PYRAMID PEAK MINING, LLC

January 26, 2018

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Joseph Navarro via email: jnavarro@blm.gov
Environmental Protection Specialist
Bureau of Land Management
Las Cruces District Office
1800 Marquess St.
Las Cruces NM 88005

RE: Summit Mine; Permit No. GRO11ME; Waste Facility Slide; Corrective Action Plan

Dear Messrs. Hollen and Navarro:

Pyramid Peak Mining LLC (PPM), hereby, submit a Corrective Action Plan (CAP) to address the failure of a development material stockpile (DMS) and operations area at the Summit Peak Mine (Mine). The CAP was requested by the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD)On August 31, 2017.

Work conducted to develop the CAP includes site investigations and surveys of the Mine by PPM personnel and completion of a geotechnical evaluation, stability analysis and preliminary corrective action design by a third-party engineer. During development of the CAP PPM consulted with MMD, New Mexico Environment Department (NMED) and Bureau of Land Management, Las Cruces District Office (BLM) during site visits and meetings.

BACKGROUND

The Mine is an underground precious metals operation located entirely on patented claims owned by PPM within the Steeple Rock Mining District in Grant County New Mexico (**Figure 1**). Activities at the Mine and within the mining district in general date back to the late 1800s. The Mine is currently operated under Permit GR011ME (Permit) and is classified as a Minimal Impact Existing Mining Operation (i.e., less than ten acres of surface disturbance). The Permit was originally granted to Saint Cloud Mining Company in 1998 with an update in 2002. The permit was transferred to the Lordsburg Mining Company (LMC) in 2008 and subsequently PPM assumed control of the Mine in February 2016. Active mining occurred during LMC's tenure but was stopped in 2013. Activity at the site is currently limited to site maintenance and security.

DMS Construction

Development of the underground workings and construction of the DMS was completed by LMC from 2009 to 2013. The DMS was constructed by end dumping non-economic material in the area from the Summit Portal area and advancing south. The DMS was partially constructed to house ancillary facilities for mining including the administrative and maintenance areas which are generally located at the north portion of the facility.

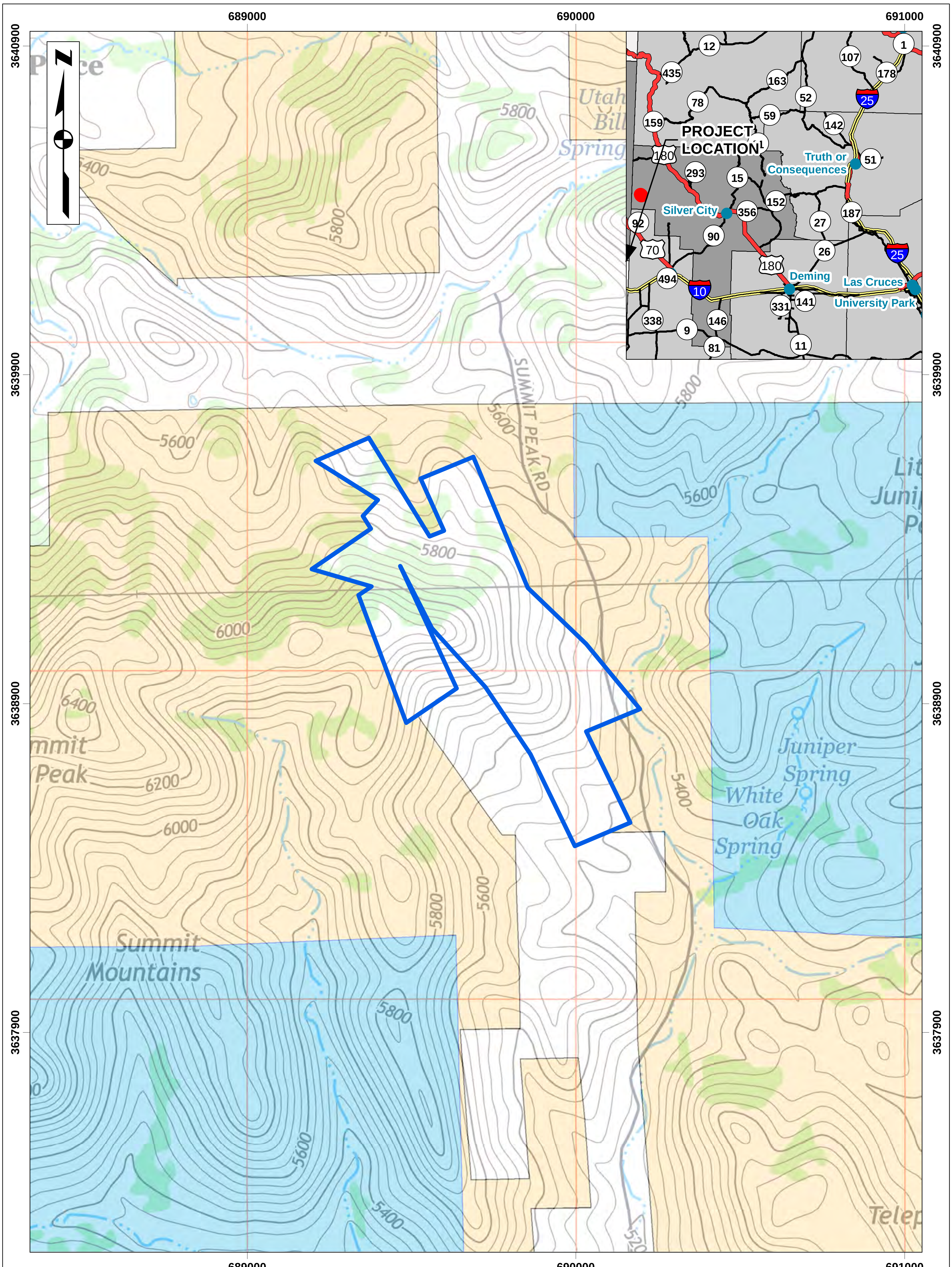
Topography in the project area is steep and variable with slopes ranging from 2.5 horizontal to 1 vertical (2.5H:1V) in the south to 4H:1V in the north. The area consists of a shallow sandy alluvial material ranging from 0.5-foot to 1.5 feet deep overlaying bedrock. Rock outcrops are present throughout the downgradient area.

At the end of construction, the facility contained approximately 175,000 cubic yards (yd^3) of development material. The final pre-slide footprint measured approximately 3.75 acres with a total height of 135 feet. All slopes were constructed at the angle of repose.

MATERIAL SLIDE

The DMS has undergone two separate failures. The first and most significant occurred during early 2017. An approximately 250-foot wide section of the facility toe moved downgradient a maximum of 150 feet. The slide is shown in **Photograph 1.** All photographs are contained in **Attachment A**. The slope failed at the highest point of the facility and toe movement resulted in a highwall forming in the facility crest (**Photograph 2**). Tension cracks formed on the DMS surface after the slide (**Photograph 3**). In the aftermath of the slide, PPM initiated a monitoring program on the tension cracks to identify the risk of further movements. In addition, equipment which was located near the slide area was relocated to the north.

A second lessor slide occurred during the fall of 2017 during the rainy season. The second slide was limited in extent and consisted of minor downgradient movement of the toe and additional failures of the highwall. Additional tension cracks became visible on the facility surface.



NOTES:

Legend

Land Ownership

- BLM
- Private Land
- State of New Mexico
- Summit Patented Claims Boundary

COORDINATE SYSTEM:

NAD 1983 UTM ZONE 12N
PROJECTION: TRANSVERSE MERCATOR
DATUM: NORTH AMERICAN 1983

SCALE:

0 0.1 0.2
Miles

1 INCH : 1,000 FEET

ELKO MINING GROUP LLC

PYRAMID PEAK MINING, LLC

DRAWN BY: L. REINSEL

DATE: 20180119

SUMMIT MINE

FIGURE 1
PROJECT LOCATION & LAND OWNERSHIP

As the DMS moved, alluvial materials were pushed in front of the advancing face creating a thick visible layer under the toe (**Photograph 4**). The soil was found to be saturated and in some location actively seeping (**Photograph 5**). Based on inspections of the stockpile toe and soil analysis PPM concluded that the slides were likely the result of meteoric water infiltration through the facility which wetted up the native alluvial material reducing cohesion and strength. The alluvial material remains saturated, but seeping has stopped with decreased precipitation.

Extent of Slide and Land Status and Survey

As constructed, the DMS was located entirely on patented claims owned by PPM. After the first slide, PPM performed a visual assessment of the modified footprint and compared it to the Bureau of Land Management (BLM) Public Land Survey System Survey data (PLSS). The assessment indicated that material had not encroached into the BLM administered public lands downgradient and east of the Mine (**Figure 1**).

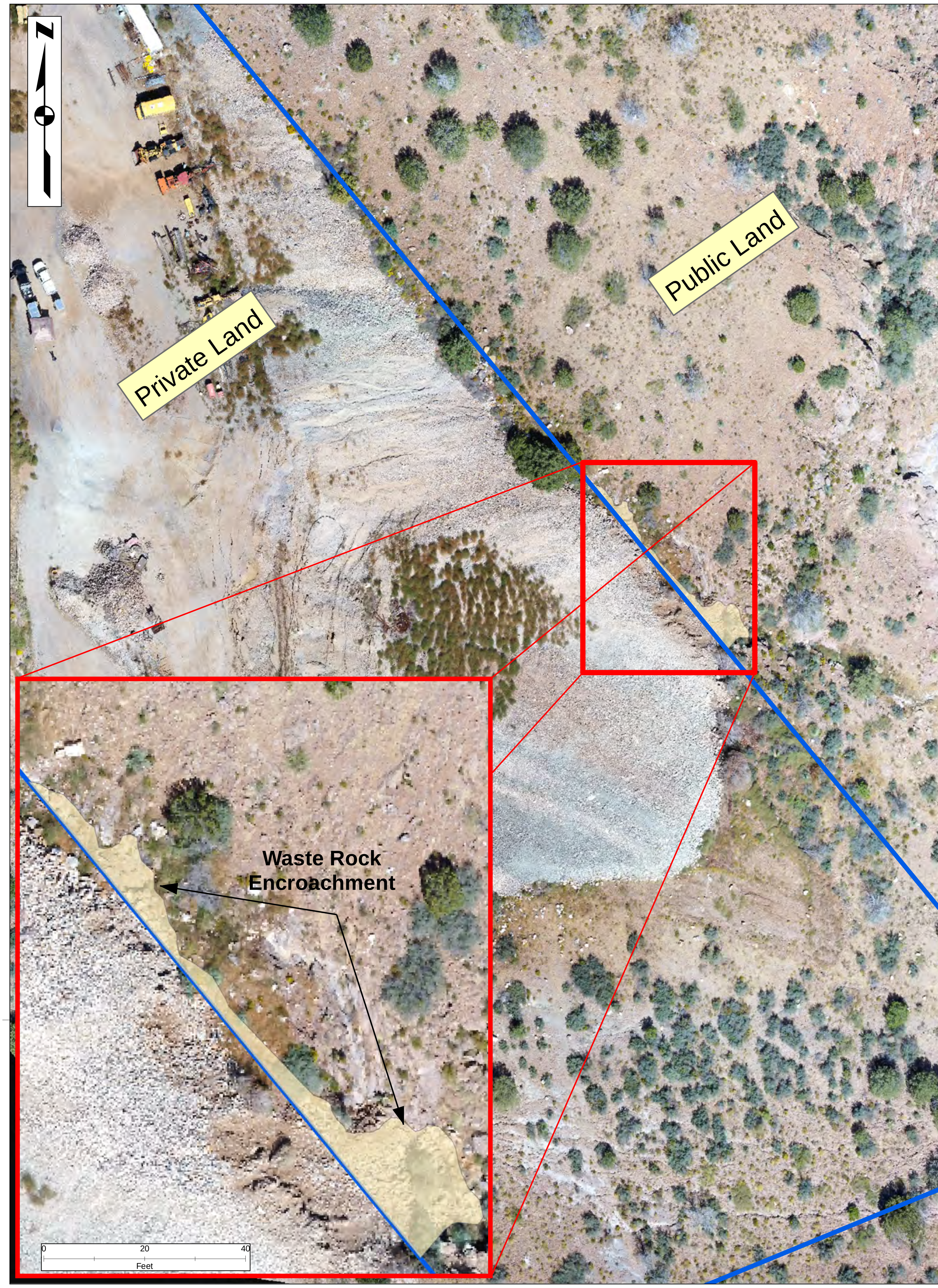
After the second slide PPM determined that a formal survey should be performed for use in developing the CAP. As part of the pre-survey research and field work, PPM discovered the available PLSS data was inaccurate and that there had been a mineral patent resurvey conducted by the BLM in 2014 (#1010). A survey was conducted in November 2017 in which the 2014 BLM survey was retraced. The surveyed extent of the slide was compared to retraced land boundaries. Results indicated that approximately 0.25 acre of the slide had encroached onto public land (**Figure 2**) on unpatented claims controlled by PPM. The BLM was notified of the discovery and a site visit to review the encroachment was conducted in January 2018. Areas of encroachment were staked for the site visit and are shown in **Photographs 6** through **9**.

The footprint of the DMS increased from 3.75 acres to approximately 4.25 acres as a result of the slide. PPM reviewed the total surface disturbance at the site and confirmed that the total surface disturbance remained under 10 acres.

Material Characterization

The Summit gold-silver deposit is a structurally-controlled, vein-type deposit. Gold and silver mineralization occur in an epithermal, low-sulfidation system containing less than one percent very-fine-grained, disseminated pyrite and trace amounts of galena, sphalerite and chalcopyrite. Above the mineralized zone the system is notably calcareous, and the mineralization is low grade and erratically distributed.

After reviewing the limited data available, a SGS Metcon Head Characterization report (M-829-01) completed by LMC, we can assume the low levels of total sulfur (0.10 parts per million [ppm]) and elevated Ca (greater than two percent, presumed to be associated with $CaCO_3$ and logged calcite) paired with the description of the mineralization of having less than one percent pyrite content that the material is not likely to be acid generating. Test results are included as **Attachment B**.

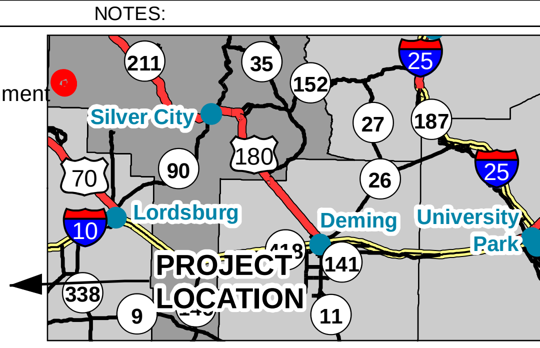


NOTES:

Legend

Waste Rock Encroachment

Property Boundary



NAD 1983 UTM ZONE 12N
PROJECTION: TRANSVERSE MERCATOR
DATUM: NORTH AMERICAN 1983

SCALE:

0 0.005 0.01
Miles

1 INCH : 59 FEET

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DRAWN BY:	SUMMIT MINE
L. REINSEL	FIGURE 2 ENCROACHMENT AREA
DATE:	
20180119	

Stability Analysis

PPM engaged Axelrod, Inc. (Axelrod) in October 2017 to prepare a Stability Analysis and Corrective Action Measures Design report (Report) for the DMS. The report included a geotechnical investigation, a stability analysis and preliminary design for two conceptual corrective actions. The Report is included for reference as **Attachment C**.

The geotechnical investigation consisted of collecting alluvial soils from two test pits, soil profiling and laboratory testing. Testing was carried out to determine the shear strength of the alluvial materials underlying the DMS and consisted of Sieve Analyses, Atterberg Limits, and a Triaxial Sheet Strength. Test protocols are detailed in the Report.

Findings in the Report include the following:

- The alluvial material has a high clay content;
- Alluvial material is highly saturated;
- The estimated friction angle of the saturated alluvium is calculated to be 22.9 degrees;
- The failure was potentially caused by the wetting of the alluvium over several years which reduced its shear strength;
- Wetting likely occurred due to infiltration of meteoric water through the DMS;
- The estimated friction angle for the bedrock in the area is 45 degrees;
- An acceptable long term factor of safety (FOS) for a facility like the DMS is 1.3;
- The pre-failure FOS for the DMS was less than 1;
- Current FOS for the dump ranges from 1.1 in the south to 1.65 in the north;
- The slide area is currently stable with a FOS of 1.2; and
- The intact northern section of the dump is stable with FOS of 1.65

The slide area and the southern slope of the DMS are currently stable; however, additional wetting of the alluvium could result in further loss cohesion and a reduction in strength. In addition, the face of the toe is made up of unconsolidated materials stacked at the angle of repose that could further erode or collapse due to other forces. The movement of the unconsolidated material is of concern for any work performed on the surface of the slide area or at the toe.

Results of the study indicated that some stabilization of the DMS is required. Based on the condition of the DMS and the site topography, Axelrod developed conceptual corrective actions designed to limit risk from further movement of the facility. Axelrod concluded that, with respect to the current condition of the facility and the steep and rocky terrain in the area, the use of toe buttresses would be a reasonable and affective way to stabilize the DMS.

CONCEPTUAL CORRECTIVE ACTIONS

Conceptual corrective actions have been developed for the DMS based on the stability analysis and existing site conditions. Corrective actions are designed to stabilize the DMS in place, reduce further encroachment on public land and reduce infiltration of meteoric water into the facility.

Toe Buttresses

A total of three buttresses are recommended around the southern dump and slide area. The use of multiple buttresses is required due to the steep, variable and rocky terrain below the facility. Placement of buttresses are estimated to increase the DMS FOS to greater than 1.3. Estimated values are shown on Table 3 for the Report (**Attachment C**).

The buttresses will be constructed with free draining angular material such as gravel or rockfill. DMS material will be evaluated for use in construction. Buttresses will have crest widths of 20 to 30 feet and material will be stacked at the angle of repose over the toe of the DMS. Prior to placing the gravel or rockfill, the alluvium within the footprint of the buttress will be stripped away, allowing for the material to be placed on bedrock. The buttresses are designed to be final, permanent “walk-away” solutions; therefore, ongoing maintenance of the structures will not be required. The designs as presented are considered conceptual and additional geotechnical study would be required prior to preparing a final engineering design.

Due to the steep and rock terrain, buttresses will have to be sited in specific locations to allow access for equipment and to ensure employee safety. The sites for Buttress 1 and Buttress 2 are near the property boundary for public and private land. At BLM’s request, two construction scenarios were developed for agency assessment.

Buttress Option 1

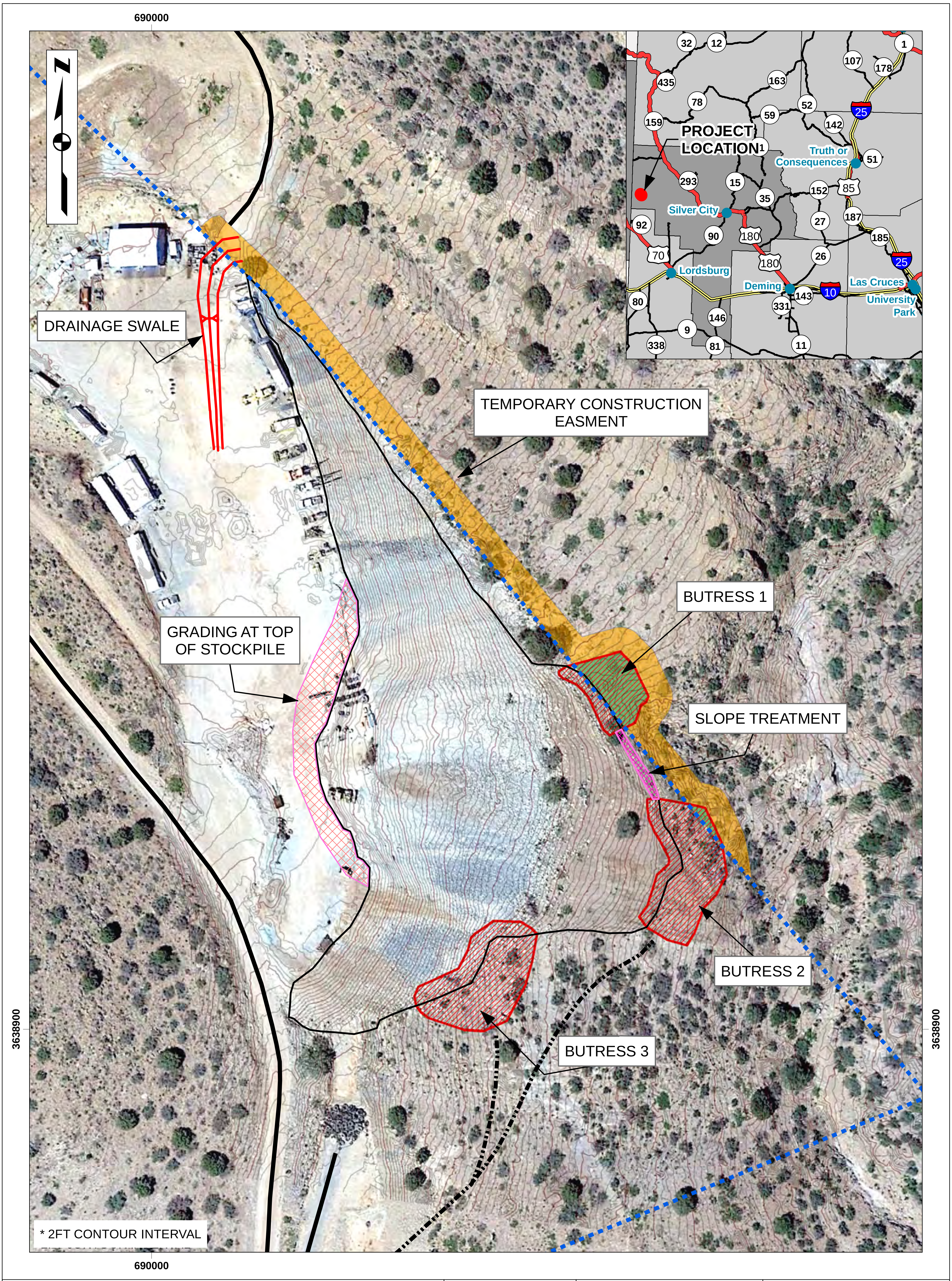
Under Option 1, PPM will construct buttresses at the existing toe of the facility as shown on **Figure 3**. The toe of the DMS will not be excavated or modified under this scenario. This option requires that portions of both Buttress 1 and 2 be constructed on public land which will require a permanent easement. As previously stated, the structures will be constructed in a way that will not require ongoing maintenance after the Mine is closed. A more detailed layout of Option 1, including sections is presented as Figure 3 of the Report (**Attachment C**).

Temporary construction access (TCA) on public land will be required to complete the work. The TCA for Option 1 is shown on **Figure 3**. The total width of the TCA will be 20 feet from the land boundary. Activities within the TCA may include clearing of vegetation, grading of uneven surfaces and reclamation.

Buttress Option 2:

Under Option 2, PPM will construct buttresses entirely within the patented claim boundary as shown on **Figure 4**. This option will require that portion of the existing DMS toe be excavated or modified. For Buttress 1 specifically, a large area of material would have to be excavated from the toe of the DMS. Excavation would have to occur from the surface of the dump or downgradient from the toe. In both scenarios, the stability of the facility material is a concern, as any collapse could create an unsafe condition for workers.

Although Option 2 will not require placement of permanent structures, TCA on public land will be required to conduct the work. The TCA for Option 2 is shown on **Figure 4**. The total width of the TCA will be 20 feet onto public land, extending from the land boundary. Activities within the TCA may include clearing of vegetation and grading of uneven surfaces.



NOTES:

Legend

Grading		Existing Road	
Butress		Access	
Slope Treatment		Property Line	
Temporary Construction Easment		Drainage Swale	
Permanant Easment		Stockpile	

NAD 1983 UTM ZONE 12N
PROJECTION: TRANSVERSE MERCATOR
DATUM: NORTH AMERICAN 1983

SCALE:

0 0.0075 0.015
Miles

1 INCH : 75 FEET

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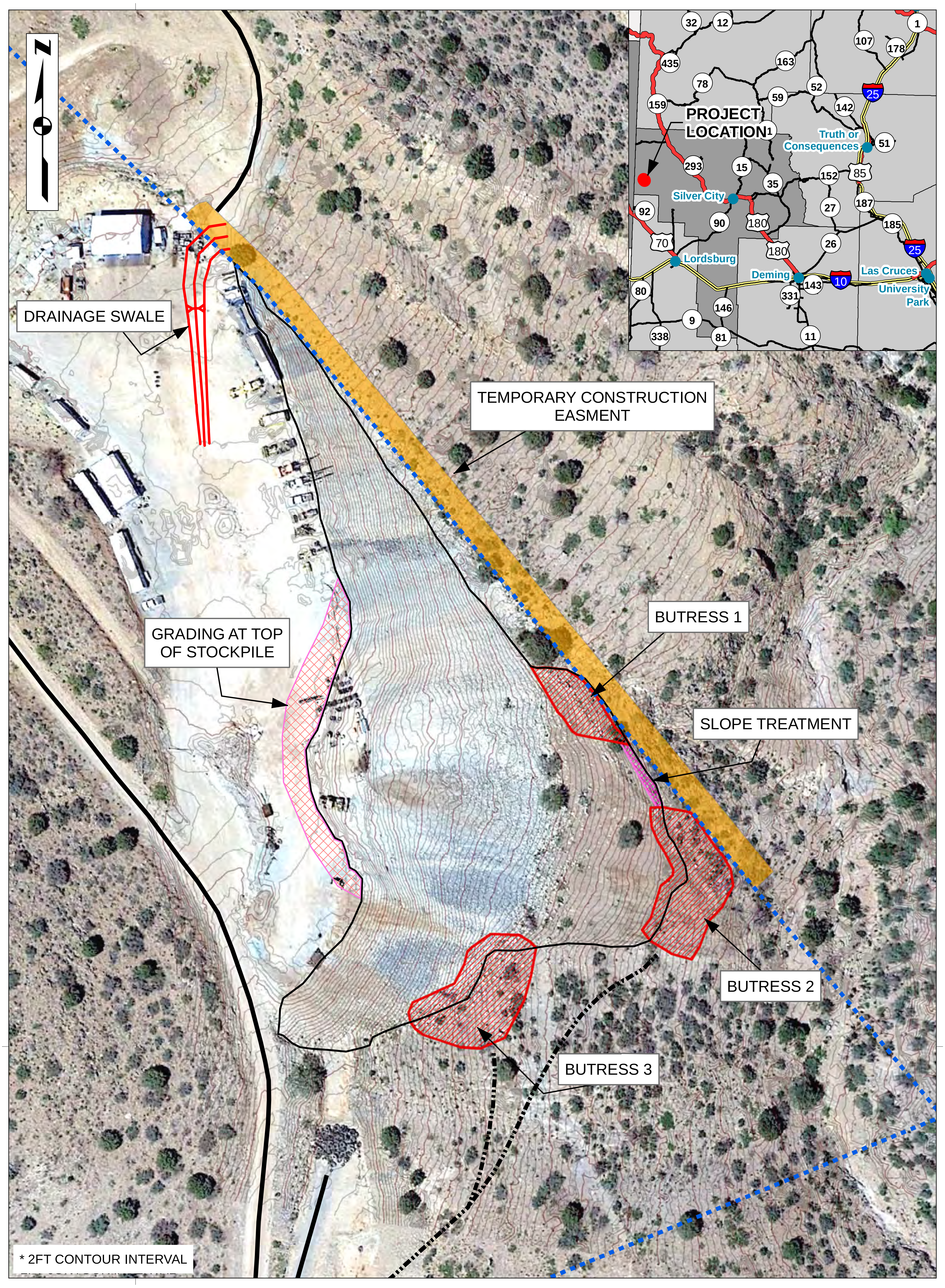
DRAWN BY: L. REINSEL

DATE: 20180119

SUMMIT MINE

FIGURE 3
CORRECTIVE MEASURES LAYOUT



NOTES:

Legend

- Grading
- Butress
- Temporary Construction Easment
- Slope Treatment
- Existing Road
- Access
- Property Line
- Drainage Swale
- Stockpile

NAD 1983 UTM ZONE 12N
PROJECTION: TRANSVERSE MERCATOR
DATUM: NORTH AMERICAN 1983

SCALE:

0 0.0075 0.015
Miles

1 INCH : 75 FEET

ELKO MINING GROUP LLC

PYRAMID PEAK MINING, LLC

DRAWN BY: L. REINSEL

DATE: 20180119

SUMMIT MINE

FIGURE 4 CORRECTIVE MEASURES LAYOUT

Slope Treatment Area

Under both options presented, the area between Buttress 1 and Buttress 2 will require a treatment to prevent the unconsolidated rock face of the facility from eroding further onto public land. The area in question is on public land and the downgradient area is not accessible by machinery due to the presence of steep rock outcrops. The outcrops serve to help stabilize the facility in place and further movement is not expected; however, the material itself is unconsolidated and could continue to fall. The area in question is shown in **Photographs 10** and **11**. The topography of the area is so severe that construction of buttresses will require access from both the north and the south as machinery will not be able to safely cross the area.

The slope treatment will consist of some retaining feature (i.e. fence or cable) that will likely be secured to the bedrock. The feature will be designed to hold material in place as opposed to stabilize the facility (which will be performed by the buttresses). Final design of the slope treatment will be completed with the buttresses.

Slope Surface Drainage

A drainage ditch will be constructed on the surface of the dump as depicted on **Figures 3** and **4**. The ditch will be designed to move meteoric water from a topographical low spot on the facility surface where ponding and infiltration could occur to native ground to the north. The depicted location and design of the diversion is conceptual. Final design of the ditch will be prepared in concert with the buttresses. The diversion will be constructed to withstand flows from the 100-year, 24-hour storm event.

Preliminary inspections of the existing upgradient stormwater diversions, generally consisting of berms and ditches on roads, indicate that meteoric water from these areas is likely not reaching the facility. Further inspection of the upgradient controls will be conducted during the construction process and any identified deficiencies will be addressed.

Crest Grading

The crest of the DMS will be graded to stabilize the highwall and reduce tension cracks. Material will be pushed down from the crest to create a stable slope. The estimated area of grading is shown on **Figures 3** and **4**. More detailed drawings of the anticipated grading are shown on Figures 3 and 4 in the Report (**Attachment C**). A safety berm will be constructed at the regraded crest to control access.

Project Access

The Summit Mine is accessed from Duncan Arizona via the Carlisle and Summit Mine Roads. The roads are maintained by Grant County and cross public and private lands. PPM has entered into an agreement with Grant County to perform maintenance on the roads if necessary. PPM anticipates that minor maintenance may be required to perform CAP related work. No widening or other alterations of the of the road will be required.

A temporary construction easement will be required to access the work areas. Buttress 2 and 3 will be accessed from the south of the DMS as shown on **Figures 3** and **4**. Buttress 1, which will either be located on public or private land, will be accessed both from the surface/toe of the dump (if deemed safe) or from the north. Additionally, some access from the south may be required to keep equipment out of the rock outcrops.

CONCLUSION

Based on PPM's investigations the DMS facility should be stable in the near term, but additional seepage of meteoric waters and wetting of the alluvium could further weaken the structure. Corrective actions are required to stabilize the dump and prevent further encroachment onto public land and downgradient drainages. Conceptual corrective actions presented in this plan are based on the following:

- The material slide was likely the result of meteoric water infiltrating though the stockpile surface and a subsequent wetting of the high clay alluvium surface;
- The stockpile is currently stable with FOS ranging from 1.1 to 1.65;
- Subsequent wetting of the alluvial material could cause further movement of the stockpile;
- Stabilization of the stockpile and stormwater diversion is required to increase the FOS to adequate levels (1.3 or greater);
- Buttressing the toe of the dump will increase the FOS to acceptable levels;
- Construction of buttresses on public and private lands is the safest approach to stabilizing the facility;
- Access to public land will be required for any corrective actions;
- Maintenance of access roads on public land may be required and would be completed in accordance with existing agreements with Grant County, and
- Corrective actions should be completed prior to the rainy season (July 2018) to reduce the likelihood of additional material movement, further encroachment onto public land, and any effects on existing drainages.

PPM herby submits this CAP as a preliminary report and fully intends to work with the MMD and BLM to develop a final course of action. If you have any questions or require further information, please do not hesitate to contact me at joseph.martini@elkominingroup.com or 775.401.6552.

Sincerely,

____

Joseph Martini

U.S. Director of Environmental Compliance

Attachments:

ATTACHMENT A

PHOTOGRAPHS

Photograph 1: DMS Slide Looking Northwest

Photograph 2: Highwall and Tension Cracks

Photograph 3: Surface Tension Cracks

Photograph 4: Alluvial Material at Toe

Photograph 5: Seepage at Toe

Photograph 6: Boundary Flagging Looking North

Photograph 7: Boundary Flagging Looking South

Photograph 8: Boundary Flagging Looking South

Photograph 9: Boundary Flagging Looking South

Photograph 10: Base of Slope Treatment Area

Photograph 11: Base of Slope Treatment Area

ATTACHMENT B

MATERIAL CHARACTERIZATION

Lordsburg Mining Company
Metallurgical study by Froth Flotation
Metcon Project M-829-01

ICP Scan on Head Samples

Element	Unit	Ore Sample
Al	%	0.39
As	ppm	27
Ba	ppm	57
Bi	ppm	3
Ca	**%**	**2.89**
Cd	ppm	3
Co	ppm	5
Cr	ppm	19
Cu	ppm	101
Fe	**%**	**1.62**
Hg	ppm	<1
K	%	0.17
La	ppm	6
Mg	%	0.14
Mn	**ppm**	**1695**
Mo	ppm	14
Na	ppm	1211
Ni	ppm	8
P	ppm	162
Pb	ppm	184
Sb	ppm	8
Sc	ppm	1
Sr	ppm	36
Ti	ppm	54
Tl	ppm	13
V	ppm	14
W	ppm	6
Zn	ppm	240
Zr	ppm	3

Lordsburg Mining Company
Metallurgical Study by Froth Flotation
Metcon Project M-829-01

ICP Whole Rock Analysis

Compose	Unit	Ore Sample
Al_2O_3	%	4.17
BaO	%	0.02
CaO	%	4.32
Cr_2O_3	%	0.01
Fe_2O_3	%	2.55
K_2O	%	1.22
LOI	%	**4.00**
MgO	%	0.44
MnO	%	0.23
Na_2O	%	1.02
P_2O_5	%	0.04
SiO_2	%	**81.32**
$Ti0_2$	%	0.12

Lordsburg Mining Company

Metcon Project M-829-01

Metallurgical Study by Froth Flotation

Sulfur Speciation on Head Sample

Compose	Unit	Ore Sample
S_T	%	0.10
S^o	%	<0.01
$SO_4^=$	%	0.04
$S^=$	%	0.06

ATTACHMENT C

STABILITY ANALYSIS AND CORRECTIVE MEASURE DESIGN

STABILITY ANALYSIS AND CORRECTIVE MEASURES DESIGN DRAFT

SUMMIT MINE WASTE ROCK STOCKPILE

Prepared for

PYRAMID PEAK MINING

January, 2018

Prepared by

AXELROD, INC.

STABILITY ANALYSIS AND CORRECTIVE MEASURES DESIGN

SUMMIT MINE WASTE ROCK STOCKPILE

Prepared for:

Pyramid Peak Mining, LLC.
230 S. Rock Boulevard, Suite 30
Reno, Nevada 89502

Prepared by:

Axelrod, Inc.
9907 E. Bell Rd., Suite 110
Scottsdale, AZ 85260
(480) 391-0752

January, 2018

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TABLE OF CONTENTS CONT:

1.0 INTRODUCTION

This report presents the results of a stability analysis and the conceptual design of corrective measures for the waste rock stockpile (stockpile) at the Summit Mine (mine). The analysis and design are required to address a recent failure of the stockpile slope. Pyramid Peak Mining intend to construct measures to stabilize the stockpile slope.

The mine is located in Grant County, New Mexico. The mine and stockpile locations are shown on Figure 1. The stockpile is located on private property. The property boundary is close to the toe on the north side of the stockpile as shown on Figures 2, 3 and 4.

Pyramid Peak Mining retained Axelrod, Inc. in October 2017 to carry out the stability analysis and the conceptual design of the corrective measures. The initial scope of work for this project is defined in the Axelrod, Inc. proposal dated October 17, 2017.

1.1 Project Background

The stockpile currently covers an area of approximately 4 acres and has a maximum height of 135 feet. The stockpile was constructed by end dumping.

The slope failed at the highest part of the stockpile. The failure consists of a slide of the middle portion of the stockpile as the slopes are still intact on either side of the failed area. The failure surface is steep at the top and there are tension cracks on the stockpile crest. The majority of the failure surface appears to be located in the natural ground at the base of the stockpile It is estimated that the stockpile has slid a distance of approximately 100 feet beyond the original toe and has stopped near a wash that is a tributary to a larger wash that in turn is a tributary to the Gila River. A small amount of seepage has been observed at the stockpile toe. It is understood that most of the sliding occurred during an initial failure and that further movement took place during a second failure

1.2 Project Objectives

The objective of this project is to analyze the stability of the stockpile and carry out a conceptual design of corrective measures as required to stabilize the slopes and prevent material moving further downgradient.

2.0 GEOTECHNICAL INVESTIGATION

Information about the site was obtained from a geotechnical investigation. The investigation included a limited amount of field work and laboratory testing.

2.1 Field Work

The field work was carried out in October 2017 and included site reconnaissance, test pit excavation, profiling and sample retrieval. A total of 2 test pits (TP) were excavated by hand to shallow depth. The test pits were located at the toe of the stockpile as shown on Figure 2. The test pits were profiled on site by a geotechnical engineer and the logs are presented in Appendix A.

Samples were retrieved from the test pits for laboratory testing. An undisturbed sample was obtained from TP 1 by pushing in a Shelby tube. Bag samples were obtained from both test pits with a hand shovel for sieve and Atterberg Limit testing.

2.2 Laboratory Testing

The laboratory testing was carried out to characterize the soils and obtain their shear strength parameters. The tests included sieve analysis, Atterberg Limits and triaxial testing. The sieve and Atterberg Limit tests were carried out by ConformaTech of Tucson. The triaxial testing was carried out by TRI of Austin, Texas. The test results are presented in Appendix B of this report and summarized in Table 1. A description of the testing is as follows:

> <u>Sieve Analyses:</u>
> Sieve analyses were performed on 2 samples, one from each test pit. The test results were used to aid in the soil classification and assign engineering properties. The tests were performed in accordance with ASTM C136/C117.
>
> <u>Atterberg Limits:</u>
> Atterberg Limits were determined for the sieve analysis samples. The tests were also used to aid in the soil classification and for general information. The tests were performed in accordance with ASTM D4318.
>
> <u>Triaxial Shear Strength Tests:</u>
> A multi staged consolidated undrained triaxial test (CU) with pore pressure measurement was conducted on the undisturbed sample from TP 1. Effective shear strength parameters are obtained from the CU test. The test was performed in accordance with ASTM D4767.

The soils that were tested were checked against the field log classifications, which were then updated in accordance with ASTM D-2487 “Standard Tests Methods for Classification of Soils for Engineering Purposes” as required.

3.0 RESULTS OF THE GEOTECHNICAL INVESTIGATION

This section presents the results of the fieldwork and laboratory testing.

From pre-mine topography and site information, the stockpile covers a small drainage on the north part of the site. Most of the stockpile including the slide are located south of the drainage. The natural ground on the site slopes to the southeast. The slope varies from 2.5:1 (horizontal to vertical - H:V) south of the drainage to 4:1 to the north of it.

From the test pits and observations on site, the stockpile is underlain by a layer of sandy clay. The thickness of the clay layer varies from less than 6 inches to the north of the stockpile to more than 1.5 feet on the east side. The clay is underlain by bedrock.

Frequent bedrock outcrops occur on the north and south sides of the stockpile. The bedrock is generally intact, moderately weathered and hard. At the time of the investigation, seepage was observed at the toe where the covered drainage exits the stockpile. The drainage is on bedrock. Seepage was observed previously by others in the material at the toe of the slide.

From the laboratory testing, the clay material contains approximately 50 percent sand and is moderately to highly plastic. Published correlations (Reference 1) between liquid limit and clay content indicate friction angles of approximately 22° for a liquid limit above 60 and 25° for a liquid limit above 45.

The results of the laboratory tests are summarized in Table 1. An effective friction angle of 22.9° and a cohesion of 240 pounds per square foot were obtained from the triaxial test on the undisturbed sample from Test Pit 1. These results are similar to those obtained by correlating the shear strength with liquid limit.

TABLE 1: Summary of Laboratory Test Results – Waste Rock Stockpile

Hole No	Sample Depth (ft)	Percent Passing						Atterberg Limits		Shear Strength ϕ' - deg, c' – psf	
		1 ¼"	½"	#4	#10	#40	#200	LL	PI	ϕ′	c′
TP-1	0 – 1	100	99	96	92	78	46	66	44	22.9	240
TP-2	0 - 1	100	95	98	93	79	48	45	24		

ϕ′, c′ are effective stress parameters

4.0 STABILITY ANALYSIS

4.1 Method of Analysis

Stability analyses for the waste rock stockpile were carried out using the computer program PCSTABL ver. 5. This program is a modified version of the original STABL program developed at Purdue University in 1987. Minimum factors of safety are calculated using the Modified Bishop specified wedge surface method.

The stockpile stability has been evaluated for static conditions. Cases analyzed include the stockpile slope before and after failure, the adjacent intact sections and the slopes with corrective measures included. The locations of the stability sections are presented on Figure 2. The extent of the corrective measures could be restricted by the property boundary. Options with the corrective measures partly on the adjacent land and only on mine property have been included in the analysis. The corrective measures are discussed in more detail in Section 5 of this report.

Topographic mapping used for the analysis was obtained from a drone survey carried out by Redbird and Pyramid Mining.

4.2 Material Properties

The material properties used for the stockpile material, clay layer and bedrock are presented on the stability analysis figures and summarized in Table 2 below. The material properties consist of shear strength and density and were based on laboratory testing, published values for similar materials and the stockpile angle of repose. The laboratory triaxial test results for the clay layer were adjusted slightly by reducing the cohesion to tie in with the analysis of the slide.

Moist and saturated unit weights (densities) were used in the analysis. Phreatic surfaces have generally not been included since only a couple of small seeps were observed at the toe of the stockpile. The effect of a phreatic surface at the top of the clay layer on the stockpile stability was assessed and determined to not have a significant impact.

TABLE 2 - Material Properties used in the Stability Analyses

Material Type	**Bulk Unit Wt. (pcf)**	**Saturated Unit Wt. (pcf)**	**Shear Strength** Angle of Friction ϕ' - deg Cohesion c' – psf	
			ϕ'	c'
Stockpile Material	115	128	35 [1]	-
Clay Layer - Slide	110	120	22.9 [2]	100 [2]
Clay Layer - Intact	110	120	22.9 [2]	240 [2]
Bedrock	140	140	45 [3]	-
Buttress Material	120	135	38 [4]	-

Notes:

1 Angle of repose – stockpile slope
2 Clay layer – triaxial test, cohesion reduced for slide area
3 Rock shear strength – arbitrary value – not significant to the analysis
4 Rockfill for buttresses - stockpile material and published values, Ref 2

Bulk and saturated unit weights were obtained from typical values

4.3 Results

The stability analysis results are shown on Figures 5 through 13 in the figures section and summarized in Table 3 below. The results show that the factors of safety for the existing stockpile are approximately 1.2 at the slide location, 1.1 at the intact slope to the south and 1.6 at the intact slope to the north of the slide.

Back analysis of the original stockpile yields a factor of safety of approximately 1.0 at the slide location. Corrective measures analyzed consist of buttresses at the toe of the stockpile. The buttresses were sized to provide a factor of safety equal to or greater than 1.3.

TABLE 3: Stability Analysis Results

Case Analyzed	Factor of Safety
Original Slope at Slide Location – Figure 5	0.98
Existing Slide Section 1 – Figure 6	1.21
Existing Slide Section 2 – Figure 7	1.18
Intact Section North Side - Figure 8	1.65
Intact Section South Side - Figure 9	1.13
Slide Section 1 with Buttress - Figure 10	1.37
Option 1, Slide Section 2 with Buttress - Figure 11	1.32
Option 2, Slide Section 2 with Buttress - Figure 12	1.30
Intact Section South Side with Buttress - Figure 13	1.36

4.4 Evaluation of the Slope Failure

The waste rock stockpile was constructed over a period of approximately 10 years by end dumping. The natural ground surface on which the stockpile was constructed is steeply sloping. From the geotechnical investigation the natural ground on the site consists of a thin clay layer underlain by bedrock. Evidence on the site indicates that the clay layer extends under the stockpile.

The stockpile failure was potentially caused by the wetting up of the clay layer over a period of years. The wetting of the clay resulted in a loss of cohesion and consequent reduction in strength which promoted sliding of the stockpile along the clay layer at its base.

The clay layer potentially wetted up over a long period by the infiltration of stormwater runoff from the top surface of the stockpile into the waste rock material. Stormwater runoff currently ponds in a low area on the stockpile surface.

4.5 Conclusions and Recommendations

The static factors of safety for the waste rock stockpile at the slide and intact (south) locations are less than the normally accepted minimum of 1.3 for similar facilities. The factor of safety of 1.3 is acceptable when there is site specific geotechnical data available to minimize uncertainties in the parameters used for the analyses. A factor of safety of 1.5 is the normally accepted minimum when site specific geotechnical data is not available. In this case a minimum factor of safety above 1.3 is recommended because of the limited amount of site specific data, fieldwork and testing.

The results of the stability analysis indicate that toe buttresses are effective in stabilizing the stockpile. The buttresses are required at the toe of the slide and the intact section on the south side of the stockpile. The buttress layout and design are described in the following section.

Recommendations for further work are as follows:

- Carry out additional geotechnical investigation to confirm the properties, extent and depth of the clay layer and to identify material for the buttresses.
- Assess conditions for buttress construction at the toe and drainage on top of stockpile.
- Install monitoring points on the stockpile crest and toe to detect any potential movement.

5.0 CORRECTIVE MEASURES CONCEPTUAL DESIGN

This section provides a description of the conceptual design for the corrective measures required to stabilize the stockpile and prevent further downgradient movement of the material. Two options are presented for the corrective measures. Option 1 includes buttresses on both private (mine) and public land. For Option 2 the buttresses are all located on private land. The corrective measures for Option 1 are presented on Figure 3 and for Option 2 on Figure 4. Both options include the following components:

- Buttresses 1, 2 and 3 consisting of free draining angular material such as gravel or rockfill.
- Slope treatment between Buttresses 1 and 2 to prevent stockpile material eroding from the toe area.
- Stockpile grading on the crest to reduce the slope at the top of the failure surface and to fill tension cracks.

- A drainage swale on the top surface of the stockpile to prevent ponding and infiltration of stormwater runoff.

For Option 1 construction of Buttresses 1, 2 and 3 will start with removal of the low strength clay layer under their footprint. It is intended to use stockpile material for buttresses fill.

For Option 2 excavation of stockpile material will be required for the construction of Buttress 1 and part of Buttress 2, because of the proximity of the property boundary on the north side (see Figure 4). Initially stockpile material will be excavated from the toe to expose bedrock at the base. The excavated material, if suitable, will be used for buttress fill.

The buttresses are not continuous around the slide toe due to the steep topography in that area. Slope treatment is required on the steep toe area between Buttresses 1 and 2 to prevent further movement of material due to erosion.

Preliminary buttress sections are presented on Figures 3 and 4 and their average overall dimensions are:

- Slide toe, Section 1 – 35 feet wide by 20 feet high
- Slide toe, Section 2 – 35 feet wide by 25 feet high
- South side toe – 50 feet wide by 40 feet high

The drainage swale on the top surface will discharge to the north side of the stockpile where bedrock is at or close to the surface. The swale width and gradient will be designed to minimize flow velocities from the swale.

6.0 REFERENCES

1. SCDOT, 2008. *Geotechnical Design Manual, Chapter 7 - Geomechanics*
2. Lambe T.W. and Whitman R.V. 1969, *Soil Mechanics*, Wiley and Sons.
3. Bowles .J.E., 1996. *Foundation Analysis and Design*, Fifth Edition, McGraw-Hill.

FIGURES

0 200
MILES

PREPARED FOR:

PYRAMID PEAK MINING

PREPARED BY:

AXELROD, INC.
PHOENIX, ARIZONA

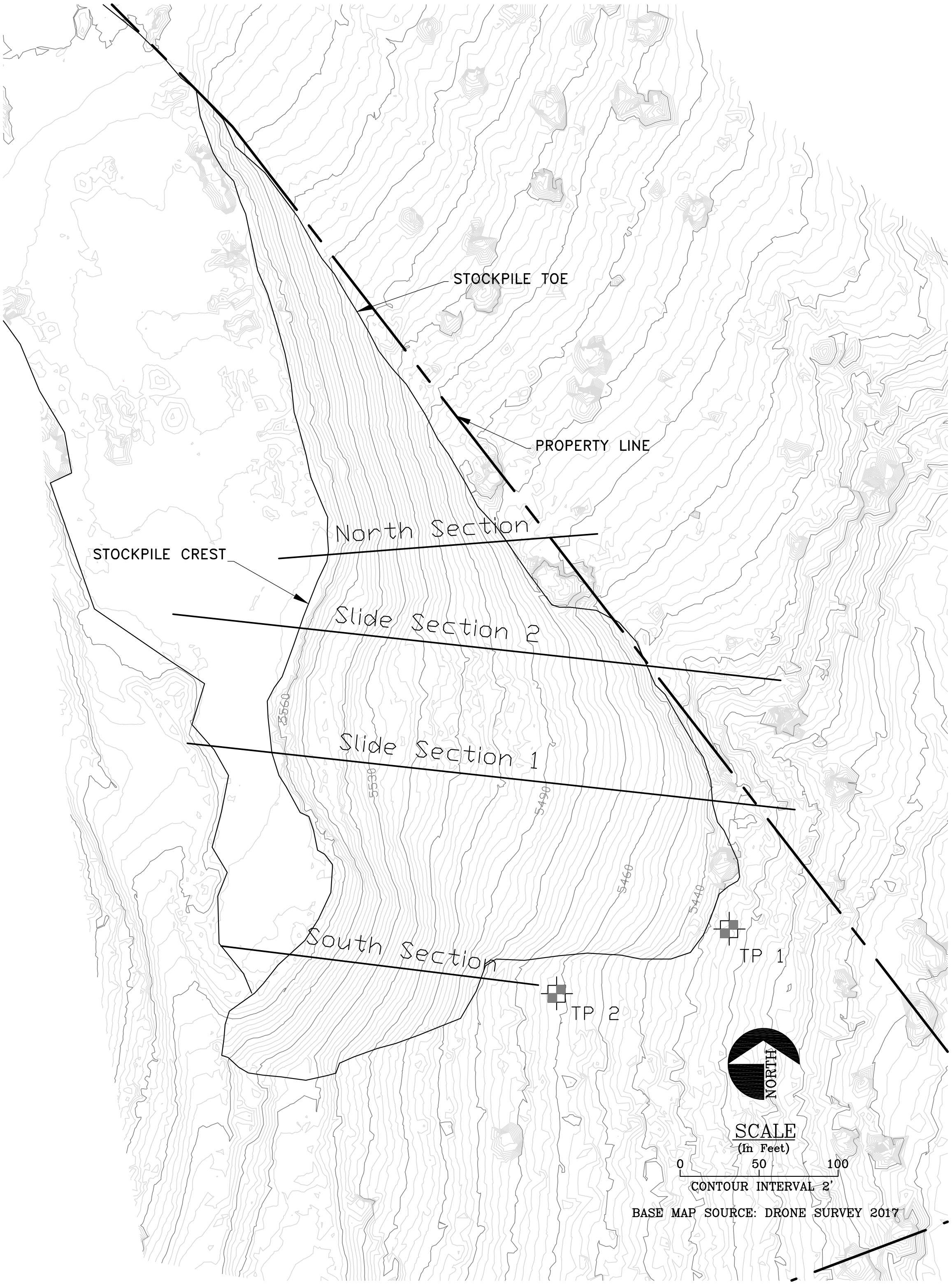
PROJECT:

SUMMIT MINE
WASTE ROCK STOCKPILE

TITLE:

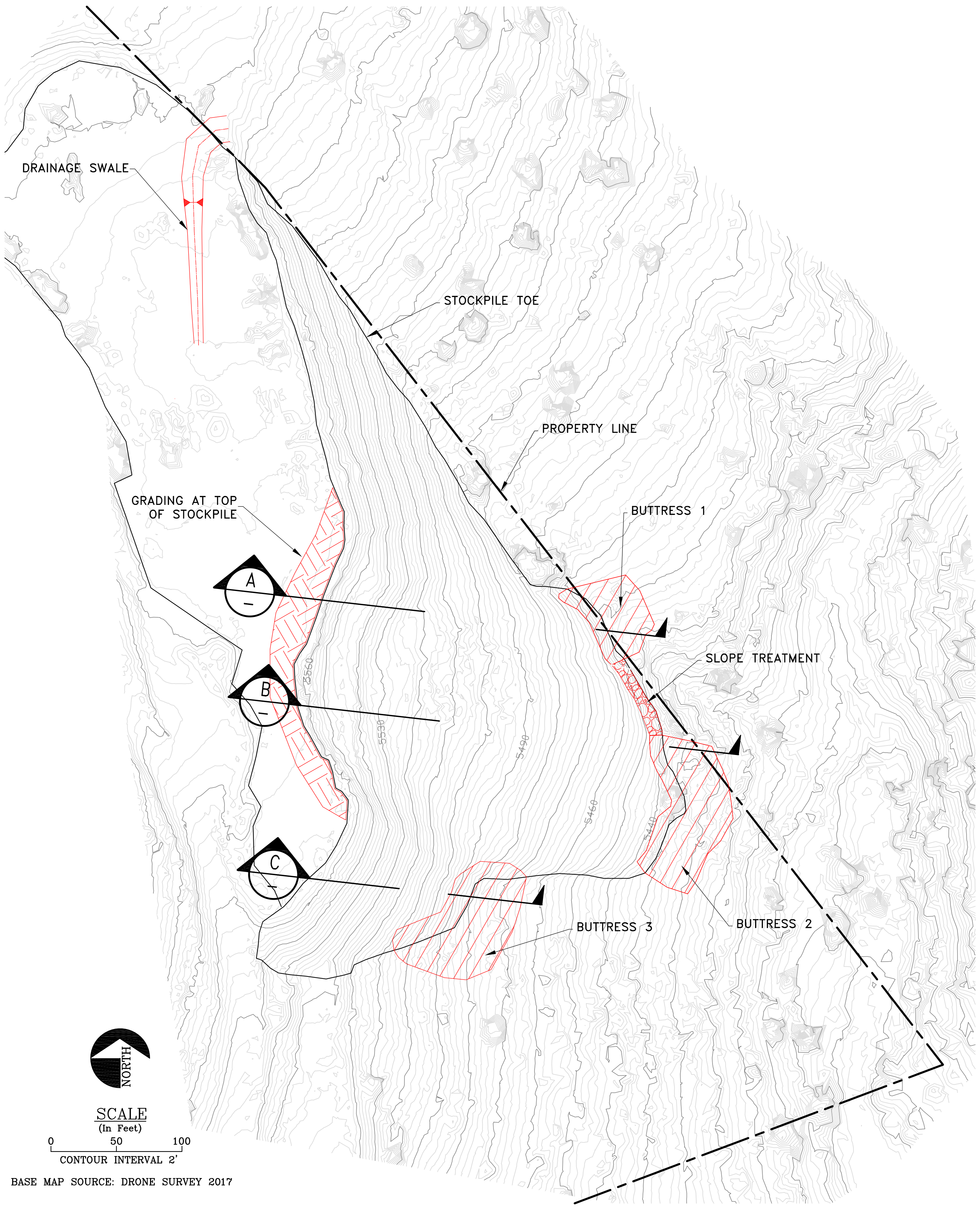
SITE LOCATION MAP

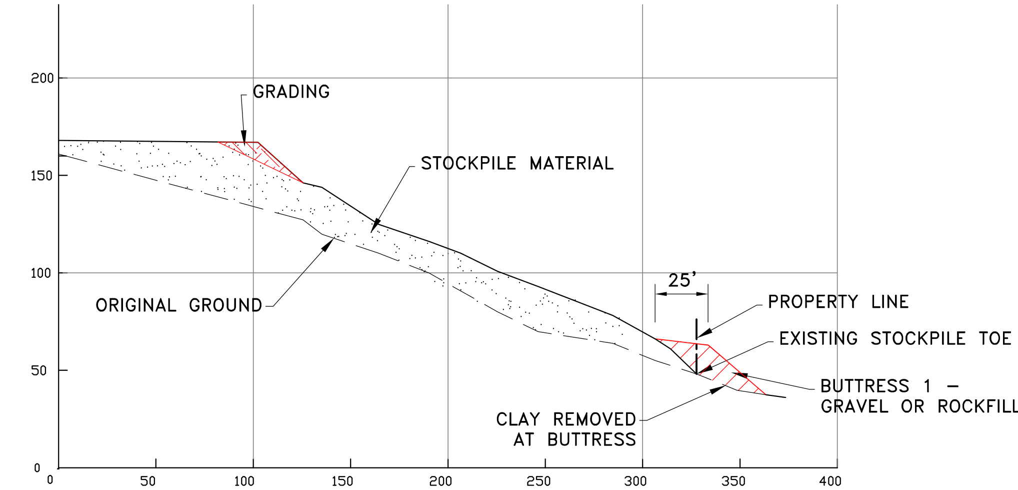
SCALE: AS SHOWN	DATE: 11/27/17	REVISION
FIGURE No. 1		A



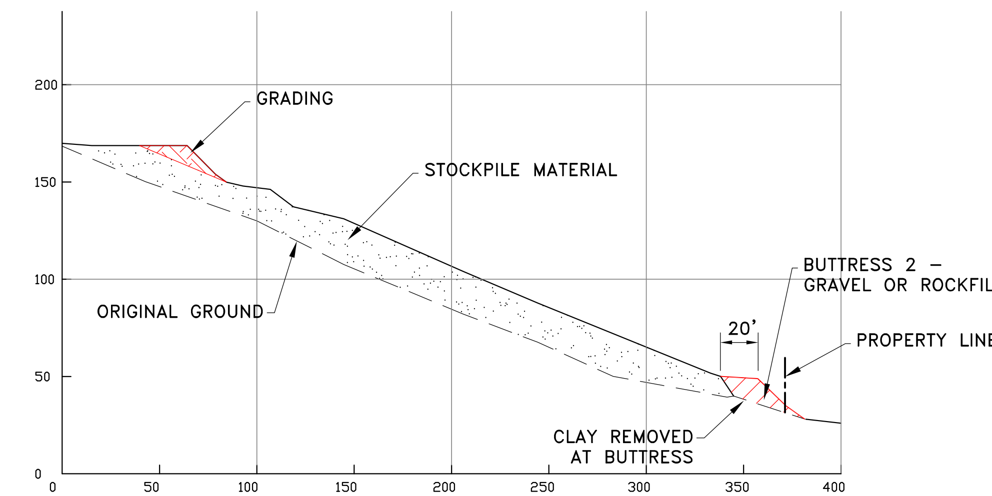
PREPARED FOR: **PYRAMID PEAK MINING**	PREPARED BY: AXELROD, INC. PHOENIX, ARIZONA

PROJECT:	TITLE:	SCALE: AS SHOWN	DATE: 1/10/18	REVISION
SUMMIT MINE WASTE ROCK STOCKPILE	STABILITY SECTIONS AND TEST PIT LOCATIONS	FIGURE No. 2		B

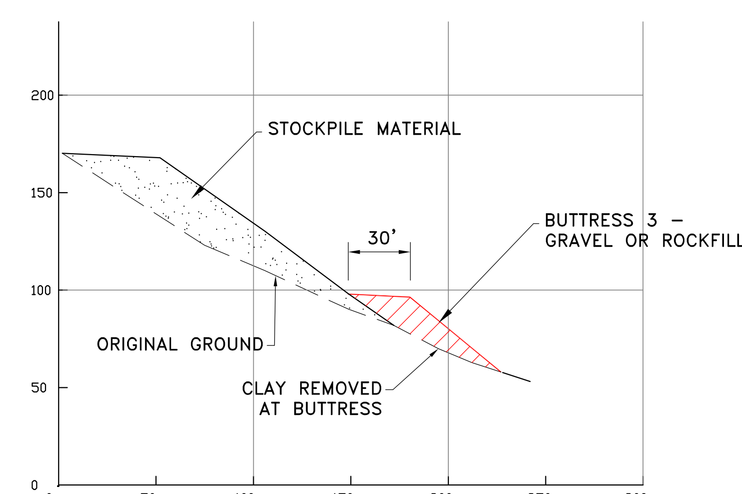




SECTION A
SCALE AS SHOWN

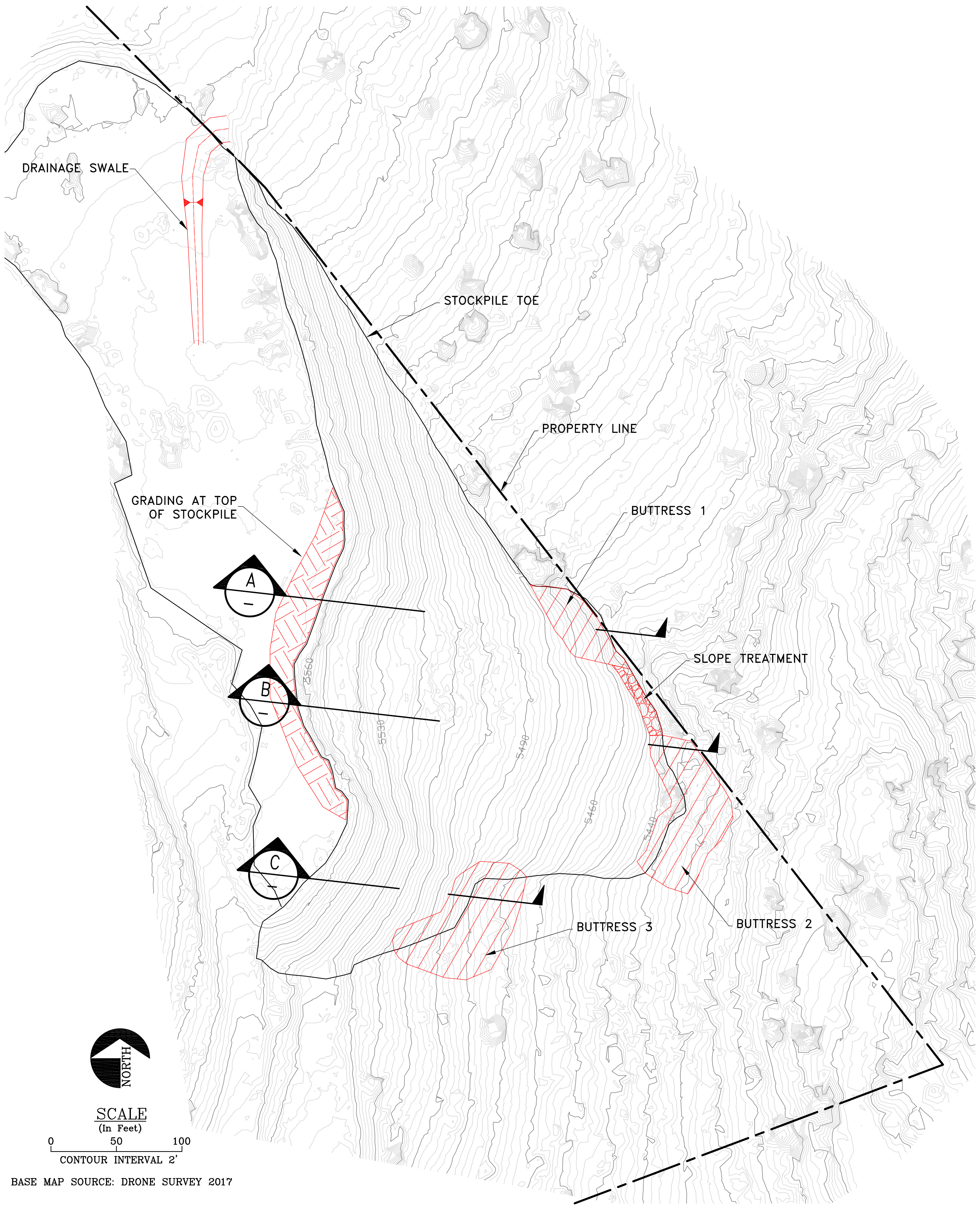


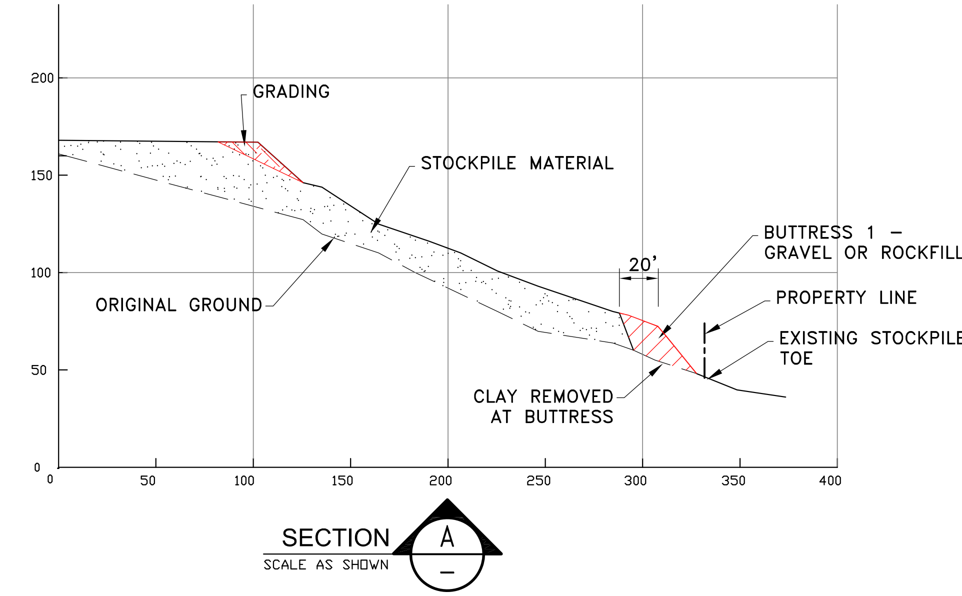
SECTION B
SCALE AS SHOWN

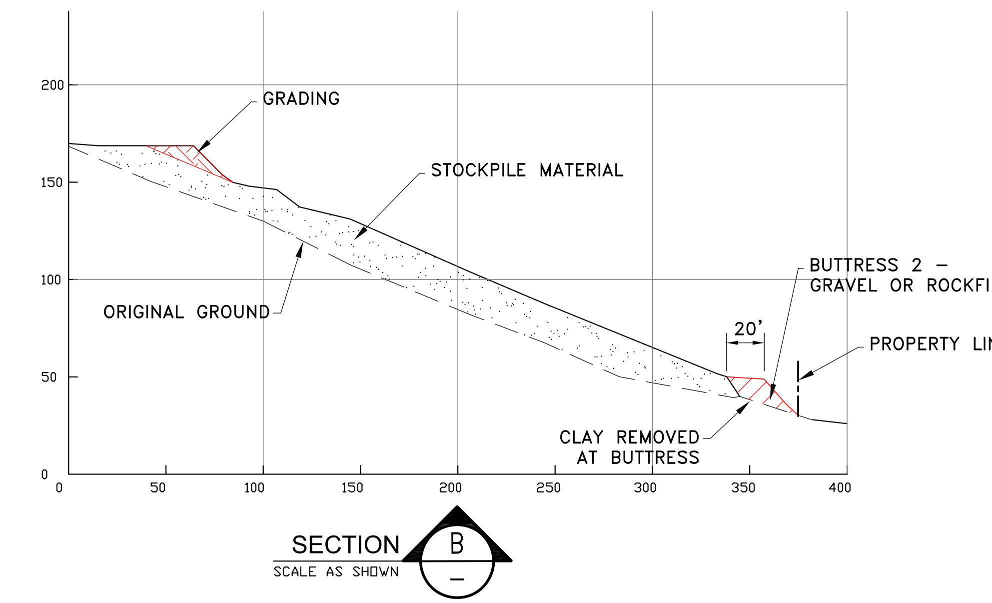


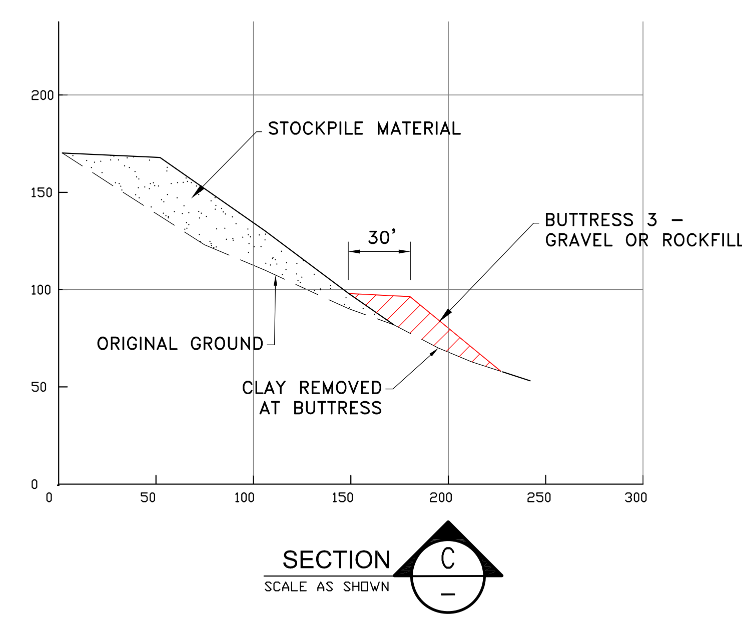
SECTION C
SCALE AS SHOWN

PROJECT:	TITLE	PREPARED BY:	PREPARED FOR:	SCALE: AS SHOWN	DATE: 1/9/18	REVISION
SUMMIT MINE WASTE ROCK STOCKPILE	OPTION 1 CORRECTIVE MEASURES LAYOUT AND SECTIONS	AXELROD, INC.	PYRAMID PEAK MINING	FIGURE No. 3		C









PROJECT:	TITLE	PREPARED BY:	PREPARED FOR:	SCALE: AS SHOWN	DATE: 1/9/18	REVISION
SUMMIT MINE WASTE ROCK STOCKPILE	OPTION 2 CORRECTIVE MEASURES LAYOUT AND SECTIONS	AXELROD, INC.	PYRAMID PEAK MINING	FIGURE No. 4		A

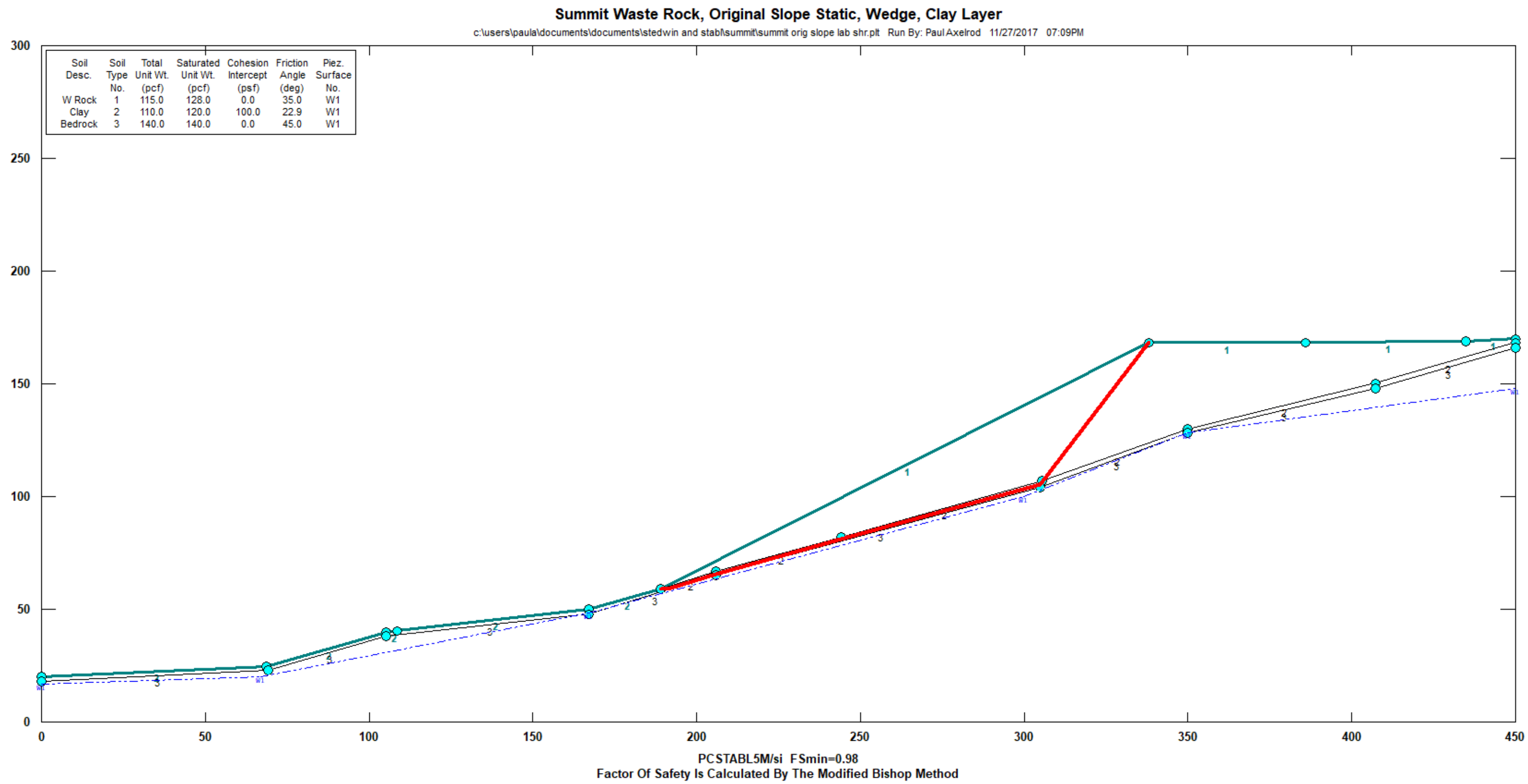


Figure 5 – Original Slope at Slide Section 1

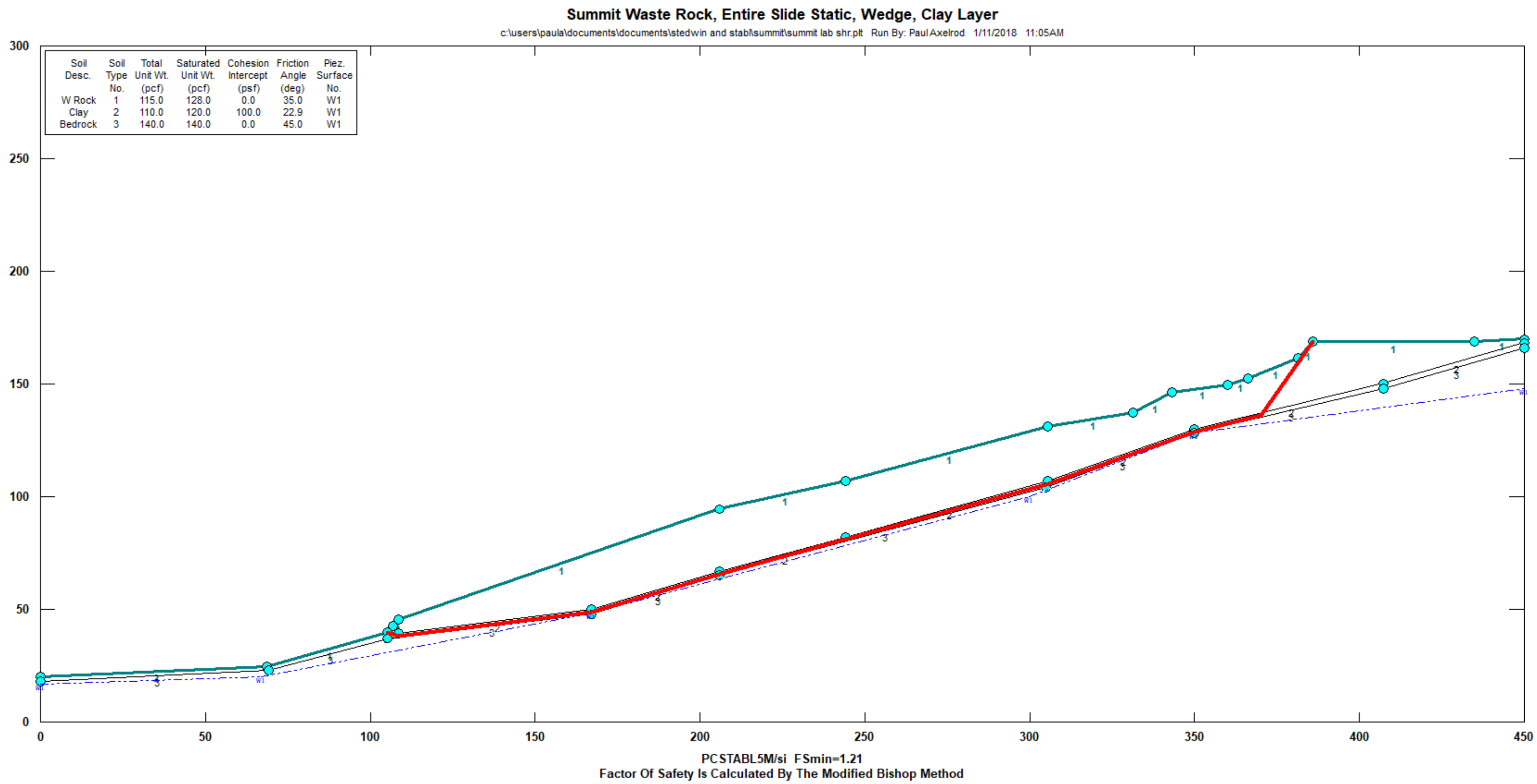


Figure 6 – Existing Slide Section 1

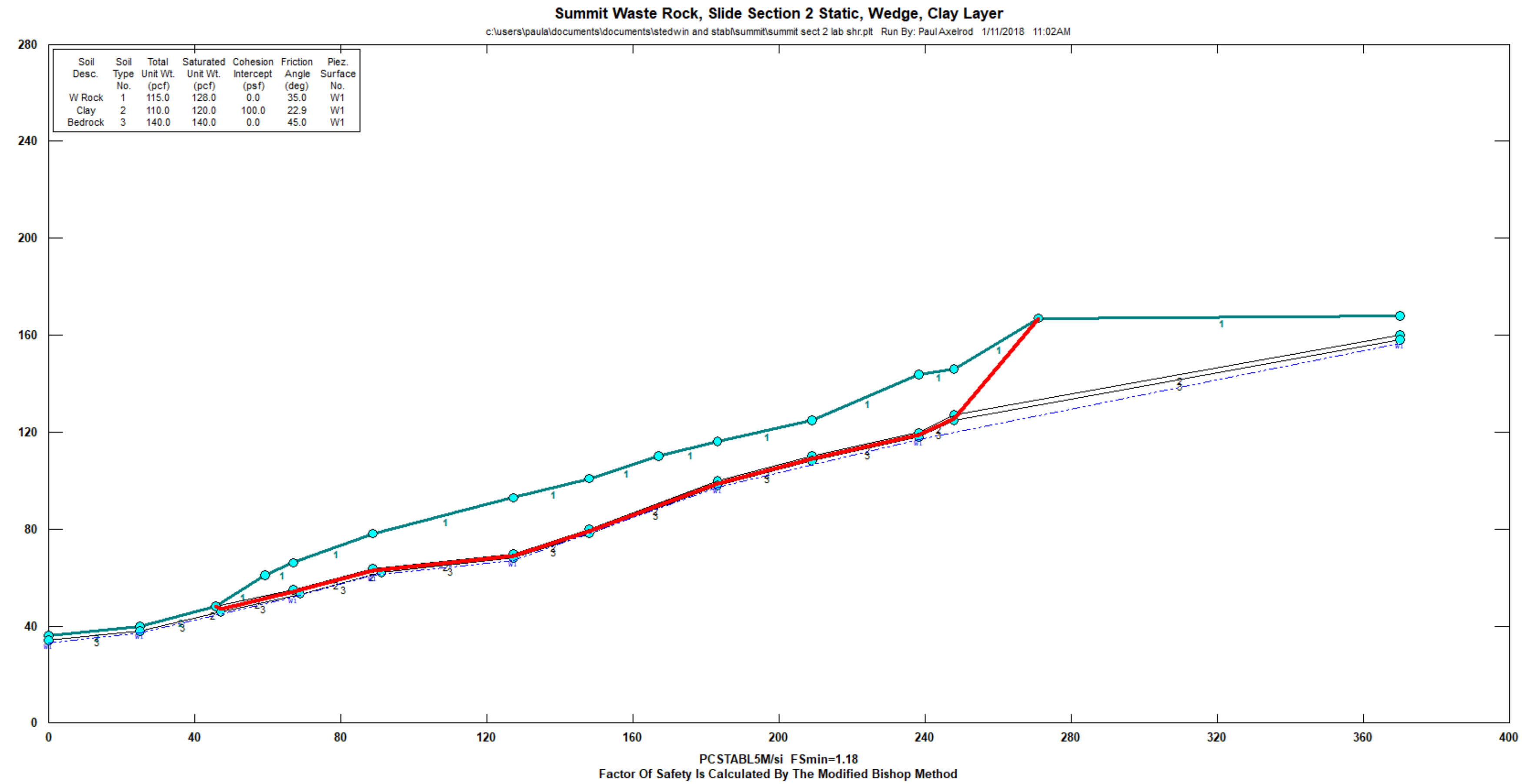


Figure 7 – Existing Slide Section 2

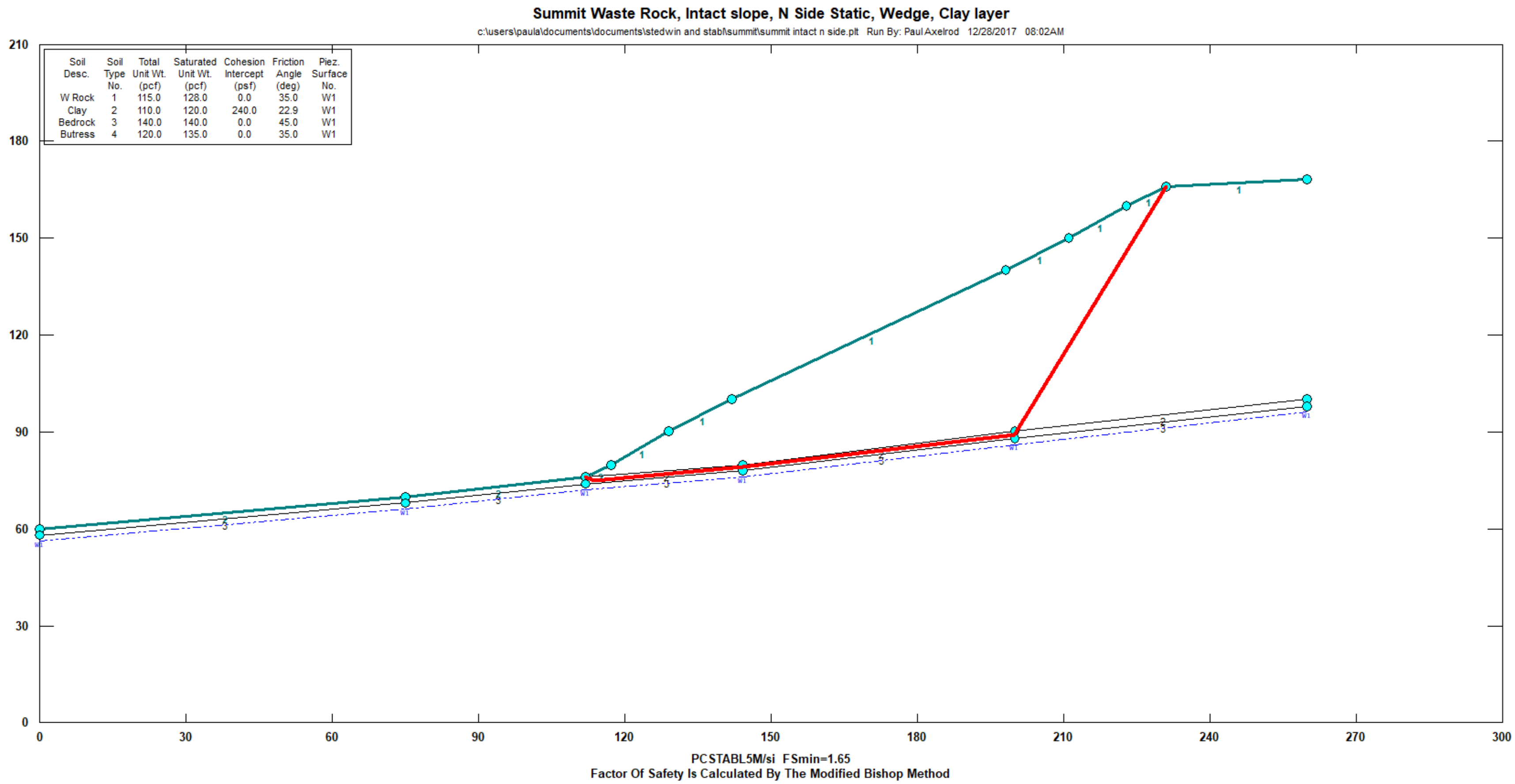


Figure 8 – Intact Section North Side

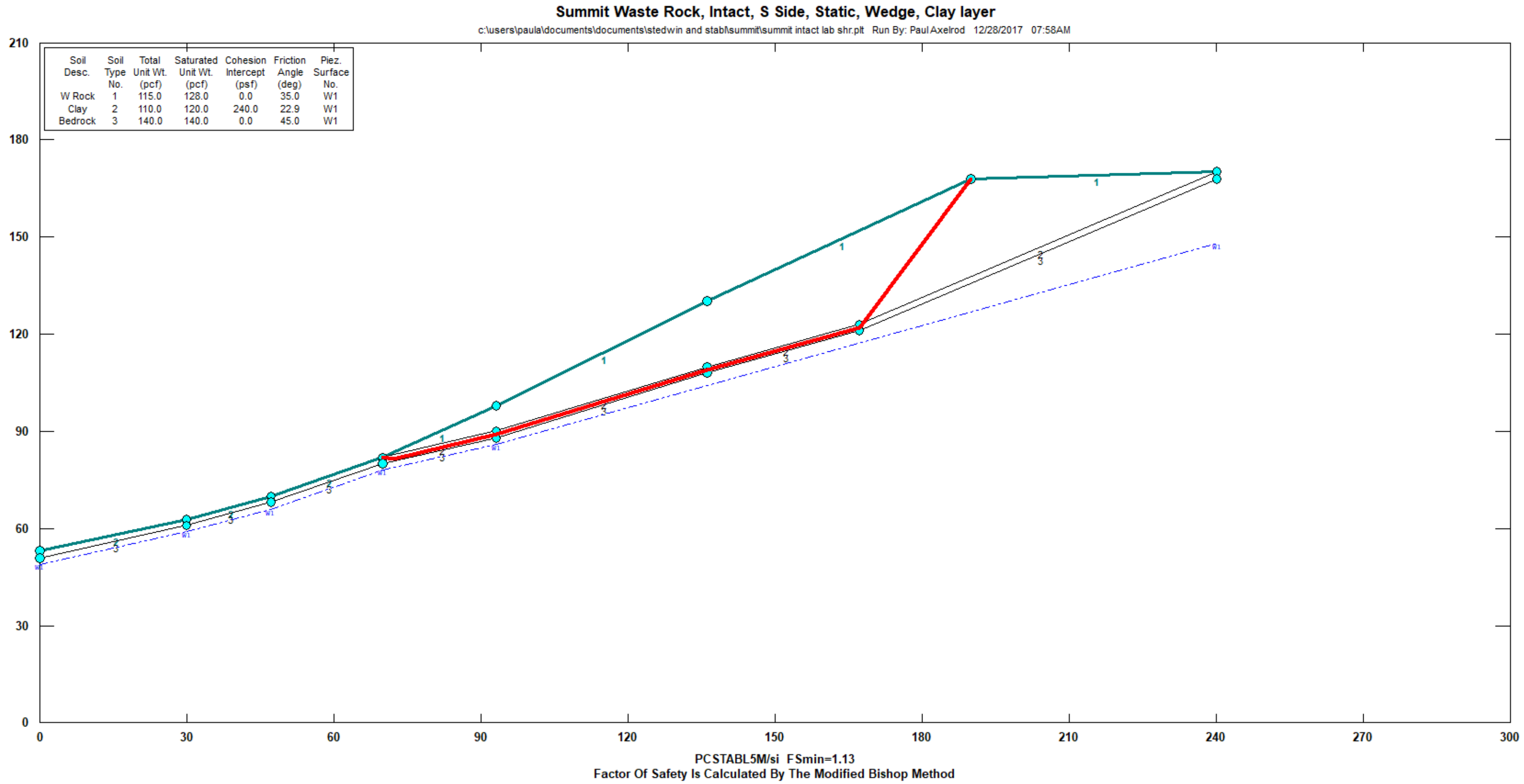


Figure 9 – Intact Section South Side

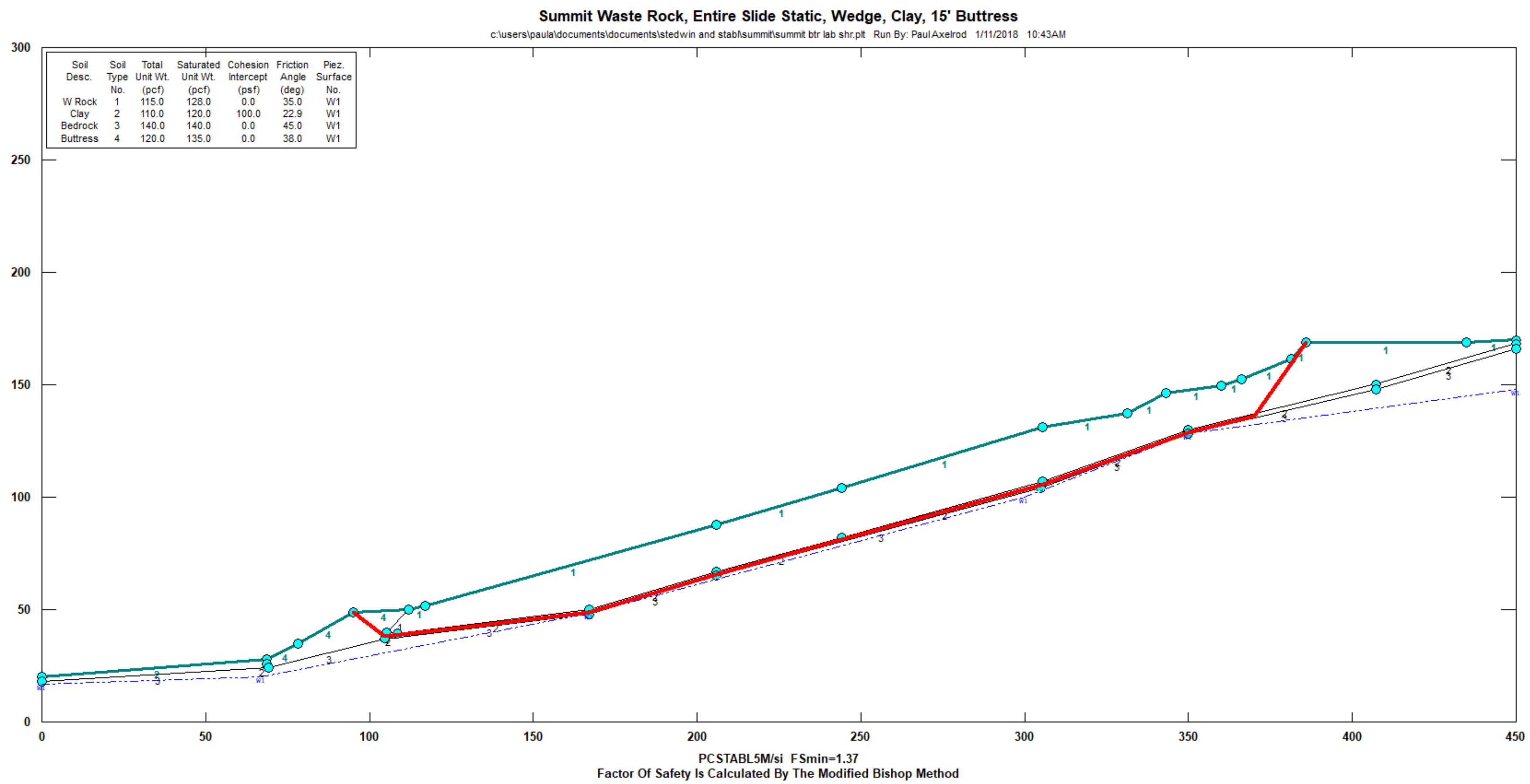


Figure 10 – Slide Section 1 with Buttress

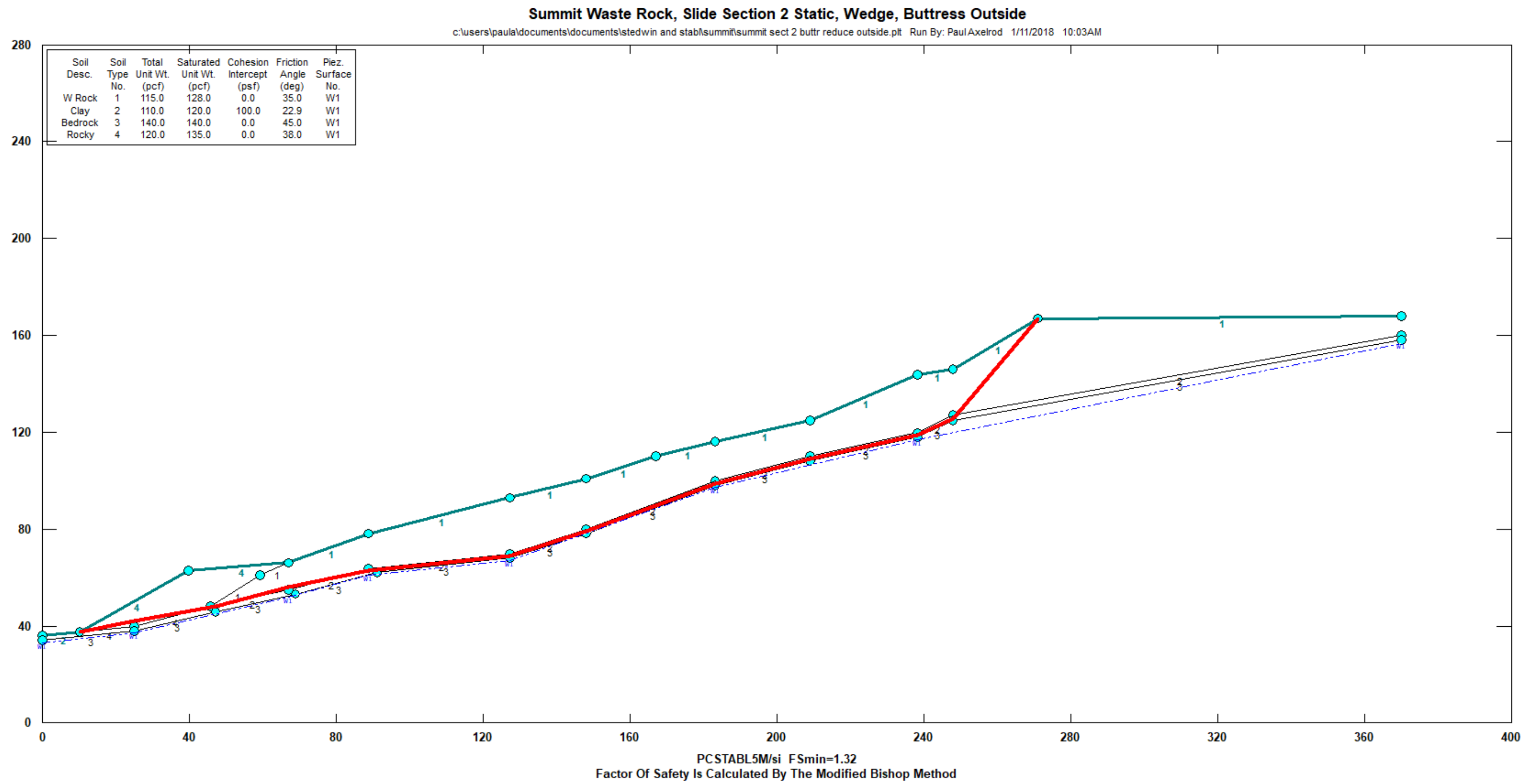


Figure 11 – Option 1, Slide Section 2 with Buttress outside Property

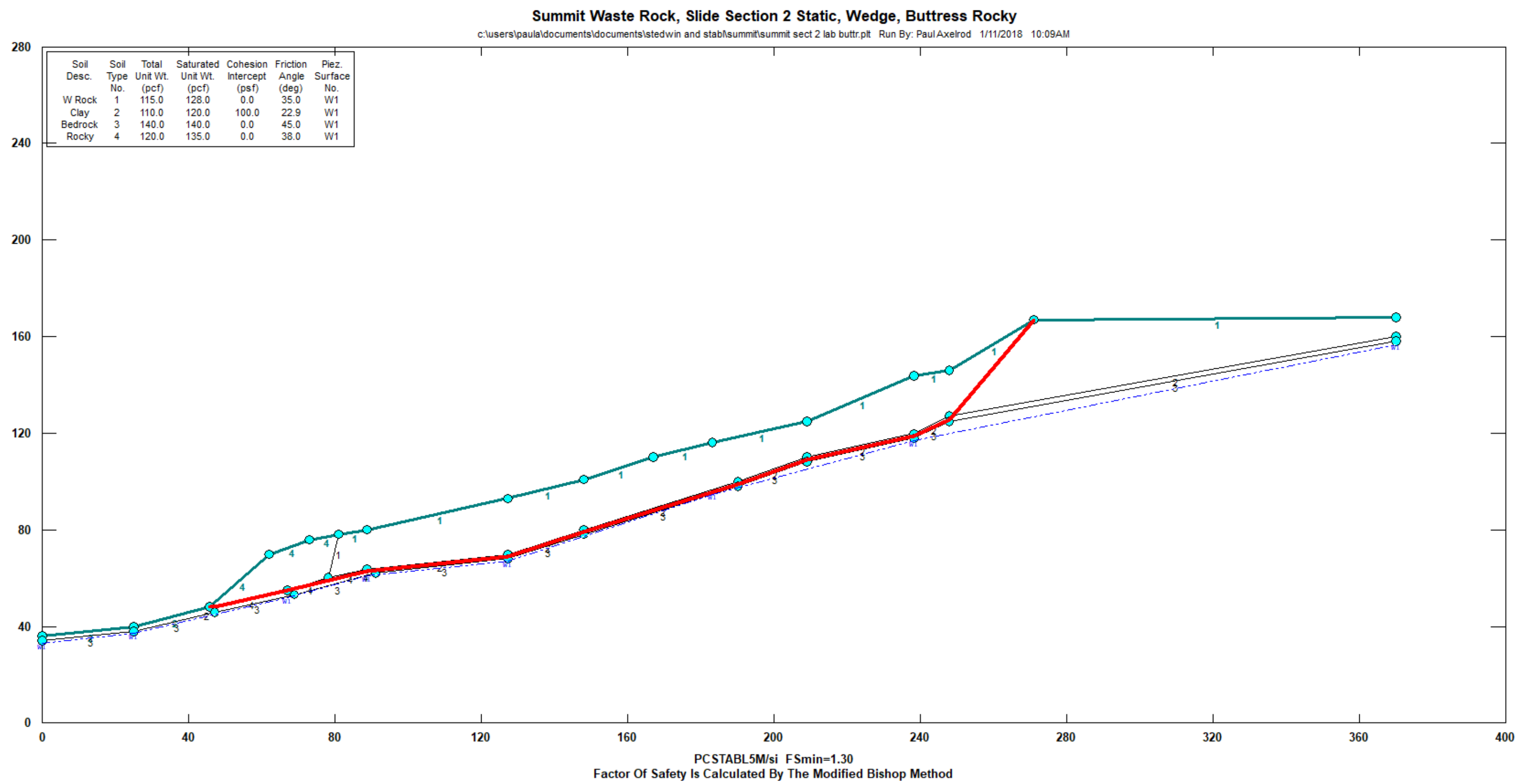


Figure 12 – Option 2, Slide Section 2 with Buttress inside Property

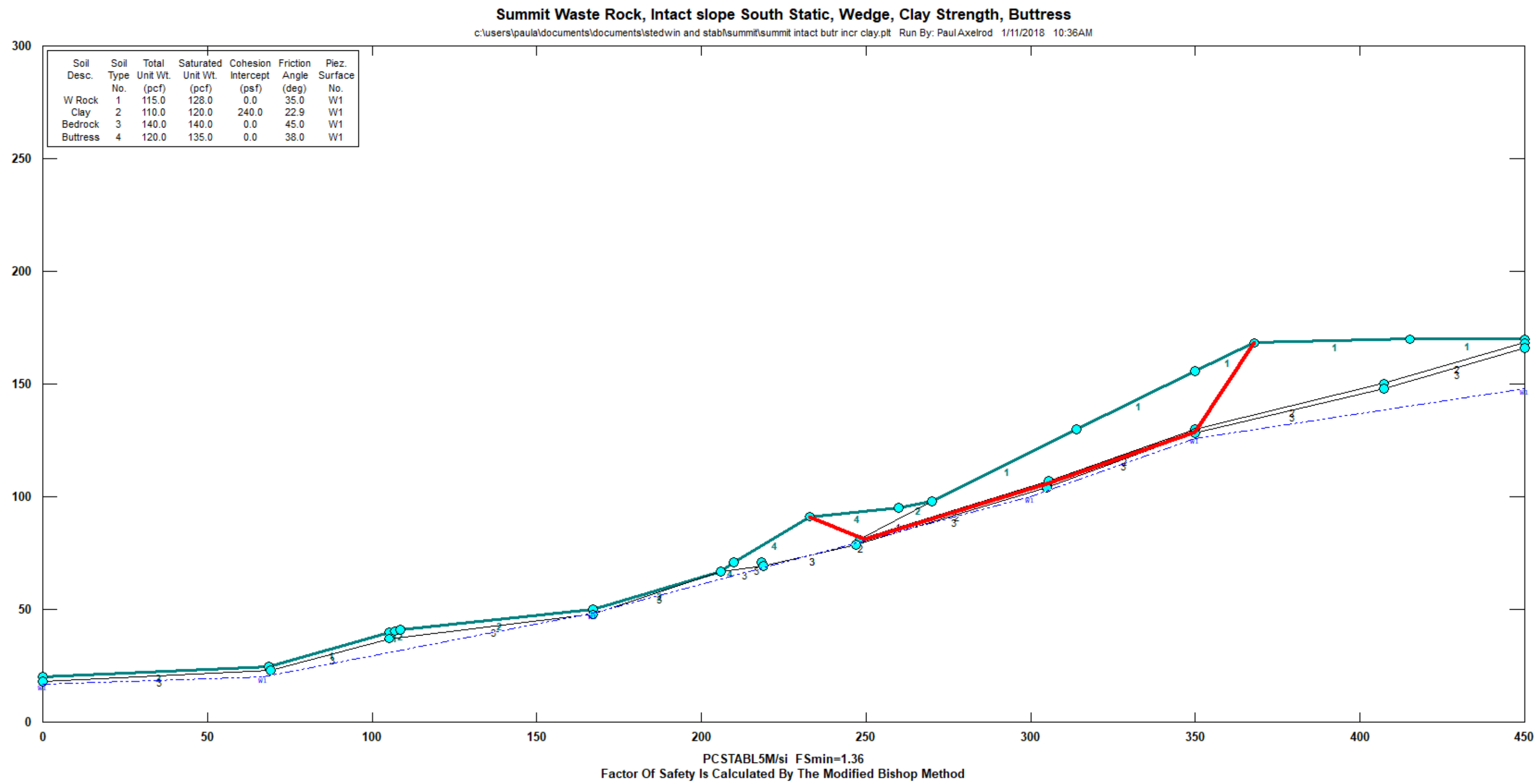


Figure 13 – Intact Section South Side with Buttress

APPENDIX A

LOG OF TEST PIT : 1

Project: SUMMIT MINE WASTE ROCK STABILITY	Project No: 217400
	Coordinates: N: 74,783 E: 82,853
Project Location: GRANT COUNTY NEW MEXICO	
Excavation Equipment: HAND SHOVEL	Approx. Surface Elev.: 5,426
Logged By: PAA	Date Excavated: 10/26/17

Depth, feet	Sample No.	Type	Field Moisture	Graphic Log	MATERIAL DESCRIPTION	Symbol	Comments
0					At surface, GRAVEL AND COBBLES. Colluvium		
		▌ ●			(0'–1.0') Sandy CLAY. Slightly gravelly and silty. Very moist, dark brown and firm. Some slickensides. Gravel is fine and medium and sub–rounded. Colluvium.		
1					No refusal.		
2							

▌ Undisturbed sample • Disturbed sample

Axelrod, Inc.

Figure

LOG OF TEST PIT : 2

Project: SUMMIT MINE WASTE ROCK STABILITY	Project No: 217400
Project Location: GRANT COUNTY NEW MEXICO	Coordinates: N: 74,674 E: 82,812
Excavation Equipment: HAND SHOVEL	Approx. Surface Elev.: 5,461
Logged By: PAA	Date Excavated: 10/26/17

Depth, feet	Sample No.	Type	Field Moisture	Graphic Log	MATERIAL DESCRIPTION	Symbol	Comments
0					At surface, GRAVEL AND COBBLES. Colluvium		
		●			(0'–0.5') Sandy CLAY. Slightly gravelly and silty. Slightly moist, dark brown, speckled white and firm. Gravel is fine. Colluvium.		
1					(0.5'–1.0') CLAY as above, but more sandy. Brown speckled white. Some sandy, friable pieces. Rock structure, residual bedrock?		
					No refusal.		
2							

• Disturbed sample

Axelrod, Inc.

Figure

APPENDIX B

ConformaTECH

PROJECT:	Axelrod Miscellaneous Testing	**JOB NO:**	17-7954
LOCATION:	Summit Mine, New Mexico	**LAB NO:**	8250
MATERIAL:	Waste Rock	**DATE SAMPLED:**	10/30/2017
SAMPLE SOURCE:	TP1, 0' to 1'		

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C136/C117)
LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318) (DRY PREP)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	100
1/2 in / 12.5 mm	99
3/8 in / 9.5 mm	98
1/4 in / 6.4 mm	97
#4, 4.75mm	96
#8, 2.36mm	93
#10, 2.00mm	92
#16, 1.18mm	89
#30, 0.60mm	83
#40, .425mm	78
#50, .300mm	72
#100, .150mm	58
#200, .075mm	46

ATTERBERG LIMITS

LL:	66
PL:	22
PI:	44

USCS: SC

% Gravel	4.0
% Sand	49.5
% Fines	46.5

Reviewed by: ______________________

ConformaTech, Inc.
1425 East Apache Park Place
Tucson, Arizona 85714
Tel.: (520) 573-2045
Fax: (520) 573-0528

ConformaTECH

PROJECT:	Axelrod Miscellaneous Testing	**JOB NO:**	17-7954
LOCATION:	Summit Mine, New Mexico	**LAB NO:**	8251
MATERIAL:	Waste Rock	**DATE SAMPLED:**	10/30/2017
SAMPLE SOURCE:	TP2, 0' to 1'		

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C136/C117)
LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318) (DRY PREP)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	99
3/4 in / 19 mm	99
1/2 in / 12.5 mm	99
3/8 in / 9.5 mm	99
1/4 in / 6.4 mm	99
#4, 4.75mm	98
#8, 2.36mm	94
#10, 2.00mm	93
#16, 1.18mm	89
#30, 0.60mm	83
#40, .425mm	79
#50, .300mm	74
#100, .150mm	60
#200, .075mm	48

ATTERBERG LIMITS

LL:	45
PL:	21
PI:	24

USCS: SC

% Gravel	2.2
% Sand	50.0
% Fines	47.8

Reviewed by: ______________________

ConformaTech, Inc.
1425 East Apache Park Place
Tucson, Arizona 85714
Tel.: (520) 573-2045
Fax: (520) 573-0528

Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Axelrod Inc.
Project: Summit Mine
Sample: TP1 (0 - 1)

TRI Log #: 33453
Test Method: ASTM D4767 Mod

Specimens			
Identification	-	-	-
Depth/Elev. (ft)	-	-	-
Eff. Consol. Stress (psi)	10.0	20.0	30.0
Initial Specimen Properties			
Avg. Diameter (in)	1.99	2.01	2.02
Avg. Height (in)	3.91	3.84	3.70
Avg. Water Content (%)	30.8	-	-
Bulk Density (pcf)	115.0	115.0	117.5
Dry Density (pcf)	87.9	-	-
Saturation (%)	90.7	-	-
Void Ratio, n	0.92	0.92	0.88
Specific Gravity (Assumed)	2.70		
Total Back-Pressure (psi)	50.7	51.0	49.9
B-Value, End of Saturation	0.99	-	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear			
Void Ratio	0.92	0.88	0.85
Area (in^2)	3.11	3.12	3.18

Shear / Post-Shear			
Avg. Water Content (%)	-	-	31.0
Rate of Strain (%/hr)	0.50	0.50	0.50

At Failure						
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$			Ratio, $(\sigma_1'/\sigma_3')_{max}$		
Axial Strain at Failure (%), $\varepsilon_{a,f}$	-	-	-	1.8	1.5	6.2
Minor Effective Stress (psi), $\sigma_3'_f$	-	-	-	3.9	10.1	15.0
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	-	-	-	10.5	17.4	24.9
Pore Water Pressure, Δu_f (psi)	-	-	-	5.6	9.1	15.1
Major Effective Stress (psi), $\sigma_1'_f$	-	-	-	14.4	27.5	39.9
Effective Friction Angle (degrees)	-			22.9		
Effective Cohesion (psi)	-			1.7		

Note: Multi-stage testing was performed for this sample. The first two stages were terminated in accordance with stress path tangency and/or peak principal stress ratio.

Please note that the presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratioare presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

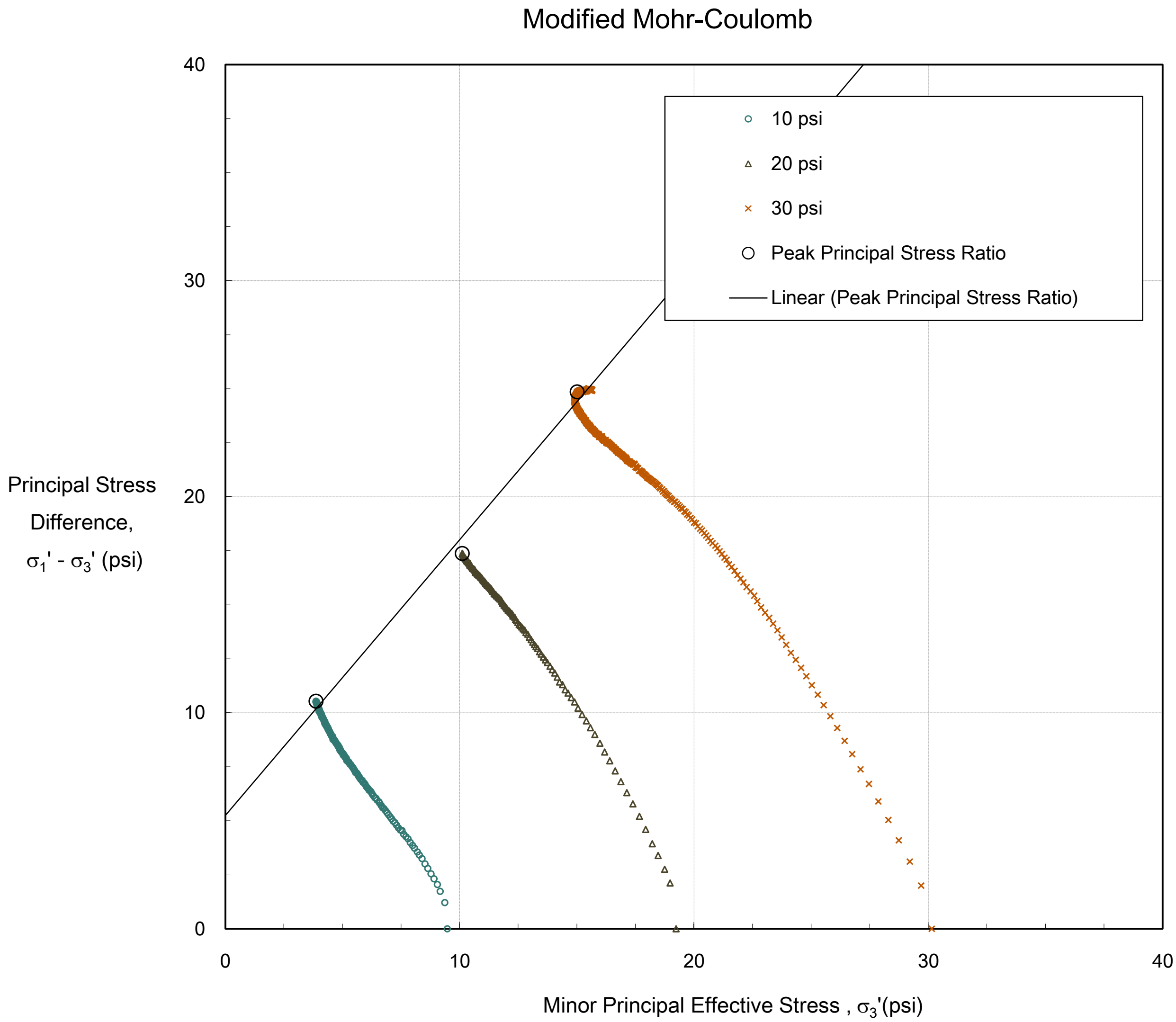
Jeffrey A. Kuhn , Ph.D., P.E., 11/22/2017
Analysis & Quality Review/Date

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Axelrod Inc.
Project: Summit Mine
Sample: TP1 (0 - 1)

TRI Log #: 33453
Test Method: ASTM D4767 Mod



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	-	22.9
Effective Cohesion (psi)	-	1.7

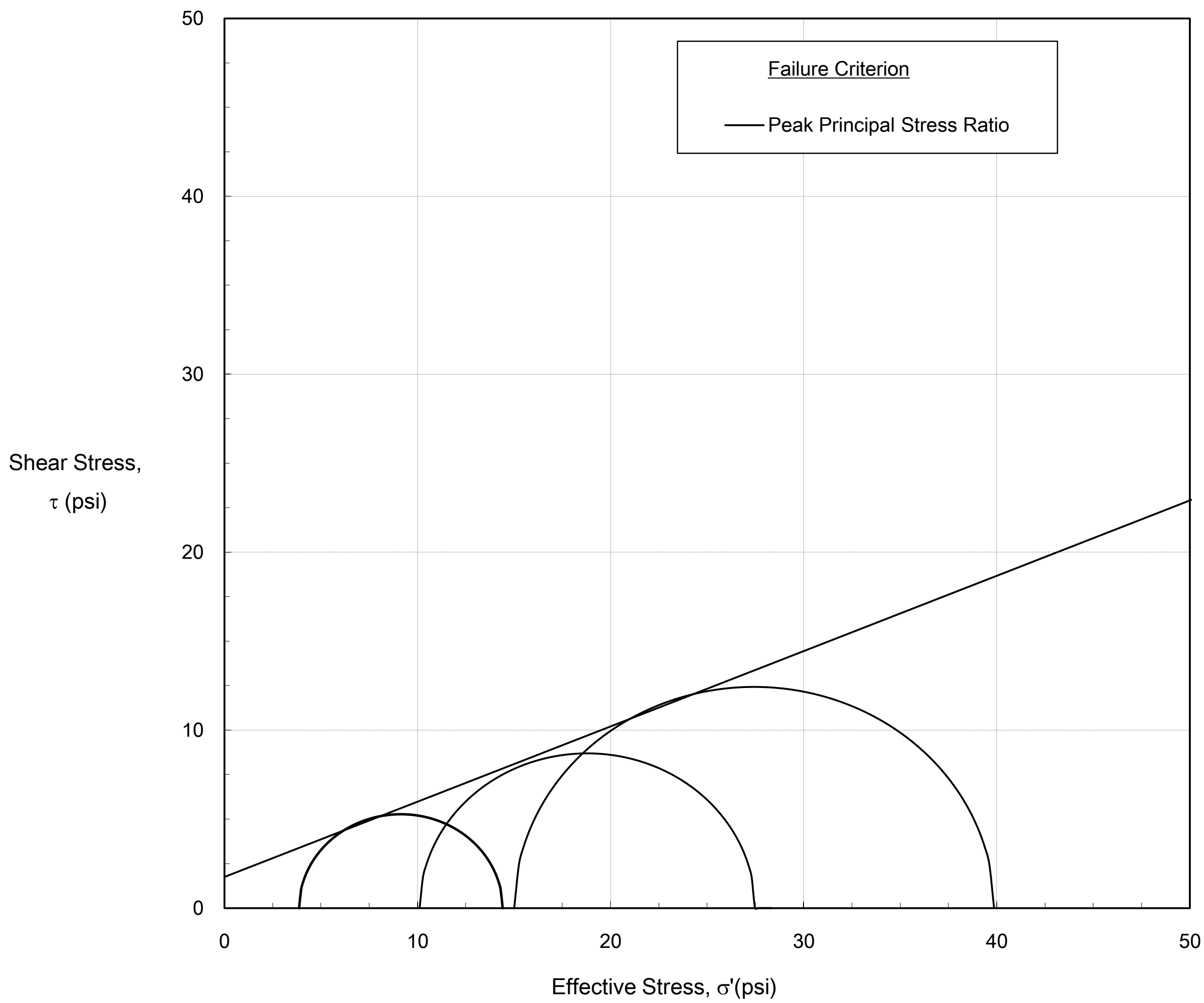
TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Axelrod Inc.
Project: Summit Mine
Sample: TP1 (0 - 1)

TRI Log #: 33453
Test Method: ASTM D4767 Mod

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	-	22.9
Effective Cohesion (psi)	-	1.7

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Axelrod Inc.
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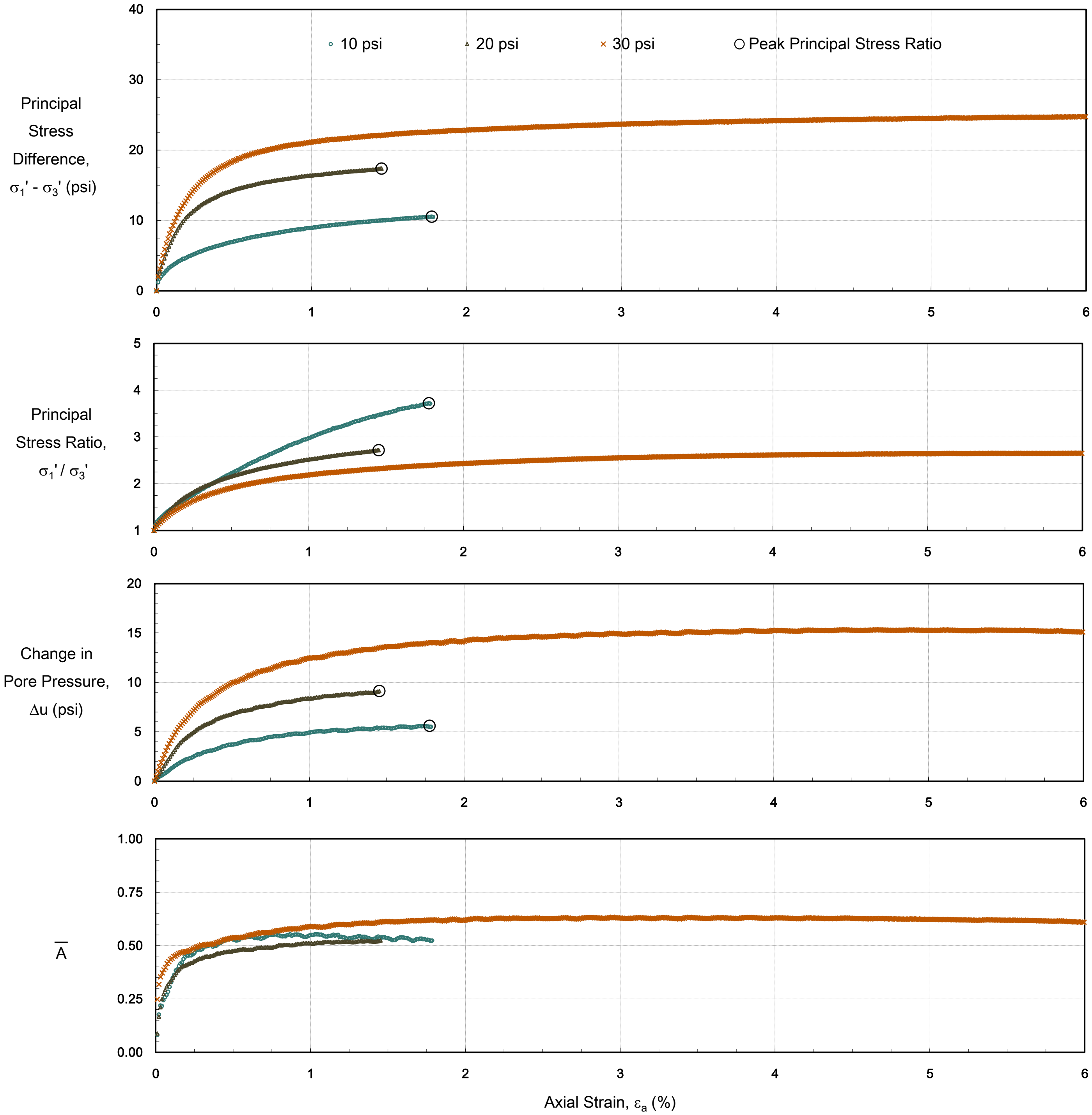

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Axelrod Inc.
Project: Summit Mine
Sample: TP1 (0 - 1)

TRI Log #: 33453
Test Method: ASTM D4767 Mod

Consolidation

Note: The specimen at the lowest effective stress was back-pressure saturated at its target effective stress. Accordingly, no consolidation data is available.