Knight Piésold CONSULTING

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Knight Piésold Ltd.
200 - 1164 Devonshire Avenue
North Bay, Ontario
Canada, P1B 6X7
T +1 705 476 2165
E northbay@knightpiesold.com
www.knightpiesold.com

Zane Leonard
Senior Tailings Engineer
Sibanye Stillwater (East Boulder)
P.O. Box 1227
Big Timber, Montana
USA, 59011

Dear Zane,

RE: Geotechnical Characterization of Filtered Fine Tailings

1.0 EXECUTIVE SUMMARY

Sibanye-Stillwater (Stillwater) and Knight Piésold Ltd. (KP) have worked together over the last two decades to evaluate and implement the best available technologies and practices that prioritize safety and environmental stewardship for tailings and water management. This letter summarizes geotechnical test work that has been carried out by KP as a follow up to the recent Paterson and Cooke (P&C, 2023) East Boulder Mine (EBM) Filtered Tailings Options Study. Testing results have are reported with a focus on the feasibility to construct a Filtered Tailings Storage Facility (FTSF) without a conventional confining embankment similar to the proposed Lewis Gulch Tailings Storage Facility (LGTSF). The test work, presented here, indicates that the overall moisture content expected from the filter pressing process will be too high for reliable placement and compaction of filtered tailings.

2.0 INTRODUCTION

Near term plans for future tailings storage as the EBM include construction of the proposed LGTSF. The facility is designed to utilize conventional slurry deposition methodology in alignment with the current operations.

A FTSF, sometimes referred to as a Dry Stack, is a tailings storage facility that utilizes tailings that have been dewatered to the point where they can be transported and placed using conventional earth moving equipment. Stillwater has demonstrated a commitment to evaluating and implementing best technologies and practices to ensure safety and environmental stewardship for tailings and water management at the EBM. KP has assisted Stillwater with various studies to evaluate and implement best available technologies for tailings/water management, including the technical feasibility of a FTSF, for over two decades.

The various studies, testwork, and analyses conducted by Stillwater over the past decades have been motivated by an objective to identify practicable and feasible opportunities for tailings and water management to maintain and continuously improve the robust and resilient systems that are currently in place at EBM. A recent P&C (2023) study has incorporated recent advances in dewatering technologies into a sequential process that involved bench scale cycloning, centrifuging, and filter pressing. These bench scale laboratory tests were able to dewater the slimes tailings to a point where they could potentially be transported without liquefying.

A follow up phase of bench scale geotechnical characterization test work was carried out by KP to determine the feasibility of constructing a FTSF. Geotechnical characterization of the tailings will provide essential information that can be used to develop improved FTSF concepts, both for comparison to the current practices, and for consideration in longer range tailings management planning.

3.0 OBJECTIVES OF STUDY

The 2023 P&C study focused on the process to filter tailings with the following objectives:

- Determine a dewatering process for EBM slimes fraction
- Report on filter cake process moisture content, transportation/fluid moisture contend
- Provide a prefeasibility level cost estimate for the process and transportation of the tailings

The P&C's study scope did not include determining whether the resulting filtered slimes product would have the geotechnical properties necessary to be safely emplaced and compacted within a FTSF.

The laboratory studies completed by KP and presented in this report evaluate the geotechnical properties of samples produced by P&C. This additional information is also used to develop an overview assessment of how and whether such fine filtered tailings material would be placed and compacted to construct a stable landform. The primary objectives of the KP test work include:

- Determine if the moisture (water) content of the filter cake is acceptable for material placement;
- Evaluate potential density; and
- Summarize information for future tailings management planning.

The geotechnical assessment provided in this report has focused more narrowly on key aspects relating to the technical feasibility of a FTSF, with evaluation of key factors relating to design, construction, operation, and closure of a conceptual FTSF. This updated geotechnical assessment complements the information presented in the most recent filtering study completed by P&C.

4.0 GEOTECHNICAL CHARACTERIZATION

4.1 GENERAL

Laboratory testing was carried out by P&C to evaluate the potential for water removal by filtering the EBM fine-grained tailings (slimes fraction). Testing completed by P&C included the following:

- Material Characterization
  - Solids Density (Specific Gravity)
  - Particle Size Analysis
  - Mineralogy
  - Micro-Photographs
  - Zero Free Water Solids Mass Concentration
  - Specific Cake Resistance
  - Zeta Potential
- Process Water Characterization
- Static Cylinder Settling
- Dynamic Thickening
- Dynamic Batch Thickener Bed Consolidation
- Centrifugation

- Flow Moisture Point
- Pressure Filtration

Much of the P&C tailings testwork was developed specifically for the design of the tailings process equipment including thickeners, reagents, pipeworks and filter press sizing. The Particle Size Analysis, Flow Moisture Point determination, and Pressure Filtration testwork are also relevant for the geotechnical evaluation and design of a FTSF.

Following the P&C test work, some of the remaining filtered tailings sample (also known as filter cake) was sent to the KP laboratory in Denver, CO. The KP laboratory testing program focused on determining and confirming key geotechnical parameters that are required for FTSF design. KP laboratory results (Appendix A) included the following:

- Particle Size Distribution - American Society for Testing and Materials (ASTM) - D6913/D7928
- Atterberg Limits - ASTM D4318
- Specific Gravity - ASTM D854
- Standard Proctor Density - ASTM D698
- Triaxial Consolidated Isotropic Undrained (CIU) - ASTM D4767 (with Jefferies and Been, 2015 Modification)
- Triaxial Consolidated Isotropic Drained (CID) - ASTM D7181 (with Jefferies and Been, 2015 Modification)
- Oedometer consolidation - In Progress

The relevant laboratory testing results, and some of the potential implications for FTSF design and operation, are discussed in the following sections.

4.2 SPECIFIC GRAVITY

The average specific gravity of the tailings was determined by KP to be 2.81, based on laboratory testing (ASTM D854). Similar testing carried out by P&C using a gas pycnometer method confirms specific gravity ranging between 2.79 to 2.82 which is in agreement with KP testing.

The specific gravity values are summarized on Table 1.

Table 1 Specific Gravity Results

Laboratory	Specific Gravity
P&C	2.79 to 2.82
KP	2.81

4.3 PARTICLE SIZE DISTRIBUTION

The filtered tailings sample provided to KP was analyzed for Particle Size Distribution (PSD) following procedures outlined by the American Society for Testing and Materials (ASTM) D6913/D7928. The PSD results indicate that the tailings are primarily comprised of Silt (90%) with a small amount of clay-sized particles (8%) with a trace of fine sand (2%). The tailings are classified as inorganic Silt (ML) according to the Unified Soil Classification System (USCS).

Particle Size Distribution testing carried out by P&C (2022) used both wet sieve and laser diffraction methods. The PSD testing results are illustrated on Figure 1 and summarized on Table 2.

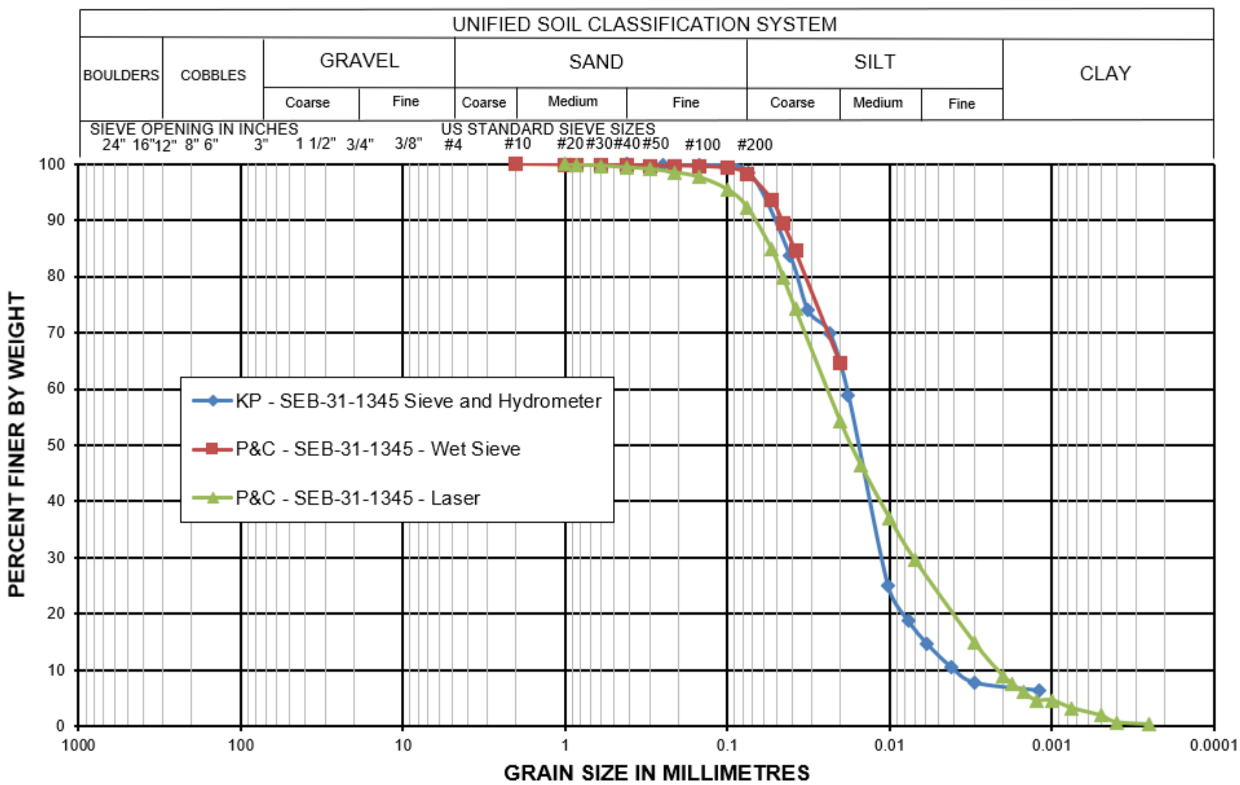


Figure 1 Particle Size Distribution

Table 2 Particle Size Distribution Results

Laboratory	Gravel (#4 to 3")	Sand (#200 to #4)	Silt (#200 to 0.02 mm)	Clay (Below 0.02 mm)
P&C	0 %	1.8 to 7.7 %	83.3 to 89.2 %	9.0 %
KP	0 %	1.5 %	91.5 %	7.0 %

4.4 MOISTURE CONTENT CONVENTION

Moisture content calculating convention is one of the most common sources of error and confusion in the scope of the mining industry. "*Plant operators and process engineers almost invariably use a definition that differs from the one used by geotechnical specialists. The lack of a shared understanding is often a root cause of tailings being consistently delivered wet of the geotechnical specification.*" (Mckenna, 2023).

It is important to note that P&C reporting utilizes a process moisture content convention (similarly calculated to volumetric water content, and also commonly referred to as slurry water content or mining water content) denoted in this letter by $\%_{MCprocess}$ where:

$$Process\ Moisture\ Content\ (\%) = \frac{Mass_{Water}}{Mass_{Water} + Mass_{Solids}}$$

KP utilizes the geotechnical standard convention for moisture content (Mckenna, 2023; also commonly referred to as water content, or gravimetric water content) denoted in this letter by $\%_{MCgeo}$) where:

$$Geotechnical\ Moisture\ Content\ (\%) = \frac{Mass_{Water}}{Mass_{Solids}}$$

Both systems are commonplace and considered standard in the mining industry. Process moisture content is used in design of systems, pumps, and pipelines where tracking of total volumes of water and solids mixtures with insignificant air content is commonplace. Almost all mining process plant equipment will be designed using process moisture content conventions. Geotechnical moisture content is utilized as a standard in geotechnical and civil engineering where the total mass of the of a material considering air, water, and solids is a variable and generally only the mass of the solids will be a known constant. As such, stability, bearing, and soil related calculations are almost exclusively completed using geotechnical moisture content.

Both systems use overlapping terminology, and both are commonly referred to by either water content or moisture content. This regularly leads to confusion and misunderstanding when attempting to compare geotechnical testing results with process testing results. Geotechnical Moisture Content is significantly higher than the Process Moisture Content. In the context of this study the difference is +/- 4% to 5% moisture content which is a significant error when interpreted incorrectly.

4.5 PRESSURE FILTRATION TESTS

P&C's scope of work included testing to determine whether the EBM tailings slimes fraction can be dewatered to a moisture content capable of being transported to a FTSF without liquefying. P&C carried out pressure filtration testwork using P&C's bench scale Druck 200 pressure filter. The equipment has an effective filtration area of 0.020 m^2 and closely mimics a full-scale pressure filter. Aino T31 filter cloth was used for all pressure filtration tests. The results of the test work are summarized on Table 3 and discussed below.

A standard test was carried out with tailings slimes at an initial solids moisture content of 47.5% $_{MCprocess}$ dosed with 2,000 g/t $ALCl_3$ and 100 g/t Magnafloc 10 to simulate thickener underflow. The resulting driest filter cake achieved was 20.3 $\%_{MCprocess}$ (25.5 $\%_{MCgeo}$) with 1,500 kPa form pressure and 1,500 kPa membrane pressure. The additional step of using an air blow dry at 900kPa was found to be ineffective at further reducing moisture.

A sensitivity test was conducted to determine if removal of the thickening step and associated reagents (coagulants and flocculants) would have an impact on the achieved moisture content. The resulting driest filter cake achieved was 18.5 $\%_{MCprocess}$ (22.7 $\%_{Mcgeo}$) with 1,000 kPa form pressure and 1,500 kPa membrane pressure. Again, the additional step of using an air blow dry at 900kPa was found to be ineffective at further reducing moisture. This decreased filter cake moisture comes at a significant reduction in effective filtration throughput.

P&C concluded *"A filter cake moisture lower than process moisture content 18.5 (%) moisture is likely difficult to achieve practically with pressure filtration technology based on the test work results achieved."* (P&C, 2022).

Table 3 Pressure Filtration Test Results

Test	Moisture Content	
	($\%_{Mcprocess}$)	($\%_{Mcgeo}$)
Driest possible Filter Cake, Pre-Thickened with Reagents	20.3	25.5
Driest Possible Filter Cake, no Thickening Reagents	18.5	22.7

4.6 TRANSPORTABLE MOISTURE LIMIT TEST

P&C completed Transportable Moisture Limit testing using a standard flow table (ASTM C230-98). The Transportable Moisture Limit, which is based on the Flowable Moisture Limit with a 10% safety factor, has been used by maritime bulk cargo carriers to determine if the materials will remain stable during shipping or if they will liquefy within the hold of a ship. Test results are shown in Table 4.

Table 4 Pressure Filtration Test Results

Test	Moisture Content	
	($\%_{Mcprocess}$)	($\%_{Mcgeo}$)
Flowable Moisture Limit	20.1	25.2
Transportable Moisture Limit	18.1	22.1

The driest achievable filter cake was determined to have a moisture content of 18.5 $\%_{MCprocess}$ (22.7 $\%_{MCgeo}$) which is slightly higher than the transportable moisture limit. This indicates that, while the material should not flow when transported (by truck or conveyor), it does not meet industry accepted transport safety margins. It is reasonable to assume that liquefaction in the back of a haul truck could happen and would need to be taken into consideration, particularly at these lower bound moisture contents.

4.7 ATTERBERG LIMITS

Atterberg limit testing on the filtered tailings samples was carried out by KP and are shown in Table 5.

Table 5 Atterberg Limit Results

Atterberg Limit	Moisture Content ($\%_{MCgeo}$)
Plastic Limit	24.0
Liquid Limit	29.0
Plasticity Index	5.0

Based on laboratory filtration test work carried out by P&C, the expected geotechnical moisture content of the filtered material will at best be 22.7 $\%_{Mcgeo}$; which would result in material that is only 1.3% below the plastic limit. Even a small amount of rain or snow can easily increase the field moisture content and would result in operational disruptions or the requirement of secondary storage when the placed moisture contents exceed the plastic limit. In heavier rains and snowmelt events this moisture content may exceed the liquid limit. In the last 5 years the USDA Snow Telemetry (SNOTEL) site located at the EBM (USDA, 2023) recorded an average of approximately 190 days of precipitation per year.

When the material moisture content exceeds the plastic limit it becomes difficult to place and compact by conventional earth moving equipment. Once material exceeds the liquid limit it will generally be non-trafficable by conventional earth moving equipment and not possible to spread and compact in a conventional manner.

4.8 PROCTOR COMPACTION TESTING

Standard and modified proctor density testing was completed on a sample of the tailings according to ASTM D698-12 Method A and ASTM D1557-12 Method A, to establish the moisture density relationship for compacted filtered tailings. The standard proctor provides a minimum objective for placed density within the filter stack. The modified proctor compaction criteria provides for denser, stronger compacted tailings material at a lower moisture content. The proctor density testing results are shown on Figure 2 and summarized on Table 6.

The proctor curve indicates that 101 pcf could potentially be achieved with the driest filtered tailings (see Figure 2 Orange line). The proctor curves also indicate that a small increase in moisture content would proportionately reduce achievable proctor density.

Table 6 Proctor Compaction Results

% Maximum Dry Density MDD	Dry Density (pcf)	Moisture Content (%$_{MCgeo}$)
Standard Proctor 1	103.5	19.9
Standard Proctor 2	100.5	21.5
Standard Proctor 3	99.9	22.5
Modified Proctor 1	114.3	15.5

The Modified Proctor Maximum Dry Density (Mod. MDD) could be achieved after dewatering to 15.5 %$_{MCgeo}$. As such the Mod. MDD would not be achievable with the tested filtering processes.

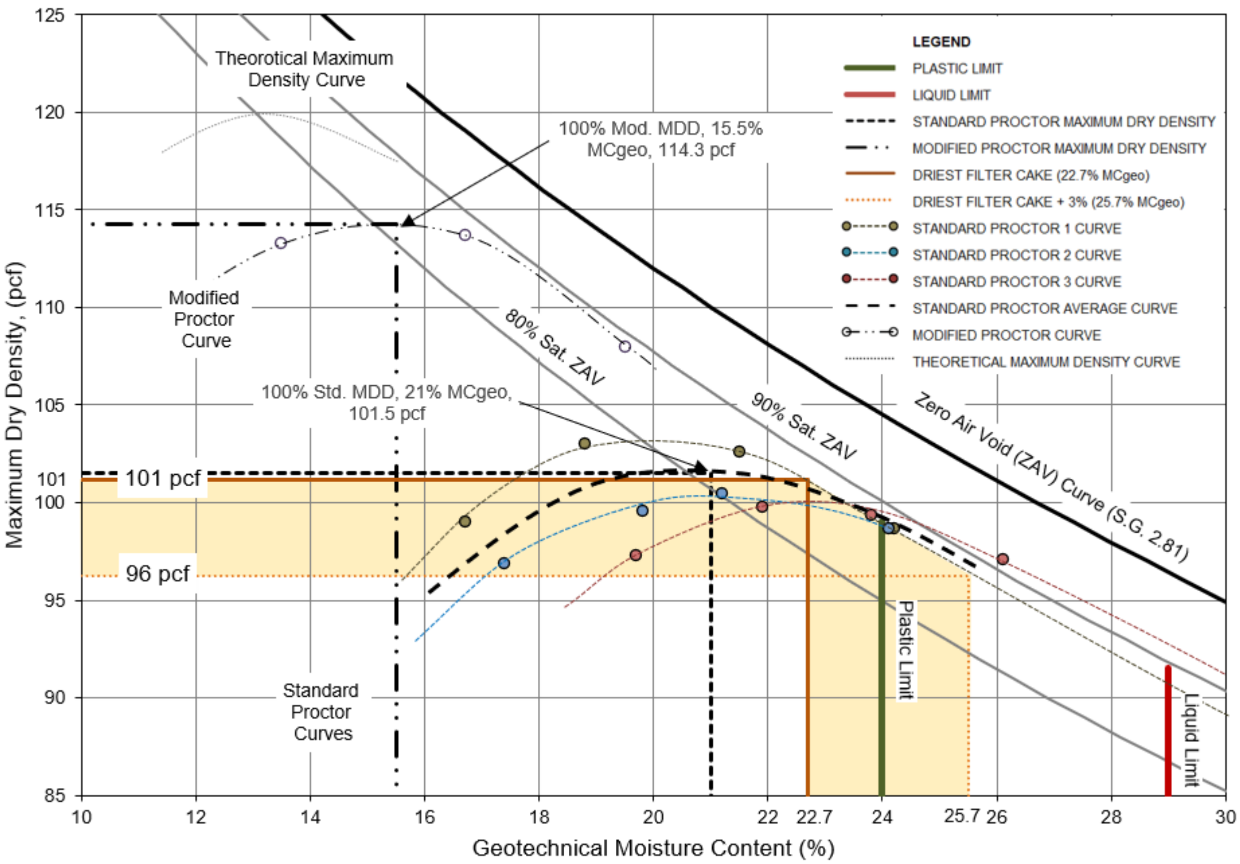


Figure 2 Moisture Density Relationship for Filtered Tailings

Typically, for compaction of filtered tailings, a target saturation of 60 to 80% is considered to be optimal (Davies, 2011). Based on the expected moisture content ranges in comparison to the proctor curve, target compaction would be expected around 85 to 90% of saturation (Figure 2) which is above the optimal range.

4.9 CONSOLIDATION TEST RESULTS

A Constant rate of strain odometer consolidation test was completed following ASTM D4186-20 on a sample of the filtered tailings to evaluate the normal compression line (Figure 3). The normal compression line is a valuable tool in both validating an interpreted critical state line, and also to determine if the tailings will experience consolidation.

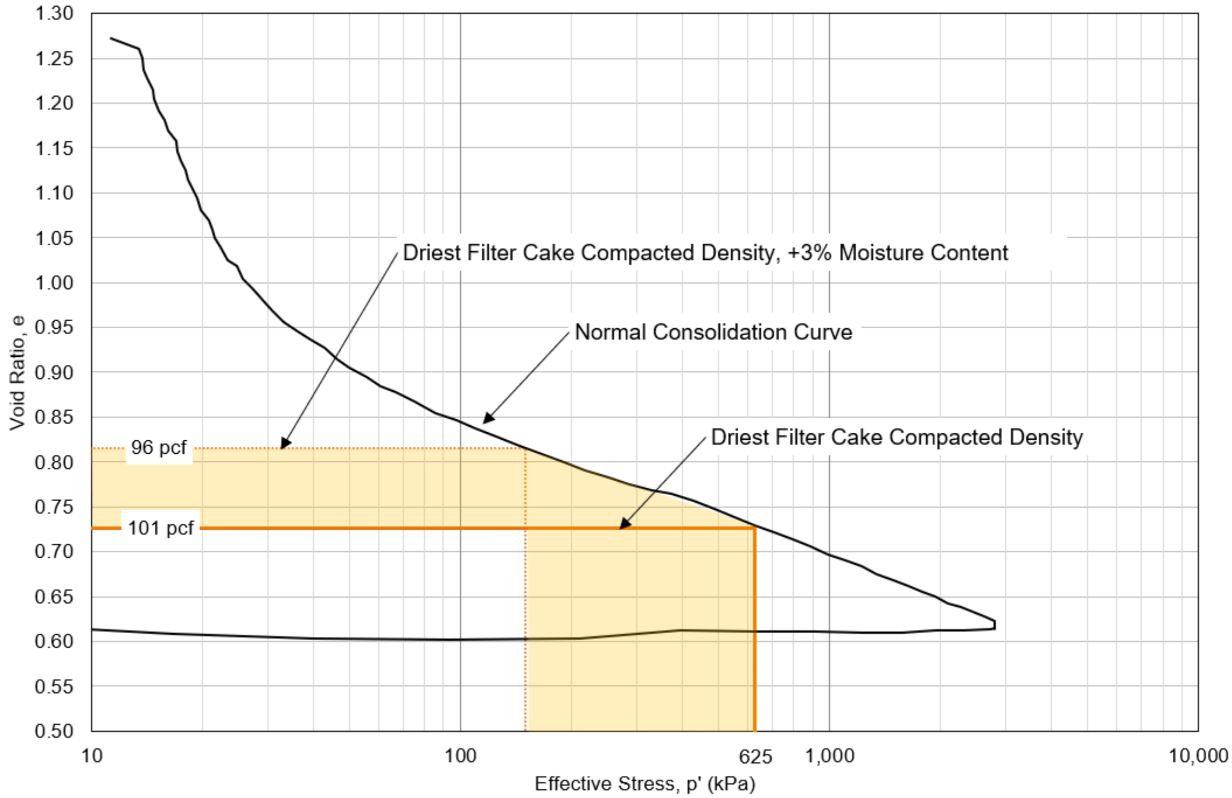


Figure 3 CRS Oedometer Result

The normal consolidation process is a key consideration in slurry deposited tailings facilities as it controls the final density as well as the time for settling of the tailings surface to be completed.

When a material is consolidating it generally means that it is near 100% saturation and that the excess pore fluid is being pressed out. In the context of stability, it means that a portion of the slope weight is being carried by the pore fluid (water) and not by the soil structure, which has a significant impact on material strength. The goal with a free standing FTSF is generally to compact the material to a density well in excess of the normal consolidation line (and the Critical State Line discussed below) to ensure that no meaningful post construction consolidation occurs.

Based on the anticipated best potential compaction (101 pcf) we can expect to see an equivalent effective overburden stress of 625 kPa (90 psi). With only a small drop in achieved density (96 pcf) we can expect to see an equivalent effective overburden stress of 110 kPa (16 psi).

4.10 TRIAXIAL COMPRESSION TESTS

A series of triaxial compression tests were completed according to ASTM D 4767 Method A on samples of the filtered tailings to estimate the tailings strength and Critical State Line (CSL), using methods outlined by Jefferies and Been (2015). Triaxial testing to estimate the CSL required loose sample compaction to minimize shear localization and sample freezing post testing to estimate void ratios (Jefferies and Been, 2015).

The CSL developed from the triaxial compression test, provides a relationship between the applied effective stress and the void ratio of a soil. The CSL can be used to predict the behaviour (dilative or contractive) of the tailings under different loading conditions. A summary of the initial and failure principal stresses and void ratios for the triaxial testing are shown in Table 7.

Table 7 Summary of Triaxial Testing Results

Test	Testing Standard	Point Number	Drainage Condition	Initial Principal Stress (kPa)	Failure Principal Stress (kPa)	Initial Void Ratio	Failure Void Ratio
Triaxial Single Point CID	ASTM D7181 Modified for CSL determination - Jefferies and Been 2015 [1]	CID01	Drained	201	494	1.10	0.64
		CID02	Drained	398	989	1.07	0.60
		CID03	Drained	799	1,877	1.11	0.53
Triaxial Single Point CIU	ASTM D4767 Modified for CSL determination - Jefferies and Been 2015 [1]	CIU01	Undrained	101	75	0.76	0.76
		CIU02	Undrained	200	136	0.71	0.71
		CIU02	Undrained	399	323	0.67	0.67

The CSL developed from the triaxial testing results is illustrated on Figure 4. Generally, points plotted below the CSL indicate that the soil will exhibit dilative conditions, while points plotted above the CSL will exhibit contractive conditions.

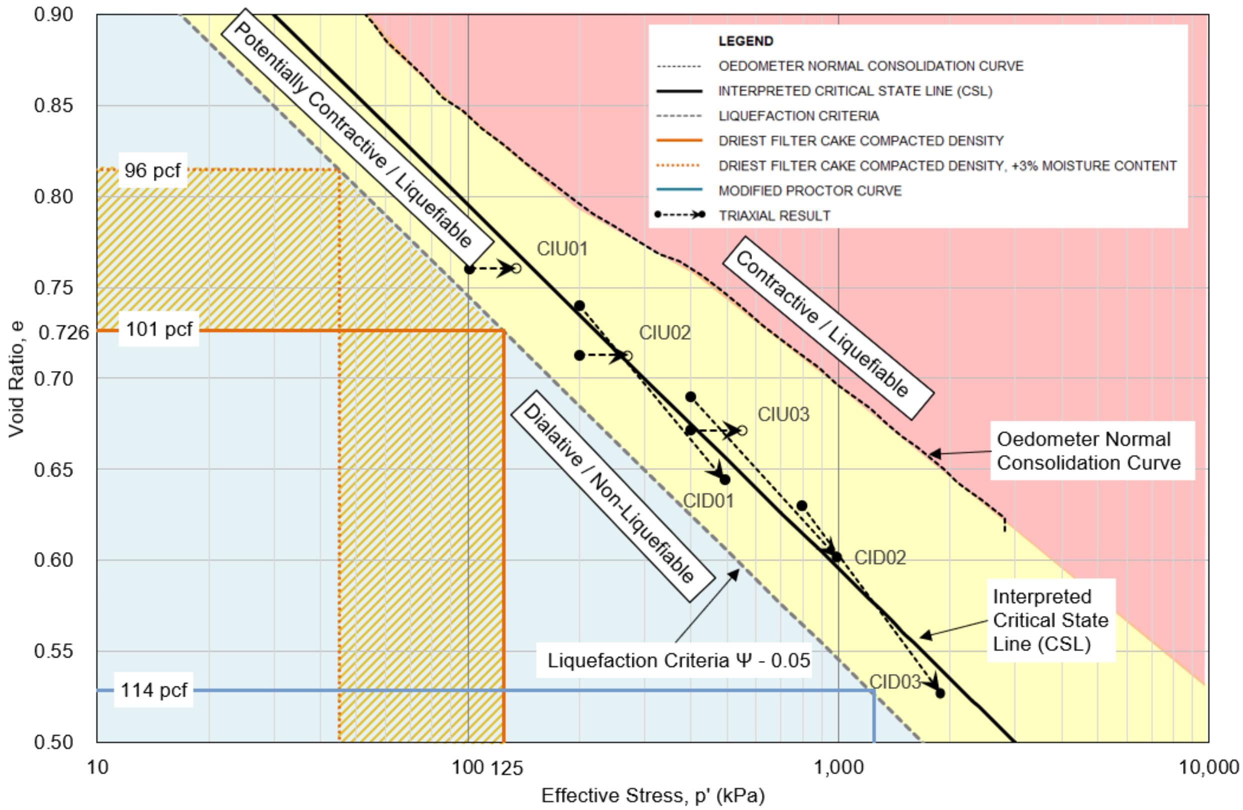


Figure 4 Triaxial Results and Critical State Line Interpretation

The triaxial testing and CSL interpretation can provide a simplified screening level method of correlating achieved compaction effort to achievable self-supporting FTSF height. The general concept being that, if the void ratio is denser than the CSL by a safe margin, then the material will be dilative during shear, which means it is unlikely to liquefy. The current criterion applied to identify if a material will be susceptible to flow slide is a state parameter (ψ) greater then -0.05 (Shuttle and Cunning, 2008). Assuming 101 pcf is achieved through compaction and using a state parameter of -0.05 the maximum supportable vertical effective stress is 125 kPa (18 psi) or approximately 20 ft of compacted tailings. It is worth noting that if the technology was available to dry the material to $15\%_{MCgeo}$ then it would be possible to compact to a modified proctor density target of 114 pcf with an equivalent vertical 1,250 kPa (180 psi) or approximately 200 ft theoretical height of compacted tailings.

The consolidated undrained triaxial compression tests are also used for determining the expected peak undrained shear strength. Based on the three CIU results, peak triaxial compression strength ratios of 0.36 to 0.41 were estimated. Triaxial compression strengths are generally measured higher than direct simple shear as the triaxial test does not take into account anisotropy of the loading. Based on Ladd and Degroot (2003) a factor of 1.43 was used to adjust the strength ratios, resulting in a peak undrained shear strength ratio (Su/p’) ranging from 0.25 to 0.29, with an average of 0.27.

An approximate relation of compaction effort to effective confining stress (p’) and expected undrained shear strength can be made from the interpreted CSL and oedometer lines (Table 8). The undrained shear strength of the compacted tailings can be expected to be approximately 15 psi with successful compaction to 101 pcf (driest possible moisture) and could drop to 8 psi with additional moisture content.

For context, common low ground pressure earth moving equipment such as a low ground pressure CAT 725 articulated haul truck can work with ground pressures in the range of 10 to 20 psi minimum. The heavier Komatzu HM400 used by one of the EBM contractors and the CAT 745 articulated haul trucks costed out as part of the P&C (2023) study would require ground bearing pressures around 25 to 30 psi for occasional trafficking with some rutting. Rigid body haul trucks like the CAT 769s currently used at the EBM would require even greater bearing pressures. Given these values and the best-case undrained strength expected to be in the range of 15 psi, EBM would need to invest in low ground pressure equipment to facilitate construction of a FTSF. During heavy rain or snow conditions with increased moisture contents, ground bearing pressure would likely drop below what is trafficable by a low ground pressure mining truck, making placement by conventional means challenging.

Table 8 Estimated Material Strength

Density	Void Ratio	Effective Stress		Peak Undrained Shear Strength	
(pcf)		(kPa)	(psi)	(kPa)	(psi)
96	0.82	200	29	55	8
101	0.74	400	58	110	15

Notes(s):

1. Shear strength is based on an estimated Su/p' ratio of 0.27.

5.0 IMPLICATIONS FOR FTSF DESIGN AND OPERATION

A conceptual FTSF arrangement was developed for the Lewis Gulch area to estimate the relative impacts of such a FTSF, and to assess the risk of failure as compared to the proposed Lewis Gulch Conventional Tailings Storage Facility (CTSF) (Stillwater, 2023). The final arrangements for the conceptual FTSF and proposed CTSF are shown on Figure 5.

Based on the geotechnical characterization test work completed, additional key considerations are as follows:

- **Mill Throughput vs Optimum Moisture Content -** Achieving a low moisture content from the tailings filtering process is key to constructing a stable FTSF. When filter presses are undersized or temporarily working at reduced effectiveness, the moisture content of the tailings can be expected to rise. Options to manage this increased moisture content are limited, either the production rate would be scaled back or temporarily halted until the filter press is repaired, or management areas for wet tailings are incorporated into the FTSF. The implication of this is that a FTSF will have areas that are weaker with a higher potential to flow, unless some sort of extra confinement is incorporated such as perimeter buttressing and/or as containment embankments.
- **Trafficability -** The filtered tailings produced at EBM would be at best at approximately the Plastic Limit. This implies that, without further drying, the material would be expected to behave as a plastic / claylike material during placement. Only a small amount of rain would bring the material above its plastic limit making it difficult to traffic on. With a small amount of additional moisture (+5% above the PL) from rain and snow the liquid limit would be exceeded making the filtered tails un-trafficable. Incorporation of large "soft spots" within a FTSF for management of off-specification materials, aside from the obvious stability concerns, also leads to problems with material handling and placement. Typically filtered

tailings are hauled by truck, then spread and compacted with conventional bulldozers. If the material is too wet and placed in multiple layers it would become un-trafficable by conventional construction equipment. It is important that during construction of a FTSF that these "soft spots" strictly controlled and monitored, and alternatively it is best to re-work each area until sufficient drying is achieved and compaction without rutting can be accomplished. This process would require dry weather conditions with significant additional monitoring, work and cost.

- **Rain and Snow -** Rain and snow can add a significant amount of moisture to fine grained fill materials. (i.e. tailings). Considering that the tailings would be coming out of the filter plant wet of the optimum moisture content, any additional moisture would result in lower compacted density, as well as poor trafficability such as fill pumping, and rutting. Fill placement during inclement weather would generally not be undertaken (Erickson et al. 2017) and instead material should be placed into temporary piles that are sealed by rolling the surface. These piles would then be spread and compacted once the weather clears. In the last 5 years the USDA Snow Telemetry (SNOTEL) site located at the East Boulder Mine (USDA, 2023) recorded an average of approximately 190 days of precipitation per year.
- **Freezing Temperatures -** Material compaction is dependent on the ability to release free water from placed filtered tailings materials. If the material is even partially frozen it cannot be effectively compacted (McKenna, 2023). In order to achieve stable target densities, tailings would need to be hauled, placed and fully compacted prior to being allowed to freeze. Material that cannot be placed within this constraint would either be temporarily stockpiled and rehandled in the spring, or placed within a designated "soft" zone within the FTSF. A separate large tailings storage building can be a requirement in colder climates to protect fresh filtered tailings material from freezing.
- **Surface Water Management -** A key requirement for successful construction of a FTSF is proper surface water management. Ponding water on the surface of the dry stack would lead to trafficability issues (McKenna, 2023). The surface of the tailings stack must be allowed to dry and be free of ponding water. Otherwise, it would prove challenging to compact subsequent lifts and would result in either perched water tables or increased percolation of water through the tailings stack (leading to increased seepage to manage). Operations of a FTSF are required to closely monitor weather conditions and constantly ensure proper drainage and sealing (typically by roller compaction) to promote runoff and reduce percolation into the stack.
- **Liquefaction Potential -** Under normal circumstances materials that would behave in a contractive manner during shearing and are highly saturated (i.e. over 80% saturation) could liquefy under rapid large strain events. A saturation of at least 90% is expected during placement of the filtered tailings given the limitations on filter press performance, required compaction density, and weather effects. The required density is also a function of maximum vertical effective stress (which can be directly correlated to stack height). As the required height of the stack increases, so to does the compaction requirement for the foundation layers to ensure dilative behavior. There is a practical limit to the level of compaction that can be achieved, and conversely a limit to how tall a free standing FTSF can be constructed while ensuring contractive behavior. In this case with the expected driest filter cake the expected limit would be approximately 20 ft. The height of the FTSF required to provide the necessary tailings storage would exceed this limit by an order of magnitude.
- **Underdrainage -** Excess pore pressure development within the FTSF must be controlled during operational placement of filtered tailings, in order to maintain the stability of the FTSF. Proper underdrainage systems would need to be incorporated into the base of the FTSF to reduce the potential

for excess pore pressure development and to facilitate drainage from the tailings deposit. In taller stacks, additional drainage layers may be required at key elevations within the stack to prevent perched water tables. Piezometers should also be installed within the drainage layers to monitor performance, and the design should accommodate the potential for the presence of saturated layering (McKenna, 2023).

6.0 CONCLUSIONS

The following conclusions are based on the filtration testing by P&C and geotechnical characterization carried out by KP on the fine tailings (slimes) from the EBM.

- **Filtered Tailings Moisture Content -** The driest possible filtered tailings content (18.5 $\%_{MCprocess}$; 22.7 $\%_{MCgeo}$) is slightly below the Flowable Moisture Limit, slightly above the Transportable Moisture Limit and wet of the Standard Proctor optimum compaction moisture content by 2.8%. In a laboratory setting it would be possible to place and compact the tailings. However, the operation would be very close to the limits, in that any underperformance or variability of the filter press, poor weather, and/or poor placement techniques could each lead to significant challenges that would result in off-spec material strengths and require mitigation measures such as a separate storage area or continued disposal of off-spec material into the conventional TSF.
- **Material Characterization and Improvements -** The geotechnical characterization is based on laboratory scale testing of one tailings sample. While the tailings material is a controlled product meaning its characteristics will generally be uniform, this limited dataset does not evaluate the sensitivity of the geotechnical characteristics to changes in the process.

Overall, a FTSF is not yet considered to be a viable option for short term tailings storage at the EBM based on the inadequate capability to consistently produce a suitably dewatered filtered tailings material, and the early stages of testing and design. It may be possible to develop a viable FTSF concept, if it can be shown that appropriately dewatered filtered tailings can be routinely generated under field conditions. The dewatering studies completed by P&C have trended in a positive direction, and show some promise that filter tailings technologies may become a longer term solution at EBM.

7.0 OPPORTUNITIES

While a self supporting FTSF is not at this time considered to be a feasible alternative to construction of the proposed LGTSF, there are several opportunities to further advance investigation into potential future use of filtered tailings technologies.

- **Field Testing of Moisture Management and Placement -** Additional time would be required to properly design and test the materials on a larger scale before implementation of filtered tailings placement at the EBM. Filtered tailings has a greater reliance on the material properties and filter press performance. Scaling up from laboratory setting to a real world setting it is very probable that field performance may be significantly different than predicted in laboratory scale tests. In wetter conditions filtered tailings can quickly gain moisture from precipitation as they are spread and compacted, which can create “soft spots” (Erickson et al. 2017). During sunny conditions excess moisture can be reduced through atmospheric drying and is facilitated by re-working with equipment, presuming it has not been buried. This technique is not viable in rainy of freezing conditions and would require additional time, effort and expenditure. A field trial of placement and drying of tailings at EBM, or at least a similar climate, would allow the EBM operation to evaluate the effectiveness and work required to reduce moisture, and conversely the impact of rain on the field moisture content of the placed tailings.

- **Future Drying -** Currently the methods for drying the filtered tailings are limited to achieving 18.5 $\%_{MCprocess}$ (22.7 $\%_{MCgeo}$). If methodology becomes available to dry the tailings further down to the range of approximately 15$\%_{MCgeo}$ (a decrease of 7%) then it would be conceivable to compact to a modified proctor density specification and construct a self supporting FTSF to a significant height (i.e. over 100 ft). Further drying beyond this point could open up the ability to compact to field densities consistently above the modified proctor value. EBM should continue to review and keep abreast of new tailings dewatering technologies as they come on to the market.

8.0 SUMMARY AND RECOMMENDATIONS

At this time, a FTSF is not a technically feasible option for tailings storage at the EBM.

The 2023 P&C test work utilized advanced dewatering techniques to produce a product that is below its Flowable Moisture Content, which means that it can likely be transported by conveyor or truck without liquefying and flowing. However, the expected driest possible filtered tailings still exceeds the optimum moisture for compaction, meaning placement and compaction in a self supporting stack would not be feasible on the scale required. Furthermore, any increase in moisture in the loose materials would degrade the geotechnical properties and impair trafficability, spreading and compaction of the filtered tailings within the FTSF to a significant degree.

It is recommended that EBM continue to proceed with conventional tailings storage for the near future. Filtered tailings technology may provide opportunities for longer term waste and water management at the EBM should further dewatering of the filter cake prove to be practicable.

It is also suggested that future tailings storage planning (beyond the proposed LGTSF) continue to consider any further advancement in tailings dewatering technologies in order to evaluate the potential for refinements to facilitate placement and compaction of suitably filtered tailings during future operations at EBM. Field trials incorporating suitably filtered tailings materials from EBM operations should be considered as a future step to confirm material behaviour during placement and compaction, as well as trialing moisture conditioning methods, evaluation of dusting, and measuring the effects of climate (i.e. moisture increase due to rain and snow).

9.0 CLOSING

Please contact us if you have any questions or require additional information with regards to the geotechnical characterization of the EBM filtered fine tailings.

Yours truly,
Knight Piésold Ltd.

LICENSED PROFESSIONAL ENGINEER
J. A. MCINTYRE
100125386
2023-08-08
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
C. N. HALL
100075047
2023-08-08
PROVINCE OF ONTARIO

Prepared: Alex McIntyre, P.Eng.
Senior Engineer

Reviewed: Craig N. Hall, P.Eng.
Managing Principal

MONTANA
KEN J. BROUWER
30020 PE
REGISTERED PROFESSIONAL ENGINEER
2023-08-08

Approved: Ken J. Brouwer, P.E.
Principal Engineer

Approval that this document adheres to the Knight Piésold Quality System:

Attachments:

Figure 5 Rev 0 Conceptual Final Arrangements for Proposed CTSF and Agency Alternative No. 4 FTSF
Appendix A KP Laboratory Results

References:

Davies, M., 2011. *Filtered Dry Stack Tailings - The Fundamentals.* Proceedings Tailings and Mine Waste 2011. November 6 to 9. Vancouver, BC.

Erickson, B. Butikofer, D. Marsh, A. Friedel, R. Murray, L. and Piggott M., 2017. *Filtered Tailings Disposal Case History: Operation and Design Considerations Part I.* Proceeding of the Twenty-first International Conference on Tailings and Mine Waste, 5-8 November 2017. Banff, Alberta, Canada.

Jefferies, M. and Been, K., 2015. *Soil Liquefaction A Critical State Approach.* Second Edition. CRC Press.

Ladd C. and DeGroot D., 2003. *Recommended Practice for Soft Ground Site Characterization*: Arthur Casagrande Lecture.

McKenna, G., 2023. *How to compact filtered tailings*. University of Alberta, Edmonton, and Australian Centre for Geomechanics. Perth. ISBN 978-1-55195-493-6.

Paterson and Cooke (P&C), 2022. *Stillwater East Boulder PFS – Filtered Tailings Study Test Work Report*. October 24. P&C Project No.: SEB-31-1345 REP-01, Rev C.

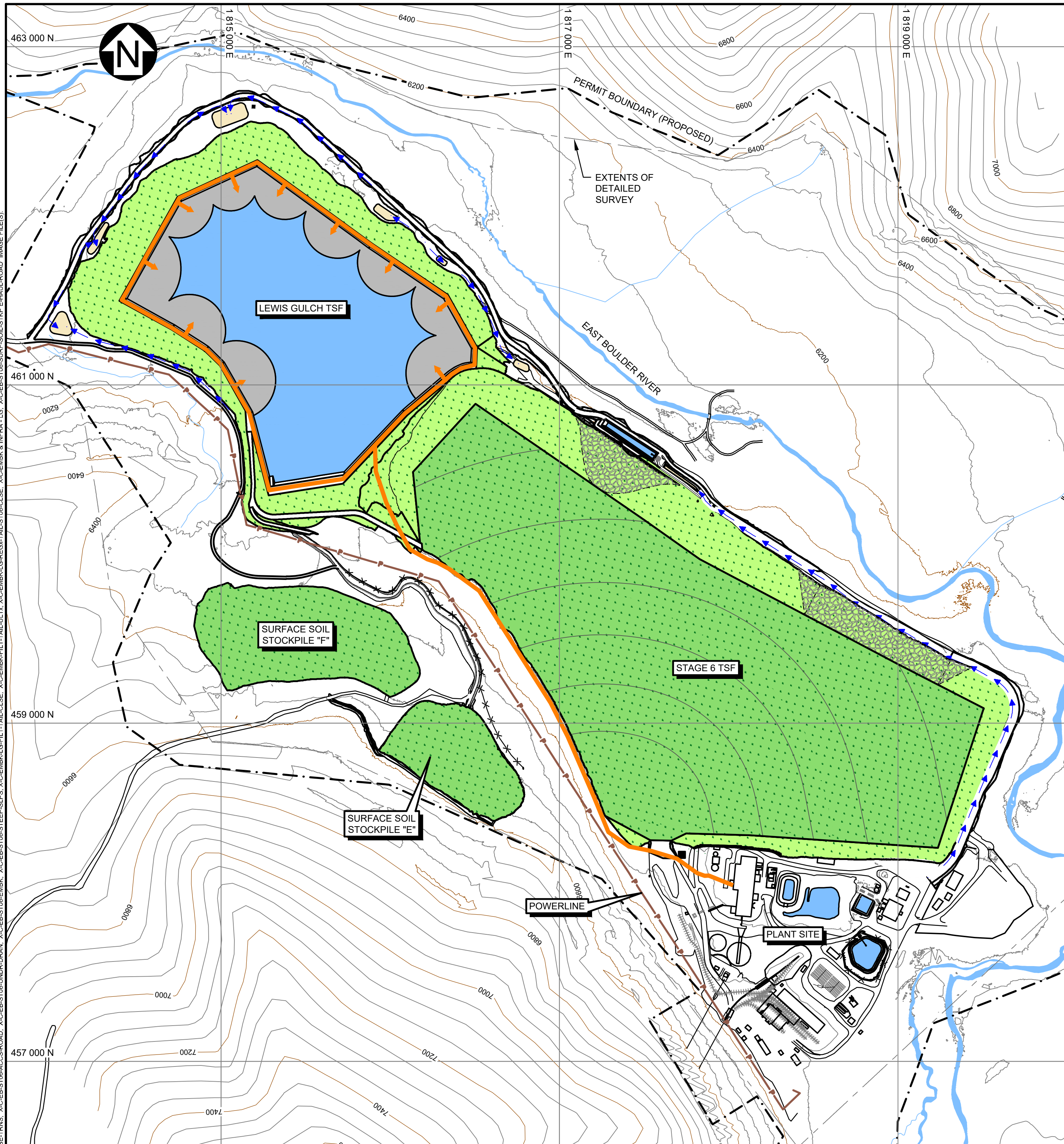
Paterson and Cooke (P&C), 2023. *Stillwater East Boulder PFS – Filtered Tailings Summary Report*. January 6. P&C Project No.: SEB-31-1345 REP-02, Rev D.

Shuttle, D. and Cunning, J., 2008. *Reply to the discussion by Robertson on "Liquefaction potential of silts from CPTu".* Can. Geotechnical Journal, 45: 142 – 145.

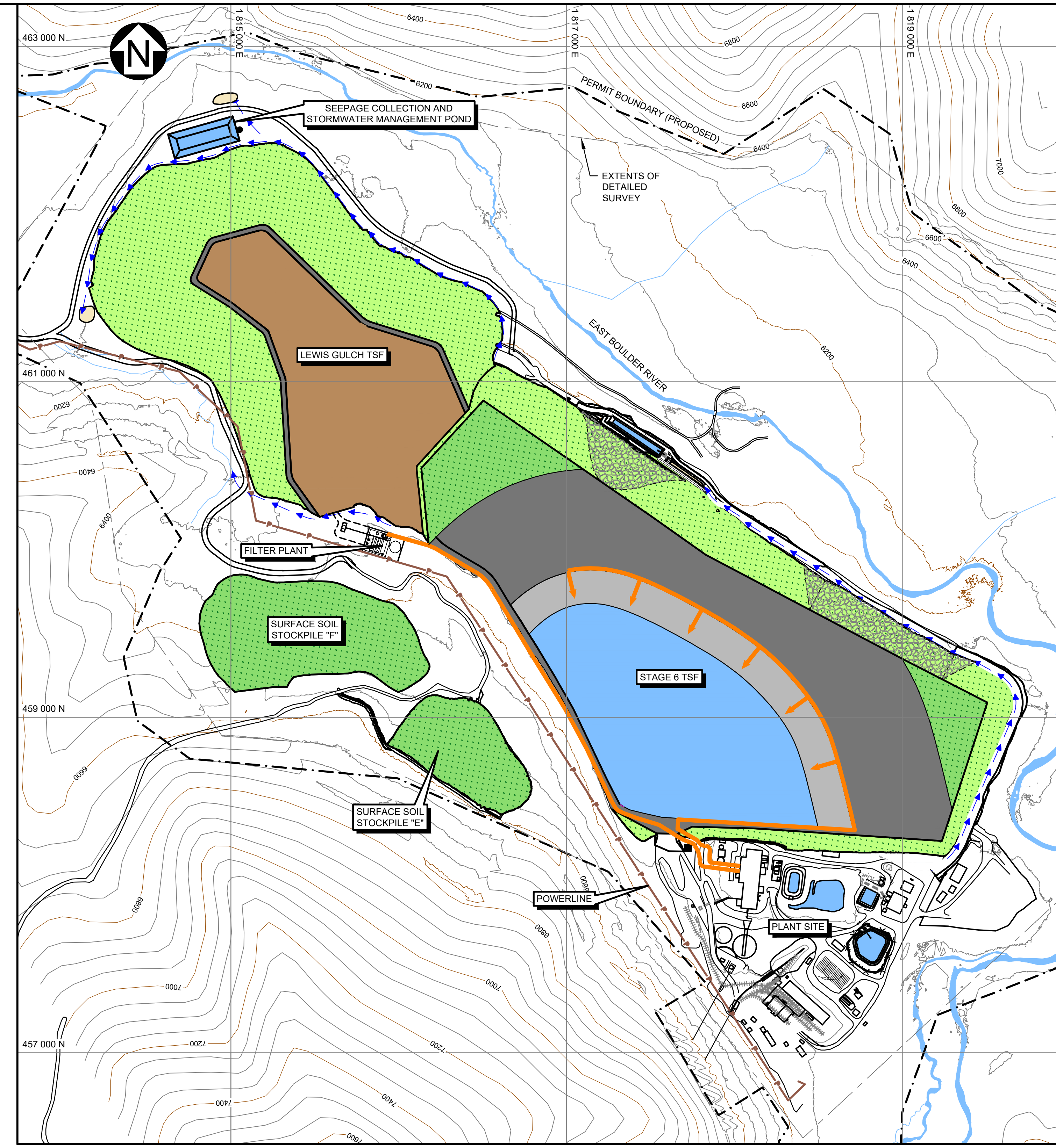
Sibanye Stillwater (Stillwater), 2023. Letter to: Ms. Erickson, Custer Gallatin National Forest. Re: *East Boulder Mine - Conceptual Lewis Gulch Filtered Tailings Storage Facility – Additional Information*. June.

United States Department of Agriculture (USDA), 2023. *SNOTEL Site: East Boulder Mine*. Natural Resources Conservation Service, National Water and Climate Center. Retrieved from https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=1105 (accessed on July 27, 2023).

/cnh



PROPOSED CONVENTIONAL TAILINGS STORAGE FACILITY (CTSF) - FINAL ARRANGEMENT



AGENCY ALTERNATIVE NO. 4 - CONCEPTUAL FILTERED TAILINGS STORAGE FACILITY (FTSF) - FINAL ARRANGEMENT

LEGEND:

- RECLAIMED SLOPES
- WATER
- TAILINGS
- PERCOLATION AREA
- ROM ROCKFILL
- RECLAIMED TSF CLOSURE CAP AND RECLAMATION SOIL STOCKPILES
- FILTERED TAILINGS (PLACED AND COMPACTED)
- POWERLINE
- DITCH
- PERMIT BOUNDARY (PROPOSED)
- EXTENTS OF DETAILED SURVEY
- TAILINGS DELIVERY PIPELINE

NOTES:

1. HORIZONTAL DATUM IS MONTANA COORDINATE SYSTEM, SINGLE ZONE, NAD83 (1992). UNITS ARE IN INTERNATIONAL FEET. VERTICAL DATUM IS NGVD29.
2. TOPOGRAPHY BASED ON DATA PROVIDED BY STILLWATER MINING COMPANY JUNE, 2022. DATA OUTSIDE OF DETAILED TOPOGRAPHIC AREA WAS OBTAINED FROM THE MONTANA GIS PORTAL (2011).
3. CONTOUR INTERVAL IS 10 FEET.
4. FILTER PLANT LOCATION AND INFRASTRUCTURE BASED ON FILTERED TAILINGS PFS BY PATTERSON COOKE, 2023.
5. SURFACE OF FILTERED TAILINGS TO BE PERIODICALLY CAPPED OR TREATED WITH A TACKIFER TO MITIGATE FUTURE DUST EMISSIONS.
6. WATER MANAGEMENT PIPEWORK NOT SHOWN FOR CLARITY.

SCALE A: 400 0 400 800 1200 1600 2000 ft

0	08AUG'23	ISSUED FOR INFORMATION	CNH	MMD	KJB
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED

STILLWATER MINING COMPANY

EAST BOULDER MINE

CONCEPTUAL FINAL ARRANGEMENTS FOR PROPOSED CTSF AND AGENCY ALTERNATIVE NO. 4 FTSF

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-45/65	NB23-00722

FIGURE 5 REV 0

Knight Piésold CONSULTING

APPENDIX A

KP Laboratory Results

(Pages A-1 to A-34)

Knight Piésold CONSULTING

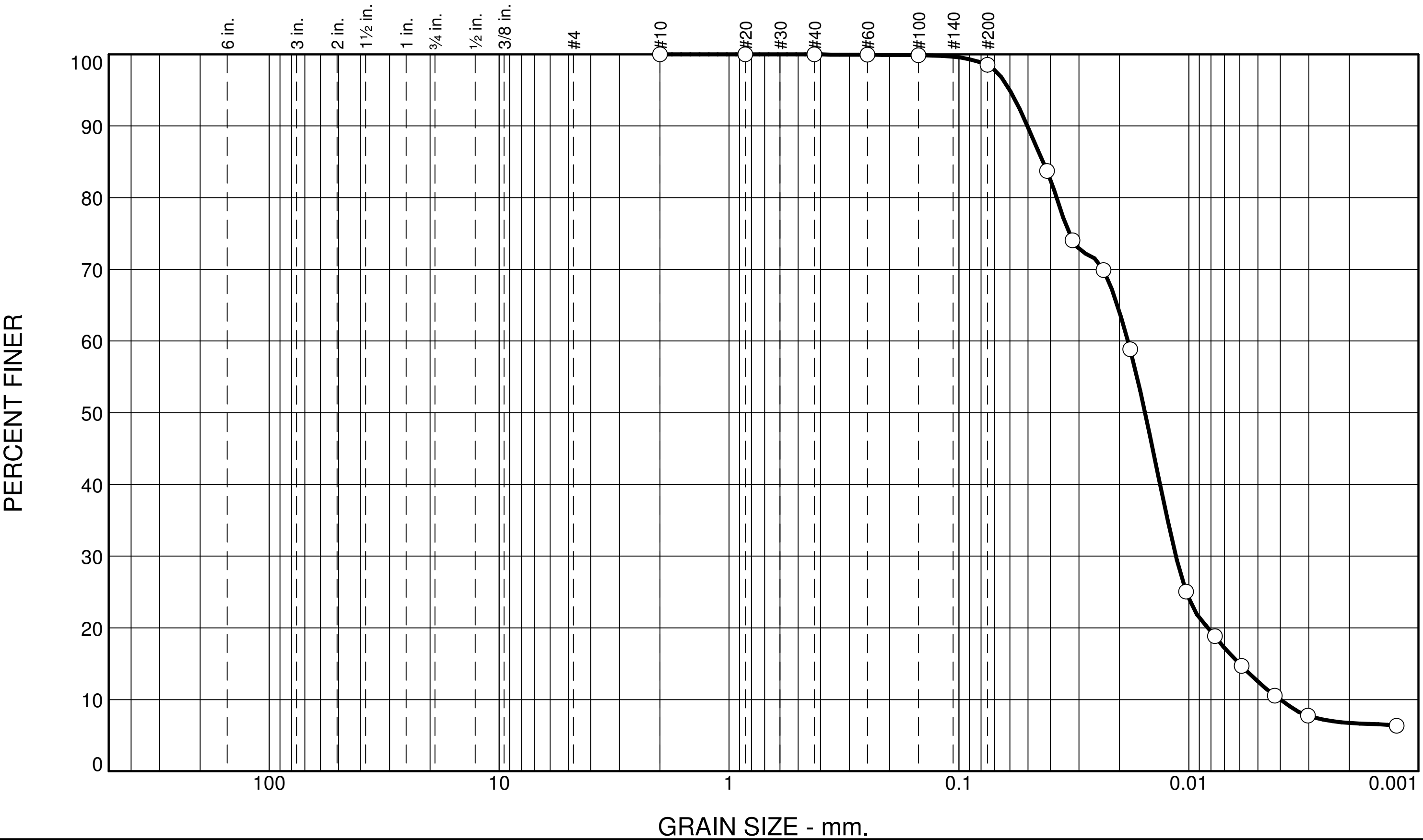
Specific Gravity - Soil
ASTM D 854

Project	East Boulder Mine	**Project No.**	NB101-00045/65
Date Tested	5/11/2023	**Lab No.**	L2023-031
Tested By	Icloud	**Entered By**	Icloud
Date Entered	5/17/2023; 7/10/23	**Checked By**	Jbruce

Sample No.	SEB-31-1345 Filtered, Trial 1		SEB-31-1345 Filtered, Trial 2		SEB-31-1345 Filtered, Trial 3					
Method (A or B)	A		A		A					
Flask No.										
1) Wt. of Flask + Soil										
2) Wt. of Flask										
3) Wt. of Soil (1-2)	29.92	29.74	30.00	30.03	30.01	30.03				
4) Calibrated Wt. of Flask + Water	368.09	369.30	369.28	368.08	375.45	375.54				
5) #3 + #4	398.01	399.04	399.28	398.11	405.46	405.57				
6) Wt. of Flask + Water + Soil	387.34	388.45	388.62	387.44	394.78	394.89				
7) Volume of Soil (5 - 6)	10.67	10.59	10.66	10.67	10.68	10.68				
8) Test Temperature, deg. C	20.7	20.7	20.98	20.9	20.9	20.9				
9) Temperature Correction, K	0.999850	0.999850	0.999810	0.999810	0.999810	0.999810				
10) Specific Gravity (3 / 7)	2.804	2.809	2.814	2.814	2.810	2.812				
Reported Average, G_s @ 20 deg.C	2.806		2.814		2.810					
Tare										
Dry Soil + tare, g	422.79	432.12	423.42	422.92	432.87	431.89				
Tare, g	392.87	402.38	393.42	392.89	402.86	401.86				

General Notes: Line 9, k, is determined by dividing the density of water at test temperature recorded, by the density of water at 20 deg. C.

Particle Size Distribution Report ASTM D6913/7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	1.5	91.8	6.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	100.0		
#60	99.9		
#100	99.9		
#200	98.5		
0.0413 mm.	83.7		
0.0320 mm.	74.0		
0.0234 mm.	69.9		
0.0180 mm.	58.9		
0.0103 mm.	25.1		
0.0077 mm.	18.8		
0.0059 mm.	14.7		
0.0042 mm.	10.6		
0.0030 mm.	7.8		
0.0012 mm.	6.4		

* (no specification provided)

Soil Description

silt

Atterberg Limits

PL= 24 LL= 29 PI= 5

Coefficients

D_{90}= 0.0503 D_{85}= 0.0431 D_{60}= 0.0184
D_{50}= 0.0155 D_{30}= 0.0114 D_{15}= 0.0060
D_{10}= 0.0040 C_u= 4.61 C_c= 1.76

Classification

USCS= ML AASHTO= A-4(5)

Remarks

Sample No.: SEB-31-1345 Filtered **Source of Sample:** **Date:**
Location: **Elev./Depth:**

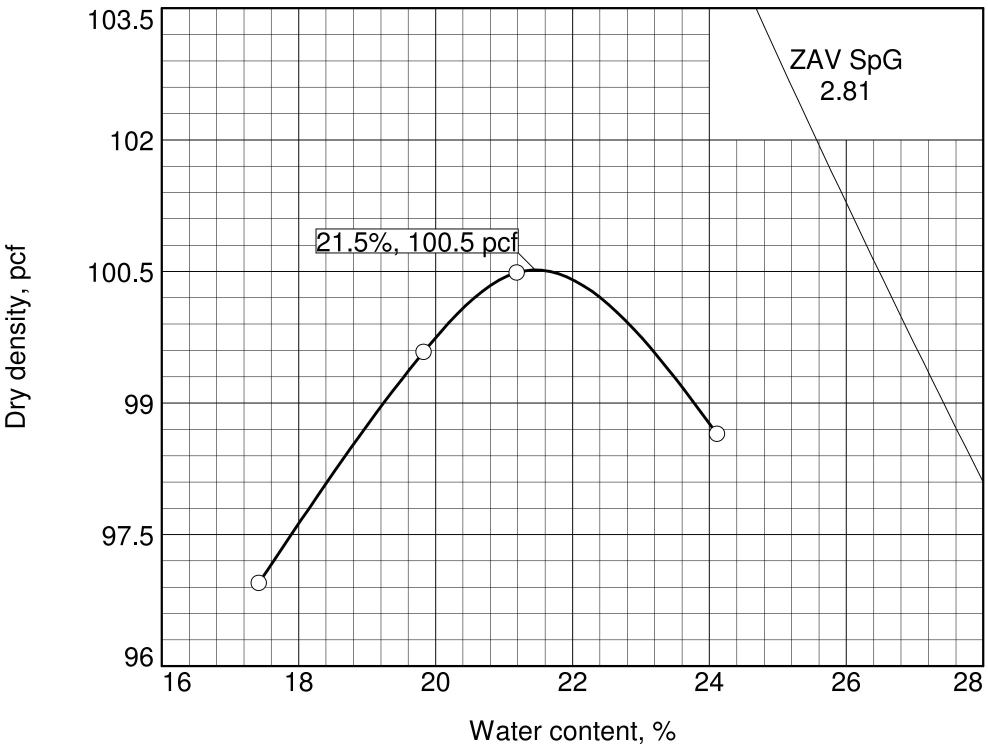
Knight Piésold CONSULTING

Client: KP North Bay
Project: East Boulder Mine
Project No: NB101-00045/23 **Figure**

Tested By: ICloud **Checked By:** JBruce

COMPACTION TEST REPORT

Curve No.



Test Specification:
ASTM D 698-91 Procedure A Standard

Preparation Method moist
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Hammer Type: manual
Layers three **Blows/Layer** 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM **LL** **PI**
Sp.G. (D854): 2.814
%>#4 0.0 **%<No.200**
USCS silt **AASHTO**
Date Sampled
Date Received
Date Tested 6/10/213
Tested By Icloud

TESTING DATA	1	2	3	4	5	6
WM + WS	5981.5	5898.5	6018.5	6028.5		
WM	4177.5	4177.5	4177.5	4177.5		
WW + T #1	505.0	436.0	542.5	854.9		
WD + T #1	452.6	398.9	480.2	725.1		
TARE #1	188.3	185.9	186.1	186.7		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	19.8	17.4	21.2	24.1		
DRY DENSITY	99.6	96.9	100.5	98.7		

TEST RESULTS

Maximum dry density = 100.5 pcf

Optimum moisture = 21.5 %

Material Description

silt

Remarks:

Project No. NB101-00045/23 **Client:** KP North Bay
Project: East Boulder Mine

○ **Location:** Trial 2 **Sample Number:** SEB-31-1345 Filtered

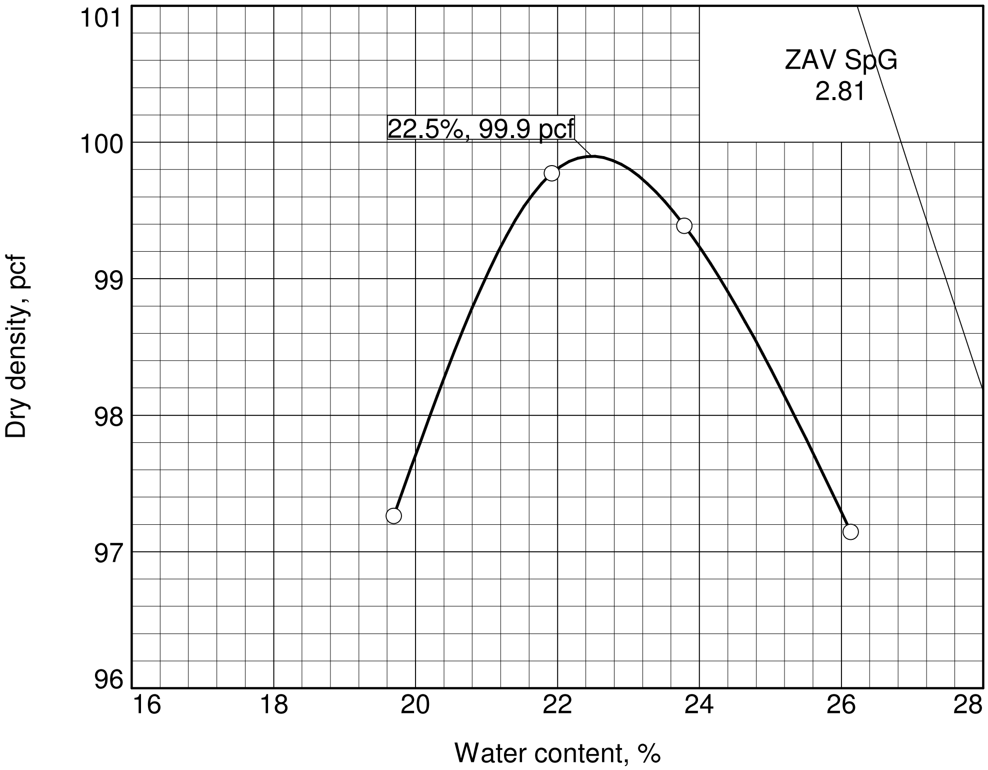
Knight Piésold CONSULTING

Checked by: JBruce
Title: Lab Manager

Figure

COMPACTION TEST REPORT

Curve No.



Test Specification:
ASTM D 698-91 Procedure A Standard

Preparation Method moist
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Hammer Type: manual
Layers three **Blows/Layer** 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**
NM **LL** **PI**
Sp.G. (D854): 2.81
%>#4 0.0 **%<No.200**
USCS **AASHTO**
Date Sampled
Date Received
Date Tested 6/10/23
Tested By Icloud

TESTING DATA	1	2	3	4	5	6
WM + WS	6037.5	6016.5	5937.5	6030.0		
WM	4177.5	4177.5	4177.5	4177.5		
WW + T #1	741.1	423.2	452.4	475.8		
WD + T #1	634.5	380.7	408.7	415.9		
TARE #1	186.4	186.8	186.8	186.7		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	23.8	21.9	19.7	26.1		
DRY DENSITY	99.4	99.8	97.3	97.1		

TEST RESULTS

Maximum dry density = 99.9 pcf

Optimum moisture = 22.5 %

Material Description

silt

Remarks:

Project No. NB101-00045/23 **Client:** KP North Bay
Project: East Boulder Mine

○ **Location:** Trial 3 **Sample Number:** SEB-31-1345 Filtered

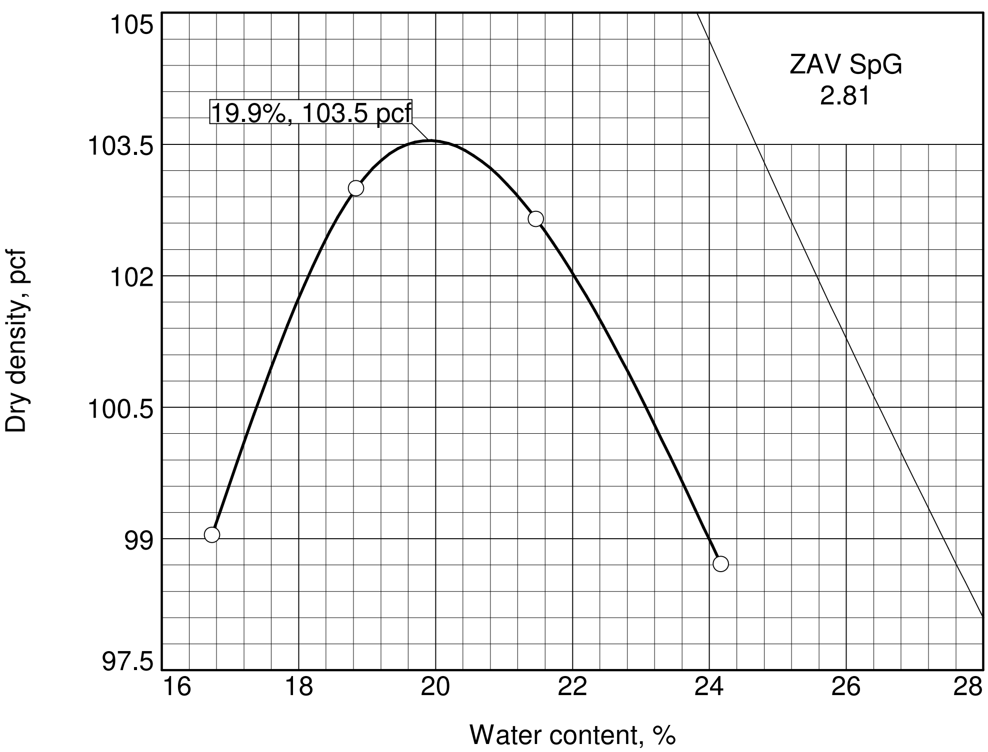
Knight Piésold CONSULTING

Checked by: JBruce
Title: Lab Management

Figure

COMPACTION TEST REPORT

Curve No.



Test Specification:
ASTM D 698-91 Procedure A Standard

Preparation Method moist
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Hammer Type:
Layers three **Blows/Layer** 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM manual **LL** 29 **PI** 5
Sp.G. (D854): 2.806
%>#4 0.0 **%<No.200** 98.5
USCS ML **AASHTO** A-4(5)
Date Sampled 5/15/23
Date Received
Date Tested 5/15/23
Tested By Icloud

TESTING DATA	1	2	3	4	5	6
WM + WS	6030.0	6062.0	6027.5	5925.0		
WM	4177.0	4177.0	4177.0	4177.0		
WW + T #1	598.0	577.7	700.4	623.5		
WD + T #1	517.5	508.9	618.9	555.0		
TARE #1	184.4	188.4	186.3	145.7		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	24.2	21.5	18.8	16.7		
DRY DENSITY	98.7	102.6	103.0	99.0		

TEST RESULTS

Maximum dry density = 103.5 pcf

Optimum moisture = 19.9 %

Material Description

silt

Remarks:

Project No. NB101-00045/23 **Client:** KP North Bay
Project: East Boulder Mine

○ **Location:** Trial 1 **Sample Number:** SEB-31-1345 Filtered

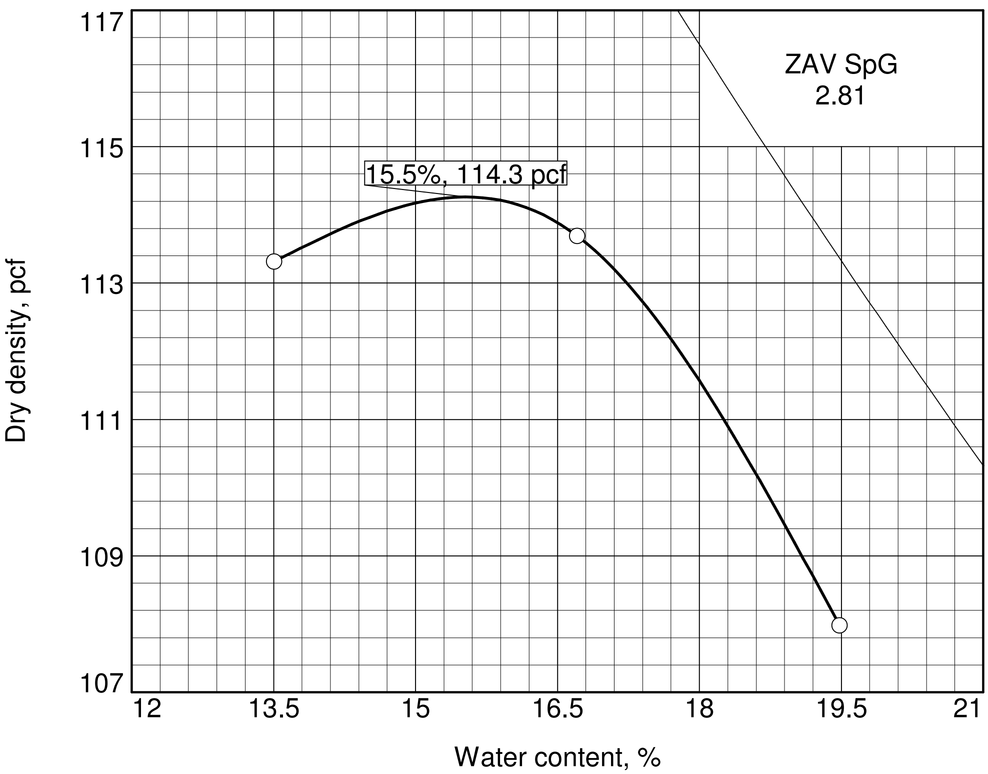
Knight Piésold CONSULTING

Checked by: JBruce
Title: Lab Manager

Figure

COMPACTION TEST REPORT

Curve No.



Test Specification:
ASTM D 1557-12 Method A Modified

Preparation Method moist
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Hammer Type: manual
Layers five **Blows/Layer** 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM manual **LL** 29 **PI** 5
Sp.G. (D854): 2.81
%>#4 0.0 **%<No.200** 98.5
USCS ML **AASHTO** A-4(5)
Date Sampled 7/11/23
Date Received
Date Tested 7/11/23
Tested By MFreund

TESTING DATA	1	2	3	4	5	6
WM + WS	6130.5	6186.0	6124.5			
WM	4180.0	4180.0	4180.0			
WW + T #1	572.1	598.3	430.9			
WD + T #1	508.9	539.2	402.0			
TARE #1	184.5	185.5	188.0			
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	19.5	16.7	13.5			
DRY DENSITY	108.0	113.7	113.3			

TEST RESULTS

Maximum dry density = 114.3 pcf

Optimum moisture = 15.5 %

Material Description

silt

Remarks:

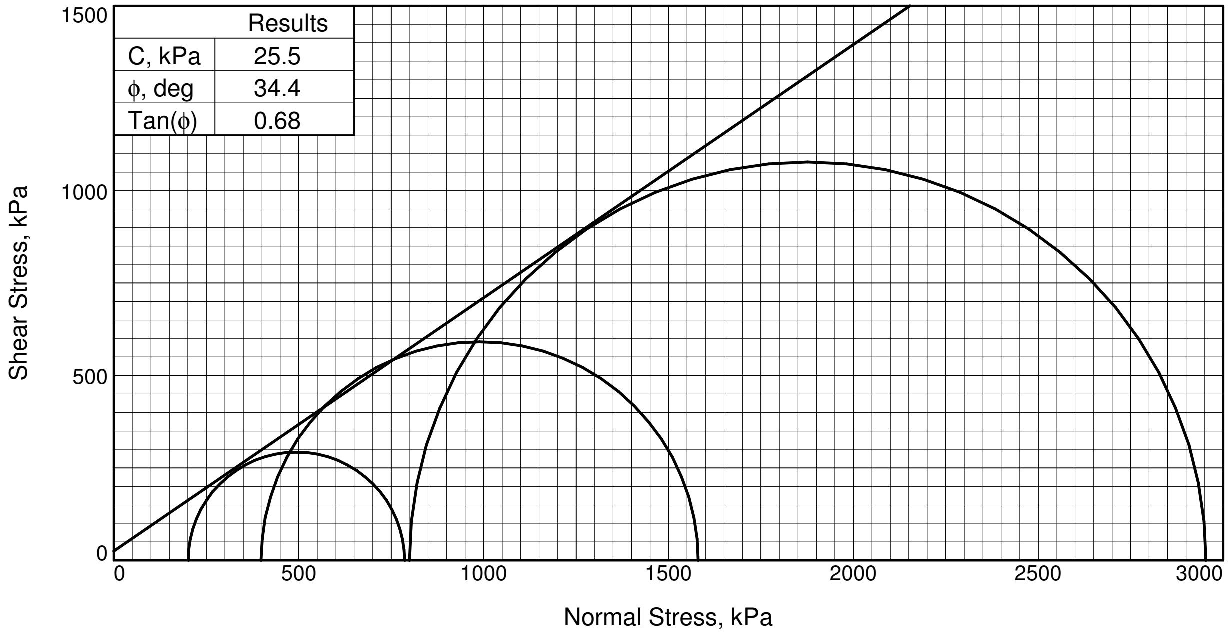
Project No. NB101-00045/23 **Client:** KP North Bay
Project: East Boulder Mine

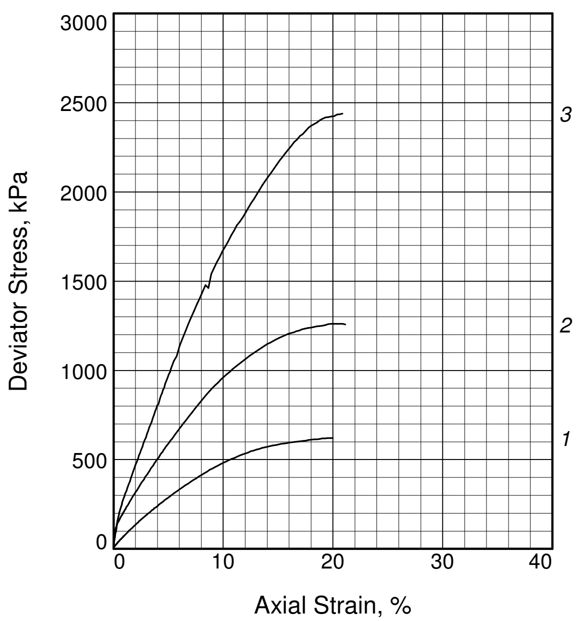
○ **Location:** ASTM D1557 **Sample Number:** SEB-31-1345 Filtered

Knight Piésold CONSULTING

Checked by: JBruce
Title: Lab Manager

Figure





	Specimen No.	1	2	3
Initial	Water Content, %	19.4	19.6	19.4
	Dry Density, kN/m3	13.13	13.30	13.06
	Saturation, %	49.8	51.4	49.1
	Void Ratio	1.0957	1.0685	1.1077
	Diameter, mm.	60.5	60.2	60.6
	Height, mm.	127.0	126.3	127.3
At Test	Water Content, %	26.4	24.7	22.5
	Dry Density, kN/m3	15.80	16.24	16.87
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7413	0.6946	0.6313
	Diameter, mm.	56.4	56.4	55.4
	Height, mm.	121.5	118.3	117.9
	Strain rate, %/min.	0.01	0.02	0.02
	Back Pressure, kPa	276	276	276
	Cell Pressure, kPa	477	674	1075
	Fail. Stress, kPa	585	1183	2155
	Strain, %	15.0	15.1	14.9
	Ult. Stress, kPa			
	Strain, %			
	σ_1 Failure, kPa	786	1580	2954
	σ_3 Failure, kPa	201	398	799

Type of Test:
Consolidated Drained

Sample Type: Reconstituted

Description: silt

Assumed Specific Gravity= 2.806

Remarks: Failure chosen at 15% strain.

Figure ________

Client: KP North Bay

Project: East Boulder Mine

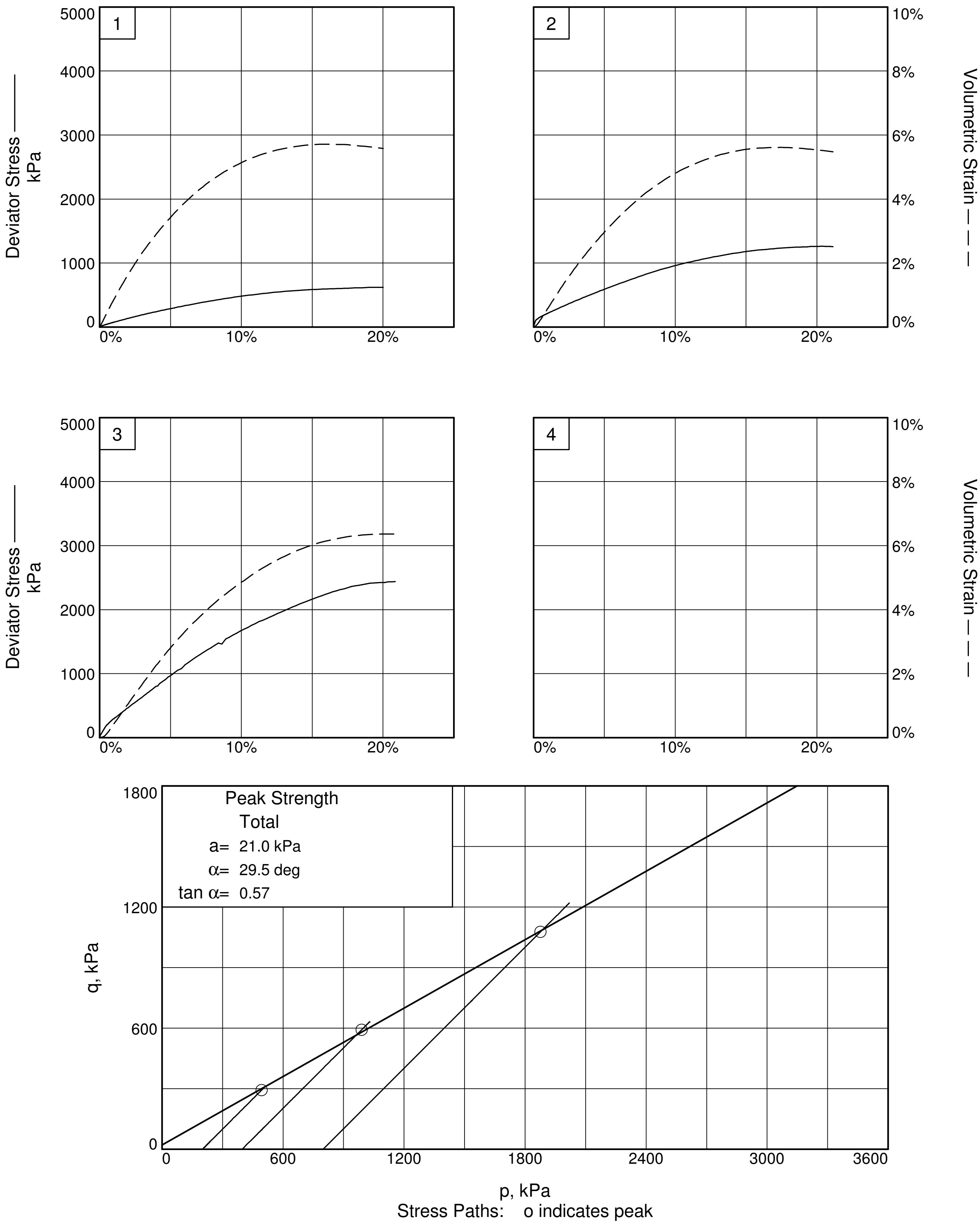
Location: TXCD

Sample Number: SEB-31-1345 Filtered

Proj. No.: NB101-00045/23 **Date Sampled:** 6/16/23

Knight Piésold CONSULTING

Tested By: JStaley **Checked By:** JBruce



Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.

Client: KP North Bay

Project: East Boulder Mine

Location: TXCD **Sample Number:** SEB-31-1345 Filtered

Project No.: NB101-00045/23 **Figure** ________

Knight Piesold Geotechnical Lab.

Tested By: JStaley **Checked By:** JBruce

TRIAXIAL COMPRESSION TEST

Consolidated Drained

6/27/2023
3:14 PM

Date: 6/16/23
Client: KP North Bay
Project: East Boulder Mine
Project No.: NB101-00045/23
Location: TXCD
Sample Number: SEB-31-1345 Filtered
Description: silt
Remarks: Failure chosen at 15% strain.
Type of Sample: Reconstituted
Assumed Specific Gravity=2.806 **LL=** **PL=** **PI=**
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.400			735.400
Moisture content: Dry soil+tare, gms.	489.290			606.200
Moisture content: Tare, gms.	0.000			116.910
Moisture, %	19.4	39.0	26.4	26.4
Moist specimen weight, gms.	584.4			
Diameter, in.	2.38	2.38	2.22	2.41
Area, in.^{2}	4.46	4.46	3.87	4.57
Height, in.	5.00	5.00	4.78	3.83
Net decrease in height, in.		0.00	0.22	0.96
Net decrease in water volume, cc.			61.80	16.94
Wet density, kN/m^3	15.68	18.26	19.98	21.16
Dry density, kN/m^3	13.13	13.13	15.80	16.74
Void ratio	1.0957	1.0957	0.7413	0.6441
Saturation, %	49.8	100.0	100.0	115.0

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm^2
Membrane thickness = 0.064 cm
Consolidation cell pressure = 69.14 psi (476.7 kPa)
Consolidation back pressure = 40.00 psi (275.8 kPa)
Consolidation effective confining stress = 200.9 kPa
Strain rate, %/min. = 0.01
Fail. Stress = 585.5 kPa **at reading no.** 121

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
0	0.2167	27.231	0.0	0.0	0.0	200.9	200.9	1.00	67.43	0.0	200.9	0.0
1	0.2179	30.465	3.2	0.0	5.8	200.9	206.7	1.03	67.38	0.0	203.8	2.9
2	0.2191	32.520	5.3	0.1	9.4	200.9	210.3	1.05	67.32	0.0	205.6	4.7
3	0.2203	34.193	7.0	0.1	12.4	200.9	213.3	1.06	67.26	0.1	207.1	6.2
4	0.2215	35.434	8.2	0.1	14.6	200.9	215.5	1.07	67.21	0.1	208.2	7.3
5	0.2227	36.951	9.7	0.1	17.3	200.9	218.2	1.09	67.13	0.1	209.6	8.6
6	0.2239	37.652	10.4	0.2	18.5	200.9	219.5	1.09	67.06	0.1	210.2	9.3
7	0.2251	38.426	11.2	0.2	19.9	200.9	220.8	1.10	66.99	0.1	210.9	10.0
8	0.2263	39.894	12.7	0.2	22.5	200.9	223.4	1.11	66.93	0.2	212.2	11.3
9	0.2275	40.923	13.7	0.2	24.4	200.9	225.3	1.12	66.87	0.2	213.1	12.2
10	0.2287	41.463	14.2	0.3	25.3	200.9	226.2	1.13	66.79	0.2	213.6	12.7
11	0.2299	42.667	15.4	0.3	27.5	200.9	228.4	1.14	66.72	0.2	214.6	13.7
12	0.2311	43.889	16.7	0.3	29.6	200.9	230.5	1.15	66.66	0.3	215.7	14.8
13	0.2323	45.245	18.0	0.3	32.0	200.9	233.0	1.16	66.59	0.3	216.9	16.0
14	0.2335	46.021	18.8	0.4	33.4	200.9	234.3	1.17	66.52	0.3	217.6	16.7
15	0.2347	47.090	19.9	0.4	35.3	200.9	236.2	1.18	66.44	0.3	218.6	17.7
16	0.2359	47.723	20.5	0.4	36.5	200.9	237.4	1.18	66.38	0.3	219.1	18.2
17	0.2371	49.338	22.1	0.4	39.3	200.9	240.2	1.20	66.32	0.4	220.6	19.7
18	0.2383	49.926	22.7	0.5	40.4	200.9	241.3	1.20	66.25	0.4	221.1	20.2
19	0.2395	50.506	23.3	0.5	41.4	200.9	242.3	1.21	66.19	0.4	221.6	20.7
20	0.2407	51.840	24.6	0.5	43.8	200.9	244.7	1.22	66.10	0.4	222.8	21.9
21	0.2419	52.674	25.4	0.5	45.3	200.9	246.2	1.23	66.03	0.5	223.5	22.6
22	0.2431	53.294	26.1	0.6	46.4	200.9	247.3	1.23	65.97	0.5	224.1	23.2
23	0.2443	54.486	27.3	0.6	48.5	200.9	249.4	1.24	65.90	0.5	225.2	24.2
24	0.2454	55.287	28.1	0.6	49.9	200.9	250.8	1.25	65.83	0.5	225.9	25.0
25	0.2467	56.482	29.3	0.6	52.0	200.9	252.9	1.26	65.77	0.5	226.9	26.0
26	0.2478	57.500	30.3	0.7	53.8	200.9	254.7	1.27	65.70	0.6	227.8	26.9
27	0.2490	58.245	31.0	0.7	55.2	200.9	256.1	1.27	65.63	0.6	228.5	27.6
28	0.2502	59.003	31.8	0.7	56.5	200.9	257.4	1.28	65.58	0.6	229.2	28.3
29	0.2514	60.118	32.9	0.7	58.5	200.9	259.4	1.29	65.52	0.6	230.2	29.2
30	0.2526	61.003	33.8	0.8	60.1	200.9	261.0	1.30	65.44	0.7	230.9	30.0
31	0.2538	61.969	34.7	0.8	61.8	200.9	262.7	1.31	65.39	0.7	231.8	30.9
32	0.2550	62.805	35.6	0.8	63.3	200.9	264.2	1.31	65.31	0.7	232.5	31.6
33	0.2562	63.626	36.4	0.8	64.7	200.9	265.6	1.32	65.25	0.7	233.3	32.4
34	0.2574	64.325	37.1	0.9	66.0	200.9	266.9	1.33	65.18	0.7	233.9	33.0
35	0.2586	65.563	38.3	0.9	68.1	200.9	269.1	1.34	65.13	0.8	235.0	34.1
36	0.2598	66.770	39.5	0.9	70.3	200.9	271.2	1.35	65.06	0.8	236.1	35.1
37	0.2610	67.190	40.0	0.9	71.0	200.9	271.9	1.35	65.00	0.8	236.4	35.5
38	0.2622	68.305	41.1	1.0	73.0	200.9	273.9	1.36	64.95	0.8	237.4	36.5
39	0.2634	69.006	41.8	1.0	74.3	200.9	275.2	1.37	64.87	0.8	238.0	37.1
40	0.2646	70.123	42.9	1.0	76.2	200.9	277.2	1.38	64.81	0.9	239.0	38.1
41	0.2658	70.904	43.7	1.0	77.6	200.9	278.5	1.39	64.76	0.9	239.7	38.8
42	0.2706	74.031	46.8	1.1	83.2	200.9	284.1	1.41	64.50	1.0	242.5	41.6
43	0.2754	77.668	50.4	1.2	89.6	200.9	290.5	1.45	64.25	1.0	245.7	44.8
44	0.2802	81.411	54.2	1.3	96.2	200.9	297.2	1.48	64.01	1.1	249.0	48.1
45	0.2849	84.719	57.5	1.4	102.1	200.9	303.0	1.51	63.77	1.2	252.0	51.0
46	0.2897	87.913	60.7	1.5	107.7	200.9	308.7	1.54	63.54	1.3	254.8	53.9

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
47	0.2945	91.255	64.0	1.6	113.7	200.9	314.6	1.57	63.30	1.4	257.7	56.8
48	0.2993	94.606	67.4	1.7	119.6	200.9	320.5	1.60	63.08	1.4	260.7	59.8
49	0.3041	97.806	70.6	1.8	125.2	200.9	326.1	1.62	62.85	1.5	263.5	62.6
50	0.3089	101.312	74.1	1.9	131.4	200.9	332.3	1.65	62.63	1.6	266.6	65.7
51	0.3136	104.427	77.2	2.0	136.9	200.9	337.8	1.68	62.40	1.7	269.4	68.4
52	0.3184	107.341	80.1	2.1	142.0	200.9	342.9	1.71	62.18	1.7	271.9	71.0
53	0.3232	110.823	83.6	2.2	148.1	200.9	349.1	1.74	61.96	1.8	275.0	74.1
54	0.3280	114.355	87.1	2.3	154.4	200.9	355.3	1.77	61.75	1.9	278.1	77.2
55	0.3328	117.175	89.9	2.4	159.3	200.9	360.2	1.79	61.54	1.9	280.6	79.6
56	0.3376	120.431	93.2	2.5	165.0	200.9	365.9	1.82	61.34	2.0	283.4	82.5
57	0.3423	123.594	96.4	2.6	170.6	200.9	371.5	1.85	61.13	2.1	286.2	85.3
58	0.3471	126.566	99.3	2.7	175.8	200.9	376.7	1.87	60.93	2.1	288.8	87.9
59	0.3519	129.357	102.1	2.8	180.6	200.9	381.5	1.90	60.73	2.2	291.2	90.3
60	0.3567	132.849	105.6	2.9	186.7	200.9	387.6	1.93	60.53	2.3	294.3	93.4
61	0.3615	135.062	107.8	3.0	190.6	200.9	391.5	1.95	60.34	2.3	296.2	95.3
62	0.3663	138.748	111.5	3.1	197.0	200.9	397.9	1.98	60.17	2.4	299.4	98.5
63	0.3711	141.534	114.3	3.2	201.8	200.9	402.8	2.00	59.98	2.5	301.8	100.9
64	0.3758	144.791	117.6	3.3	207.5	200.9	408.4	2.03	59.80	2.5	304.7	103.8
65	0.3806	147.607	120.4	3.4	212.4	200.9	413.3	2.06	59.62	2.6	307.1	106.2
66	0.3854	150.293	123.1	3.5	217.0	200.9	417.9	2.08	59.44	2.6	309.4	108.5
67	0.3902	152.926	125.7	3.6	221.6	200.9	422.5	2.10	59.26	2.7	311.7	110.8
68	0.3950	156.326	129.1	3.7	227.5	200.9	428.4	2.13	59.08	2.8	314.6	113.7
69	0.3998	158.804	131.6	3.8	231.7	200.9	432.6	2.15	58.92	2.8	316.8	115.9
70	0.4045	161.073	133.8	3.9	235.6	200.9	436.5	2.17	58.75	2.9	318.7	117.8
71	0.4093	164.243	137.0	4.0	241.1	200.9	442.0	2.20	58.58	2.9	321.5	120.5
72	0.4141	167.789	140.6	4.1	247.2	200.9	448.1	2.23	58.41	3.0	324.5	123.6
73	0.4189	170.528	143.3	4.2	251.9	200.9	452.8	2.25	58.24	3.0	326.9	126.0
74	0.4237	173.274	146.0	4.3	256.6	200.9	457.5	2.28	58.09	3.1	329.2	128.3
75	0.4285	175.812	148.6	4.4	260.9	200.9	461.8	2.30	57.92	3.1	331.4	130.5
76	0.4332	178.980	151.7	4.5	266.3	200.9	467.3	2.33	57.77	3.2	334.1	133.2
77	0.4380	181.594	154.4	4.6	270.8	200.9	471.7	2.35	57.61	3.2	336.3	135.4
78	0.4428	184.578	157.3	4.7	275.9	200.9	476.8	2.37	57.46	3.3	338.9	137.9
79	0.4476	186.959	159.7	4.8	279.9	200.9	480.8	2.39	57.30	3.3	340.9	140.0
80	0.4524	189.738	162.5	4.9	284.6	200.9	485.5	2.42	57.15	3.4	343.2	142.3
81	0.4572	192.481	165.2	5.0	289.3	200.9	490.2	2.44	57.01	3.4	345.6	144.6
82	0.4691	199.180	171.9	5.3	300.6	200.9	501.5	2.50	56.63	3.6	351.2	150.3
83	0.4811	206.059	178.8	5.5	312.2	200.9	513.1	2.55	56.27	3.7	357.0	156.1
84	0.4930	212.425	185.2	5.8	322.8	200.9	523.7	2.61	55.93	3.8	362.3	161.4
85	0.5050	219.276	192.0	6.0	334.2	200.9	535.1	2.66	55.61	3.9	368.0	167.1
86	0.5170	225.599	198.4	6.3	344.7	200.9	545.6	2.72	55.29	4.0	373.3	172.4
87	0.5289	232.482	205.3	6.5	356.1	200.9	557.0	2.77	54.98	4.1	379.0	178.0
88	0.5409	238.215	211.0	6.8	365.4	200.9	566.3	2.82	54.69	4.2	383.6	182.7
89	0.5528	244.529	217.3	7.0	375.7	200.9	576.6	2.87	54.41	4.3	388.8	187.9
90	0.5648	250.993	223.8	7.3	386.2	200.9	587.1	2.92	54.14	4.4	394.0	193.1
91	0.5768	256.808	229.6	7.5	395.5	200.9	596.5	2.97	53.87	4.5	398.7	197.8
92	0.5887	263.618	236.4	7.8	406.5	200.9	607.4	3.02	53.62	4.5	404.2	203.3
93	0.6007	269.207	242.0	8.0	415.3	200.9	616.3	3.07	53.39	4.6	408.6	207.7

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
94	0.6127	275.043	247.8	8.3	424.5	200.9	625.4	3.11	53.16	4.7	413.2	212.3
95	0.6246	280.588	253.4	8.5	433.2	200.9	634.1	3.16	52.93	4.8	417.5	216.6
96	0.6366	286.765	259.5	8.8	442.8	200.9	643.8	3.20	52.73	4.8	422.3	221.4
97	0.6485	292.185	265.0	9.0	451.2	200.9	652.1	3.25	52.53	4.9	426.5	225.6
98	0.6605	297.321	270.1	9.3	458.9	200.9	659.9	3.28	52.34	5.0	430.4	229.5
99	0.6724	303.002	275.8	9.5	467.6	200.9	668.5	3.33	52.16	5.0	434.7	233.8
100	0.6844	308.328	281.1	9.8	475.6	200.9	676.5	3.37	51.99	5.1	438.7	237.8
101	0.6964	313.537	286.3	10.0	483.4	200.9	684.3	3.41	51.82	5.1	442.6	241.7
102	0.7083	318.023	290.8	10.3	489.8	200.9	690.7	3.44	51.67	5.2	445.8	244.9
103	0.7203	323.338	296.1	10.5	497.6	200.9	698.6	3.48	51.52	5.2	449.7	248.8
104	0.7322	327.818	300.6	10.8	504.0	200.9	704.9	3.51	51.38	5.3	452.9	252.0
105	0.7442	332.276	305.0	11.0	510.3	200.9	711.2	3.54	51.25	5.3	456.0	255.1
106	0.7562	336.740	309.5	11.3	516.5	200.9	717.4	3.57	51.13	5.4	459.2	258.3
107	0.7681	341.832	314.6	11.5	523.7	200.9	724.6	3.61	51.02	5.4	462.8	261.9
108	0.7801	345.841	318.6	11.8	529.1	200.9	730.0	3.63	50.91	5.4	465.5	264.5
109	0.7920	350.208	323.0	12.0	535.0	200.9	735.9	3.66	50.81	5.5	468.4	267.5
110	0.8040	354.735	327.5	12.3	541.1	200.9	742.1	3.69	50.72	5.5	471.5	270.6
111	0.8160	359.110	331.9	12.5	547.0	200.9	747.9	3.72	50.63	5.5	474.4	273.5
112	0.8279	362.696	335.5	12.8	551.4	200.9	752.4	3.74	50.56	5.6	476.6	275.7
113	0.8399	366.821	339.6	13.0	556.8	200.9	757.7	3.77	50.49	5.6	479.3	278.4
114	0.8518	370.202	343.0	13.3	560.8	200.9	761.7	3.79	50.42	5.6	481.3	280.4
115	0.8638	373.568	346.3	13.5	564.8	200.9	765.7	3.81	50.37	5.6	483.3	282.4
116	0.8758	376.849	349.6	13.8	568.6	200.9	769.5	3.83	50.31	5.6	485.2	284.3
117	0.8877	379.795	352.6	14.0	571.8	200.9	772.7	3.85	50.27	5.7	486.8	285.9
118	0.8997	383.948	356.7	14.3	577.0	200.9	777.9	3.87	50.22	5.7	489.4	288.5
119	0.9116	386.688	359.5	14.5	579.8	200.9	780.7	3.89	50.18	5.7	490.8	289.9
120	0.9236	389.157	361.9	14.8	582.1	200.9	783.0	3.90	50.15	5.7	492.0	291.1
121	0.9356	392.266	365.0	15.0	585.5	200.9	786.4	3.91	50.12	5.7	493.6	292.7
122	0.9475	395.184	368.0	15.3	588.4	200.9	789.4	3.93	50.11	5.7	495.1	294.2
123	0.9595	397.502	370.3	15.5	590.4	200.9	791.3	3.94	50.10	5.7	496.1	295.2
124	0.9714	400.294	373.1	15.8	593.1	200.9	794.0	3.95	50.09	5.7	497.5	296.6
125	0.9834	402.894	375.7	16.0	595.5	200.9	796.4	3.96	50.09	5.7	498.7	297.7
126	0.9954	405.213	378.0	16.3	597.4	200.9	798.3	3.97	50.09	5.7	499.6	298.7
127	1.0073	407.545	380.3	16.5	599.3	200.9	800.2	3.98	50.09	5.7	500.5	299.6
128	1.0193	410.028	382.8	16.8	601.3	200.9	802.2	3.99	50.11	5.7	501.6	300.7
129	1.0312	412.206	385.0	17.0	602.9	200.9	803.8	4.00	50.12	5.7	502.4	301.5
130	1.0432	414.409	387.2	17.3	604.5	200.9	805.4	4.01	50.12	5.7	503.2	302.3
131	1.0552	417.273	390.0	17.5	607.1	200.9	808.0	4.02	50.15	5.7	504.5	303.6
132	1.0671	419.945	392.7	17.8	609.4	200.9	810.3	4.03	50.18	5.7	505.6	304.7
133	1.0791	423.105	395.9	18.0	612.3	200.9	813.2	4.05	50.20	5.7	507.1	306.2
134	1.0910	425.414	398.2	18.3	613.9	200.9	814.9	4.06	50.24	5.7	507.9	307.0
135	1.1030	426.548	399.3	18.5	613.7	200.9	814.6	4.05	50.28	5.7	507.8	306.9
136	1.1150	429.282	402.1	18.8	616.0	200.9	816.9	4.07	50.30	5.6	508.9	308.0
137	1.1269	432.281	405.1	19.0	618.6	200.9	819.5	4.08	50.34	5.6	510.2	309.3
138	1.1389	434.494	407.3	19.3	620.0	200.9	820.9	4.09	50.37	5.6	510.9	310.0
139	1.1508	436.059	408.8	19.5	620.3	200.9	821.2	4.09	50.42	5.6	511.1	310.2
140	1.1628	437.600	410.4	19.8	620.7	200.9	821.6	4.09	50.45	5.6	511.2	310.3

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
141	1.1737	438.615	411.4	20.0	620.3	200.9	821.3	4.09	50.49	5.6	511.1	310.2

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.100			727.100
Moisture content: Dry soil+tare, gms.	488.510			606.200
Moisture content: Tare, gms.	0.000			117.690
Moisture, %	19.6	38.1	24.7	24.7
Moist specimen weight, gms.	584.1			
Diameter, in.	2.37	2.37	2.22	2.43
Area, in.^{2}	4.42	4.42	3.87	4.63
Height, in.	4.97	4.97	4.66	3.67
Net decrease in height, in.		0.00	0.32	0.98
Net decrease in water volume, cc.			65.10	16.14
Wet density, kN/m^3	15.91	18.37	20.26	21.43
Dry density, kN/m^3	13.30	13.30	16.24	17.18
Void ratio	1.0685	1.0685	0.6946	0.6018
Saturation, %	51.4	100.0	100.0	115.4

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm^2

Membrane thickness = 0.064 cm

Consolidation cell pressure = 97.72 psi (673.8 kPa)

Consolidation back pressure = 40.00 psi (275.8 kPa)

Consolidation effective confining stress = 398.0 kPa

Strain rate, %/min. = 0.02

Fail. Stress = 1182.5 kPa **at reading no.** 118

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
0	0.0540	30.382	0.0	0.0	0.0	398.0	398.0	1.00	83.35	0.0	398.0	0.0
1	0.0552	41.526	11.1	0.0	19.9	398.0	417.8	1.05	83.34	0.0	407.9	9.9
2	0.0564	52.853	22.5	0.1	40.1	398.0	438.0	1.10	83.32	0.0	418.0	20.0
3	0.0576	64.765	34.4	0.1	61.3	398.0	459.3	1.15	83.31	0.0	428.6	30.6
4	0.0589	74.798	44.4	0.1	79.2	398.0	477.1	1.20	83.28	0.0	437.5	39.6
5	0.0601	83.738	53.4	0.1	95.1	398.0	493.0	1.24	83.26	0.0	445.5	47.5
6	0.0613	89.260	58.9	0.2	104.9	398.0	502.9	1.26	83.23	0.0	450.4	52.4
7	0.0626	93.482	63.1	0.2	112.4	398.0	510.4	1.28	83.20	0.1	454.2	56.2
8	0.0638	97.224	66.8	0.2	119.0	398.0	517.0	1.30	83.16	0.1	457.5	59.5
9	0.0650	98.176	67.8	0.2	120.7	398.0	518.7	1.30	83.12	0.1	458.3	60.4
10	0.0663	100.600	70.2	0.3	125.0	398.0	523.0	1.31	83.08	0.1	460.5	62.5
11	0.0675	103.843	73.5	0.3	130.8	398.0	528.8	1.33	83.04	0.1	463.4	65.4
12	0.0687	105.966	75.6	0.3	134.5	398.0	532.5	1.34	83.00	0.1	465.2	67.3
13	0.0699	108.511	78.1	0.3	139.1	398.0	537.0	1.35	82.95	0.1	467.5	69.5
14	0.0712	111.291	80.9	0.4	144.0	398.0	542.0	1.36	82.91	0.1	470.0	72.0
15	0.0724	113.233	82.9	0.4	147.4	398.0	545.4	1.37	82.86	0.2	471.7	73.7
16	0.0736	115.314	84.9	0.4	151.1	398.0	549.1	1.38	82.80	0.2	473.5	75.6
17	0.0749	116.850	86.5	0.4	153.8	398.0	551.8	1.39	82.75	0.2	474.9	76.9
18	0.0761	118.566	88.2	0.5	156.9	398.0	554.8	1.39	82.70	0.2	476.4	78.4

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
19	0.0773	120.135	89.8	0.5	159.7	398.0	557.6	1.40	82.65	0.2	477.8	79.8
20	0.0786	122.806	92.4	0.5	164.4	398.0	562.4	1.41	82.60	0.3	480.2	82.2
21	0.0798	124.280	93.9	0.6	167.0	398.0	565.0	1.42	82.56	0.3	481.5	83.5
22	0.0810	125.783	95.4	0.6	169.7	398.0	567.6	1.43	82.49	0.3	482.8	84.8
23	0.0822	126.960	96.6	0.6	171.7	398.0	569.7	1.43	82.44	0.3	483.8	85.9
24	0.0835	129.140	98.8	0.6	175.6	398.0	573.6	1.44	82.39	0.3	485.8	87.8
25	0.0847	130.898	100.5	0.7	178.7	398.0	576.7	1.45	82.33	0.3	487.3	89.4
26	0.0859	132.289	101.9	0.7	181.2	398.0	579.1	1.46	82.28	0.4	488.6	90.6
27	0.0872	134.404	104.0	0.7	184.9	398.0	582.9	1.46	82.23	0.4	490.4	92.5
28	0.0884	135.882	105.5	0.7	187.5	398.0	585.5	1.47	82.17	0.4	491.7	93.8
29	0.0896	137.627	107.2	0.8	190.6	398.0	588.6	1.48	82.12	0.4	493.3	95.3
30	0.0909	138.529	108.1	0.8	192.2	398.0	590.2	1.48	82.07	0.4	494.1	96.1
31	0.0921	140.727	110.3	0.8	196.1	398.0	594.1	1.49	82.00	0.5	496.0	98.1
32	0.0933	142.089	111.7	0.8	198.5	398.0	596.5	1.50	81.96	0.5	497.2	99.2
33	0.0946	143.586	113.2	0.9	201.1	398.0	599.1	1.51	81.90	0.5	498.5	100.6
34	0.0958	145.175	114.8	0.9	203.9	398.0	601.9	1.51	81.85	0.5	499.9	102.0
35	0.0970	146.765	116.4	0.9	206.7	398.0	604.7	1.52	81.80	0.5	501.3	103.4
36	0.0982	148.277	117.9	1.0	209.4	398.0	607.4	1.53	81.74	0.5	502.7	104.7
37	0.0995	149.470	119.1	1.0	211.5	398.0	609.5	1.53	81.68	0.6	503.7	105.8
38	0.1007	152.024	121.6	1.0	216.0	398.0	614.0	1.54	81.63	0.6	506.0	108.0
39	0.1019	153.981	123.6	1.0	219.5	398.0	617.5	1.55	81.58	0.6	507.7	109.8
40	0.1032	155.161	124.8	1.1	221.6	398.0	619.5	1.56	81.52	0.6	508.8	110.8
41	0.1044	156.369	126.0	1.1	223.7	398.0	621.7	1.56	81.47	0.6	509.8	111.9
42	0.1093	162.536	132.2	1.2	234.6	398.0	632.5	1.59	81.25	0.7	515.3	117.3
43	0.1142	168.092	137.7	1.3	244.4	398.0	642.3	1.61	81.04	0.8	520.1	122.2
44	0.1192	175.390	145.0	1.4	257.2	398.0	655.2	1.65	80.82	0.9	526.6	128.6
45	0.1241	181.212	150.8	1.5	267.5	398.0	665.4	1.67	80.60	0.9	531.7	133.7
46	0.1290	187.399	157.0	1.6	278.4	398.0	676.3	1.70	80.38	1.0	537.1	139.2
47	0.1339	193.539	163.2	1.7	289.1	398.0	687.1	1.73	80.19	1.1	542.5	144.6
48	0.1388	199.717	169.3	1.8	300.0	398.0	697.9	1.75	79.96	1.1	547.9	150.0
49	0.1438	206.000	175.6	1.9	311.0	398.0	709.0	1.78	79.75	1.2	553.5	155.5
50	0.1487	211.231	180.8	2.0	320.1	398.0	718.1	1.80	79.56	1.3	558.0	160.1
51	0.1536	216.633	186.3	2.1	329.6	398.0	727.5	1.83	79.34	1.4	562.7	164.8
52	0.1585	223.124	192.7	2.2	340.9	398.0	738.9	1.86	79.15	1.4	568.4	170.5
53	0.1634	228.864	198.5	2.4	350.9	398.0	748.9	1.88	78.95	1.5	573.4	175.5
54	0.1684	235.339	205.0	2.5	362.2	398.0	760.2	1.91	78.76	1.6	579.1	181.1
55	0.1733	240.592	210.2	2.6	371.3	398.0	769.3	1.93	78.57	1.6	583.6	185.7
56	0.1782	246.387	216.0	2.7	381.4	398.0	779.4	1.96	78.38	1.7	588.7	190.7
57	0.1831	251.615	221.2	2.8	390.5	398.0	788.5	1.98	78.18	1.8	593.2	195.2
58	0.1880	257.887	227.5	2.9	401.4	398.0	799.4	2.01	77.99	1.8	598.7	200.7
59	0.1930	264.008	233.6	3.0	412.0	398.0	810.0	2.04	77.81	1.9	604.0	206.0
60	0.1979	268.970	238.6	3.1	420.6	398.0	818.5	2.06	77.62	1.9	608.3	210.3
61	0.2028	274.080	243.7	3.2	429.4	398.0	827.3	2.08	77.44	2.0	612.7	214.7
62	0.2077	279.984	249.6	3.3	439.6	398.0	837.5	2.10	77.26	2.1	617.7	219.8
63	0.2126	286.180	255.8	3.4	450.3	398.0	848.2	2.13	77.08	2.1	623.1	225.1
64	0.2176	291.788	261.4	3.5	459.9	398.0	857.9	2.16	76.90	2.2	627.9	230.0
65	0.2225	296.821	266.4	3.6	468.6	398.0	866.5	2.18	76.72	2.2	632.2	234.3

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
66	0.2274	302.632	272.3	3.7	478.5	398.0	876.5	2.20	76.56	2.3	637.2	239.3
67	0.2323	308.082	277.7	3.8	487.9	398.0	885.8	2.23	76.38	2.4	641.9	243.9
68	0.2372	314.098	283.7	3.9	498.2	398.0	896.2	2.25	76.20	2.4	647.1	249.1
69	0.2422	319.260	288.9	4.0	507.0	398.0	904.9	2.27	76.05	2.5	651.5	253.5
70	0.2471	324.572	294.2	4.1	516.0	398.0	914.0	2.30	75.88	2.5	656.0	258.0
71	0.2520	330.373	300.0	4.3	526.0	398.0	923.9	2.32	75.70	2.6	660.9	263.0
72	0.2569	336.533	306.2	4.4	536.5	398.0	934.4	2.35	75.55	2.6	666.2	268.2
73	0.2618	341.334	311.0	4.5	544.6	398.0	942.5	2.37	75.39	2.7	670.2	272.3
74	0.2668	346.909	316.5	4.6	554.0	398.0	952.0	2.39	75.23	2.8	675.0	277.0
75	0.2717	352.797	322.4	4.7	564.0	398.0	962.0	2.42	75.06	2.8	680.0	282.0
76	0.2766	357.797	327.4	4.8	572.4	398.0	970.4	2.44	74.92	2.9	684.2	286.2
77	0.2815	362.917	332.5	4.9	581.1	398.0	979.0	2.46	74.76	2.9	688.5	290.5
78	0.2864	368.317	337.9	5.0	590.2	398.0	988.1	2.48	74.61	3.0	693.0	295.1
79	0.2914	373.291	342.9	5.1	598.5	398.0	996.5	2.50	74.45	3.0	697.2	299.2
80	0.2963	378.751	348.4	5.2	607.7	398.0	1005.6	2.53	74.30	3.1	701.8	303.8
81	0.3012	383.620	353.2	5.3	615.8	398.0	1013.8	2.55	74.15	3.1	705.9	307.9
82	0.3135	397.358	367.0	5.6	638.8	398.0	1036.7	2.61	73.79	3.2	717.3	319.4
83	0.3258	409.934	379.6	5.8	659.6	398.0	1057.6	2.66	73.44	3.4	727.8	329.8
84	0.3381	423.368	393.0	6.1	681.9	398.0	1079.8	2.71	73.10	3.5	738.9	340.9
85	0.3504	436.314	405.9	6.4	703.2	398.0	1101.2	2.77	72.75	3.6	749.6	351.6
86	0.3627	448.710	418.3	6.6	723.4	398.0	1121.4	2.82	72.44	3.7	759.7	361.7
87	0.3750	461.751	431.4	6.9	744.7	398.0	1142.7	2.87	72.12	3.8	770.3	372.4
88	0.3873	473.740	443.4	7.2	764.0	398.0	1162.0	2.92	71.82	3.9	780.0	382.0
89	0.3996	486.758	456.4	7.4	785.1	398.0	1183.0	2.97	71.52	4.0	790.5	392.5
90	0.4119	499.506	469.1	7.7	805.5	398.0	1203.5	3.02	71.23	4.1	800.7	402.8
91	0.4242	512.253	481.9	7.9	825.9	398.0	1223.8	3.08	70.95	4.2	810.9	412.9
92	0.4365	524.966	494.6	8.2	846.0	398.0	1243.9	3.13	70.70	4.3	820.9	423.0
93	0.4488	536.612	506.2	8.5	864.2	398.0	1262.1	3.17	70.45	4.4	830.0	432.1
94	0.4611	548.205	517.8	8.7	882.2	398.0	1280.1	3.22	70.21	4.5	839.0	441.1
95	0.4734	559.717	529.3	9.0	899.9	398.0	1297.9	3.26	69.98	4.5	847.9	450.0
96	0.4857	570.478	540.1	9.3	916.3	398.0	1314.2	3.30	69.75	4.6	856.1	458.1
97	0.4980	580.965	550.6	9.5	932.1	398.0	1330.0	3.34	69.53	4.7	864.0	466.0
98	0.5103	592.183	561.8	9.8	948.9	398.0	1346.9	3.38	69.34	4.7	872.4	474.5
99	0.5226	602.934	572.6	10.1	965.0	398.0	1362.9	3.42	69.13	4.8	880.4	482.5
100	0.5349	612.949	582.6	10.3	979.6	398.0	1377.6	3.46	68.95	4.9	887.8	489.8
101	0.5472	622.289	591.9	10.6	993.0	398.0	1391.0	3.50	68.77	4.9	894.5	496.5
102	0.5594	632.652	602.3	10.9	1008.0	398.0	1406.0	3.53	68.61	5.0	902.0	504.0
103	0.5717	641.408	611.0	11.1	1020.2	398.0	1418.2	3.56	68.45	5.1	908.1	510.1
104	0.5840	651.027	620.6	11.4	1033.7	398.0	1431.7	3.60	68.30	5.1	914.8	516.9
105	0.5963	660.093	629.7	11.6	1046.2	398.0	1444.2	3.63	68.15	5.2	921.1	523.1
106	0.6086	669.464	639.1	11.9	1059.1	398.0	1457.1	3.66	68.02	5.2	927.5	529.6
107	0.6209	678.457	648.1	12.2	1071.3	398.0	1469.3	3.69	67.90	5.2	933.6	535.7
108	0.6332	687.076	656.7	12.4	1082.8	398.0	1480.7	3.72	67.78	5.3	939.3	541.4
109	0.6455	696.346	666.0	12.7	1095.2	398.0	1493.2	3.75	67.66	5.3	945.6	547.6
110	0.6578	704.509	674.1	13.0	1105.7	398.0	1503.7	3.78	67.55	5.4	950.8	552.9
111	0.6701	712.986	682.6	13.2	1116.6	398.0	1514.6	3.81	67.45	5.4	956.3	558.3
112	0.6824	721.353	691.0	13.5	1127.2	398.0	1525.2	3.83	67.36	5.4	961.6	563.6

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
113	0.6947	729.181	698.8	13.8	1136.8	398.0	1534.8	3.86	67.28	5.4	966.4	568.4
114	0.7070	738.190	707.8	14.0	1148.3	398.0	1546.2	3.89	67.20	5.5	972.1	574.1
115	0.7193	744.534	714.2	14.3	1155.3	398.0	1553.3	3.90	67.14	5.5	975.6	577.6
116	0.7316	752.431	722.0	14.6	1164.8	398.0	1562.7	3.93	67.07	5.5	980.3	582.4
117	0.7439	760.189	729.8	14.8	1173.9	398.0	1571.8	3.95	67.01	5.5	984.9	586.9
118	0.7562	767.720	737.3	15.1	1182.5	398.0	1580.5	3.97	66.96	5.6	989.2	591.3
119	0.7685	774.245	743.9	15.3	1189.4	398.0	1587.4	3.99	66.92	5.6	992.7	594.7
120	0.7808	780.509	750.1	15.6	1195.9	398.0	1593.8	4.00	66.88	5.6	995.9	597.9
121	0.7931	787.273	756.9	15.9	1203.0	398.0	1601.0	4.02	66.85	5.6	999.5	601.5
122	0.8054	793.664	763.3	16.1	1209.4	398.0	1607.4	4.04	66.84	5.6	1002.7	604.7
123	0.8177	797.779	767.4	16.4	1212.2	398.0	1610.2	4.05	66.82	5.6	1004.1	606.1
124	0.8300	804.961	774.6	16.7	1219.8	398.0	1617.8	4.07	66.80	5.6	1007.9	609.9
125	0.8423	809.585	779.2	16.9	1223.2	398.0	1621.2	4.07	66.80	5.6	1009.6	611.6
126	0.8546	816.299	785.9	17.2	1229.8	398.0	1627.8	4.09	66.80	5.6	1012.9	614.9
127	0.8669	821.423	791.0	17.5	1233.9	398.0	1631.9	4.10	66.79	5.6	1014.9	617.0
128	0.8792	826.187	795.8	17.7	1237.3	398.0	1635.3	4.11	66.80	5.6	1016.6	618.7
129	0.8915	830.650	800.3	18.0	1240.2	398.0	1638.2	4.12	66.81	5.6	1018.1	620.1
130	0.9038	835.769	805.4	18.2	1244.0	398.0	1642.0	4.13	66.83	5.6	1020.0	622.0
131	0.9161	840.388	810.0	18.5	1247.1	398.0	1645.0	4.13	66.85	5.6	1021.5	623.5
132	0.9284	844.161	813.8	18.8	1248.7	398.0	1646.7	4.14	66.87	5.6	1022.3	624.4
133	0.9407	848.082	817.7	19.0	1250.5	398.0	1648.5	4.14	66.90	5.6	1023.2	625.3
134	0.9530	852.753	822.4	19.3	1253.4	398.0	1651.4	4.15	66.93	5.6	1024.7	626.7
135	0.9653	859.565	829.2	19.6	1259.5	398.0	1657.5	4.16	66.96	5.6	1027.7	629.8
136	0.9776	863.089	832.7	19.8	1260.5	398.0	1658.5	4.17	67.00	5.5	1028.2	630.3
137	0.9899	866.004	835.6	20.1	1260.6	398.0	1658.6	4.17	67.04	5.5	1028.3	630.3
138	1.0022	869.475	839.1	20.4	1261.5	398.0	1659.5	4.17	67.08	5.5	1028.7	630.8
139	1.0145	871.983	841.6	20.6	1260.9	398.0	1658.9	4.17	67.11	5.5	1028.4	630.5
140	1.0268	874.539	844.2	20.9	1260.3	398.0	1658.3	4.17	67.16	5.5	1028.1	630.2
141	1.0380	875.457	845.1	21.1	1257.6	398.0	1655.6	4.16	67.21	5.5	1026.8	628.8

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.300			714.800
Moisture content: Dry soil+tare, gms.	489.400			604.700
Moisture content: Tare, gms.	0.000			115.300
Moisture, %	19.4	39.5	22.5	22.5
Moist specimen weight, gms.	584.3			
Diameter, in.	2.39	2.39	2.18	2.37
Area, in.^{2}	4.48	4.48	3.74	4.43
Height, in.	5.01	5.01	4.64	3.67
Net decrease in height, in.		0.00	0.37	0.97
Net decrease in water volume, cc.			83.10	18.10
Wet density, kN/m^3	15.59	18.21	20.66	22.07
Dry density, kN/m^3	13.06	13.06	16.87	18.01
Void ratio	1.1077	1.1077	0.6313	0.5275
Saturation, %	49.1	100.0	100.0	119.7

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm^2

Membrane thickness = 0.064 cm

Consolidation cell pressure = 155.91 psi (1075.0 kPa)

Consolidation back pressure = 40.00 psi (275.8 kPa)

Consolidation effective confining stress = 799.2 kPa

Strain rate, %/min. = 0.02

Fail. Stress = 2154.7 kPa **at reading no.** 118

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
0	0.1704	69.248	0.0	0.0	0.0	799.2	799.2	1.00	80.81	0.0	799.2	0.0
1	0.1716	82.517	13.3	0.0	24.5	799.2	823.6	1.03	80.81	0.0	811.4	12.2
2	0.1729	90.907	21.7	0.1	39.9	799.2	839.1	1.05	80.80	0.0	819.1	20.0
3	0.1741	95.085	25.8	0.1	47.6	799.2	846.8	1.06	80.79	0.0	823.0	23.8
4	0.1753	99.273	30.0	0.1	55.3	799.2	854.5	1.07	80.78	0.0	826.8	27.7
5	0.1765	104.989	35.7	0.1	65.8	799.2	865.0	1.08	80.77	0.0	832.1	32.9
6	0.1777	112.896	43.6	0.2	80.4	799.2	879.5	1.10	80.76	0.0	839.4	40.2
7	0.1789	118.282	49.0	0.2	90.3	799.2	889.4	1.11	80.76	0.0	844.3	45.1
8	0.1801	121.604	52.4	0.2	96.3	799.2	895.5	1.12	80.75	0.0	847.3	48.2
9	0.1813	127.179	57.9	0.2	106.6	799.2	905.8	1.13	80.74	0.0	852.5	53.3
10	0.1826	132.878	63.6	0.3	117.0	799.2	916.2	1.15	80.73	0.0	857.7	58.5
11	0.1838	138.439	69.2	0.3	127.2	799.2	926.4	1.16	80.71	0.0	862.8	63.6
12	0.1850	144.592	75.3	0.3	138.5	799.2	937.7	1.17	80.68	0.0	868.4	69.3
13	0.1862	150.461	81.2	0.3	149.3	799.2	948.5	1.19	80.67	0.1	873.8	74.6
14	0.1874	156.141	86.9	0.4	159.7	799.2	958.9	1.20	80.64	0.1	879.0	79.9
15	0.1886	160.155	90.9	0.4	167.1	799.2	966.2	1.21	80.61	0.1	882.7	83.5
16	0.1898	164.561	95.3	0.4	175.1	799.2	974.3	1.22	80.57	0.1	886.7	87.6
17	0.1910	167.963	98.7	0.4	181.4	799.2	980.5	1.23	80.55	0.1	889.8	90.7
18	0.1922	171.747	102.5	0.5	188.3	799.2	987.5	1.24	80.50	0.1	893.3	94.1
19	0.1935	175.947	106.7	0.5	196.0	799.2	995.1	1.25	80.47	0.1	897.2	98.0
20	0.1947	179.884	110.6	0.5	203.2	799.2	1002.3	1.25	80.44	0.1	900.8	101.6
21	0.1959	182.277	113.0	0.5	207.5	799.2	1006.7	1.26	80.40	0.1	902.9	103.8
22	0.1971	184.873	115.6	0.6	212.3	799.2	1011.5	1.27	80.36	0.2	905.3	106.1
23	0.1983	188.154	118.9	0.6	218.3	799.2	1017.5	1.27	80.31	0.2	908.3	109.1

Test Readings for Specimen No. 3

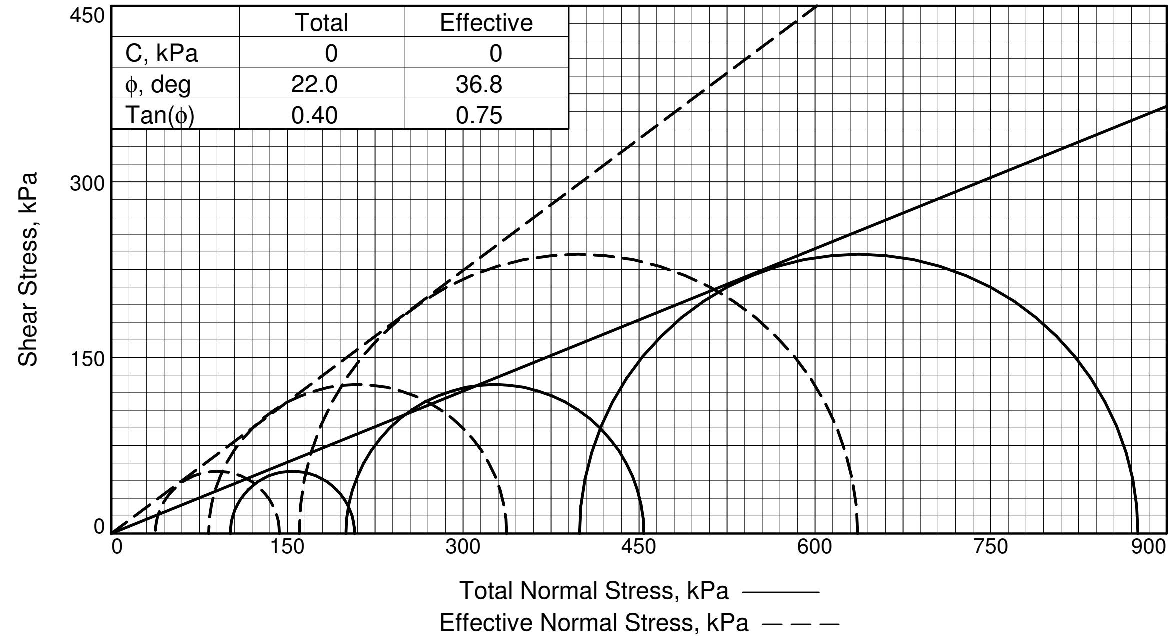
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
24	0.1995	191.379	122.1	0.6	224.2	799.2	1023.4	1.28	80.26	0.2	911.3	112.1
25	0.2007	194.896	125.6	0.7	230.6	799.2	1029.8	1.29	80.22	0.2	914.5	115.3
26	0.2019	197.892	128.6	0.7	236.1	799.2	1035.3	1.30	80.18	0.2	917.2	118.0
27	0.2032	200.055	130.8	0.7	240.0	799.2	1039.2	1.30	80.13	0.2	919.2	120.0
28	0.2044	203.580	134.3	0.7	246.5	799.2	1045.7	1.31	80.07	0.3	922.4	123.2
29	0.2056	206.410	137.2	0.8	251.6	799.2	1050.8	1.31	80.04	0.3	925.0	125.8
30	0.2068	209.581	140.3	0.8	257.4	799.2	1056.6	1.32	80.00	0.3	927.9	128.7
31	0.2080	213.010	143.8	0.8	263.7	799.2	1062.9	1.33	79.95	0.3	931.0	131.8
32	0.2092	215.464	146.2	0.8	268.2	799.2	1067.4	1.34	79.89	0.3	933.3	134.1
33	0.2104	218.357	149.1	0.9	273.5	799.2	1072.6	1.34	79.85	0.3	935.9	136.7
34	0.2116	221.019	151.8	0.9	278.3	799.2	1077.5	1.35	79.80	0.4	938.3	139.2
35	0.2129	223.986	154.7	0.9	283.7	799.2	1082.9	1.36	79.74	0.4	941.0	141.9
36	0.2141	225.578	156.3	0.9	286.6	799.2	1085.8	1.36	79.70	0.4	942.5	143.3
37	0.2153	228.496	159.2	1.0	291.9	799.2	1091.1	1.37	79.66	0.4	945.1	146.0
38	0.2165	231.086	161.8	1.0	296.7	799.2	1095.8	1.37	79.60	0.4	947.5	148.3
39	0.2177	233.162	163.9	1.0	300.4	799.2	1099.6	1.38	79.56	0.4	949.4	150.2
40	0.2189	235.376	166.1	1.0	304.5	799.2	1103.7	1.38	79.51	0.5	951.4	152.2
41	0.2201	238.514	169.3	1.1	310.2	799.2	1109.4	1.39	79.47	0.5	954.3	155.1
42	0.2250	246.645	177.4	1.2	325.0	799.2	1124.1	1.41	79.28	0.5	961.7	162.5
43	0.2298	256.533	187.3	1.3	342.9	799.2	1142.1	1.43	79.10	0.6	970.6	171.5
44	0.2346	267.458	198.2	1.4	362.8	799.2	1162.0	1.45	78.92	0.7	980.6	181.4
45	0.2395	276.784	207.5	1.5	379.7	799.2	1178.9	1.48	78.73	0.7	989.0	189.9
46	0.2443	286.891	217.6	1.6	398.0	799.2	1197.2	1.50	78.55	0.8	998.2	199.0
47	0.2492	298.292	229.0	1.7	418.7	799.2	1217.9	1.52	78.36	0.9	1008.5	209.4
48	0.2540	306.782	237.5	1.8	434.1	799.2	1233.2	1.54	78.17	0.9	1016.2	217.0
49	0.2589	317.555	248.3	1.9	453.6	799.2	1252.8	1.57	77.98	1.0	1026.0	226.8
50	0.2637	326.708	257.5	2.0	470.1	799.2	1269.3	1.59	77.80	1.1	1034.2	235.1
51	0.2686	335.562	266.3	2.1	486.1	799.2	1285.3	1.61	77.60	1.1	1042.2	243.0
52	0.2734	346.189	276.9	2.2	505.3	799.2	1304.4	1.63	77.43	1.2	1051.8	252.6
53	0.2782	356.903	287.7	2.3	524.6	799.2	1323.8	1.66	77.24	1.3	1061.5	262.3
54	0.2831	365.652	296.4	2.4	540.3	799.2	1339.5	1.68	77.06	1.3	1069.3	270.2
55	0.2879	374.843	305.6	2.5	556.9	799.2	1356.0	1.70	76.88	1.4	1077.6	278.4
56	0.2928	383.427	314.2	2.6	572.3	799.2	1371.4	1.72	76.69	1.4	1085.3	286.1
57	0.2976	394.594	325.3	2.7	592.3	799.2	1391.5	1.74	76.52	1.5	1095.3	296.2
58	0.3025	404.275	335.0	2.8	609.7	799.2	1408.9	1.76	76.34	1.6	1104.0	304.8
59	0.3073	413.062	343.8	2.9	625.4	799.2	1424.6	1.78	76.16	1.6	1111.9	312.7
60	0.3121	423.438	354.2	3.1	644.0	799.2	1443.2	1.81	75.98	1.7	1121.2	322.0
61	0.3170	433.329	364.1	3.2	661.7	799.2	1460.9	1.83	75.80	1.8	1130.0	330.9
62	0.3218	443.532	374.3	3.3	680.0	799.2	1479.1	1.85	75.62	1.8	1139.1	340.0
63	0.3267	453.034	383.8	3.4	696.9	799.2	1496.1	1.87	75.43	1.9	1147.6	348.5
64	0.3315	461.708	392.5	3.5	712.3	799.2	1511.5	1.89	75.26	2.0	1155.3	356.2
65	0.3364	473.093	403.8	3.6	732.7	799.2	1531.8	1.92	75.09	2.0	1165.5	366.3
66	0.3412	482.943	413.7	3.7	750.2	799.2	1549.4	1.94	74.91	2.1	1174.3	375.1
67	0.3461	493.117	423.9	3.8	768.3	799.2	1567.5	1.96	74.73	2.1	1183.3	384.2
68	0.3509	502.969	433.7	3.9	785.8	799.2	1585.0	1.98	74.55	2.2	1192.1	392.9
69	0.3557	512.770	443.5	4.0	803.2	799.2	1602.4	2.01	74.38	2.3	1200.8	401.6
70	0.3606	517.040	447.8	4.1	810.5	799.2	1609.7	2.01	74.22	2.3	1204.4	405.3

Test Readings for Specimen No. 3

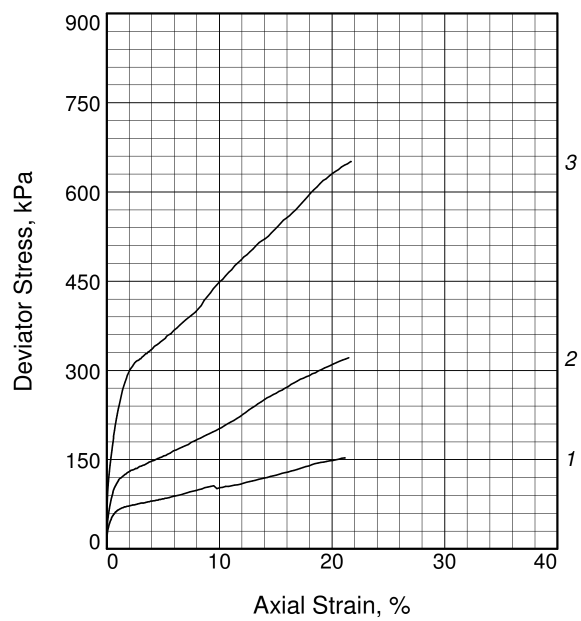
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
71	0.3654	532.219	463.0	4.2	837.6	799.2	1636.7	2.05	74.07	2.4	1218.0	418.8
72	0.3703	542.860	473.6	4.3	856.4	799.2	1655.6	2.07	73.90	2.4	1227.4	428.2
73	0.3751	552.013	482.8	4.4	872.6	799.2	1671.7	2.09	73.72	2.5	1235.4	436.3
74	0.3800	562.066	492.8	4.5	890.3	799.2	1689.4	2.11	73.56	2.6	1244.3	445.1
75	0.3848	569.890	500.6	4.6	904.0	799.2	1703.1	2.13	73.40	2.6	1251.1	452.0
76	0.3896	581.900	512.7	4.7	925.1	799.2	1724.3	2.16	73.25	2.7	1261.7	462.6
77	0.3945	592.695	523.4	4.8	944.1	799.2	1743.3	2.18	73.09	2.7	1271.2	472.1
78	0.3993	602.318	533.1	4.9	961.0	799.2	1760.2	2.20	72.92	2.8	1279.7	480.5
79	0.4042	611.504	542.3	5.0	977.0	799.2	1776.2	2.22	72.77	2.8	1287.7	488.5
80	0.4090	619.171	549.9	5.1	990.3	799.2	1789.4	2.24	72.62	2.9	1294.3	495.1
81	0.4139	630.392	561.1	5.2	1009.9	799.2	1809.0	2.26	72.49	2.9	1304.1	504.9
82	0.4260	655.654	586.4	5.5	1054.0	799.2	1853.1	2.32	72.08	3.1	1326.2	527.0
83	0.4381	670.618	601.4	5.8	1079.2	799.2	1878.4	2.35	71.74	3.2	1338.8	539.6
84	0.4502	704.215	635.0	6.0	1137.8	799.2	1937.0	2.42	71.38	3.3	1368.1	568.9
85	0.4623	728.440	659.2	6.3	1179.5	799.2	1978.7	2.48	71.02	3.4	1388.9	589.8
86	0.4744	751.402	682.2	6.5	1218.8	799.2	2017.9	2.53	70.67	3.6	1408.5	609.4
87	0.4865	775.013	705.8	6.8	1258.8	799.2	2057.9	2.58	70.38	3.7	1428.6	629.4
88	0.4986	797.307	728.1	7.1	1296.5	799.2	2095.6	2.62	70.04	3.8	1447.4	648.2
89	0.5107	818.989	749.7	7.3	1332.8	799.2	2131.9	2.67	69.75	3.9	1465.6	666.4
90	0.5228	841.650	772.4	7.6	1370.8	799.2	2170.0	2.72	69.43	4.0	1484.6	685.4
91	0.5349	862.386	793.1	7.9	1405.2	799.2	2204.3	2.76	69.13	4.1	1501.8	702.6
92	0.5470	884.605	815.4	8.1	1441.9	799.2	2241.1	2.80	68.85	4.2	1520.1	721.0
93	0.5591	906.188	836.9	8.4	1477.5	799.2	2276.7	2.85	68.55	4.3	1537.9	738.7
94	0.5713	898.791	829.5	8.6	1461.8	799.2	2260.9	2.83	68.28	4.4	1530.0	730.9
95	0.5834	945.647	876.4	8.9	1541.2	799.2	2340.3	2.93	68.05	4.5	1569.8	770.6
96	0.5955	964.892	895.6	9.2	1572.1	799.2	2371.2	2.97	67.78	4.6	1585.2	786.0
97	0.6076	985.667	916.4	9.4	1605.3	799.2	2404.4	3.01	67.56	4.7	1601.8	802.6
98	0.6197	1004.328	935.1	9.7	1634.9	799.2	2434.1	3.05	67.28	4.8	1616.6	817.4
99	0.6318	1025.198	955.9	9.9	1668.0	799.2	2467.2	3.09	67.05	4.8	1633.2	834.0
100	0.6439	1042.522	973.3	10.2	1694.6	799.2	2493.7	3.12	66.85	4.9	1646.4	847.3
101	0.6560	1061.147	991.9	10.5	1723.5	799.2	2522.7	3.16	66.60	5.0	1660.9	861.8
102	0.6681	1081.678	1012.4	10.7	1755.6	799.2	2554.8	3.20	66.37	5.1	1677.0	877.8
103	0.6802	1099.229	1030.0	11.0	1782.3	799.2	2581.5	3.23	66.14	5.2	1690.3	891.2
104	0.6923	1119.364	1050.1	11.2	1813.3	799.2	2612.5	3.27	65.93	5.2	1705.8	906.6
105	0.7044	1133.223	1064.0	11.5	1833.1	799.2	2632.2	3.29	65.74	5.3	1715.7	916.5
106	0.7165	1149.577	1080.3	11.8	1857.0	799.2	2656.2	3.32	65.56	5.4	1727.7	928.5
107	0.7286	1167.499	1098.3	12.0	1883.6	799.2	2682.8	3.36	65.37	5.4	1741.0	941.8
108	0.7408	1186.150	1116.9	12.3	1911.2	799.2	2710.3	3.39	65.19	5.5	1754.8	955.6
109	0.7529	1204.557	1135.3	12.5	1938.2	799.2	2737.4	3.43	65.01	5.6	1768.3	969.1
110	0.7650	1221.832	1152.6	12.8	1963.0	799.2	2762.2	3.46	64.84	5.6	1780.7	981.5
111	0.7771	1240.032	1170.8	13.1	1989.2	799.2	2788.4	3.49	64.68	5.7	1793.8	994.6
112	0.7892	1257.050	1187.8	13.3	2013.3	799.2	2812.5	3.52	64.52	5.7	1805.8	1006.7
113	0.8013	1275.063	1205.8	13.6	2038.8	799.2	2838.0	3.55	64.38	5.8	1818.6	1019.4
114	0.8134	1292.105	1222.9	13.8	2062.4	799.2	2861.6	3.58	64.24	5.8	1830.4	1031.2
115	0.8255	1309.513	1240.3	14.1	2086.5	799.2	2885.7	3.61	64.11	5.9	1842.4	1043.2
116	0.8376	1325.483	1256.2	14.4	2107.9	799.2	2907.1	3.64	63.98	5.9	1853.1	1054.0
117	0.8497	1342.925	1273.7	14.6	2131.7	799.2	2930.8	3.67	63.86	6.0	1865.0	1065.8

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Princ. Stress kPa	Major Princ. Stress kPa	1:3 Ratio	Buret Read. cc's	Vol. Strain %	P kPa	Q kPa
118	0.8618	1360.088	1290.8	14.9	2154.7	799.2	2953.9	3.70	63.74	6.0	1876.5	1077.3
119	0.8739	1377.096	1307.8	15.2	2177.3	799.2	2976.5	3.72	63.63	6.0	1887.8	1088.6
120	0.8860	1392.740	1323.5	15.4	2197.5	799.2	2996.7	3.75	63.52	6.1	1897.9	1098.8
121	0.8981	1409.062	1339.8	15.7	2218.4	799.2	3017.6	3.78	63.44	6.1	1908.4	1109.2
122	0.9103	1424.458	1355.2	15.9	2237.8	799.2	3036.9	3.80	63.35	6.1	1918.0	1118.9
123	0.9224	1440.229	1371.0	16.2	2257.4	799.2	3056.6	3.82	63.27	6.2	1927.9	1128.7
124	0.9345	1457.299	1388.1	16.5	2279.1	799.2	3078.3	3.85	63.19	6.2	1938.7	1139.5
125	0.9466	1470.824	1401.6	16.7	2294.7	799.2	3093.8	3.87	63.13	6.2	1946.5	1147.3
126	0.9587	1486.659	1417.4	17.0	2313.8	799.2	3113.0	3.90	63.07	6.2	1956.1	1156.9
127	0.9708	1497.145	1427.9	17.2	2324.1	799.2	3123.3	3.91	63.01	6.3	1961.2	1162.0
128	0.9829	1512.901	1443.7	17.5	2342.9	799.2	3142.0	3.93	62.95	6.3	1970.6	1171.4
129	0.9950	1527.716	1458.5	17.8	2359.9	799.2	3159.1	3.95	62.90	6.3	1979.1	1179.9
130	1.0071	1538.782	1469.5	18.0	2370.6	799.2	3169.8	3.97	62.86	6.3	1984.5	1185.3
131	1.0192	1549.338	1480.1	18.3	2380.3	799.2	3179.5	3.98	62.83	6.3	1989.3	1190.2
132	1.0313	1559.665	1490.4	18.5	2389.5	799.2	3188.7	3.99	62.80	6.3	1993.9	1194.8
133	1.0434	1571.417	1502.2	18.8	2401.0	799.2	3200.1	4.00	62.77	6.3	1999.7	1200.5
134	1.0555	1582.465	1513.2	19.1	2410.9	799.2	3210.1	4.02	62.76	6.3	2004.6	1205.5
135	1.0676	1591.540	1522.3	19.3	2417.8	799.2	3216.9	4.03	62.74	6.4	2008.1	1208.9
136	1.0798	1597.000	1527.8	19.6	2418.7	799.2	3217.9	4.03	62.73	6.4	2008.5	1209.4
137	1.0919	1605.114	1535.9	19.8	2423.9	799.2	3223.0	4.03	62.70	6.4	2011.1	1211.9
138	1.1040	1611.114	1541.9	20.1	2425.4	799.2	3224.6	4.03	62.71	6.4	2011.9	1212.7
139	1.1161	1621.109	1551.9	20.4	2433.1	799.2	3232.3	4.04	62.71	6.4	2015.7	1216.6
140	1.1282	1628.198	1559.0	20.6	2436.2	799.2	3235.4	4.05	62.71	6.4	2017.3	1218.1
141	1.1392	1634.786	1565.5	20.9	2439.1	799.2	3238.3	4.05	62.72	6.4	2018.7	1219.6



	Total	Effective
C, kPa	0	0
ϕ, deg	22.0	36.8
Tan(ϕ)	0.40	0.75



Specimen No.		1	2	3
Initial	Water Content, %	20.1	19.9	19.9
	Dry Density, kN/m3	13.36	13.14	13.26
	Saturation, %	53.2	51.2	51.8
	Void Ratio	1.0604	1.0941	1.0749
	Diameter, mm.	60.0	60.4	60.1
	Height, mm.	126.2	127.0	127.2
At Test	Water Content, %	27.1	25.4	23.9
	Dry Density, kN/m3	15.63	16.07	16.46
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7604	0.7128	0.6714
	Diameter, mm.	57.0	56.6	56.1
	Height, mm.	119.6	118.3	117.6
Strain rate, %/min.		0.02	0.02	0.02
Eff. Cell Pressure, kPa		101	200	399
Fail. Stress, kPa		106	254	476
Excess Pore Pr., kPa		64	117	239
Strain, %		9.5	14.2	11.4
Ult. Stress, kPa				
Excess Pore Pr., kPa				
Strain, %				
$\bar{\sigma}_1$ Failure, kPa		143	337	636
$\bar{\sigma}_3$ Failure, kPa		37	83	160

Type of Test:
CU with Pore Pressures

Sample Type: Reconsititुted

Description: silt

LL= 29 **PL=** 24 **PI=** 5

Assumed Specific Gravity= 2.806

Remarks: Failure chosen at peak principal stress ratio with no cohesion intercept.

Figure ________

Client: KP North Bay

Project: East Boulder Mine

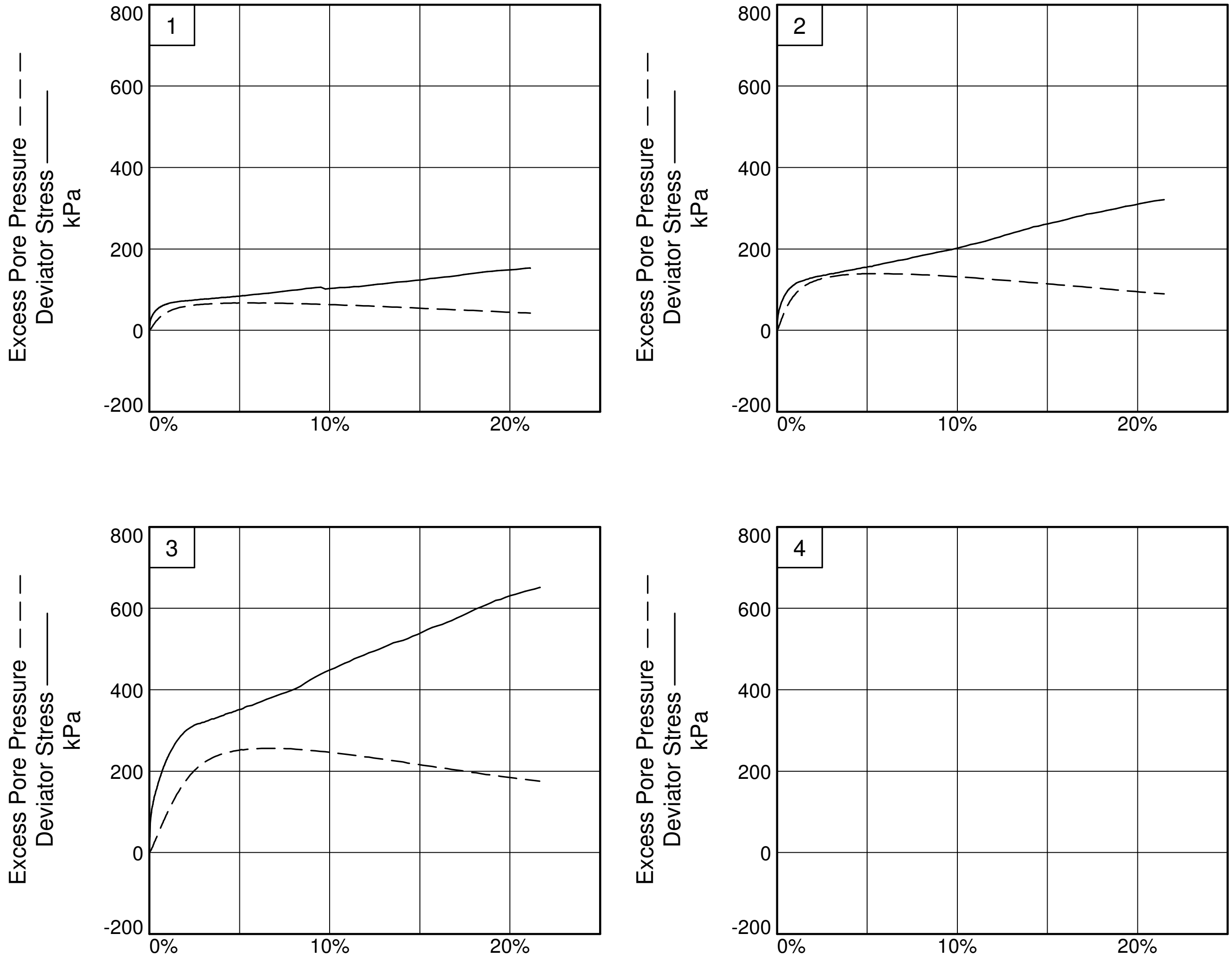
Location: TXCU

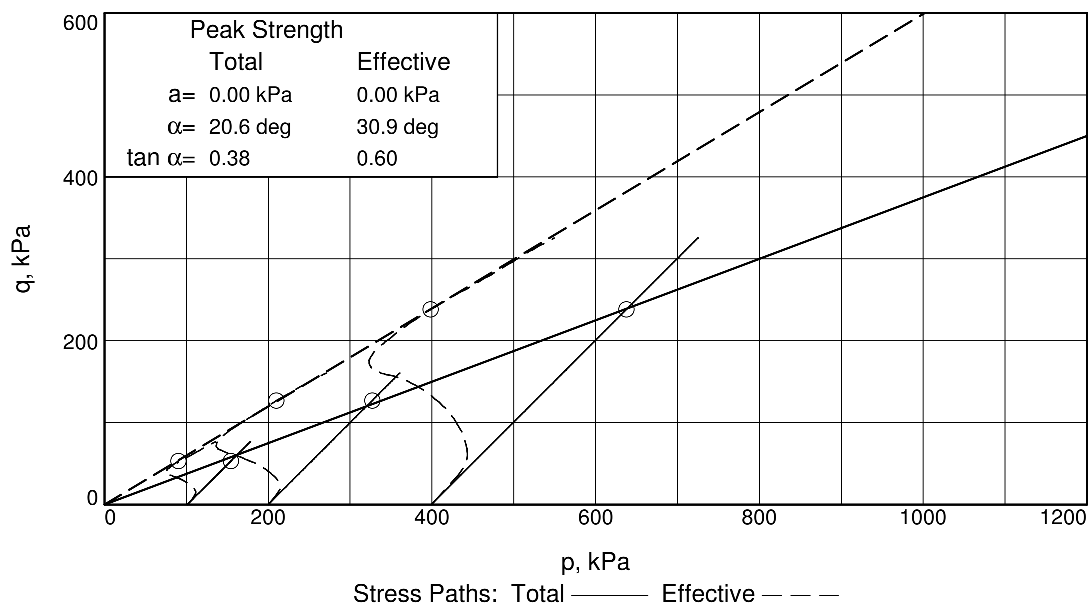
Sample Number: SEB-31-1345 Filtered

Proj. No.: NB101-00045/23 **Date Sampled:** 6/19/23

Knight Piésold CONSULTING

Tested By: JStaley **Checked By:** JBruce





Client: KP North Bay

Project: East Boulder Mine

Location: TXCU **Sample Number:** SEB-31-1345 Filtered

Project No.: NB101-00045/23 **Figure** ________

Knight Piesold Geotechnical Lab.

Tested By: JStaley **Checked By:** JBruce

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

Date: 6/19/23
Client: KP North Bay
Project: East Boulder Mine
Project No.: NB101-00045/23
Location: TXCU
Sample Number: SEB-31-1345 Filtered
Description: silt
Remarks: Failure chosen at peak principal stress ratio with no cohesion intercept.
Type of Sample: Reconsitituted
Assumed Specific Gravity=2.806 **LL=**29 **PL=**24 **PI=**5
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.300			735.400
Moisture content: Dry soil+tare, gms.	486.420			603.600
Moisture content: Tare, gms.	0.000			117.180
Moisture, %	20.1	37.8	27.1	27.1
Moist specimen weight, gms.	584.3			
Diameter, in.	2.36	2.36	2.24	
Area, in.^{2}	4.39	4.39	3.96	
Height, in.	4.97	4.97	4.71	
Net decrease in height, in.		0.00	0.26	
Net decrease in water volume, cc.			52.00	
Wet density, kN/m^3	16.04	18.40	19.87	
Dry density, kN/m^3	13.36	13.36	15.63	
Void ratio	1.0604	1.0604	0.7604	
Saturation, %	53.2	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm^2
Membrane thickness = 0.064 cm
Consolidation cell pressure = 54.74 psi (377.4 kPa)
Consolidation back pressure = 40.03 psi (276.0 kPa)
Consolidation effective confining stress = 101.4 kPa
Strain rate, %/min. = 0.02
Fail. Stress = 106.0 kPa **at reading no.** 96

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
0	0.7783	0.300	0.0	0.0	0.0	101.4	101.4	1.00	40.03	101.4	0.0
1	0.7795	7.877	7.6	0.0	13.2	100.6	113.8	1.13	40.15	107.2	6.6
2	0.7808	13.343	13.0	0.1	22.7	99.1	121.8	1.23	40.37	110.4	11.4
3	0.7820	16.367	16.1	0.1	28.0	97.6	125.6	1.29	40.58	111.6	14.0
4	0.7833	18.412	18.1	0.1	31.5	95.8	127.3	1.33	40.85	111.5	15.8
5	0.7845	19.866	19.6	0.1	34.1	94.0	128.1	1.36	41.10	111.1	17.0
6	0.7857	20.978	20.7	0.2	36.0	92.3	128.3	1.39	41.36	110.3	18.0
7	0.7870	22.305	22.0	0.2	38.3	90.7	128.9	1.42	41.59	109.8	19.1
8	0.7882	23.444	23.1	0.2	40.3	88.7	128.9	1.45	41.88	108.8	20.1
9	0.7895	24.415	24.1	0.2	41.9	87.0	129.0	1.48	42.12	108.0	21.0
10	0.7907	25.435	25.1	0.3	43.7	85.6	129.3	1.51	42.33	107.4	21.8
11	0.7920	26.368	26.1	0.3	45.3	83.7	129.0	1.54	42.61	106.3	22.7
12	0.7932	27.186	26.9	0.3	46.7	82.2	128.9	1.57	42.82	105.6	23.4
13	0.7944	27.870	27.6	0.3	47.9	80.7	128.6	1.59	43.03	104.7	23.9
14	0.7957	28.620	28.3	0.4	49.2	79.2	128.4	1.62	43.25	103.8	24.6
15	0.7969	29.223	28.9	0.4	50.2	77.8	128.1	1.65	43.45	102.9	25.1
16	0.7982	29.951	29.7	0.4	51.5	76.6	128.1	1.67	43.63	102.4	25.7
17	0.7994	30.560	30.3	0.4	52.5	75.1	127.6	1.70	43.85	101.4	26.3
18	0.8007	31.151	30.9	0.5	53.5	73.9	127.4	1.72	44.02	100.7	26.8
19	0.8019	31.716	31.4	0.5	54.5	72.8	127.3	1.75	44.18	100.0	27.2
20	0.8031	32.187	31.9	0.5	55.3	71.4	126.7	1.77	44.38	99.0	27.6
21	0.8044	32.613	32.3	0.6	56.0	70.4	126.4	1.80	44.53	98.4	28.0
22	0.8056	33.015	32.7	0.6	56.7	69.5	126.2	1.82	44.66	97.8	28.3
23	0.8069	33.490	33.2	0.6	57.5	68.3	125.7	1.84	44.84	97.0	28.7
24	0.8081	33.960	33.7	0.6	58.3	67.3	125.6	1.87	44.98	96.4	29.1
25	0.8094	34.303	34.0	0.7	58.9	66.4	125.3	1.89	45.11	95.8	29.4
26	0.8106	34.706	34.4	0.7	59.6	65.3	124.9	1.91	45.27	95.1	29.8
27	0.8118	35.092	34.8	0.7	60.2	64.5	124.7	1.93	45.39	94.6	30.1
28	0.8131	35.395	35.1	0.7	60.7	63.7	124.4	1.95	45.50	94.1	30.4
29	0.8143	35.712	35.4	0.8	61.2	62.7	124.0	1.98	45.64	93.3	30.6
30	0.8156	36.065	35.8	0.8	61.8	62.2	124.0	1.99	45.73	93.1	30.9
31	0.8168	36.316	36.0	0.8	62.3	61.1	123.4	2.02	45.87	92.3	31.1
32	0.8181	36.639	36.3	0.8	62.8	60.5	123.3	2.04	45.97	91.9	31.4
33	0.8193	36.932	36.6	0.9	63.3	59.8	123.1	2.06	46.06	91.5	31.6
34	0.8206	37.135	36.8	0.9	63.6	59.0	122.6	2.08	46.19	90.8	31.8
35	0.8218	37.324	37.0	0.9	63.9	58.3	122.2	2.10	46.28	90.3	32.0
36	0.8230	37.722	37.4	1.0	64.6	57.6	122.2	2.12	46.38	89.9	32.3
37	0.8243	37.786	37.5	1.0	64.7	57.0	121.7	2.14	46.48	89.3	32.3
38	0.8255	38.130	37.8	1.0	65.3	56.4	121.7	2.16	46.56	89.1	32.6
39	0.8268	38.322	38.0	1.0	65.6	56.0	121.5	2.17	46.62	88.8	32.8
40	0.8280	38.456	38.2	1.1	65.8	55.1	120.9	2.19	46.75	88.0	32.9
41	0.8330	39.258	39.0	1.2	67.1	53.1	120.2	2.26	47.04	86.7	33.6
42	0.8380	39.760	39.5	1.3	67.9	51.2	119.1	2.33	47.31	85.2	34.0
43	0.8429	40.331	40.0	1.4	68.8	49.6	118.4	2.39	47.54	84.0	34.4
44	0.8479	40.953	40.7	1.5	69.8	47.9	117.7	2.46	47.79	82.8	34.9
45	0.8529	41.394	41.1	1.6	70.5	46.7	117.2	2.51	47.97	81.9	35.2
46	0.8578	41.651	41.4	1.7	70.9	45.4	116.3	2.56	48.15	80.9	35.4

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
47	0.8628	42.112	41.8	1.8	71.6	44.4	115.9	2.61	48.30	80.2	35.8
48	0.8678	42.372	42.1	1.9	71.9	43.3	115.3	2.66	48.46	79.3	36.0
49	0.8728	42.599	42.3	2.0	72.2	42.7	114.9	2.69	48.55	78.8	36.1
50	0.8777	42.866	42.6	2.1	72.6	41.7	114.3	2.74	48.69	78.0	36.3
51	0.8827	43.232	42.9	2.2	73.2	41.0	114.2	2.78	48.79	77.6	36.6
52	0.8877	43.561	43.3	2.3	73.6	40.5	114.1	2.82	48.87	77.3	36.8
53	0.8927	43.817	43.5	2.4	74.0	39.7	113.7	2.87	48.99	76.7	37.0
54	0.8976	44.177	43.9	2.5	74.5	39.3	113.8	2.90	49.04	76.6	37.3
55	0.9026	44.345	44.0	2.6	74.7	38.6	113.4	2.93	49.14	76.0	37.4
56	0.9076	44.865	44.6	2.7	75.5	38.3	113.8	2.97	49.19	76.0	37.8
57	0.9126	45.340	45.0	2.9	76.3	37.8	114.0	3.02	49.26	75.9	38.1
58	0.9175	45.507	45.2	3.0	76.5	37.5	113.9	3.04	49.31	75.7	38.2
59	0.9225	45.799	45.5	3.1	76.9	37.0	113.9	3.08	49.37	75.5	38.4
60	0.9275	45.928	45.6	3.2	77.0	36.8	113.8	3.09	49.40	75.3	38.5
61	0.9325	46.100	45.8	3.3	77.2	36.6	113.8	3.11	49.43	75.2	38.6
62	0.9374	46.479	46.2	3.4	77.8	36.1	113.9	3.15	49.50	75.0	38.9
63	0.9424	46.811	46.5	3.5	78.2	36.0	114.2	3.18	49.52	75.1	39.1
64	0.9474	47.007	46.7	3.6	78.5	35.8	114.3	3.19	49.55	75.0	39.2
65	0.9523	47.389	47.1	3.7	79.0	35.5	114.6	3.23	49.59	75.0	39.5
66	0.9573	47.698	47.4	3.8	79.5	35.4	114.9	3.24	49.60	75.2	39.7
67	0.9623	48.189	47.9	3.9	80.2	35.0	115.2	3.29	49.66	75.1	40.1
68	0.9673	48.375	48.1	4.0	80.4	35.1	115.5	3.29	49.65	75.3	40.2
69	0.9722	48.782	48.5	4.1	81.0	34.8	115.8	3.33	49.69	75.3	40.5
70	0.9772	48.849	48.5	4.2	81.0	34.7	115.7	3.34	49.71	75.2	40.5
71	0.9822	49.164	48.9	4.3	81.5	34.7	116.2	3.34	49.70	75.5	40.7
72	0.9872	49.361	49.1	4.4	81.7	34.4	116.1	3.37	49.75	75.3	40.9
73	0.9921	49.655	49.4	4.5	82.1	34.6	116.7	3.37	49.72	75.6	41.1
74	0.9971	50.129	49.8	4.6	82.8	34.3	117.1	3.41	49.76	75.7	41.4
75	1.0021	50.358	50.1	4.8	83.1	34.2	117.3	3.43	49.77	75.8	41.5
76	1.0071	50.607	50.3	4.9	83.4	34.4	117.9	3.42	49.75	76.1	41.7
77	1.0120	50.953	50.7	5.0	83.9	34.2	118.1	3.46	49.78	76.1	42.0
78	1.0170	51.192	50.9	5.1	84.2	34.1	118.3	3.47	49.79	76.2	42.1
79	1.0220	51.682	51.4	5.2	84.9	34.3	119.2	3.48	49.77	76.7	42.5
80	1.0269	51.984	51.7	5.3	85.3	34.1	119.4	3.50	49.80	76.7	42.7
81	1.0394	52.746	52.4	5.5	86.3	34.1	120.4	3.54	49.80	77.2	43.2
82	1.0518	53.966	53.7	5.8	88.1	34.1	122.2	3.58	49.79	78.2	44.1
83	1.0642	54.617	54.3	6.1	88.9	34.4	123.3	3.59	49.75	78.8	44.5
84	1.0766	55.559	55.3	6.3	90.2	34.3	124.5	3.63	49.77	79.4	45.1
85	1.0891	56.378	56.1	6.6	91.3	34.4	125.6	3.66	49.76	80.0	45.6
86	1.1015	57.482	57.2	6.9	92.8	34.6	127.4	3.69	49.73	81.0	46.4
87	1.1139	58.487	58.2	7.1	94.2	34.8	129.0	3.70	49.69	81.9	47.1
88	1.1264	59.612	59.3	7.4	95.7	34.9	130.7	3.74	49.68	82.8	47.9
89	1.1388	60.401	60.1	7.7	96.7	35.3	132.0	3.74	49.62	83.7	48.4
90	1.1512	61.447	61.1	7.9	98.1	35.4	133.5	3.77	49.61	84.5	49.1
91	1.1636	62.435	62.1	8.2	99.4	35.8	135.2	3.78	49.55	85.5	49.7
92	1.1761	63.494	63.2	8.5	100.8	36.2	137.0	3.79	49.49	86.6	50.4
93	1.1885	64.850	64.6	8.7	102.7	36.3	139.0	3.83	49.48	87.6	51.4

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
94	1.2009	65.736	65.4	9.0	103.8	36.7	140.5	3.83	49.42	88.6	51.9
95	1.2134	66.652	66.4	9.2	105.0	37.2	142.1	3.82	49.35	89.6	52.5
96	1.2258	67.515	67.2	9.5	106.0	37.4	143.4	3.84	49.32	90.4	53.0
97	1.2382	68.339	68.0	9.8	101.6	37.8	139.4	3.69	49.25	88.6	50.8
98	1.2506	69.378	69.1	10.0	102.7	38.3	141.0	3.68	49.18	89.7	51.4
99	1.2631	70.295	70.0	10.3	103.7	38.5	142.2	3.69	49.15	90.4	51.8
100	1.2755	71.410	71.1	10.6	105.0	39.0	144.0	3.69	49.08	91.5	52.5
101	1.2879	71.939	71.6	10.8	105.3	39.6	144.9	3.66	49.00	92.2	52.7
102	1.3004	72.828	72.5	11.1	106.2	39.7	145.9	3.67	48.98	92.8	53.1
103	1.3128	73.729	73.4	11.4	107.1	40.2	147.3	3.66	48.91	93.8	53.6
104	1.3252	74.388	74.1	11.6	107.7	40.7	148.4	3.64	48.84	94.5	53.8
105	1.3376	75.564	75.3	11.9	109.0	41.3	150.3	3.64	48.74	95.8	54.5
106	1.3501	76.680	76.4	12.1	110.2	41.6	151.8	3.65	48.70	96.7	55.1
107	1.3625	78.096	77.8	12.4	111.8	42.2	154.1	3.65	48.62	98.1	55.9
108	1.3749	79.197	78.9	12.7	113.0	42.7	155.8	3.64	48.54	99.2	56.5
109	1.3873	80.316	80.0	12.9	114.2	43.1	157.3	3.65	48.49	100.2	57.1
110	1.3998	81.429	81.1	13.2	115.4	43.6	159.0	3.64	48.41	101.3	57.7
111	1.4122	82.696	82.4	13.5	116.8	44.2	161.0	3.64	48.33	102.6	58.4
112	1.4246	83.919	83.6	13.7	118.1	44.5	162.6	3.65	48.28	103.6	59.0
113	1.4371	85.022	84.7	14.0	119.2	45.1	164.3	3.64	48.20	104.7	59.6
114	1.4495	86.086	85.8	14.3	120.3	45.7	165.9	3.63	48.11	105.8	60.1
115	1.4619	87.422	87.1	14.5	121.7	46.1	167.8	3.64	48.06	106.9	60.9
116	1.4743	88.563	88.3	14.8	122.8	46.5	169.3	3.64	48.00	107.9	61.4
117	1.4868	89.583	89.3	15.1	123.8	47.1	170.9	3.63	47.91	109.0	61.9
118	1.4992	91.045	90.7	15.3	125.4	47.7	173.1	3.63	47.83	110.4	62.7
119	1.5116	92.495	92.2	15.6	127.0	47.9	174.9	3.65	47.79	111.4	63.5
120	1.5240	93.767	93.5	15.8	128.3	48.5	176.8	3.64	47.70	112.7	64.1
121	1.5365	94.995	94.7	16.1	129.5	49.2	178.7	3.63	47.60	114.0	64.7
122	1.5489	96.463	96.2	16.4	131.0	49.8	180.8	3.63	47.52	115.3	65.5
123	1.5613	97.548	97.2	16.6	132.0	50.0	182.0	3.64	47.49	116.0	66.0
124	1.5738	98.864	98.6	16.9	133.3	50.7	184.0	3.63	47.39	117.4	66.7
125	1.5862	100.382	100.1	17.2	134.9	51.1	186.0	3.64	47.33	118.6	67.5
126	1.5986	102.182	101.9	17.4	136.9	51.8	188.7	3.64	47.23	120.2	68.5
127	1.6111	103.536	103.2	17.7	138.2	52.3	190.5	3.64	47.16	121.4	69.1
128	1.6235	104.984	104.7	18.0	139.7	52.7	192.3	3.65	47.10	122.5	69.8
129	1.6359	106.797	106.5	18.2	141.6	53.1	194.8	3.67	47.03	124.0	70.8
130	1.6483	108.296	108.0	18.5	143.1	53.8	197.0	3.66	46.93	125.4	71.6
131	1.6607	109.636	109.3	18.7	144.4	54.4	198.8	3.65	46.85	126.6	72.2
132	1.6732	110.799	110.5	19.0	145.4	55.0	200.3	3.65	46.77	127.7	72.7
133	1.6856	111.830	111.5	19.3	146.2	55.3	201.5	3.64	46.72	128.4	73.1
134	1.6980	112.893	112.6	19.5	147.0	55.9	202.9	3.63	46.63	129.4	73.5
135	1.7105	114.199	113.9	19.8	148.2	56.6	204.8	3.62	46.53	130.7	74.1
136	1.7229	114.958	114.7	20.1	148.6	56.9	205.4	3.61	46.49	131.2	74.3
137	1.7353	116.142	115.8	20.3	149.5	57.5	207.0	3.60	46.40	132.3	74.8
138	1.7477	117.679	117.4	20.6	151.0	58.1	209.0	3.60	46.32	133.6	75.5
139	1.7602	119.110	118.8	20.9	152.3	58.5	210.8	3.60	46.25	134.7	76.1
140	1.7726	120.091	119.8	21.1	152.9	59.2	212.1	3.59	46.16	135.6	76.5

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
141	1.7727	119.972	119.7	21.1	152.7	59.1	211.9	3.58	46.17	135.5	76.4

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.400			722.900
Moisture content: Dry soil+tare, gms.	487.210			599.160
Moisture content: Tare, gms.	0.000			111.950
Moisture, %	19.9	39.0	25.4	25.4
Moist specimen weight, gms.	584.4			
Diameter, in.	2.38	2.38	2.23	
Area, in.^{2}	4.44	4.44	3.90	
Height, in.	5.00	5.00	4.66	
Net decrease in height, in.		0.00	0.34	
Net decrease in water volume, cc.			66.20	
Wet density, kN/m^3	15.76	18.26	20.15	
Dry density, kN/m^3	13.14	13.14	16.07	
Void ratio	1.0941	1.0941	0.7128	
Saturation, %	51.2	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm^2

Membrane thickness = 0.064 cm

Consolidation cell pressure = 69.05 psi (476.1 kPa)

Consolidation back pressure = 40.03 psi (276.0 kPa)

Consolidation effective confining stress = 200.1 kPa

Strain rate, %/min. = 0.02

Fail. Stress = 254.0 kPa **at reading no.** 113

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
0	0.7818	0.300	0.0	0.0	0.0	200.1	200.1	1.00	40.03	200.1	0.0
1	0.7831	12.479	12.2	0.0	21.5	198.2	219.8	1.11	40.30	209.0	10.8
2	0.7843	20.689	20.4	0.1	36.1	196.0	232.1	1.18	40.62	214.1	18.0
3	0.7856	25.074	24.8	0.1	43.8	193.0	236.8	1.23	41.06	214.9	21.9
4	0.7868	28.184	27.9	0.1	49.3	189.6	238.9	1.26	41.54	214.3	24.6
5	0.7881	30.575	30.3	0.1	53.5	186.4	239.9	1.29	42.02	213.1	26.8
6	0.7893	32.966	32.7	0.2	57.7	183.1	240.8	1.32	42.49	212.0	28.9
7	0.7906	34.880	34.6	0.2	61.1	180.0	241.1	1.34	42.94	210.6	30.5
8	0.7919	37.089	36.8	0.2	65.0	176.7	241.6	1.37	43.43	209.2	32.5
9	0.7931	38.905	38.6	0.2	68.2	173.4	241.6	1.39	43.90	207.5	34.1
10	0.7944	40.637	40.3	0.3	71.2	170.2	241.4	1.42	44.37	205.8	35.6
11	0.7956	42.244	41.9	0.3	74.0	167.2	241.2	1.44	44.81	204.2	37.0
12	0.7969	43.763	43.5	0.3	76.7	164.4	241.1	1.47	45.21	202.7	38.3
13	0.7981	45.267	45.0	0.4	79.3	161.4	240.7	1.49	45.64	201.1	39.7
14	0.7994	46.630	46.3	0.4	81.7	158.6	240.3	1.51	46.04	199.5	40.8
15	0.8006	48.169	47.9	0.4	84.4	155.9	240.3	1.54	46.44	198.1	42.2
16	0.8019	49.365	49.1	0.4	86.5	153.4	239.9	1.56	46.79	196.7	43.2
17	0.8032	50.442	50.1	0.5	88.3	150.7	239.1	1.59	47.19	194.9	44.2
18	0.8044	51.645	51.3	0.5	90.4	148.1	238.5	1.61	47.57	193.3	45.2

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
19	0.8057	52.730	52.4	0.5	92.3	145.6	237.9	1.63	47.93	191.8	46.2
20	0.8069	53.810	53.5	0.5	94.2	143.4	237.6	1.66	48.25	190.5	47.1
21	0.8082	54.600	54.3	0.6	95.6	141.1	236.7	1.68	48.58	188.9	47.8
22	0.8094	55.678	55.4	0.6	97.4	138.8	236.3	1.70	48.91	187.5	48.7
23	0.8107	56.590	56.3	0.6	99.0	136.7	235.7	1.72	49.23	186.2	49.5
24	0.8119	57.297	57.0	0.6	100.2	134.5	234.7	1.75	49.55	184.6	50.1
25	0.8132	58.254	58.0	0.7	101.9	132.1	234.0	1.77	49.89	183.1	50.9
26	0.8144	58.984	58.7	0.7	103.1	130.1	233.2	1.79	50.19	181.6	51.6
27	0.8157	59.470	59.2	0.7	104.0	128.2	232.2	1.81	50.45	180.2	52.0
28	0.8169	60.123	59.8	0.8	105.1	126.4	231.4	1.83	50.72	178.9	52.5
29	0.8182	60.782	60.5	0.8	106.2	124.6	230.8	1.85	50.98	177.7	53.1
30	0.8194	61.260	61.0	0.8	107.0	122.9	229.9	1.87	51.22	176.4	53.5
31	0.8207	61.839	61.5	0.8	108.0	121.1	229.1	1.89	51.49	175.1	54.0
32	0.8220	62.499	62.2	0.9	109.1	119.2	228.4	1.92	51.76	173.8	54.6
33	0.8232	63.101	62.8	0.9	110.2	117.5	227.7	1.94	52.01	172.6	55.1
34	0.8245	63.577	63.3	0.9	111.0	116.2	227.1	1.96	52.20	171.6	55.5
35	0.8257	64.101	63.8	0.9	111.8	114.6	226.5	1.98	52.42	170.6	55.9
36	0.8270	64.639	64.3	1.0	112.8	113.1	225.9	2.00	52.64	169.5	56.4
37	0.8282	65.153	64.9	1.0	113.6	111.7	225.3	2.02	52.85	168.5	56.8
38	0.8295	65.678	65.4	1.0	114.5	110.3	224.8	2.04	53.05	167.6	57.3
39	0.8307	66.235	65.9	1.1	115.5	109.2	224.7	2.06	53.21	166.9	57.7
40	0.8320	66.633	66.3	1.1	116.1	107.8	223.9	2.08	53.42	165.8	58.1
41	0.8370	68.081	67.8	1.2	118.5	103.1	221.6	2.15	54.10	162.4	59.3
42	0.8420	68.891	68.6	1.3	119.8	98.7	218.6	2.21	54.73	158.6	59.9
43	0.8470	69.936	69.6	1.4	121.5	95.1	216.6	2.28	55.26	155.8	60.8
44	0.8520	70.931	70.6	1.5	123.1	91.6	214.7	2.34	55.76	153.2	61.6
45	0.8570	72.029	71.7	1.6	124.9	88.5	213.4	2.41	56.21	151.0	62.4
46	0.8620	72.750	72.4	1.7	126.0	86.2	212.2	2.46	56.55	149.2	63.0
47	0.8670	73.933	73.6	1.8	127.9	83.5	211.4	2.53	56.94	147.4	64.0
48	0.8720	74.656	74.4	1.9	129.0	81.5	210.5	2.58	57.23	146.0	64.5
49	0.8770	75.565	75.3	2.0	130.5	79.4	209.8	2.64	57.54	144.6	65.2
50	0.8820	76.520	76.2	2.2	132.0	77.7	209.6	2.70	57.79	143.6	66.0
51	0.8870	76.822	76.5	2.3	132.4	76.0	208.3	2.74	58.03	142.1	66.2
52	0.8920	77.360	77.1	2.4	133.1	74.7	207.8	2.78	58.22	141.2	66.6
53	0.8970	78.070	77.8	2.5	134.2	73.1	207.4	2.84	58.44	140.2	67.1
54	0.9020	78.651	78.4	2.6	135.1	72.0	207.0	2.88	58.61	139.5	67.5
55	0.9070	78.946	78.6	2.7	135.4	70.8	206.2	2.91	58.78	138.5	67.7
56	0.9120	79.843	79.5	2.8	136.8	69.9	206.7	2.96	58.92	138.3	68.4
57	0.9170	80.696	80.4	2.9	138.1	69.0	207.2	3.00	59.04	138.1	69.1
58	0.9220	81.150	80.9	3.0	138.8	68.1	206.8	3.04	59.18	137.5	69.4
59	0.9270	81.644	81.3	3.1	139.5	67.5	206.9	3.07	59.27	137.2	69.7
60	0.9321	82.392	82.1	3.2	140.6	66.6	207.2	3.11	59.39	136.9	70.3
61	0.9371	82.728	82.4	3.3	141.0	66.1	207.1	3.13	59.47	136.6	70.5
62	0.9421	83.530	83.2	3.4	142.2	65.4	207.6	3.18	59.57	136.5	71.1
63	0.9471	84.182	83.9	3.5	143.2	64.8	208.0	3.21	59.65	136.4	71.6
64	0.9521	84.988	84.7	3.7	144.4	64.3	208.7	3.25	59.73	136.5	72.2
65	0.9571	85.899	85.6	3.8	145.8	63.9	209.7	3.28	59.78	136.8	72.9

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
66	0.9621	86.558	86.3	3.9	146.7	63.4	210.1	3.32	59.86	136.7	73.4
67	0.9671	87.005	86.7	4.0	147.3	63.2	210.5	3.33	59.89	136.8	73.7
68	0.9721	87.660	87.4	4.1	148.3	62.7	211.0	3.36	59.95	136.9	74.1
69	0.9771	88.110	87.8	4.2	148.9	62.5	211.4	3.38	59.98	136.9	74.4
70	0.9821	88.705	88.4	4.3	149.7	62.1	211.9	3.41	60.04	137.0	74.9
71	0.9871	89.509	89.2	4.4	150.9	62.0	213.0	3.43	60.05	137.5	75.5
72	0.9921	90.097	89.8	4.5	151.7	61.8	213.5	3.46	60.09	137.6	75.9
73	0.9971	90.598	90.3	4.6	152.4	61.6	214.0	3.47	60.11	137.8	76.2
74	1.0021	91.407	91.1	4.7	153.6	61.3	214.9	3.51	60.16	138.1	76.8
75	1.0071	91.908	91.6	4.8	154.3	61.3	215.6	3.52	60.16	138.4	77.1
76	1.0121	92.410	92.1	4.9	155.0	61.0	216.0	3.54	60.20	138.5	77.5
77	1.0171	93.086	92.8	5.1	155.9	61.0	216.9	3.55	60.20	139.0	78.0
78	1.0221	93.636	93.3	5.2	156.7	60.8	217.4	3.58	60.24	139.1	78.3
79	1.0271	93.966	93.7	5.3	157.0	60.8	217.8	3.58	60.23	139.3	78.5
80	1.0321	95.170	94.9	5.4	158.9	60.7	219.5	3.62	60.25	140.1	79.4
81	1.0446	96.719	96.4	5.6	161.0	60.8	221.8	3.65	60.24	141.3	80.5
82	1.0571	99.145	98.8	5.9	164.6	60.8	225.4	3.71	60.23	143.1	82.3
83	1.0696	100.618	100.3	6.2	166.6	61.0	227.6	3.73	60.20	144.3	83.3
84	1.0821	102.347	102.0	6.4	169.0	61.4	230.3	3.75	60.15	145.8	84.5
85	1.0947	104.092	103.8	6.7	171.3	61.4	232.7	3.79	60.15	147.1	85.7
86	1.1072	105.542	105.2	7.0	173.2	61.7	235.0	3.81	60.10	148.3	86.6
87	1.1197	107.317	107.0	7.3	175.7	62.1	237.7	3.83	60.05	149.9	87.8
88	1.1322	109.745	109.4	7.5	179.1	62.4	241.6	3.87	60.00	152.0	89.6
89	1.1447	111.539	111.2	7.8	181.5	63.0	244.5	3.88	59.92	153.7	90.8
90	1.1572	113.470	113.2	8.1	184.1	63.6	247.7	3.90	59.83	155.6	92.1
91	1.1697	115.246	114.9	8.3	186.5	64.2	250.6	3.91	59.75	157.4	93.2
92	1.1822	117.115	116.8	8.6	189.0	64.7	253.7	3.92	59.66	159.2	94.5
93	1.1947	119.037	118.7	8.9	191.5	65.4	257.0	3.93	59.56	161.2	95.8
94	1.2072	120.727	120.4	9.1	193.7	66.2	259.8	3.93	59.45	163.0	96.8
95	1.2197	122.695	122.4	9.4	196.2	66.9	263.1	3.93	59.35	165.0	98.1
96	1.2322	124.513	124.2	9.7	198.6	67.6	266.2	3.94	59.24	166.9	99.3
97	1.2447	126.468	126.2	9.9	201.1	68.3	269.4	3.94	59.14	168.9	100.5
98	1.2572	128.857	128.6	10.2	204.3	69.2	273.5	3.95	59.02	171.3	102.1
99	1.2697	131.090	130.8	10.5	207.2	70.1	277.3	3.96	58.88	173.7	103.6
100	1.2822	133.593	133.3	10.7	210.6	70.7	281.3	3.98	58.79	176.0	105.3
101	1.2947	135.731	135.4	11.0	213.3	71.6	284.9	3.98	58.67	178.2	106.6
102	1.3072	137.950	137.6	11.3	216.1	72.5	288.6	3.98	58.54	180.5	108.1
103	1.3197	140.200	139.9	11.5	219.0	73.5	292.5	3.98	58.39	183.0	109.5
104	1.3322	142.834	142.5	11.8	222.4	74.4	296.9	3.99	58.25	185.7	111.2
105	1.3447	145.594	145.3	12.1	226.1	75.4	301.5	4.00	58.11	188.4	113.0
106	1.3572	148.222	147.9	12.4	229.4	76.3	305.8	4.01	57.98	191.0	114.7
107	1.3697	151.322	151.0	12.6	233.5	77.2	310.8	4.02	57.85	194.0	116.8
108	1.3822	154.032	153.7	12.9	237.0	78.2	315.2	4.03	57.71	196.7	118.5
109	1.3947	156.581	156.3	13.2	240.2	79.1	319.3	4.04	57.58	199.2	120.1
110	1.4072	159.330	159.0	13.4	243.7	80.2	323.8	4.04	57.42	202.0	121.8
111	1.4197	161.953	161.7	13.7	246.9	81.1	328.0	4.04	57.29	204.5	123.5
112	1.4323	164.577	164.3	14.0	250.1	82.1	332.3	4.05	57.14	207.2	125.1

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
113	1.4447	167.669	167.4	14.2	254.0	83.0	337.1	4.06	57.00	210.1	127.0
114	1.4573	169.605	169.3	14.5	256.2	83.9	340.0	4.05	56.89	212.0	128.1
115	1.4698	172.159	171.9	14.8	259.2	85.0	344.2	4.05	56.73	214.6	129.6
116	1.4823	174.330	174.0	15.0	261.7	86.0	347.6	4.04	56.58	216.8	130.8
117	1.4948	176.884	176.6	15.3	264.7	87.0	351.7	4.04	56.43	219.3	132.3
118	1.5073	179.039	178.7	15.6	267.1	88.0	355.1	4.03	56.28	221.6	133.5
119	1.5198	181.726	181.4	15.8	270.2	89.1	359.3	4.03	56.13	224.2	135.1
120	1.5323	184.255	184.0	16.1	273.1	90.1	363.2	4.03	55.98	226.7	136.6
121	1.5448	187.406	187.1	16.4	276.9	91.3	368.2	4.03	55.81	229.7	138.4
122	1.5573	189.575	189.3	16.6	279.2	92.1	371.3	4.03	55.70	231.7	139.6
123	1.5698	192.019	191.7	16.9	281.9	93.0	374.9	4.03	55.55	234.0	140.9
124	1.5823	194.887	194.6	17.2	285.2	94.2	379.4	4.03	55.39	236.8	142.6
125	1.5948	196.827	196.5	17.5	287.1	95.3	382.4	4.01	55.23	238.9	143.6
126	1.6073	199.028	198.7	17.7	289.4	96.4	385.8	4.00	55.06	241.1	144.7
127	1.6198	201.075	200.8	18.0	291.4	97.4	388.8	3.99	54.92	243.1	145.7
128	1.6323	203.828	203.5	18.3	294.4	98.6	393.0	3.99	54.75	245.8	147.2
129	1.6448	205.788	205.5	18.5	296.3	99.5	395.8	3.98	54.62	247.6	148.1
130	1.6573	208.364	208.1	18.8	299.0	100.6	399.6	3.97	54.47	250.1	149.5
131	1.6698	210.887	210.6	19.1	301.6	101.8	403.4	3.96	54.29	252.6	150.8
132	1.6823	213.494	213.2	19.3	304.4	102.8	407.1	3.96	54.14	255.0	152.2
133	1.6948	215.477	215.2	19.6	306.2	103.8	410.0	3.95	54.00	256.9	153.1
134	1.7073	217.788	217.5	19.9	308.4	104.7	413.1	3.95	53.86	258.9	154.2
135	1.7198	220.400	220.1	20.1	311.1	105.8	416.9	3.94	53.70	261.4	155.5
136	1.7323	222.746	222.4	20.4	313.3	106.5	419.9	3.94	53.60	263.2	156.7
137	1.7448	224.996	224.7	20.7	315.4	107.6	423.1	3.93	53.44	265.4	157.7
138	1.7574	227.326	227.0	20.9	317.6	108.6	426.3	3.92	53.29	267.5	158.8
139	1.7699	229.199	228.9	21.2	319.2	109.6	428.8	3.91	53.15	269.2	159.6
140	1.7820	231.456	231.2	21.5	321.3	110.7	431.9	3.90	53.00	271.3	160.6

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	584.200			721.200
Moisture content: Dry soil+tare, gms.	487.440			604.600
Moisture content: Tare, gms.	0.000			117.160
Moisture, %	19.9	38.3	23.9	23.9
Moist specimen weight, gms.	584.2			
Diameter, in.	2.37	2.37	2.21	
Area, in.²	4.39	4.39	3.83	
Height, in.	5.01	5.01	4.63	
Net decrease in height, in.		0.00	0.38	
Net decrease in water volume, cc.			70.10	
Wet density, kN/m^3	15.89	18.34	20.40	
Dry density, kN/m^3	13.26	13.26	16.46	
Void ratio	1.0749	1.0749	0.6714	
Saturation, %	51.8	100.0	100.0	

Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.064 cm
Consolidation cell pressure = 97.95 psi (675.3 kPa)
Consolidation back pressure = 40.04 psi (276.1 kPa)
Consolidation effective confining stress = 399.3 kPa
Strain rate, %/min. = 0.02
Fail. Stress = 476.3 kPa **at reading no.** 102

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
0	0.7781	1.000	0.0	0.0	0.0	399.3	399.3	1.00	40.04	399.3	0.0
1	0.7794	23.312	22.3	0.0	40.2	397.7	437.9	1.10	40.27	417.8	20.1
2	0.7806	41.189	40.2	0.1	72.4	396.0	468.4	1.18	40.52	432.2	36.2
3	0.7819	50.022	49.0	0.1	88.3	393.8	482.1	1.22	40.83	437.9	44.1
4	0.7831	55.665	54.7	0.1	98.4	391.5	490.0	1.25	41.16	440.7	49.2
5	0.7844	60.143	59.1	0.1	106.4	388.9	495.4	1.27	41.54	442.1	53.2
6	0.7856	64.053	63.1	0.2	113.5	386.2	499.7	1.29	41.93	442.9	56.7
7	0.7869	67.457	66.5	0.2	119.5	383.3	502.9	1.31	42.35	443.1	59.8
8	0.7881	70.529	69.5	0.2	125.0	380.7	505.7	1.33	42.73	443.2	62.5
9	0.7894	73.540	72.5	0.2	130.4	377.8	508.2	1.35	43.16	443.0	65.2
10	0.7906	76.648	75.6	0.3	136.0	374.8	510.8	1.36	43.59	442.8	68.0
11	0.7919	79.159	78.2	0.3	140.4	372.0	512.4	1.38	44.00	442.2	70.2
12	0.7932	81.573	80.6	0.3	144.7	369.3	514.0	1.39	44.39	441.6	72.4
13	0.7944	84.197	83.2	0.4	149.4	366.3	515.7	1.41	44.82	441.0	74.7
14	0.7957	86.773	85.8	0.4	154.0	363.4	517.4	1.42	45.24	440.4	77.0
15	0.7969	89.021	88.0	0.4	158.0	360.8	518.8	1.44	45.62	439.8	79.0
16	0.7982	91.179	90.2	0.4	161.8	357.9	519.7	1.45	46.04	438.8	80.9
17	0.7994	93.461	92.5	0.5	165.9	355.0	520.9	1.47	46.46	438.0	82.9
18	0.8007	96.063	95.1	0.5	170.5	352.5	523.0	1.48	46.83	437.7	85.2
19	0.8019	98.337	97.3	0.5	174.5	349.6	524.1	1.50	47.25	436.8	87.3
20	0.8032	100.572	99.6	0.5	178.5	346.8	525.3	1.51	47.65	436.1	89.2
21	0.8045	102.643	101.6	0.6	182.1	344.0	526.1	1.53	48.06	435.0	91.1
22	0.8057	104.846	103.8	0.6	186.0	341.0	527.0	1.55	48.49	434.0	93.0
23	0.8070	106.761	105.8	0.6	189.4	338.0	527.5	1.56	48.92	432.7	94.7

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
24	0.8082	108.703	107.7	0.7	192.8	335.3	528.2	1.58	49.32	431.7	96.4
25	0.8095	110.608	109.6	0.7	196.2	332.6	528.8	1.59	49.70	430.7	98.1
26	0.8107	112.446	111.4	0.7	199.4	330.0	529.4	1.60	50.09	429.7	99.7
27	0.8120	114.596	113.6	0.7	203.2	327.1	530.3	1.62	50.51	428.7	101.6
28	0.8132	116.660	115.7	0.8	206.9	324.4	531.2	1.64	50.90	427.8	103.4
29	0.8145	118.534	117.5	0.8	210.2	321.6	531.8	1.65	51.30	426.7	105.1
30	0.8158	120.076	119.1	0.8	212.9	319.0	531.8	1.67	51.69	425.4	106.4
31	0.8170	121.803	120.8	0.8	215.9	316.3	532.2	1.68	52.08	424.2	107.9
32	0.8183	123.727	122.7	0.9	219.3	313.8	533.1	1.70	52.43	423.5	109.6
33	0.8195	125.207	124.2	0.9	221.8	311.2	533.0	1.71	52.82	422.1	110.9
34	0.8208	126.692	125.7	0.9	224.4	308.7	533.1	1.73	53.18	420.9	112.2
35	0.8221	128.449	127.4	0.9	227.5	306.0	533.5	1.74	53.57	419.8	113.8
36	0.8233	130.082	129.1	1.0	230.4	303.4	533.8	1.76	53.94	418.6	115.2
37	0.8246	131.633	130.6	1.0	233.1	300.8	533.8	1.77	54.33	417.3	116.5
38	0.8258	133.083	132.1	1.0	235.6	298.3	533.9	1.79	54.68	416.1	117.8
39	0.8271	134.428	133.4	1.1	237.9	295.7	533.6	1.80	55.07	414.6	119.0
40	0.8283	135.795	134.8	1.1	240.3	293.1	533.4	1.82	55.43	413.3	120.1
41	0.8334	141.389	140.4	1.2	250.0	283.7	533.7	1.88	56.81	408.7	125.0
42	0.8384	145.687	144.7	1.3	257.4	274.7	532.1	1.94	58.11	403.4	128.7
43	0.8434	151.227	150.2	1.4	266.9	265.4	532.4	2.01	59.45	398.9	133.5
44	0.8484	155.312	154.3	1.5	273.9	256.6	530.5	2.07	60.73	393.5	136.9
45	0.8534	159.116	158.1	1.6	280.3	248.8	529.1	2.13	61.87	388.9	140.2
46	0.8584	162.560	161.6	1.7	286.1	241.1	527.2	2.19	62.99	384.1	143.1
47	0.8634	165.810	164.8	1.8	291.6	234.0	525.6	2.25	64.01	379.8	145.8
48	0.8684	168.677	167.7	2.0	296.3	226.9	523.2	2.31	65.04	375.0	148.1
49	0.8734	171.350	170.3	2.1	300.7	220.4	521.1	2.36	65.98	370.8	150.3
50	0.8785	173.594	172.6	2.2	304.3	214.1	518.4	2.42	66.90	366.2	152.2
51	0.8835	175.189	174.2	2.3	306.8	208.3	515.1	2.47	67.74	361.7	153.4
52	0.8885	177.015	176.0	2.4	309.7	203.1	512.8	2.52	68.49	358.0	154.8
53	0.8935	179.051	178.1	2.5	312.9	198.2	511.1	2.58	69.21	354.6	156.4
54	0.8985	180.473	179.5	2.6	315.0	193.5	508.5	2.63	69.89	351.0	157.5
55	0.9035	181.548	180.5	2.7	316.6	189.0	505.5	2.68	70.54	347.2	158.3
56	0.9085	182.088	181.1	2.8	317.2	185.5	502.7	2.71	71.05	344.1	158.6
57	0.9136	183.401	182.4	2.9	319.1	181.7	500.8	2.76	71.60	341.3	159.6
58	0.9186	184.087	183.1	3.0	320.0	178.2	498.1	2.80	72.11	338.1	160.0
59	0.9236	185.683	184.7	3.1	322.4	175.2	497.6	2.84	72.54	336.4	161.2
60	0.9286	186.763	185.8	3.2	323.9	172.5	496.4	2.88	72.93	334.4	162.0
61	0.9336	188.181	187.2	3.4	326.0	169.7	495.7	2.92	73.34	332.7	163.0
62	0.9386	189.584	188.6	3.5	328.1	167.0	495.1	2.96	73.73	331.1	164.0
63	0.9436	189.808	188.8	3.6	328.1	164.9	493.0	2.99	74.03	329.0	164.1
64	0.9486	191.638	190.6	3.7	330.9	162.8	493.7	3.03	74.34	328.3	165.5
65	0.9537	192.666	191.7	3.8	332.3	161.0	493.3	3.06	74.60	327.2	166.2
66	0.9587	193.882	192.9	3.9	334.1	158.8	492.8	3.10	74.92	325.8	167.0
67	0.9637	195.212	194.2	4.0	336.0	157.7	493.7	3.13	75.08	325.7	168.0
68	0.9687	196.272	195.3	4.1	337.4	156.1	493.5	3.16	75.31	324.8	168.7
69	0.9737	197.962	197.0	4.2	340.0	154.6	494.6	3.20	75.53	324.6	170.0
70	0.9787	199.111	198.1	4.3	341.6	153.0	494.6	3.23	75.76	323.8	170.8

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
71	0.9837	200.161	199.2	4.4	343.0	152.3	495.3	3.25	75.86	323.8	171.5
72	0.9887	201.097	200.1	4.5	344.2	151.3	495.6	3.27	76.00	323.4	172.1
73	0.9938	202.476	201.5	4.7	346.2	150.2	496.4	3.31	76.17	323.3	173.1
74	0.9988	203.642	202.6	4.8	347.8	149.4	497.2	3.33	76.28	323.3	173.9
75	1.0038	204.846	203.8	4.9	349.5	148.6	498.1	3.35	76.40	323.3	174.7
76	1.0088	205.999	205.0	5.0	351.1	147.6	498.7	3.38	76.54	323.2	175.5
77	1.0138	206.991	206.0	5.1	352.3	146.7	499.0	3.40	76.68	322.8	176.2
78	1.0188	208.114	207.1	5.2	353.9	146.7	500.6	3.41	76.67	323.6	176.9
79	1.0238	210.195	209.2	5.3	357.0	146.1	503.1	3.44	76.76	324.6	178.5
80	1.0288	211.653	210.7	5.4	359.1	145.5	504.5	3.47	76.85	325.0	179.5
81	1.0414	213.875	212.9	5.7	361.8	144.6	506.5	3.50	76.97	325.6	180.9
82	1.0539	217.403	216.4	6.0	366.8	144.0	510.8	3.55	77.07	327.4	183.4
83	1.0664	220.767	219.8	6.2	371.4	143.2	514.6	3.59	77.18	328.9	185.7
84	1.0790	224.320	223.3	6.5	376.3	143.3	519.6	3.63	77.16	331.5	188.2
85	1.0915	227.689	226.7	6.8	380.9	143.3	524.2	3.66	77.17	333.7	190.5
86	1.1040	230.943	229.9	7.0	385.2	143.0	528.3	3.69	77.20	335.7	192.6
87	1.1165	234.087	233.1	7.3	389.4	143.6	532.9	3.71	77.13	338.2	194.7
88	1.1291	237.066	236.1	7.6	393.2	144.1	537.3	3.73	77.05	340.7	196.6
89	1.1416	240.567	239.6	7.8	397.9	144.0	541.9	3.76	77.06	343.0	198.9
90	1.1541	244.550	243.6	8.1	403.3	145.4	548.7	3.77	76.86	347.1	201.6
91	1.1666	248.838	247.8	8.4	409.2	146.4	555.6	3.79	76.72	351.0	204.6
92	1.1792	254.536	253.5	8.7	417.4	146.8	564.2	3.84	76.66	355.5	208.7
93	1.1917	259.439	258.4	8.9	424.2	148.2	572.3	3.86	76.46	360.3	212.1
94	1.2042	264.216	263.2	9.2	430.7	149.4	580.1	3.88	76.28	364.7	215.4
95	1.2168	269.300	268.3	9.5	437.7	150.4	588.1	3.91	76.14	369.3	218.9
96	1.2293	273.611	272.6	9.7	443.4	151.4	594.8	3.93	75.99	373.1	221.7
97	1.2418	277.661	276.7	10.0	448.7	153.0	601.7	3.93	75.76	377.3	224.3
98	1.2543	281.292	280.3	10.3	453.2	154.6	607.8	3.93	75.53	381.2	226.6
99	1.2669	285.870	284.9	10.6	459.2	155.6	614.8	3.95	75.38	385.2	229.6
100	1.2794	290.284	289.3	10.8	464.9	157.3	622.2	3.96	75.14	389.7	232.5
101	1.2919	293.907	292.9	11.1	469.3	158.9	628.2	3.95	74.91	393.5	234.7
102	1.3045	299.143	298.1	11.4	476.3	160.1	636.4	3.97	74.73	398.2	238.1
103	1.3170	302.765	301.8	11.6	480.6	161.8	642.4	3.97	74.48	402.1	240.3
104	1.3295	306.585	305.6	11.9	485.2	163.9	649.0	3.96	74.18	406.4	242.6
105	1.3420	310.959	310.0	12.2	490.6	165.0	655.6	3.97	74.01	410.3	245.3
106	1.3546	314.389	313.4	12.4	494.5	166.7	661.2	3.97	73.77	414.0	247.2
107	1.3671	318.434	317.4	12.7	499.3	168.7	668.0	3.96	73.49	418.3	249.7
108	1.3796	322.516	321.5	13.0	504.2	169.7	673.9	3.97	73.33	421.8	252.1
109	1.3921	326.927	325.9	13.3	509.5	171.9	681.4	3.96	73.02	426.6	254.8
110	1.4047	331.422	330.4	13.5	514.9	173.7	688.6	3.96	72.76	431.2	257.5
111	1.4172	334.660	333.7	13.8	518.3	175.2	693.5	3.96	72.54	434.4	259.2
112	1.4297	337.735	336.7	14.1	521.5	176.9	698.4	3.95	72.29	437.7	260.7
113	1.4423	341.672	340.7	14.3	525.9	179.2	705.1	3.93	71.96	442.2	263.0
114	1.4548	346.268	345.3	14.6	531.3	180.9	712.2	3.94	71.71	446.6	265.7
115	1.4673	350.603	349.6	14.9	536.3	182.5	718.8	3.94	71.48	450.6	268.1
116	1.4798	355.174	354.2	15.2	541.6	184.5	726.1	3.93	71.19	455.3	270.8
117	1.4924	360.166	359.2	15.4	547.5	186.5	734.0	3.94	70.90	460.2	273.7

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress kPa	Minor Eff. Stress kPa	Major Eff. Stress kPa	1:3 Ratio	Pore Press. psi	P kPa	Q kPa
118	1.5049	364.884	363.9	15.7	552.9	187.9	740.8	3.94	70.70	464.3	276.4
119	1.5174	368.354	367.4	16.0	556.4	189.8	746.2	3.93	70.42	468.0	278.2
120	1.5299	371.970	371.0	16.2	560.0	191.7	751.8	3.92	70.14	471.7	280.0
121	1.5425	376.810	375.8	16.5	565.5	193.0	758.5	3.93	69.96	475.8	282.8
122	1.5550	380.785	379.8	16.8	569.6	195.0	764.6	3.92	69.67	479.8	284.8
123	1.5675	386.113	385.1	17.0	575.8	196.9	772.6	3.92	69.39	484.8	287.9
124	1.5801	391.042	390.0	17.3	581.2	198.0	779.3	3.93	69.23	488.7	290.6
125	1.5926	396.353	395.4	17.6	587.2	200.0	787.2	3.94	68.94	493.6	293.6
126	1.6051	401.248	400.2	17.9	592.5	202.1	794.6	3.93	68.63	498.4	296.3
127	1.6176	406.777	405.8	18.1	598.7	203.4	802.1	3.94	68.45	502.7	299.4
128	1.6302	411.368	410.4	18.4	603.5	205.2	808.7	3.94	68.19	507.0	301.8
129	1.6427	416.022	415.0	18.7	608.3	207.3	815.6	3.93	67.89	511.5	304.2
130	1.6552	421.169	420.2	18.9	613.8	208.7	822.6	3.94	67.67	515.7	306.9
131	1.6677	426.330	425.3	19.2	619.3	210.1	829.4	3.95	67.48	519.7	309.6
132	1.6803	429.656	428.7	19.5	622.0	212.0	834.0	3.93	67.21	523.0	311.0
133	1.6928	434.565	433.6	19.8	627.1	213.6	840.7	3.94	66.97	527.1	313.5
134	1.7053	438.984	438.0	20.0	631.3	214.8	846.1	3.94	66.80	530.4	315.7
135	1.7179	442.769	441.8	20.3	634.6	216.4	851.0	3.93	66.56	533.7	317.3
136	1.7304	446.422	445.4	20.6	637.7	218.5	856.2	3.92	66.26	537.3	318.8
137	1.7429	450.771	449.8	20.8	641.7	219.3	861.0	3.93	66.14	540.2	320.9
138	1.7554	454.540	453.5	21.1	644.9	220.7	865.6	3.92	65.94	543.2	322.4
139	1.7680	457.768	456.8	21.4	647.3	222.5	869.7	3.91	65.68	546.1	323.6
140	1.7805	462.127	461.1	21.6	651.2	223.6	874.8	3.91	65.52	549.2	325.6
141	1.7807	462.036	461.0	21.6	651.0	223.8	874.8	3.91	65.50	549.3	325.5