – 50.30	28.0	19	38	15	–	–	

Project: 0201-1200173 Date Tested: 05/12/08 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-043
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944780.92 E384730.74	ELEVATION: 818.8 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ▭ NQ ▯ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0			SILT – sandy, fine grained, dark brown	
1.0				Vx, trace < 5% well bonded below 1.5 m Nbe, well bonded
2.0				
3.0			SAND – some silt, trace of fine to medium grained gravel	
4.0			– colour changes to medium brown around 3.0 m	
5.0			– sand becomes fine to medium grained below 3.5 m	
6.0			– silty below 3.5 m	
7.0			– trace of fine gravel around 3.5 m	
8.0			– cobbles and coarse gravel, encountered around 6.1 m to 6.5 m	Vx 10–15% Vs, 20–25% 5–100 mm thick, spaced 5–100 mm
9.0			– medium grey colour	
10.0			– gravel content increases, becomes coarser around 8.8 m	
11.0				
12.0				
13.0				
14.0				
15.0				Vx, 10–15% med. bonded
16.0				
17.0				
18.0				
19.0				
20.0			SILT – some clay, some sand, fine grained, medium grey	Vx, 5–10% Vs, 15–20% 2–5 mm thick spaced 150 – 300 mm
21.0			– trace to some fine to medium gravel below 20.1 m	
22.0				
23.0				
24.0				
25.0			– becomes clayey around 25.0 m	Vx, trace 5–10%
26.0			– trace of sand around 25.0 m	
27.0				becomes well bonded
28.0				
29.0				
30.0			– trace of fine to medium grained gravel from 29.3 to 32.3 m	
31.0				
32.0				

▲GROUND TEMPERATURE (C)▲ –2 –1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

●PERCENT CLAY● 20 40 60 80

■PERCENT SILT OR FINES■ 20 40 60 80

▲PERCENT SAND▲ 20 40 60 80

◆PERCENT GRAVEL◆ 20 40 60 80

ELEVATION(ft): 2686.0, 2684.0, 2682.0, 2680.0, 2678.0, 2676.0, 2674.0, 2672.0, 2670.0, 2668.0, 2666.0, 2664.0, 2662.0, 2660.0, 2658.0, 2656.0, 2654.0, 2652.0, 2650.0, 2648.0, 2646.0, 2644.0, 2642.0, 2640.0, 2638.0, 2636.0, 2634.0, 2632.0, 2630.0, 2628.0, 2626.0, 2624.0, 2622.0, 2620.0, 2618.0, 2616.0, 2614.0, 2612.0, 2610.0, 2608.0, 2606.0, 2604.0, 2602.0, 2600.0, 2598.0, 2596.0, 2594.0, 2592.0, 2590.0, 2588.0, 2586.0, 2584.0, 2582.0

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LOGGED BY: JSB
REVIEWED BY: JRT

COMPLETION DEPTH: 61 m
COMPLETE:

06/01/17 04:25PM (YUKON84)

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-043
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944780.92 E384730.74	ELEVATION: 818.8 m

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | HQ | NQ | CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
32.0			– some gravel encountered from 33.2 m to 37.2 m – may have been ice rich with fine grained soils that would have been washed during drilling – cobbles present below 33.2 m – becomes sandy below 33.8 m – some clay present below 33.8 m – trace of fine gravel below 33.8 m	Vs, trace spaced 200 – 600 mm 2–75 mm thick
44.0			SAND – silty, some clay, some gravel, well graded sand, fine to medium grained gravel, dark grey	Vx, trace Vs, 10–15% 2–5 mm thick spaced 200 – 300 mm Nbe, well bonded
53.0			SILT – clayey, trace of sand, fine grained, medium grey	Nbn
57.0			BEDROCK (GRANITE) – poor quality, fractured, oxidized, rust coloured, coarse sand, trace to some silt infill – becomes competent with depth around 59.4 m	
61.0			END OF BOREHOLE 61.0 m	
64.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2580.0 2578.0 2576.0 2574.0 2572.0 2570.0 2568.0 2566.0 2564.0 2562.0 2560.0 2558.0 2556.0 2554.0 2552.0 2550.0 2548.0 2546.0 2544.0 2542.0 2540.0 2538.0 2536.0 2534.0 2532.0 2530.0 2528.0 2526.0 2524.0 2522.0 2520.0 2518.0 2516.0 2514.0 2512.0 2510.0 2508.0 2506.0 2504.0 2502.0 2500.0 2498.0 2496.0 2494.0 2492.0 2490.0 2488.0 2486.0 2484.0 2482.0 2480.0 2478.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

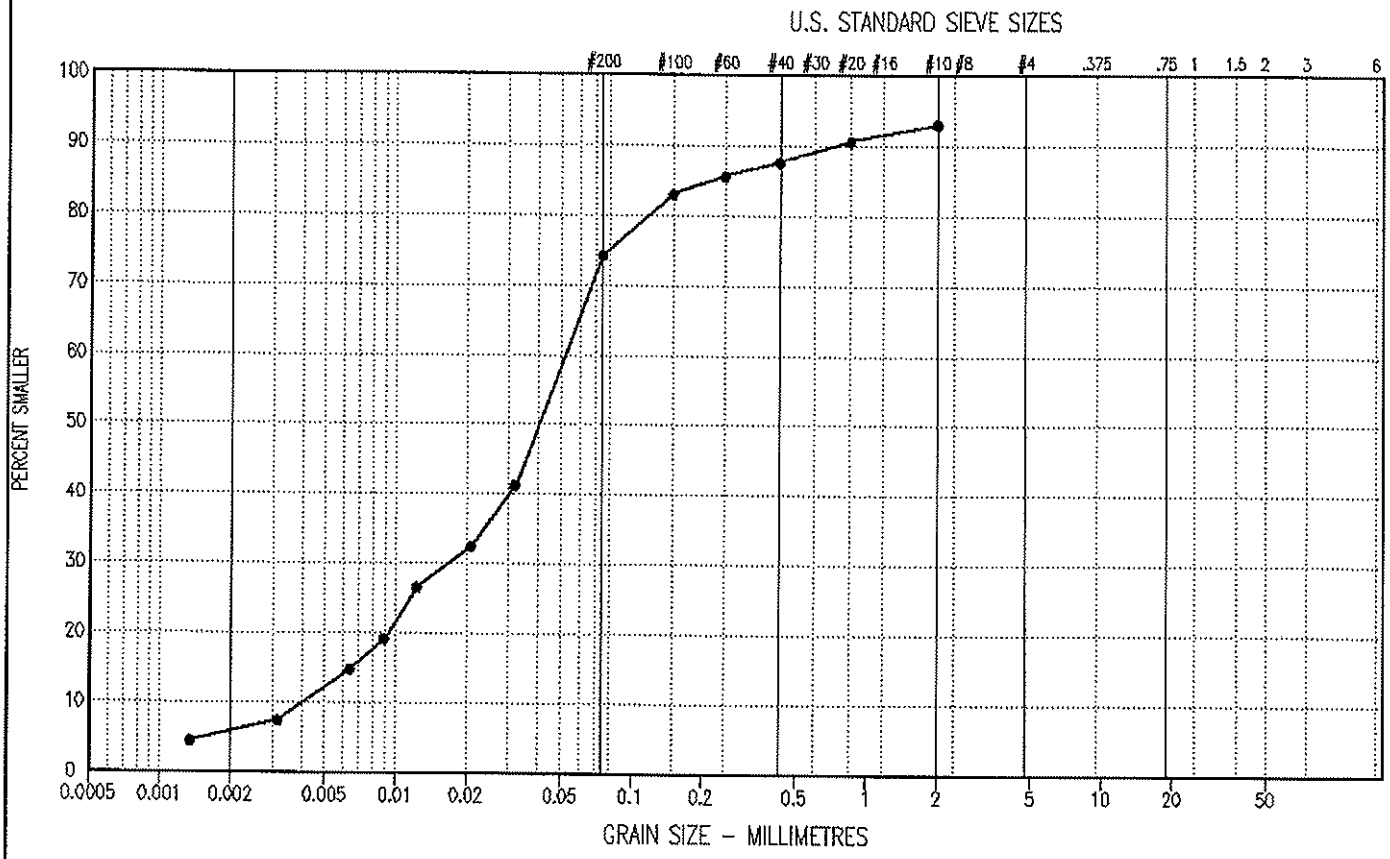
LOGGED BY: JSB | COMPLETION DEPTH: 61 m
REVIEWED BY: JRT | COMPLETE:

06/01/17 04:25PM [YUKONP84]

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-043	7.70 – 7.90	5.0	69	26	0	13.1	1.2	

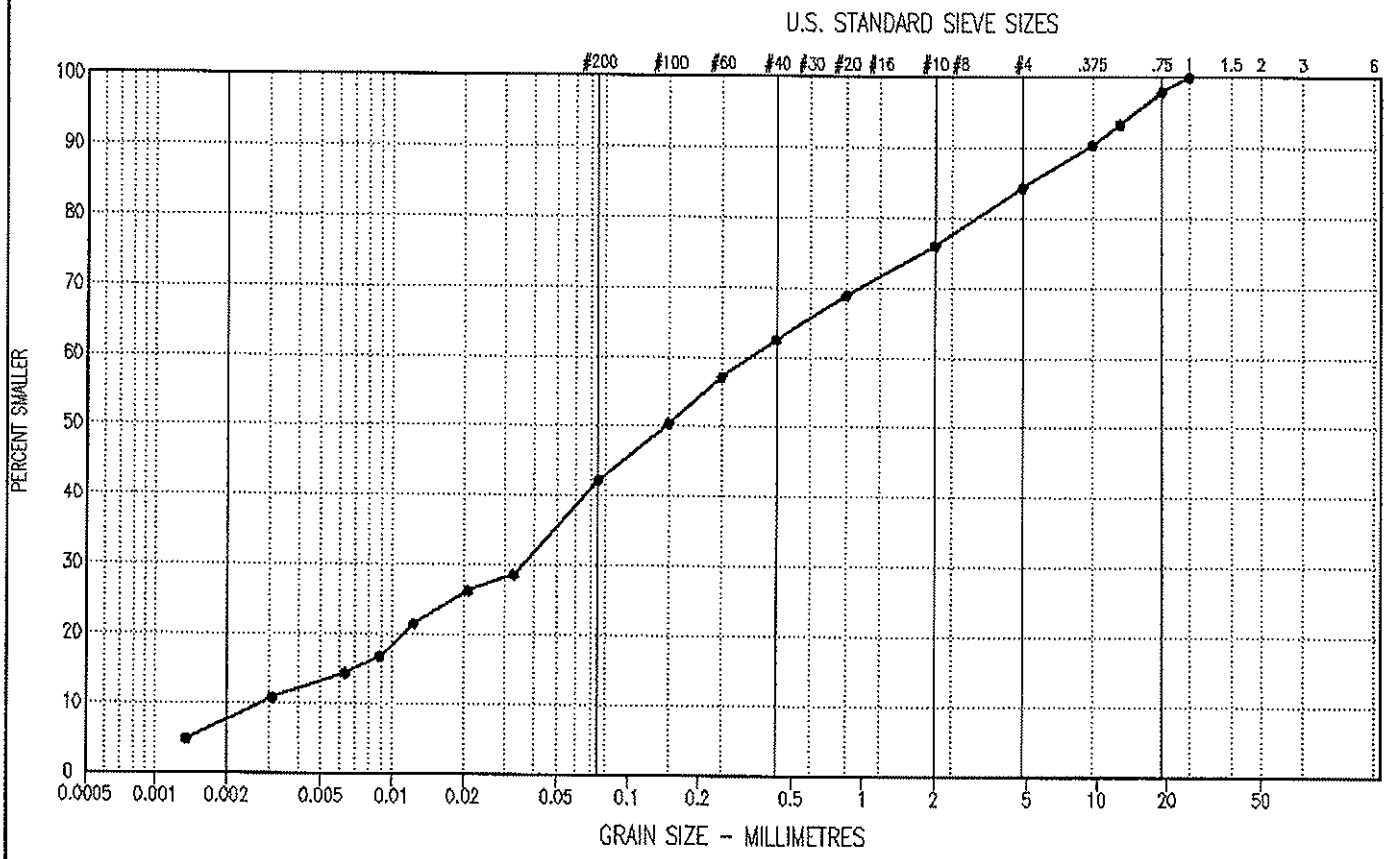
Project: 0201-1200173 Date Tested: 05/12/08 BY: JP

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-043	17.70 – 17.85	6.0	36	42	16	118.7	1.4	SM

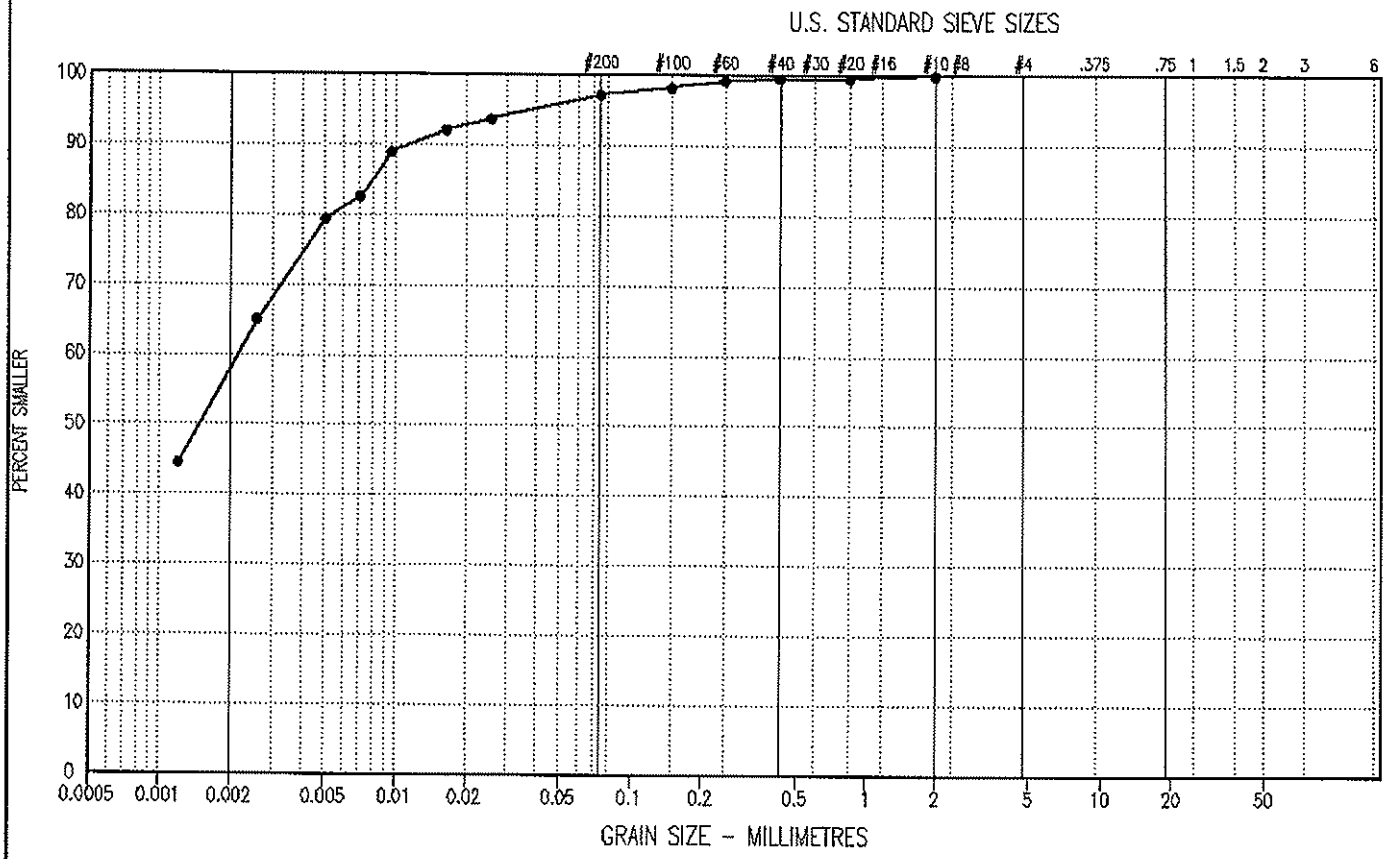
Project: 0201-1200173 Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-043	27.90 – 28.10	56.0	41	3	0	–	–	

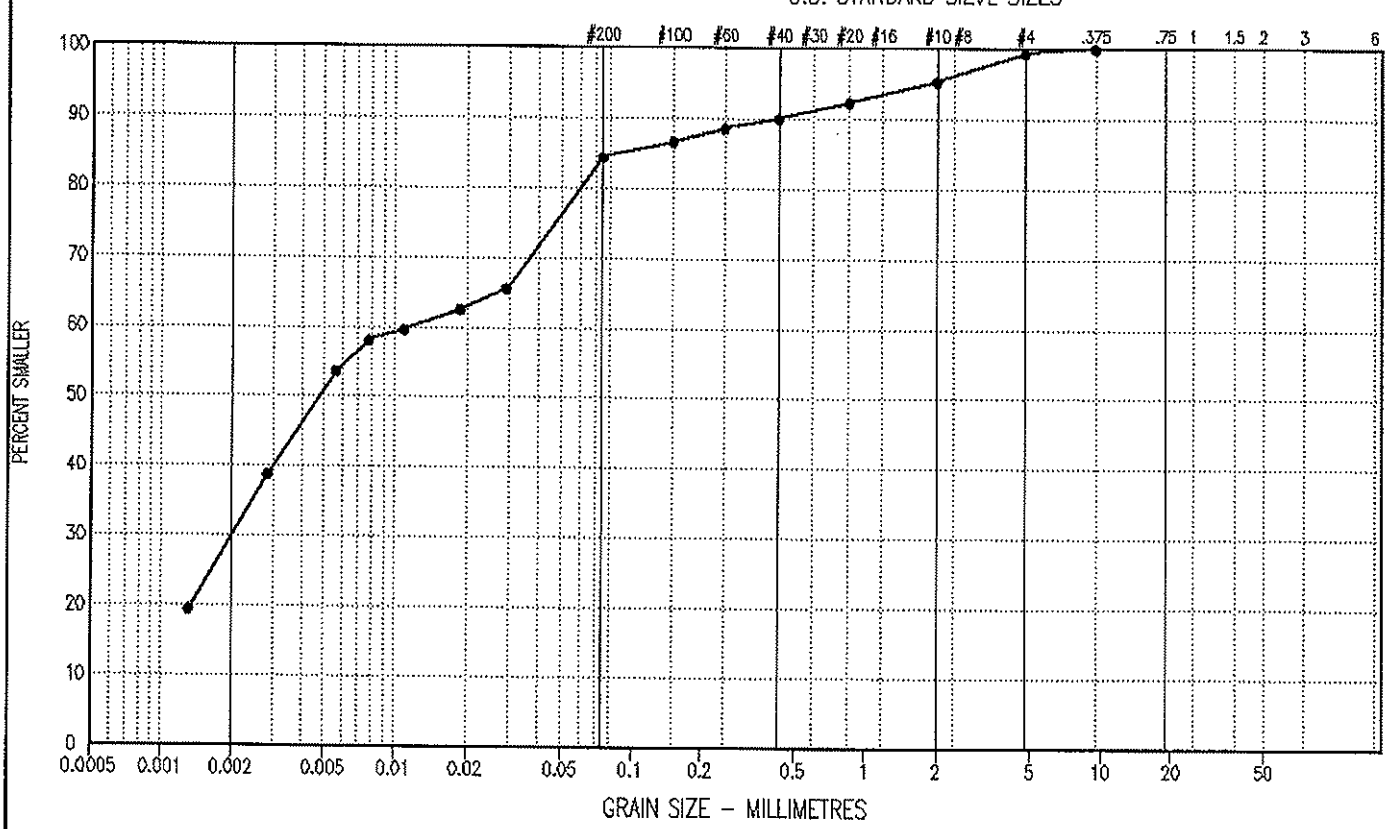
Project: 0201-1200173 Date Tested: 05/12/08 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-043	46.00 – 46.20	28.0	56	15	1	–	–	

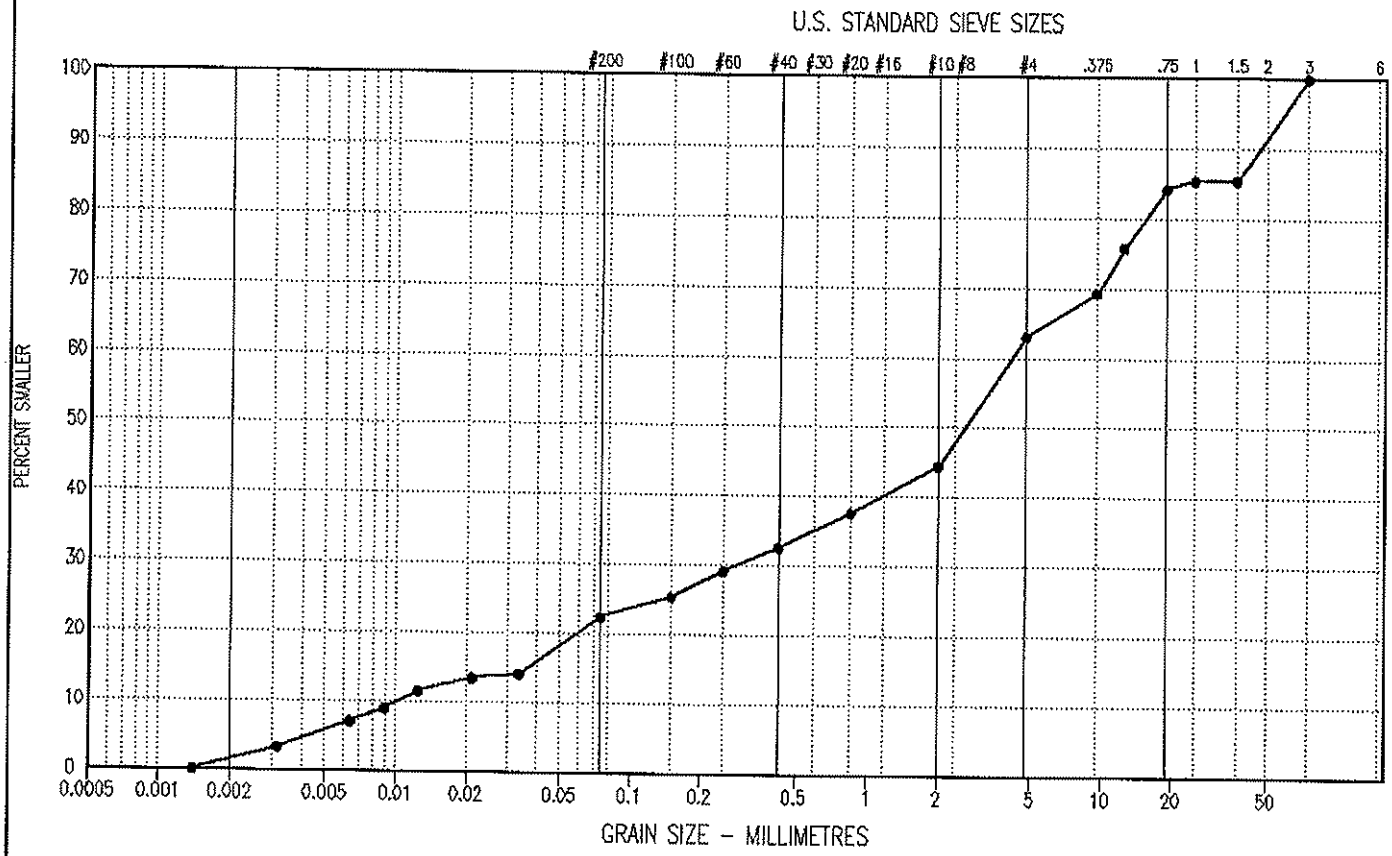
Project: 0201-1200173 Date Tested: 05/12/06 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-043	56.10 – 56.30	1.0	21	41	37	–	2.0	SM

Project: 0201-1200173 Date Tested: 05/12/06 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-044
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944758.56 E384582.51	ELEVATION: 824.96 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ☰ NQ ▯▯ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0			ORGANIC ROOT AND MOSS COVER	
1.0			SILT – trace to some sand	
2.0			– poor to no recovery from 0.0 m to 22.0 m	
3.0			– some gravel, fine to coarse grained encountered from 2.1 m to 21.9 m	
4.0			– some cobbles are present between 2.1 to 21.9 m	
5.0				
6.0				
7.0				
8.0				
9.0				
10.0				
11.0				
12.0				
13.0			GRAVEL – sandy, silty, trace of clay, well graded sand, fine to medium subrounded gravel, medium grey	Visible ice inclusions 10–15% clear ice, well bonded between 12.8 m – 16.2 m Vs, 2–75 mm thick, spaced 150 – 300 mm Vx, trace
14.0				
15.0				
16.0				
17.0			SILT – sandy, some gravel, some clay, medium to coarse angular sand, fine to medium grained gravel, grey	
18.0				
19.0				
20.0				
21.0				
22.0				mainly Vx trace below 22.0 m
23.0			– gravel content increases around 23.0 m	
24.0				
25.0			– poor recovery from 25.0 to 26.5 m	
26.0				
27.0				Vx, 10–15% med. bonded Vs, trace 2–5 mm thick
28.0			SAND – silty, some gravel to gravelly, well graded angular sand, well graded subangular and rounded gravel, dark grey	
29.0			– visible ice from 27.3 to 40.2 m consists mainly of medium bonded	
30.0				
31.0				
32.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2706.0, 2704.0, 2702.0, 2700.0, 2698.0, 2696.0, 2694.0, 2692.0, 2690.0, 2688.0, 2686.0, 2684.0, 2682.0, 2680.0, 2678.0, 2676.0, 2674.0, 2672.0, 2670.0, 2668.0, 2666.0, 2664.0, 2662.0, 2660.0, 2658.0, 2656.0, 2654.0, 2652.0, 2650.0, 2648.0, 2646.0, 2644.0, 2642.0, 2640.0, 2638.0, 2636.0, 2634.0, 2632.0, 2630.0, 2628.0, 2626.0, 2624.0, 2622.0, 2620.0, 2618.0, 2616.0, 2614.0, 2612.0, 2610.0, 2608.0, 2606.0, 2604.0, 2602.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: JSB	COMPLETION DEPTH: 61 m
	REVIEWED BY: JRT	COMPLETE:
		Page 1 of 2

05/01/17 05:03PM (YUKON.PGT)

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-044
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944758.56 E384582.51	ELEVATION: 824.96 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ☰ NQ ||| CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
32.0				
33.0			– some intermittent layers of silt diamict are present from 32.6 to 34.7 m – colour changes to dark brown from 33.2 m to 36.2 m and 36.9 m to 40.2	
34.0				
35.0				
36.0				
37.0				
38.0				
39.0				
40.0				
41.0				
42.0			– some clay below 42.0 m	Vs, well bonded spaced 200 – 500 mm
43.0				
44.0				
45.0			– coarser gravels, cobbles from 44.5 to 45.7 m	
46.0				
47.0				
48.0				
49.0			– gravelly below 48.4 m	
50.0				
51.0			– becomes silt – sandy below 50.0 m – dark grey	
52.0			BEDROCK (GRANITE) – poor quality, highly fractured oxidized, sand and silt infilled	
53.0				
54.0				
55.0				
56.0				
57.0			END OF BOREHOLE 57.0 m	
58.0				
59.0				
60.0				
61.0				
62.0				
63.0				
64.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2600.0, 2598.0, 2596.0, 2594.0, 2592.0, 2590.0, 2588.0, 2586.0, 2584.0, 2582.0, 2580.0, 2578.0, 2576.0, 2574.0, 2572.0, 2570.0, 2568.0, 2566.0, 2564.0, 2562.0, 2560.0, 2558.0, 2556.0, 2554.0, 2552.0, 2550.0, 2548.0, 2546.0, 2544.0, 2542.0, 2540.0, 2538.0, 2536.0, 2534.0, 2532.0, 2530.0, 2528.0, 2526.0, 2524.0, 2522.0, 2520.0, 2518.0, 2516.0, 2514.0, 2512.0, 2510.0, 2508.0, 2506.0, 2504.0, 2502.0, 2500.0, 2498.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: JSB
REVIEWED BY: JRT

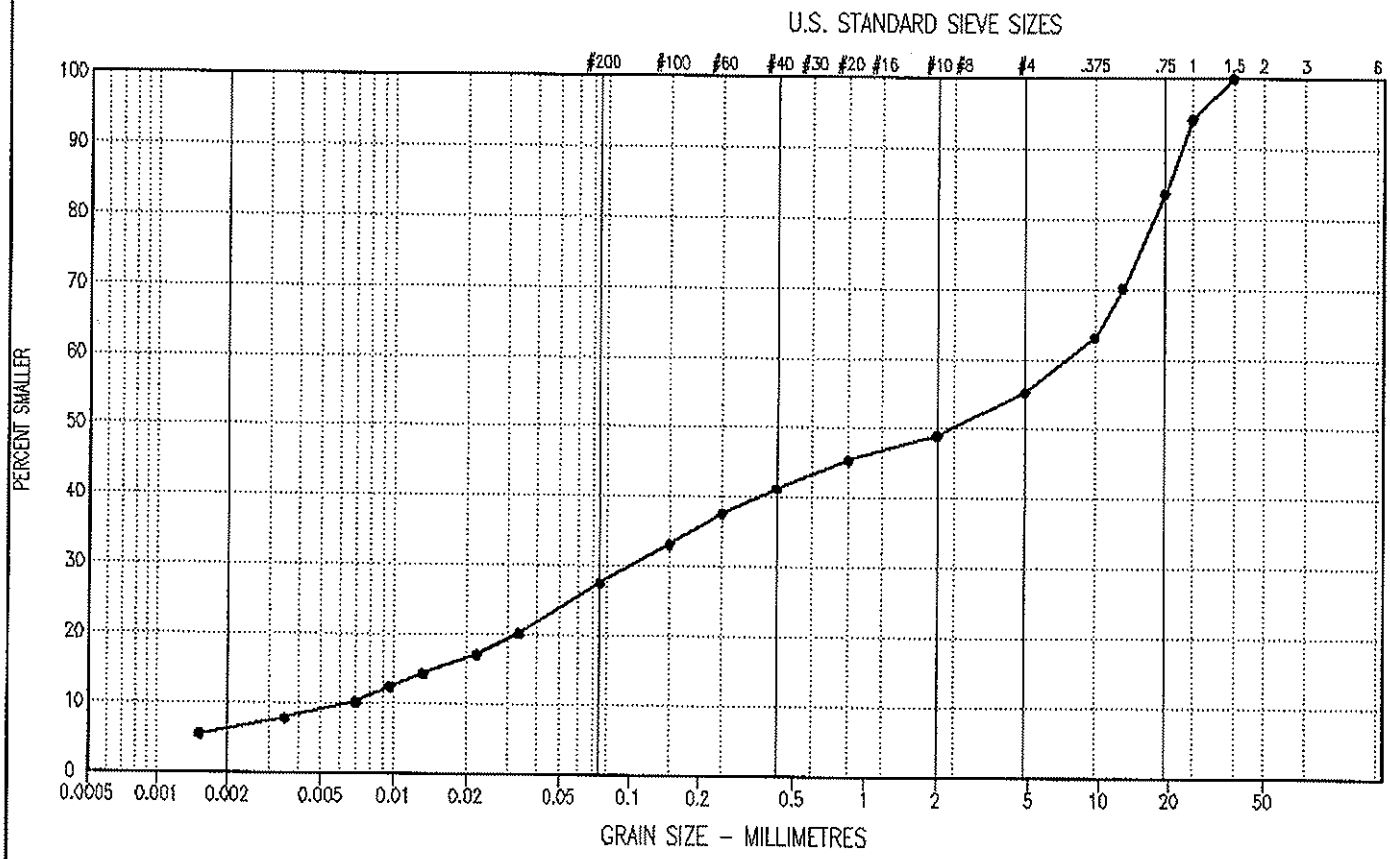
COMPLETION DEPTH: 61 m
COMPLETE:

06/01/17 05:00PM (YUKON*84)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-044	13.10 – 13.30	5.0	22	28	45	–	0.2	GM

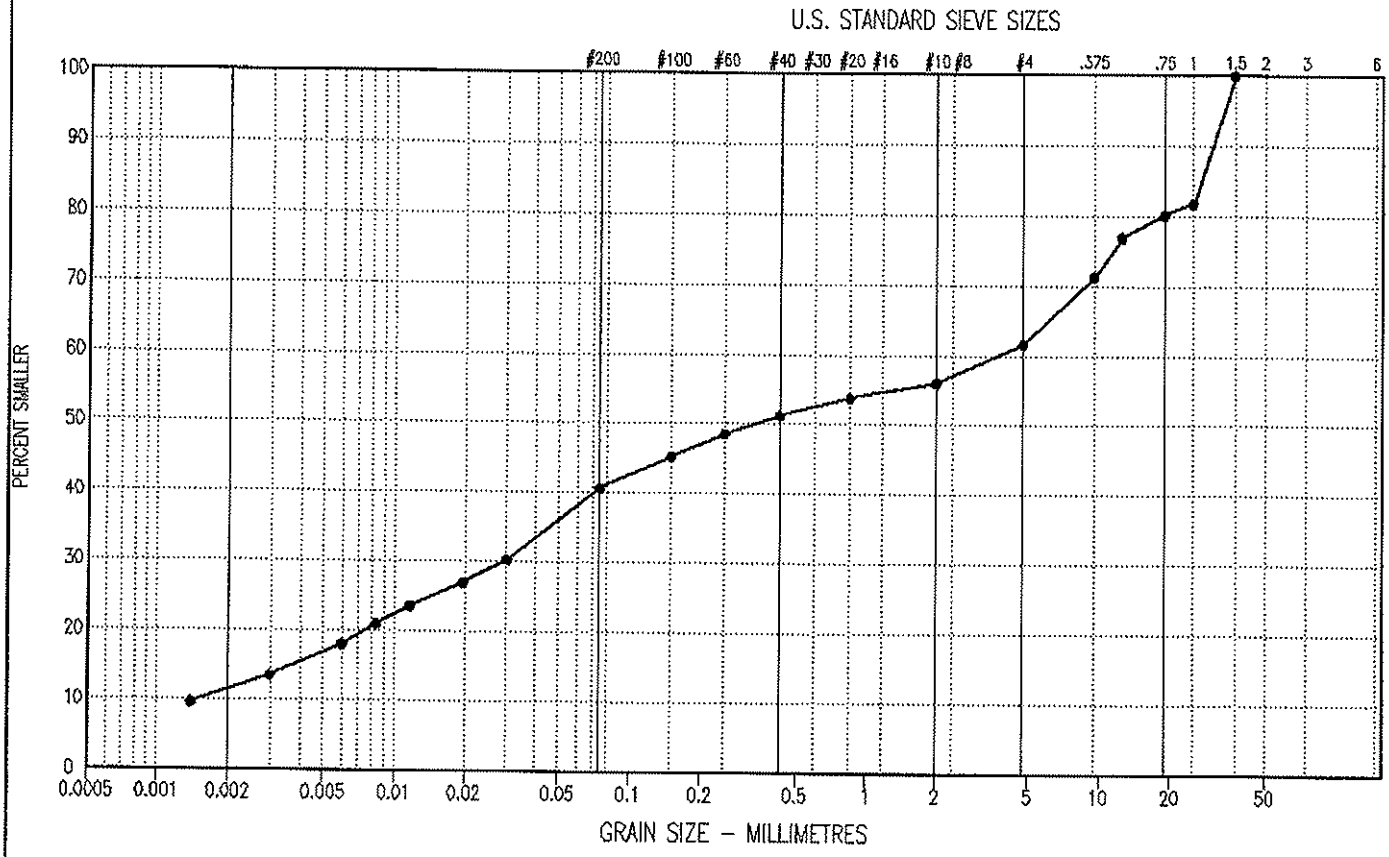
Project: 0201-1200173 Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-044	23.80 ~ 24.00	11.0	29	21	39	–	0.1	GM

Project: 0201-1200173

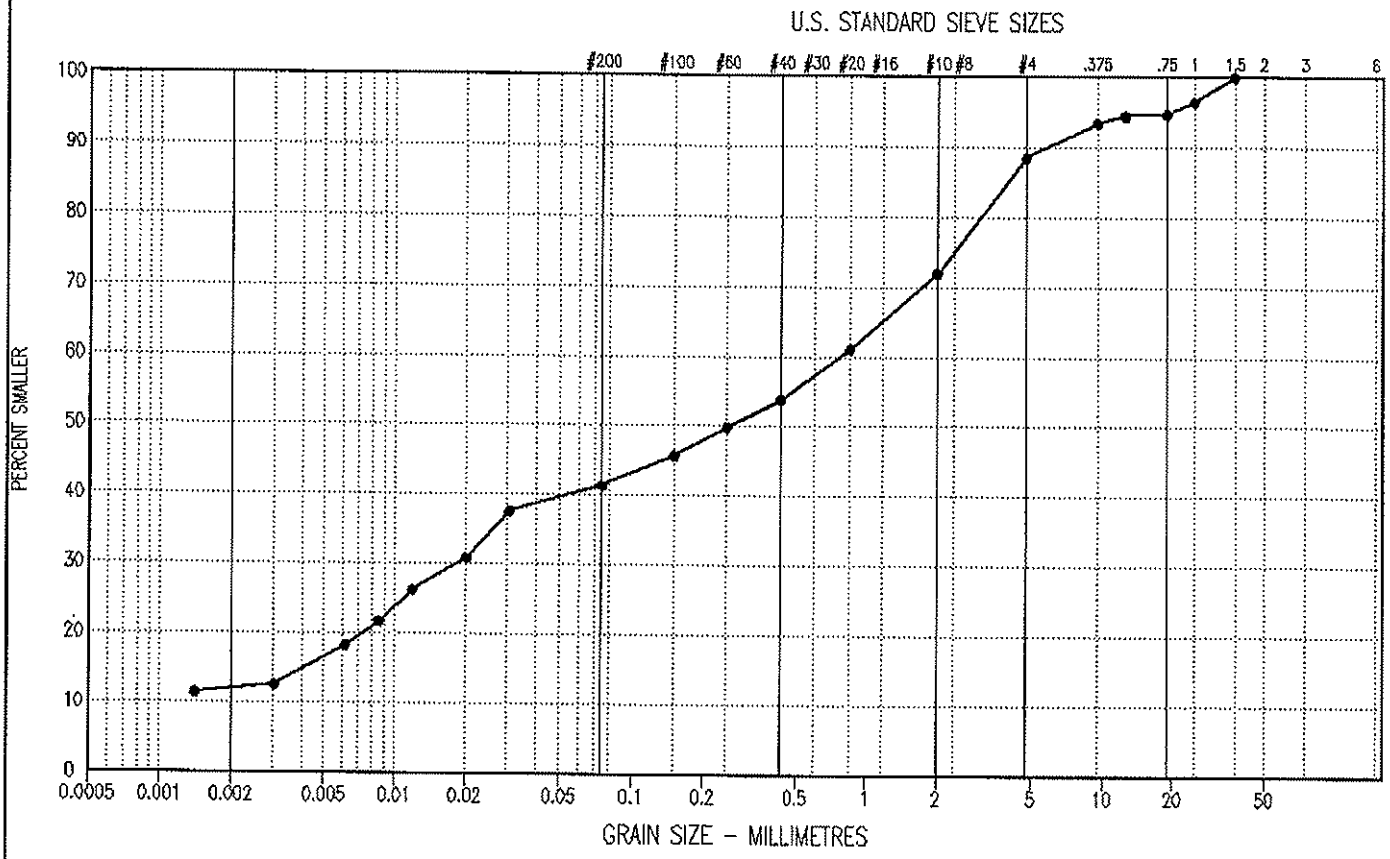
Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-044	41.10 – 41.30	11.0	30	47	12	–	–	

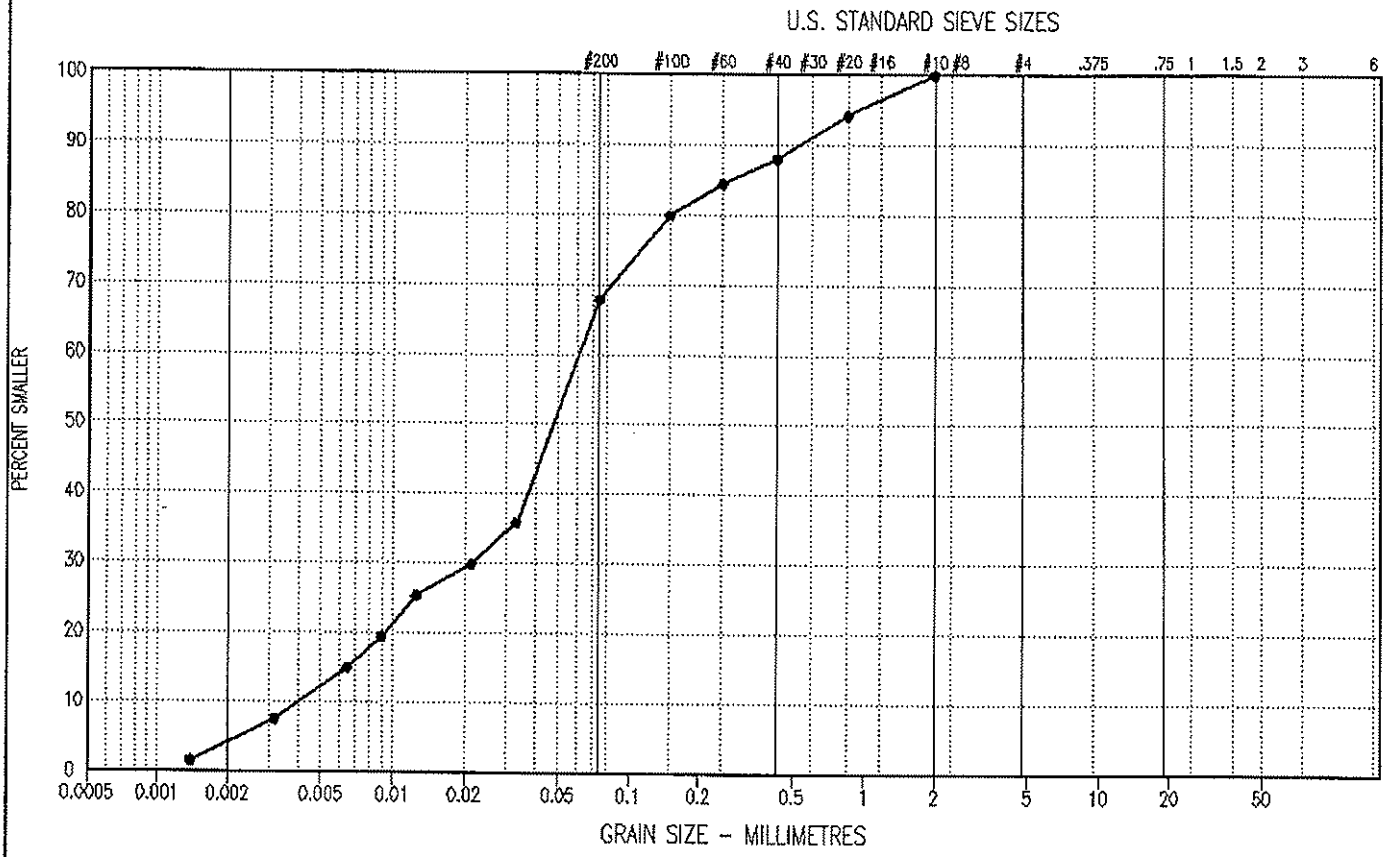
Project: 0201-1200173 Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	1200173-044	50.60 – 50.80	3.0	64	33	0	15.1	1.7	

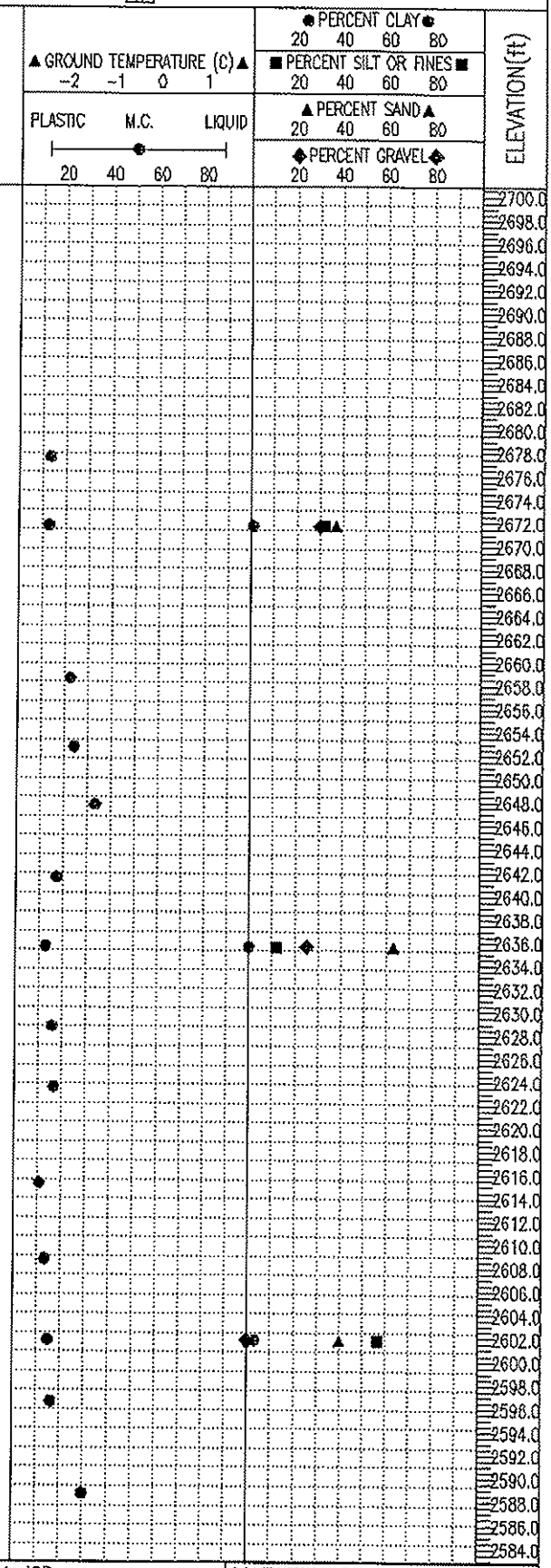
Project: 0201-1200173 Date Tested: 05/12/06 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-045
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944772.1 E384515.45	ELEVATION: 823.19 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ▤ NQ ▥ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0			MOSS COVERED ORGANIC ROOT MAT	
1.0			SILT – some sand, trace of clay	
2.0			– poor to no recovery from 0.0 m to 9.0 m	
3.0			– gravels present below 3.0 m to 12.5 m	
4.0				
5.0				
6.0				
7.0			– visible ice below 6.4 m	Vx 10–15%
8.0			SAND – gravelly, silty, trace of clay, well graded sand, fine to med. grained gravel, grey	Vs, 10–15% 2–5 mm thick, spaced 300 mm from 7.6–22.6 m
9.0				
10.0			– some cobbles encountered below 10.0 m to 15.5 m	
11.0				
12.0				
13.0				Vs 20–30%
14.0				
15.0				
16.0			SILT – clayey, trace sand, fine grained, medium to dark grey	
17.0				
18.0			SAND – gravelly, some silt, well graded sand, fine to medium grained gravel, med. to dark grey	
19.0			– some gravel below 19.8 m	
20.0			– trace of clay below 19.8 m	
21.0			– becomes silty below 21.3 m	
22.0				
23.0			– occasional cobbles encountered below 22.9 m	Vs, 10–15% 2–75 mm thick spaced 75 to 500 mm
24.0				
25.0				
26.0				Vx, 10–15% from 22.9 – 49.1 m
27.0			– poor to no recovery from 26.2 m to 27.7 m	
28.0				
29.0				
30.0				
31.0				
32.0				
33.0			– becomes silt, sandy around 32.0 m	
34.0			– trace of gravel below 32.0 m	
35.0			– becomes clayey around 32.0 m	
36.0				



EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: JSB	COMPLETION DEPTH: 60.96 m
REVIEWED BY: JRT	COMPLETE:

06/01/20 02:28PM (YUKON72)

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-045
Minto Copper Mine	DRILL: DD HQ	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944772.1 E384515.45	ELEVATION: 823.19 m

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | HQ | NQ | CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
36.0			– becomes sand, silty, some gravel, some clay below 35.4 m – colour changes to dark brown	
41.0			– becomes silt, sandy, clayey, trace of fine gravel	
45.0				Vs, 15–20% 5–10 mm thick spaced 300 to 600 mm Vx, 10% from 43.0 to 59.0 m
52.0			– poor recovery from 52.0 to 53.6 m	
59.0				Vx, 20%
60.0			SAND – silty, gravelly, trace of clay, well graded sand, fine to medium gravel, light to medium grey	
62.0			BEDROCK (GRANITE) – poor quality, highly fractured, decomposed	
71.0			END OF BOREHOLE 70.4 m	

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft)

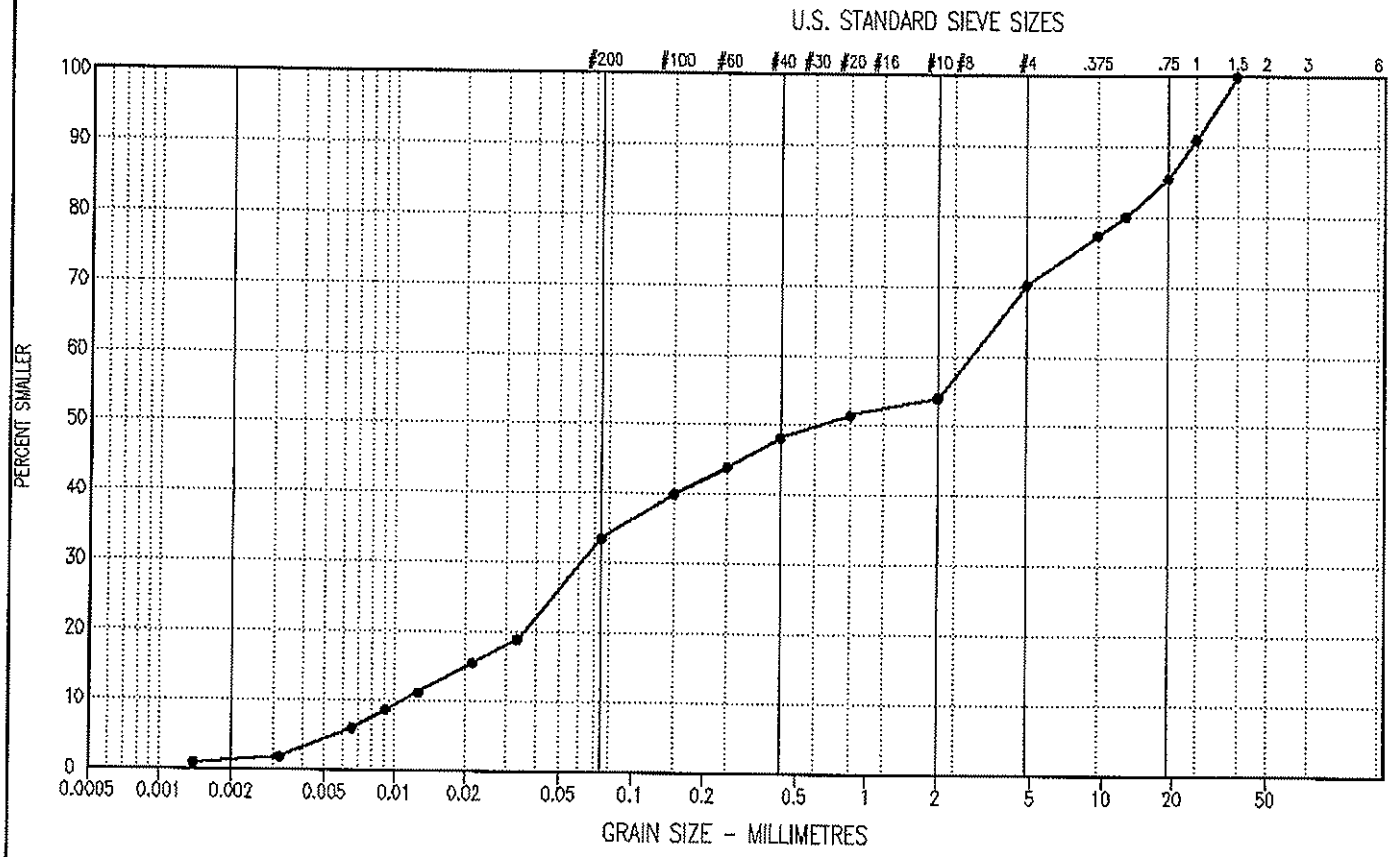
EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: JSB	COMPLETION DEPTH: 60.96 m
	REVIEWED BY: JRT	COMPLETE:
		Page 2 of 2

06/31/20 02:28PM (YUKON72)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045	8.80 – 9.00	1.0	32	37	30	–	0.1	SM

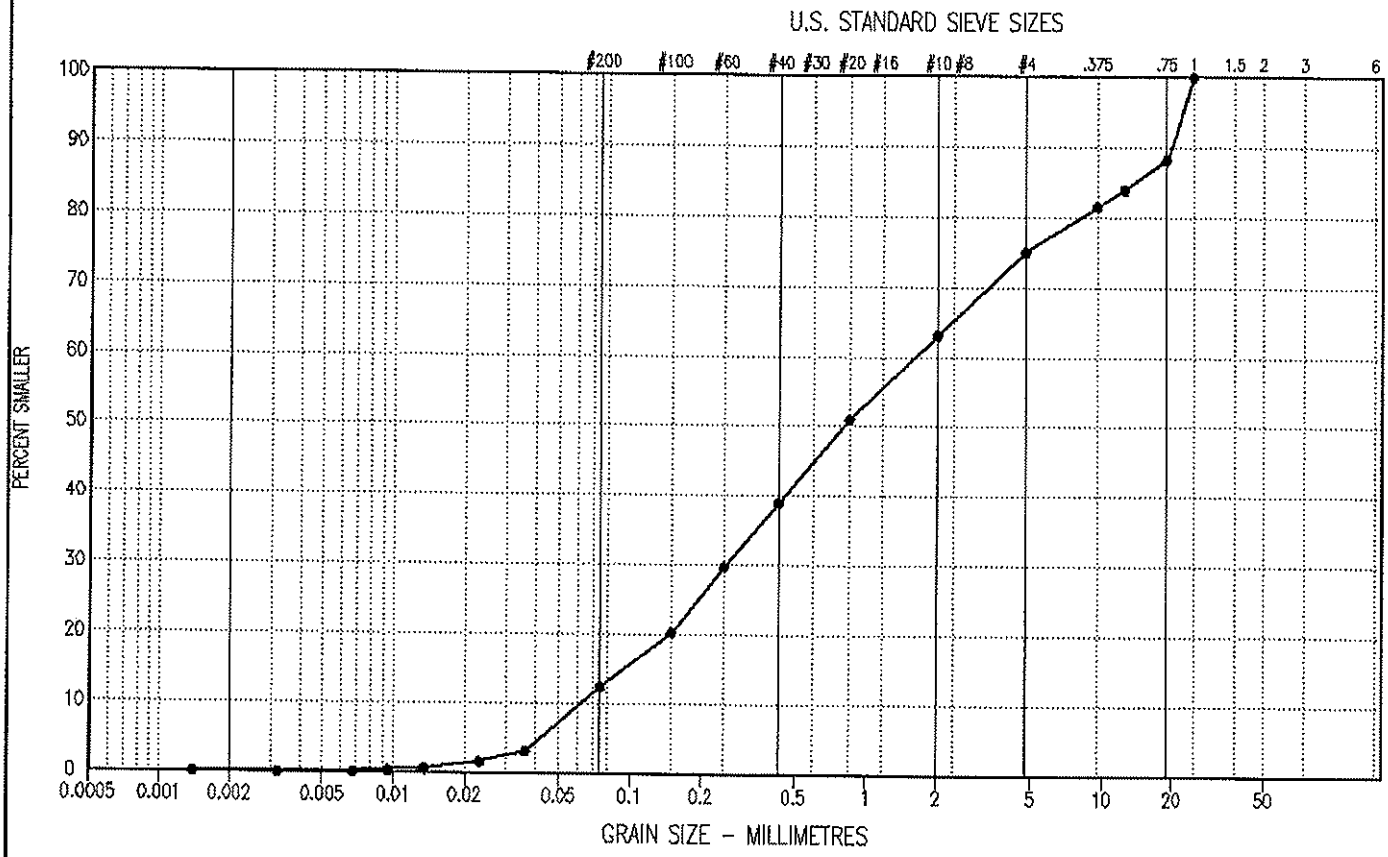
Project: 0201-1200173 Date Tested: 05/12/06 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-045	19.80 – 20.00	0.0	12	63	25	26.2	0.6	S

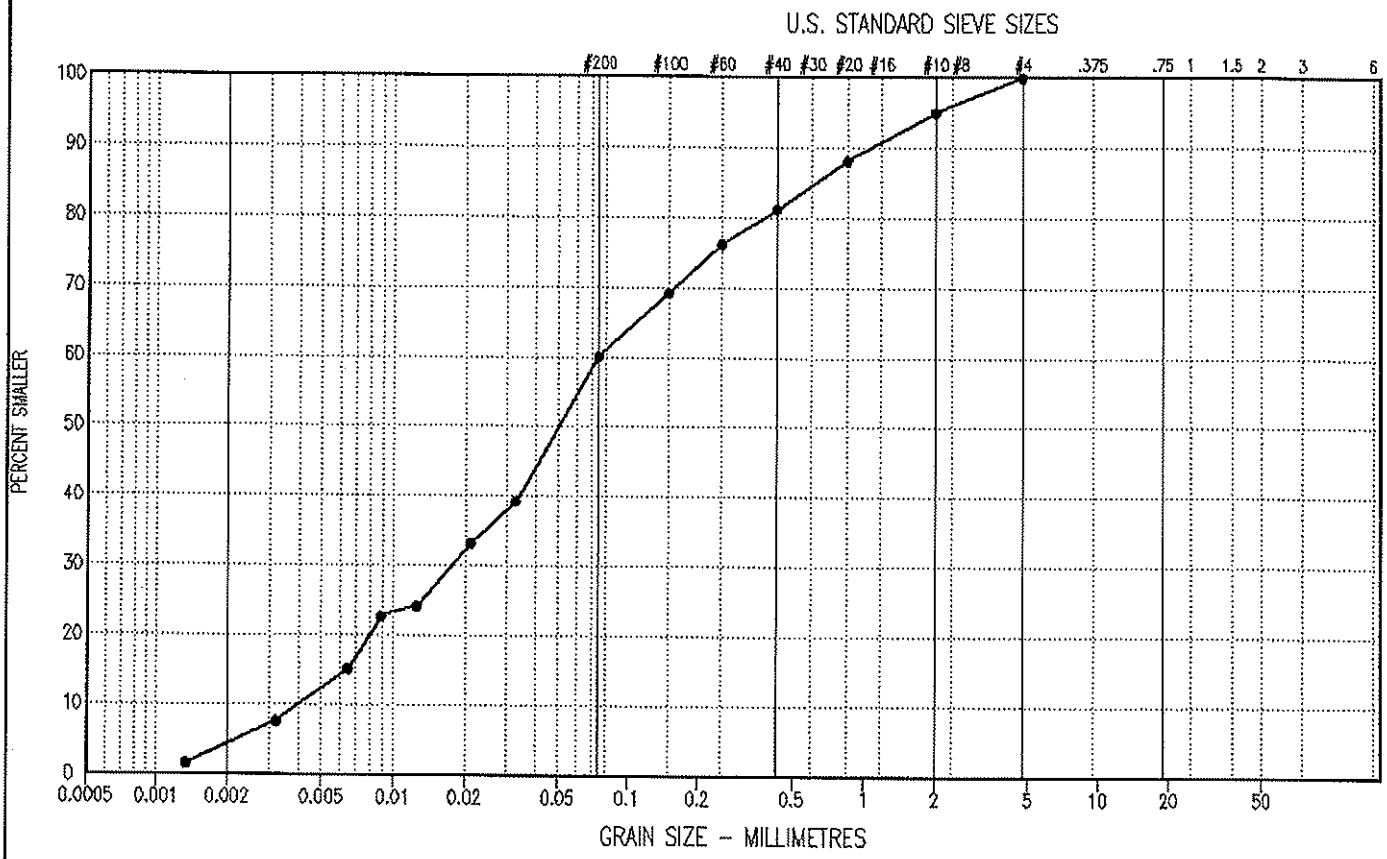
Project: 0201-1200173 Date Tested: 05/12/06 BY:

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-045	30.10 – 30.30	3.0	57	40	0	17.5	1.0	

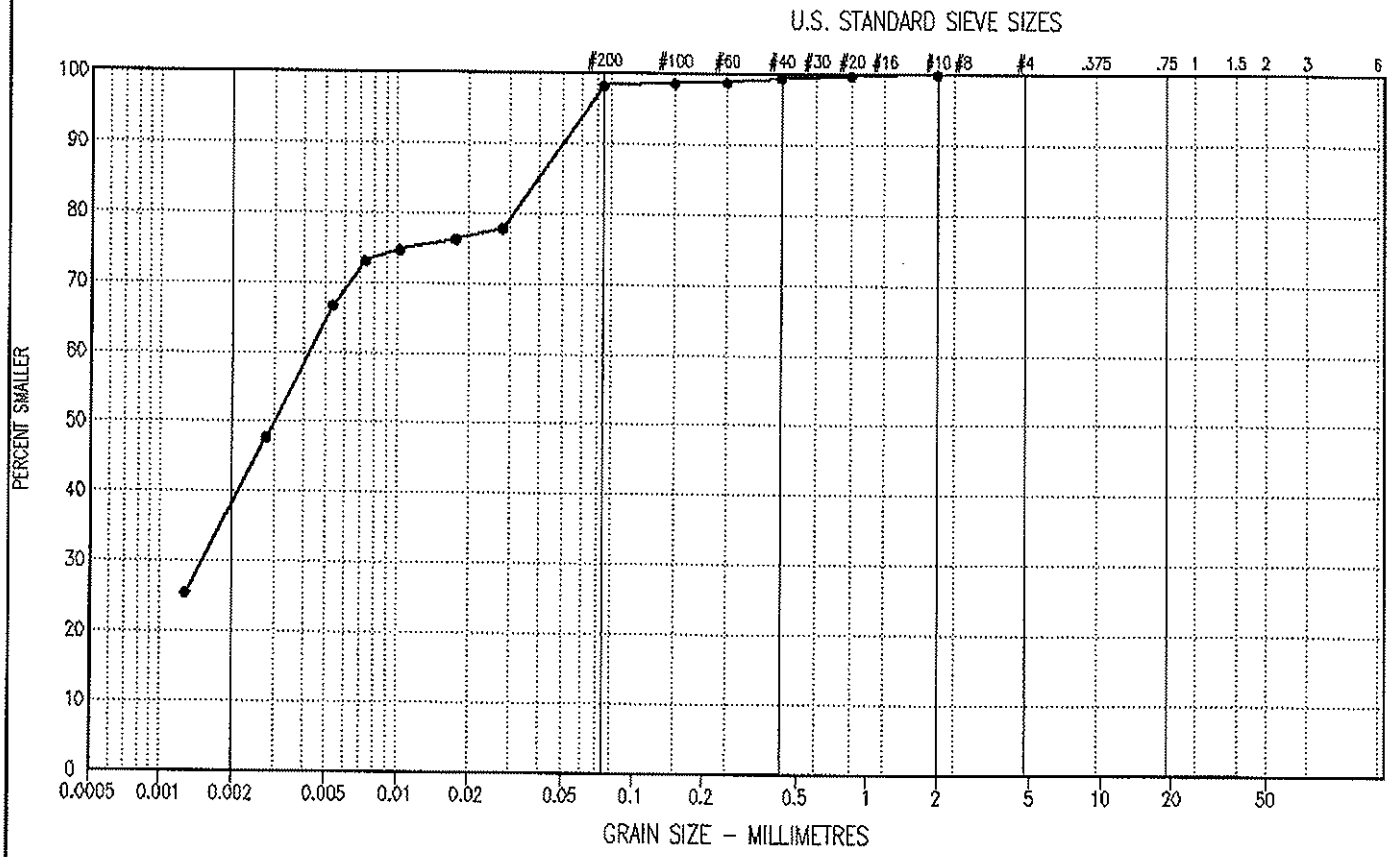
Project: 0201-1200173 Date Tested: 05/12/06 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045	41.10 – 41.30	36.0	62	2	0	–	–	

Project: 0201-1200173

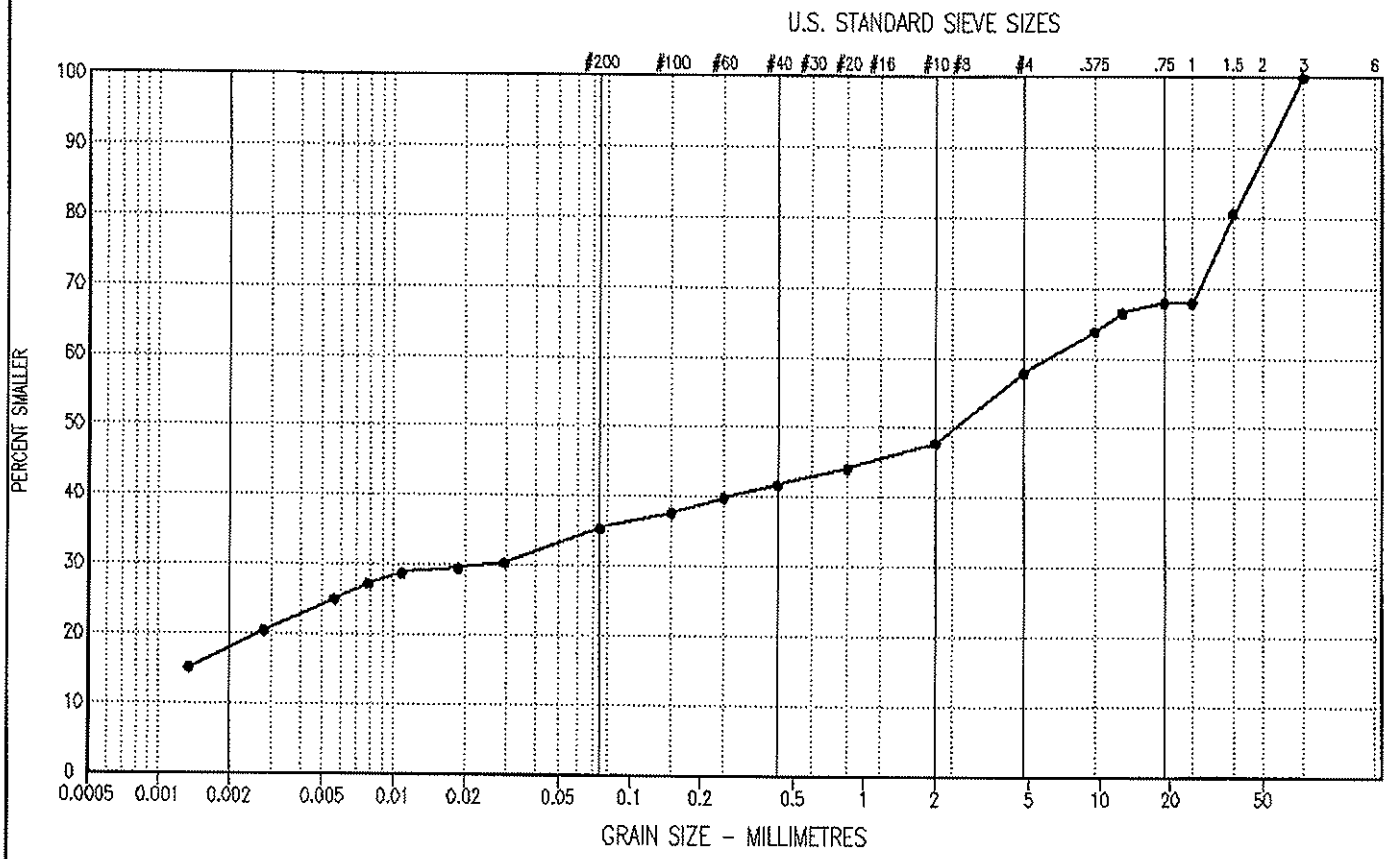
Date Tested: 05/12/08 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045	50.60 – 50.80	17.0	18	22	43	–	–	

Project: 0201-1200173 Date Tested: 05/12/07 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

Minto Mine Development 2005	Client: Sherwood Mining Corporation	BOREHOLE NO: 1200173-045B
Minto Copper Mine	DRILL: CME 750 – Hollow Stem	PROJECT NO: 1200173
NW of Minto, YT	UTM ZONE: 8 N6944772.1 E384515.45	ELEVATION: 823.19 m

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ HQ ▤ NQ ▥ CRREL BARREL

Depth(m)	SAMPLE TYPE	RUN NO	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0			ORGANIC ROOT MAT	PERMAFROST
1.0			SILT – sandy, trace of fine gravel, dark brown	
2.0			– poor recovery CRREL has thawed sample during drilling	Vs, 10–15% crystals
3.0			– becomes sand, gravelly, silty, well graded sand, fine to medium grained gravel	Vx trace < 5%
4.0				Vc trace < 5%
5.0			– colour changes to medium grey around 2.5 m	
6.0			– cobble encountered around 5.0 m	
7.0			– more gravel and coarser around 5.0 m	
8.0			– no recovery from 6.5 m to 7.5 m	
9.0			SILT – sandy, trace to some fine to medium grained gravel, dark grey	
10.0			– slough continues to fill CRREL	
11.0			– some clay below 11.2 m	Vx 5–10%
12.0				
13.0				
14.0				
15.0				
16.0				Vx, Vx 5–10%
17.0				
18.0				Nbn
19.0			– sand becomes angular, well graded around 18.9 m	
20.0			– trace of fine angular gravel around 18.9 m	Nf
21.0			– grinding, hard drilling around 20.4 m	
22.0				
23.0			– becomes gravelly, fine to medium grained around 20.4 m	Vs, Vr 15–20%
24.0				VS, Vx 15–20%
25.0				
26.0				
27.0				Vs, Vx Trace 5%
28.0				
29.0				Nbe
30.0				Vs, 25–30% clear
31.0			END OF BOREHOLE 30.1 m	
32.0			NOTE: Hole advanced to 30.1 m, 0.6 m slough during 25 mm PVC install, backfilled with mine residuum	
33.0				
34.0				

▲ GROUND TEMPERATURE (C) ▲ −2 −1 0 1

PLASTIC M.C. LIQUID 20 40 60 80

● PERCENT CLAY ● 20 40 60 80

■ PERCENT SILT OR FINES ■ 20 40 60 80

▲ PERCENT SAND ▲ 20 40 60 80

◆ PERCENT GRAVEL ◆ 20 40 60 80

ELEVATION(ft): 2700.0, 2698.0, 2696.0, 2694.0, 2692.0, 2690.0, 2688.0, 2686.0, 2684.0, 2682.0, 2680.0, 2678.0, 2676.0, 2674.0, 2672.0, 2670.0, 2668.0, 2666.0, 2664.0, 2662.0, 2660.0, 2658.0, 2656.0, 2654.0, 2652.0, 2650.0, 2648.0, 2646.0, 2644.0, 2642.0, 2640.0, 2638.0, 2636.0, 2634.0, 2632.0, 2630.0, 2628.0, 2626.0, 2624.0, 2622.0, 2620.0, 2618.0, 2616.0, 2614.0, 2612.0, 2610.0, 2608.0, 2606.0, 2604.0, 2602.0, 2600.0, 2598.0, 2596.0, 2594.0, 2592.0, 2590.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

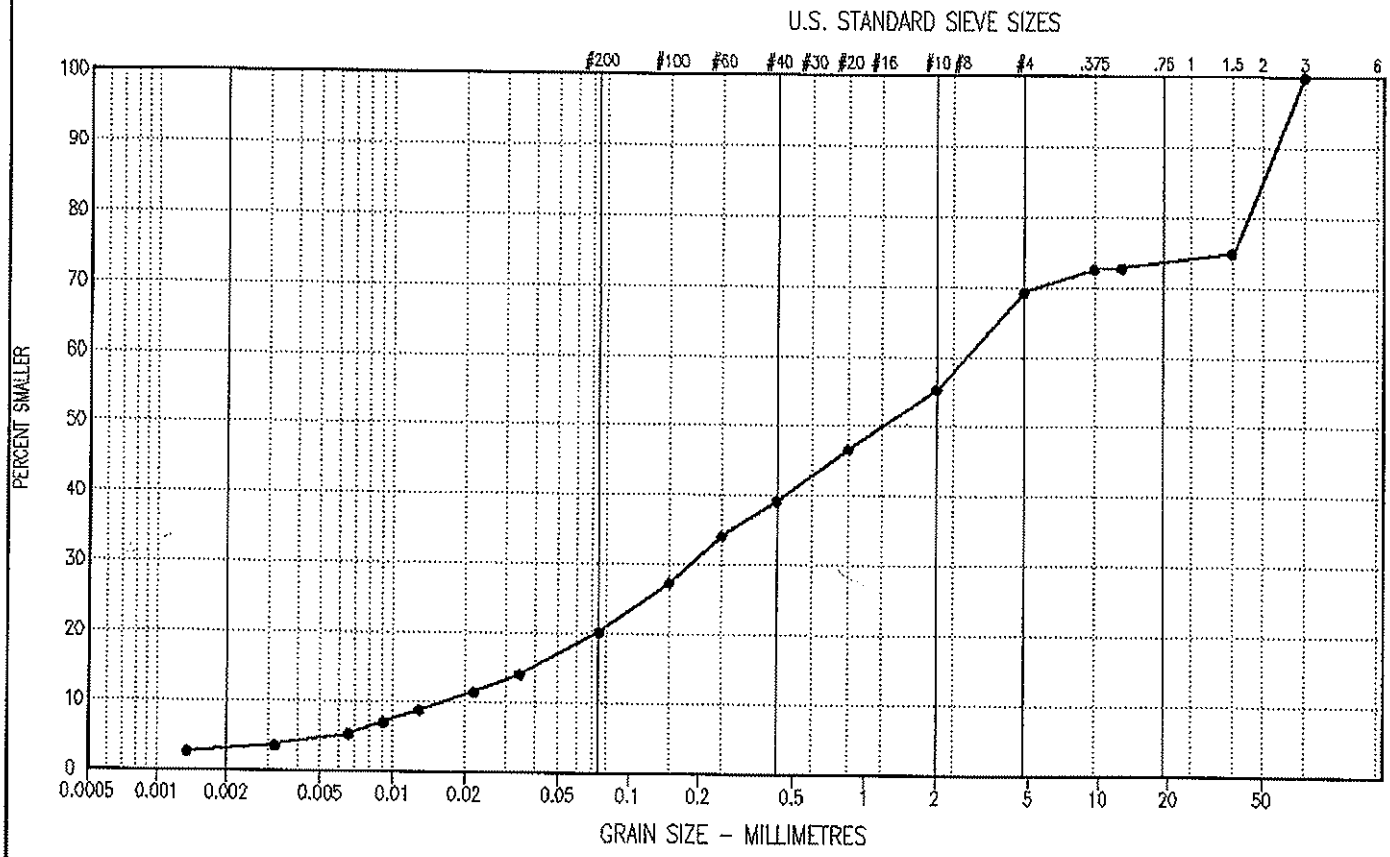
LOGGED BY: JSB	COMPLETION DEPTH: 30.1 m
REVIEWED BY: JRT	COMPLETE:

06/01/20 02:52PM (YUKONP34)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045B	3.00 – 3.20	2.0	18	49	31	169.9	0.7	SM

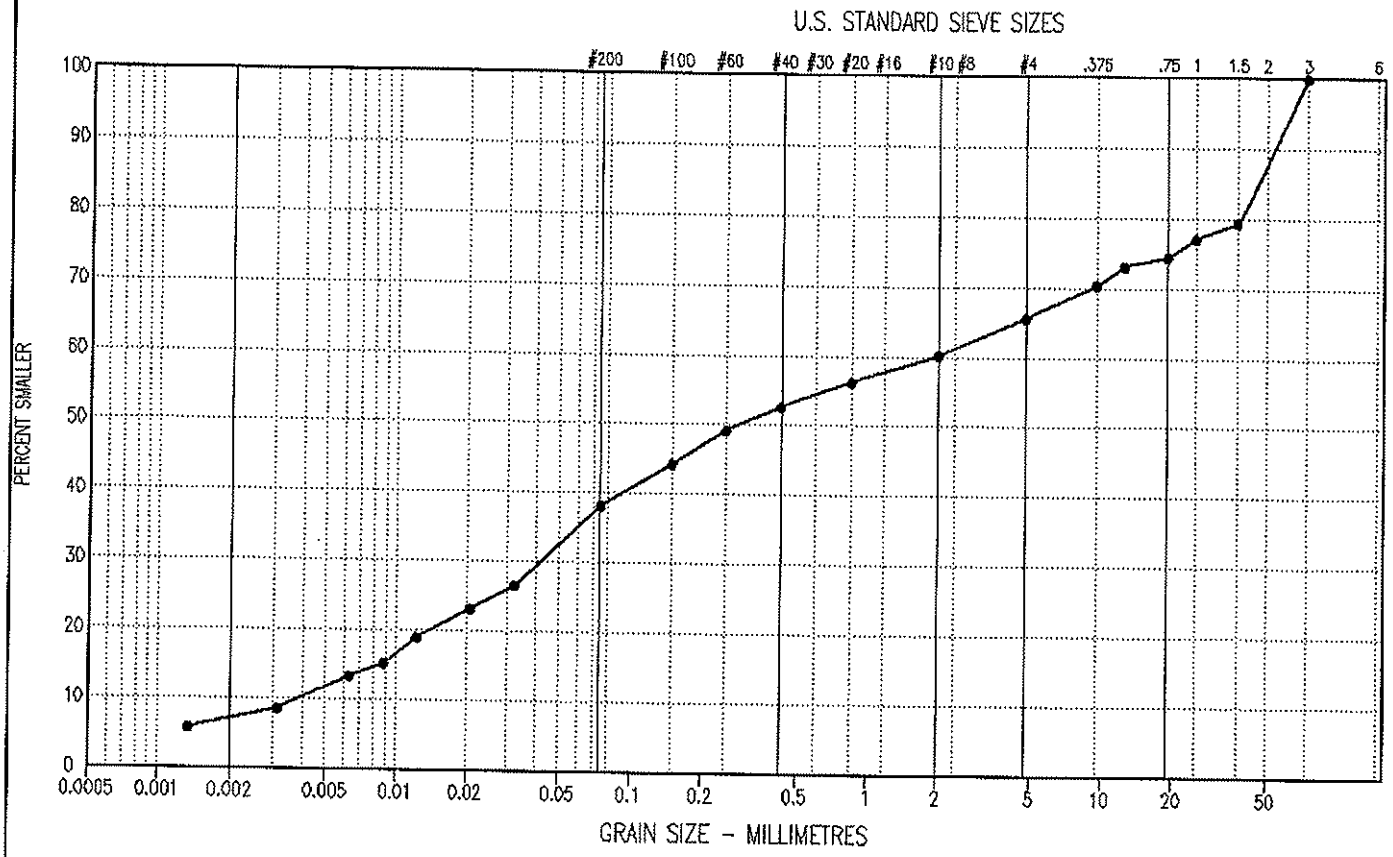
Project: 0201-1200173 Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045B	6.20 – 6.40	6.0	32	27	35	–	0.3	GM

Project: 0201-1200173

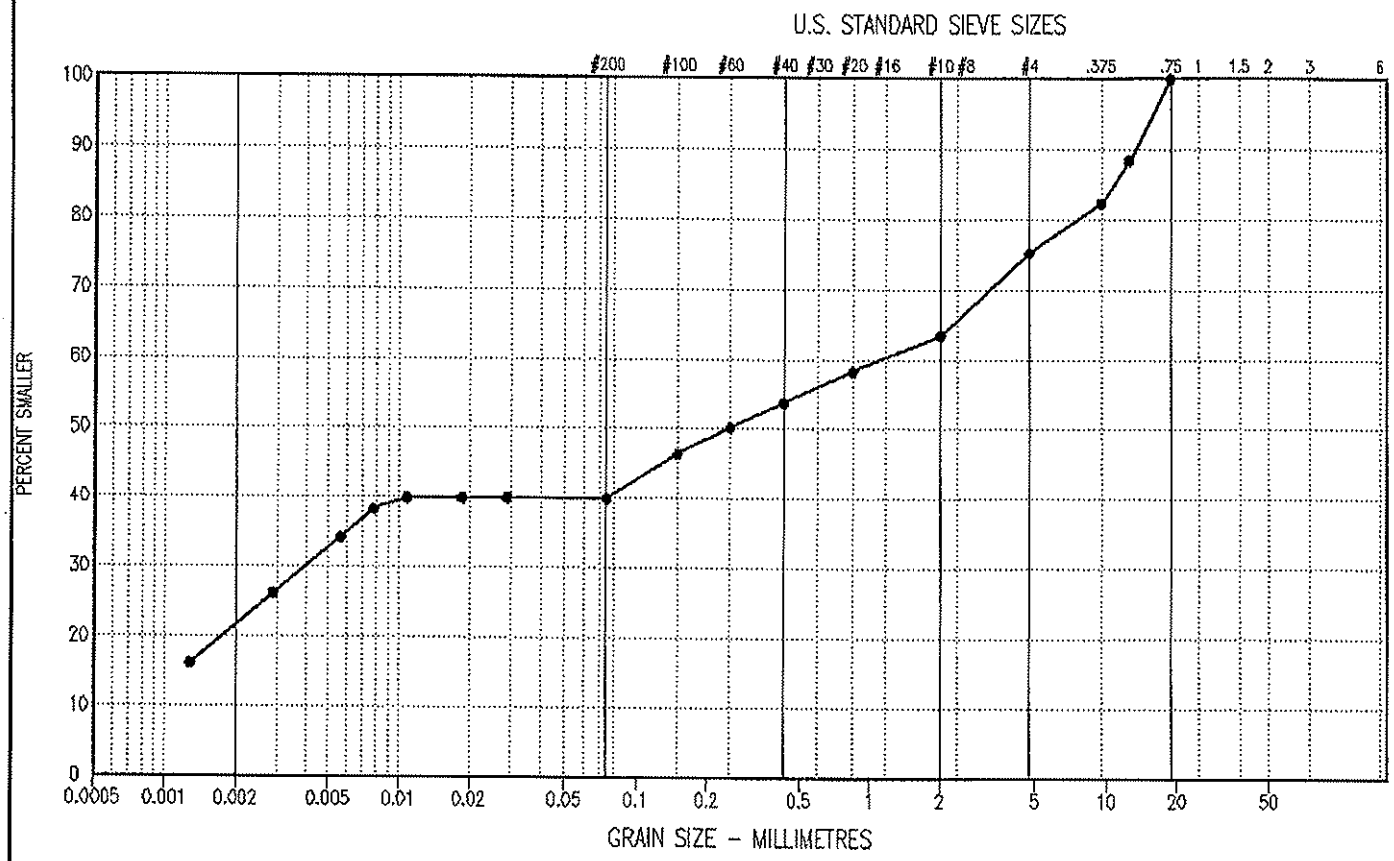
Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	1200173-045B	11.70 – 11.90	20.0	19	36	25	–	–	

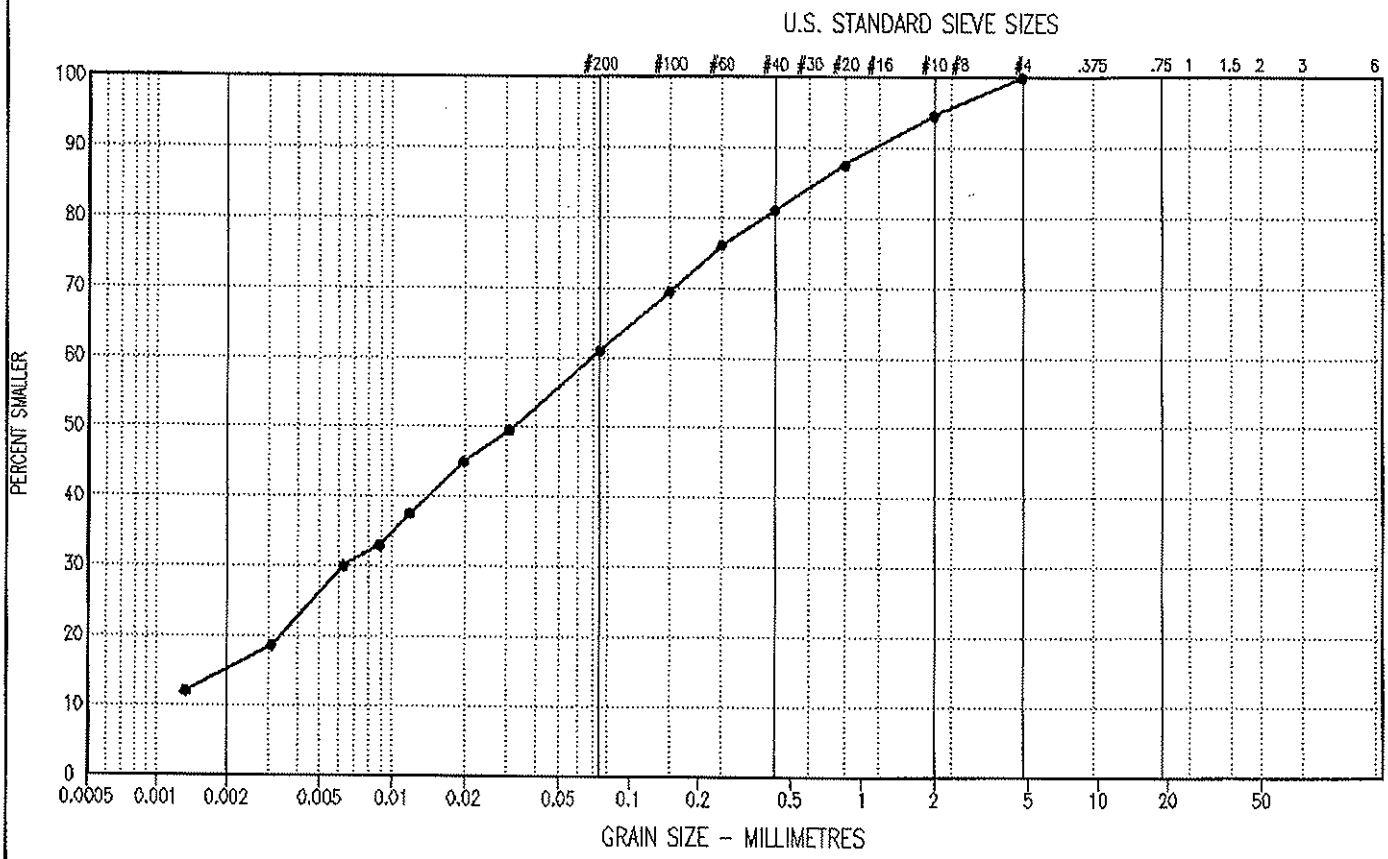
Project: 0201-1200173 Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045B	23.20 – 23.50	14.0	46	40	0	–	–	

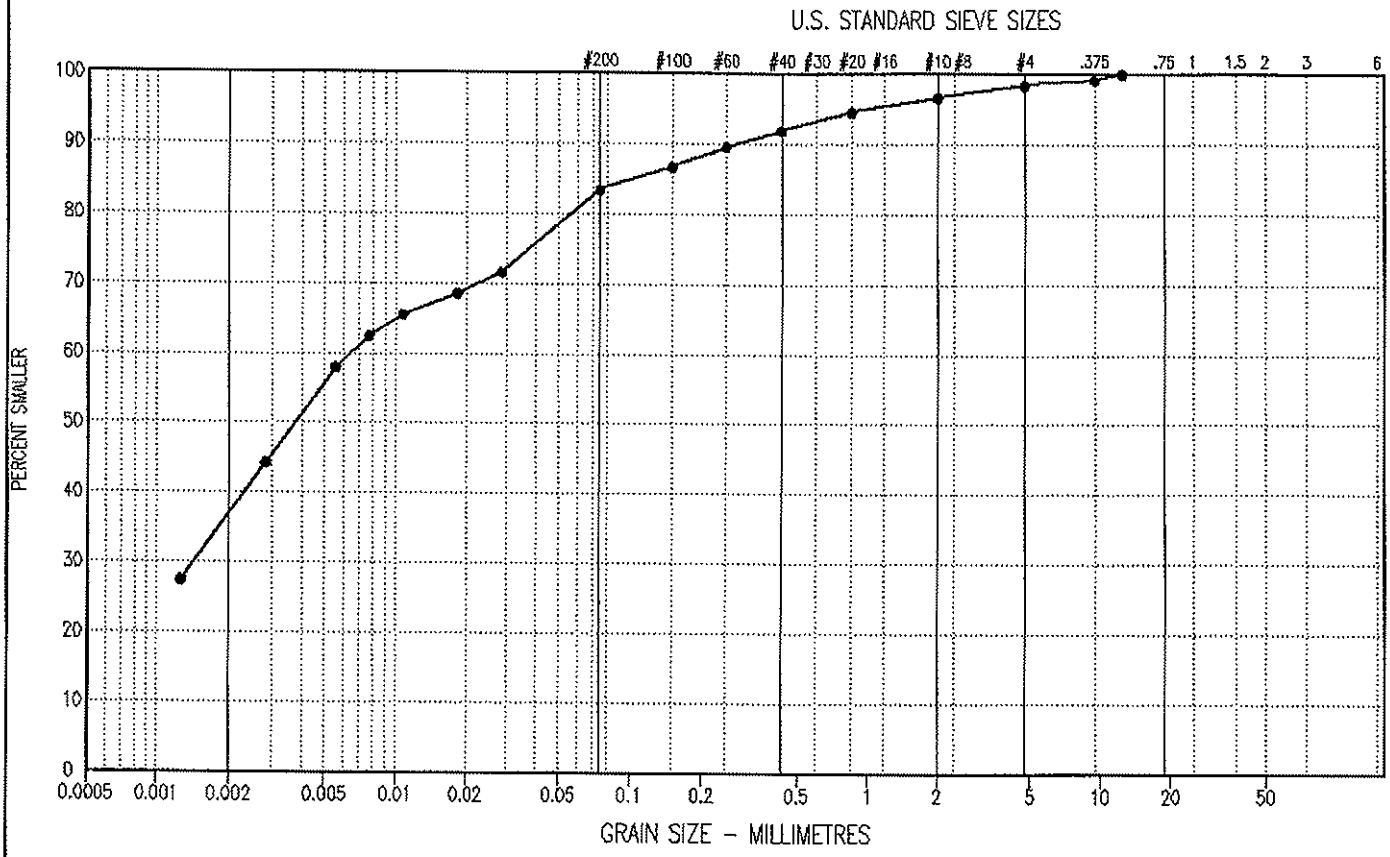
Project: 0201-1200173 Date Tested: 05/12/09 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	1200173-045B	29.20 - 29.40	35.0	48	15	2	–	–	

Project: 0201-1200173 Date Tested: 05/12/12 BY: TS

Tested in accordance with ASTM D422 unless otherwise noted.

APPENDIX

APPENDIX C 2005 OVERBURDEN CHARACTERIZATION PROGRAM – ADDITIONAL DATA

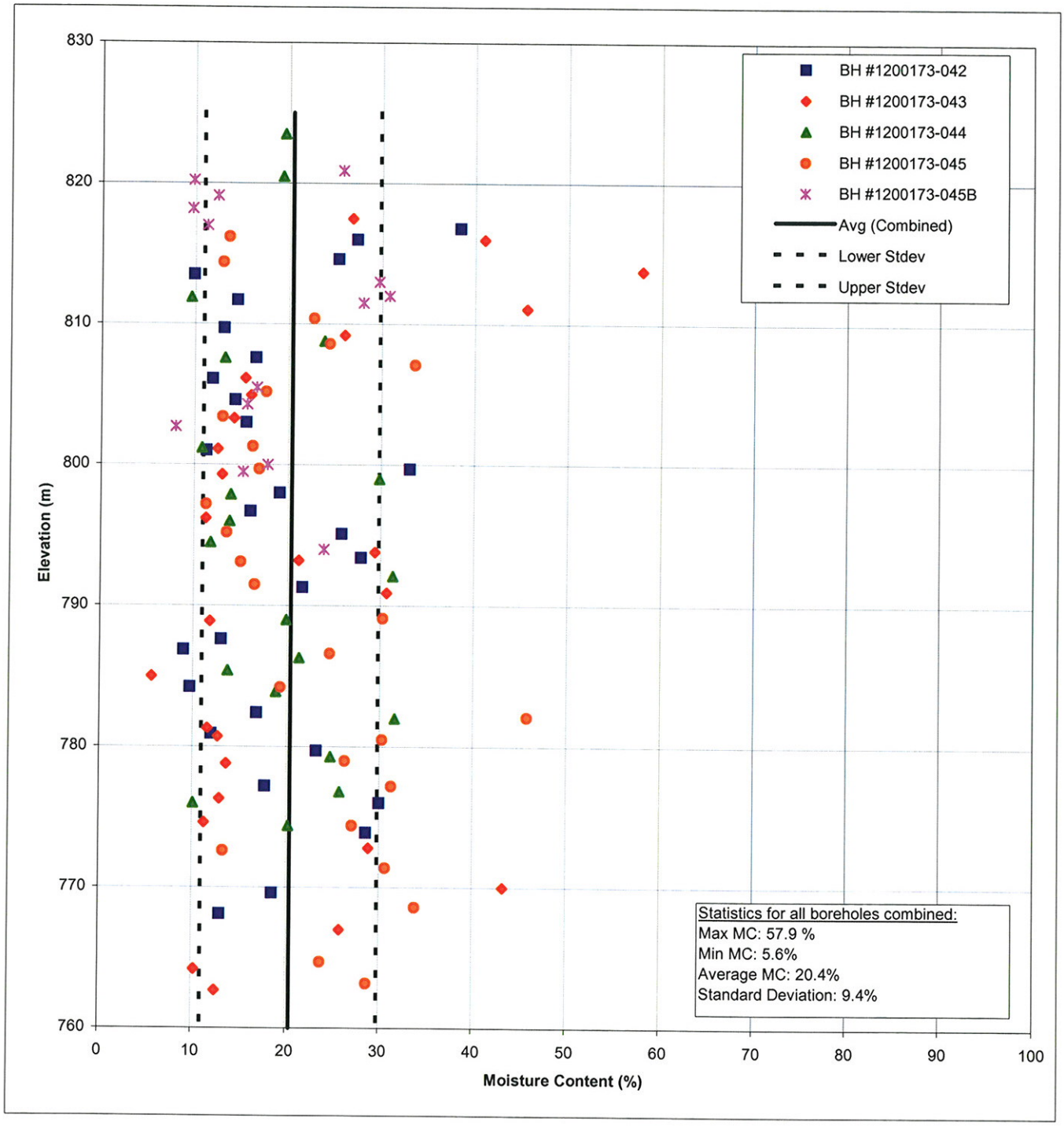


Figure C.1
Moisture Content versus Elevation for 2005 Characterization
Minto Mine
Proposed Reclamation Overburden Dump

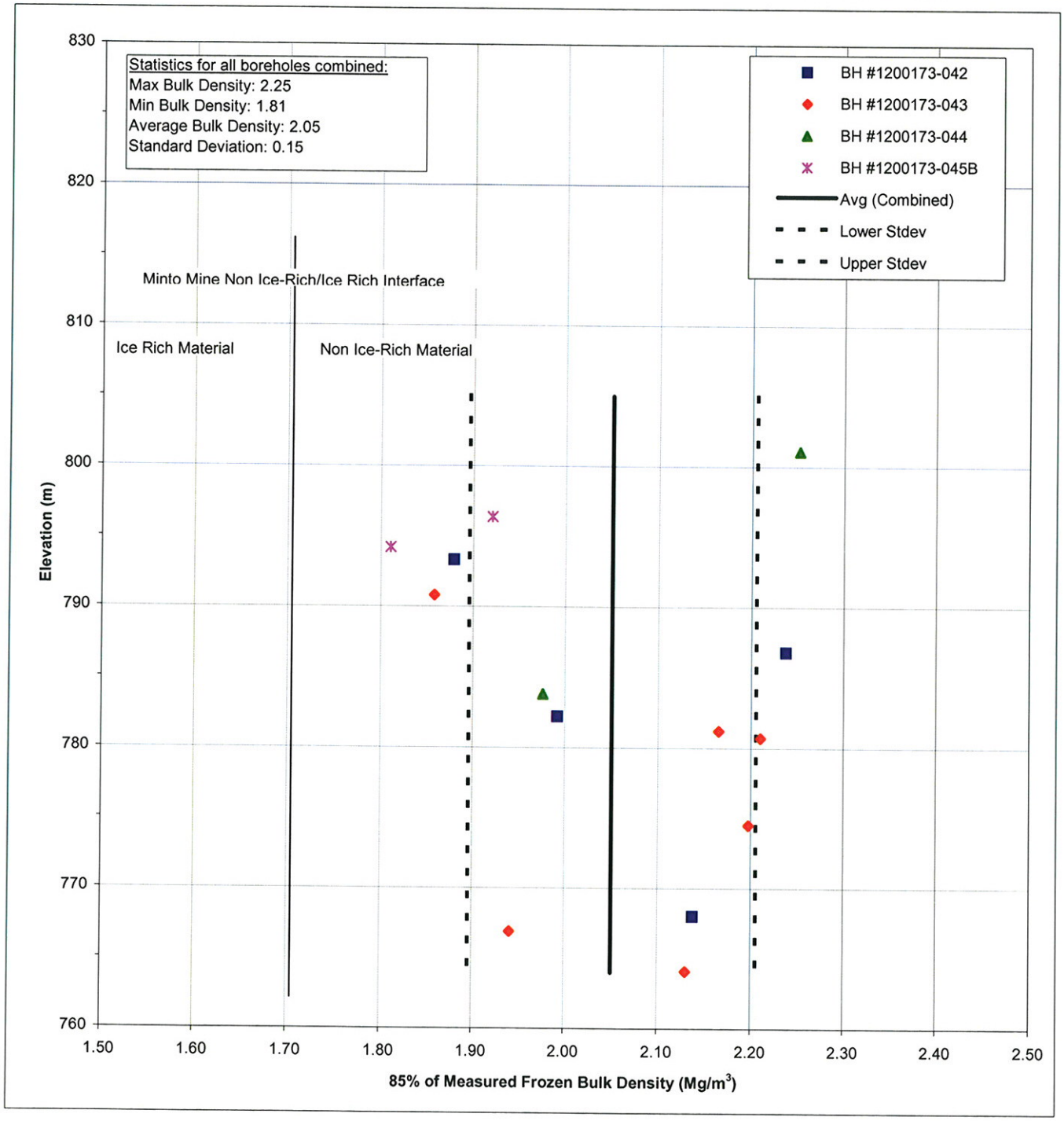


Figure C.2
Frozen Bulk Density versus Elevation for 2005 Characterization
Minto Mine
Proposed Reclamation Overburden Dump

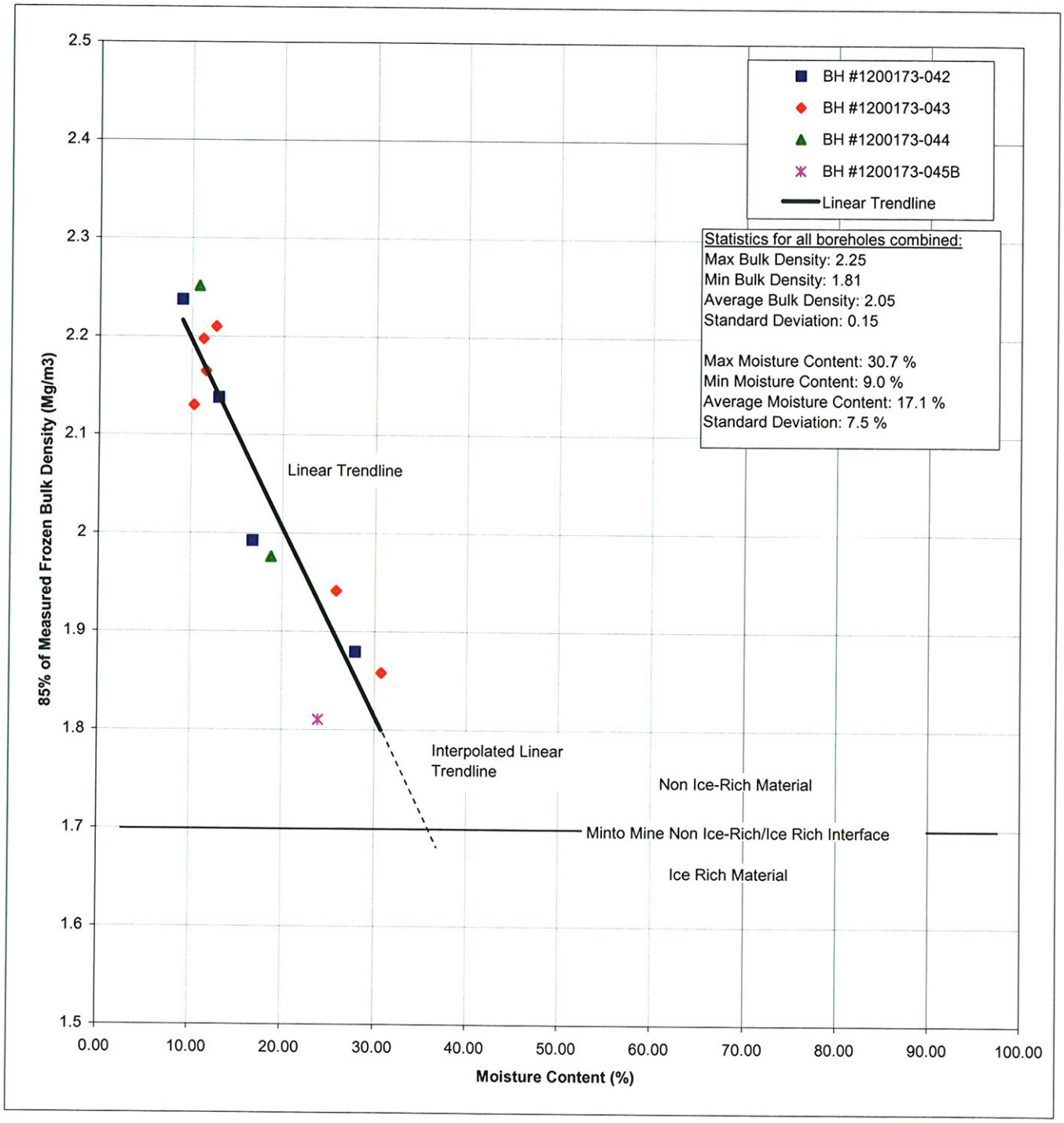


Figure C.3
Moisture Content versus Frozen Bulk Density for 2005 Characterization
Minto Mine
Proposed Reclamation Overburden Dump

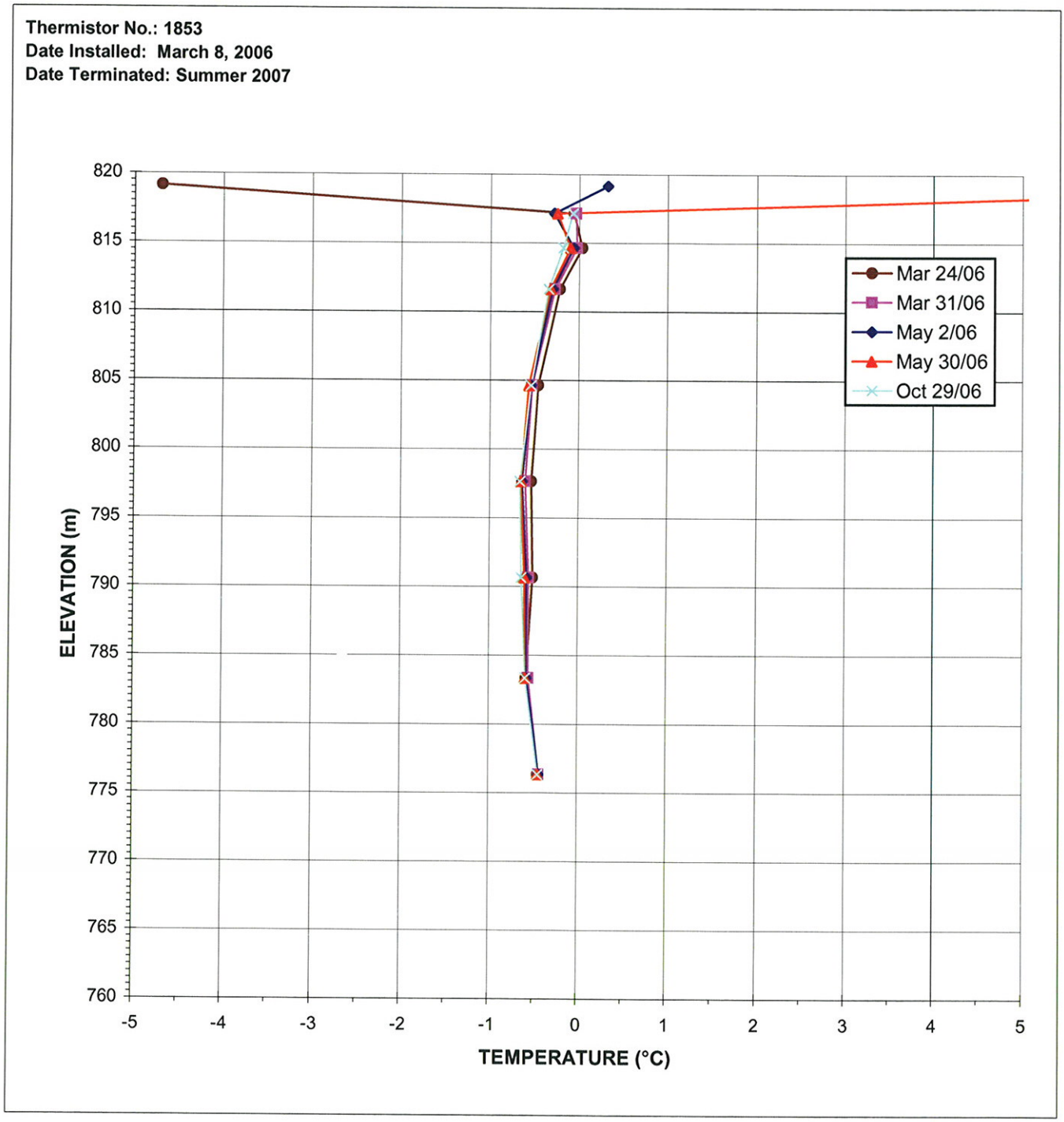


Figure C.4
Ground Temperature Profile for Borehole 1200173-042
Minto Mine
Proposed Reclamation Overburden Dump

ISSUED FOR REVIEW

TABLE C.1 - SUMMARY OF PARTICLE SIZE DISTRIBUTION AND ATTERBERG LIMIT DETERMINATIONS

Elevation(m)	Sample	BH-042							BH-043							BH-044							BH-045							BH-045B						
		% Clay	% Silt	% Sand	% Grav	Atterberg LL	Atterberg PL	Atterberg PI	% Clay	% Silt	% Sand	% Grav	Atterberg LL	Atterberg PL	Atterberg PI	% Clay	% Silt	% Sand	% Grav	Atterberg LL	Atterberg PL	Atterberg PI	% Clay	% Silt	% Sand	% Grav	Atterberg LL	Atterberg PL	Atterberg PI	% Clay	% Silt	% Sand	% Grav	Atterberg LL	Atterberg PL	Atterberg PI
821																																			
820	820.2																													2	18	49	31			
819																																			
818																																			
817	817																													6	32	27	35	17	11	6
816																																			
815	814.6	0	59	40	1																														
814	814.4																						1	32	37	30									
813																																			
812	811.9															5	22	28	45	18	15	3													
811	811.5																													20	19	36	25			
810	811.1								5	69	26	0	32	23	9																				
809																																			
808																																			
807																																			
806																																			
805	804.6	6	37	47	10	19	13	6																											
804																																			
803	803.4																						0	12	63	25									
802	801.2															11	29	21	39																	
801	801.1								6	36	42	16																							
800	800.0																													14	46	40	0			
799																																			
798																																			
797																																			
796																																			
795	795.1	16	47	26	11	22	14	8																											
794	794.0																													35	48	15	2			
793	793.1																						3	57	40	0									
792																																			
791	790.9								56	41	3	0																							
790																																			
789																																			
788																																			
787																																			
786																																			
785	784.2	8	38	41	13																														
784	783.9															11	30	47	12																	
783																																			
782	782.1																						36	62	2	0									
781																																			
780																																			
779																																			
778																																			
777																																			
776																																			
775																																			
774	774.4															3	64	33	0	51	26	24													
773	772.8								28	56	15	1	39	26	13																				
772	772.6																						17	18	22	43	35	21	15						
771																																			
770	769.6	28	19	38	15																														
769																																			
768																																			
767																																			
766																																			
765																																			
764																																			
763	762.7								1	21	41	37																							
762																																			
761																																			

Elevation(m)	ALL BOREHOLES COMBINED						
	% Clay	% Silt	% Sand	% Gravel	Atterberg LL	Atterberg PL	Atterberg PI
820.2	2	18	49	31			
817	6	32	27	35	16.5	11	5.5
814.6	0	59	40	1			
814.4	1	32	37	30			
811.9	5	22	28	45	17.7	14.8	2.9
811.5	20	19	36	25			
811.1	5	69	26	0	32	23.4	8.6
804.6	6	37	47	10	19	13	6
803.4	0	12	63	25			
801.2	11	29	21	39			
801.1	6	36	42	16			
800.0	14	46	40	0			
795.1	16	47	26	11	22	14	8
794.0	35	48	15	2			
793.1	3	57	40	0			
790.9	56	41	3	0			
784.2	8	38	41	13			
783.9	11	30	47	12			
782.1	36	62	2	0			
774.4	3	64	33	0	50.5	26.2	24.3
772.8	28	56	15	1	39.2	25.8	13.4
772.6	17	18	22	43	35.4	20.6	14.8
769.6	28	19	38	15			
762.7	1	21	41	37			
Min %	0	12	2	0	16.5	11	2.9
Max %	56	69	63	45	50.5	26.2	24.3
Average %	13.3	38.0	32.5	16.3	29.0	18.6	10.4
Standard Deviation	14.2	16.9	14.6	15.8	12.2	6.1	6.9

APPENDIX

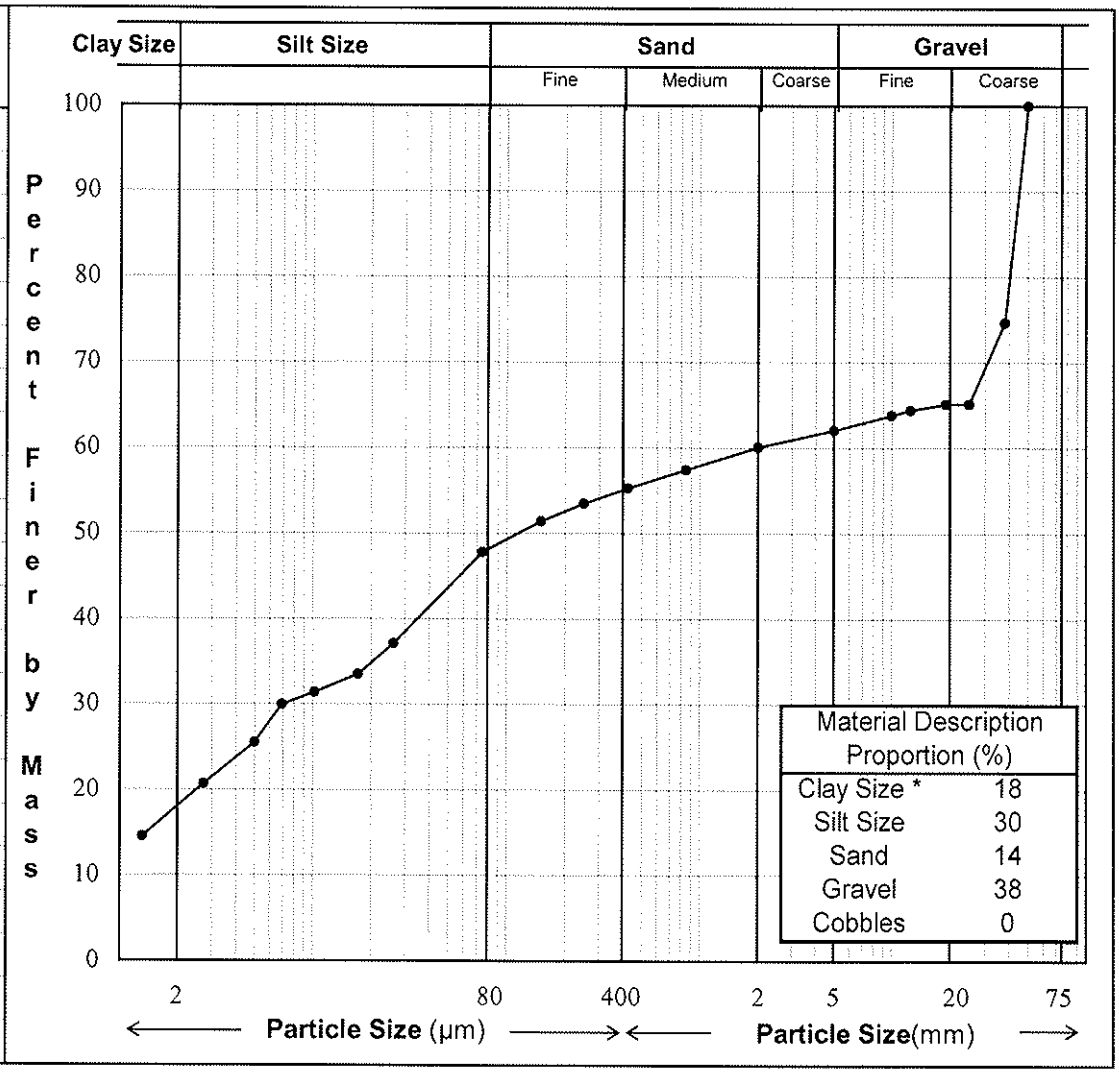
APPENDIX D 2008 OVERBURDEN CHARACTERIZATION PROGRAM – LABORATORY DATA

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/11
Client:	Minto Explorations Ltd.		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08 - ROD -OB01		
Depth:	796 m Bench		
Description**:	SILT AND SAND - trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	100
38 mm	75
25 mm	65
19 mm	65
13 mm	64
10 mm	64
5 mm	62
2 mm	60
850 µm	57
425 µm	55
250 µm	53
150 µm	51
75 µm	48
26 µm	37
17 µm	33
10 µm	31
7 µm	30
5 µm	26
3 µm	21
1 µm	15



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

EBA Engineering Consultants Ltd.

EBA Engineering Consultants Ltd.

MOISTURE - DENSITY RELATIONSHIP

ASTM D698, D1557, or D2049

Project: Minto Mine - Reclamation Overburden Dump

Project No.: W14101068.004

Client: Minto Explorations Ltd.

Soil Description: SILT, gravelly (50mm max.), some clay, sand - yellowish brown

Sample Location: Eastern section of 796 bench

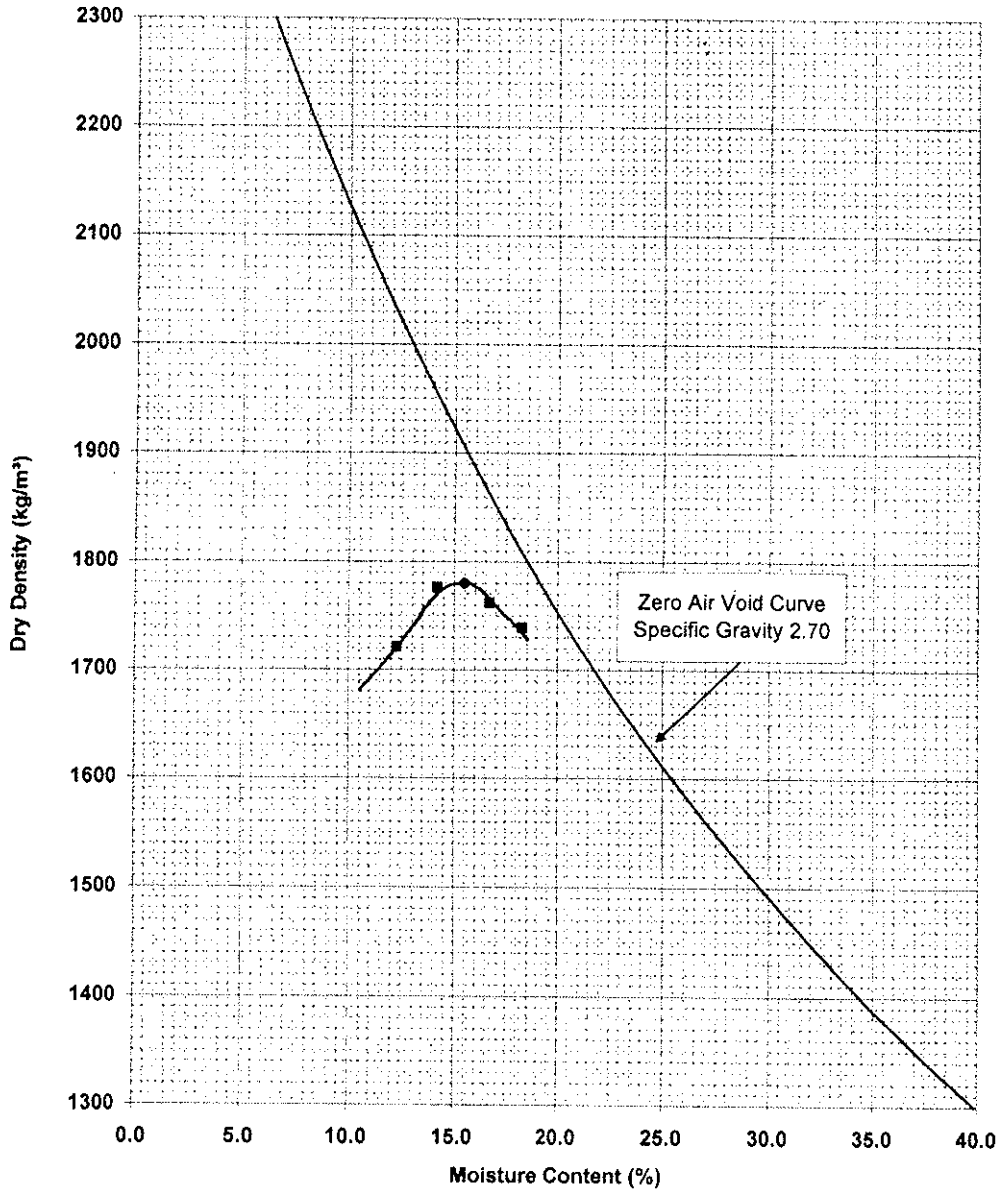
Sample Number: 08-ROD-0B01

Date Tested: 08/01/10

Moisture Content (as received): 39.4%

Maximum Dry Density: 1780 kg/m³

Optimum Moisture Content: 15.5%



STANDARD PROCTOR

ASTM D698

Hammer Mass: 2.494 kg

Hammer Drop: 304.8 mm

Number of Layers: 3

Number of Blows/Layer: 56

Diameter of Mould: 152.3 mm

Height of Mould: 116.5 mm

Mould Volume: 0.00212 m³

Compactive Effort: 590.3 kJ/m³

REVIEWED BY:

REMARKS:

Rock correction = 2.2%+19mm

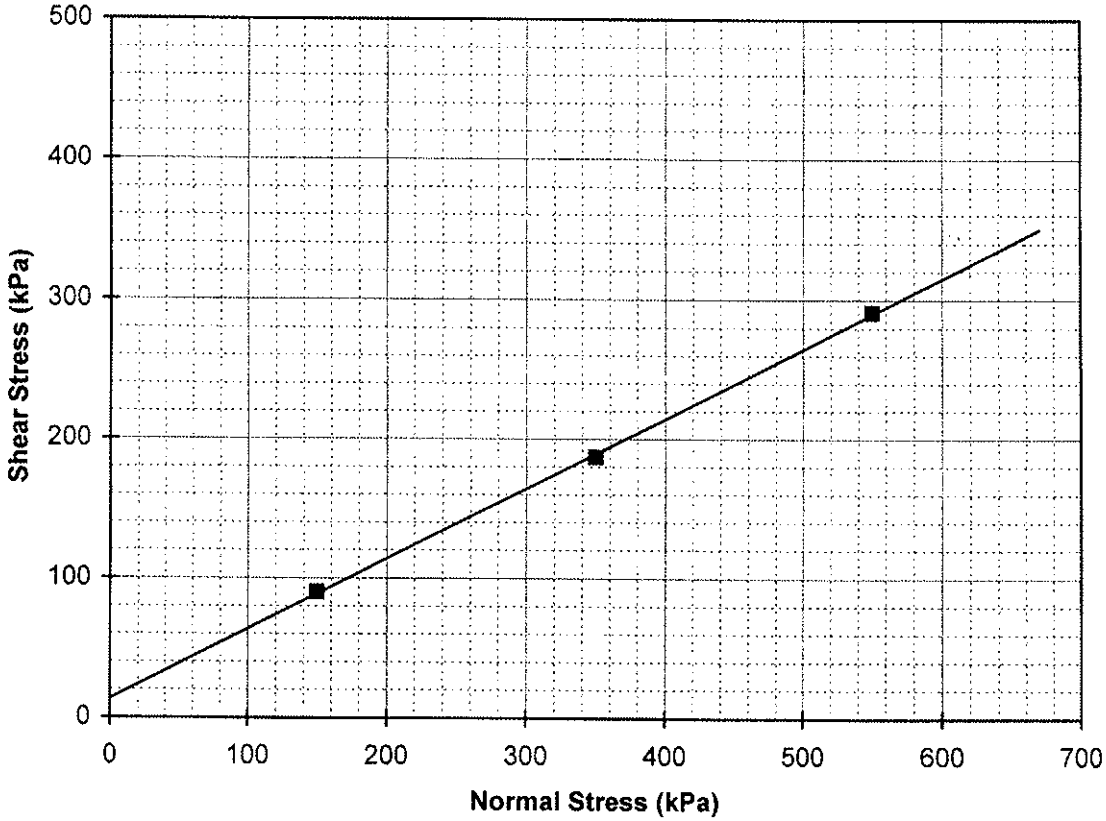
EBA Engineering Consultants Ltd.

Creating and Delivering Better Solutions

Summary of Direct Shear Test Results

Project : Reclamation Overburden Dump **Project No. :** W14101068.004

Test Hole No.: 08-ROD-OB01 (Tested @ 85% SPD) **Date :** 08-01-23



Inferred Shear Strength Parameters :-

	Cohesion Intercept (kPa)	Inferred Angle of Shearing Resistance (Degrees)
Peak Strength	13.5	26.7
Residual Strength	n/a	n/a

EBA Engineering Consultants Ltd.

Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-18
Test Hole No.: 08-ROD-OB01
Test Number: DS-4

Initial Sample Conditions

Moisture Content (%): 16.6
Wet Density (Mg/m3): 1.759
Dry Density (Mg/m3): 1.509

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	7.62	-0.523	88.1
0.14	-0.006	7.3	7.88	-0.521	88.7
0.29	-0.010	14.7	8.15	-0.518	88.9
0.45	-0.019	23.3	8.41	-0.525	89.1
0.66	-0.041	33.0	8.65	-0.532	88.7
0.86	-0.060	38.7	8.91	-0.538	89.1
1.09	-0.107	45.0	9.17	-0.538	89.4
1.32	-0.161	49.2	9.42	-0.541	89.7
1.54	-0.205	53.4	9.66	-0.542	89.3
1.78	-0.244	56.2	9.93	-0.542	89.5
1.99	-0.272	58.9	10.19	-0.543	89.6
2.21	-0.294	62.2	10.44	-0.553	89.4
2.43	-0.318	65.5	10.67	-0.549	89.5
2.67	-0.338	67.9	10.94	-0.558	89.3
2.89	-0.364	70.4	11.18	-0.551	89.3
3.32	-0.378	74.6	11.43	-0.552	88.8
3.54	-0.393	76.0	11.68	-0.548	88.8
3.76	-0.404	77.5	11.92	-0.553	88.8
3.97	-0.416	78.8	12.15	-0.553	88.6
4.19	-0.439	80.2	12.37	-0.547	88.6
4.40	-0.453	81.5	12.59	-0.552	88.8
4.61	-0.465	82.5	12.83	-0.545	88.2
4.84	-0.468	83.7	13.28	-0.549	87.6
5.03	-0.474	84.3	13.51	-0.560	87.7
5.29	-0.482	85.3	13.75	-0.560	87.4
5.55	-0.487	86.1	13.98	-0.559	87.2
5.81	-0.502	86.7	14.20	-0.556	86.9
6.07	-0.507	87.1	14.45	-0.559	86.3
6.32	-0.512	87.5	14.67	-0.561	86.1
6.58	-0.515	87.7	14.87	-0.566	85.6
6.85	-0.518	87.6	15.09	-0.568	85.3
7.09	-0.521	87.9			
7.35	-0.526	87.9			

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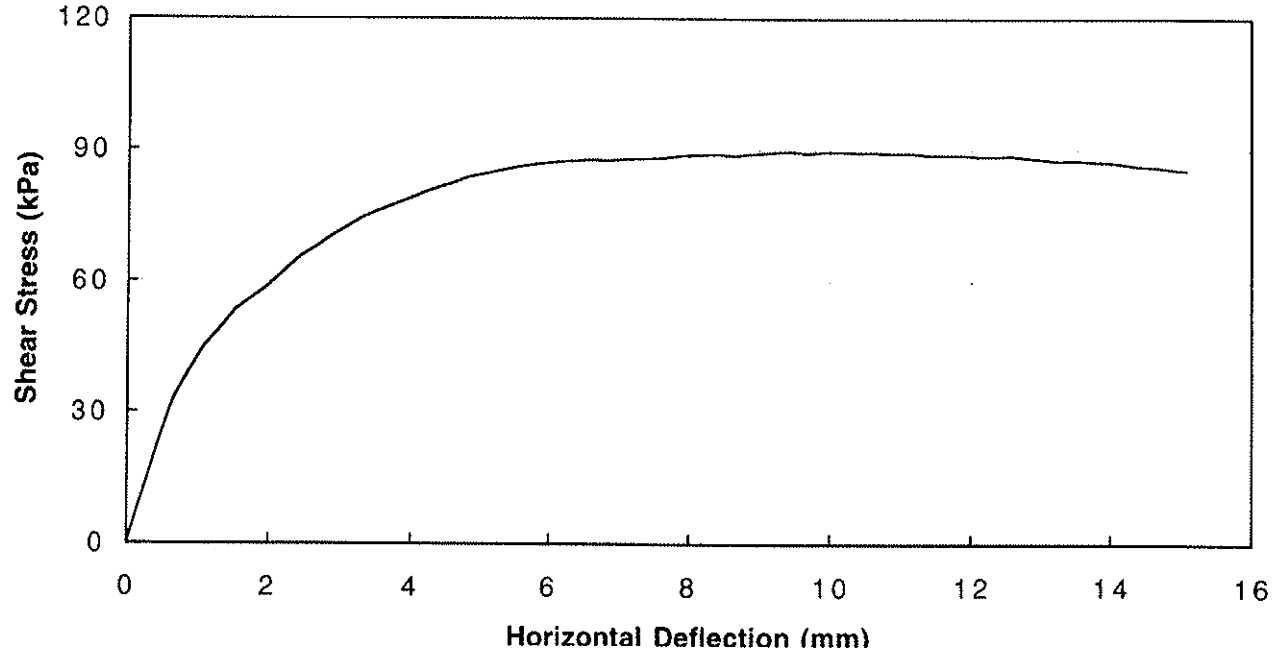
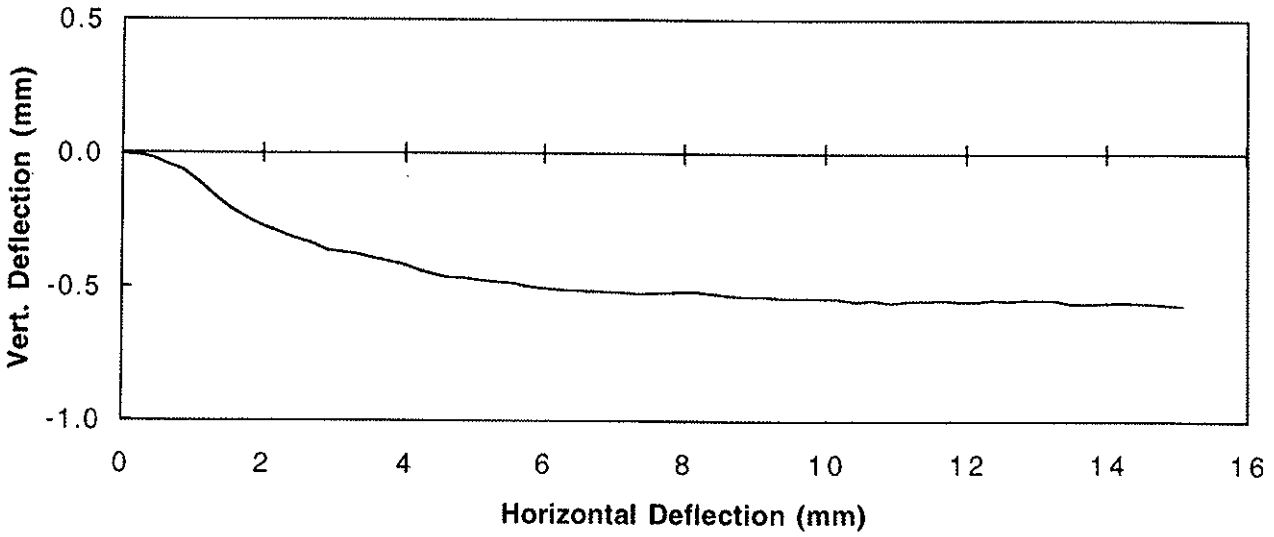
Direct Shear Test

Peak Stress = 90 kPa





Test Hole Number: 08-ROD-OB01
Normal Stress(kPa): 150
Displ. Rate(mm/min.): 0.024
Test No.: DS-4

SAMPLE INFORMATION

Project: Reclamation Overburden Dump
Address: _____
_____
Project Number: W1410168.004
Date Tested: 08.01.18 By: S.K.
Test Apparatus: Direct Shear
Machine Number: 1
Rate of Strain: .024 mm/minute
Normal Stress: 150 kPa
Cell Pressure: _____ kPa
Back Pressure: _____ kPa
Head Differential: _____ kPa
Swelling Pressure: _____ kPa

Borehole Number: 08-ROD-OB01
Depth: _____
Test Number: DS-4
Sample Description: SILT, clayey, some sand, trc. gravel.

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	63.50	19.06

$\gamma_{max} = 1.780$ Mg/m³ @ 15.5 % Opt. m.c. $V = 60.36$ cm³

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		182.13	(111.19) 116.64
Mass of Dry Soil & Tare g			(91.08) 96.75
Mass of Tare g		75.97	6.67
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.56	22.08
Wet Density Mg/m³		1.759	
Dry Density Mg/m³		1.509	

84.8% SPD

7.6
6.6
1.0

Sketch and Remarks:

150 kPa = 21.75 psi × 4.91 in² = 106.8 lbs.
= 2.6 lbs. on Lv. hanger

Angle of Shear: _____

EBA Engineering Consultants Ltd.

Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-18
Test Hole No.: 08-ROD-OB01
Test Number: DS-5

Initial Sample Conditions

Moisture Content (%): 16.2
Wet Density (Mg/m3): 1.752
Dry Density (Mg/m3): 1.508

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	7.34	-0.523	186.2
0.11	-0.017	17.5	7.60	-0.531	185.9
0.17	-0.029	33.5	7.86	-0.530	185.9
0.29	-0.050	51.3	8.13	-0.535	185.1
0.48	-0.075	67.5	8.37	-0.541	184.8
0.71	-0.115	88.4	8.63	-0.548	184.5
0.95	-0.154	107.5	8.90	-0.556	183.7
1.17	-0.188	119.5	9.16	-0.559	183.0
1.39	-0.214	126.7	9.41	-0.569	182.8
1.60	-0.240	134.9	9.68	-0.570	182.2
1.82	-0.265	140.2	9.93	-0.574	181.3
2.05	-0.282	147.3	10.18	-0.583	180.9
2.25	-0.302	152.4	10.43	-0.585	180.0
2.47	-0.308	158.1	10.67	-0.592	179.7
2.69	-0.323	161.2	10.94	-0.592	178.6
3.13	-0.354	167.7	11.19	-0.596	176.0
3.34	-0.372	169.4	11.44	-0.596	175.3
3.56	-0.380	172.2	11.69	-0.602	175.4
3.78	-0.395	175.4	11.93	-0.603	173.5
3.98	-0.415	177.4	12.19	-0.609	173.8
4.19	-0.426	179.0	12.43	-0.614	172.7
4.40	-0.432	180.2	12.67	-0.622	172.0
4.62	-0.434	181.4	12.90	-0.626	171.4
4.83	-0.444	182.3	13.39	-0.627	170.1
5.06	-0.453	183.4	13.63	-0.635	169.7
5.31	-0.461	183.9	13.86	-0.637	169.0
5.55	-0.477	184.3	14.09	-0.648	167.3
5.81	-0.488	185.2	14.38	-0.652	167.2
6.07	-0.493	185.2	14.57	-0.658	166.6
6.32	-0.510	185.8	14.79	-0.659	166.6
6.60	-0.504	186.3	15.01	-0.660	164.4
6.86	-0.509	186.4			
7.10	-0.516	186.7			

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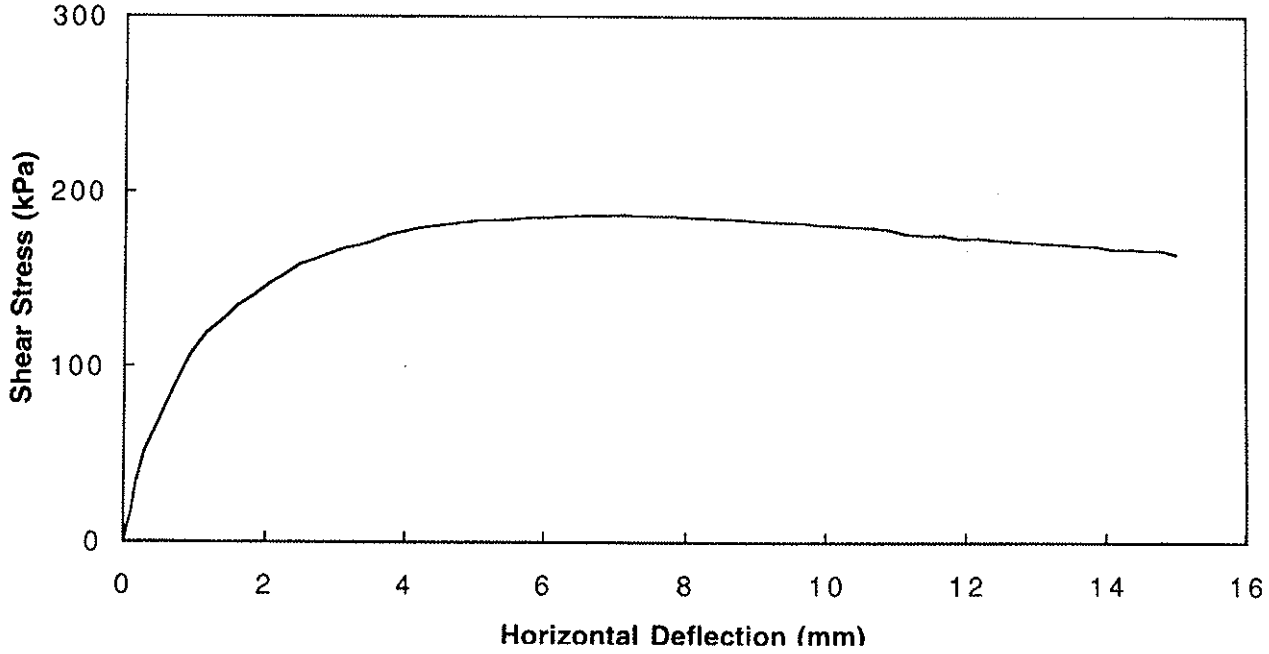
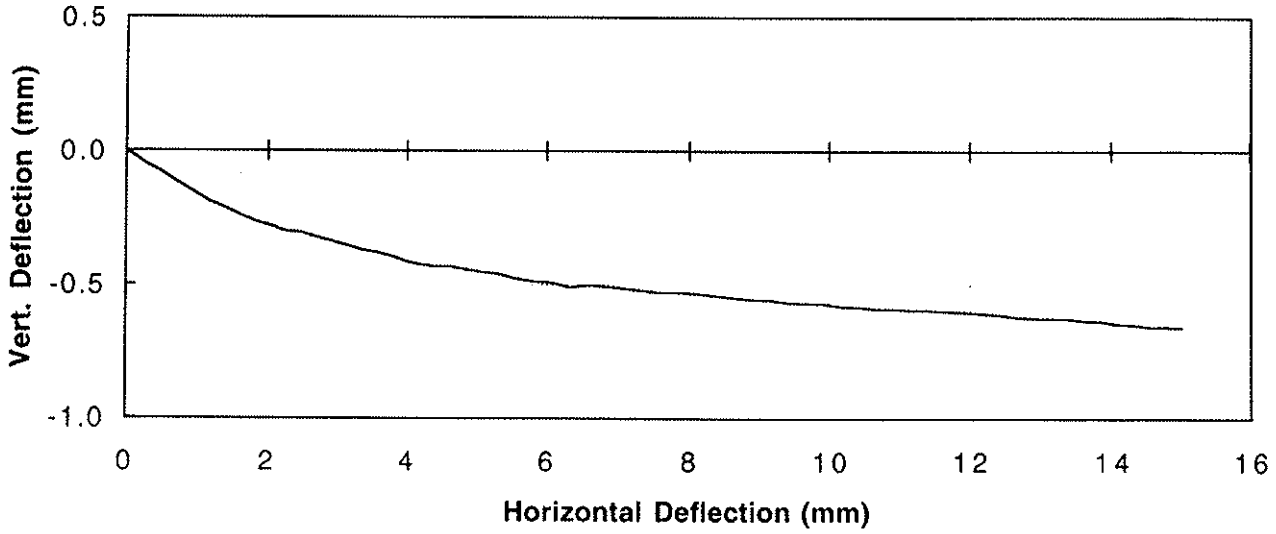
Direct Shear Test

Peak Stress = 187 kPa





Test Hole Number:	08-ROD-OB01
Normal Stress(kPa):	350
Displ. Rate(mm/min.):	0.024
Test No.:	DS-5

SAMPLE INFORMATION

Project: Reclamation Overburden Dump
Borehole Number: 08-ROD-OB01
Address:
Depth:
Test Number: DS-5
Project Number: W1410068.004
Sample Description: SILT, clayey, some sand, trc. gravel
Date Tested: 08.01.18 By: S.K.
Test Apparatus: Direct Shear
Machine Number: 2
Rate of Strain: .024 mm / minute
Normal Stress: 350 kPa
Cell Pressure: kPa
Back Pressure: kPa
Head Differential: kPa
Swelling Pressure: kPa

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	63.50	19.06

$\gamma_{max.} = 1.780$ Mg/m^3 @ 15.5 % Opt. m.c. $V = 60.36$ cm^3

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		181.74	(109.10) 114.40
Mass of Dry Soil & Tare g			(91.01) 96.54
Mass of Tare g		75.97	6.67
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.22	19.87
Wet Density Mg/m^3		1.752	
Dry Density Mg/m^3		1.508	

84.7 % SPD

7.8
6.7
1.1

Sketch and Remarks:

350 kPa = 50.76 psi x 4.91 in^2 = 249.2 lbs.
= 16.8 lbs. on Lv. Arm

Angle of Shear:

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Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-21
Test Hole No.: 08-ROD-OB01
Test Number: DS-6

Initial Sample Conditions

Moisture Content (%): 16.3
Wet Density (Mg/m3): 1.755
Dry Density (Mg/m3): 1.510

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.46	-0.444	290.4
0.09	-0.006	25.9	6.72	-0.446	291.2
0.16	-0.012	53.9	6.96	-0.450	290.9
0.25	-0.016	80.8	7.19	-0.451	290.8
0.30	-0.020	107.5	7.45	-0.463	290.7
0.38	-0.034	128.7	7.66	-0.463	290.2
0.52	-0.062	152.5	7.94	-0.466	290.1
0.66	-0.091	167.4	8.16	-0.470	289.4
0.81	-0.122	186.1	8.42	-0.472	288.4
0.97	-0.143	198.8	8.69	-0.475	288.7
1.14	-0.160	211.3	8.94	-0.483	288.4
1.41	-0.174	224.1	9.18	-0.487	287.9
1.62	-0.191	230.5	9.42	-0.484	286.9
1.81	-0.207	238.2	9.70	-0.484	286.9
1.96	-0.225	243.4	9.99	-0.484	286.6
2.10	-0.243	249.4	10.30	-0.483	286.3
2.27	-0.263	252.7	10.60	-0.483	285.6
2.42	-0.279	256.9	10.89	-0.483	285.0
2.58	-0.283	260.8	11.24	-0.484	285.2
2.99	-0.289	268.2	11.52	-0.485	283.6
3.22	-0.293	271.8	11.83	-0.485	283.2
3.44	-0.299	274.3	12.09	-0.483	280.5
3.67	-0.300	276.7	12.37	-0.483	280.4
3.91	-0.315	279.8	12.65	-0.483	279.4
4.18	-0.324	282.5	12.94	-0.484	278.8
4.45	-0.344	285.0	13.22	-0.485	276.7
4.71	-0.362	286.4	13.48	-0.488	276.5
4.97	-0.373	287.0	13.81	-0.491	274.9
5.23	-0.387	288.0	14.05	-0.494	274.3
5.50	-0.402	287.6	14.33	-0.495	274.2
5.73	-0.420	288.8	14.60	-0.498	273.1
5.98	-0.430	289.7			
6.23	-0.434	290.2			

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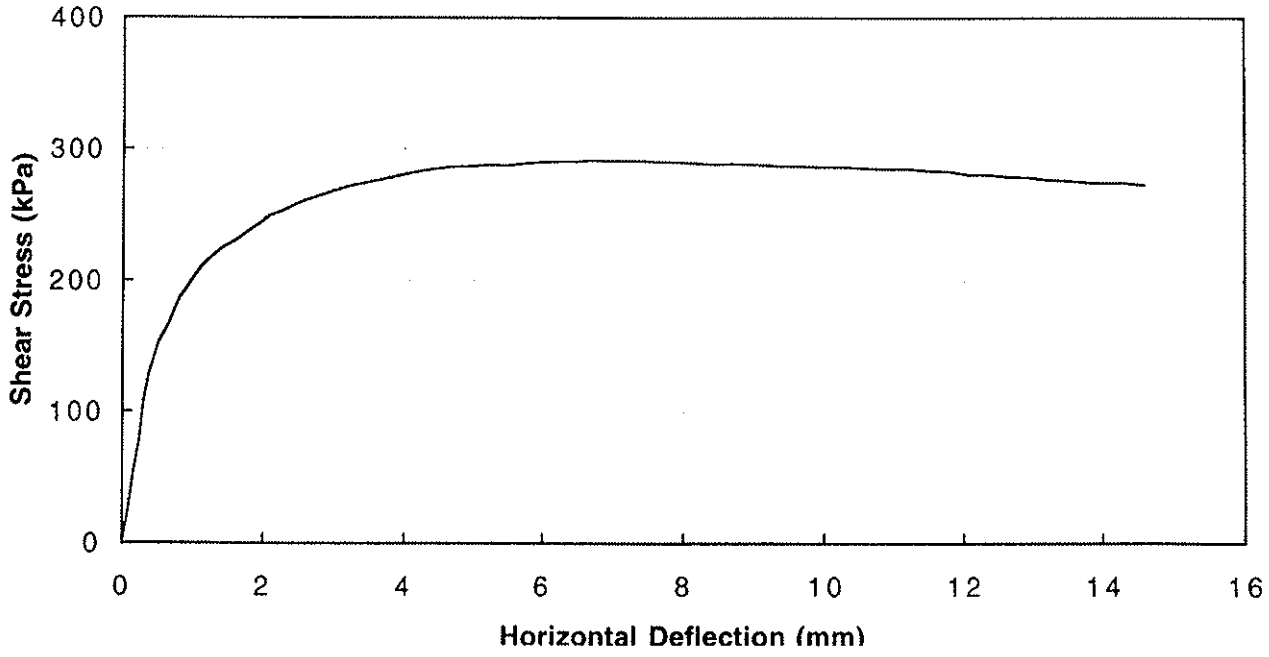
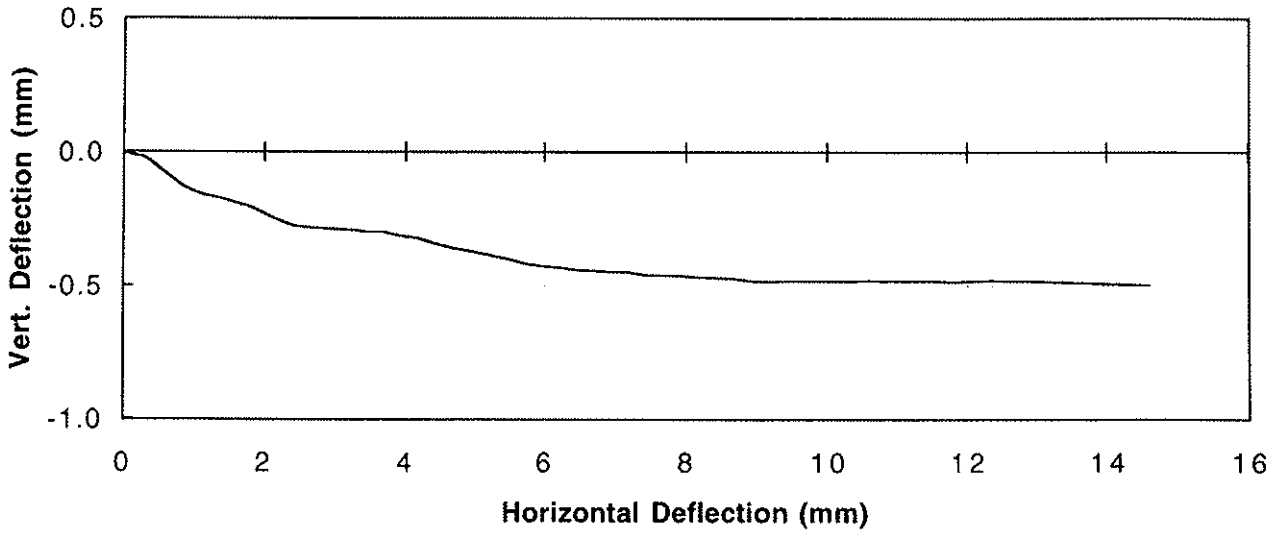
Direct Shear Test

Peak Stress = 291 kPa





Test Hole Number:	08-ROD-OB01
Normal Stress(kPa):	550
Displ. Rate(mm/min.):	0.024
Test No.:	DS-6

SAMPLE INFORMATION

Project: Reclamation Overburden Dump Borehole Number: 08-ROD-OB01

Address: _____ Depth: _____

Test Number: DS-6

Project Number: W14101068.004 Sample Description: SILT, clayey, some sand, trc. gravel,

Date Tested: 08.01.21 By: S.K.

Test Apparatus: Direct Shear

Machine Number: 3

Rate of Strain: .024 mm/minute

Normal Stress: 550 kPa

Cell Pressure: _____ kPa

Back Pressure: _____ kPa

Head Differential: _____ kPa

Swelling Pressure: _____ kPa

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	63.50	19.06

$\gamma_{max.} = 1.780$ Mg/m³ @ 15.5 % Opt. m.c. $V = 60.36$ cm³

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		181.94	(108.01) 113.67
Mass of Dry Soil & Tare g			(91.13) 96.95
Mass of Tare g		75.98	6.67
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.27	18.52
Wet Density Mg/m³		1.755	
Dry Density Mg/m³		1.510	

84.8 % SPD

7.5
6.6
0.8

Sketch and Remarks:

550 kPa = 79.77 psi. x 4.91 in² = 391.7 lbs.
= 30.9 lbs on Lv. hanger

Angle of Shear: _____

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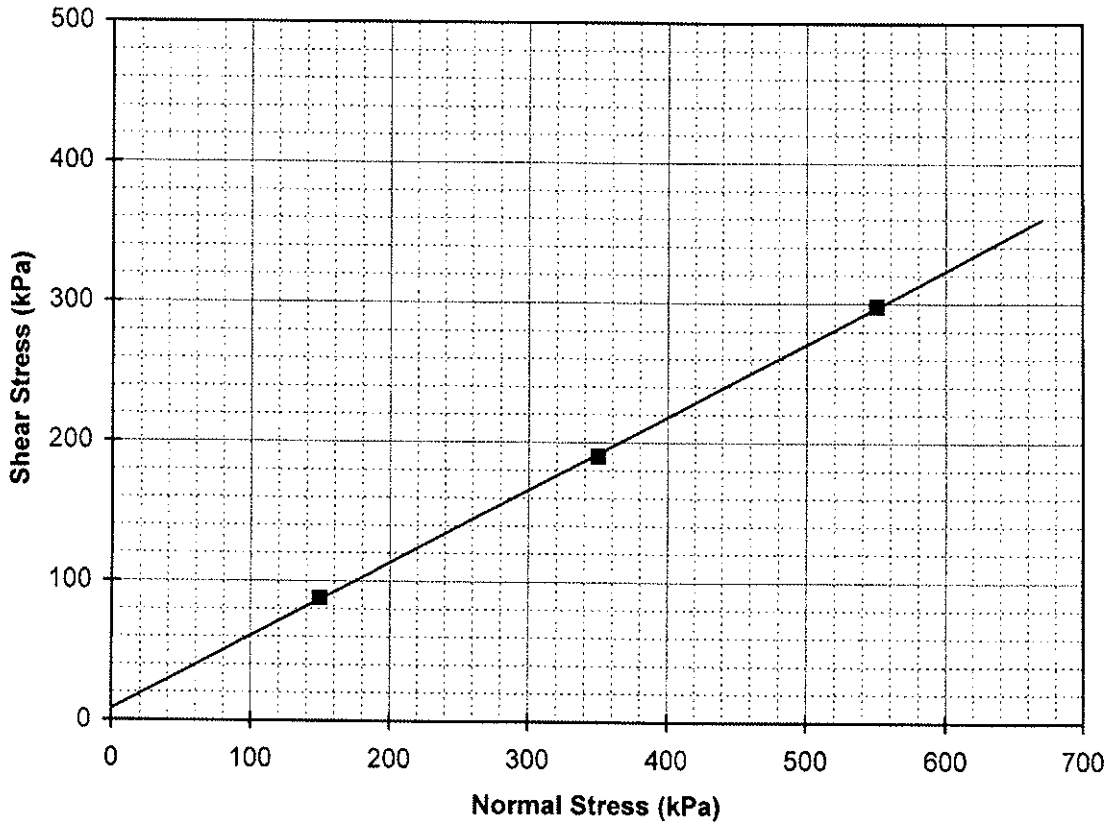
Creating and Delivering Better Solutions

Summary of Direct Shear Test Results

Project : Reclamation Overburden Dump **Project No. :** W14101068.004

Test Hole No.: 08-ROD-OB01 (Tested @ 90% SPD) **Date :** 08-01-23



Inferred Shear Strength Parameters :-

	Cohesion Intercept (kPa)	Inferred Angle of Shearing Resistance (Degrees)
Peak Strength	8.3	27.7
Residual Strength	n/a	n/a

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Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-15
Test Hole No.: 08-ROD-OB01
Test Number: DS-1

Initial Sample Conditions

Moisture Content (%): 16.4
Wet Density (Mg/m3): 1.866
Dry Density (Mg/m3): 1.603

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	5.34	-0.601	82.2
0.07	-0.012	7.8	5.64	-0.612	82.8
0.17	-0.011	15.1	5.94	-0.624	83.3
0.25	-0.020	19.3	6.29	-0.627	83.7
0.35	-0.034	23.9	6.63	-0.644	84.5
0.47	-0.073	28.8	6.98	-0.655	85.1
0.56	-0.108	32.2	7.34	-0.663	85.5
0.67	-0.132	36.0	7.68	-0.669	85.7
0.78	-0.151	38.7	8.02	-0.681	86.5
0.89	-0.178	42.1	8.36	-0.697	86.9
0.98	-0.210	44.4	8.72	-0.703	87.0
1.11	-0.227	46.7	9.06	-0.713	87.1
1.20	-0.245	48.9	9.41	-0.722	87.4
1.31	-0.270	51.0	9.75	-0.735	87.4
1.42	-0.288	52.9	10.10	-0.741	87.5
1.49	-0.301	54.7	10.44	-0.751	87.2
1.62	-0.320	56.8	10.78	-0.757	87.3
1.73	-0.338	57.6	11.12	-0.762	87.3
1.84	-0.354	59.2	11.45	-0.766	87.0
1.93	-0.372	60.9	11.77	-0.774	86.9
2.05	-0.377	62.0	12.09	-0.782	87.0
2.19	-0.390	63.6	12.40	-0.783	86.8
2.35	-0.405	65.9	12.70	-0.787	86.0
2.57	-0.445	68.3	13.00	-0.792	85.8
2.84	-0.464	70.3	13.33	-0.798	86.1
3.08	-0.490	72.4	13.62	-0.800	85.8
3.33	-0.509	74.1	13.99	-0.802	85.8
3.60	-0.523	75.9	14.31	-0.803	85.8
3.85	-0.532	77.1			
4.13	-0.551	78.4			
4.44	-0.563	79.7			
4.73	-0.580	80.6			
5.04	-0.589	81.6			

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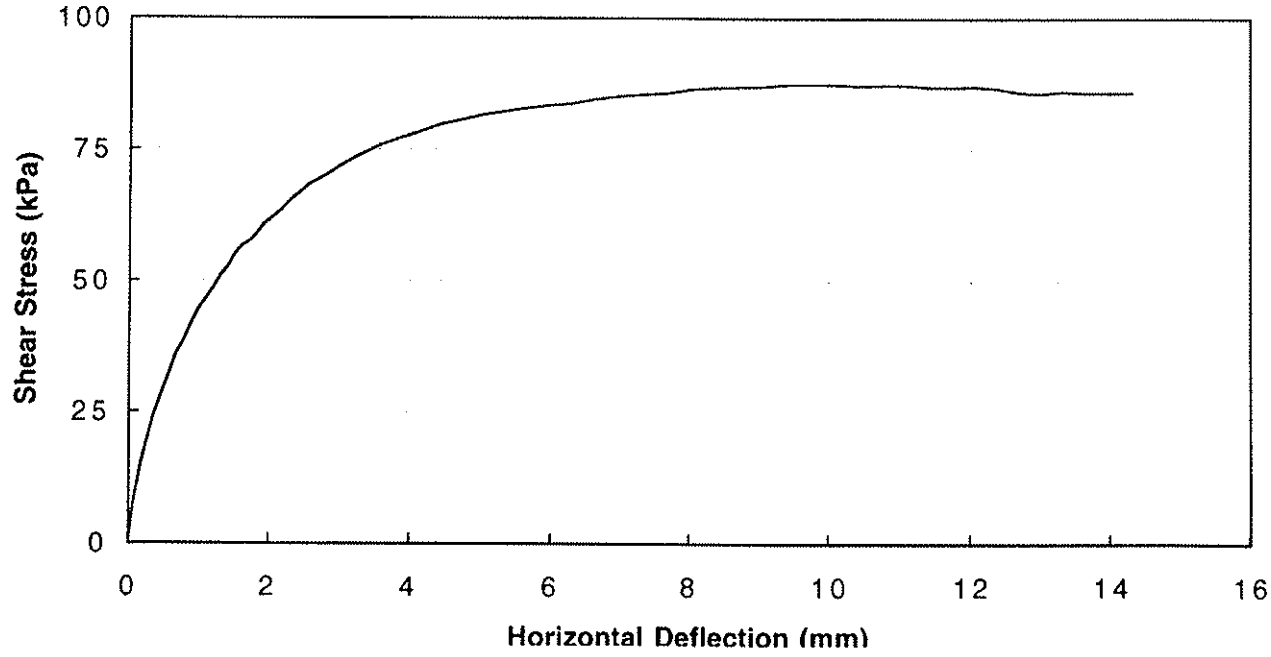
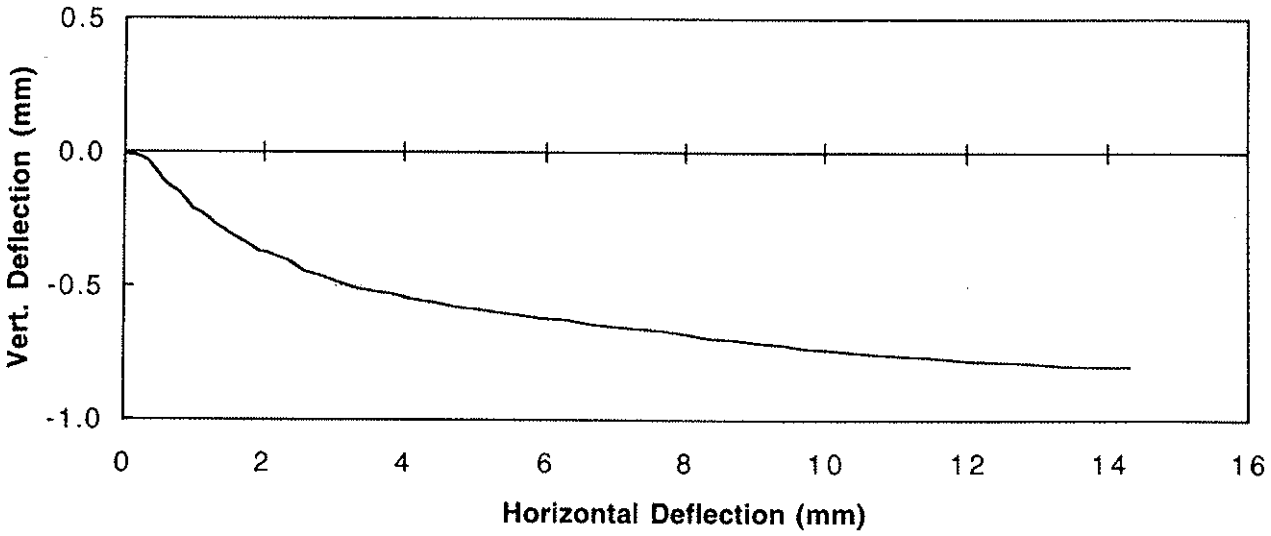
Direct Shear Test

Peak Stress = 88 kPa





Test Hole Number: 08-ROD-OB01
Normal Stress(kPa): 150
Displ. Rate(mm/min.): 0.024
Test No.: DS-1

SAMPLE INFORMATION

Project: Reclamation Overburden Dump
Borehole Number: 08-ROD-0801
Address:
Depth:
Test Number: DS-1
Project Number: W1410106 8.004
Sample Description: SILT, clayey, some sand, trc. gravel
Date Tested: 08.01.15 By: S.K.
Test Apparatus: Direct Shear
Machine Number: 3
Rate of Strain: .024 mm/minute
Normal Stress: 150 kPa
Cell Pressure: kPa
Back Pressure: kPa
Head Differential: kPa
Swelling Pressure: kPa

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	102.25	20.00

$\rho_{max.} = 1.780$ Mg/m^3 @ 15.5 % Opt. m.c.
$V = 209.10$ cm^3

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		567.45	(404.52) 404.05
Mass of Dry Soil & Tare g			(335.16) 336.62
Mass of Tare g		177.21	10.78
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.43	20.69
Wet Density Mg/m^3		1.866	
Dry Density Mg/m^3		1.603	

90.0 % SPD

15.9
6.5
9.3

Sketch and Remarks:

150 kPa = 21.75 psi x 16.21 in^2 = 352.65 lbs
= 27.1 lbs on Lv. hange

Angle of Shear:

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Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-16
Test Hole No.: 08-ROD-OB01
Test Number: DS-2

Initial Sample Conditions

Moisture Content (%): 16.5
Wet Density (Mg/m3): 1.868
Dry Density (Mg/m3): 1.604

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	5.75	-0.515	183.0
0.18	-0.009	46.3	6.11	-0.522	184.6
0.31	-0.038	63.6	6.47	-0.529	185.8
0.44	-0.064	75.9	6.82	-0.544	186.8
0.55	-0.107	84.6	7.17	-0.553	187.6
0.69	-0.132	92.8	7.52	-0.566	188.5
0.82	-0.156	99.9	7.88	-0.577	188.6
0.95	-0.181	106.7	8.24	-0.595	189.0
1.09	-0.202	112.9	8.60	-0.611	189.3
1.21	-0.227	118.2	8.95	-0.624	189.7
1.34	-0.243	123.4	9.31	-0.636	189.8
1.47	-0.262	127.9	9.67	-0.645	189.7
1.61	-0.276	132.4	10.01	-0.657	189.7
1.74	-0.294	136.5	10.36	-0.667	189.7
1.88	-0.307	139.7	10.74	-0.680	189.5
2.02	-0.313	143.4	11.13	-0.696	189.1
2.15	-0.328	146.6	11.51	-0.711	188.2
2.28	-0.341	149.4	11.89	-0.726	187.0
2.40	-0.351	152.3	12.27	-0.740	185.9
2.53	-0.365	155.0	12.65	-0.754	184.9
2.67	-0.373	157.3	13.03	-0.763	184.2
2.83	-0.390	160.1	13.41	-0.778	183.7
2.98	-0.399	162.4	13.79	-0.795	183.3
3.15	-0.407	164.5	14.17	-0.818	182.8
3.30	-0.418	166.4	14.55	-0.832	182.5
3.46	-0.424	168.3			
3.62	-0.429	170.0			
3.79	-0.435	172.1			
4.08	-0.448	174.1			
4.40	-0.459	176.2			
4.71	-0.473	178.3			
5.06	-0.484	179.9			
5.41	-0.497	181.3			

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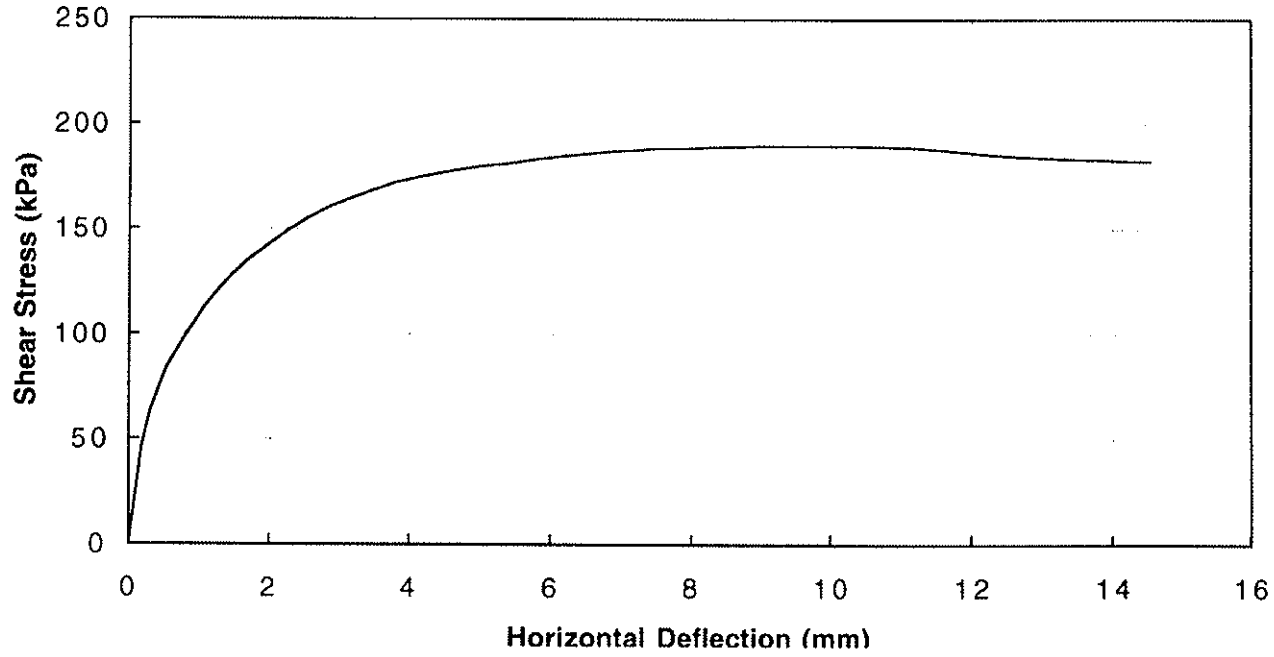
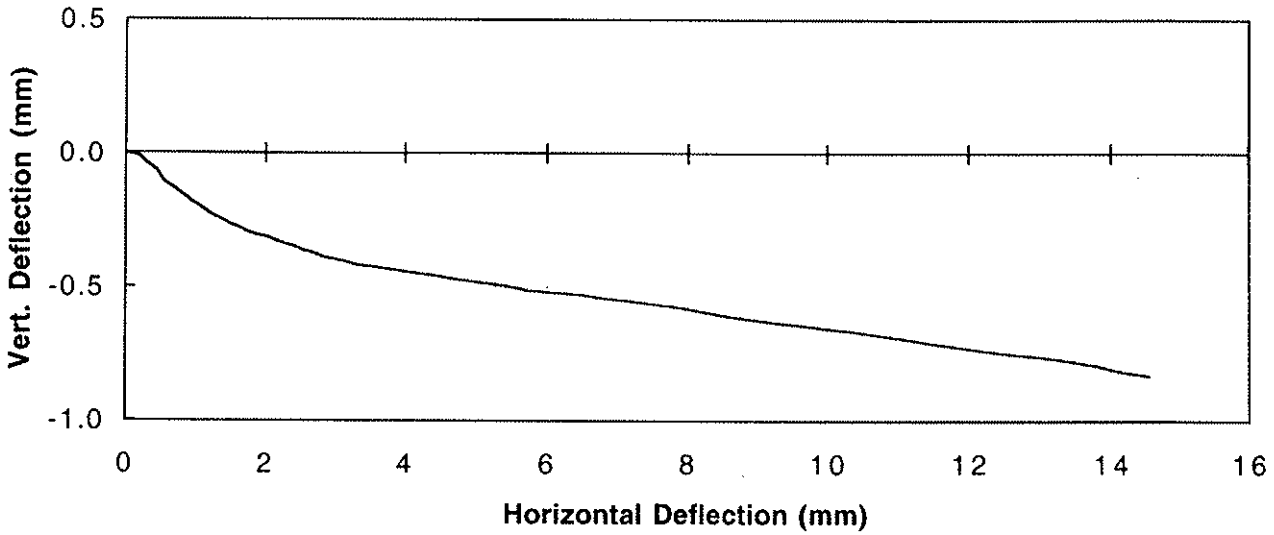
Direct Shear Test

Peak Stress = 190 kPa





Test Hole Number: 08-ROD-OB01
Normal Stress(kPa): 350
Displ. Rate(mm/min.): 0.024
Test No.: DS-2

SAMPLE INFORMATION

Project: Reclamation Overburden Dump
Borehole Number: 08-ROD-0801
Address:
Depth:
Test Number: DS-2
Project Number: W14101068.004
Sample Description: SILT, clayey, some sand, trc. gravel
Date Tested: 08.01.16 By: S.K.
Test Apparatus: Direct Shear
Machine Number: 2
Rate of Strain: .024 mm/minute
Normal Stress: 350 kPa
Cell Pressure: kPa
Back Pressure: kPa
Head Differential: kPa
Swelling Pressure: kPa

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	102.25	20.00

(max. = 1.780 Mg/m³ @ 15.5 % Opt. m.c.) (= 209.10 cm³

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		567.75	(402.06) 402.64
Mass of Dry Soil & Tare g			(335.35) 337.63
Mass of Tare g		177.21	10.81
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.46	19.89
Wet Density Mg/m³		1.868	
Dry Density Mg/m³		1.604	

90.1 % SPD

15.2
6.7
8.5

Sketch and Remarks:

350 kPa = 50.76 psi × 16.21 in² = 822.8 lbs
= 73.8 lbs. on Lv. hanger

Angle of Shear:

EBA Engineering Consultants Ltd.

Direct Shear Test — **Reclamation Overburden Dump**

Project No.: W14101068.004
Date Tested: 08-01-18
Test Hole No.: 08-ROD-OB01
Test Number: DS-3

Initial Sample Conditions

Moisture Content (%): 16.4
Wet Density (Mg/m3): 1.925
Dry Density (Mg/m3): 1.654

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.76	-0.560	290.5
0.10	-0.004	21.8	7.00	-0.575	291.4
0.21	-0.006	39.4	7.25	-0.580	292.4
0.38	-0.009	63.6	7.50	-0.587	293.5
0.55	-0.015	91.4	7.76	-0.590	294.6
0.68	-0.049	110.6	8.04	-0.592	295.3
0.84	-0.095	128.3	8.27	-0.595	295.6
1.04	-0.130	146.2	8.52	-0.602	296.4
1.25	-0.183	162.5	8.78	-0.610	296.9
1.46	-0.221	176.1	9.05	-0.613	297.6
1.67	-0.258	188.9	9.28	-0.619	297.0
1.86	-0.291	201.0	9.52	-0.629	297.1
2.08	-0.310	214.4	9.79	-0.630	297.1
2.28	-0.336	225.9	10.04	-0.637	296.9
2.48	-0.357	233.0	10.29	-0.637	296.6
2.71	-0.370	239.7	10.54	-0.637	295.6
2.91	-0.388	246.5	10.78	-0.641	294.9
3.13	-0.405	251.3	11.02	-0.643	294.7
3.34	-0.421	256.1	11.26	-0.651	294.9
3.53	-0.430	259.9	11.50	-0.654	293.9
3.74	-0.447	262.8	11.74	-0.657	293.3
3.95	-0.454	265.6	11.98	-0.655	292.8
4.16	-0.469	268.2	12.21	-0.655	291.5
4.36	-0.482	270.5	12.43	-0.661	289.8
4.57	-0.490	272.1	12.66	-0.662	289.3
4.78	-0.503	273.2	12.89	-0.662	289.0
4.98	-0.509	274.9	13.12	-0.667	288.3
5.23	-0.516	276.5	13.34	-0.673	286.7
5.49	-0.529	280.3	13.57	-0.676	285.9
5.74	-0.542	282.8	13.79	-0.677	284.8
5.98	-0.550	285.3	14.01	-0.684	283.6
6.23	-0.555	287.3			
6.50	-0.555	289.1			

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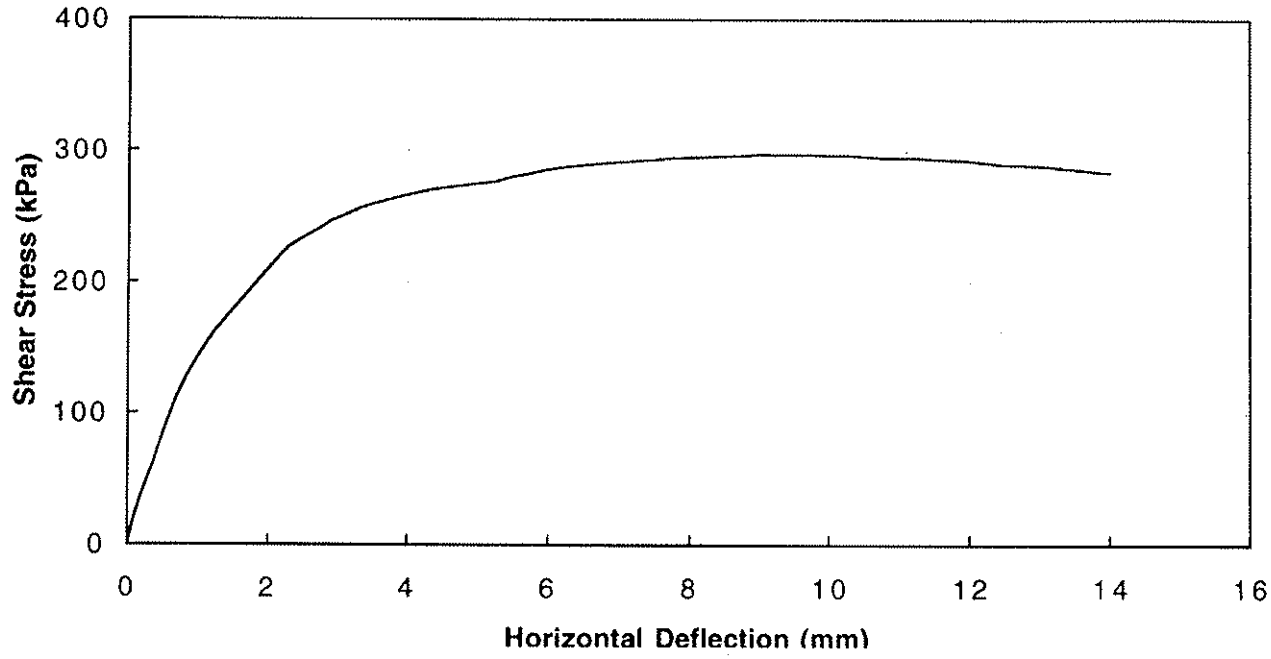
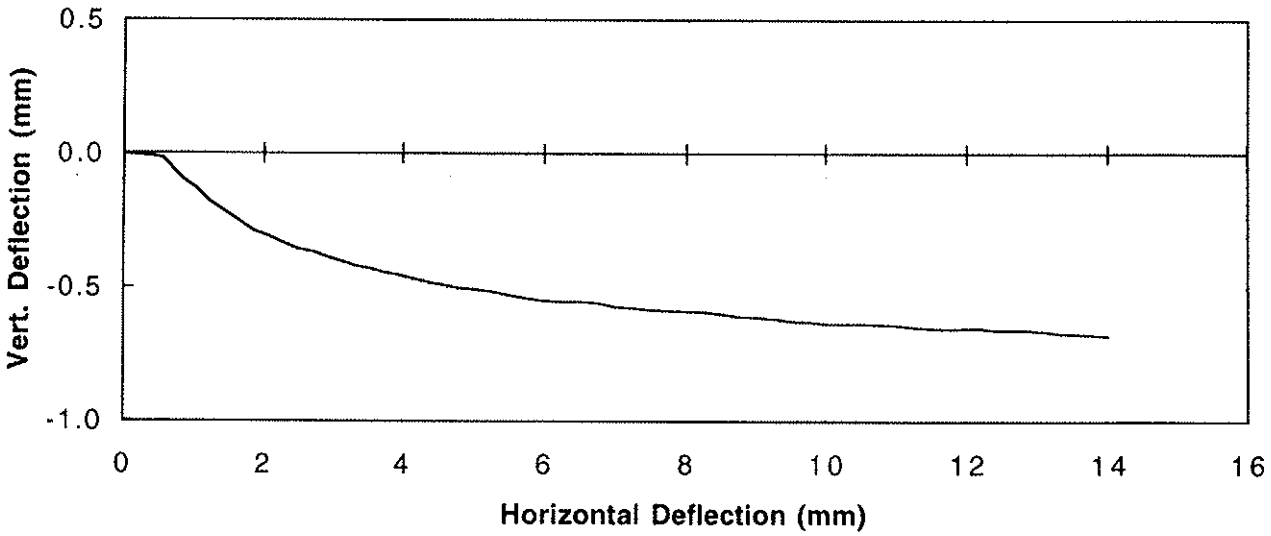
Direct Shear Test

Peak Stress = 298 kPa





Test Hole Number:	08-ROD-OB01
Normal Stress(kPa):	550
Displ. Rate(mm/min.):	0.024
Test No.:	DS-3

SAMPLE INFORMATION

Project: Reclamation Overburden Dump Borehole Number: 08-ROD-0801

Address: _____ Depth: _____

_____ Test Number: DS-3

Project Number: W1401068.004 Sample Description: SILT, clayey, some sand, trc. gravel

Date Tested: 08.01.18 By: S.K.

Test Apparatus: Direct Shear

Machine Number: 3

Rate of Strain: .024 mm/minute

Normal Stress: 550 kPa

Cell Pressure: _____ kPa

Back Pressure: _____ kPa

Head Differential: _____ kPa

Swelling Pressure: _____ kPa

Sample Description	Diameter (mm)	Height (mm)
1		
2		
3		
4		
Mean	63.50	19.06

$\gamma_{max.}$ = 1.780 Mg/m³ @ 15.5 % Opt. m.c. V = 60.36 cm³

	Trimmings	Initial	Final
Tare Number			
Mass of Wet Soil & Tare g		192.15	(118.47) 123.81
Mass of Dry Soil & Tare g			(99.85) 105.39
Mass of Tare g		75.97	6.60
Mass of Dry Soil g			
Mass of Moisture g			
Moisture Content %		16.35	18.65
Wet Density Mg/m³		1.925	
Dry Density Mg/m³		1.654	

92.9 % SPD

7.7
6.6
1.0

Sketch and Remarks:

550 kPa = 79.8 psi × 4.91 in² = 391.7 lbs.
= 30.9 lbs. on LV. hange.

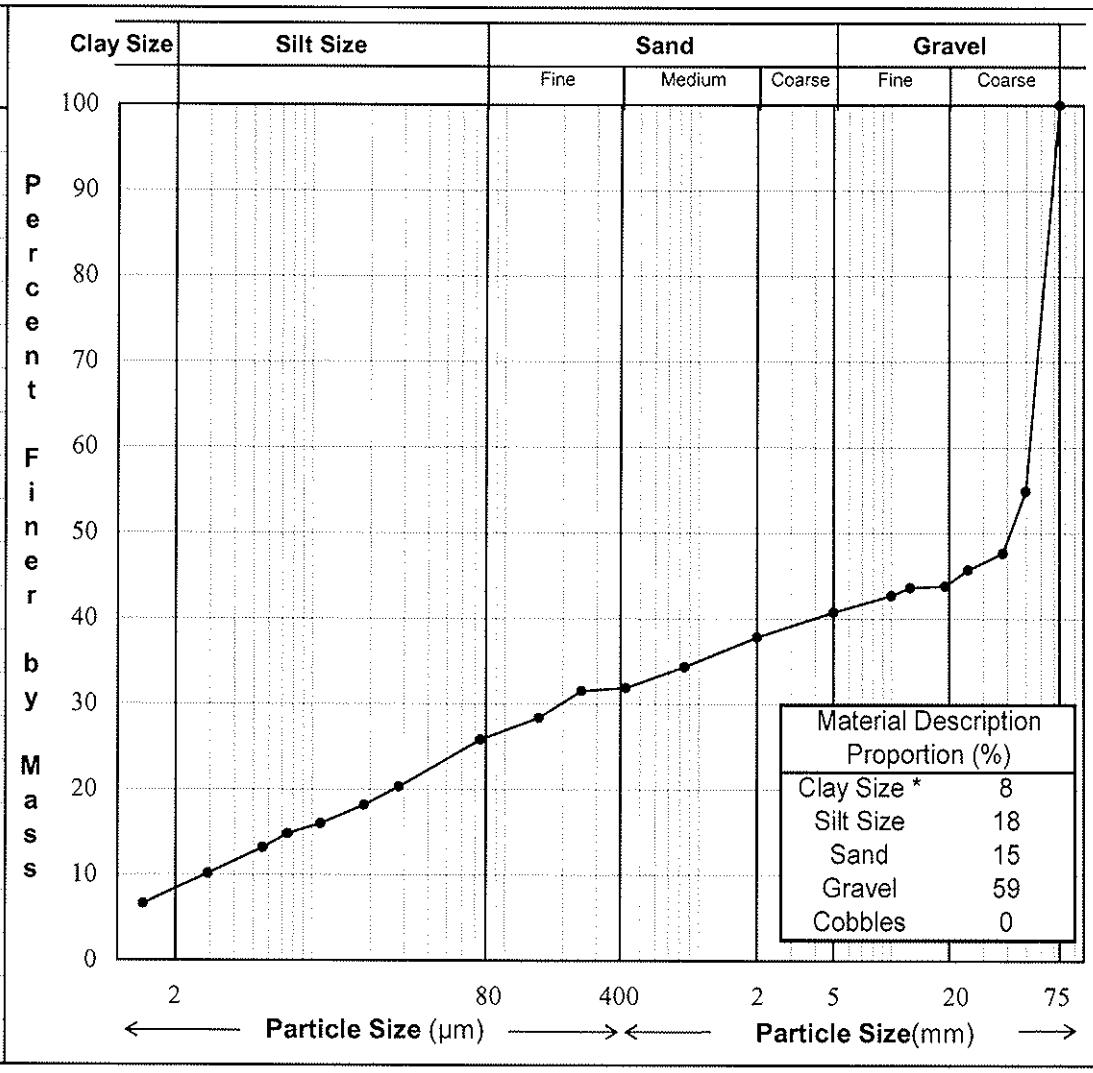
Angle of Shear: _____

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/11
Client:	Minto Explorations Ltd.		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08 - ROD -OB02		
Depth:	808 m Bench		
Description**:	SILT AND SAND - trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	100
50 mm	55
38 mm	48
25 mm	46
19 mm	44
13 mm	44
10 mm	43
5 mm	41
2 mm	38
850 µm	34
425 µm	32
250 µm	32
150 µm	28
75 µm	26
28 µm	20
19 µm	18
11 µm	16
8 µm	15
6 µm	13
3 µm	10
1 µm	7



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

EBA Engineering Consultants Ltd.

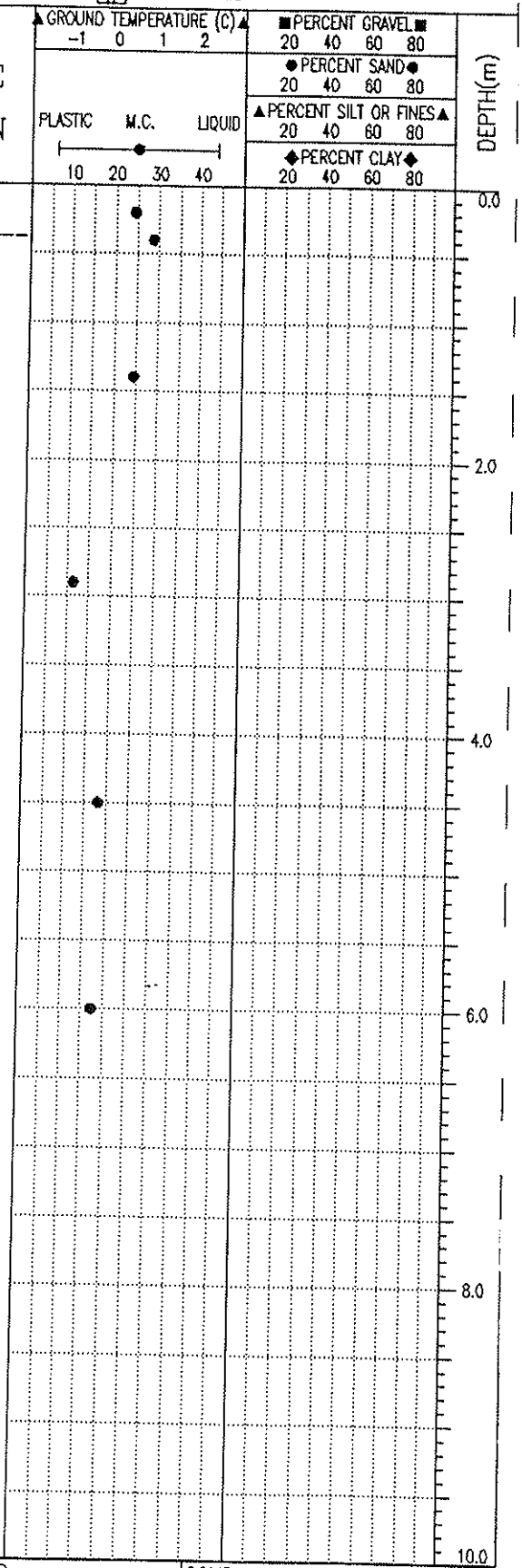
APPENDIX

APPENDIX E 1997 SITE CHARACTERIZATION PROGRAM – BOREHOLE AND TESTPIT LOGS

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD.	BOREHOLE NO: 97-G17
GEOTECHNICAL EVAL. – WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: – N – E –	ELEVATION: 2827.2 '

SAMPLE TYPE ■ GRAB SAMPLE ▨ NO RECOVERY ⊠ STANDARD PEN. ▤ 75 mm SPOON ▥ CRREL BARREL

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0	■	98			MOSS AND ROOT MAT	UNFROZEN
	■	99			SAND & SILT – trace of fine grained gravel, well graded sand, brownish grey	PERMAFROST Vx, <5%
1.0					– become some silt to silty below 0.3 m	
	■	100				Vx, 15 to 20%
2.0					– silt content increases to silty below 1.6 m – trace of clay below 1.6 m – gravel becomes fine to med grained below 1.6 m – color becomes grey below 1.6 m	
3.0	■	101			– some gravel below 3.0 m	Vx, <5%
4.0						
	■	102				
5.0						
6.0	■	103				
					END OF BOREHOLE @ 6.1 m – no water table encountered – some slough throughout NOTE: Mine Coordinates N 10416.00 E 7347.00	
7.0						
8.0						
9.0						
10.0						



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REVIEWED BY: CRH	COMPLETE: 97/09/12
Fig. No:	Page 1 of 1

98/02/17 11:54AM (YUK-PT1B)

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G18
GEOTECHNICAL EVAL. – WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: – N – E –	ELEVATION: 2841.5'

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0						MOSS AND ROOT MAT
		104				SILT & SAND – trace of gravel, well graded sand, fine to med. grained angular and sub-rounded gravels, moist, loose, mottled brown and grey
1.0		105				SAND – silty, some gravel, well graded sand, fine to med. grained angular and sub-rounded gravel, loose, moist, light greyish brown
2.0						– sand becomes coarse grained below 2.1 m
		106		SP-SM		– some silt below 2.1 m
						– some fine grained gravel below 2.1 m
3.0						– trace of silt below 2.1 m
						– very wet below 2.1 m, possible water table
4.0		107				– sand becomes fine to med. grained below 4.3 m
5.0						– trace of fine grained gravel below 4.3 m
		108				
6.0						
7.0		109		SM		– silty, some clay below 7.1 m
						END OF BOREHOLE @ 7.3 m
8.0						– major sloughing
						NOTE: Mine Coordinates N 10730.00 E 7575.00
9.0						
10.0						

CONE PENETRATION 20 40 60 80

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

PERCENT CLAY 20 40 60 80

INSTRUMENTATION DATA

DEPTH(ft): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0

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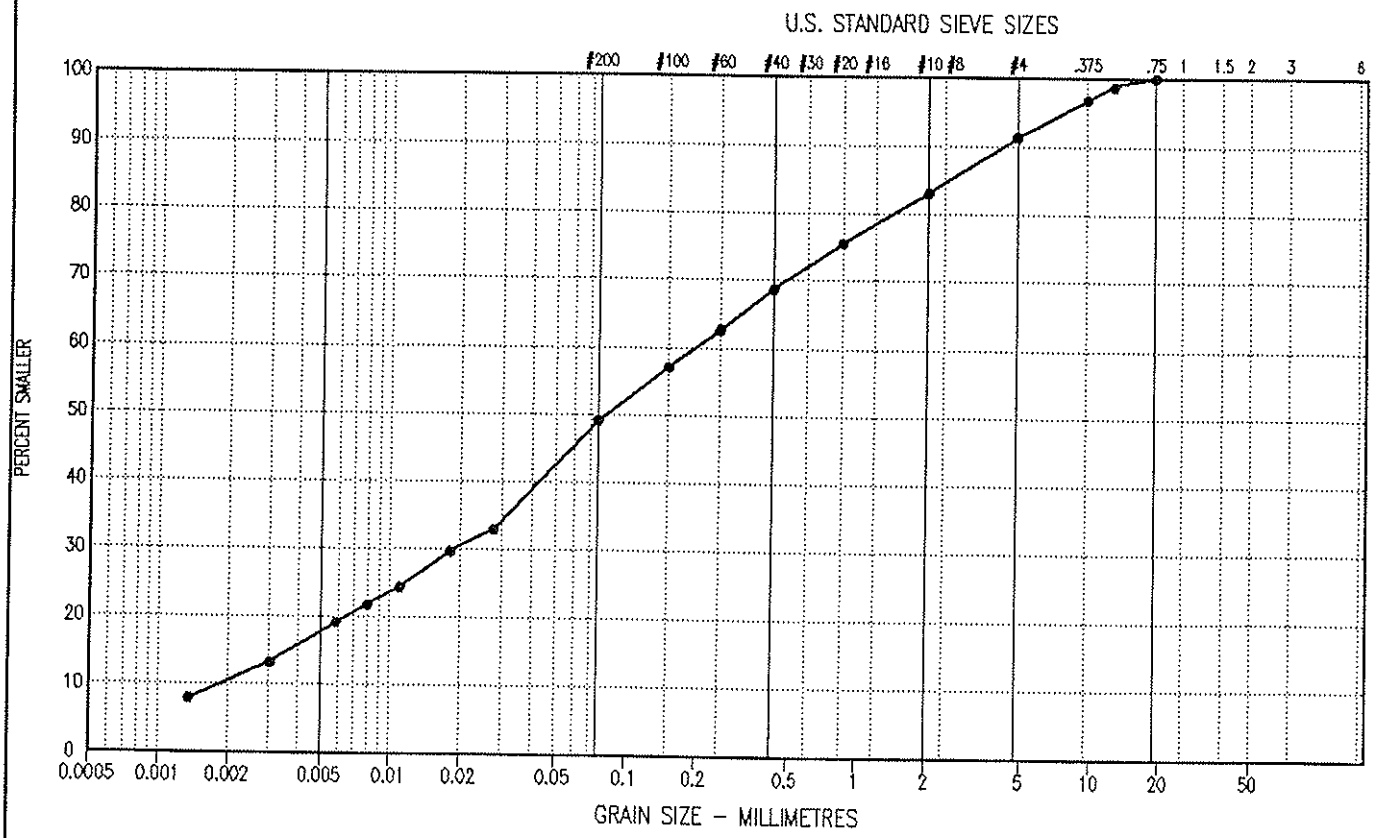
REVIEWED BY: CRH	COMPLETE: 97/09/13
Fig. No:	Page 1 of 1

98/01/14 10:15AM (YUKON-10)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	97-G18	7.10 – 7.30	17.3	31.8	42.2	8.7	100.5	0.9	SM

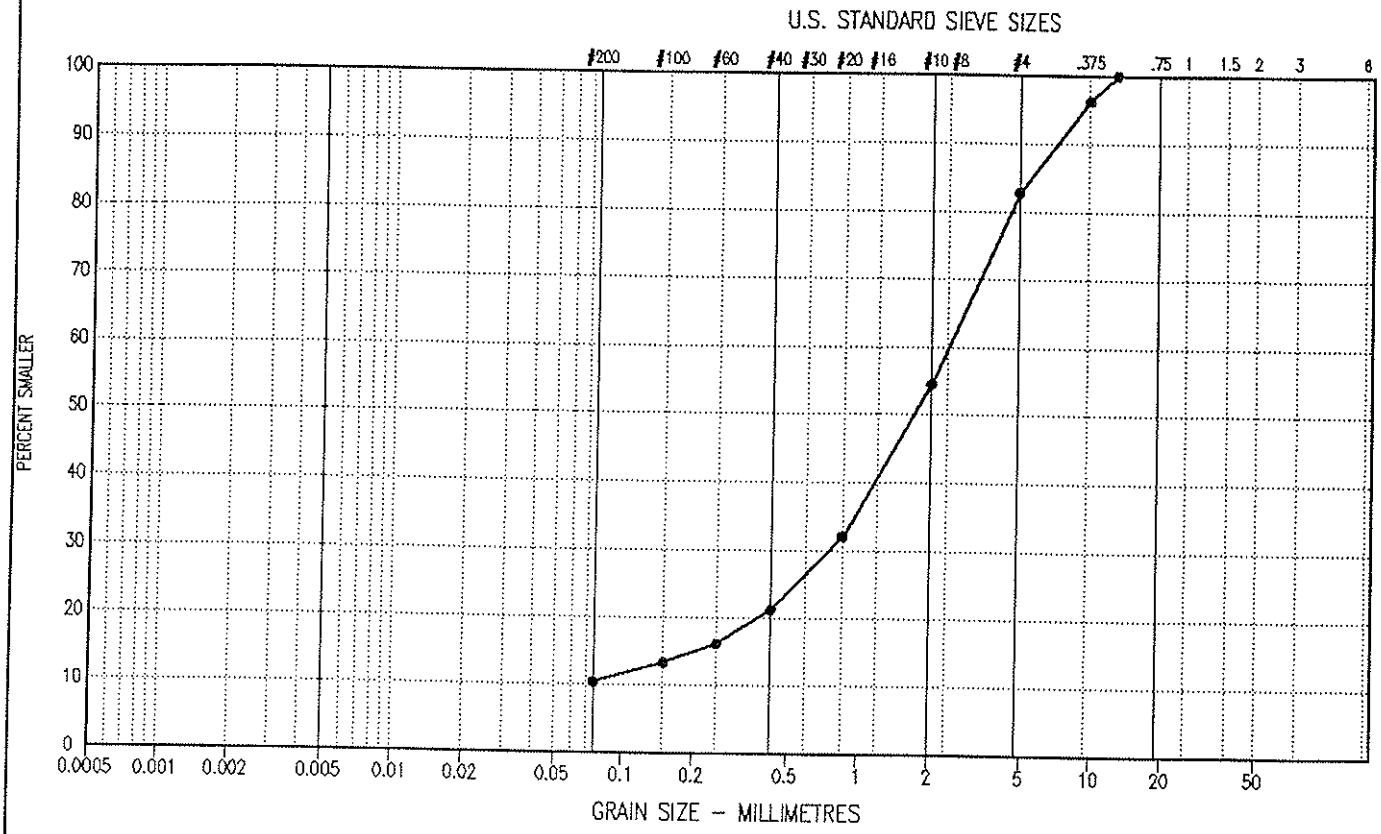
Project: 0201-97-11509 Date Tested: 97/10/27 BY: JSB

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●	97-G18	2.50 – 2.70	10.3	72.4	17.3	35.0	3.2	SP-SM

Project: 0201-97-11509

Date Tested: 97/10/20 BY: RS

Tested in accordance with ASTM D422 unless otherwise noted.

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G19
GEOTECHNICAL EVAL. - WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2857.7 ′

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0						MOSS AND ROOTMAT
		110				SILT & SAND - trace of gravel, well graded sand, fine to med. grained sub-rounded gravel, soft, moist, dark olive brown
1.0		111				SAND - silty, trace of gravel, well graded sand, fine to med. grained sub-rounded gravel, loose, moist, greyish brown
						- water table at 1.2 m possibly lower at sand seam below 2.1 m
2.0		112				- 0.3 m thick layer of med. to coarse grained sand, trace of silt, loose, very wet, grey
		113				
3.0						
4.0		114		SM		- sand becomes med to coarse grained below 3.7 m
						- some silt below 3.7 m
						- trace of fine grained sub-rounded gravels
5.0						- gravel content increases below 4.1 m
						- becomes silty below 4.4 m
		115				
6.0						- drilling slightly harder below 6.1 m
7.0		116				
8.0						
		117				
9.0						END OF BOREHOLE @ 8.8 m
						- borehole sloughing
						- water around 1.2 m
10.0						NOTE: Mine Coordinates N 10837.00 E 7237.00

CONE PENETRATION 20 40 60 80

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

PERCENT CLAY 20 40 60 80

INSTRUMENTATION DATA

DEPTH(ft) 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0

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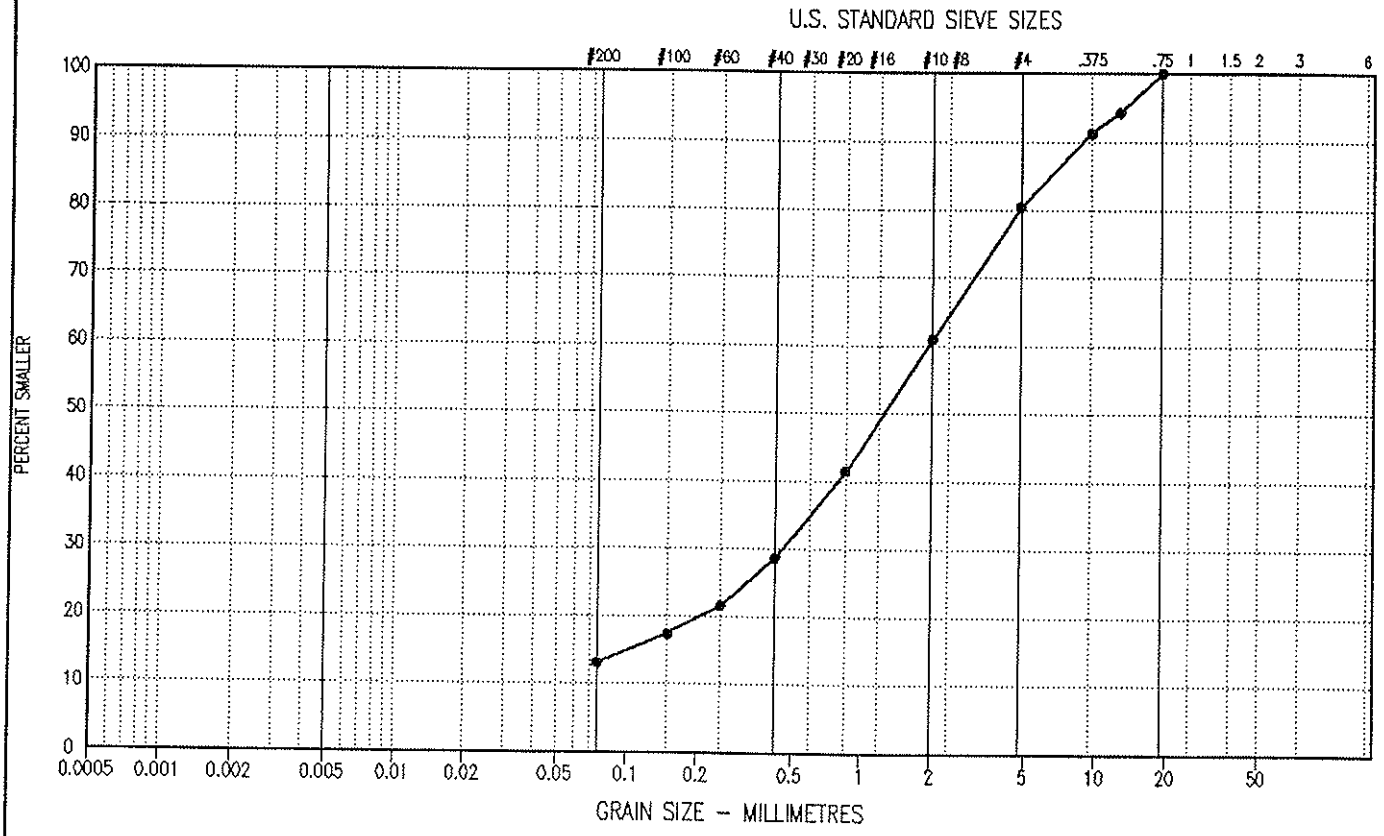
PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●——●	97-G19	4.10 – 4.30	13.0	67.5	19.5	33.7	2.0	SM

Project: 0201-97-11509 Date Tested: 97/10/20 BY: RS

Tested in accordance with ASTM D422 unless otherwise noted.

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G20
GEOTECHNICAL EVAL. - WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2906.3'

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0						MOSS AND ROOT MAT
		118				SAND - silty, trace of gravel, well graded sand, fine to med. grained gravel, loose, moist, olive brown
1.0		119				- color changes to brownish grey below 0.4 m
2.0		120		SM		- 0.3 m thick layer of fine to med. grained sand, trace of silt, loose, moist, olive brown
		121				- some coarse grained sub-rounded gravel below 2.4 m - 2.7 m
3.0						- increases slightly to very moist below 3.0 m
4.0		122				
5.0						- moisture content becomes moist below 4.6 m
		123				
6.0						
7.0		124				- trace of fine grained gravel below 6.5 m
8.0						- drilling becomes harder below 7.9 m
		125				
9.0						END OF BOREHOLE @ 8.8 m - borehole sloughing - no water encountered NOTE: Mine Coorindates N 11303.00 E 6833.00
10.0						

CONE PENETRATION 20 40 60 80

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

PERCENT CLAY 20 40 60 80

INSTRUMENTATION DATA

DEPTH(ft) 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0

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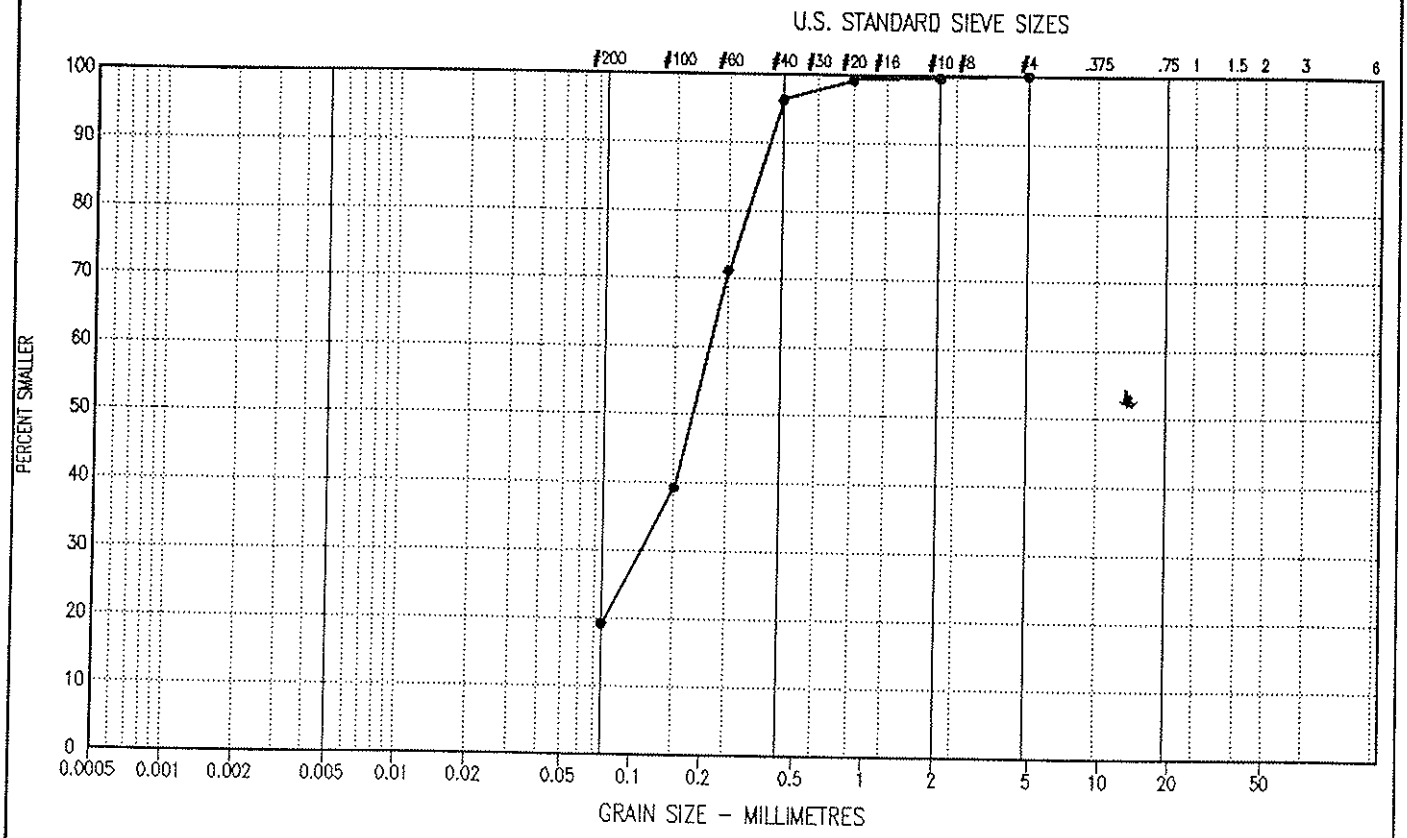
EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●—●	97-G20	2.10 – 2.30	19.1	80.9	0.0	5.5	1.6	SM

Project: 0201-97-11509

Date Tested: 97/10/20

BY: RS

Tested in accordance with ASTM D422 unless otherwise noted.

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G21
GEOTECHNICAL EVAL. - WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2928.7'

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0						MOSS AND ROOT MAT
		126				SAND - silty, trace of gravel, well graded sand, fine to med. grained sub-rounded gravel, loose, moist, greyish brown
1.0						- some silt below 0.3 m
		127				- color changes to light greyish brown below 0.3 m
2.0						
						- 0.6 m thick layer of med. to coarse grained sand at 2.4 m
3.0		128				- trace of fine grained angular gravel, trace of silt, loose, very moist, grey
4.0						- hard drilling from 0.3 m to 4.0 m
		129		SM		- some larger gravel, siltier below 4.4 m
5.0						- easier drilling below 4.9 m - moist to wet below 5.0 m
6.0		130				
						- little to no gravel below 6.7 m - damp to moist below 6.7 m
7.0						
		131				
8.0						- very moist to wet below 8.0 m
9.0		132				END OF BOREHOLE @ 9.1 m - borehole sloughing, no water NOTE: Mine Coordinates N 11520.00 E 6541.00
10.0						

CONE PENETRATION 20 40 60 80

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

PERCENT CLAY 20 40 60 80

INSTRUMENTATION DATA

DEPTH(ft) 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0

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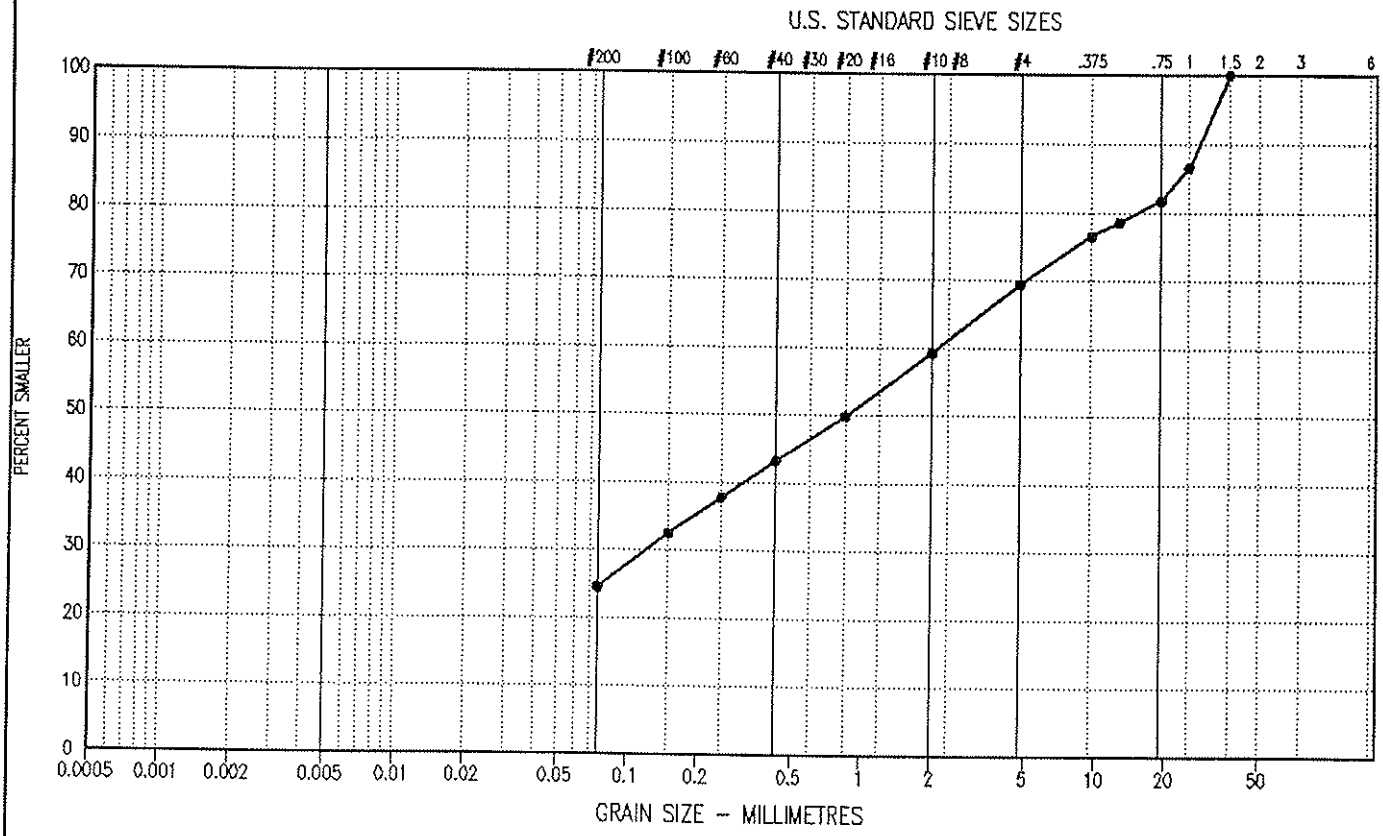
Fig. No:	Page 1 of 1

98/01/14 10:19AM (YUKON-10)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●——●	97-G21	4.40 – 4.60	24.5	44.8	30.7	72.8	0.2	SM

Project: 0201-97-11509 Date Tested: 97/10/20 BY: RS

Tested in accordance with ASTM D422 unless otherwise noted.

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G22
GEOTECHNICAL EVAL. - WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2902.5 '

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0		133				MOSS ROOT MAT
						SAND - silty, trace of gravel, well graded sand, fine to med. grained sub-angular gravel, moist to wet, loose, light brownish grey
1.0		134				- sand becomes coarse grained below 0.75 m
						- trace to some silt below 0.75 m
2.0						- water table around 1.5 m
		135				
3.0		136				
4.0						
		137				- 0.5 m thick layer of med. grained uniform sand at 4.5 m
5.0						
		138				
6.0						- harder drilling below 6.4 m
						- grinding below 6.7 m
7.0		139				
8.0						- no grinding, hard drilling below 7.9 m
						- sand becomes med. grained uniform sand below 7.9 m
9.0		140				END OF BOREHOLE @ 8.8 m
						- water table at 1.5 m
						- major slough throughout
10.0						NOTE: Mine Coordinates N 11127.00 E 6359.00

CONE PENETRATION 20 40 60 80

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

PERCENT CLAY 20 40 60 80

INSTRUMENTATION DATA

DEPTH(ft) 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0

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	REVIEWED BY: CRH	COMPLETE: 97/09/13
	Fig. No:	Page 1 of 1

98/01/14 10:20AM (YUKON-10)

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	BOREHOLE NO: 97-G23
GEOTECHNICAL EVAL. - WASTE DUMP AREA	DRILL: CME-75 c/w SOLID SHAFT AUGERS	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2885'

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPOON | CRREL BARREL

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
0.0					MOSS AND ROOT MAT	UNFROZEN
		141			SAND - some silt, trace of gravel, med, to coarse grained sand, fine grained sub-rounded gravel, dense, moist, light greyish brown	
1.0					- harder drilling below 0.3 m	
		142				
					- gravel content increases slightly and becomes fine to med. grained below 1.6 m	
2.0						
		143				
3.0						
4.0						
		144				
5.0						PERMAFROST
6.0		145				-0.09 degree C. Nf
7.0						
		146			- very hard drilling and grinding below 7.7 m	
8.0					END OF BOREHOLE 7.9 m (REFUSAL) - very little slough - no water table encountered NOTE: Mine Coordinates N 10932.00 E 6560.00	
9.0						
10.0						

GROUND TEMPERATURE (C): -1 0 1 2

PLASTIC M.C. LIQUID: 10 20 30 40

PERCENT GRAVEL: 20 40 60 80

PERCENT SAND: 20 40 60 80

PERCENT SILT OR FINES: 20 40 60 80

PERCENT CLAY: 20 40 60 80

DEPTH(m): 0.0 2.0 4.0 6.0 8.0 10.0

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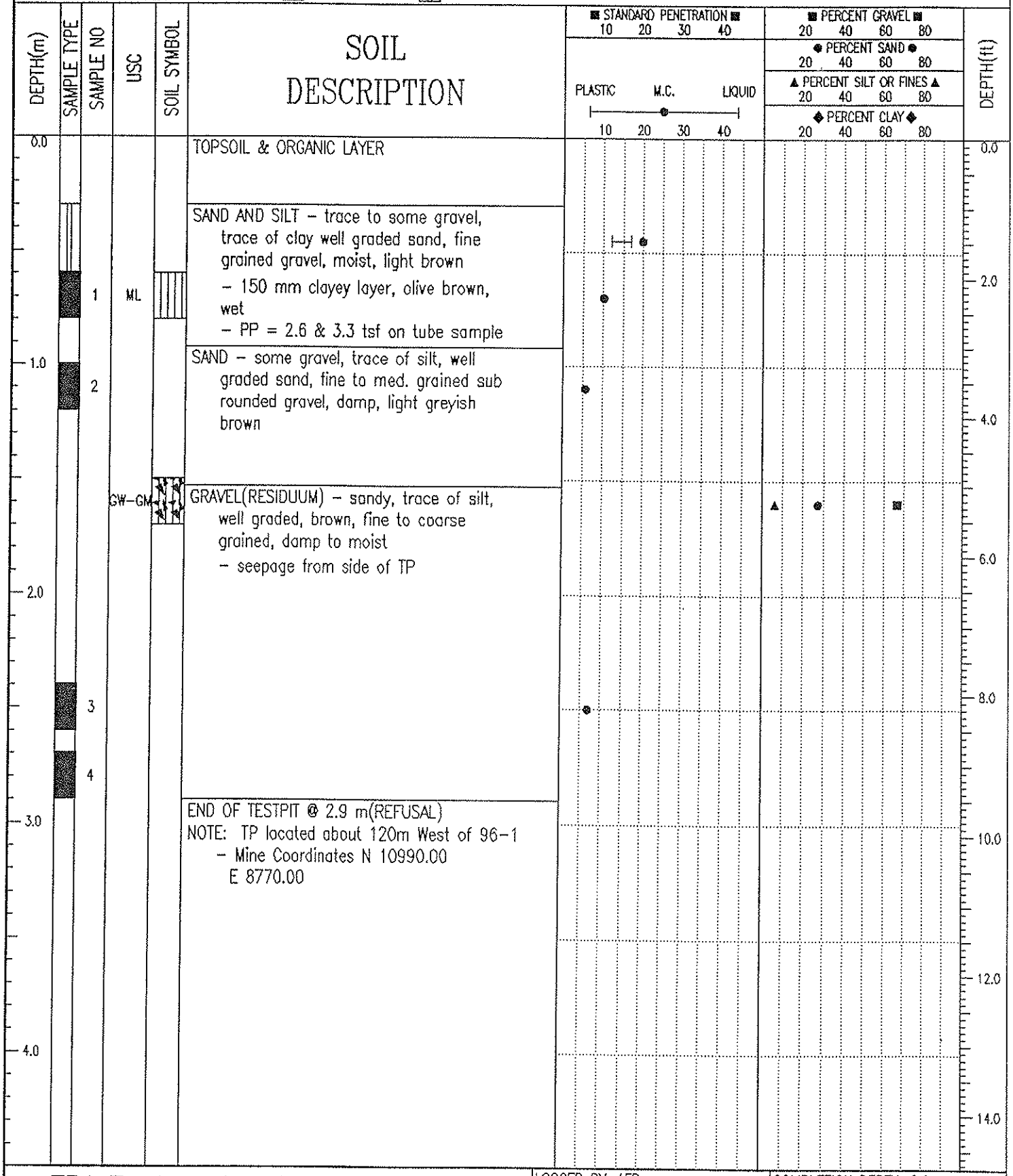
REVIEWED BY: CRH	COMPLETE: 97/09/14
Fig. No:	Page 1 of 1

98/02/17 11:55AM (YUK-PT10)

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	TEST PIT NO: 97-TP01
GEOTECHNICAL EVALUATION - MAIN DUMP	EXCAVATOR: CAT 235	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2805'

SAMPLE TYPE: GRAB | NO RECOVERY | SHELBY TUBE



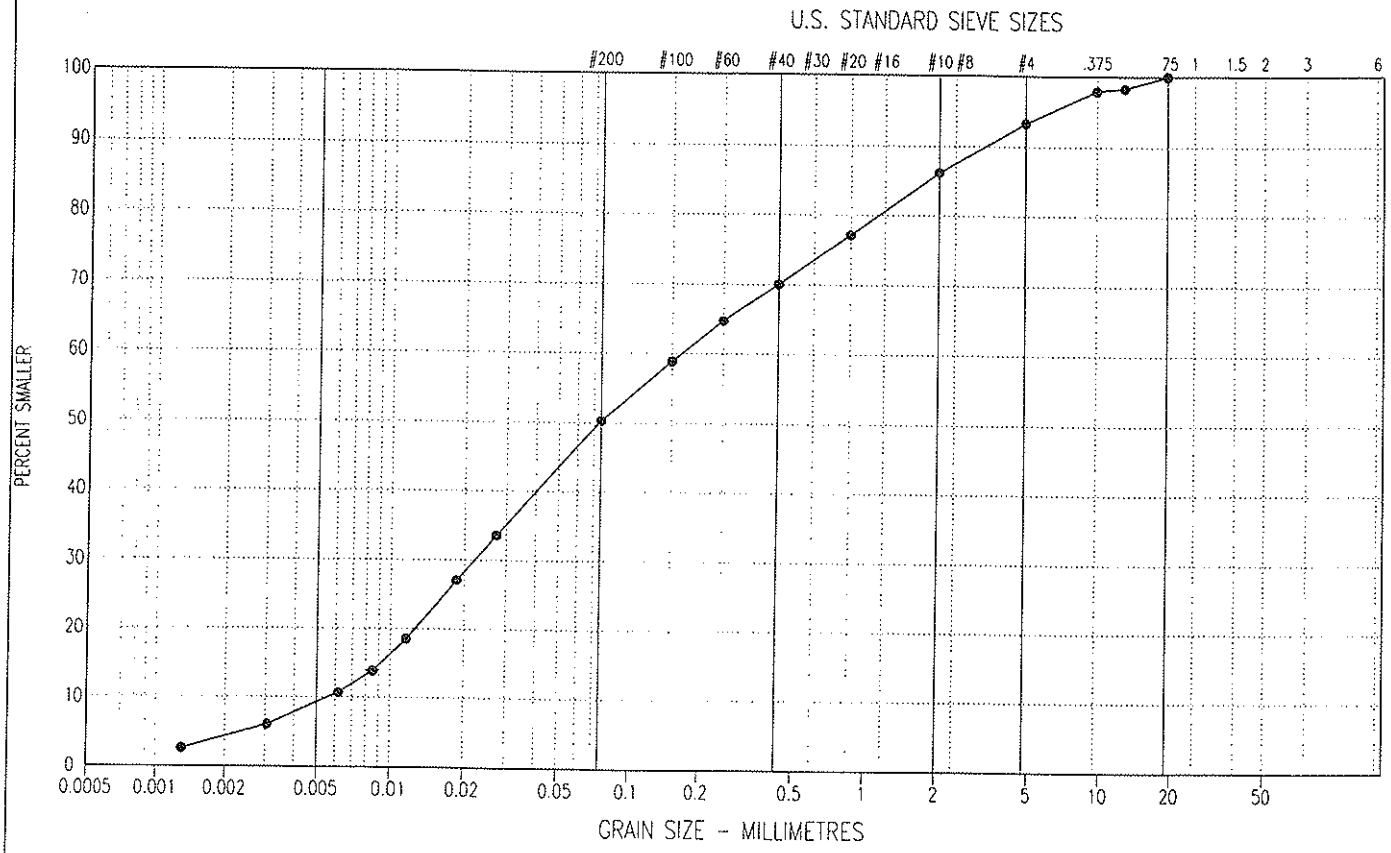
EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: AFR	COMPLETION DEPTH: 2.9 m
	REVIEWED BY: CRH	COMPLETE: 97/10/01
	Fig. No:	Page 1 of 1

98/03/18 03:40PM (YUKON-14)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——	TP1(1A)	1.00 – 2.00	8.9	41.4	43.0	6.7	29.7	0.5	

Project: 0201-11509

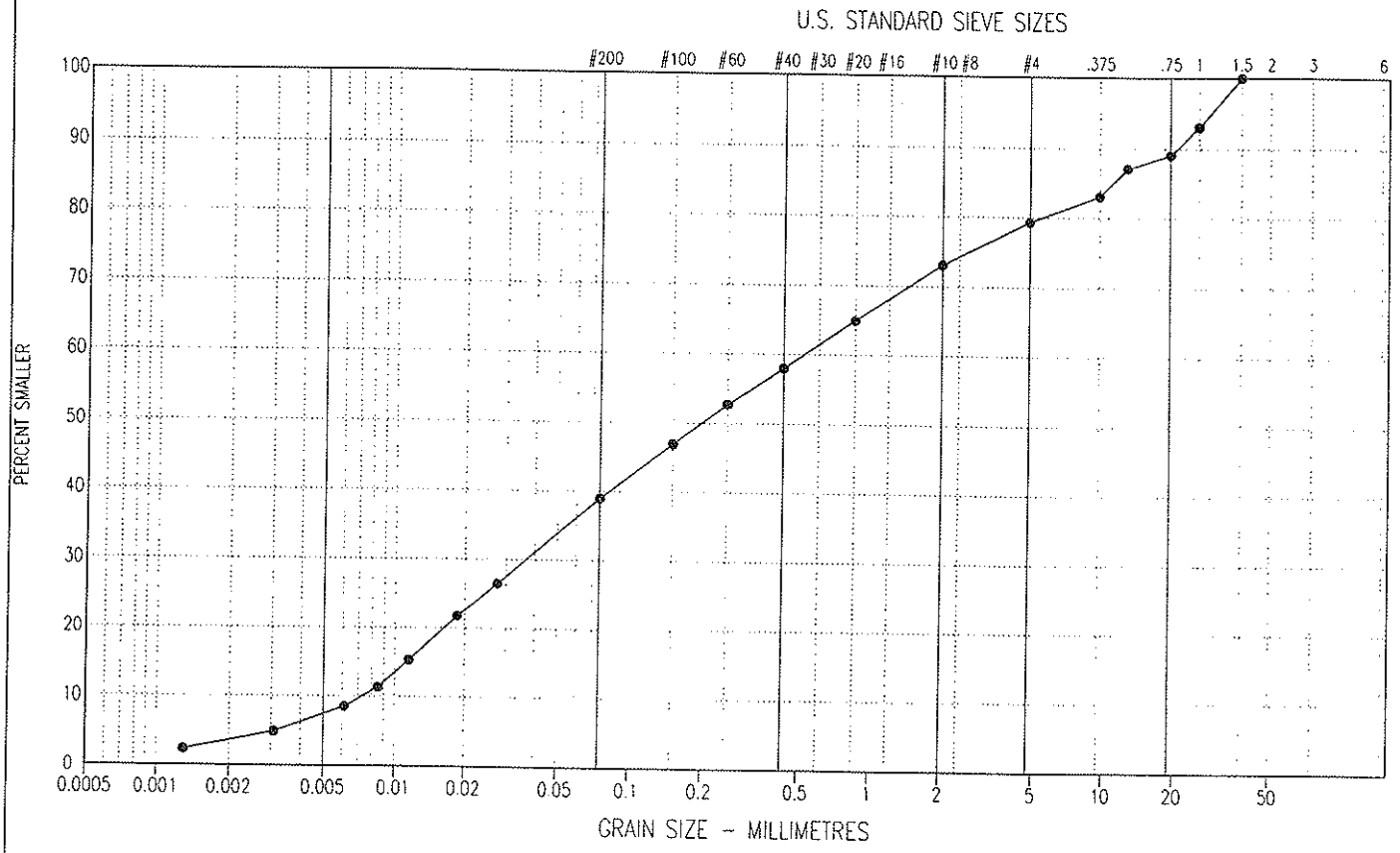
Date Tested: 97/10/17 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●	TP1(1B)	1.00 – 2.00	7.2	31.7	40.4	20.7	74.4	0.4	SM

Project: 0201-11509

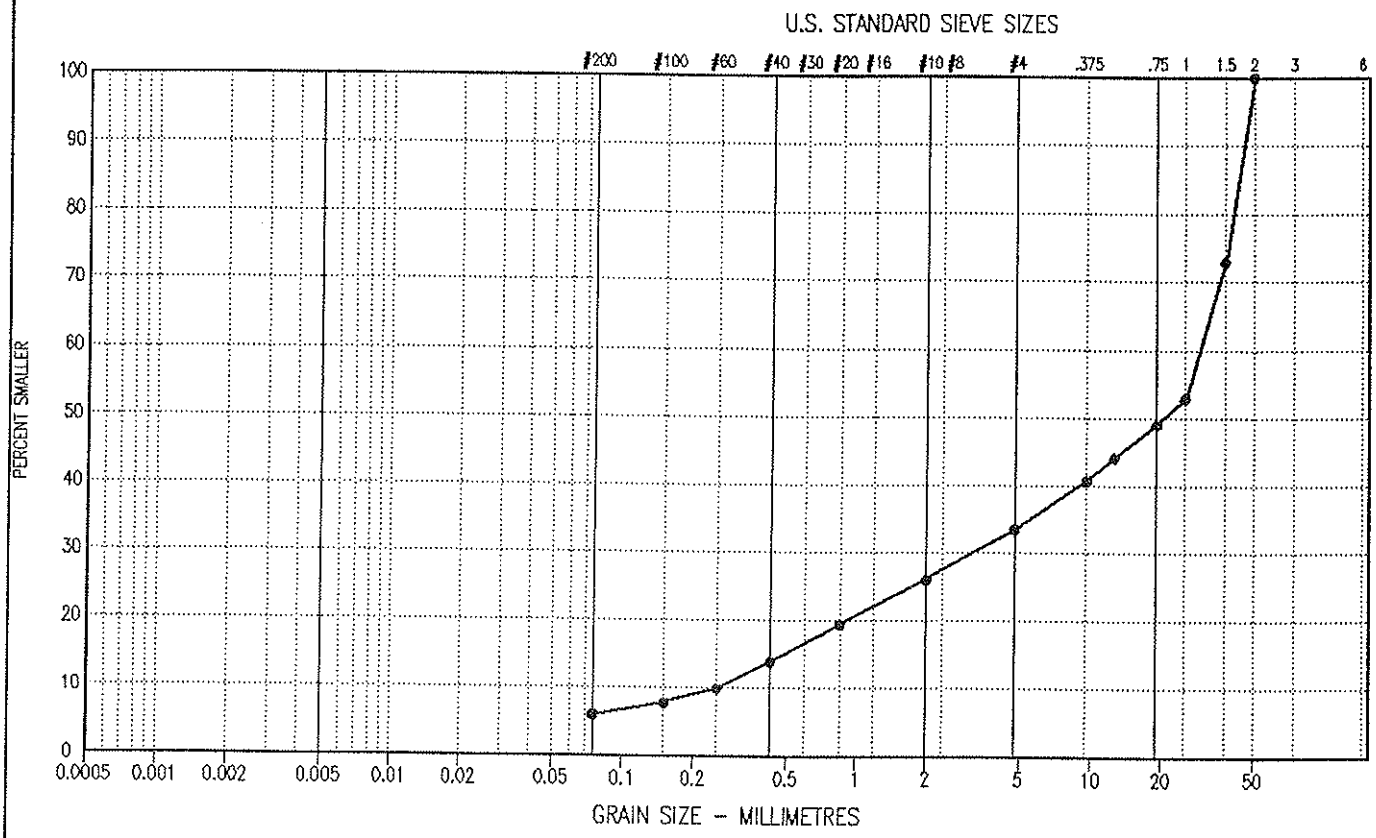
Date Tested: 97/10/17 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



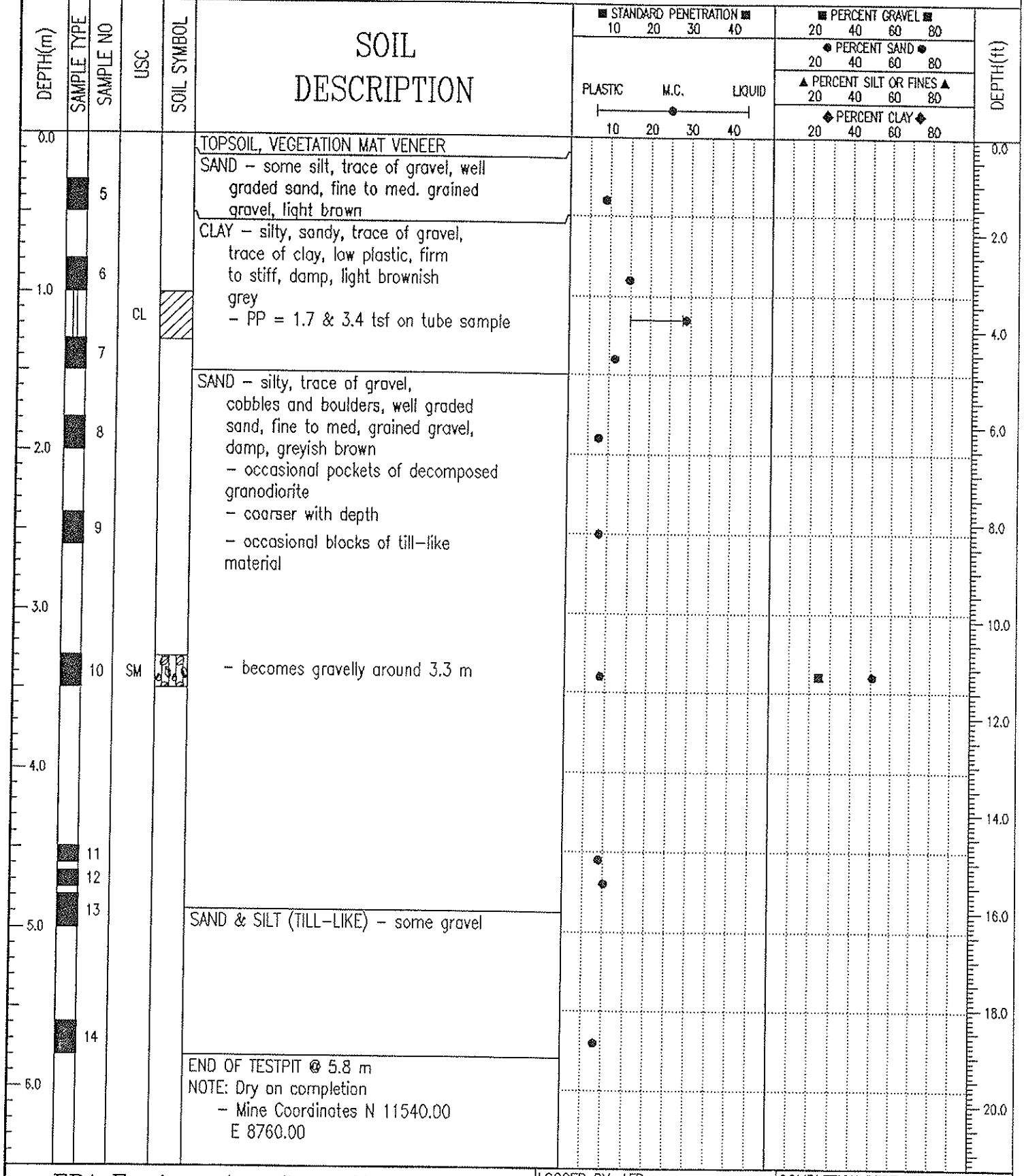
SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●—●	97-TP01	1.50 – 1.70	6.0	27.4	66.6	114.8	1.6	GW-GM

Project: 0201-97-11509 Date Tested: 97/10/21 BY: JSB

Tested in accordance with ASTM D422 unless otherwise noted.

THE MINTO PROJECT	CLIENT: MINTO EXPLORATIONS LTD	TEST PIT NO: 97-TP02
GEOTECHNICAL EVALUATION - MAIN DUMP	EXCAVATOR: CAT 235	PROJECT NO: 0201-97-11509
MINTO CREEK, YUKON	UTM ZONE: - N - E -	ELEVATION: 2863'

SAMPLE TYPE: GRAB | NO RECOVERY | SHELBY TUBE



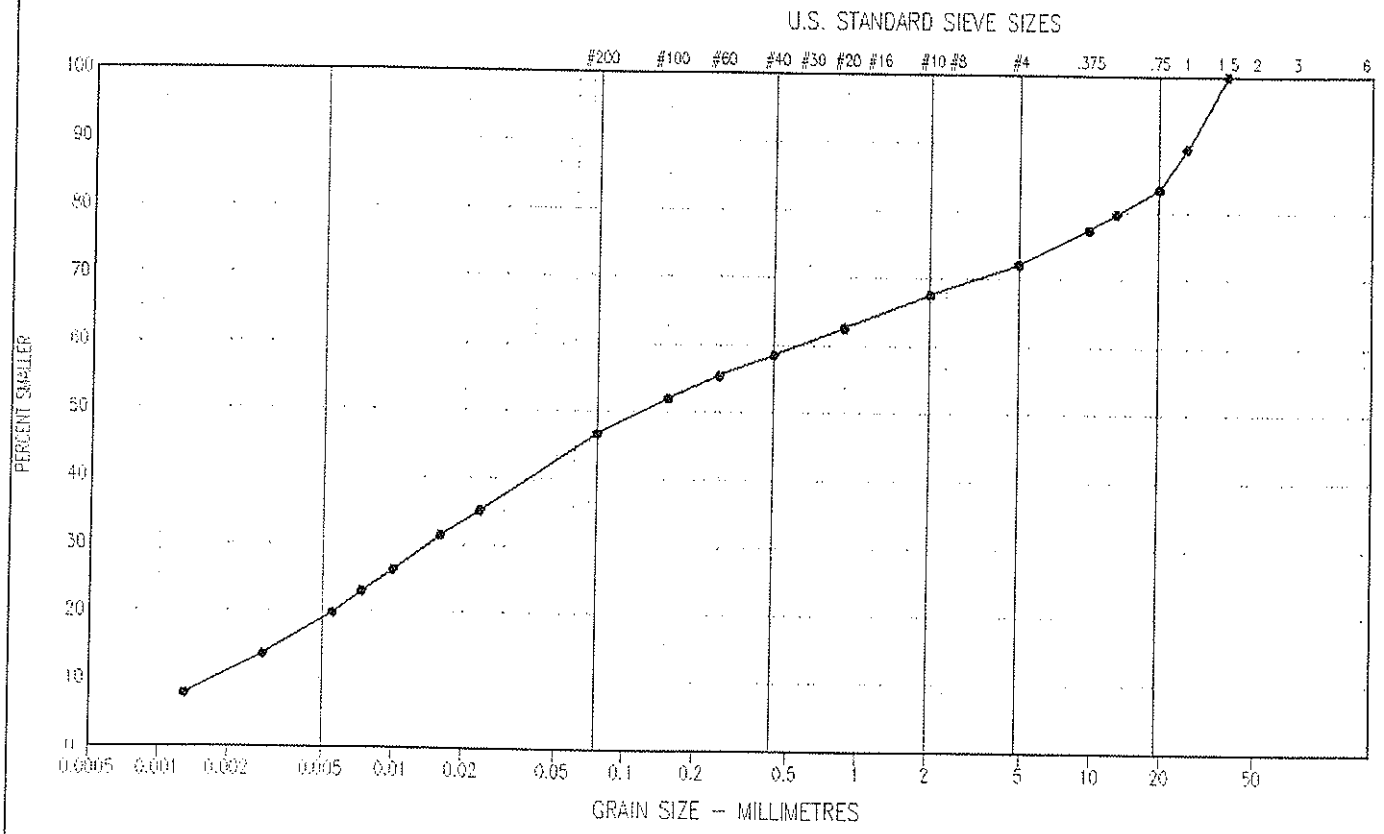
EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: AFR	COMPLETION DEPTH: 5.8 m
	REVIEWED BY: CRH	COMPLETE: 97/10/01
	Fig. No:	Page 1 of 1

98/03/18 03:41PM (YUKON-TB)

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION CLAY %	SILT %	SAND %	GRAVEL %	Cu	Cc	U.S.C
●—●	TP2(2A)	3.00 – 4.00	18.6	28.0	25.5	27.9	316.0	0.2	GM

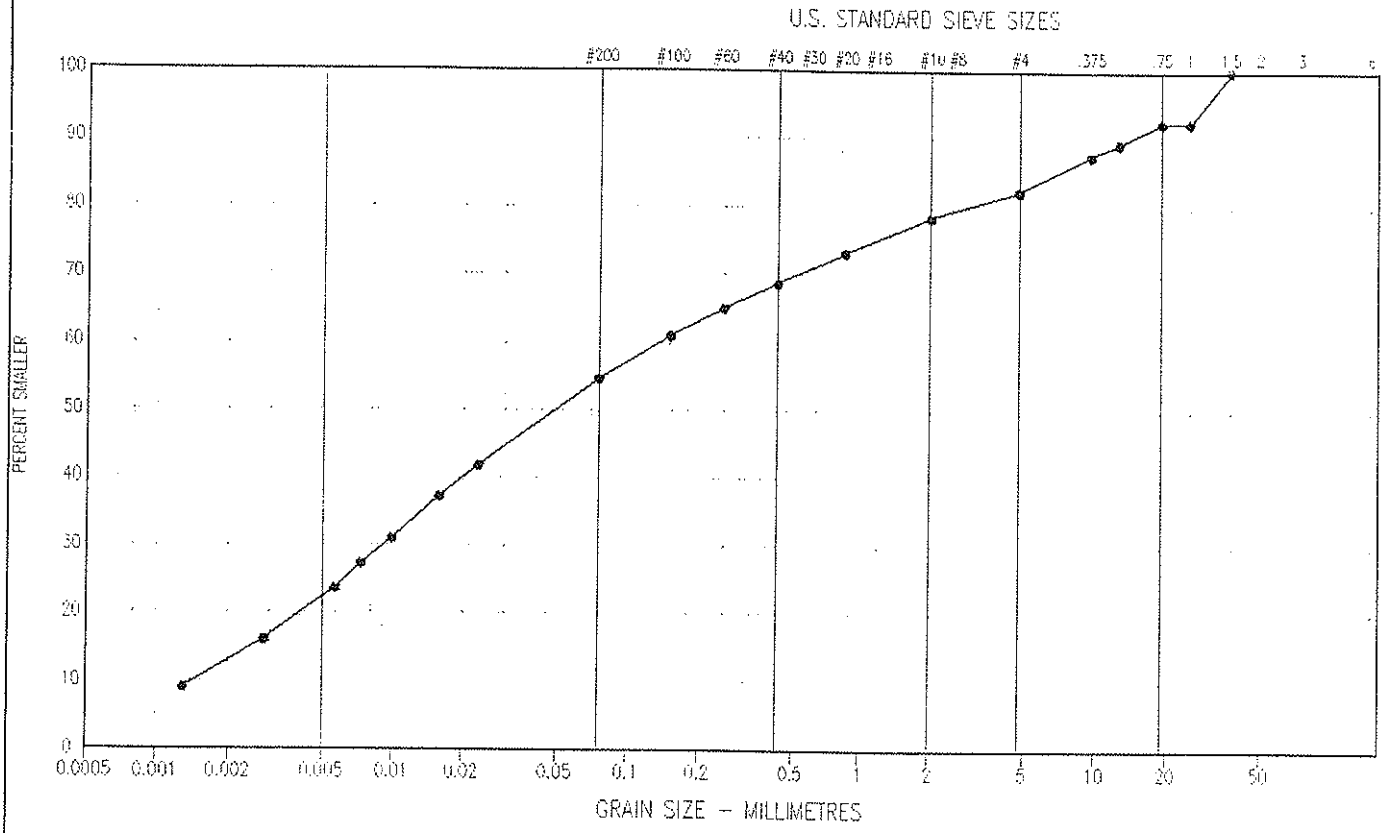
Project: 0201-11509 Date Tested: 97/10/23 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION CLAY %	SILT %	SAND %	GRAVEL %	Cu	Cc	U.S.C
——●	TP2(2B)	3.00 – 4.00	21.7	32.9	27.7	17.7	92.3	0.4	

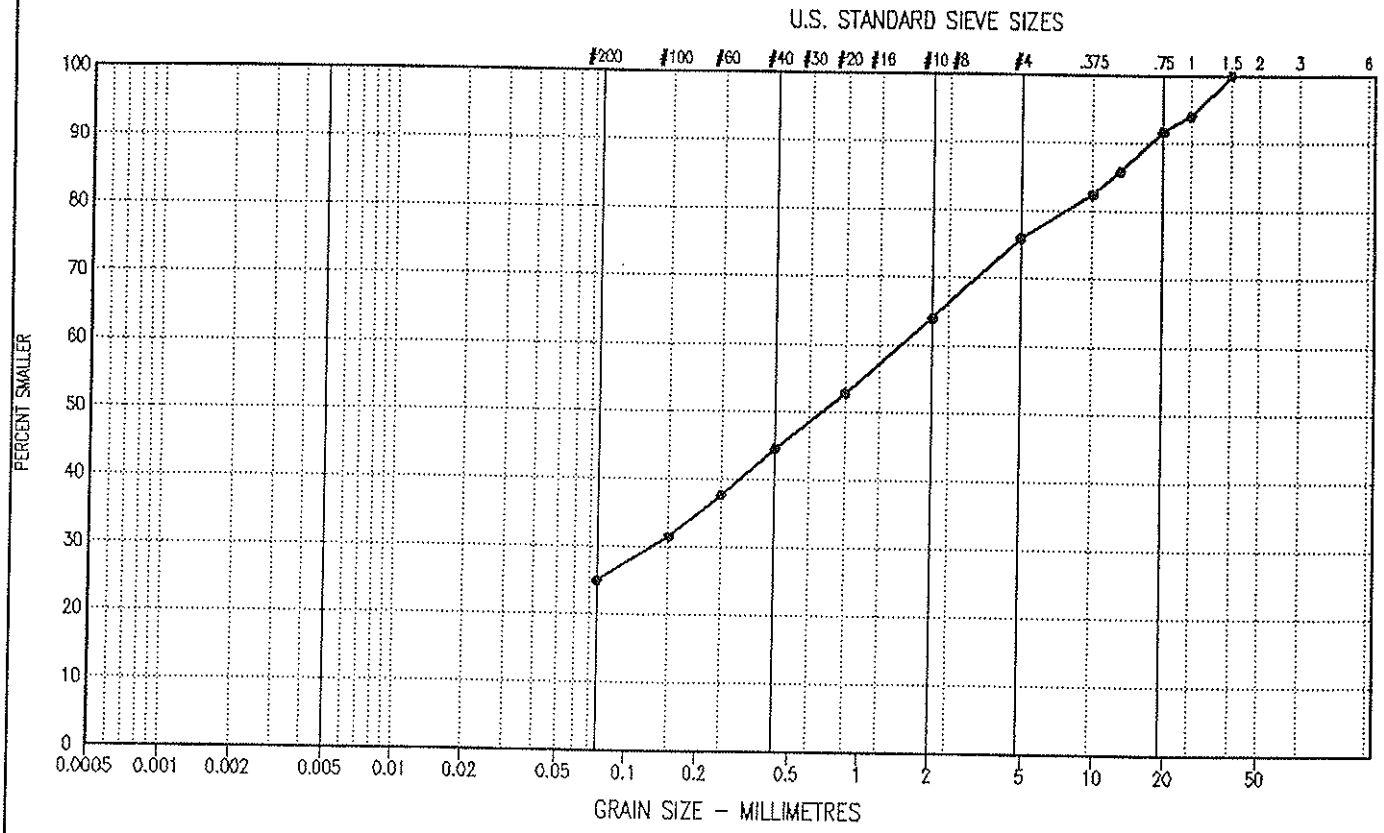
Project: 0201-11509 Date Tested: 97/10/23 By: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●——●	97-TP02	3.30 – 3.50	24.9	50.9	24.2	-52.9	0.4	SM

Project: 0201-97-11509

Date Tested: 97/10/21

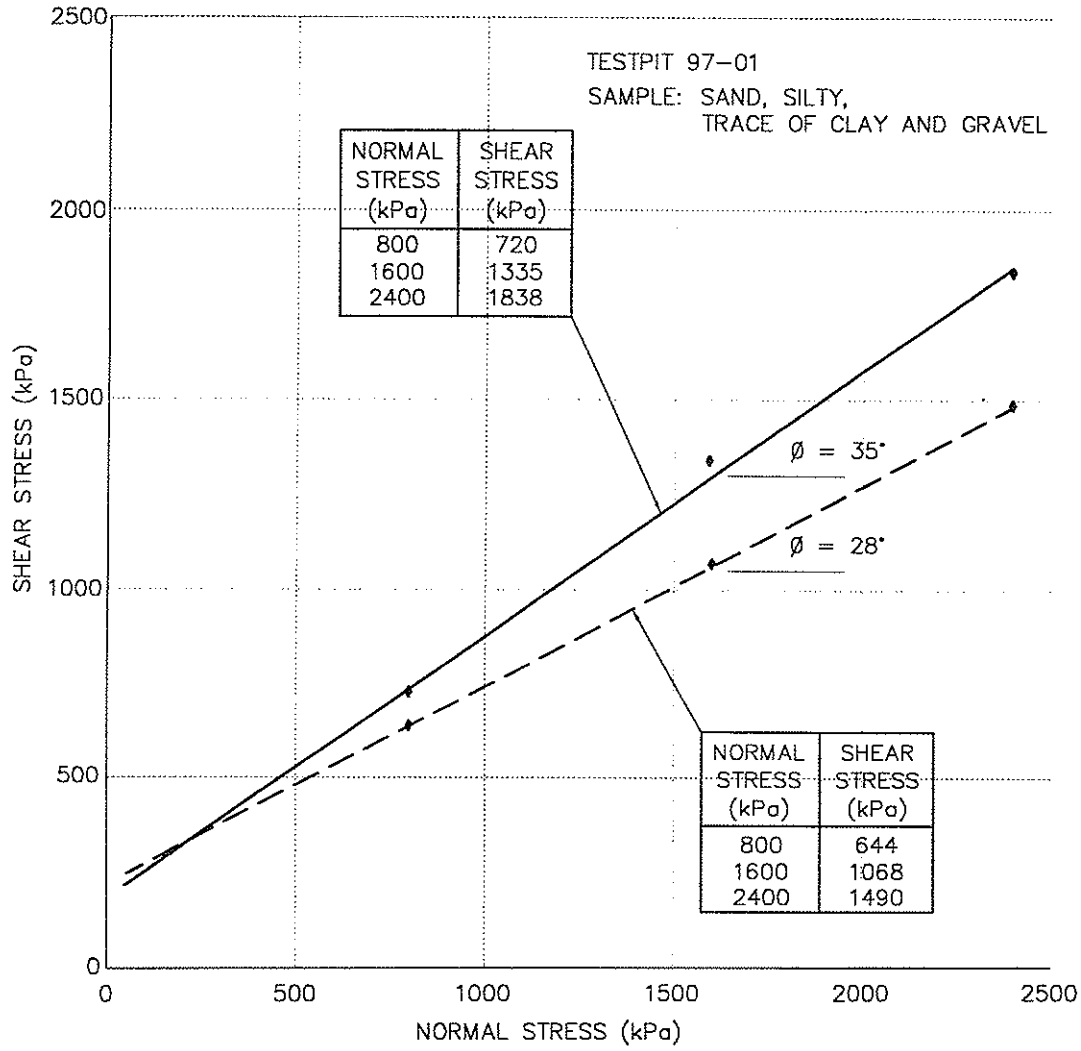
BY: JSB

Tested in accordance with ASTM D422 unless otherwise noted.

APPENDIX

APPENDIX F 1997 SITE CHARACTERIZATION PROGRAM – ADDITIONAL DATA

DIRECT SHEAR TEST RESULTS
SILTY SAND COLLUVIUM



——— Peak Shear Stress Mohr Coulomb Failure Envelope

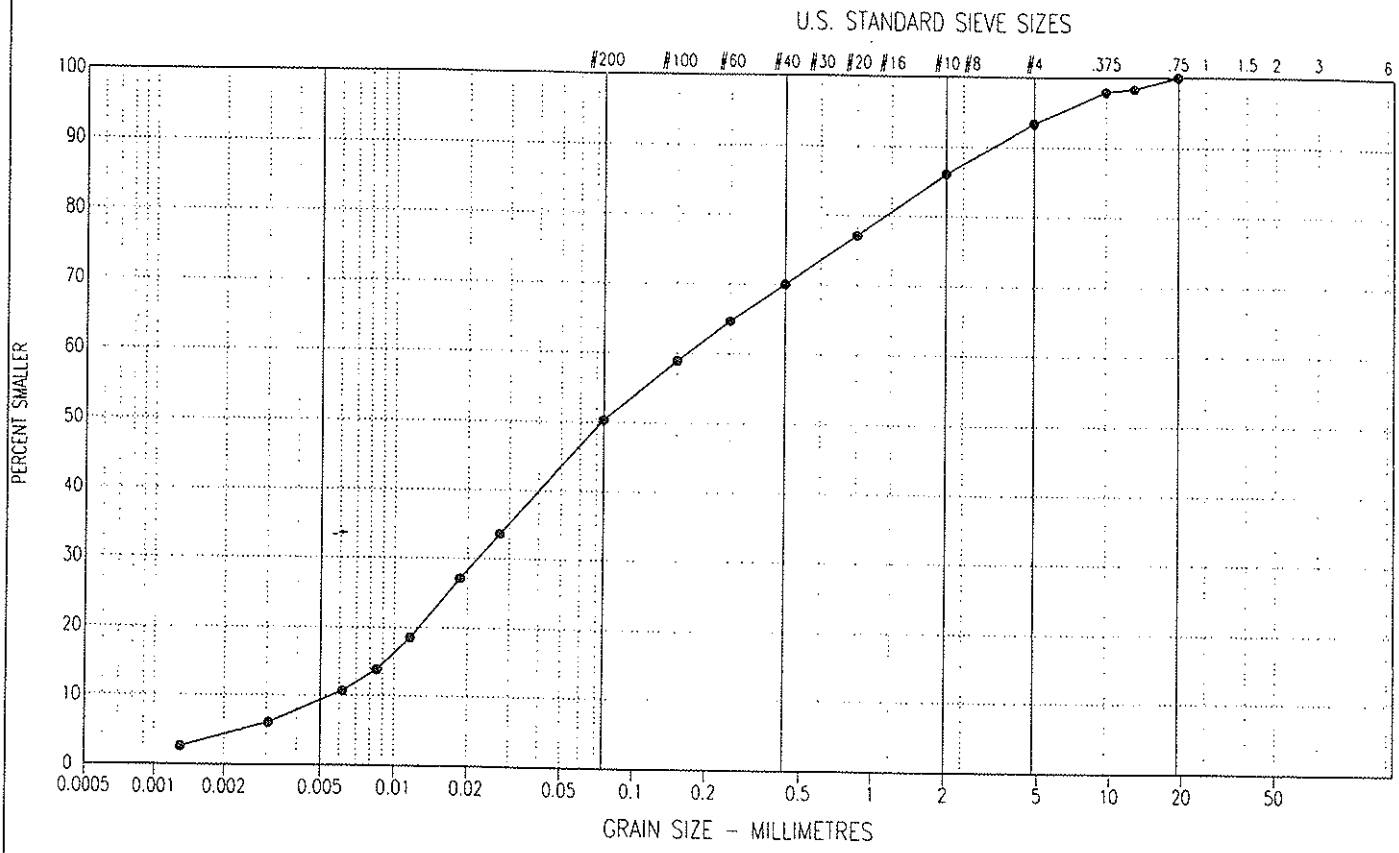
– – – Residual Shear Stress Mohr Coulomb Failure Envelope

Figure C-1

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●—●	TP1(1A)	1.00 – 2.00	8.9	41.4	43.0	6.7	29.7	0.5	

Project: 0201-11509

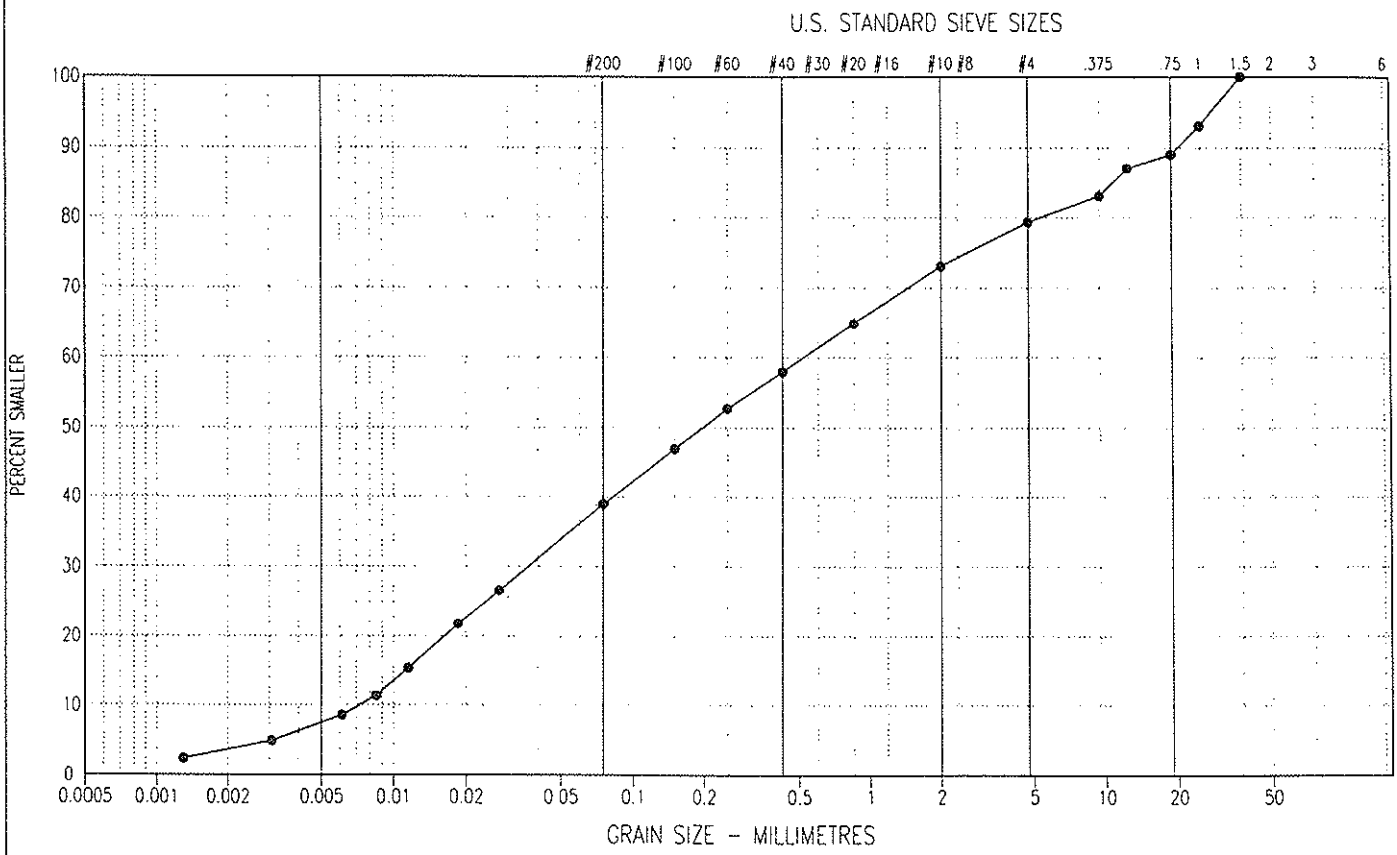
Date Tested: 97/10/17 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE - ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION				Cu	Cc	U.S.C
			CLAY %	SILT %	SAND %	GRAVEL %			
●——●	TP1(1B)	1.00 - 2.00	7.2	31.7	40.4	20.7	74.4	0.4	SM

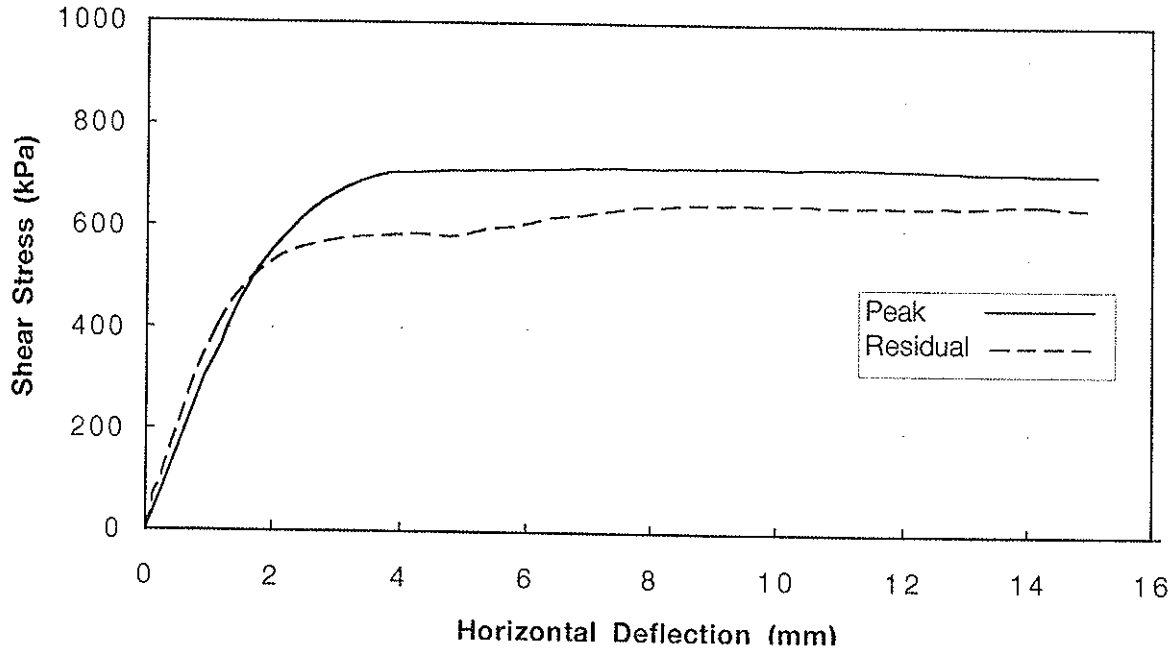
Project: 0201-11509 Date Tested: 97/10/17 BY: SK

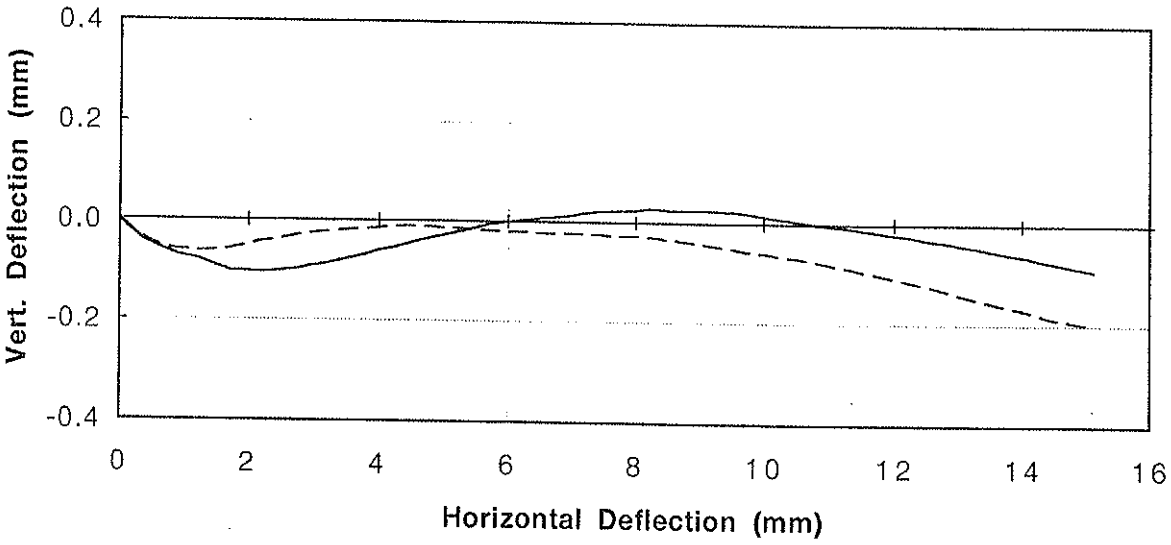
Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering Consultants Ltd.

Direct Shear Test

Peak Stress= 720 kPa
Resid. Stress= 644 kPa





Test Hole Number:	TP1 (1B)
Depth (ft):	1.0-2.0
Normal Stress(kPa):	800
Displ. Rate(mm/min.):	0.024
Test No.:	DS-1

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EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-16

Test Hole No.: TP1 (1B)
Depth (ft): 1.0-2.0
Test Number: DS-1

Initial Sample Conditions

Moisture Content (%): 10.3
Wet Density (Mg/m3): 2.314
Dry Density (Mg/m3): 2.098

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.93	0.013	716.8
0.36	-0.040	113.8	7.20	0.018	716.6
0.64	-0.057	209.3	7.46	0.022	718.1
0.93	-0.071	303.3	7.73	0.023	716.3
1.19	-0.078	367.4	7.99	0.024	717.0
1.31	-0.082	409.0	8.24	0.028	716.7
1.45	-0.090	446.7	8.51	0.026	718.5
1.72	-0.101	504.5	8.76	0.026	718.2
1.87	-0.102	532.2	9.02	0.027	718.6
2.03	-0.103	555.9	9.27	0.024	719.5
2.18	-0.104	578.4	9.54	0.024	719.5
2.33	-0.103	598.3	9.80	0.020	719.8
2.49	-0.102	618.1	10.14	0.013	717.4
2.65	-0.099	634.8	10.32	0.009	716.7
2.80	-0.096	650.1	10.58	0.004	718.7
2.96	-0.092	662.1	10.92	-0.002	717.8
3.16	-0.088	676.5	11.18	-0.005	719.1
3.37	-0.080	688.7	11.68	-0.014	718.6
3.58	-0.075	697.4	11.98	-0.020	717.2
3.79	-0.068	703.7	12.21	-0.022	716.7
3.99	-0.060	706.7	12.50	-0.030	715.9
4.20	-0.054	707.5	12.77	-0.034	715.4
4.41	-0.047	708.4	13.03	-0.040	713.3
4.62	-0.039	709.3	13.30	-0.045	713.7
4.83	-0.033	710.1	13.56	-0.051	712.4
5.04	-0.026	710.3	13.82	-0.058	713.6
5.26	-0.020	711.5	14.09	-0.063	710.9
5.46	-0.014	712.4	14.34	-0.071	710.3
5.68	-0.006	711.6	14.59	-0.077	710.5
5.89	-0.002	712.5	14.86	-0.084	709.9
6.13	0.002	713.4	15.12	-0.090	708.8
6.40	0.005	714.3			
6.67	0.009	715.7			

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RESIDUAL STRENGTH TEST

Test Hole No.: TP1 (1B)
Depth (ft): 1.0-2.0

Test Number: DS-1

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0
0.10	-0.012	36.5
0.12	-0.016	70.2
0.23	-0.025	96.2
0.29	-0.032	126.1
0.36	-0.037	152.3
0.46	-0.043	188.4
0.60	-0.050	242.1
0.73	-0.055	289.4
0.87	-0.059	334.1
1.12	-0.062	401.5
1.37	-0.062	454.9
1.63	-0.059	492.9
1.88	-0.053	519.8
2.14	-0.045	542.4
2.41	-0.038	557.3
2.67	-0.033	565.6
2.92	-0.026	571.9
3.18	-0.022	576.2
3.44	-0.020	578.9
3.70	-0.017	581.9
3.96	-0.015	583.8
4.22	-0.011	586.8
4.49	-0.010	584.1
4.76	-0.011	580.9
5.02	-0.013	585.9
5.28	-0.015	594.4
5.55	-0.017	599.5
5.82	-0.018	603.2
6.07	-0.020	608.9
6.34	-0.020	619.0
6.61	-0.023	622.3
6.87	-0.022	624.1
7.13	-0.022	628.6
7.39	-0.024	634.3
7.66	-0.027	638.8
7.91	-0.027	642.6
8.17	-0.027	641.3
8.42	-0.031	645.9
8.69	-0.035	647.0
8.94	-0.039	646.1
9.19	-0.045	646.5
9.46	-0.048	648.4
9.73	-0.055	647.2
9.99	-0.058	646.9
10.25	-0.064	647.5
10.52	-0.068	648.3
10.79	-0.074	644.4
11.06	-0.081	643.9
11.32	-0.088	643.7
11.59	-0.095	645.2
11.86	-0.103	644.3
12.12	-0.111	643.7
12.38	-0.119	644.2
12.65	-0.126	646.4
12.92	-0.137	644.7
13.18	-0.145	645.8
13.44	-0.152	647.3
13.70	-0.162	651.1
13.97	-0.168	650.9
14.23	-0.177	650.0
14.49	-0.186	647.2
14.76	-0.192	644.7
15.03	-0.200	643.6

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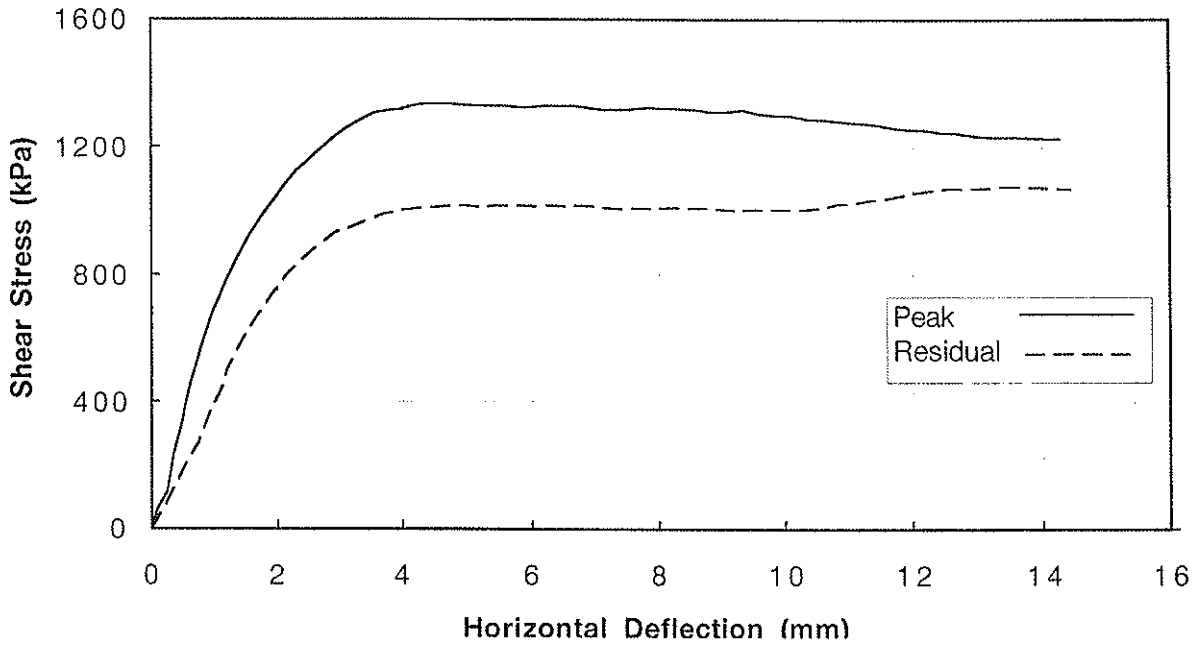
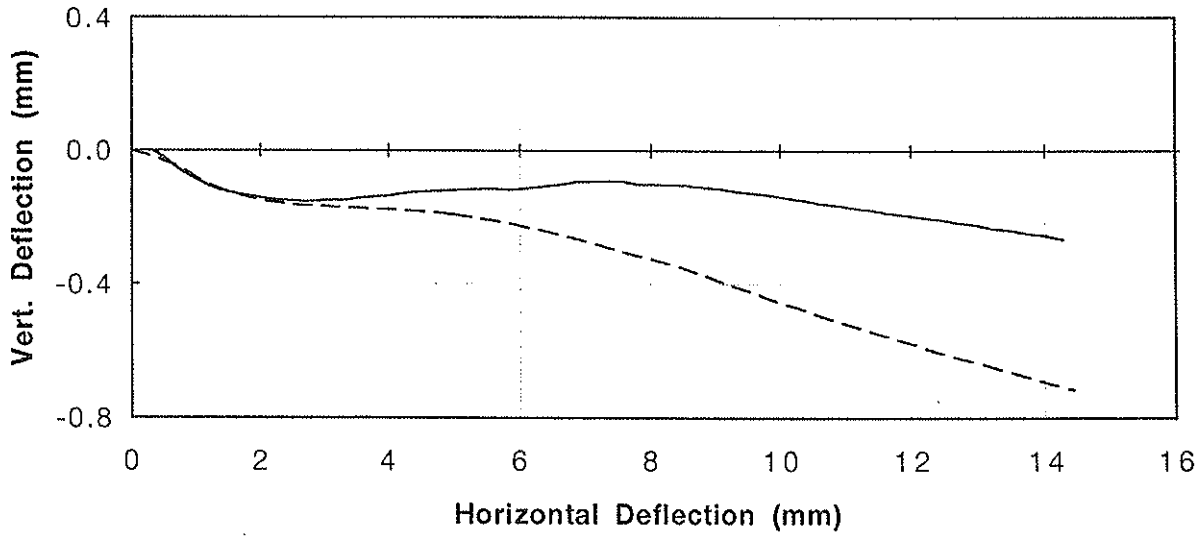
Direct Shear Test

Peak Stress= 1335 kPa
Resid. Stress= 1068 kPa





Test Hole Number: TP1 (1A)
Depth (ft): 1.0-2.0
Normal Stress(kPa): 1600
Displ. Rate(mm/min.): 0.024
Test No.: DS-2

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EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-15

Test Hole No.: TP1 (1A)
Depth (ft): 1.0-2.0
Test Number: DS-2

Initial Sample Conditions

Moisture Content (%): 12.2
Wet Density (Mg/m3): 2.288
Dry Density (Mg/m3): 2.039

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.67	-0.102	1328.1
0.08	-0.001	54.8	6.87	-0.095	1323.5
0.24	0.000	118.8	7.08	-0.095	1316.8
0.31	0.001	183.3	7.28	-0.092	1317.1
0.35	-0.002	233.7	7.54	-0.092	1317.3
0.46	-0.015	317.5	7.80	-0.102	1323.9
0.54	-0.027	397.7	8.05	-0.102	1321.8
0.62	-0.040	465.0	8.30	-0.104	1318.8
0.71	-0.053	527.1	8.57	-0.106	1316.2
0.80	-0.065	584.7	8.83	-0.112	1309.6
0.98	-0.085	688.5	9.09	-0.115	1312.1
1.17	-0.103	778.4	9.34	-0.123	1314.3
1.37	-0.118	856.4	9.60	-0.129	1303.0
1.56	-0.127	923.5	9.85	-0.135	1298.8
1.75	-0.133	983.2	10.12	-0.141	1296.6
2.12	-0.147	1084.8	10.38	-0.149	1287.2
2.32	-0.149	1128.8	10.64	-0.159	1283.9
2.52	-0.151	1164.3	10.90	-0.164	1279.9
2.72	-0.153	1201.7	11.15	-0.173	1274.4
2.93	-0.150	1233.7	11.42	-0.178	1271.4
3.13	-0.149	1260.3	11.67	-0.188	1261.5
3.34	-0.149	1284.6	11.92	-0.193	1254.2
3.54	-0.144	1304.9	12.19	-0.202	1252.3
3.75	-0.140	1313.2	12.45	-0.208	1244.8
3.95	-0.138	1317.4	12.71	-0.217	1242.4
4.15	-0.132	1328.6	12.97	-0.223	1234.0
4.36	-0.128	1335.0	13.23	-0.234	1231.0
4.65	-0.123	1335.4	13.49	-0.240	1231.0
4.96	-0.121	1331.2	13.76	-0.249	1229.9
5.27	-0.116	1330.1	14.02	-0.255	1226.3
5.57	-0.114	1328.1	14.28	-0.266	1226.6
5.88	-0.118	1323.4			
6.26	-0.111	1328.1			

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RESIDUAL STRENGTH TEST

Test Hole No.: TP1 (1A) Test Number: DS-2
Depth (ft): 1.0-2.0

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	9.78	-0.442	1004.8
0.24	-0.014	81.9	10.04	-0.459	1004.0
0.43	-0.026	158.1	10.30	-0.472	1004.6
0.53	-0.035	202.4	10.55	-0.492	1009.2
0.75	-0.048	271.8	10.81	-0.509	1021.2
0.85	-0.062	329.6	11.06	-0.524	1023.9
0.96	-0.076	385.9	11.31	-0.540	1032.0
1.11	-0.098	444.8	11.57	-0.555	1039.1
1.18	-0.102	496.3	11.83	-0.570	1049.7
1.29	-0.110	541.7	12.09	-0.586	1058.6
1.42	-0.119	586.0	12.35	-0.602	1067.4
1.54	-0.127	630.1	12.61	-0.617	1069.9
1.66	-0.133	667.4	12.88	-0.631	1071.2
1.92	-0.146	740.4	13.13	-0.645	1073.0
2.17	-0.156	804.9	13.39	-0.659	1077.1
2.42	-0.161	855.3	13.65	-0.675	1075.9
2.68	-0.164	896.0	13.92	-0.690	1075.4
2.93	-0.167	932.3	14.17	-0.704	1070.9
3.19	-0.171	949.5	14.43	-0.718	1067.9
3.44	-0.173	971.4			
3.69	-0.174	988.4			
3.95	-0.177	999.9			
4.19	-0.179	1006.7			
4.45	-0.183	1011.4			
4.71	-0.187	1014.5			
4.97	-0.192	1017.3			
5.23	-0.200	1013.4			
5.49	-0.207	1016.8			
5.75	-0.215	1015.9			
6.00	-0.226	1014.5			
6.26	-0.238	1017.3			
6.53	-0.249	1015.1			
6.78	-0.261	1015.9			
7.05	-0.274	1012.9			
7.31	-0.289	1006.7			
7.62	-0.306	1008.4			
7.88	-0.319	1009.0			
8.23	-0.337	1010.4			
8.40	-0.347	1008.5			
8.66	-0.363	1009.2			
9.26	-0.406	1002.8			
9.52	-0.424	1004.3			

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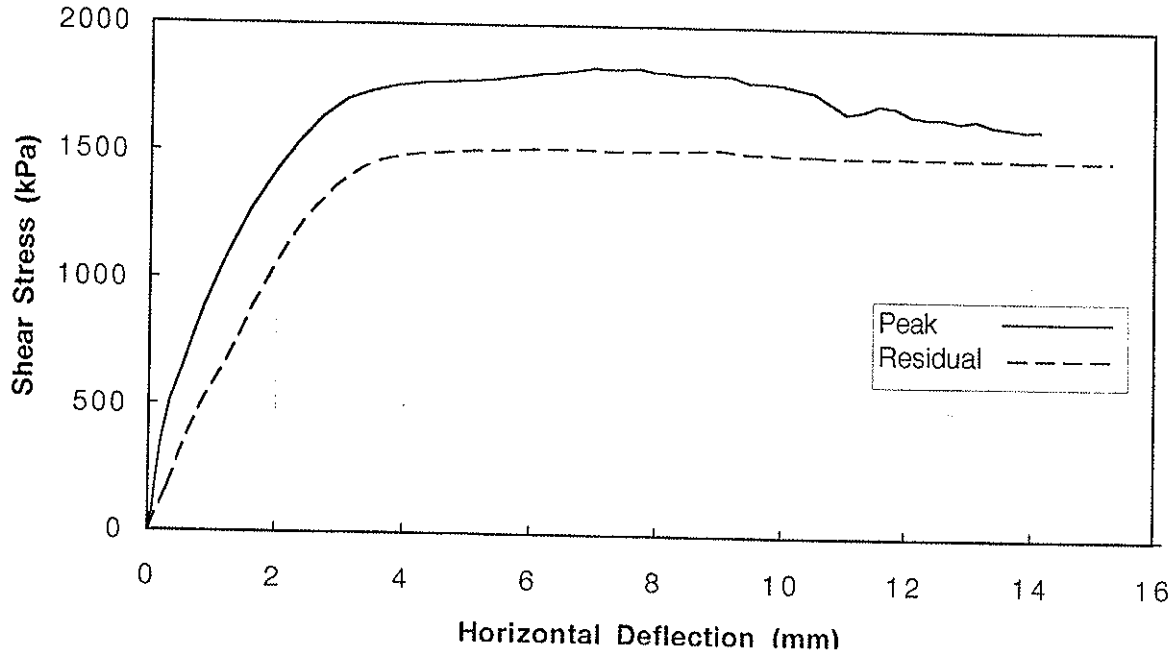
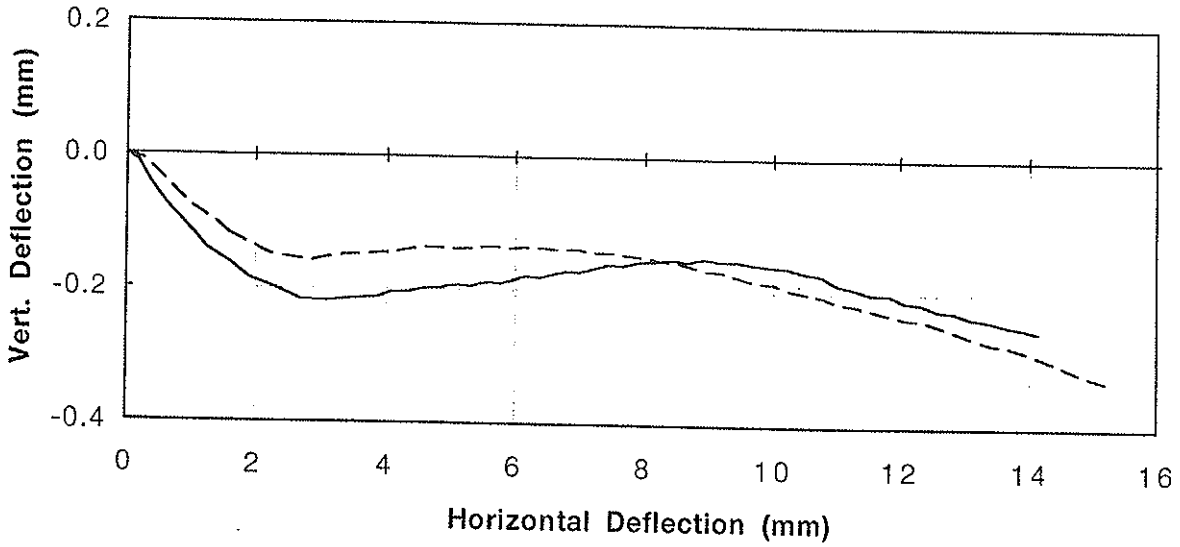
Direct Shear Test

Peak Stress= 1838 kPa
Resid. Stress= 1490 kPa





Test Hole Number:	TP1 (1A)
Depth (ft):	1.0-2.0
Normal Stress(kPa):	2400
Displ. Rate(mm/min.):	0.024
Test No.:	DS-3

EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-15

Test Hole No.: TP1 (1A)
Depth (ft): 1.0-2.0
Test Number: DS-3

Initial Sample Conditions

Moisture Content (%): 11.8
Wet Density (Mg/m3): 2.303
Dry Density (Mg/m3): 2.059

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.77	-0.172	1827.2
0.06	-0.003	70.8	6.97	-0.173	1837.5
0.11	-0.008	180.1	7.17	-0.168	1831.1
0.19	-0.012	339.4	7.42	-0.161	1832.2
0.34	-0.039	512.4	7.67	-0.161	1835.6
0.52	-0.062	633.5	7.92	-0.156	1824.6
0.70	-0.084	762.4	8.17	-0.155	1818.4
0.88	-0.101	883.8	8.43	-0.153	1812.8
1.07	-0.119	995.0	8.68	-0.155	1815.1
1.25	-0.140	1096.7	8.93	-0.150	1811.7
1.44	-0.153	1191.4	9.18	-0.154	1808.9
1.63	-0.162	1278.2	9.44	-0.154	1786.1
1.92	-0.184	1394.0	9.70	-0.157	1784.2
2.29	-0.199	1524.3	9.96	-0.161	1779.4
2.69	-0.217	1634.4	10.22	-0.163	1762.8
3.08	-0.219	1703.0	10.48	-0.169	1752.7
3.46	-0.215	1736.1	10.75	-0.173	1709.2
3.87	-0.213	1760.0	11.02	-0.188	1667.6
4.07	-0.205	1764.8	11.28	-0.193	1678.3
4.38	-0.204	1773.5	11.54	-0.200	1704.4
4.53	-0.200	1775.2	11.81	-0.201	1693.4
4.69	-0.198	1777.1	12.07	-0.213	1664.5
4.84	-0.198	1779.1	12.33	-0.215	1653.0
4.99	-0.194	1781.1	12.59	-0.224	1653.3
5.15	-0.193	1781.6	12.86	-0.228	1639.8
5.30	-0.195	1785.6	13.11	-0.237	1649.3
5.46	-0.190	1790.4	13.37	-0.240	1626.3
5.61	-0.189	1794.3	13.63	-0.247	1618.7
5.77	-0.190	1798.8	13.89	-0.251	1610.0
5.95	-0.186	1804.4	14.14	-0.258	1610.8
6.15	-0.179	1810.6			
6.36	-0.181	1815.1			
6.56	-0.176	1820.7			

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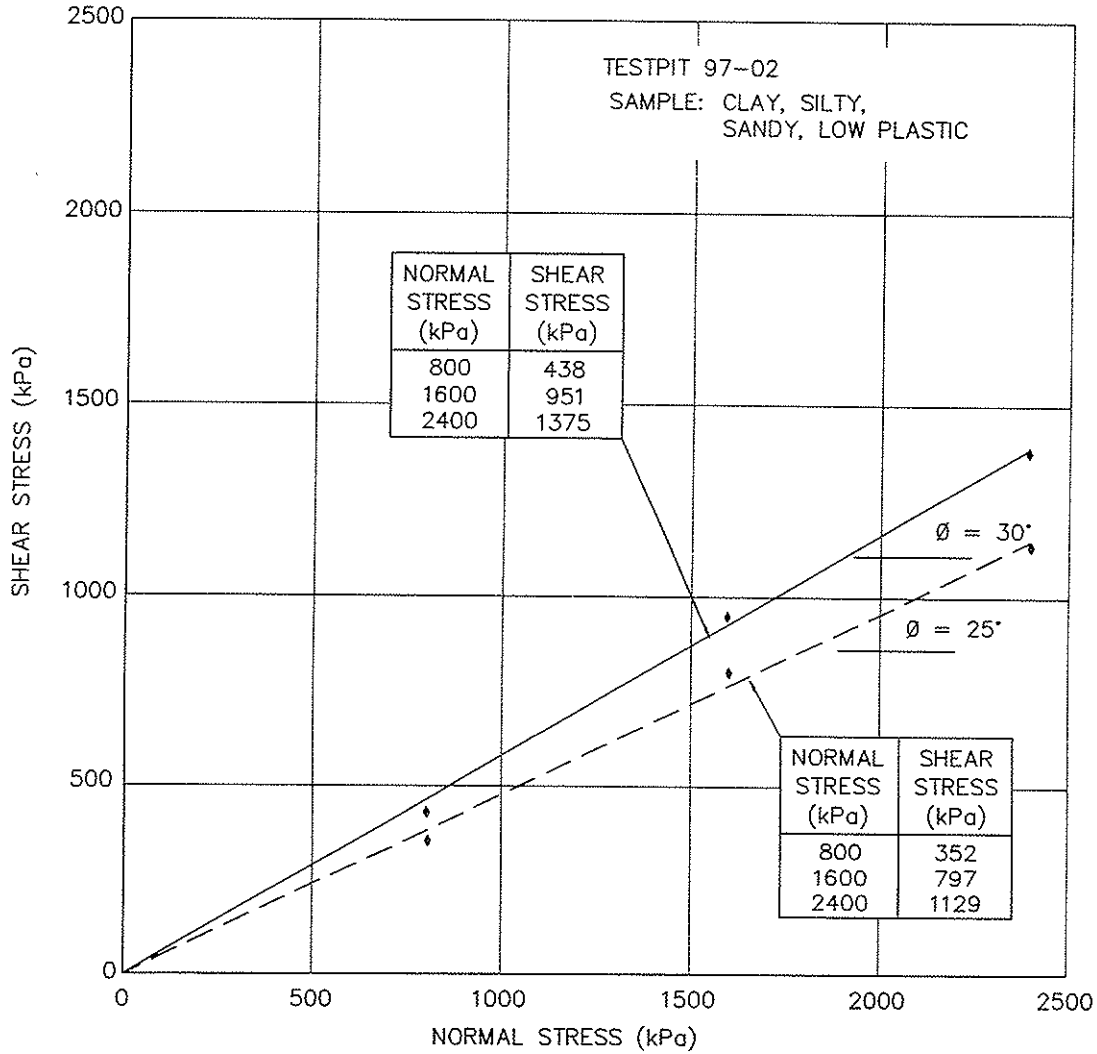
RESIDUAL STRENGTH TEST

Test Hole No.: TP1 (1A)
Depth (ft): 1.0-2.0

Test Number: DS-3

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	10.01	-0.187	1501.6
0.14	-0.004	84.6	10.27	-0.196	1501.6
0.30	-0.011	166.9	10.54	-0.201	1500.2
0.42	-0.022	249.5	10.81	-0.207	1497.3
0.64	-0.042	387.4	11.07	-0.216	1497.1
0.83	-0.061	492.5	11.32	-0.219	1495.4
1.04	-0.080	588.8	11.59	-0.226	1496.2
1.24	-0.091	675.6	11.85	-0.232	1499.9
1.43	-0.104	769.5	12.11	-0.238	1497.3
1.61	-0.119	870.0	12.37	-0.240	1494.8
1.80	-0.127	963.6	12.63	-0.249	1495.1
1.99	-0.138	1053.2	12.88	-0.257	1493.1
2.19	-0.148	1141.7	13.14	-0.266	1492.6
2.41	-0.153	1223.4	13.41	-0.275	1492.3
2.62	-0.155	1291.4	13.67	-0.278	1490.9
2.85	-0.157	1350.4	13.94	-0.286	1489.8
3.08	-0.153	1398.7	14.21	-0.296	1490.6
3.33	-0.150	1436.4	14.48	-0.306	1488.9
3.57	-0.148	1463.1	14.75	-0.316	1488.6
3.83	-0.147	1478.0	15.02	-0.325	1489.5
4.08	-0.145	1488.9	15.30	-0.332	1489.8
4.34	-0.140	1494.5			
4.60	-0.137	1499.0			
4.87	-0.138	1503.2			
5.13	-0.138	1508.3			
5.39	-0.137	1507.5			
5.65	-0.135	1512.0			
5.90	-0.138	1513.6			
6.15	-0.136	1515.3			
6.41	-0.137	1516.7			
6.67	-0.140	1515.9			
6.92	-0.138	1513.1			
7.17	-0.142	1510.8			
7.47	-0.142	1511.7			
7.72	-0.147	1512.0			
8.05	-0.149	1512.5			
8.23	-0.154	1513.9			
8.49	-0.156	1515.6			
8.96	-0.169	1520.1			
9.22	-0.170	1514.8			
9.49	-0.178	1506.9			
9.75	-0.184	1507.2			

DIRECT SHEAR TEST RESULTS
SILTY CLAY COLLUVIUM



——— Peak Shear Stress Mohr Coulomb Failure Envelope

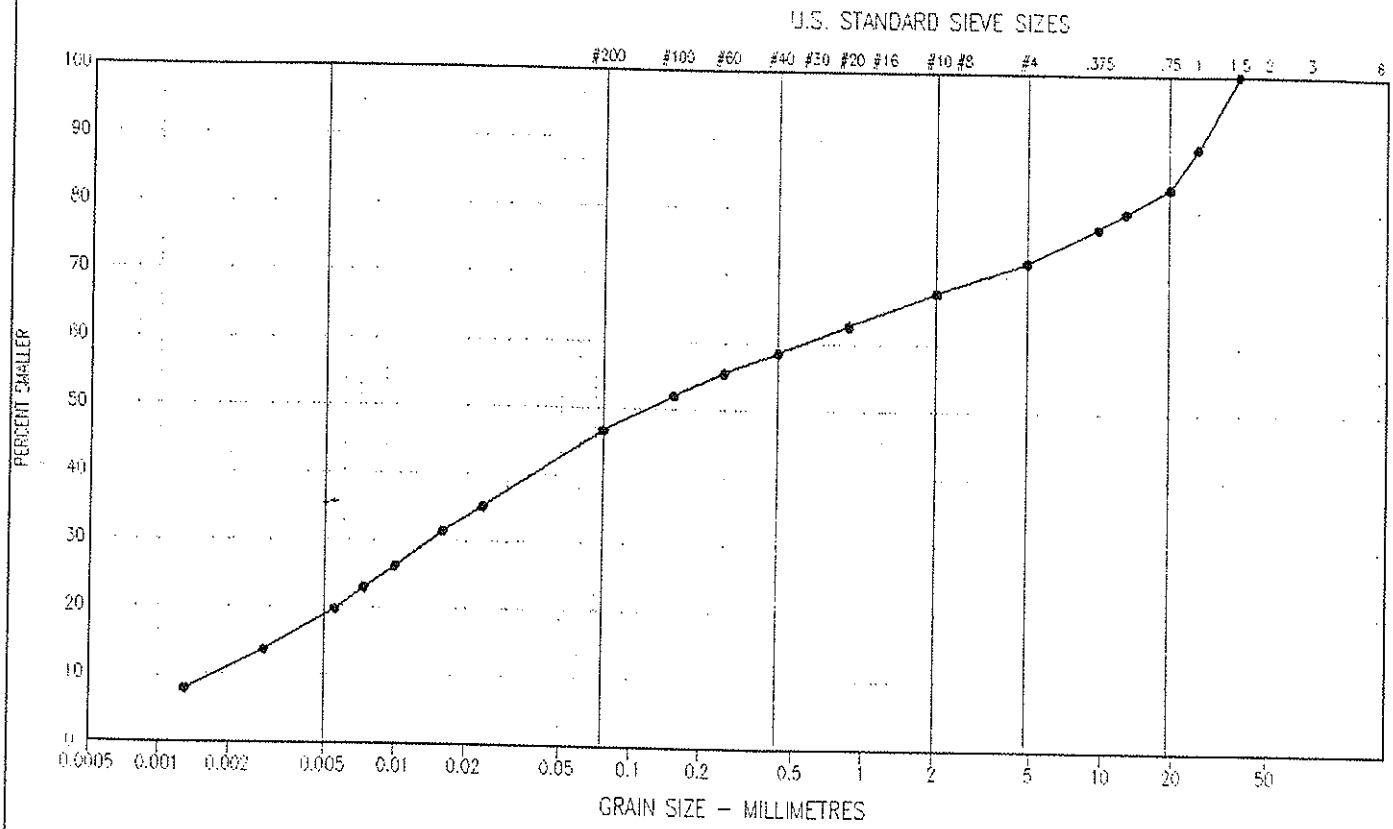
– – – Residual Shear Stress Mohr Coulomb Failure Envelope

Figure C-2

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION CLAY %	SILT %	SAND %	GRAVEL %	Cu	Cc	U.S.C
●——	TP2(2A)	3.00 – 4.00	18.6	28.0	25.5	27.9	316.0	0.2	GM

Project: 0201-11509

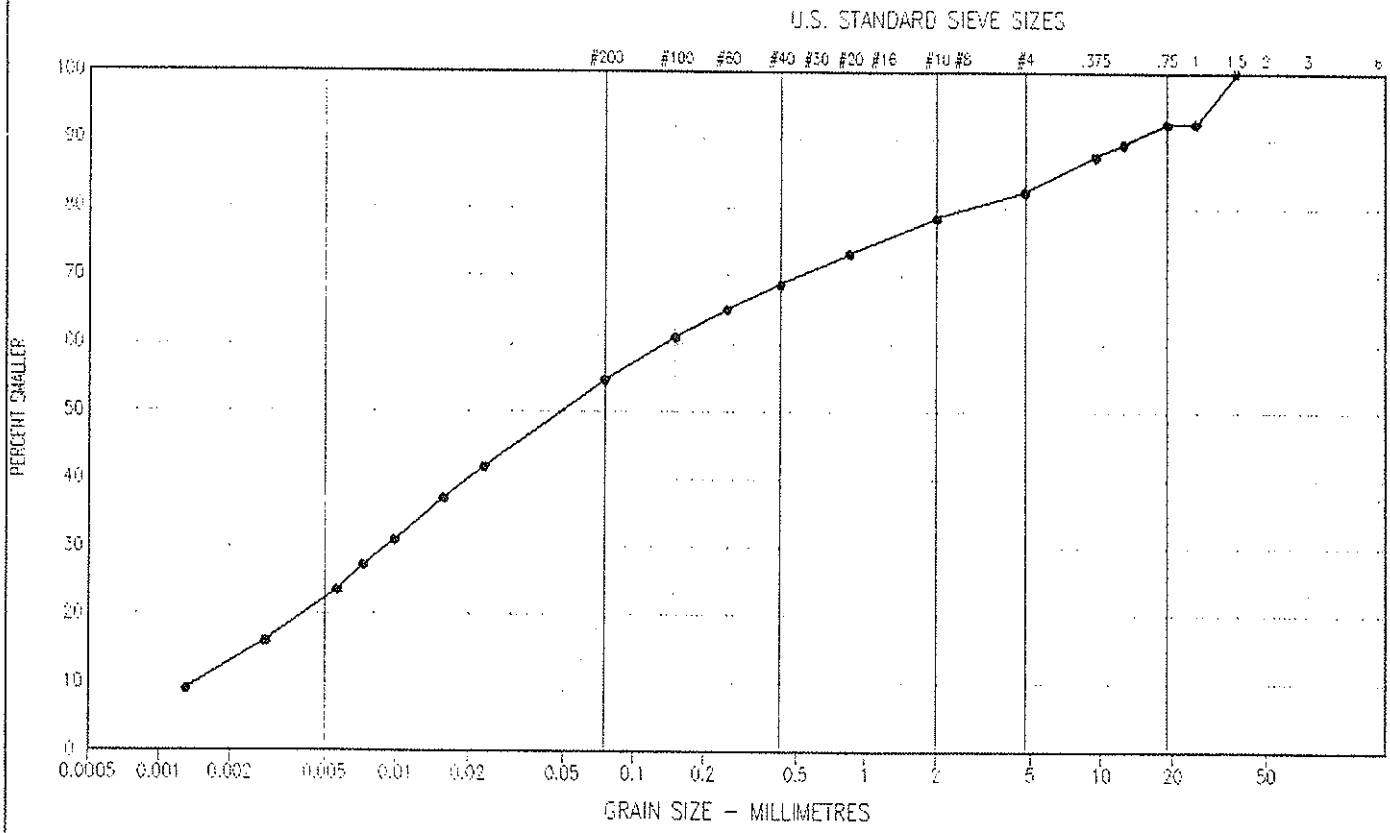
Date Tested: 97/10/23 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

EBA Engineering

PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (ft)	DESCRIPTION CLAY %	SILT %	SAND %	GRAVEL %	Cu	Cc	U.S.C
———	TP2(2B)	3.00 – 4.00	21.7	32.9	27.7	17.7	92.3	0.4	

Project: 0201-11509 Date Tested: 97/10/23 BY: SK

Tested in accordance with ASTM D422 unless otherwise noted.

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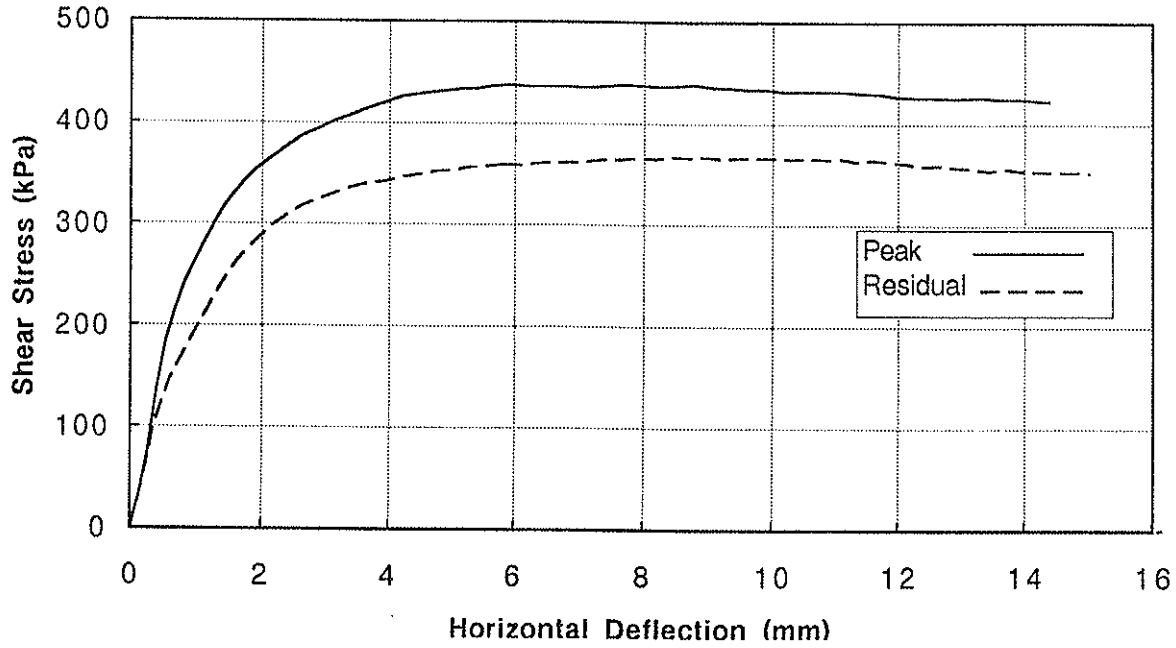
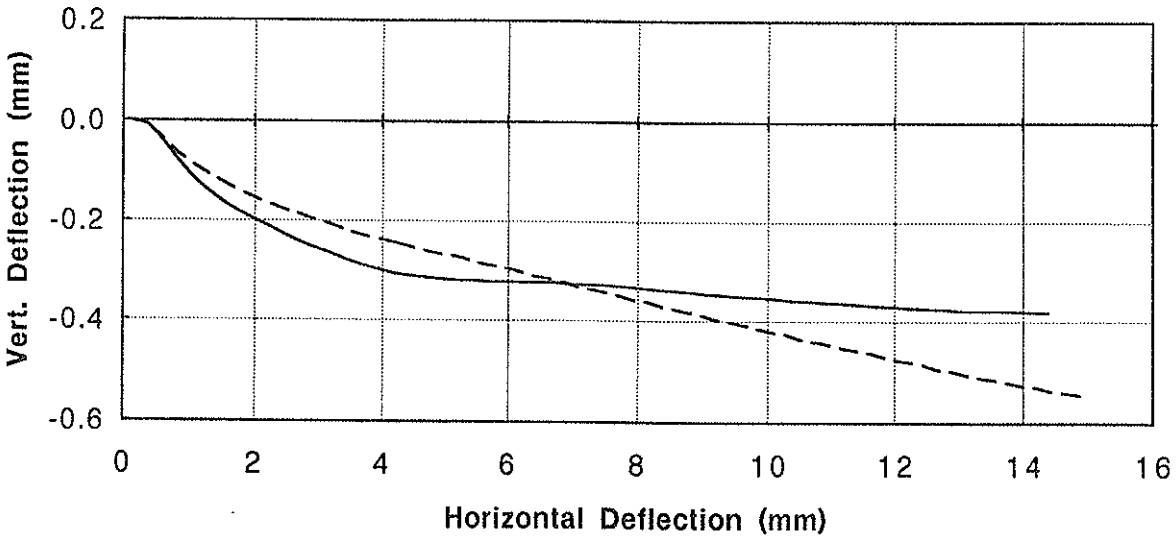
Direct Shear Test

Peak Stress= 438 kPa
Resid. Stress= 352 kPa





Test Hole Number:	TP2 (2B)
Depth (ft)	3.0-4.0
Normal Stress(kPa):	800
Displ. Rate(mm/min.):	0.024
Test No.:	DS-4

EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-22

Test Hole No.: TP2 (2B)
Depth (ft): 3.0-4.0
Test Number: DS-4

Initial Sample Conditions

Moisture Content (%): 20.0
Wet Density (Mg/m3): 2.093
Dry Density (Mg/m3): 1.745

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	6.97	-0.327	435.3
0.12	-0.001	29.1	7.23	-0.327	435.5
0.26	-0.003	70.8	7.48	-0.328	436.3
0.39	-0.010	133.6	7.74	-0.331	437.7
0.54	-0.029	182.5	8.01	-0.334	436.3
0.68	-0.053	216.1	8.27	-0.337	436.2
0.83	-0.078	243.3	8.53	-0.339	436.7
0.99	-0.102	264.8	8.79	-0.342	437.6
1.14	-0.123	283.9	9.06	-0.346	435.6
1.29	-0.140	301.7	9.33	-0.348	434.5
1.44	-0.155	318.0	9.58	-0.351	433.2
1.59	-0.170	330.4	9.85	-0.353	433.6
1.75	-0.181	342.9	10.12	-0.355	431.8
1.89	-0.190	352.5	10.39	-0.359	431.6
2.05	-0.201	361.0	10.65	-0.360	431.7
2.21	-0.212	368.0	10.92	-0.363	431.5
2.36	-0.221	375.4	11.19	-0.364	431.1
2.62	-0.237	385.7	11.45	-0.366	429.4
2.87	-0.251	393.5	11.72	-0.369	428.9
3.14	-0.264	401.8	11.98	-0.370	426.7
3.40	-0.278	407.3	12.24	-0.373	426.0
3.67	-0.288	414.0	12.51	-0.374	425.7
3.92	-0.298	419.4	12.77	-0.376	425.1
4.19	-0.306	425.5	13.03	-0.377	425.5
4.60	-0.313	429.2	13.31	-0.377	425.7
4.87	-0.317	431.1	13.57	-0.378	424.6
5.14	-0.319	432.7	13.84	-0.380	424.4
5.40	-0.320	433.6	14.12	-0.380	423.1
5.66	-0.321	435.6	14.39	-0.382	422.1
5.93	-0.322	437.2			
6.19	-0.323	436.1			
6.45	-0.324	435.9			
6.70	-0.324	435.8			

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RESIDUAL STRENGTH TEST

Test Hole No.: TP2 (2B)
Depth (ft): 3.0-4.0

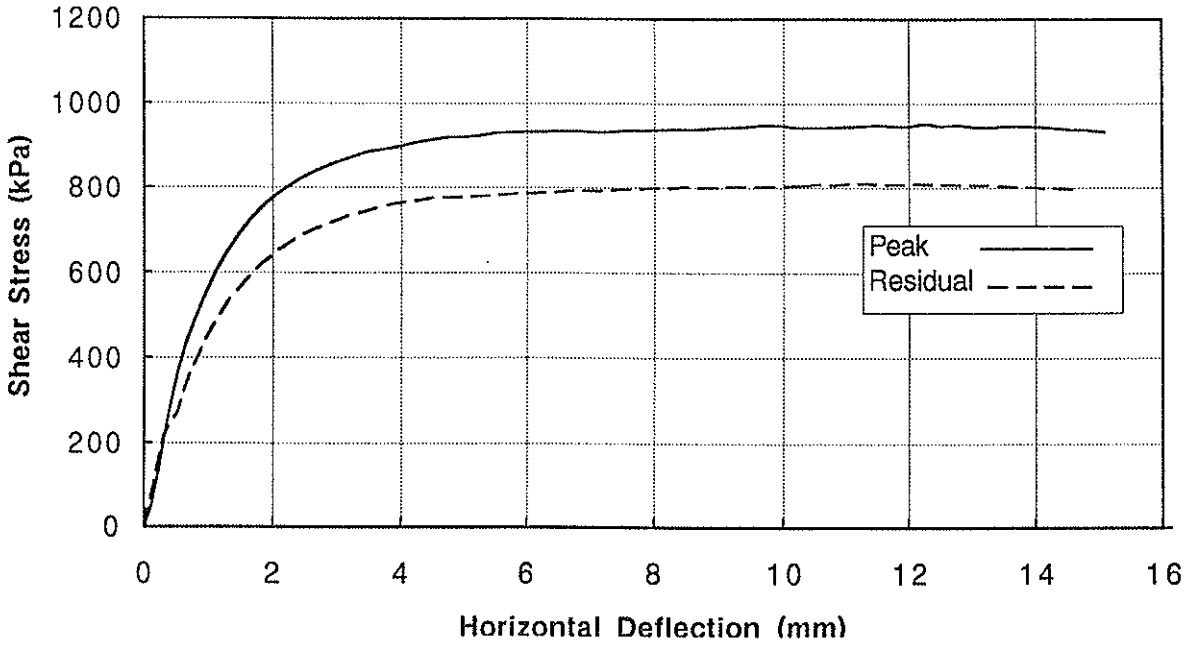
Test Number: DS-4

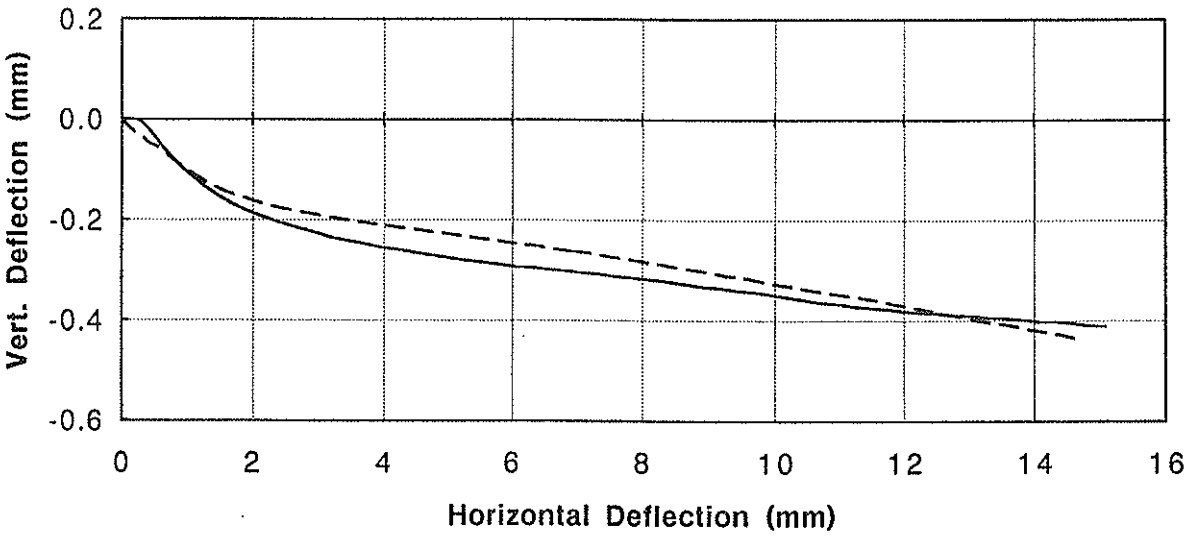
Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	10.53	-0.436	365.4
0.11	0.000	27.1	10.80	-0.442	364.8
0.23	-0.001	61.0	11.06	-0.449	365.2
0.35	-0.006	98.9	11.33	-0.458	363.0
0.60	-0.035	147.1	11.59	-0.463	364.0
0.86	-0.066	178.3	11.86	-0.472	362.2
1.11	-0.091	209.5	12.13	-0.478	361.1
1.37	-0.113	239.5	12.38	-0.484	358.5
1.63	-0.131	264.4	12.64	-0.494	359.2
1.88	-0.147	282.5	12.91	-0.499	357.0
2.14	-0.162	297.5	13.17	-0.508	356.1
2.40	-0.175	308.8	13.43	-0.512	354.1
2.65	-0.186	318.6	13.69	-0.518	356.1
2.91	-0.197	324.9	13.96	-0.526	354.1
3.16	-0.206	330.6	14.23	-0.529	353.3
3.42	-0.219	336.2	14.49	-0.539	352.9
3.69	-0.229	340.3	14.76	-0.543	352.6
3.95	-0.236	342.2	15.02	-0.549	352.3
4.22	-0.244	346.8			
4.48	-0.253	349.1			
4.75	-0.261	352.2			
5.02	-0.268	353.0			
5.29	-0.275	356.4			
5.55	-0.285	356.9			
5.82	-0.292	359.2			
6.09	-0.299	358.6			
6.35	-0.309	360.2			
6.62	-0.316	360.8			
6.88	-0.323	361.6			
7.13	-0.334	361.9			
7.40	-0.340	364.3			
7.66	-0.348	364.1			
7.91	-0.357	365.4			
8.17	-0.363	364.4			
8.43	-0.373	366.5			
8.69	-0.381	366.2			
8.96	-0.387	366.3			
9.21	-0.398	365.3			
9.48	-0.403	366.2			
9.74	-0.412	365.8			
10.01	-0.420	366.0			
10.27	-0.425	364.5			

EBA Engineering Consultants Ltd.

Direct Shear Test

Peak Stress= 951 kPa
Resid. Stress= 797 kPa





Test Hole Number:	TP2 (2A)
Depth (ft):	3.0-4.0
Normal Stress(kPa):	1600
Displ. Rate(mm/min.):	0.024
Test No.:	DS-5

EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-21

Test Hole No.: TP2 (2A)
Depth (ft): 3.0-4.0
Test Number: DS-5

Initial Sample Conditions

Moisture Content (%): 16.4
Wet Density (Mg/m3): 2.167
Dry Density (Mg/m3): 1.862

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	7.10	-0.306	931.2
0.12	0.000	51.8	7.35	-0.308	932.3
0.24	-0.001	146.1	7.62	-0.312	935.1
0.29	-0.004	193.3	7.88	-0.316	935.7
0.42	-0.020	288.2	8.14	-0.320	937.2
0.54	-0.040	369.5	8.40	-0.324	938.9
0.68	-0.062	437.7	8.67	-0.328	939.0
0.82	-0.081	496.1	8.93	-0.333	941.4
0.96	-0.100	549.5	9.19	-0.336	943.3
1.11	-0.117	597.7	9.44	-0.340	943.7
1.28	-0.134	644.5	9.69	-0.344	948.6
1.48	-0.152	687.6	9.95	-0.348	946.7
1.68	-0.168	726.3	10.21	-0.353	942.9
1.91	-0.182	763.2	10.72	-0.365	942.6
2.16	-0.194	794.7	10.98	-0.368	944.2
2.42	-0.206	820.2	11.24	-0.372	946.4
2.68	-0.217	840.6	11.50	-0.376	949.2
2.94	-0.225	856.8	11.75	-0.377	945.8
3.21	-0.235	870.0	12.01	-0.381	945.5
3.47	-0.242	883.5	12.26	-0.384	951.1
3.73	-0.248	889.9	12.52	-0.386	945.5
4.00	-0.256	897.5	12.77	-0.390	948.1
4.24	-0.260	906.0	13.04	-0.391	945.0
4.50	-0.266	912.1	13.29	-0.395	943.3
4.76	-0.271	919.0	13.55	-0.396	945.9
5.02	-0.276	918.5	13.81	-0.398	945.1
5.28	-0.282	923.8	14.07	-0.402	943.7
5.54	-0.285	928.5	14.33	-0.402	941.7
5.80	-0.289	930.4	14.59	-0.405	938.4
6.06	-0.293	931.8	14.84	-0.409	936.4
6.32	-0.296	932.5	15.10	-0.411	932.8
6.58	-0.299	934.3			
6.83	-0.301	933.1			

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RESIDUAL STRENGTH TEST

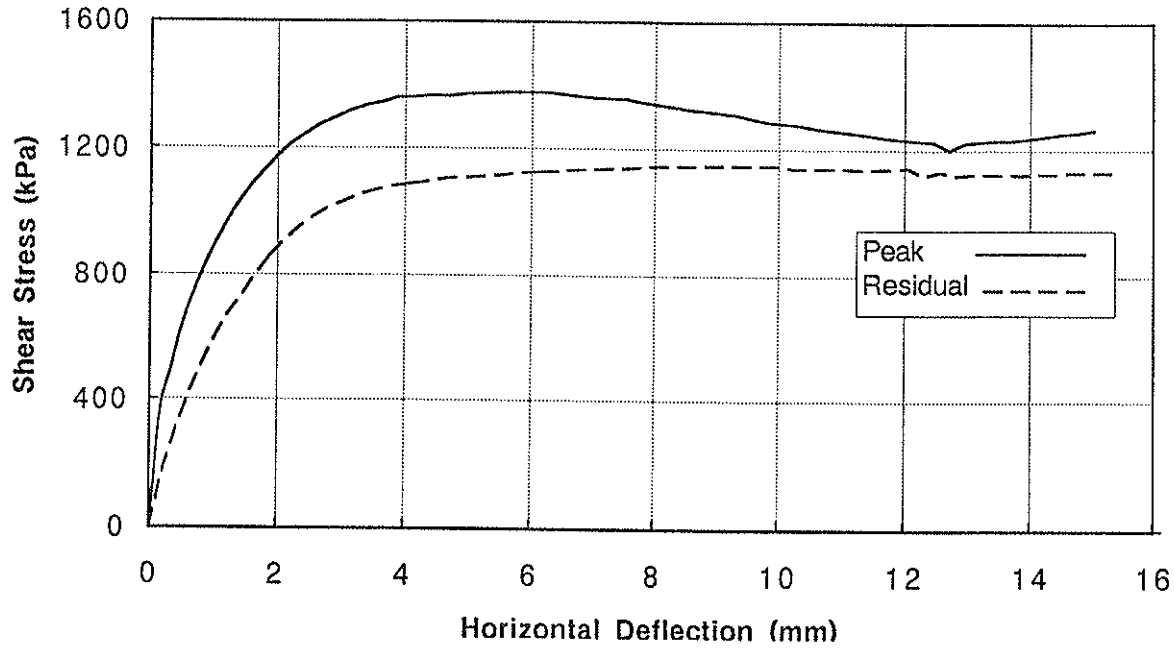
Test Hole No.: TP2 (2A) Test Number: DS-5
Depth(ft): 3.0-4.0

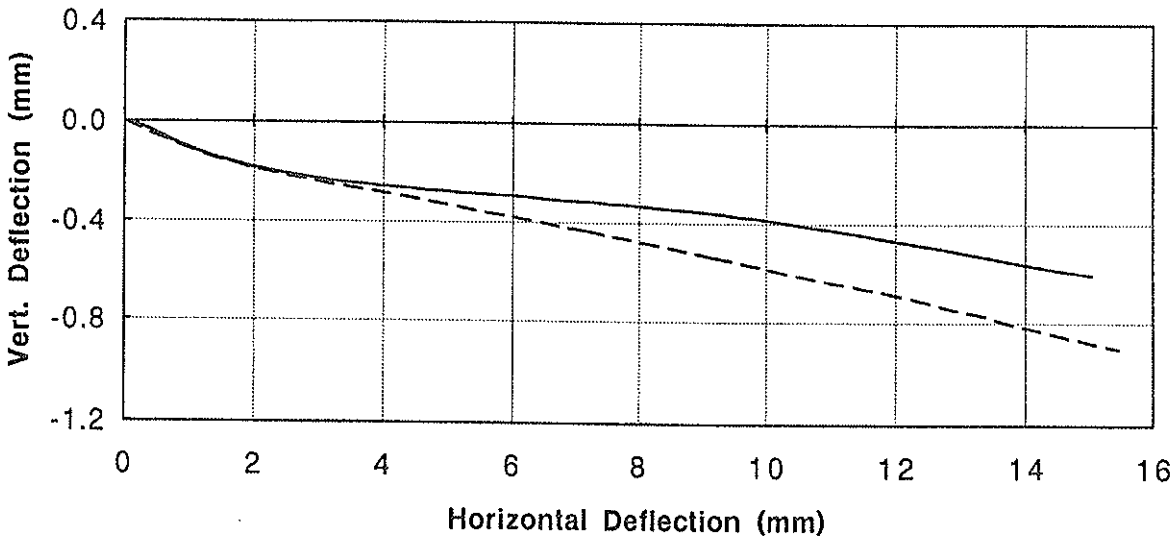
Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	8.50	-0.293	801.3
0.08	-0.013	62.2	8.76	-0.299	799.9
0.14	-0.020	98.2	9.02	-0.304	799.9
0.22	-0.027	151.1	9.27	-0.311	803.1
0.31	-0.037	212.1	9.53	-0.315	801.9
0.42	-0.048	246.4	9.79	-0.322	802.5
0.53	-0.054	271.9	10.04	-0.328	803.5
0.64	-0.065	329.4	10.30	-0.332	804.1
0.76	-0.077	372.3	10.56	-0.340	807.4
0.87	-0.089	411.1	10.82	-0.344	806.1
0.99	-0.100	450.4	11.07	-0.350	809.1
1.11	-0.110	482.7	11.33	-0.356	810.7
1.23	-0.120	512.9	11.58	-0.360	806.0
1.35	-0.129	539.7	11.84	-0.368	808.3
1.47	-0.137	561.3	12.10	-0.374	808.8
1.60	-0.145	582.7	12.35	-0.379	808.2
1.73	-0.151	603.7	12.61	-0.387	807.7
1.86	-0.156	623.3	12.87	-0.392	806.3
2.11	-0.166	654.7	13.13	-0.399	805.6
2.37	-0.175	680.4	13.40	-0.405	804.6
2.63	-0.182	700.3	13.66	-0.409	801.9
2.89	-0.188	716.6	13.91	-0.418	801.3
3.15	-0.194	731.3	14.17	-0.422	799.1
3.41	-0.200	741.6	14.42	-0.428	797.8
3.67	-0.205	752.6	14.68	-0.435	797.2
3.92	-0.209	760.6			
4.34	-0.216	770.0			
4.60	-0.222	776.4			
4.86	-0.225	775.9			
5.12	-0.230	778.1			
5.38	-0.235	781.1			
5.64	-0.238	782.5			
5.90	-0.245	785.5			
6.16	-0.249	786.5			
6.41	-0.252	787.5			
6.67	-0.258	792.8			
6.93	-0.262	793.3			
7.19	-0.266	792.0			
7.45	-0.272	796.3			
7.72	-0.277	795.6			
7.98	-0.283	799.1			
8.24	-0.288	798.8			

EBA Engineering Consultants Ltd.

Direct Shear Test

Peak Stress= 1375 kPa
Resid. Stress= 1129 kPa





Test Hole Number:	TP2 (2B)
Depth (ft):	3.0-4.0
Normal Stress(kPa):	2400
Displ. Rate(mm/min.):	0.024
Test No.:	DS-6

EBA Engineering Consultants Ltd.

Direct Shear Test

Project No.: 0201-11509
Date Tested: 97-10-15

Test Hole No.: TP2 (2B)
Depth (ft): 3.0-4.0
Test Number: DS-6

Initial Sample Conditions

Moisture Content (%): 15.9
Wet Density (Mg/m3): 2.199
Dry Density (Mg/m3): 1.897

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	5.73	-0.291	1374.6
0.04	0.000	65.7	6.00	-0.295	1374.3
0.07	-0.001	151.1	6.26	-0.299	1374.3
0.11	-0.004	242.7	6.52	-0.306	1368.4
0.15	-0.008	325.6	6.78	-0.312	1362.5
0.20	-0.014	402.9	7.03	-0.316	1359.7
0.33	-0.026	489.7	7.29	-0.318	1356.6
0.46	-0.043	601.5	7.55	-0.326	1354.4
0.60	-0.059	690.8	7.81	-0.327	1345.6
0.74	-0.078	766.7	8.32	-0.339	1331.6
0.88	-0.094	835.5	8.57	-0.345	1323.7
1.02	-0.109	896.7	8.82	-0.350	1318.7
1.17	-0.123	952.1	9.33	-0.363	1307.4
1.31	-0.137	1002.1	9.59	-0.372	1295.4
1.46	-0.149	1045.3	9.84	-0.379	1284.7
1.61	-0.159	1086.1	10.36	-0.399	1274.0
1.76	-0.169	1121.2	10.63	-0.410	1263.9
1.91	-0.179	1155.5	10.89	-0.420	1260.0
2.05	-0.188	1183.5	11.42	-0.439	1246.2
2.20	-0.195	1209.4	11.68	-0.454	1239.7
2.40	-0.204	1237.2	11.95	-0.464	1233.3
2.66	-0.216	1270.4	12.47	-0.487	1225.1
2.90	-0.226	1293.1	12.71	-0.499	1200.1
3.16	-0.235	1317.0	12.97	-0.510	1222.9
3.41	-0.243	1333.0	13.49	-0.537	1230.2
3.66	-0.250	1342.3	13.74	-0.549	1231.9
3.91	-0.257	1358.3	14.00	-0.562	1237.8
4.17	-0.262	1359.4	14.52	-0.585	1251.8
4.43	-0.267	1364.5	14.79	-0.595	1254.9
4.68	-0.274	1363.3	15.05	-0.606	1262.8
4.95	-0.277	1369.8			
5.21	-0.283	1372.1			
5.47	-0.286	1373.5			

eba

RESIDUAL STRENGTH TEST

Test Hole No.: TP2 (2B) Test Number: DS-6
Depth (ft): 3.0-4.0

Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)	Horiz. Disp. (mm)	Vert Disp. (mm)	Shear Stress (kPa)
0.00	0.000	0.0	10.22	-0.595	1140.0
0.23	-0.028	192.2	10.48	-0.610	1141.1
0.42	-0.052	309.3	10.75	-0.624	1141.1
0.61	-0.072	413.0	11.01	-0.637	1140.6
0.81	-0.094	510.7	11.27	-0.648	1138.3
1.01	-0.112	593.3	11.52	-0.663	1139.7
1.22	-0.133	672.0	11.79	-0.676	1140.3
1.44	-0.151	728.2	12.05	-0.691	1144.5
1.65	-0.165	799.5	12.30	-0.707	1121.5
1.88	-0.183	857.7	12.55	-0.722	1132.4
2.10	-0.196	905.7	12.81	-0.743	1120.9
2.34	-0.208	948.1	13.07	-0.756	1125.4
2.57	-0.221	983.0	13.32	-0.772	1125.4
2.81	-0.232	1013.0	13.59	-0.792	1124.3
3.06	-0.244	1033.5	13.85	-0.808	1123.4
3.31	-0.255	1055.4	14.11	-0.824	1126.2
3.56	-0.267	1069.8	14.38	-0.841	1126.0
3.81	-0.278	1081.3	14.65	-0.857	1131.9
4.07	-0.289	1089.7	14.92	-0.874	1131.3
4.33	-0.301	1095.6	15.19	-0.890	1130.5
4.59	-0.313	1103.8	15.47	-0.904	1129.0
4.85	-0.325	1108.8			
5.11	-0.337	1110.5			
5.37	-0.350	1115.6			
5.63	-0.363	1118.1			
5.89	-0.375	1124.3			
6.14	-0.385	1126.8			
6.39	-0.397	1128.8			
6.65	-0.409	1132.4			
6.90	-0.421	1134.7			
7.15	-0.433	1136.4			
7.40	-0.445	1139.2			
7.66	-0.458	1141.7			
7.90	-0.470	1145.1			
8.15	-0.482	1146.2			
8.41	-0.495	1147.6			
8.66	-0.509	1147.6			
8.92	-0.522	1149.3			
9.18	-0.538	1148.4			
9.44	-0.550	1147.9			
9.70	-0.565	1149.8			
9.96	-0.579	1149.6			

APPENDIX

APPENDIX G 2008 SITE CHARACTERIZATION PROGRAM – TESTPIT LOGS

Reclamation Overburden Dump	Client: Minto Explorations Ltd	TESTPIT NO: 08-ROD-TP01
Minto Mine	Excavator: 385B CAT	PROJECT NO: W14101068.004
Minto, YT	6945021N; 383576E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	▲TEMPERATURE (°C)▲ -7 -4 -1 2 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	ORGANIC MAT - silt, sand, and organics, fiberous, dark brown, frozen				SEASONAL FROST	0
	SAND AND SILT - trace gravel, trace clay, fine grained sand, maximum aggregate size 10mm, rounded to sub-angular, moist, brown, frozen - unfrozen @ 0.4m		G1		unfrozen at 0.4m	
1	SAND - silty, some gravel, trace clay, fine grained sand, maximum aggregate size 40mm, rounded to angular, moist, brown		G2			5
	- some silt, well graded sand, maximum aggregate size 150mm, light brown - gravelly		G3		PERMAFROST Nbn	
2			G4			
3						10
			G5			
4			G6			
			G7			15
	END OF TESTPIT 4.5m					
5						
6						20

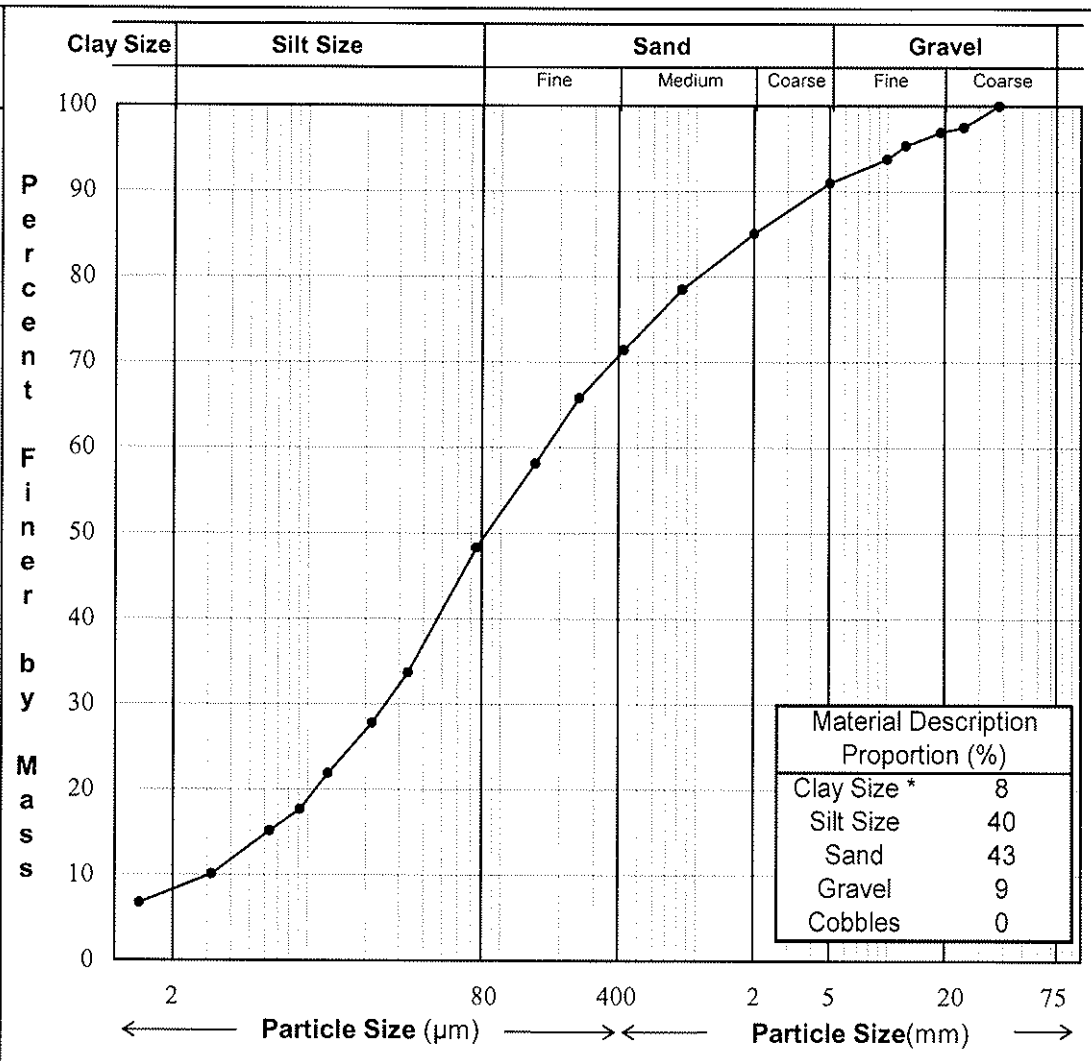
eba	LOGGED BY: JPB	COMPLETION DEPTH: 4.5m
	REVIEWED BY: JRT	COMPLETE: 1/10/2008
	DRAWING NO:	Page 1 of 1

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/24
Client:	Minto Explorations Ltd		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08-ROD-TP01		
Depth:	0.6 - 0.8 m		
Description**:	SAND AND SILT - trace gravel, trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	
38 mm	100
25 mm	97
19 mm	97
13 mm	95
10 mm	94
5 mm	91
2 mm	85
850 µm	79
425 µm	71
250 µm	66
150 µm	58
75 µm	48
33 µm	34
22 µm	28
13 µm	22
9 µm	18
6 µm	15
3 µm	10
1 µm	7



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

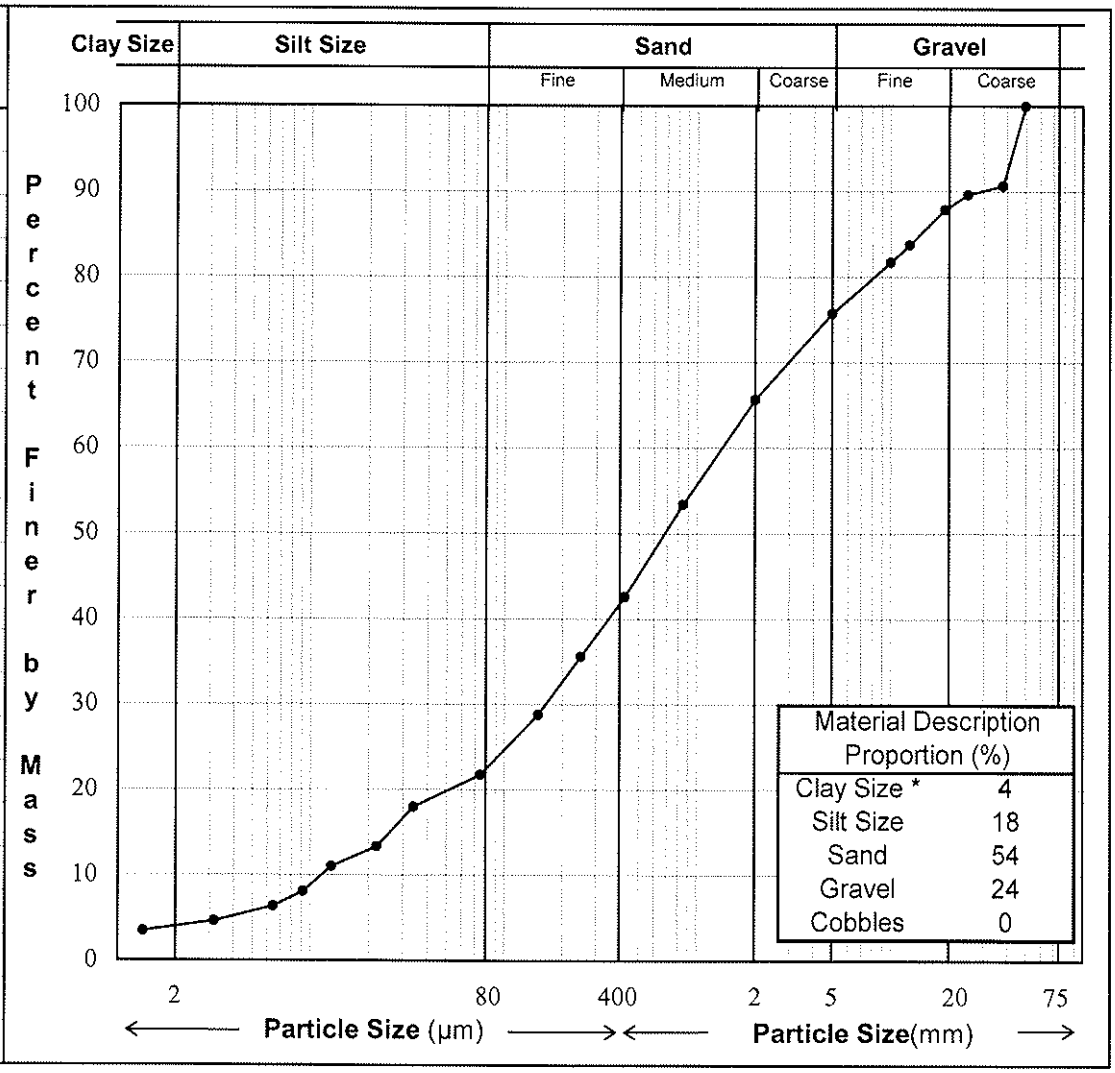
EBA Engineering Consultants Ltd.

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/14
Client:	Minto Explorations Ltd		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08-ROD-TP01		
Depth:	3.3 - 3.5 m		
Description**:	SAND - gravelly, some silt, trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	100
38 mm	91
25 mm	90
19 mm	88
13 mm	84
10 mm	82
5 mm	76
2 mm	66
850 µm	53
425 µm	43
250 µm	36
150 µm	29
75 µm	22
34 µm	18
22 µm	13
13 µm	11
9 µm	8
6 µm	6
3 µm	5
1 µm	3



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

EBA Engineering Consultants Ltd.

Reclamation Overburden Dump	Client: Minto Explorations Ltd.	TESTPIT NO: 08-ROD-TP02
Minto Mine	Excavator: 385B CAT	PROJECT NO: W14101068.004
Minto, YT	6945000N; 383420E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	▲TEMPERATURE (°C)▲ -7 -4 -1 2 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	ORANGIC MAT - silt, sand and organics, fiberous, dark brown, frozen					0
	SILT AND SAND - trace organics, trace clay, trace gravel, fine grained sand, rounded to sub-angular, maximum aggregate size 10mm, brown, frozen		G1		Vx, Vr 5%	
1						
	SAND - silty, trace gravel to gravelly, trace clay, fine grained sand, maximum aggregate size 100mm, angular to sub-rounded, light brown, frozen		G2		Vx, Vc, Vr 5-15%	5
2			G3			
			G4			
3						10
	- silt content decreases slightly		G5			
4			G6			
	END OF TESTPIT 4.1m					
5						15
6						20

eba

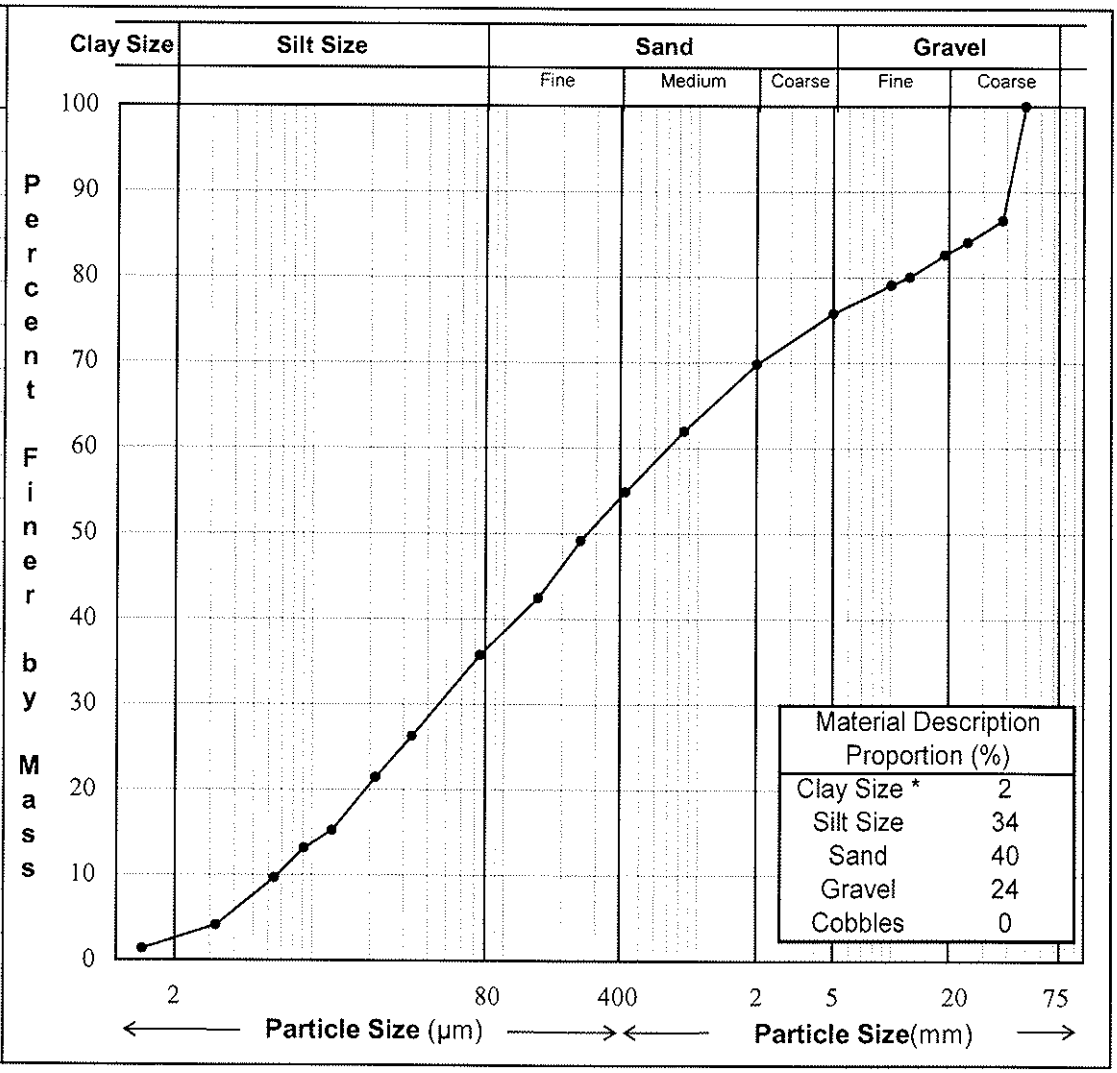
LOGGED BY: JPB	COMPLETION DEPTH: 4.1m
REVIEWED BY: JRT	COMPLETE: 1/10/2008
DRAWING NO:	Page 1 of 1

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/24
Client:	Minto Explorations Ltd		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08-ROD-TP02		
Depth:	1.4 - 1.5 m		
Description**:	SAND - silty, gravelly, trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	100
38 mm	87
25 mm	84
19 mm	83
13 mm	80
10 mm	79
5 mm	76
2 mm	70
850 µm	62
425 µm	55
250 µm	49
150 µm	42
75 µm	36
33 µm	26
22 µm	21
13 µm	15
9 µm	13
6 µm	10
3 µm	4
1 µm	1



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

EBA Engineering Consultants Ltd.

Reclamation Overburden Dump	Client: Minto Explorations Ltd.	TESTPIT NO: 08-ROD-TP03
Minto Mine	Excavator: 385B CAT	PROJECT NO: W14101068.004
Minto, YT	6945100N; 383300E; Zone 8	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	▲TEMPERATURE (°C)▲ -7 -4 -1 2 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	ORGANIC MAT - silt, sand and organics, fiberous, dark brown, frozen				SEASONAL FROST	0
	SAND AND SILT - trace gravel, trace clay, fine grained sand, maximum aggregate size 15mmm angular to sub-rounded, dark brown, frozen					
	- unfrozen @ 0.4m		G1		unfrozen @ 0.4m	
1						
	SAND - silty, some gravel, trace clay, fine grained sand, maximum aggregate size 50mm, angular to rounded, light brown					5
			G2		PERMAFROST	
2	- some silt to silty, gravel content increases				Nbn	
			G3			
3	- gravelly, some silt, well graded sand, harder digging		G4			10
	- trace silt					
			G5			
4						
			G6			
	END OF TESTPIT 4.5m					15
5						
6						20

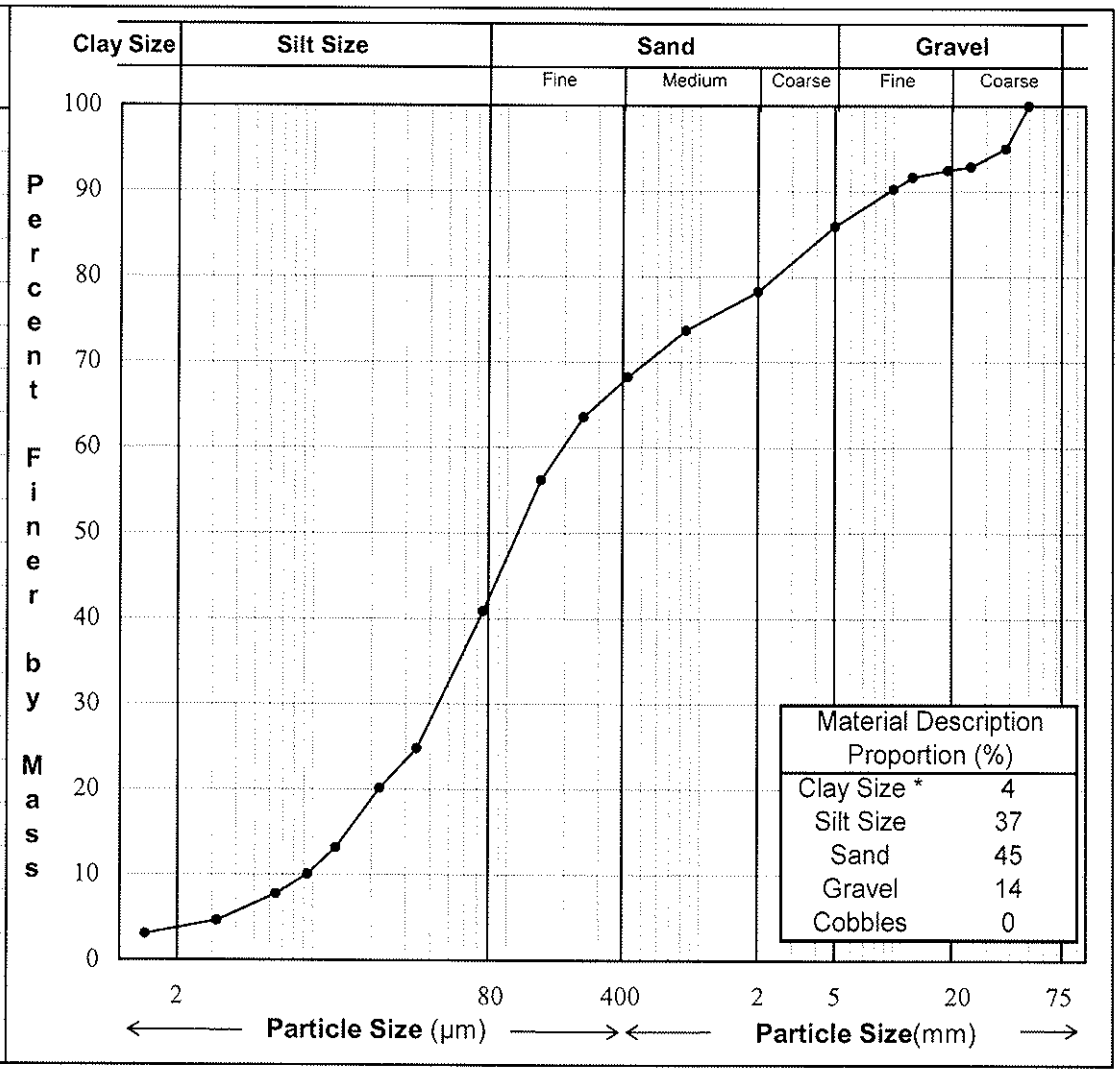
eba	LOGGED BY: JPB	COMPLETION DEPTH: 4.5m
	REVIEWED BY: JRT	COMPLETE: 1/10/2008
	DRAWING NO:	Page 1 of 1

PARTICLE SIZE ANALYSIS (Hydrometer) TEST REPORT

ASTM D422

Project:	**Reclamation Overburden Dump**	Date Tested:	2008/01/24
Client:	Minto Explorations Ltd		
Project No.:	W14101068.004		
Location:	Minto Mine, YT		
Sample No.:	08-ROD-TP03		
Depth:	1.6 - 1.8 m		
Description**:	SAND AND SILT - some gravel, trace clay		

Particle Size	Percent Passing
100 mm	
75 mm	
50 mm	100
38 mm	95
25 mm	93
19 mm	92
13 mm	92
10 mm	90
5 mm	86
2 mm	78
850 µm	74
425 µm	68
250 µm	64
150 µm	56
75 µm	41
34 µm	25
22 µm	20
13 µm	13
9 µm	10
6 µm	8
3 µm	5
1 µm	3



Remarks: * The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual.

** The description is visually based & subject to EBA description protocols.

Reviewed By:

EBA Engineering Consultants Ltd.