Revised Slope Stability Investigation

Chandler Gilman Springs Pit - Proposed Expansion Area
Riverside County, California

April 19, 2019
Terracon Project No. CB195044

Prepared for:

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April 19, 2019

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Re: Revised Slope Stability Investigation
Chandler Gilman Springs Pit - Proposed Expansion Area
CA Mine ID 90-33-0019 – SMP 159R2
Riverside County, California
Terracon Project No. CB195044

Dear Mr. Pendergrass:

We have completed the Revised Slope Stability Investigation services for the above referenced project. This study was performed in general accordance with the supplement to agreement for services dated April 9, 2019.This report presents the revised slope stability calculations and findings related to reclamation plan revisions made subsequent to County approval of our prior report dated February 5, 2018.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

APPENDICES

Appendix A – Maps and Cross Sections
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Revised Slope Stability Investigation Report

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CA Mine ID 90-33-0019 – SMP 159R2
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INTRODUCTION

During April 2019, this firm performed slope stability analysis for revisions to the reclamation area of the Gilman Springs Pit expansion located in the Moreno Valley area of Riverside County, California. The purpose of this evaluation was to provide slope stability calculations for a revised reclamation slope configuration depicted on plans dated March 28, 2019. The revision includes modification to the southern and western extents of the proposed pit and shallowing of the pit floor. Information from our prior field investigation and report dated February 5, 2018 was utilized in this study. The prior report (GEO No. 180007) was approved by the County of Riverside Planning Department in a letter dated May 2, 2018. Revisions of the prior report specific to modification of the pit boundary are presented herein along with the original report text for completeness. Revisions include recalculation of global stability and presentation of the revised pit margin. The prior Kinematic analysis utilized and presented sensitivity analysis of slope azimuth versus failure type; therefore, the findings of kinematic analysis from the prior report are applicable to the modified pit margin.

The approximate area of the site is shown on the attached Location Map (Exhibit A). The Mine Plan prepared by Chandler was used as the base map for the Site Plan and Geologic Map (Exhibit B).

The results of our investigation, together with our conclusions and recommendations, are presented in this report.

SCOPE OF SERVICES

The scope of services provided during this investigation included the following:

- Review of the revised reclamation plan and pit boundary dated March 28, 2019
- Review of published and unpublished literature and maps including geologic mapping by Tran (2017) and Matti and Morton (2015)
- Examination of the reclamation slope plan and benching diagrams
- Evaluation of material strengths
- Evaluation of the prior geologic (kinematic) evaluation of the proposed rock slopes
- Slope stability calculations (limit equilibrium) for the revised proposed slopes under static

and seismic conditions
- Presentation of findings for suitability of the previously approved report.

PROJECT CONSIDERATIONS

This study was performed to provide a slope stability evaluation of revisions to proposed mine slopes as depicted on the revised reclamation plan dated March 28, 2019. Reclamation of the project is expected to be phased with mining. Revision of the pit area from the prior expansion plan includes southward extension of the pit margin, contraction of the western margin, and shallowing of the pit floor from 1,740 feet above mean sea level (amsl) to 1,825 feet amsl. Geologic mapping performed by Mr. Anh Tran was provided for our use and was utilized to support our investigation. The mine is formed in crystalline bedrock that includes granitics, metasedimentary rocks and marble, and overlying sandstone of the Mt. Eden Formation (Matti and Morton, 2015). Older alluvial fan deposits locally mantle the bedrock areas. A roughly rectangular pit is proposed with local bends in the finished walls. The floor is proposed with a bottom at elevation 1,825 feet amsl.

The revised reclamation plan, with regard to slope configuration, is consistent with the prior approved slopes. The plan utilizes a benched configuration using 25-foot-tall by 25-foot-wide benches with locally wider (35-foot-wide benches) forming an overall slope inclined at *approximately* 1 horizontal to 1 vertical (45 degrees). The stated angle for overall slopes is 37 degrees. Bench face angles are proposed at approximately 88 degrees with allowance for back break to about 80 degrees. The stated angle for the upper and lower portions of the overall slope is 43 degrees. We evaluated slightly steeper angles for both overall slopes and the upper/lower slopes. Overall slope heights have been reduced; however, the prior calculations demonstrate suitable stability of slopes taller than now planned. All slopes are anticipated to be formed in rock material. The slope configuration as modeled for global stability calculations is shown in Appendix C.

SITE DESCRIPTION

The site includes approximately 1,000 acres of rugged bedrock highland within the badlands of Riverside County, California. The San Timoteo Badlands is an elevated region of rugged topography formed in non-marine sediments that extends from the San Jacinto Mountains to Loma Linda. In the area of the site, the badlands expose a contact between overlying Mt. Eden beds and underlying crystalline rock types that include granites, metasedimentary rocks and limestones. The site is accessed from a dirt haul road via Gilman Springs Road. Bedrock mountains/hills with locally steep relief are formed in a sequence of limestone, quartzite, marble and granitic rocks in the site region. A mantle of soil and rock detritus covers bedrock outcrop in flats and swales between elongate ridgeline outcrops. Weedy shrubs and grasses on undisturbed surfaces comprise the vegetative cover across the undisturbed portions of the site. Active mining areas including several quarry areas; a processing area and loading/stockpile areas are located east of the proposed expansion area.

Aerial imagery dating from 1948 to present was examined for geologic and site use information. The expansion area appears as undeveloped badlands hillside including the prominent limestone ridgelines and intervening recessive beds in imagery dated 1948 through 1974. The general northeast dip and northwest trend of limestone beds is apparent. In 1974, a network of access roads leading to drill pads is evident throughout the mine and proposed expansion area. The modern haul road and beginnings of mining in the active mine area are apparent in 2000. The contact of Mt. Eden sediments overlying older metasedimentary and granitic rock units is evident as a contrast in color tone along the northern limits of the mine boundary. Faults or landslides within the expansion area were not noted on the aerial imagery examined.

Surface water was not present at the time of our site examination in 2018.

The expansion area boundary and proposed reclaimed mine configuration is depicted on Exhibit B. Cross sections are presented on Exhibit C. Ground photographs of the site and selected features are included in Appendix D.

PREVIOUS INVESTIGATIONS

The approved slope stability investigation report (GEO No. 180007) dated February 5, 2018 was based on investigation performed by Terracon in 2018.

A detailed geologic map prepared by Mr. Anh T. Tran was provided in PDF and CAD formats for our use. The map indicates outcrop boundaries of limestone (marble) beds, granitics, metasedimentary beds and schist beds. Attitudes measured on bedding/foliation are included in dip/azimuth format. Cross sections through the revised expansion area are included.

Geologic mapping of the El Casco, 7.5-minute quadrangle is available from U.S. Geological Survey as Open-File Report 2010-1274 (Matti and Morton, 2015). This compilation includes a pamphlet, geologic and geophysical map sheet and gravity map.

These geologic maps were compiled on Exhibit B to aid in defining the aerial and subaerial limits and structural relations of bedding, foliation and joints in the expansion area. The cross sections (Exhibit C) present an idealized geometry of subsurface units to aid in modeling global slope stability.

FIELD INVESTIGATION

A certified engineering geologist conducted reconnaissance and geologic mapping of the site on November 1, 2017. Geologic structure was measured, including bedding, foliation and joint orientations, using a Brunton compass and clinometer. The field mapping focus included geologic contacts, bedding, and rock fabric in proposed slope areas and on features that might affect kinematic stability of local slope faces. The active mine area provided exposures of the limestone (marble) resource and enclosing schist. Structural mapping in the expansion area was conducted along resistant ridges formed in limestone, in drainages and along the road cut extending between the active mine and expansion area. Portions of the expansion area are mantled by a weathered profile that includes soil accumulations. Inference of the underlying recessive geologic units was made based on surface debris and localized outcrops. The structural data set is included as Table B-1 in Appendix B.

Structural data were augmented by data from the cross sections by Tran (2017).

The location numbers corresponding to areas where structural data were measured are included on the Site Plan and Geologic Map (Exhibit B).

SITE GEOLOGY

The site is located in Riverside County, northeast of Gilman Springs Road and west of State Highway 79. The site is situated in an elevated and dissected badlands terrain in the northern Peninsular Ranges geomorphic province. The Peninsular Ranges include plutonic and metamorphic crystalline rocks of Cretaceous and older age. The crystalline basement rocks are locally mantled by residual soils and capped by isolated alluvial/sedimentary remnants. Ground photographs of the site and selected features are included in Appendix D.

Geologic Units

Geologic units compiled from regional-scale mapping by Matti and Morton (2015) and site-scale mapping by Tran (2017) are depicted on Exhibit B. The geologic units designated for this investigation are described below from youngest to oldest.

Fill (f): Fill associated with disturbed areas and stockpile materials is present along roads and in the active mine area. Fill includes loose material on slopes and benches. Significant fill does not occur within the expansion area; therefore, the distribution of this unit is not included on Exhibit B.

Old Alluvium (Qofu): Old alluvial-fan deposits are depicted by Matti and Morton (2015) as a mantle on underlying bedrock units in the southwestern portion of the expansion area. These materials include sand, silt, and gravelly sediments derived from local bedrock areas. Tran (2017) did not differentiate alluvial cover in his mapping. These deposits are not included on Exhibit B since they will be removed from the expansion area as overburden or soil stockpile.

Mt. Eden Formation (Tmea): Arkosic sandstone and silty sandstone of the Mt. Eden formation forms a sedimentary cover along the northern boundary of the expansion area. This unit is described as homogeneous, consolidated to lithified, well-bedded gray and brown sandstone. This unit is recessive and slope forming. Areas of Tmea appear to occur within the proposed slope boundary along the northern side of the proposed expansion area.

Granitic and Gneissic Bedrock (gr): Bedrock of intrusive origin and mixed gneissic textures crops out south of the expansion area and as localized dikes and screens in the limestone and metasedimentary units (ls, mss, sch). This unit is described by Matti and Morton (2015) as "very pale-brown, texturally massive to foliated, inequigranular to coarse-grained muscovite-garnet monzogranite. Grain size ranges from fine to coarse, with grain size varying on a small scale." Outcrops of granite tend toward rounded forms that protrude through a grussy soil cover.

Metasedimentary Rocks (ms): Metamorphic sedimentary rocks of mixed composition include schist, quartzite and foliated gneiss that include thin layers of limestone (marble) forming recessive landforms. Matti and Morton (2015) describe these as "layered and foliated biotite-quartz gneiss associated with thin unmapped zones of white marble and metaquartzite; locally intermingled with unmapped dikes and sills of Granite of Mt. Eden (gr)." This unit is equivalent to Tran (2017) units '"metasandstone" and "schist."

Marble (m): Marble beds crop out along resistant northwest-trending ridges that form the high ground within the expansion area. The marble is white and varies in texture from medium- to very coarse-grained and rough. Solution weathering has formed localized voids and pockets visible at the ground surface in some outcrops. The marble is indicated as limestone by Tran (2017).

Geologic Structure

The geologic structure of the expansion area is defined by northwest-trending foliation/bedding visible in aerial imagery as resistant ridges, outcrop alignment and primary bedding in steeply northeast-dipping metasediments and marble. The metasediments are bounded by and locally invaded by an intrusive igneous body near the south boundary of the expansion area. Cross joints oriented normal to bedding/foliation form blocky structure within the marble and metasediments. The granitic units tend toward more random joint orientations. Matti and Morton (2015) indicate north to northeast-dipping foliation in the metasedimentary units of the expansion area. Tran (2017) recorded north- and northeast-dipping bedding in the marble (limestone) unit with dip angles between 36 and 60 degrees. Stereonet plots of bedding/foliation data support a bias toward north and northeast-dipping beds in the expansion area. Folding in the metasediments result in more easterly dips locally. Cross joints are more randomly oriented discontinuities that cut bedding and form block fabric in outcrop and excavations in rock material.

Regional-scale and/or large faults were not observed in the existing mine exposures.

FAULTING AND SEISMICITY

Regional Faults

The site is not located within or immediately adjacent to an Alquist-Priolo Earthquake Fault Zone (APZ) designated by the State of California or fault hazard zones designated by the County of Riverside to include traces of suspected active faulting. The closest APZ boundary, designated for the San Jacinto fault, is located approximately two-tenths of a mile southwest of the expansion area boundary. Active or potentially active faults are not shown on or in the immediate vicinity of the site on published geologic maps. Evidence of active faulting on or immediately adjacent to the site was not observed during the geologic field reconnaissance or on the aerial photographs reviewed. The following table lists known potential seismic sources in the site region.

Table 1: Fault Table—Gilman Mine Expansion

Fault Name	Distance (km)[2]	Minimum Magnitude[1]
San Jacinto	0.85	7.04
Beaumont Plains fault zone†	5	6.3
San Andreas	20.8	6.94
Elsinore	35	7.07

1 Petersen et al., 2008
2 EZFRISK version 7.65 (2015)
†Wells and Coppersmith (1994)

San Jacinto Fault Zone: The San Jacinto fault zone is a system of northwest-trending, right-lateral, strike-slip faults approximately 1/4 mile southwest of the site. More large, historic earthquakes have occurred on the San Jacinto fault than any other fault in Southern California (Working Group on California Earthquake Probabilities, 1988).

Based on the data of Matti and others (1992), a portion of the San Jacinto fault may accommodate most of the slip between the Pacific and the North American plates. Matti and others (1992) suggest this motion is transferred to the San Andreas fault in the Cajon Pass region by "stepping over" to parallel fault strands that include the Glen Helen fault.

Beaumont Plain Fault: Fault scarps and other lineaments associated with the Beaumont Plain Fault Zone have been mapped approximately 3 miles northeast of the site. The Beaumont Plain fault zone is a system of north- and northwest-trending normal faults that are apparently the result of local extensional strain. Traces of this fault zone are observed as muted scarps and tonal lineaments expressed in older alluvium. Quaternary activity is evident for the fault zone but, where investigated, evidence of Holocene (recent) activity has been uncertain or doubtful (Treiman, 1994). Traces of the Beaumont Plain fault zone across Noble Creek were trenched in the late 1980s. That investigation concluded that the faults that were trenched were inactive and not considered to be a ground rupture hazard (Wessley Reeder, Personal Communication, July 13, 1999). The Beaumont Plain fault zone was interpreted from seismic profiles conducted for water recharge potential in the Beaumont-Cherry Valley area (Gandhok et al., 1999) and was exposed in trenches located in the Beaumont area north of the site. Faults exposed in these trenches were shown to exhibit evidence of Holocene activity (CHJ, Incorporated, 2006).

San Andreas Fault Zone: The San Andreas fault zone (SAFZ) is a major geographic feature of California and constitutes the major expression of the Pacific and North American plate tectonic boundary. The SAFZ extends generally northwestward from the Salton Sea region approximately 745 miles to the offshore region of northern California. The San Bernardino Mountains segment is located approximately 12-1/2 miles northeast of the site. The SAFZ is characterized by numerous youthful fault-related landforms including fault scarps, vegetational lineaments, springs and offset drainages.

Elsinore Fault Zone: The Wildomar segment of the Elsinore fault zone is about 23 miles southwest of the site. The Elsinore fault zone is typified by multiple en echelon and diverging faults. To the north, it splays into the Whittier and Chino faults. The Elsinore is primarily a strike-slip fault zone; however, transtentional features such as the graben of the Elsinore and Temecula Valleys also occur. Most Elsinore fault traces are demonstrably active (Holocene) as documented by Saul (1978), Rockwell and others (1986) and Wills (1988).

GROUND-SHAKING HAZARD

The ground-shaking hazard at the site was evaluated from a deterministic standpoint for use as a guide to formulate an appropriate seismic coefficient for use in slope stability analyses.

A deterministic evaluation of seismic hazard was performed for the San Jacinto fault and other regional faults using the attenuation relations of Boore and Atkinson (2008), Campbell and Bozorgnia (2008) and Chiou and Youngs (2008). These data are summarized in the following table.

Table 2: Summary of Regional Seismic Sources

Fault (segments)	Magnitude	Distance (km)	Peak Ground Acceleration (g)
San Jacinto (SBV+SJV)	7.4	0.85	0.51
Beaumont Plain fault zone	6.3	5	0.32
San Andreas (SM+NSB+SSB)	7.6	20.8	0.19
Elsinore (W+GI)	7.3	35	0.13

W=Whittier, GI=Glen Ivy, SBV=San Bernardino Valley, SJV=San Jacinto Valley, SM=South Mojave, NSB=North San Bernardino, SSB=South San Bernardino

We selected Kh = 0.20 to model the psuedostatic condition for slope stability calculations, consistent with conservative application of methods described by Seed (1979). Seed (1979) considered the size of the sliding mass and earthquake magnitude in selection of Kh. For large slopes, Seed suggested Kh = 0.15 for sites near faults capable of generating magnitude 8.5 earthquakes. The closest fault to the site, the San Jacinto fault, is assigned a characteristic magnitude of 7.4 for the San Bernardino Valley and San Jacinto Valley segments. Based on the method of Seed (1979) and the seismic setting of the site, our selection of Kh = 0.20 is conservative and appropriate for evaluation of existing site slopes.

GROUNDWATER

The site is located in Section 25 of Township 3 South, Range 2 West and is elevated above the groundwater-producing zones of the San Jacinto valley. We observed no seepage, springs or other evidence for a groundwater table within the quarry boundary during geologic mapping. Groundwater data compiled by Western Municipal Water District (2017) did not indicate well data for the site vicinity.

Two wells are located on site. Information reported for Well “KM Shallow” indicates that it is situated at an elevation of 1,933 feet amsl and had a static water level of 397 feet below the existing ground surface (bgs) when drilled in 2000. A depth to water of 522 feet bgs is also reported for this well. These data indicate that groundwater occurs below the proposed bottom elevation of the expansion pit. Groundwater is not anticipated to occur within the lowest proposed elevation of the final pit bottom (1,740 feet amsl).

The reclaimed pit is expected to be graded to prevent overland and surface flow from tributary channels reaching the pit.

Based on the presence of non-liquefiable bedrock, the potential for liquefaction and other shallow groundwater-related hazards at the site is considered to be very low. The quarry bottom may be exposed to periodic ponding of surface water after locally heavy precipitation. However, such ponding is anticipated to be shallow and short-lived—lasting only as long as evaporation/infiltration occurs; therefore, this transient water is not considered in slope stability calculations. Groundwater is not anticipated to significantly affect the stability of the proposed slopes; therefore, our evaluation considered dry conditions in the slope stability calculations.

SLOPE STABILITY

The term "landslide," as used in this report, refers to deep-seated slope failures that involve mine pit-scale features (overall slope or interramp slope) that have the potential to reduce the long-term stability of finished reclamation slopes. Landslides in hard rock mines are controlled by the interaction of geologic structure with the mine wall configuration and character of the rock material. Surficial failures refer to shallow failures that affect limited interbench slopes and may result in localized raveling of rock material. Surficial failures or raveling are considered a slope management/maintenance issue during mining. Landslide denotes more problematic, large-volume features.

The susceptibility of a geologic unit to landsliding is dependent upon various factors, primarily: 1) the presence and orientation of weak structures, such as fractures, faults or weak beds; 2) the height and steepness of the natural or cut slope; 3) the presence and quantity of groundwater; and 4) the occurrence of strong seismic shaking. Primary influences on the stability of final mine slopes are anticipated to be interaction between slope geometry and geologic structure including bedding/foliation and joints, within the pit margin. The groundwater potential at the Gilman site is low. The seismic ground shaking potential is high.

Geologic Mapping

Geologic structural mapping included measurement of the orientation of bedrock structures (discontinuities such as joints, shears and bedding/foliation) in mine and outcrop exposures. The orientations of discontinuities were recorded in tabular format (Appendix B – Table B-1). Structural data were grouped according to the field location.

The controlling bedrock discontinuities at the mine-wall scale consist of moderately-dipping foliation/bedding planes within the metasedimentary and marble units and joints to a lesser degree. As observed in existing mine exposures, at the bench/face scale, discontinuities are primarily block-forming joints and fractures oriented normal to the bedding planes. Analyses of the proposed reclamation slopes are presented in the following section as kinematic analysis and slope stability calculations.

SLOPE STABILITY EVALUATION

We evaluated the kinematic and global slope stability of the proposed slopes for representative configurations and material types. Stereographic analyses were conducted on the discontinuity orientation data (Table B-1) to identify the kinematically possible failure modes in bench faces. Typically, it is not cost effective to eliminate all potentially unstable blocks, and a certain percentage of small failure and/or multiple bench instabilities is acceptable. Most of the smaller unstable features will be removed during mining by scaling of the bench faces. Limit equilibrium analyses (global stability) of the proposed rock slopes were performed to compute the overall factors of safety against large-scale, multiple-bench failures through the rock mass. The proposed slope heights and overall slope angles were evaluated based on the results of the rock mass stability analyses.

Rock strength properties for global stability calculations were modeled using Hoek Brown criteria and the ultimate mining depths (highest slopes) anticipated in the mine pit. Discussion and summary of these analyses are presented below. Slope stability data and calculations are presented in Appendices B and C.

Kinematic Analysis

Kinematic analysis involves the evaluation of geometrically feasible failure modes in bedrock based on the orientation of structural discontinuities including joints, faults, shear zones, bedding and foliation. Kinematic analysis does not consider mass or force as in a limit-equilibrium analysis. Structurally controlled kinematic failure modes include planar, wedge and topple failure. Topple failure geometry was not evident in the native outcrops or existing mine benches but was included based on the potential for north-dipping regional bedding to produce tensional features on the proposed south mine benches. A diagram illustrating the terminology of mine slope configuration is included in Appendix B.

Stereonet analysis (Rocscience, 2017) for selected representative slope/bench aspects was performed utilizing the data compiled from mapping and measurement of geologic structures within the site (Appendix B – Table B-1). The initially-proposed and adjusted maximum bench face angles (45 degrees and 80 degrees, respectively) were evaluated for various slope azimuths (facing directions) shown on the reclamation plan. The bench face angle is stated as 88 degrees by the designer. Based on our experience with similar rock types and geologic environments, actual face angles will be closer to 80 degrees or flatter. Therefore, we evaluated the 80-degree face for kinematic considerations. The slope orientations are listed in Table 4.

The geologic structure is strongly influenced by well-developed bedding and foliation planes that dip north-northeast, northeast, and east-northeast within the metasedimentary and marble units. A stereonet plot of bedding planes is included in Appendix B (B-3.2).

Planar analysis considers dip vectors of measured planar features. Planar sliding requires a releasing surface—a joint, tension crack or daylighted plane—to allow sliding to occur. Kinematic analysis does not consider the geometry of releasing surfaces or the presence of bonded contacts along the sliding plane; therefore, actual conditions are typically more stable than indicated by kinematic results. The potential for planar sliding or wedge failure suggested by stereonet analysis should be considered a conservative estimate of probability subject to mitigation by mining practices such as scaling and adjustment of slope face angles to the geometry and conditions encountered during mining. Wedge analysis generates dip vectors for the intersections of all planes; therefore, wedge analysis generates a large number of vectors to evaluate. Topple analysis identifies the potential for columns to form along steeply dipping joint systems or contacts to tilt out of the excavated face along separation surfaces. The stereonet data plots are presented in Appendix B. Table 4 summarizes the results of kinematic evaluation.

Table 3: Kinematic Evaluation—Gilman Expansion						
Slope Aspect	**Percentage Critical Points**					
	Planar		**Wedge**		**Topple**	
	45° slope	80° face	45° slope	80° face	45° slope	80° face
010	2.2	17.8	6.6	37.2	2.2	2.2
050	8.9	13.3	16.8	27.1	2.2	2.2
090	4.4	4.4	11.1	18.9	4.4	8.9
145	0.0	2.2	0.2	8.5	0.0	0.0
205	0.0	0.0	0.7	4.1	0.0	15.6
265	0.0	6.7	0.0	10.3	2.2	6.7

The stereonet evaluation provides results as a percentage of points in a data set with a geometrically feasible orientation to undergo a particular failure mode. In general, the percentage value relates to probability of a particular failure mode. Probabilities below 5 percent suggest low failure potential, 5 percent to 20 percent (blue shading) a low to moderate potential, and values above 20 percent (orange shading) a moderate or higher potential.

As expected for geologic units with well-developed bedding planes, a strong potential for planar and wedge failure is suggested for north- and north-east-facing slopes that are cut at steep angles in the bedded metasedimentary and marble units. However, the bedded units do not generally occur in north- or northeast-facing slopes within the planned pit footprint. In addition, bedded units are mapped in proposed slope areas that will result in favorable bedding orientation relative to slope direction. It is expected that slope management during mining will mitigate planar and wedge features exposed in mine and finished slopes.

Topple potential is low to moderate for all slopes cut to 80 degrees or flatter. Topple features are generally absent from the site bedrock as columnar-type joint systems are not present. The potential for topple failure is considered low and any topple features are considered mitigatable during mining.

The use of sensitivity plots provides analysis necessary for evaluation of the revised pit margin. Sensitivity analysis plots are included in Appendix B for planar, wedge and topple geometries versus slope aspect (facing direction). For the proposed 80-degree slope faces, these plots indicate low to moderate potential for planar sliding in slope aspects between 85 and 360 degrees and moderate to high potential for north- to northeast-facing aspects in bedded geologic units. Similar potentials are indicated for wedge sliding based on the sensitivity analysis. Topple potential is low to moderate for all slope aspects according to the sensitivity evaluation.

Typical bench face heights in hard rock mines range from 40 to 50 feet, the expected range for the proposed expansion area of the proposed expansion mine. The modified Ritchie criteria (MRC), where bench width is equal to 0.2 x height + 15 feet, provides a guide for selection of bench width to mitigate rock fall (Ryan and Pryor, 2000). The minimum recommended bench widths for 40-foot-tall and 50-foot-tall slopes is 23 feet and 25 feet, respectively. Consideration of back break results in an effective bench width of approximately 20 feet measured from the toe of the bench face to the outside of the bench. This effective bench width (benches constructed at 25-foot widths with back break to 20 feet) is considered suitable for mitigation of rock fall for the subject mine.

Recommendations for mitigation of bench-scale raveling due to kinematically possible slope failures are provided in the Recommendations section. The slope plan presented in the mine plan is considered feasible with regard to the performance of the proposed rock faces, provided that the recommendations presented herein, including consideration of increased bench widths where adverse geologic structure results in poorly performing slopes and benches, are considered in mine planning and operation. Slope and bench design should allow for adjustments due to areas of raveling on wall faces.

Global Stability Calculations

The global stability of revised reclamation slopes, as depicted on the plan dated March 28, 2019, was analyzed using Spencer's method under both static and seismic conditions for rotational and composite failure surfaces using the SLIDE computer program, version 6.039 (Rocscience, Inc., 2016). Selection of the slope configurations for the analysis, which includes the tallest anticipated slopes, is a most-conservative approach. The whole rock strength of the geologic units was determined in part by reference to our database of unconfined compressive strength (UCS) tests on block samples from similar geologic units and a database of Generalized Hoek-Brown rock strength parameters included in the SLIDE software application.

Slope stability calculations were performed on representative slopes modeled as follows:

Table 4: Summary of Slope Configurations

Section	Height (ft.)	Modeled Configuration	Location
A*	315	25’(H) - 90° interbench slopes x 25'(W) benches** forming overall 45° slopes	North wall
B*	225	25’(H) - 90° interbench slopes x 25’ (W) benches forming overall 45° slopes	South wall

*Analyzed for global stability – finished faces and slopes will be slightly flatter and inclusion of haul roads will reduce the overall slope angle; therefore, this analysis is conservative. Design slope configurations are provided in the Reclamation Plan.

**Note: recommended bench widths are 20 feet minimum

The modeled slope angles slightly exceed the planned upper/lower and overall slope angles. The occurrence of back break and kinematic influence on face angles may result in flatter slopes overall. Our slope stability calculations for the proposed reclaimed slopes are based on configurations consistent with anticipated final mining conditions.

Seismic stability calculations were performed using a lateral pseudostatic coefficient Kh of 0.20, consistent with the seismic conditions of the site region. Groundwater was not included in the global stability models due to the lack of seepage and depth to groundwater anticipated in the site environment.

The rock strengths modeled utilizing measured UCS values, the Generalized Hoek-Brown criteria (Hoek, 2000; Hoek, Carranza-Torres & Corkum, 2002) and the SLIDE program built-in parameter calculator with the following input values:

Table 5.1: Gilman Expansion—Marble Unit (m)
Rock Strength Parameters

Parameter	Value	Description
Unit Weight (pcf*)	175	Databases
Specific Gravity	2.80	Databases
Intact UCS[1] (psf**)	1.50×10^6	Databases
Geological Strength Index	45	Very blocky structure Fair surface conditions
Intact Rock Constant (mi***)	9	Marble
Disturbance Factor	0.85	Engineering - production blasting

*pcf = pounds per cubic foot
**psf = pounds per square foot
[1]Uniaxial compressive strength test result
***mi = unitless constant

Table 5.2: Gilman Expansion—Schist (Sch)
Rock Strength Parameters

Parameter	Value	Description
Unit Weight (pcf*)	170	Databases
Specific Gravity	2.72	Databases
Intact UCS[1] (psf**)	7.00×10^5	Databases
Geological Strength Index	37	Blocky disturbed seamy structure Fair surface conditions
Intact Rock Constant (mi***)	12	Schist
Disturbance Factor	0.85	Engineering - production blasting

*pcf = pounds per cubic foot
**psf = pounds per square foot
[1]Uniaxial compressive strength test result
***mi = unitless constant

Table 5.3: Gilman Expansion—Metasedimentary Unit (mss) Rock Strength Parameters		
Parameter	**Value**	**Description**
Unit Weight (pcf*)	168	Databases
Specific Gravity	2.69	Databases
Intact UCS[1] (psf**)	3.50×10^6	Databases
Geological Strength Index	45	Very blocky interlocked structure Fair surface conditions
Intact Rock Constant (mi***)	19	Metasandstone
Disturbance Factor	0.85	Engineering - production blasting

*pcf = pounds per cubic foot
**psf = pounds per square foot
[1]Uniaxial compressive strength test result
***mi = unitless constant

Table 5.4: Gilman Expansion—Granite Unit (gr) Rock Strength Parameters		
Parameter	**Value**	**Description**
Unit Weight (pcf*)	165	Databases
Specific Gravity	2.65	Databases
Intact UCS[1] (psf**)	1.50×10^6	Databases
Geological Strength Index	35	Blocky/Disturbed/Seamy structure Fair surface conditions
Intact Rock Constant (mi***)	25	Database - granite (reduced by 25%)
Disturbance Factor	0.85	Engineering - production blasting

*pcf = pounds per cubic foot
**psf = pounds per square foot
[1]Uniaxial compressive strength test result
***mi = unitless constant

The results of the global slope stability analyses are summarized below in Table 6. Details of stability calculations including material type boundaries, strength parameters utilized and the minimum factor of safety (FS) and critical slip surface are included in Enclosures C-1.1 through C-2.2.

Table 6: Summary of Slope Stability Results—Gilman Expansion			
Cross Section	**Static Factor of Safety**	**Seismic Factor of Safety (Kh=0.20)**	**Enclosure No.**
A	1.53*	1.26	C-1.1 and C-1.2
B	2.01	1.46	C-2.1 and C-2.2

Minimum FS focused in bench face only. Whole slope FS values exceed the minimum 1.5 FS required

As indicated by calculation, sufficient static factors of safety (FS) in excess of 1.5 and seismic factors of safety in excess of 1.1 were indicated for the modeled slope configurations and satisfy Office of Mine Reclamation criteria. The global slope configurations appear suitably stable for reclamation of the proposed slopes according to regulatory requirements.

CONCLUSIONS

On the basis of our current slope stability analyses, it is the opinion of this firm that the proposed slope excavations and reclamation of the proposed mine slopes are feasible from geotechnical engineering and engineering geologic standpoints, provided the recommendations contained in this report are implemented during mining.

In general, it appears that the whole rock strength of bedrock materials is sufficient to accommodate the proposed overall slope angles.

Based on our prior analyses (GEO No. 180007), overall modeled 42-degree mine cut-slopes up to approximately 400 feet in height and upper/lower intermediate slopes (modeled at 45 degrees) are suitably stable against gross failure for the anticipated long-term conditions, including the effects of seismic shaking. Based on our current analysis, revised slope configurations are also suitably stable against gross failure for the anticipated long-term conditions, including the effects of seismic shaking. Therefore the planned (slightly flatter) slope angles are considered suitably stable against gross failure for the anticipated long-term conditions, including seismic shaking.

Subsequent to excavation of the rock slope walls and prior to moving below the reach of mining equipment, mining operations should include the use of a scaling chain or mechanical equipment (excavator) to assist in removal of loose or precarious blocks during mucking operations. Adherence to the slope benching plan and consideration of newly exposed, potentially adverse structural features (if present) during mining work can result in stable slopes during mining after completion of reclamation.

Evidence of active faulting was not observed on the site during this investigation, and active faulting is not anticipated to affect the reclaimed slopes. The potential for liquefaction and other shallow groundwater hazards within the reclamation area is considered to be low.

Moderate to severe seismic shaking of the site can be expected to occur during the lifetime of the proposed mining and reclamation. This potential has been considered in our analyses and evaluation of slope stability.

Raveling processes during and after quarry operation, with time, will result in deposition of talus on benches that are included in design to mitigate rockfall as catchment zones. Talus left on the benches can facilitate revegetation and lend a more natural appearance to the reclaimed slopes. It is anticipated that rock fragments will be angular and relatively resistant to rolling. Therefore, rockfall hazard is not anticipated for properly excavated and scaled rock slopes.

RECOMMENDATIONS

Overall final cut slopes (pit top to pit toe) should be no steeper than approved angles (42 degrees as modeled in Cross Section A) up to the maximum proposed height (400 feet). The benching plan is suitable to provide rock fall protection consistent with the modified Ritchie criteria (MRC), as described by Ryan and Pryor (2000). The bedding orientation (generally 40-degree northeast dip) within marble-bearing and foliated schist strata may influence the geometry of north- and northwest-facing pit walls. The occurrence of back break and kinematic influence on face angles may result in slightly flatter or steeper interbench slope angles. Mining operations and ongoing slope design should include allowance for flattening or steepening of interbench slope angles where geologic structure dominates. The design criteria for the recommended pit slope angles are based on the assumption that low-damage, controlled blasting techniques or other suitable methods of excavating relatively clean and uniform benches and faces will be employed to create the final reclamation slopes. The geotechnical engineer or geologist should be notified if adverse slope conditions that are not mitigatable by established operational plans are discovered during mining.

Geotechnical evaluation and design, management of mine bench geometry based on encountered conditions, or use of mechanical support systems can enhance the safety of or mitigate hazards in mining; however, monitoring of slope conditions for failure warning signs is the most important means for protecting mine workers (Girard and McHugh, 2000) as it can prevent exposure of personnel to potentially hazardous conditions. As is typical for any surface mining operation, we recommend periodic observation of mine benches above working areas for indications of potential instability during mine operations. Pit slope monitoring should include regular inspections of benches and pit crests in order to identify any tension cracks or other indications of potential slope instability. Inspection of the benches/pit walls near newly-mined areas should identify and document any features suggestive of slope instability, including fissures or cracks, raveling on rock faces or water seepage, if present.

The required annual inspections should be performed to provide documentation of conditions in mining and reclamation slopes. Inspections of pit conditions should be performed at time intervals sufficient to provide for ongoing safety of personnel and mine slope stability and should be determined by on-site personnel (mine manager) based on operating conditions.

Geologic mapping of final reclamation slopes may be performed during annual inspections or more frequently as conditions warrant. Preparation of the final benched slope faces should include scaling to ensure removal of loose or potentially unstable blocks, if present. If raveling or instability is evident during excavation of final slopes, the bench width should be increased to provide a suitable buffer to daylighted or unstable features and a sufficient bench area to mitigate rockfall.

Unstable, rounded boulders on overburden or mine slopes steeper than approximately 2(h) to 1(v) should be removed or stabilized where accessible. Mine areas below loose rock, if left in place during mining, should be restricted from general access and indicated by means of signage or fencing.

Mine slopes and benches should be protected with perimeter berms and/or levees as necessary to prevent slope erosion or surface flow incursion in the areas where natural slopes drain toward the mining and/or reclaimed slopes.

GENERAL COMMENTS

Our services are conducted with the understanding of the project as described in the proposal, and will incorporate collaboration with the design team as we complete our services to verify assumptions. Revision of our understanding to reflect actual conditions important to our services will be based on these verifications and will be reflected in the final report. The design team should collaborate with Terracon to confirm these assumptions and to prepare the final design plans and specifications. This facilitates the incorporation of our opinions related to implementation of our geotechnical recommendations. Any information conveyed prior to the final report is for informational purposes only and should not be considered or used for decision-making purposes.

Our analysis and opinions are based upon our understanding of the geotechnical conditions in the area, the data obtained from our site exploration and from our understanding of the project. Variations will occur between exploration point locations, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the geotechnical engineer, where noted in the final report, to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our scope of services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third party beneficiaries intended. Any third party access to services or correspondence is solely for information purposes only. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

We appreciate this opportunity to be of service and trust this report provides the information desired at this time. Should questions arise, please do not hesitate to contact this office.

Sincerely,
Terracon Consultants, Inc.

John S. McKeown, E.G. 2396	Jay J. Martin, E.G. 1529
Senior Geologist	Principal Geologist

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Aerial Imagery Examined

Riverside County Flood Control District, January 19, 1948, black and white aerial photograph nos. 148 and 149.

Riverside County Flood Control District, May 24, 1974, black and white aerial photograph nos. 242 and 316.

Riverside County Flood Control District, February 15, 1977, black and white aerial photograph nos. 3-16 and 3-17.

Riverside County Flood Control District, March 11, 2000, black and white aerial photograph nos. 6-39 and 6-40.

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ATTACHMENTS

APPENDIX A – MAPS AND CROSS SECTIONS

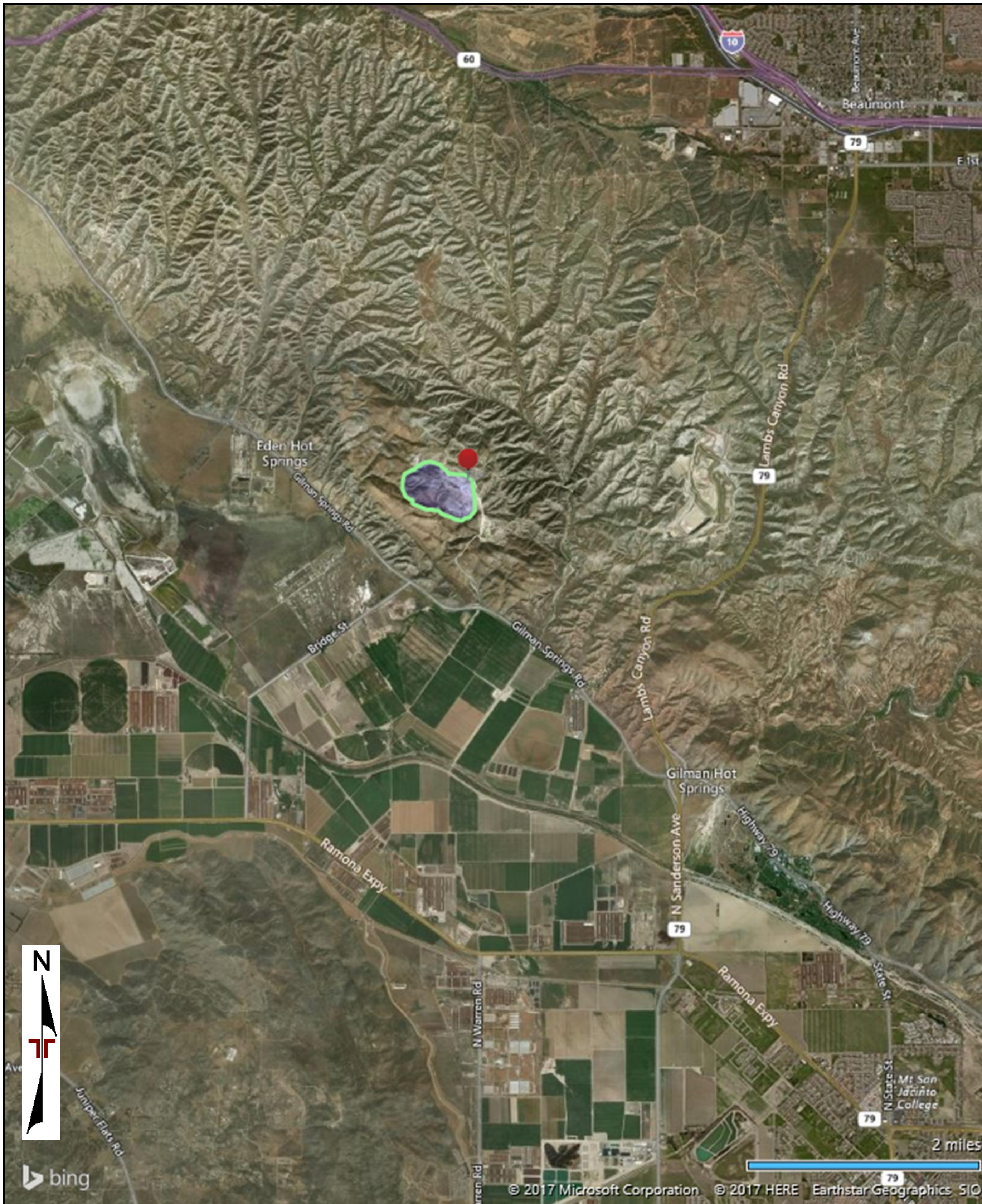
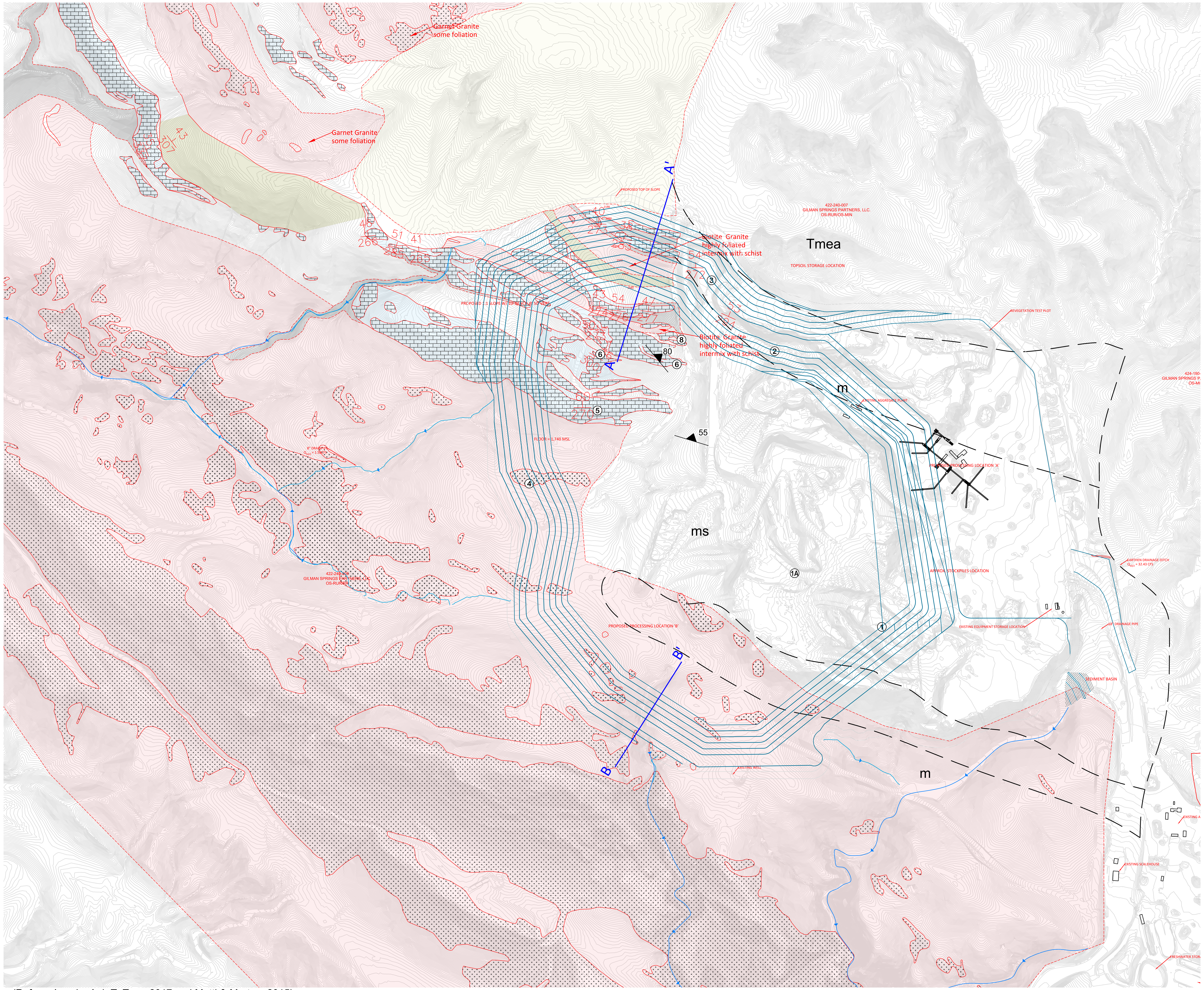


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: JJM	Project No. CB195044	Terracon 1355 E Cooley Dr Ste C Colton, CA 92324-3954	LOCATION MAP	Exhibit
Drawn by: JMc	Scale: AS SHOWN		Revised Slope Stability Investigation **Proposed Expansion of Gilman Springs Pit** **Moreno Valley, CA**	A-1
Checked by: JMc	File Name: ?			
Approved by: JJM	Date: APR 2019			



(Ref: geology by Anh T. Tran, 2017 and Matti & Morton, 2015)

-N-

SCALE: 1" = 200'

0 200 400

GEOLOGIC UNITS:

Tmea - Mt. Eden Formation, arkosic member, recissive
ls - limestone
gr - granite
mss - metasandstone
sch - schist
ms - metasedimentary rocks, biotite-quartz, gneiss, marble, & metaquartzite
m - marble

Geologic Contact

B B'
Location of Cross Section

28
Mineral & compositional foliation in metamorphic rocks

dip
54
272
azimuth
Strike and dip of bedding/foliation (Tran 2017)

⑧ Location of structural mapping corresponding to Table B-1

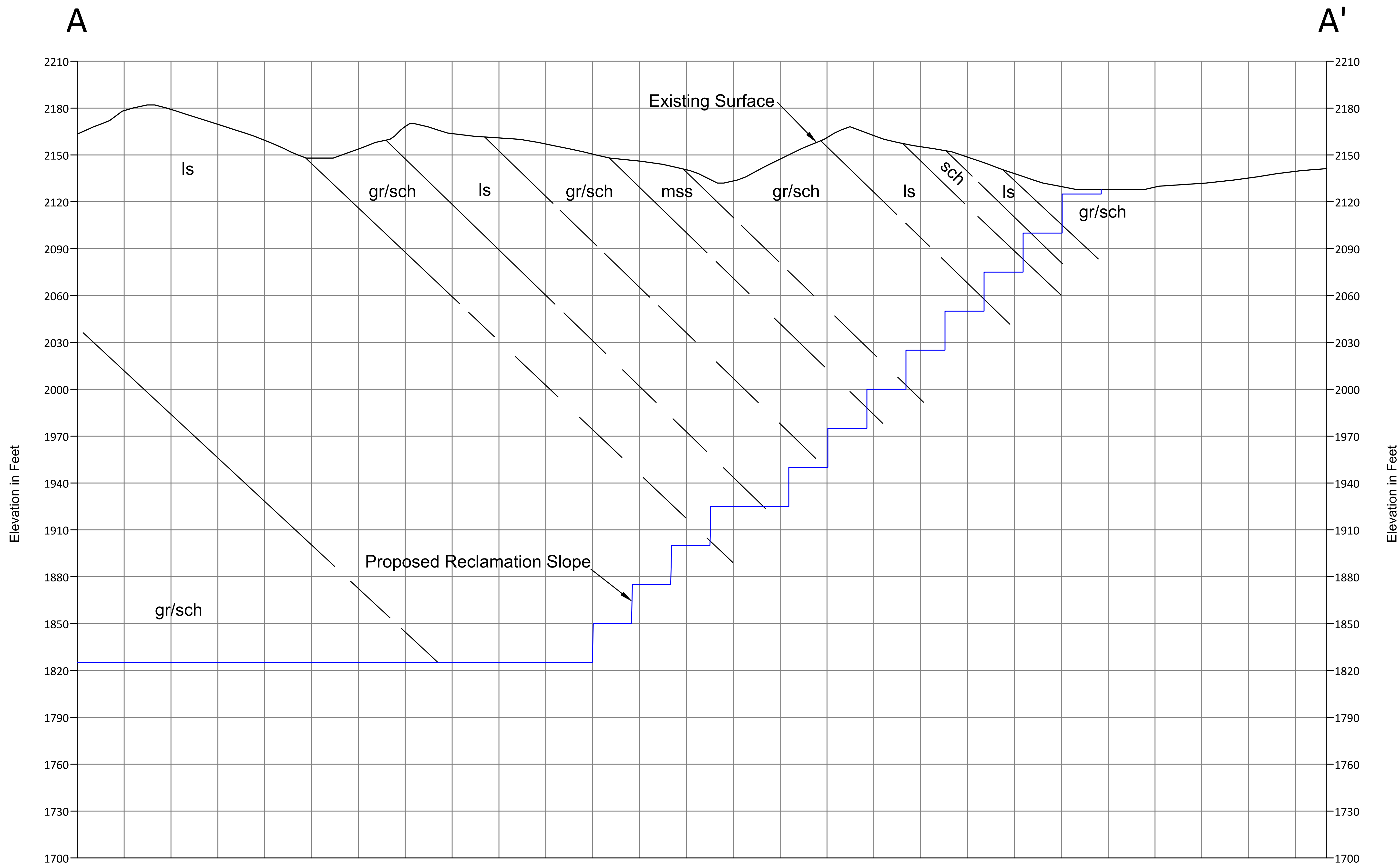
Limestone

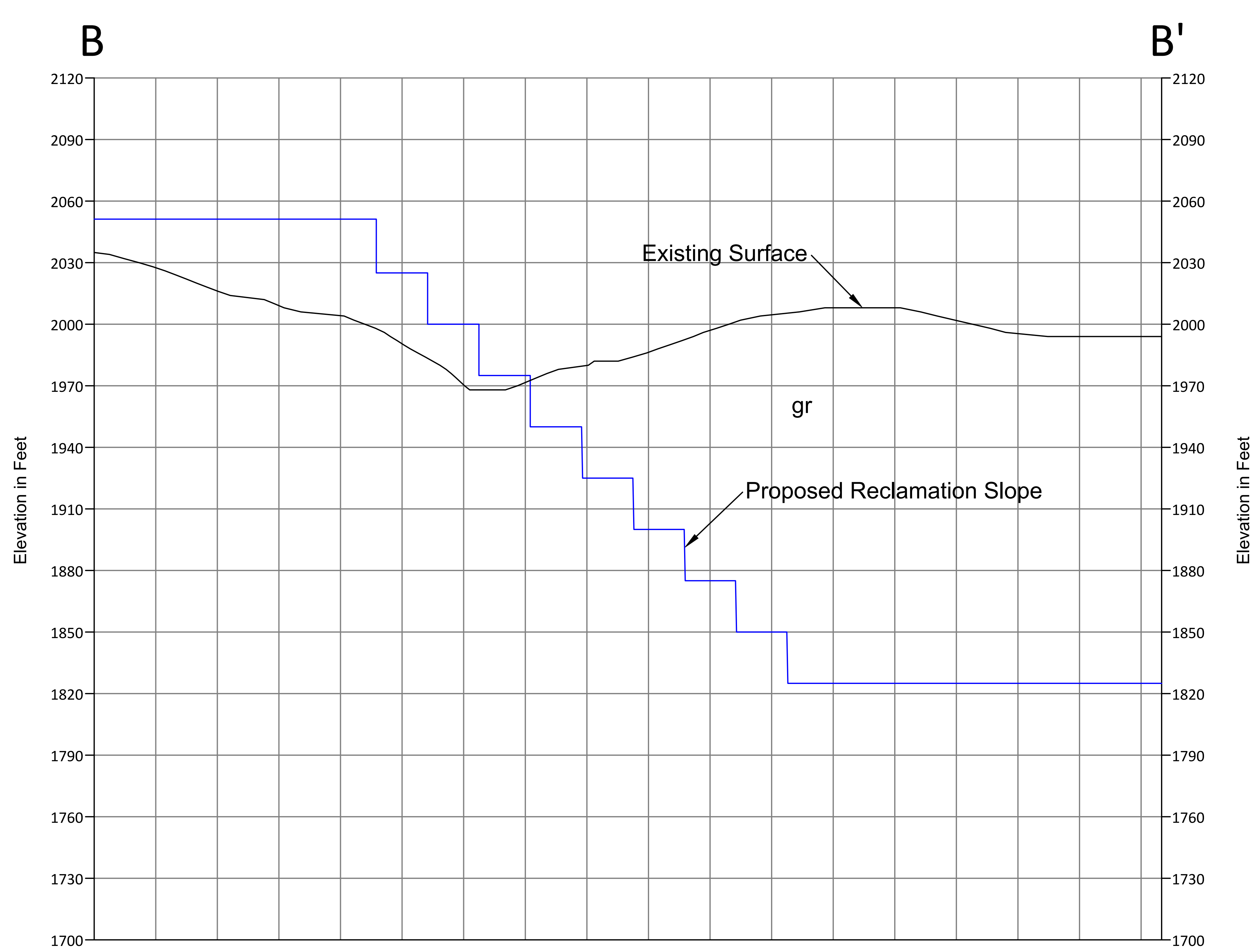
MetaSandstone

Granite and Granitoids

Schist

Project Manager: JM	Project No. DB195044	Terracon 1355 E. Cooley Drive Colton, CA 92324	GEOLOGIC MAP & SITE PLAN	Exhibit
Drawn By: ST	Scale: 1" = 200'		Revised Slope Stability Investigation Proposed Mine Expansion - Gilman Springs Pit Moreno Valley, California	A-2
Checked By: JJM	File Name: Exhibit B			
Approved By: JM	Date: April 2019			





NOTE: Slope height modeled taller than existing surface to provide stability calculation for potentially taller finished and benched slope.

LEGEND:

ls - limestone
gr/sch - granite & schist
mss - metasandstone
sch - schist
gr - granite

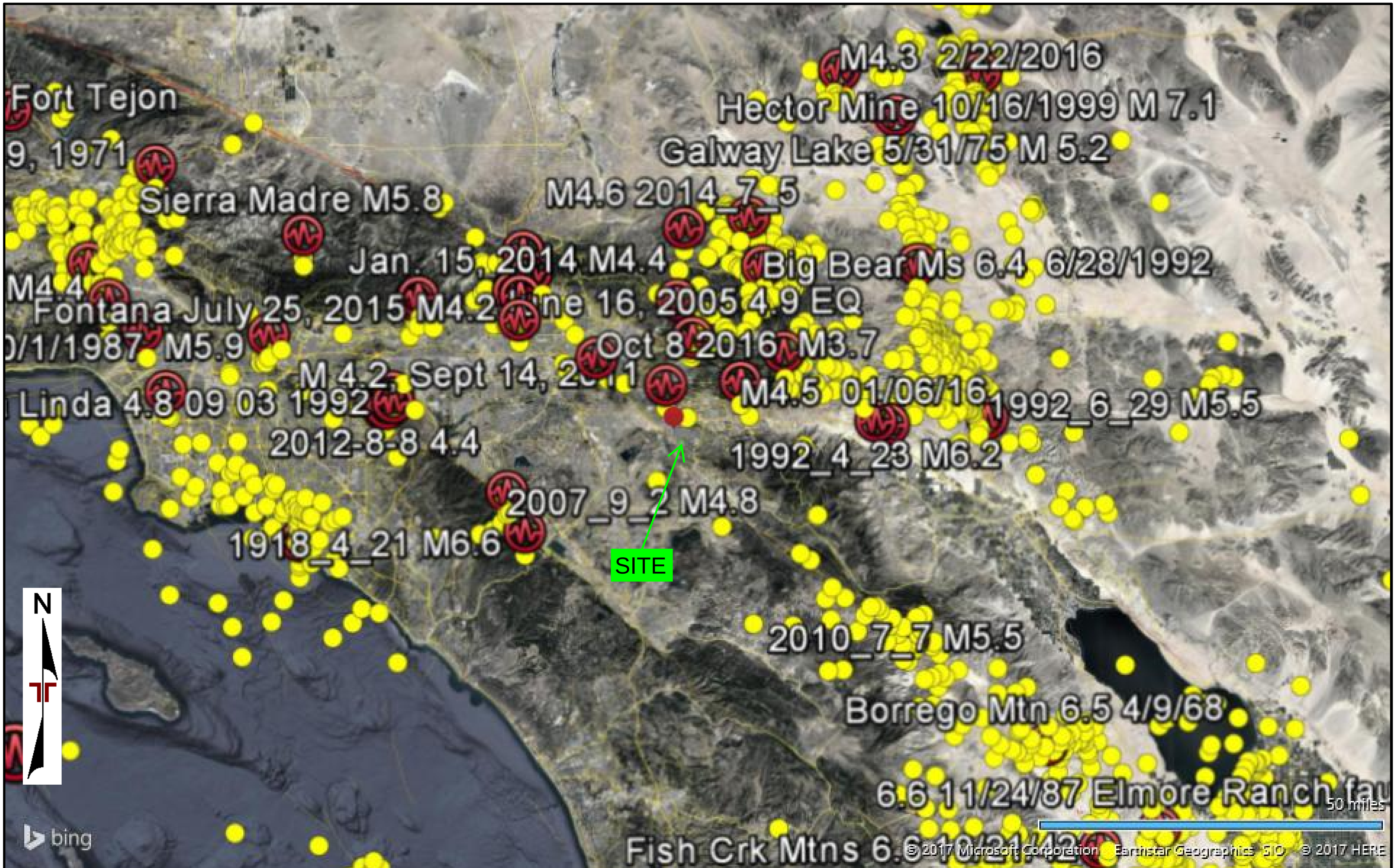
SCALE: 1" = 60'
0 60 120

Project Manager: JM	Project No. CB195030	Terracon 1355 E. Cooley Drive Colton, CA 92324
Drawn By: ST	Scale: 1" = 60'	
Checked By: JM	File Name: Exhibit C	
Approved By: JM	Date: April 2019	

CROSS SECTIONS

Revised Slope Stability Investigation
Proposed Mine Expansion - Gilman Springs Pit
Moreno Valley, California

Exhibit
A-3



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: JJM	Project No. CB175260
Drawn by: JMc	Scale:
Checked by: JJM	File Name: ?
Approved by: JMc	Date: NOV 2017

Terracon

1355 E Cooley Dr Ste C
Colton, CA 92324-3954

REGIONAL SEISMICITY

Proposed Expansion of Gilman Springs Pit 36060 Gilman Springs Road
Moreno Valley, CA

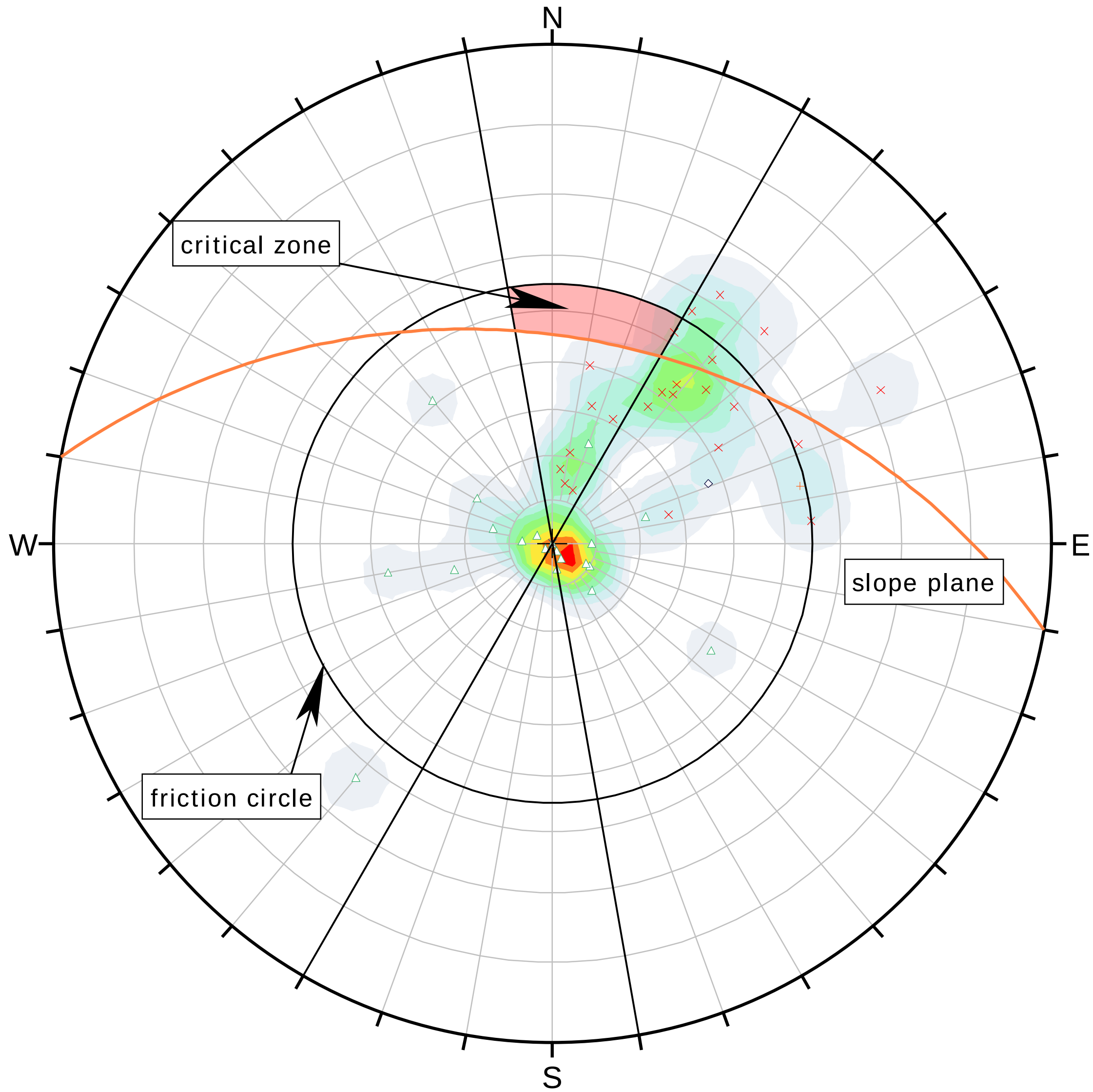
Exhibit

A-4

APPENDIX B – KINEMATIC EVALUATION

Table B-1: Discontinuity Data – Chandler Gilman Springs Mine							
ID	**Dip**	**Dip Direction**	**Location**	**Geologic Unit**	**Type**	**Continuity**	**Notes**
1	48	060	1	schist	fol	1	
2	28	045	1	marble	fol	1	
3	34	068	1	schist	fol	5	
4	53	069	1	marble	con	4	
5	28	034	1A	schist	fol	5	sch v gr
6	83	275	1A	schist	j	3	normal to foliation
7	86	150	1A	schist	j	3	
8	88	234	1A	schist	j	3	
9	41	053	1A	schist	fol	5	
10	36	077	1A	schist	lin	4	lineation in schist
11	43	045	2	marble	fol	5	
12	76	284	2	gr	j	3	
13	66	020	2	gr	j	3	
14	70	301	2	gr	j	3	
15	86	298	2	gr	j	3	
16	46	038	2	schist	fol	5	
17	67	255	2	marble	j	3	sets form wedges
18	84	170	2	marble	j	3	sets form wedges
19	33	031	2	marble	fol	5	
20	49	036	3	schist	fol	4	
21	90	290	3	schist	j	3	
22	18	065	3	schist	fol	5	
23	63	076	3	marble	fol	5	contact sch v marble
24	80	121	3	gr	j	3	
25	88	151	4	gr	j	3	
26	76	012	5	schist	fol	5	
27	50	012	5	schist	fol	5	road cut
28	35	085	5	marble	fol	3	contact
29	77	021	5	marble	fol	5	
30	69	011	5	marble	fol	5	outcrop
31	49	320	5	marble	j	3	
32	53	260	5	marble	j	3	
33	48	124	6	marble	j	3	
34	48	039	6	marble	fol	5	
35	27	220	6	marble	j	3	
36	68	074	6	marble	j	3	
37	81	121	6	marble	j	3	
38	59	026	7	marble	fol	5	
39	38	041	7	marble	fol	5	
40	81	090	7	marble	j	3	
41	76	140	7	marble	j	3	
42	38	030	7	gr	fol	5	contact gr v marble
43	73	006	6	schist	fol	5	
44	53	035	8	schist	fol	5	
45	58	016	8	schist	marble	5	marble layer 60" thick in contact w/ schist and granite

* C1 - discontinuous (less than 3 ft.); C2 - slightly continuous (3 to 10 feet); C3 - moderately continuous (10 to 30 feet); C4 - highly continuous (30 to 100 feet); C5 - very continuous (greater than 100 feet). Based on Department of the Interior - Bureau of Reclamation, Engineering Geology Field Manual (2nd edition 1998).



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

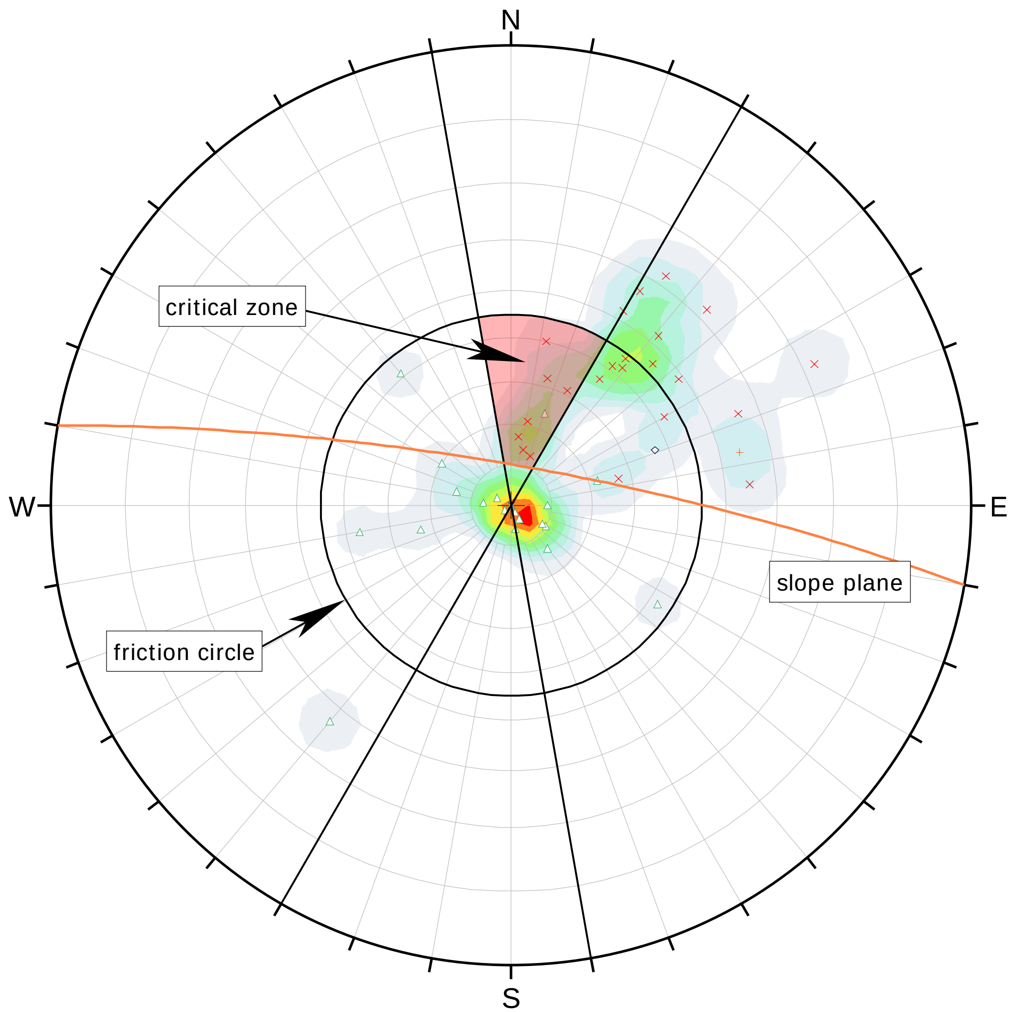
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	10
Friction Angle	35°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Planar Sliding - 45-Degree Slope		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 010 plan 45 gilman global data.dips7	Enclosure: B-2.1



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

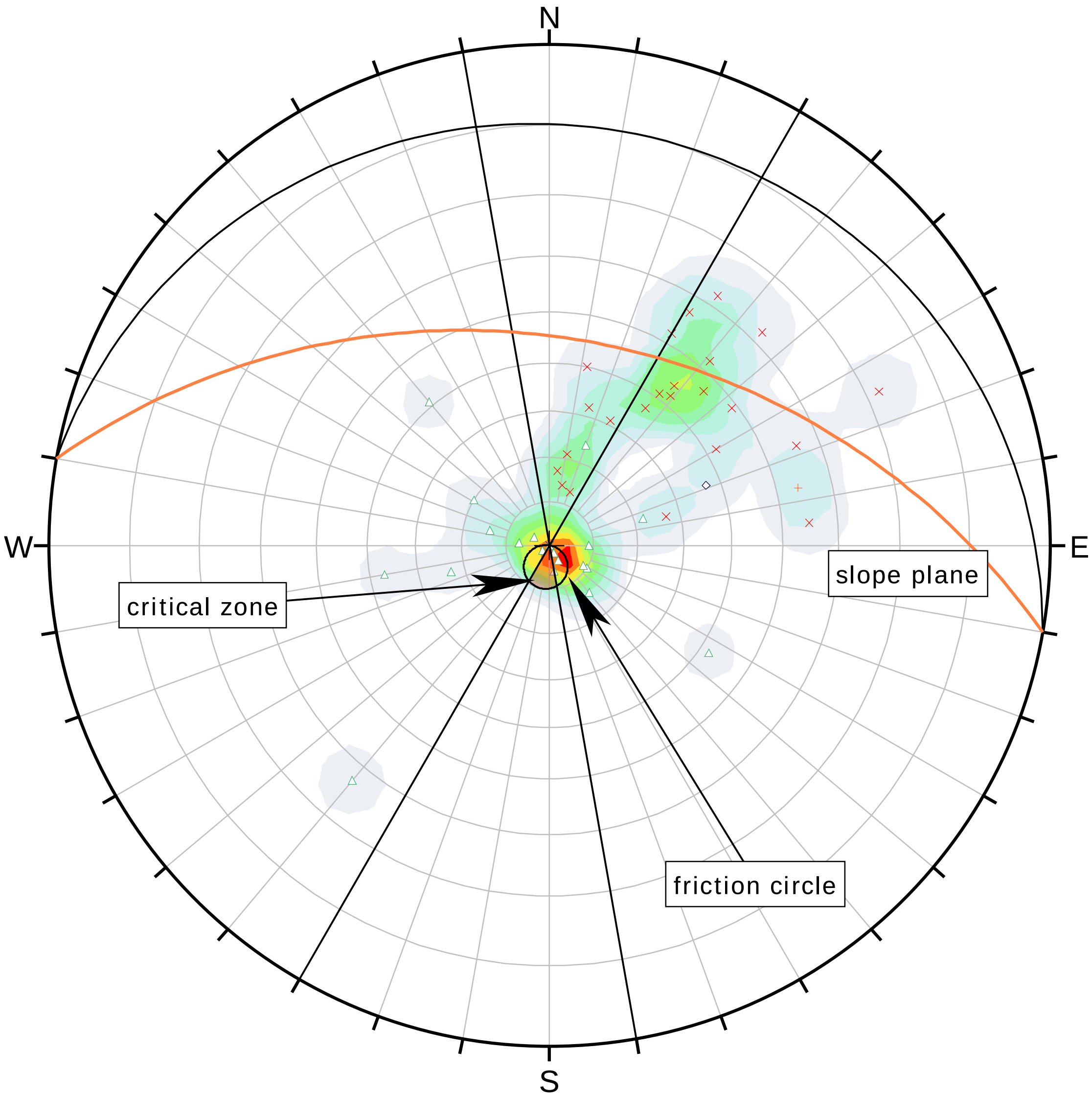
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	80
Slope Dip Direction	10
Friction Angle	45°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	8	45	17.78%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description Global Data Planar Sliding 80 degree face		
	Drawn By JMc	Company Terracon	
DIPS 7.011	*Date* 11/10/2017, 10:04:13 AM	File Name 010 plan 80 gilman global data dips7	Enclosure B-2.2



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

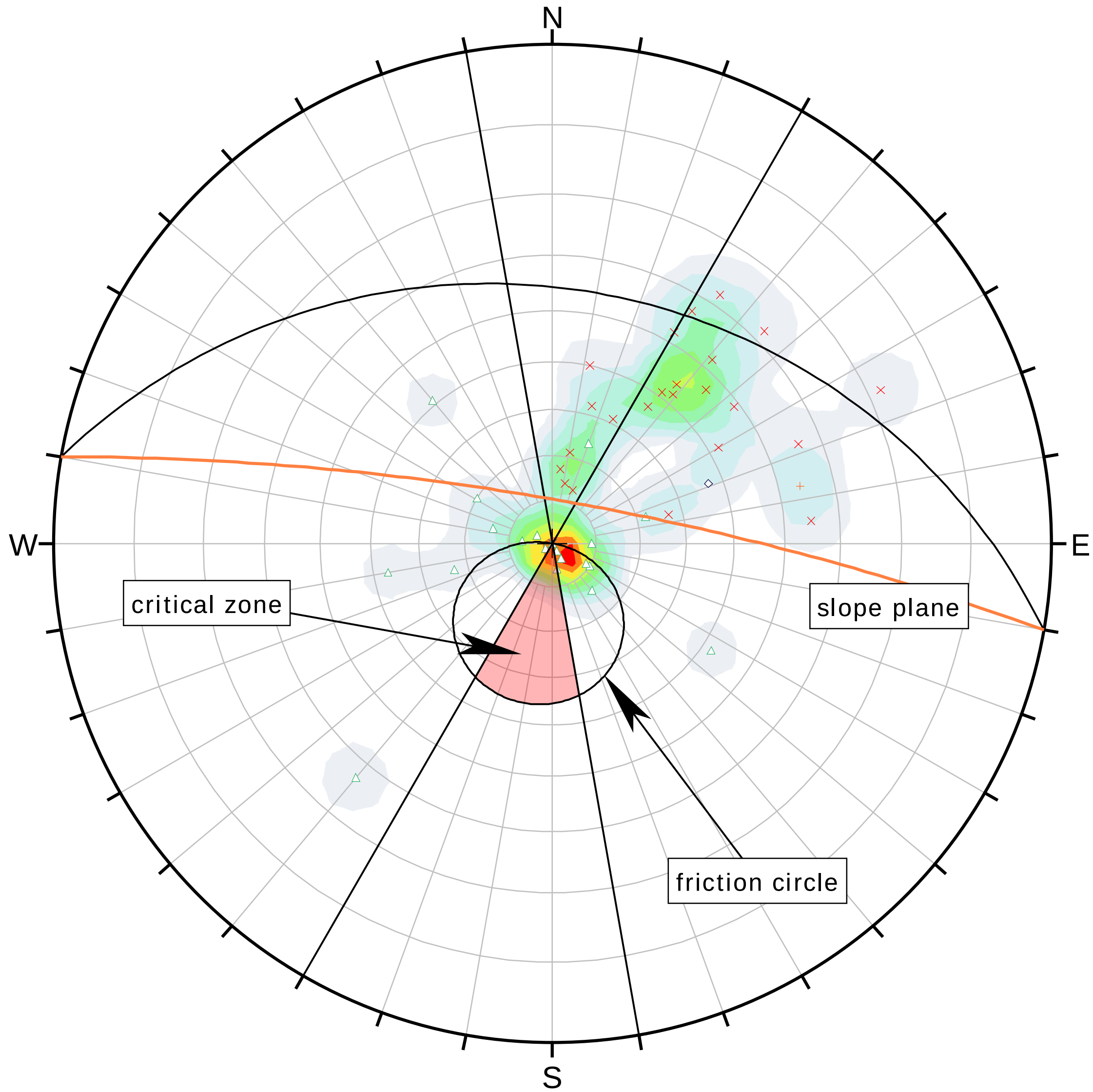
Kinematic Analysis	Flexural Toppling		
Slope Dip	45		
Slope Dip Direction	10		
Friction Angle	35°		
Lateral Limits	20°		
	Critical	Total	%
Flexural Toppling (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Topple Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	010 topl 45 gilman global data dips7
		Enclosure	B-2.3

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
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	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

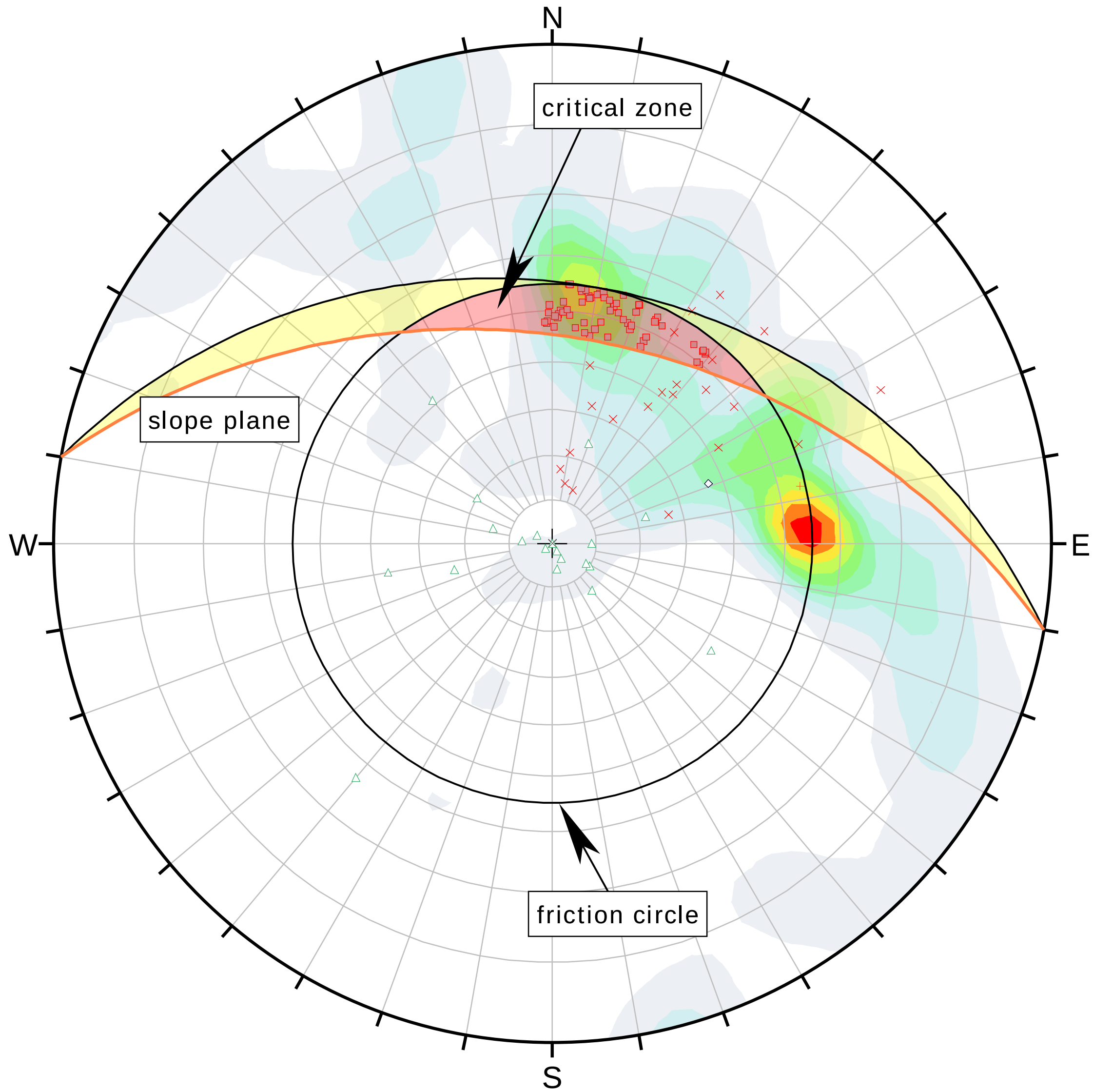
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	80
Slope Dip Direction	10
Friction Angle	44°
Lateral Limits	20°

	Critical	Total	%
Flexural Toppling (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Global Data Topple Analysis		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 010 topl 80 gilman global data.dips7	Enclosure: B-2.4



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

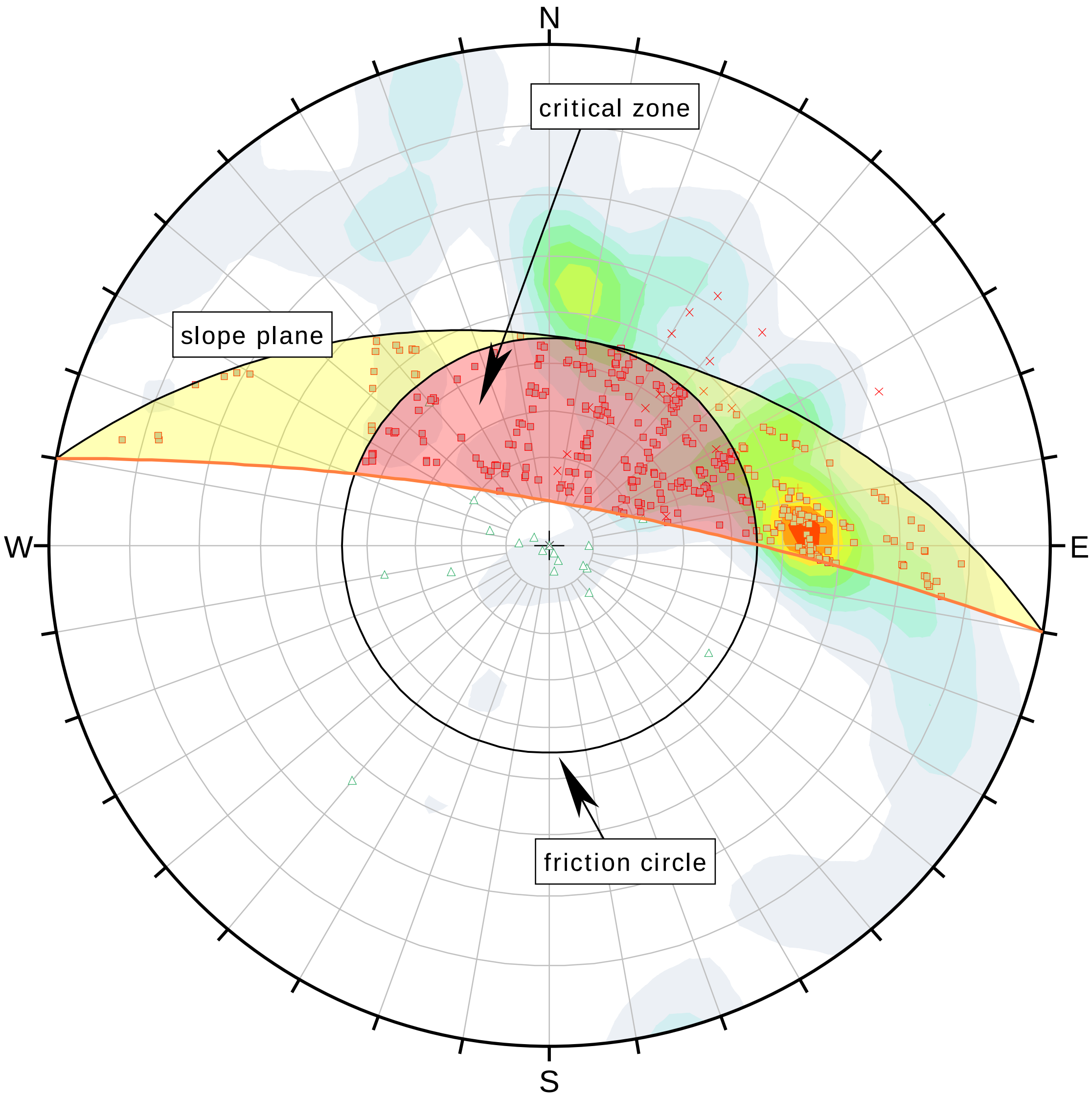
Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	10		
Friction Angle	35°		
	Critical	Total	%
Wedge Sliding	65	990	6.57%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Wedge Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	010 wedg 45 gilman global data.dips7
		Enclosure	B-2.5

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

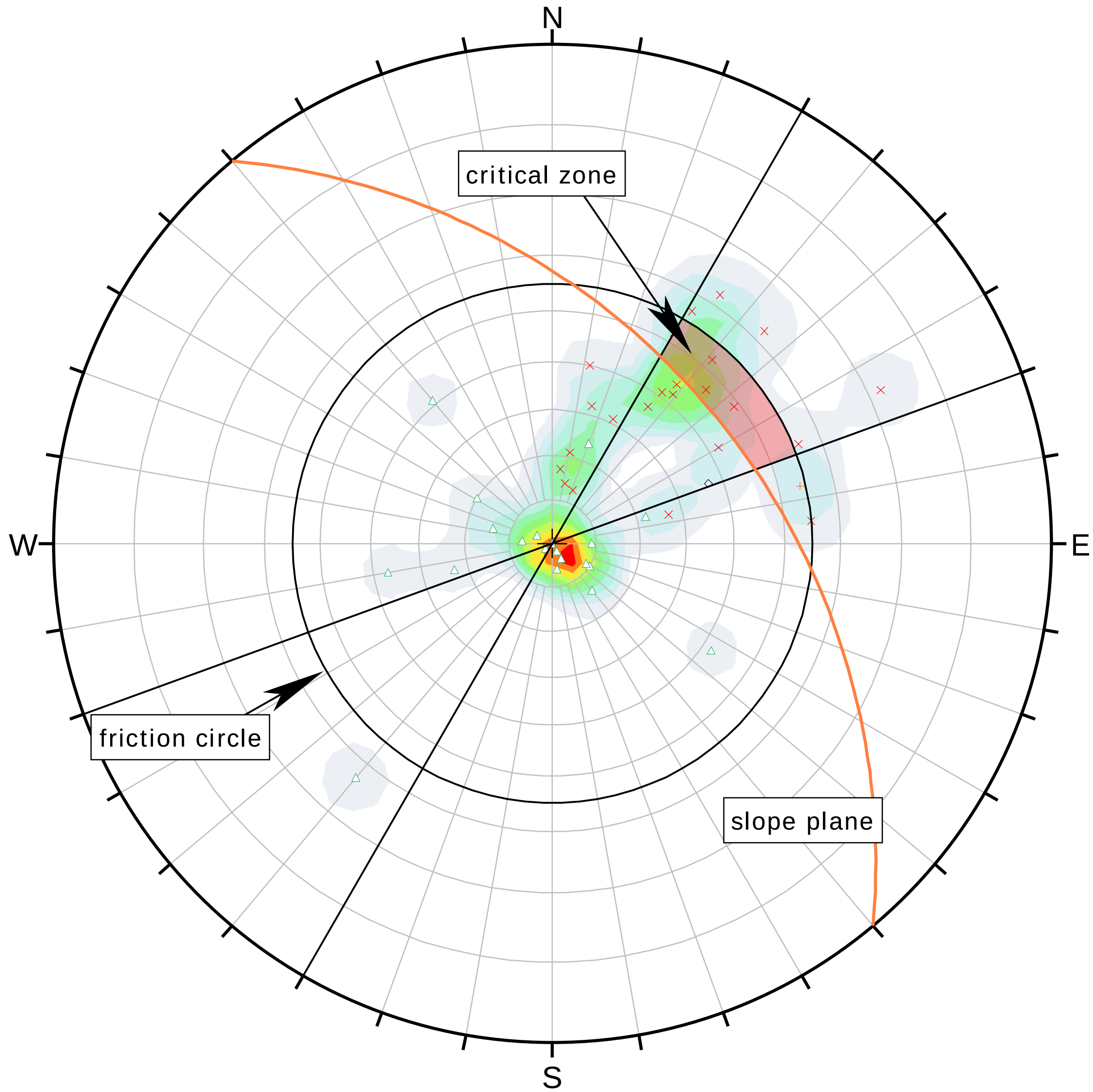
Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	10		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	369	990	37.27%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Global Data Wedge Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name: 010 wedg 80 gilman global data dips7	Enclosure: B-2.6



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

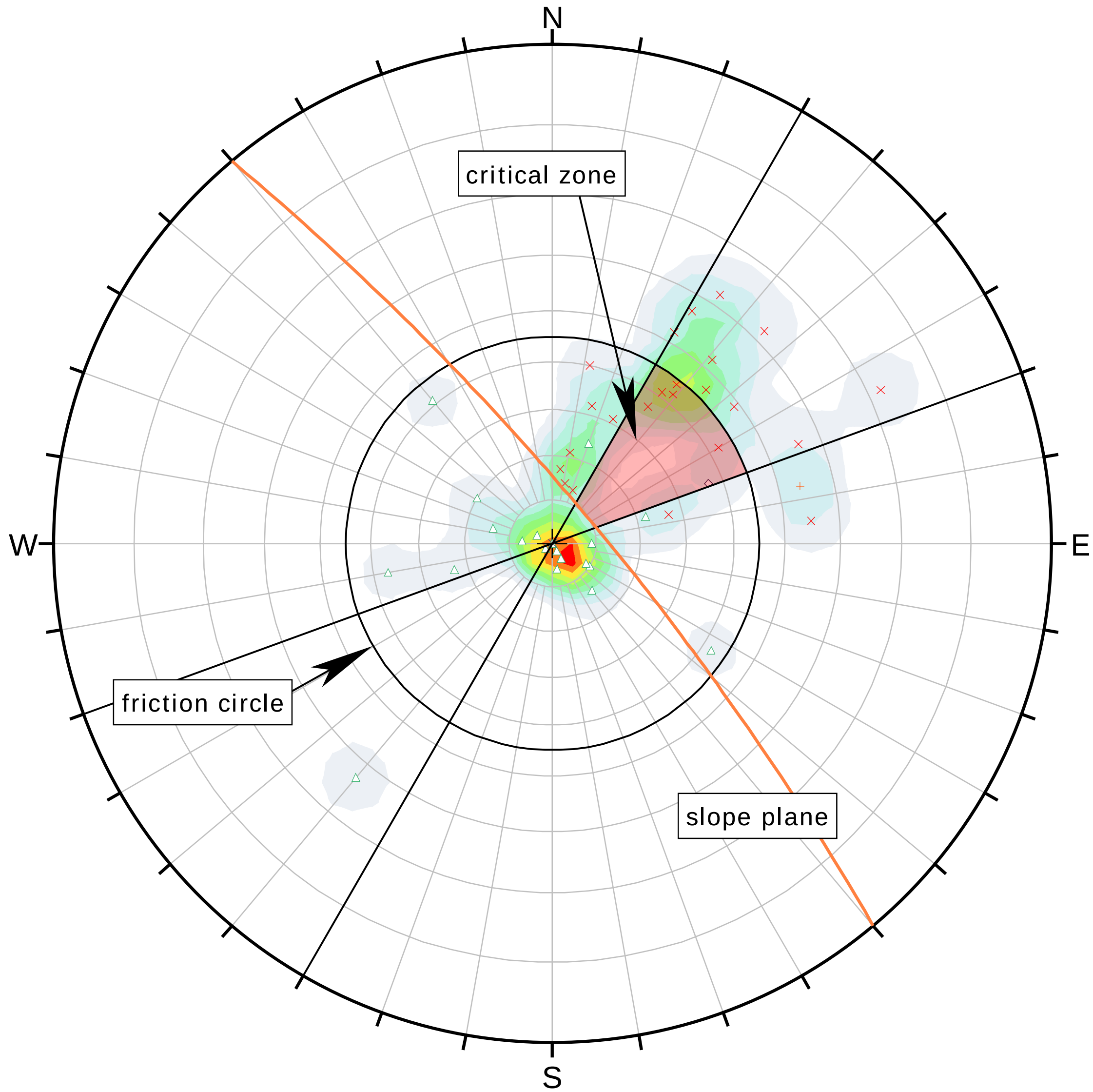
Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	50
Friction Angle	35°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	4	45	8.89%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Project	Gilman Mine		
Analysis Description	Planar Sliding - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	050 plan 45 gilman global data.dips7
Enclosure	B-2.7		

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

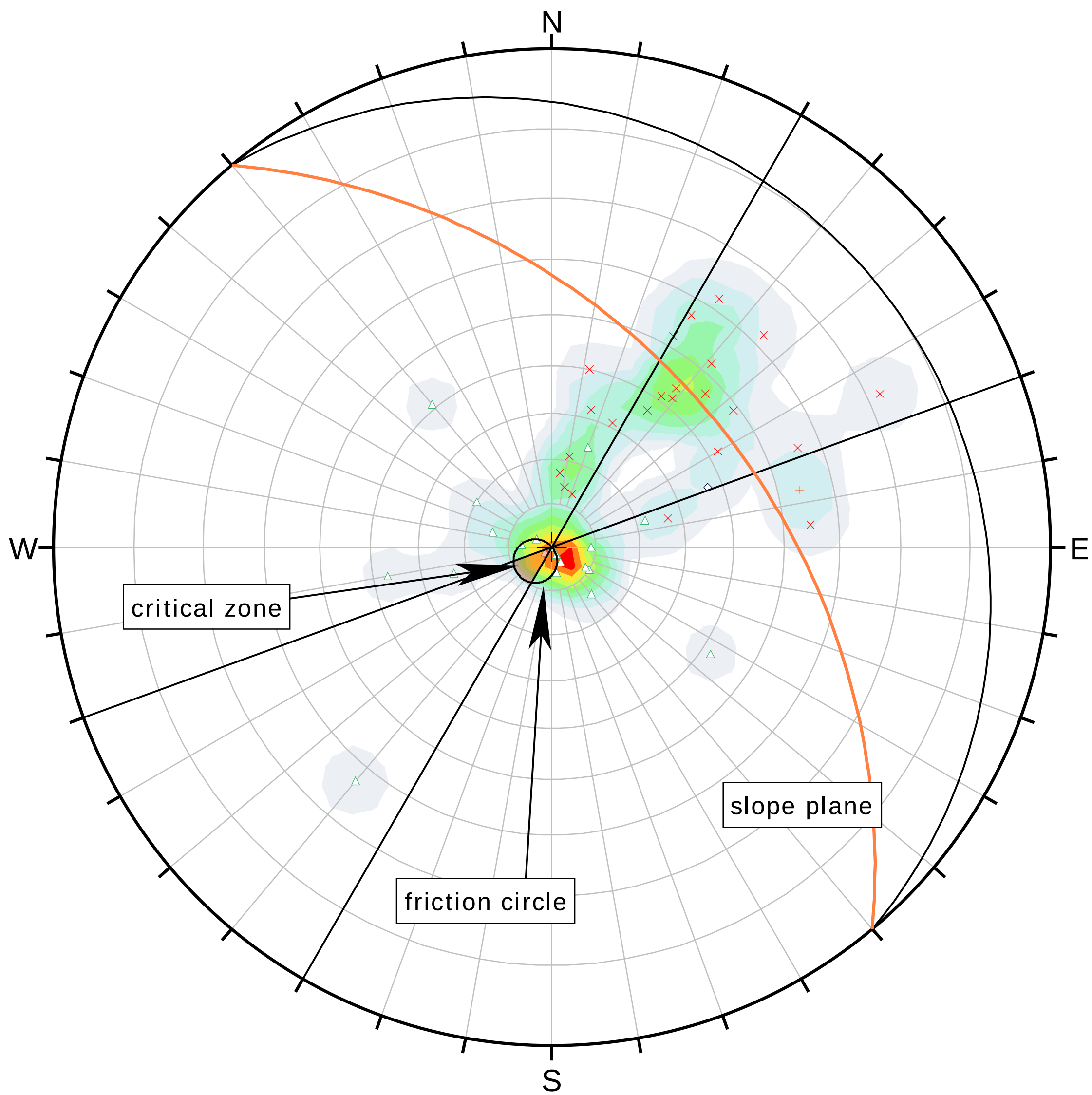
Kinematic Analysis	Planar Sliding		
Slope Dip	80		
Slope Dip Direction	50		
Friction Angle	45°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	6	45	13.33%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Global Data Planar Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 050 plan 80 gilman global data.dips7	Enclosure B-2.8

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	45
Slope Dip Direction	50
Friction Angle	35°
Lateral Limits	20°

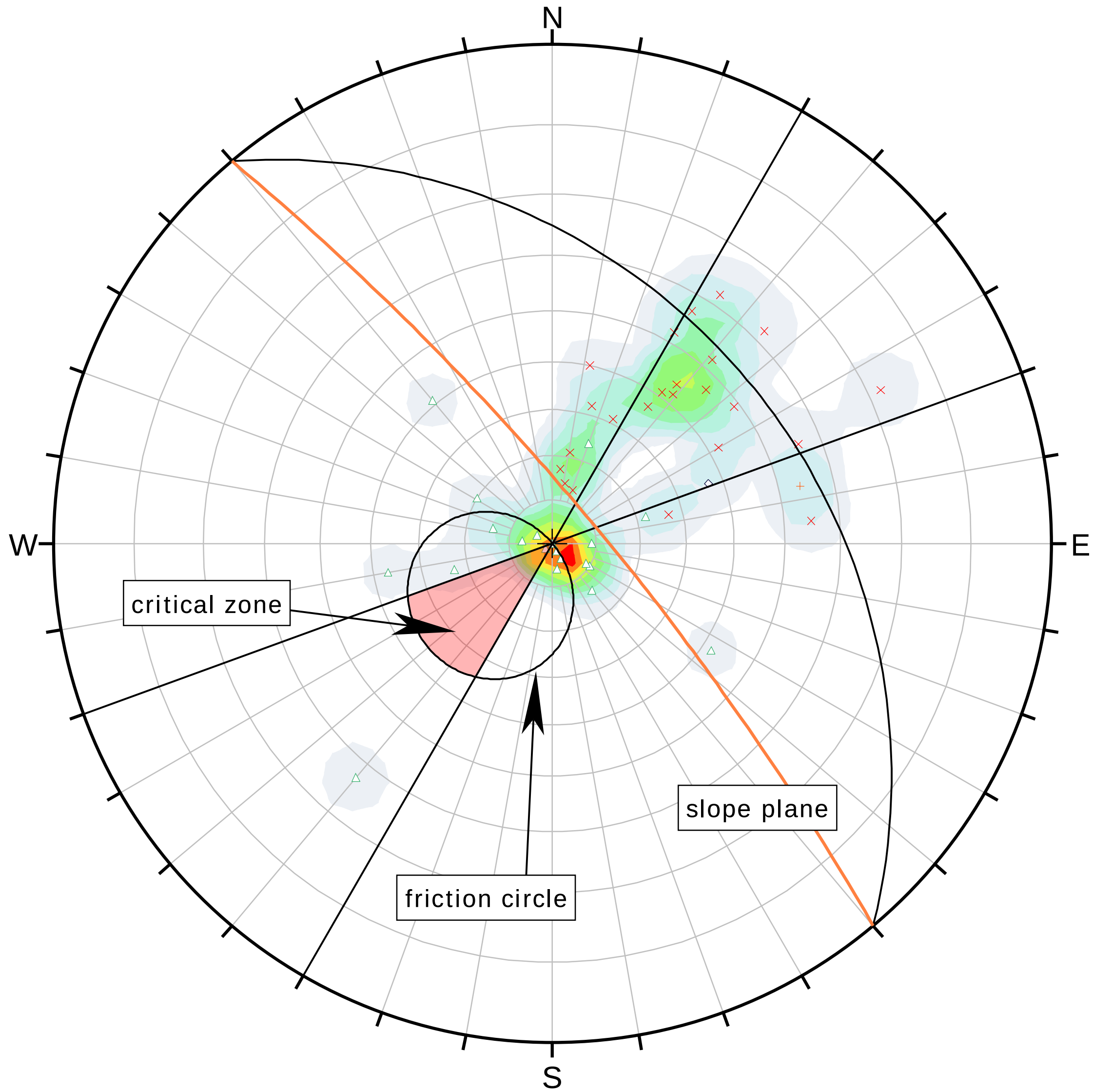
	Critical	Total	%
Flexural Toppling (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Topple Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 050 topl 45 gilman global data.dips7	Enclosure B-2.9



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

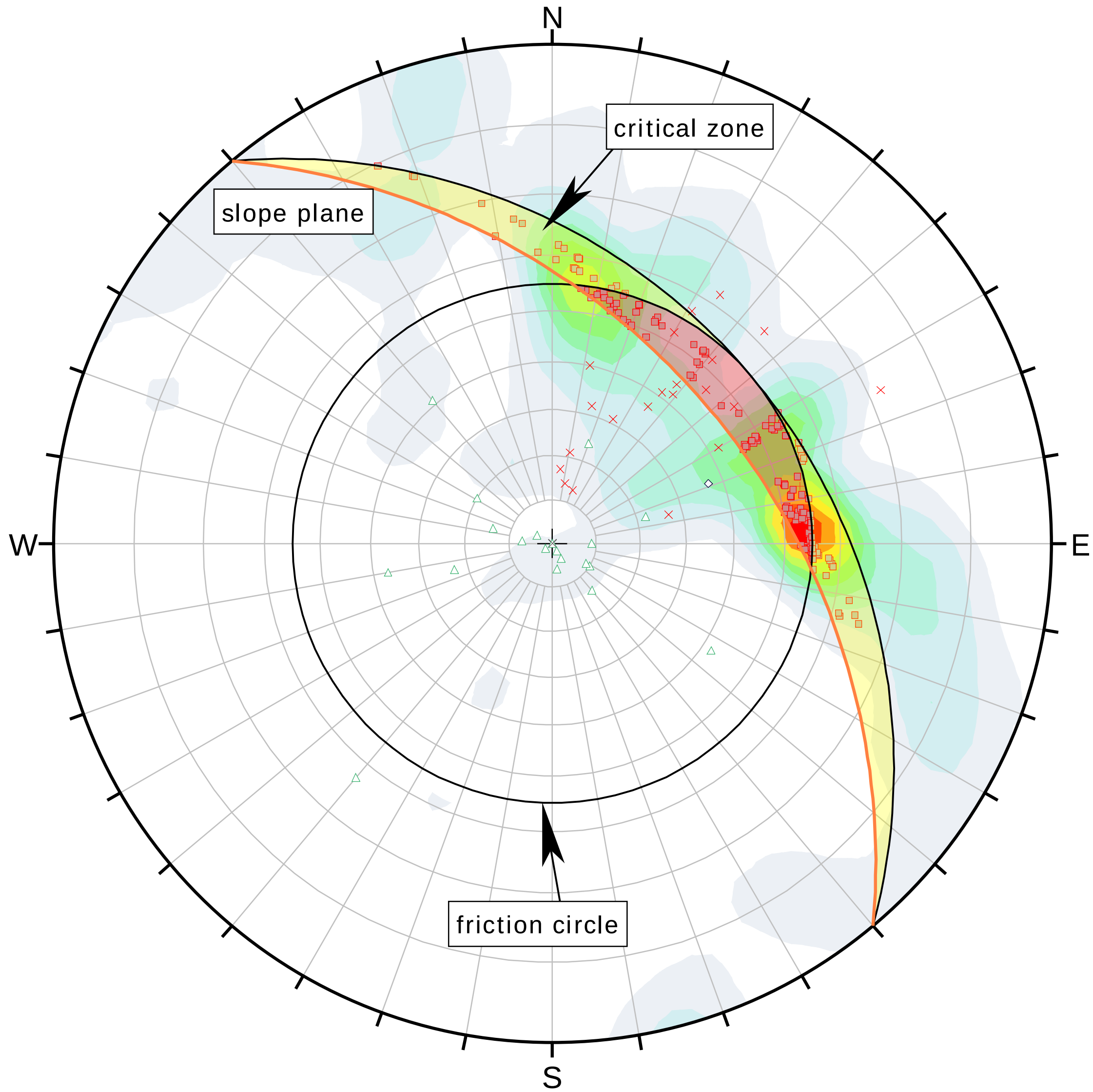
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	80
Slope Dip Direction	50
Friction Angle	44°
Lateral Limits	20°

	Critical	Total	%
Flexural Toppling (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Global Data Topple Analysis		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 050 topl 80 gilman global data.dips7	Enclosure: B-2.10



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
▪	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

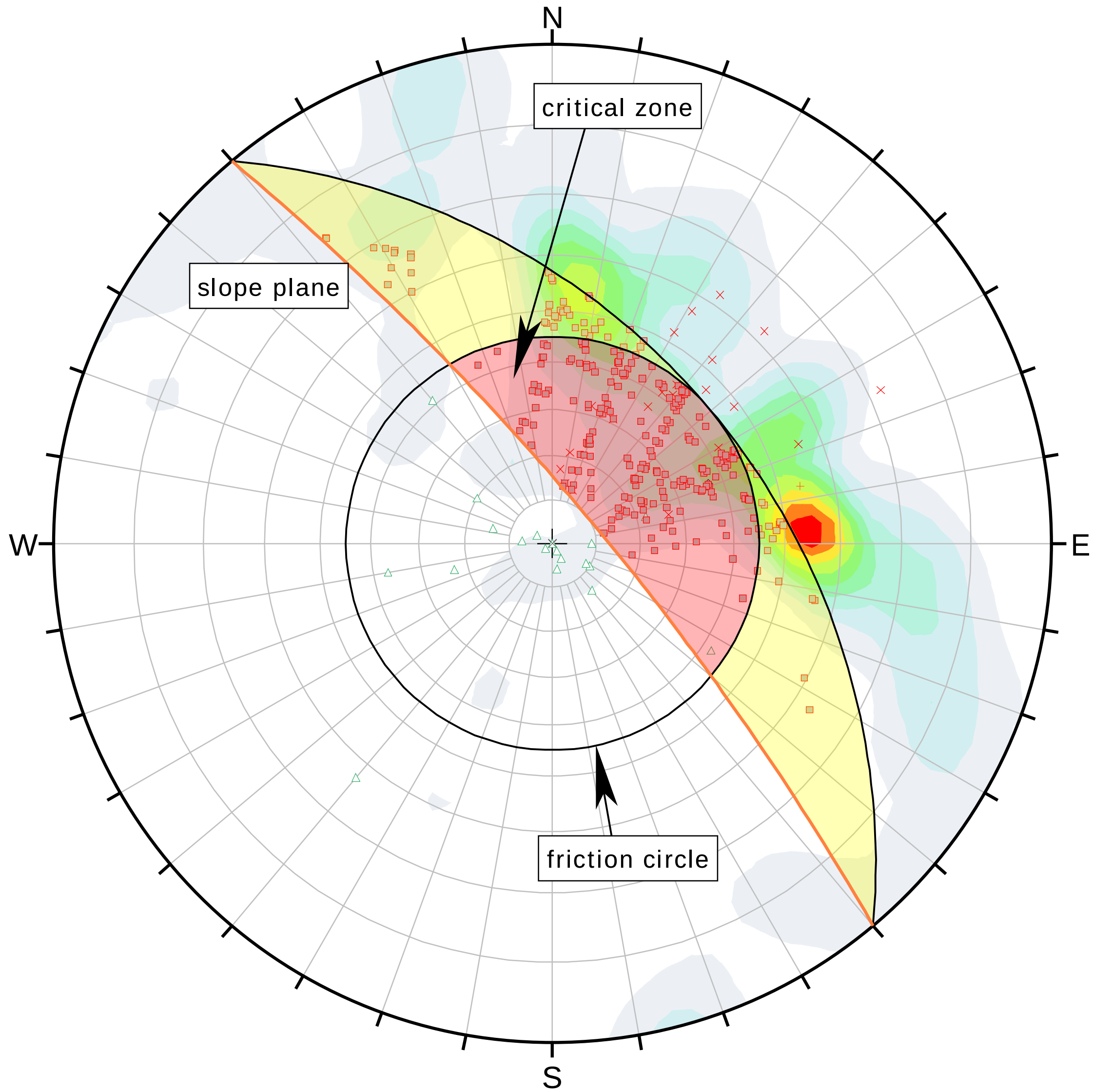
Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	50		
Friction Angle	35°		
	Critical	Total	%
Wedge Sliding	166	990	16.77%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Wedge Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name: 050 wedg 45 gilman global data.dips7	Enclosure: B-2.11

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
▫	Critical Intersection	

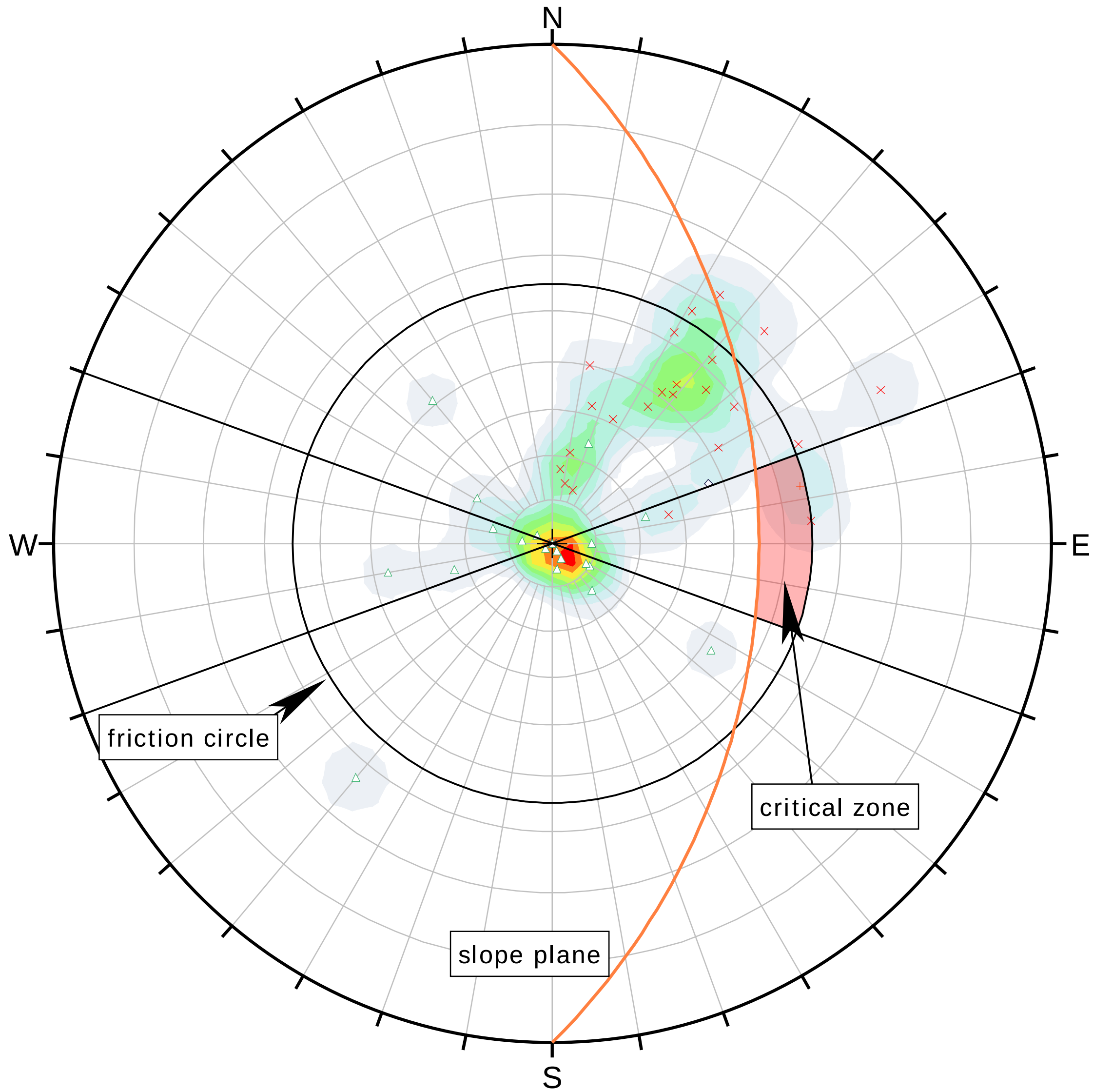
Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	50		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	268	990	27.07%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon	Project: Gilman Mine		
	Analysis Description: Global Data Wedge Sliding 80 degree face		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	Date: 11/10/2017, 10:04:13 AM	File Name: 050 wedg 80 gilman global data.dips7	Enclosure: B-2.12



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

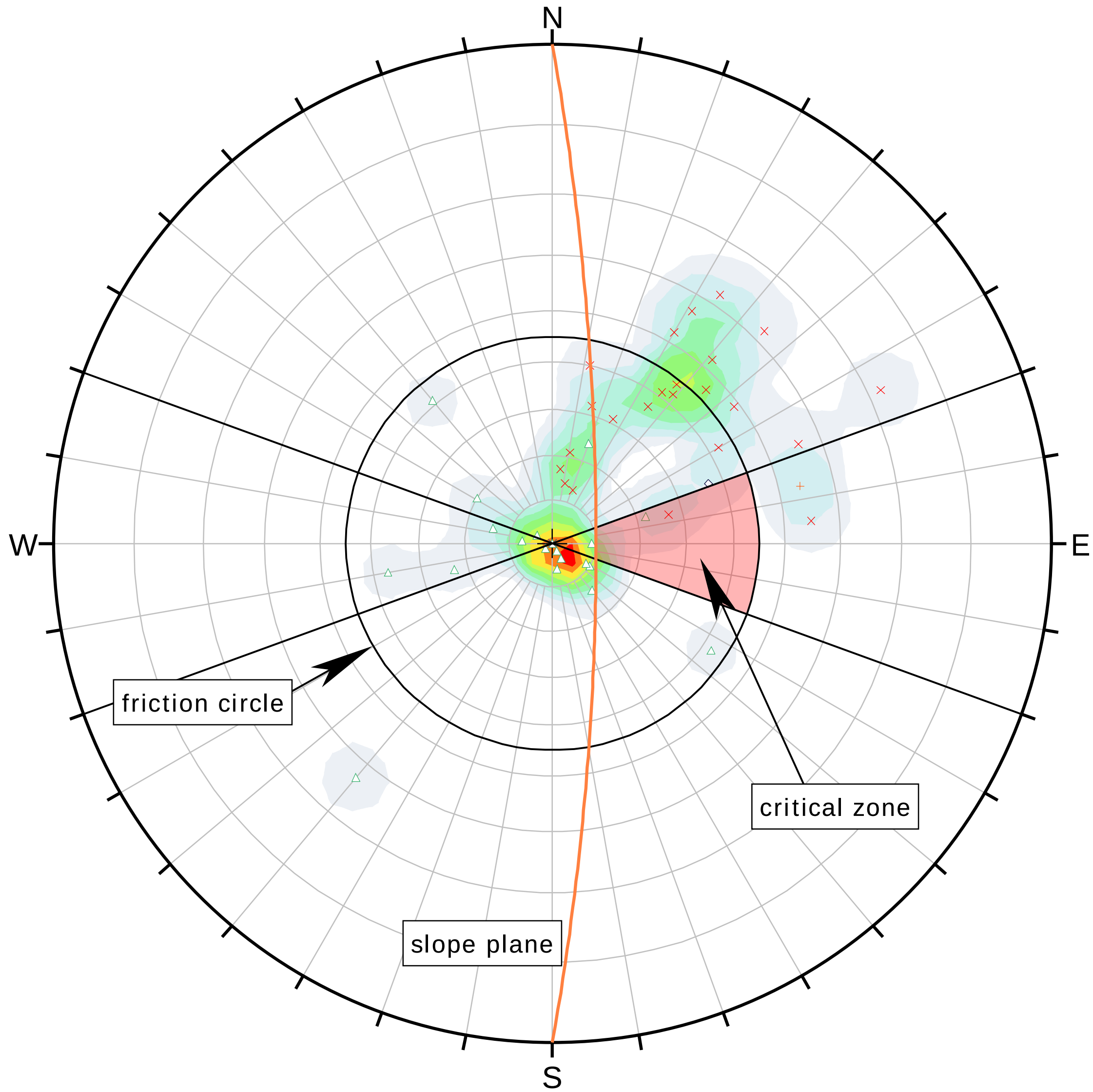
Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	90
Friction Angle	35°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	2	45	4.44%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description Planar Sliding - 45-Degree Slope		
	Drawn By JMc	Company Terracon	
DIPS 7.011	*Date* 11/10/2017, 10:04:13 AM	File Name 090 plan 45 gilman global data.dips7	Enclosure B-2.13



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

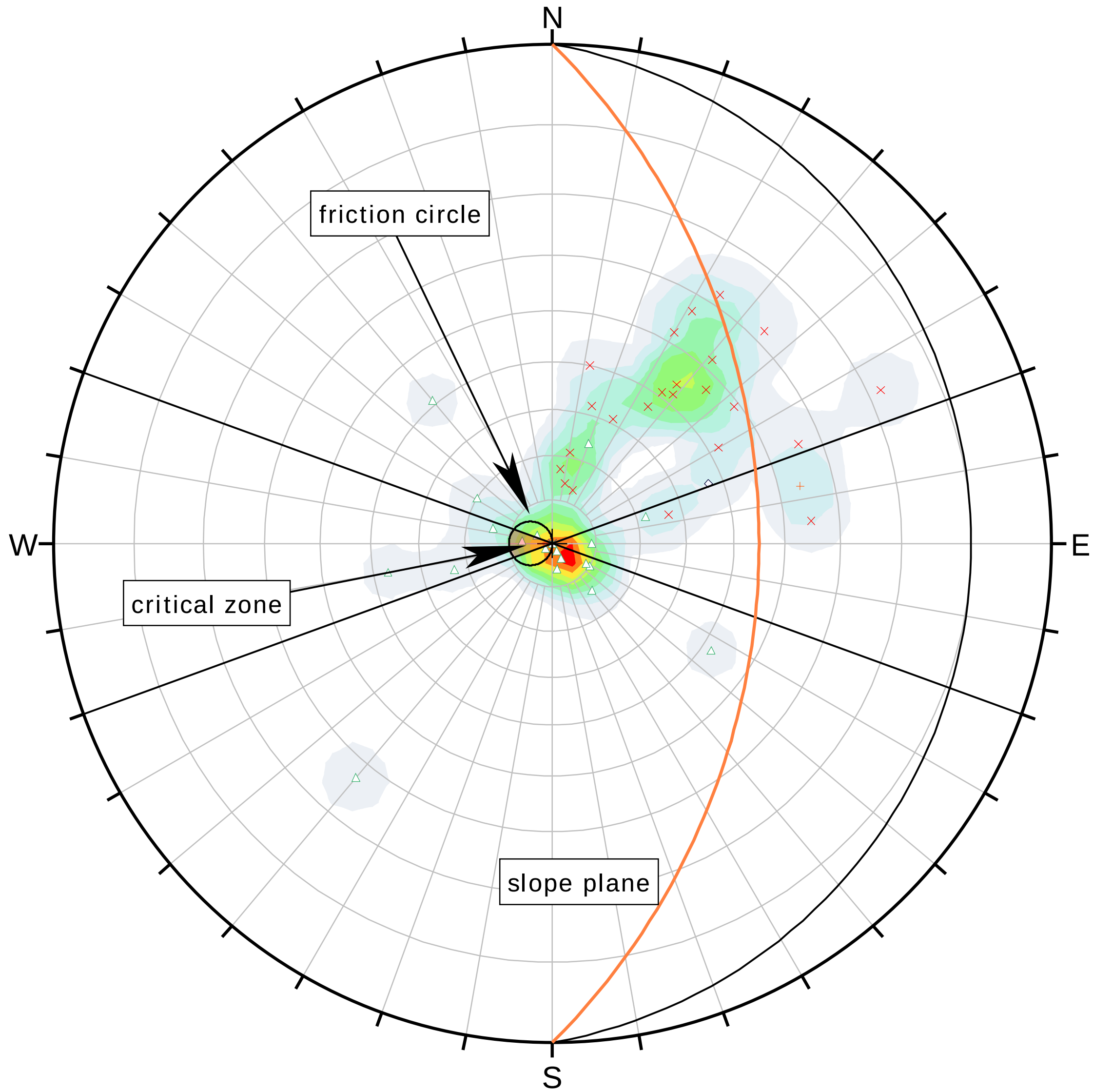
Kinematic Analysis	Planar Sliding
Slope Dip	80
Slope Dip Direction	90
Friction Angle	45°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	2	45	4.44%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Project	Gilman Mine		
Analysis Description	Global Data Planar Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 090 plan 80 gilman global data.dips7	Enclosure B-2.14

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

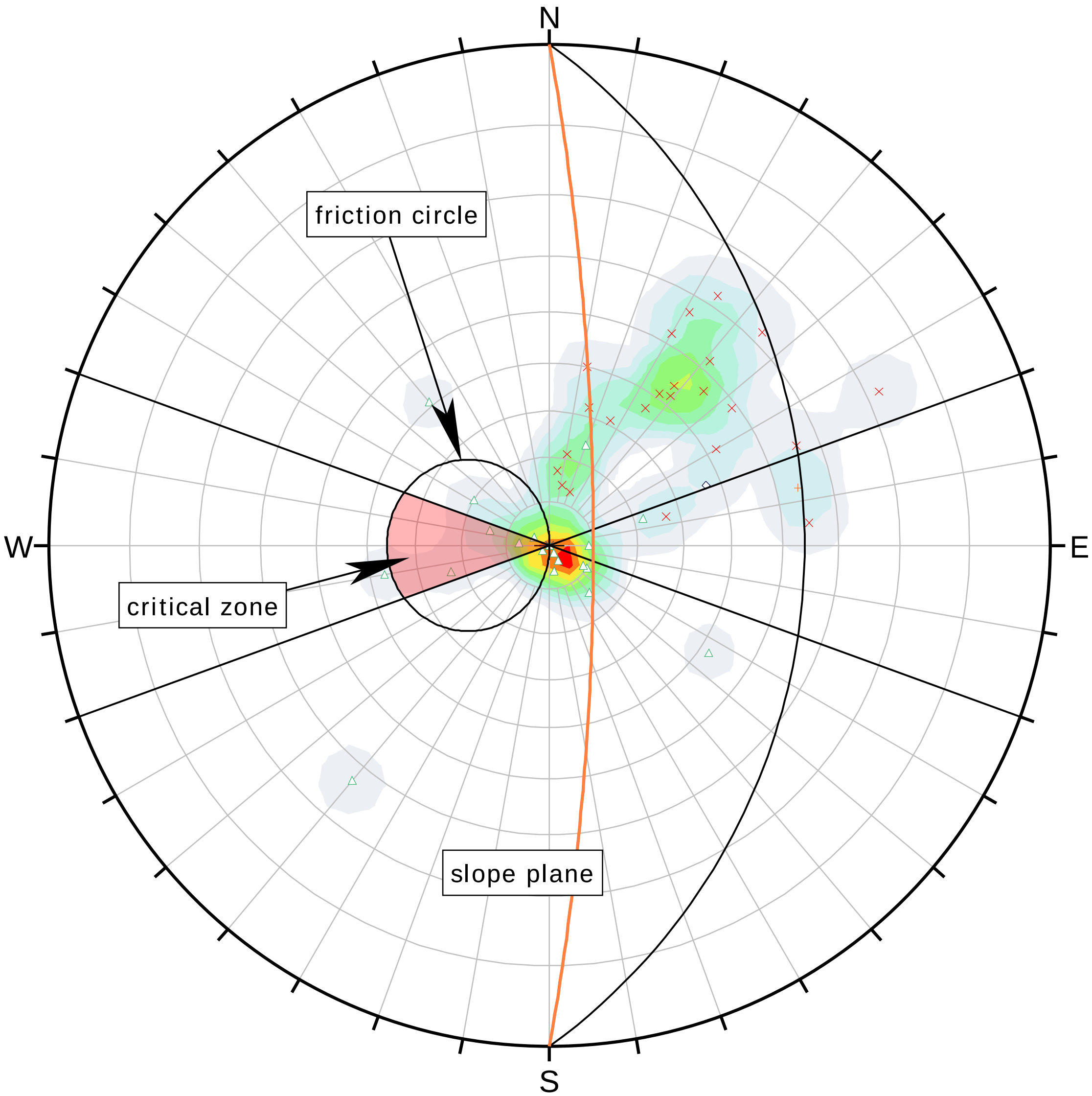
Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	45
Slope Dip Direction	90
Friction Angle	35°
Lateral Limits	20°

	Critical	Total	%
Flexural Toppling (All)	2	45	4.44%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Topple Potential - 45-Degree Slope		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 090 topl 45 gilman global data.dips7	Enclosure: B-2.15



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

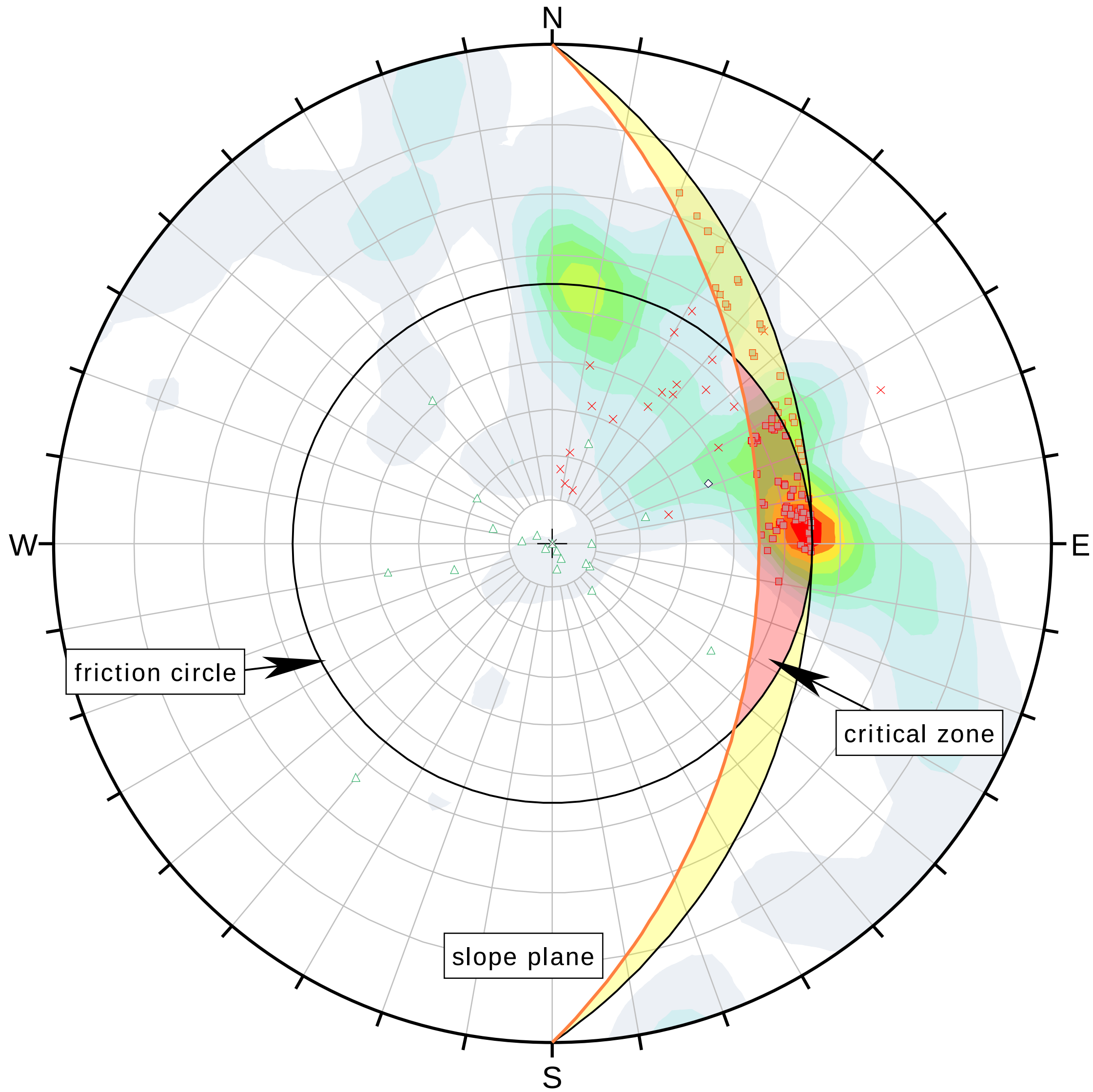
Kinematic Analysis	Flexural Toppling		
Slope Dip	80		
Slope Dip Direction	90		
Friction Angle	44°		
Lateral Limits	20°		
	Critical	Total	%
Flexural Toppling (All)	4	45	8.89%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine
Analysis Description	Global Data Topple Analysis
Drawn By	JMc
Company	Terracon
Date	11/10/2017, 10:04:13 AM
File Name	090 topl 80 gilman global data.dips7
Enclosure	B-2.16

DIPS 7.011



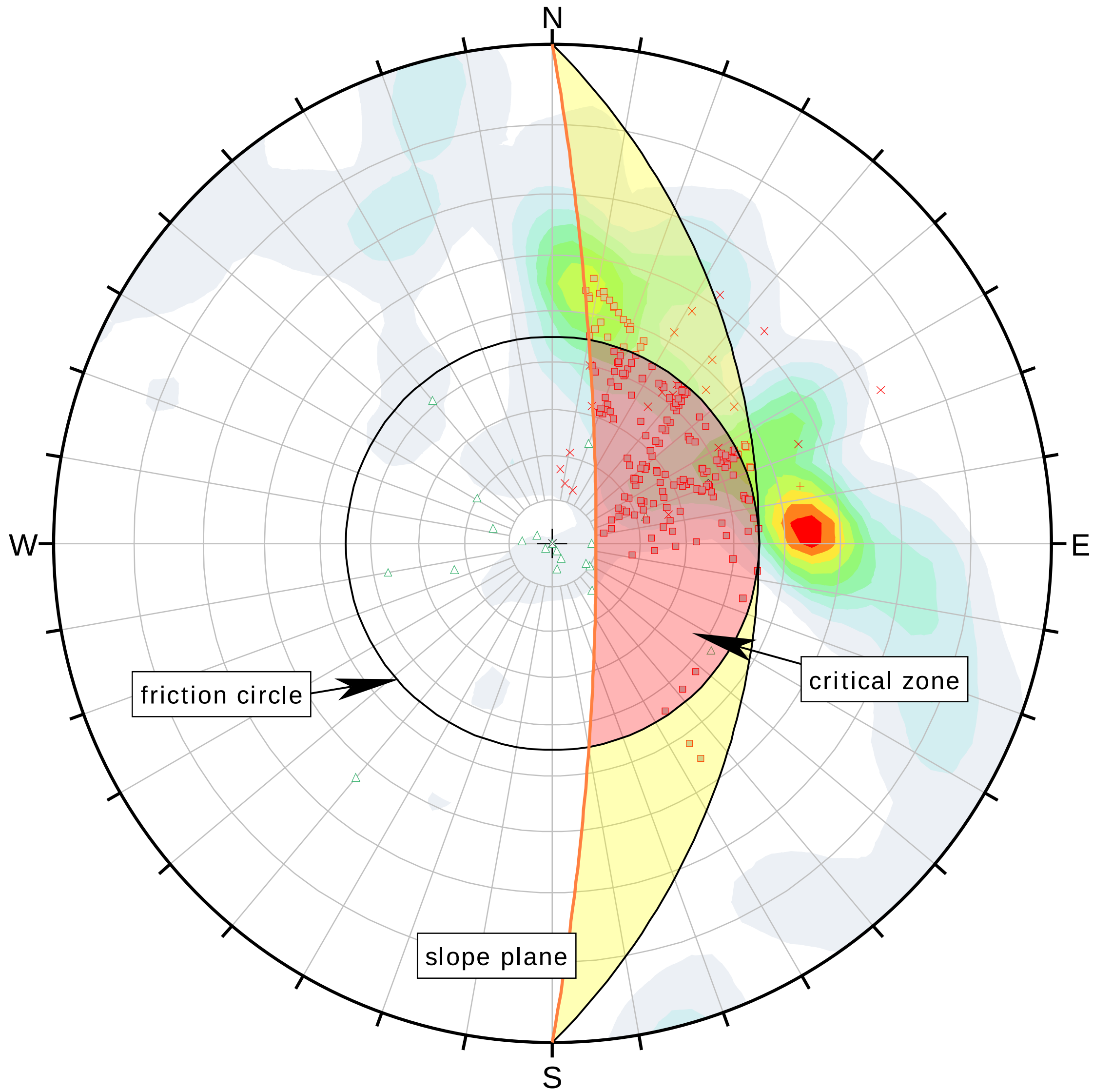
Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00
Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	90		
Friction Angle	35°		
	Critical	Total	%
Wedge Sliding	110	990	11.11%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Wedge Potential - 45-Degree Slope		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 090 wedg 45 gilman global data.dips7	Enclosure: B-2.17



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
▪	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

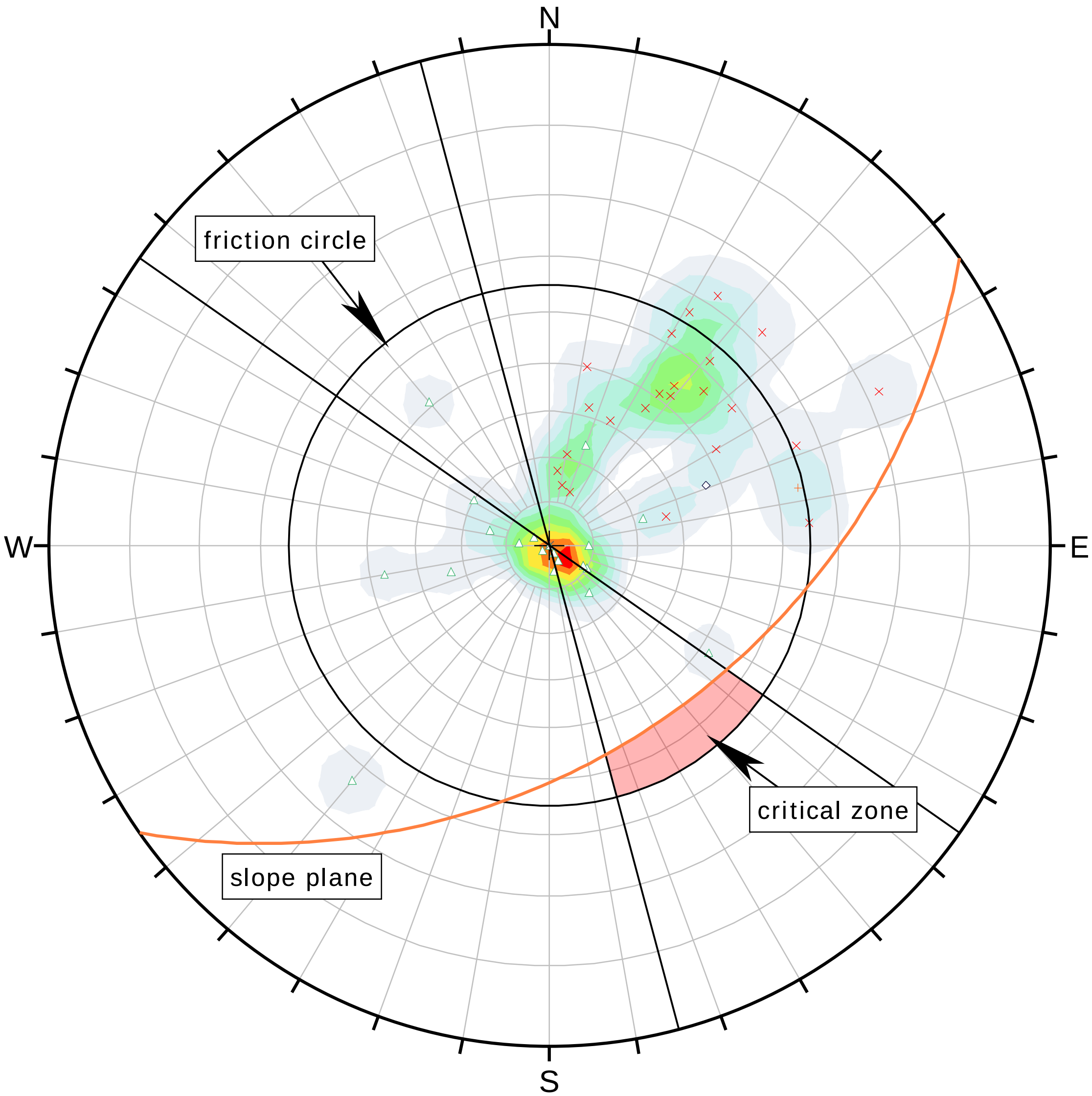
Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	90		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	187	990	18.89%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Global Data Wedge Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 990 wedg 80 gilman global data.dips7	Enclosure B-2.18



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	145
Friction Angle	35°
Lateral Limits	20°

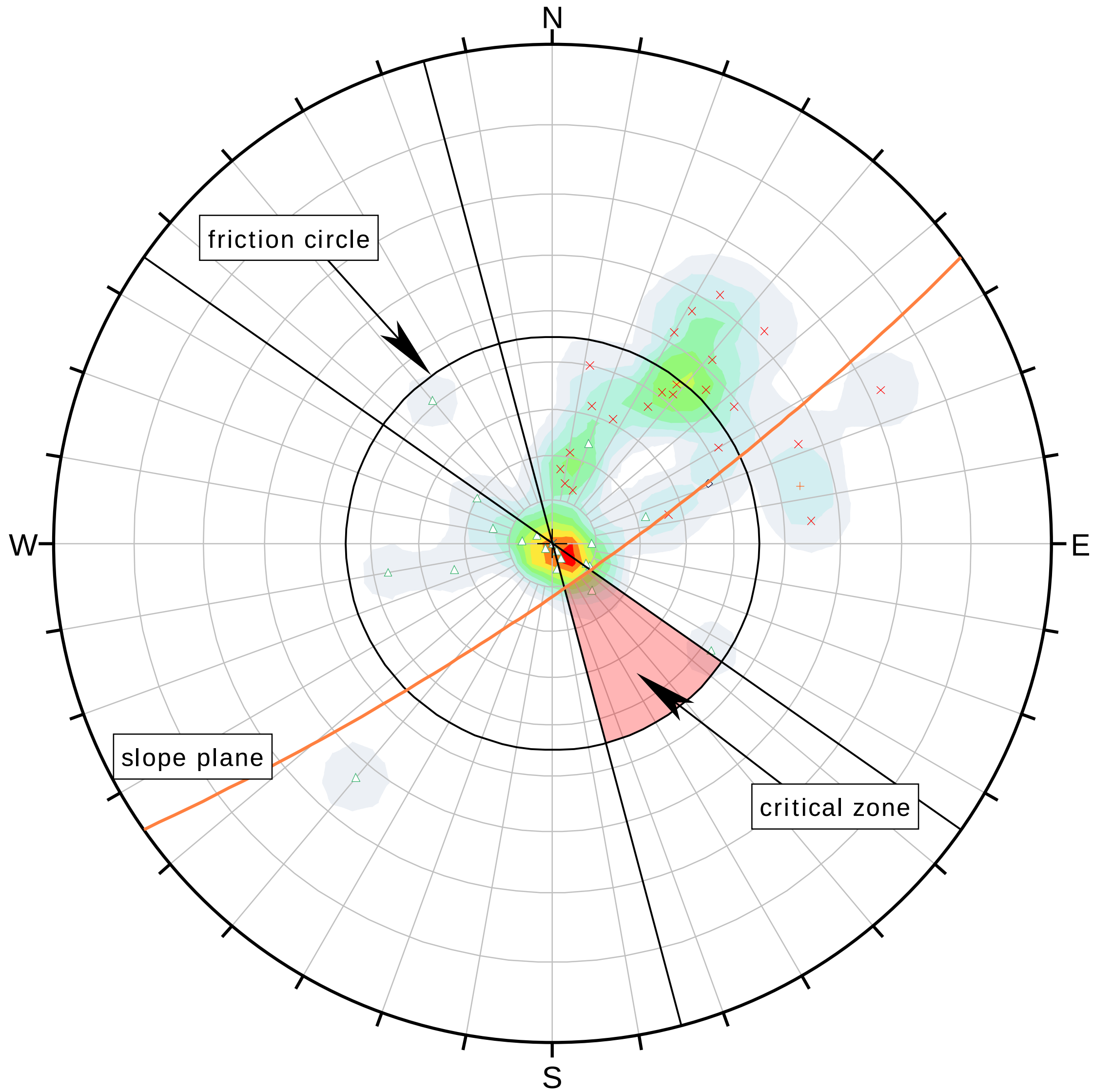
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Planar Sliding - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 145 plan 45 gilman global data.dips7	Enclosure B-2.19

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	80
Slope Dip Direction	145
Friction Angle	45°
Lateral Limits	20°

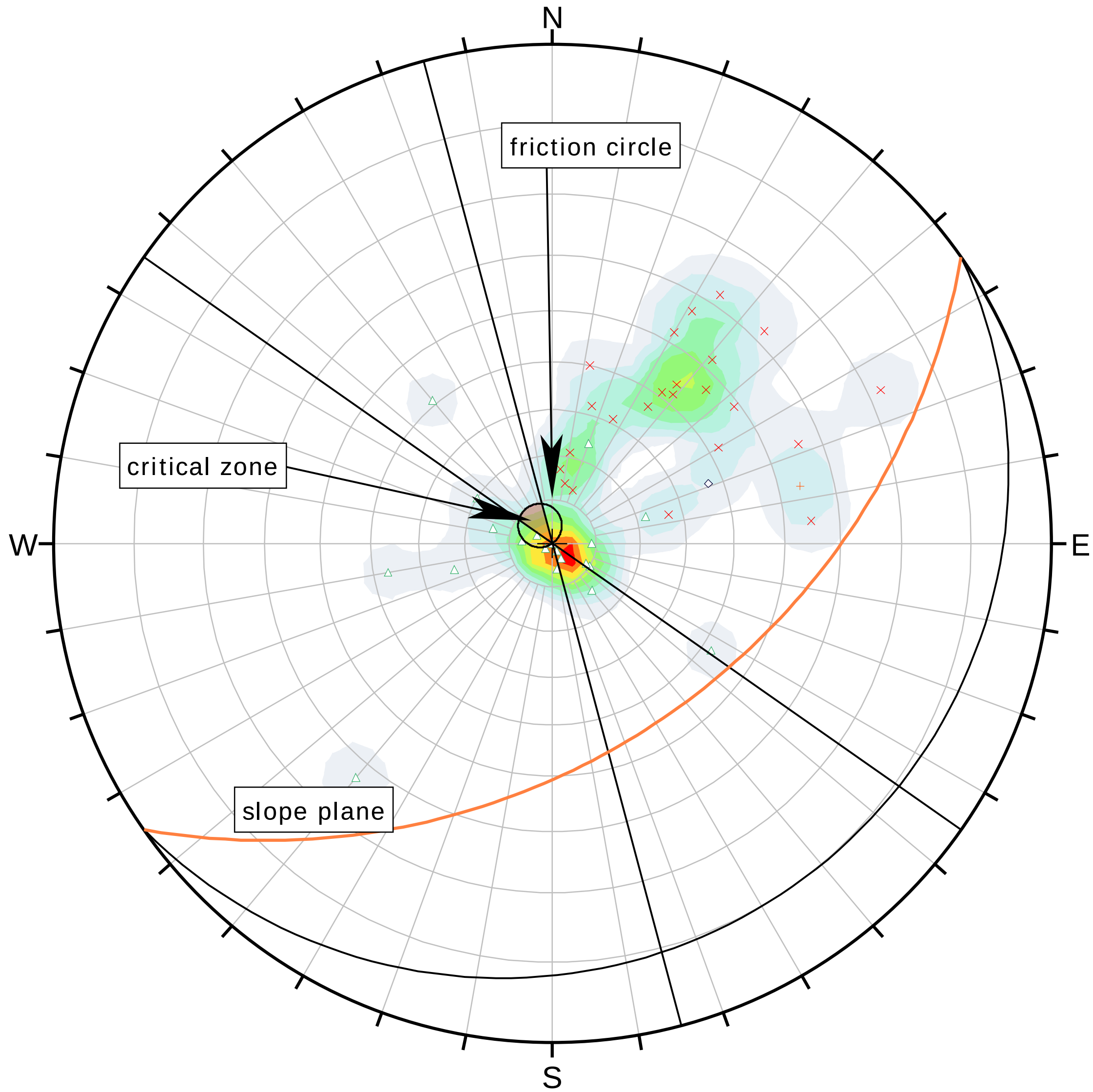
	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project Gilman Mine			
Analysis Description Global Data Planar Sliding 80 degree face			
Drawn By JMc		Company Terracon	
Date 11/10/2017, 10:04:13 AM		File Name 145 plan 80 gilman global data.dips7	Enclosure B-2.20

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	45
Slope Dip Direction	145
Friction Angle	35°
Lateral Limits	20°

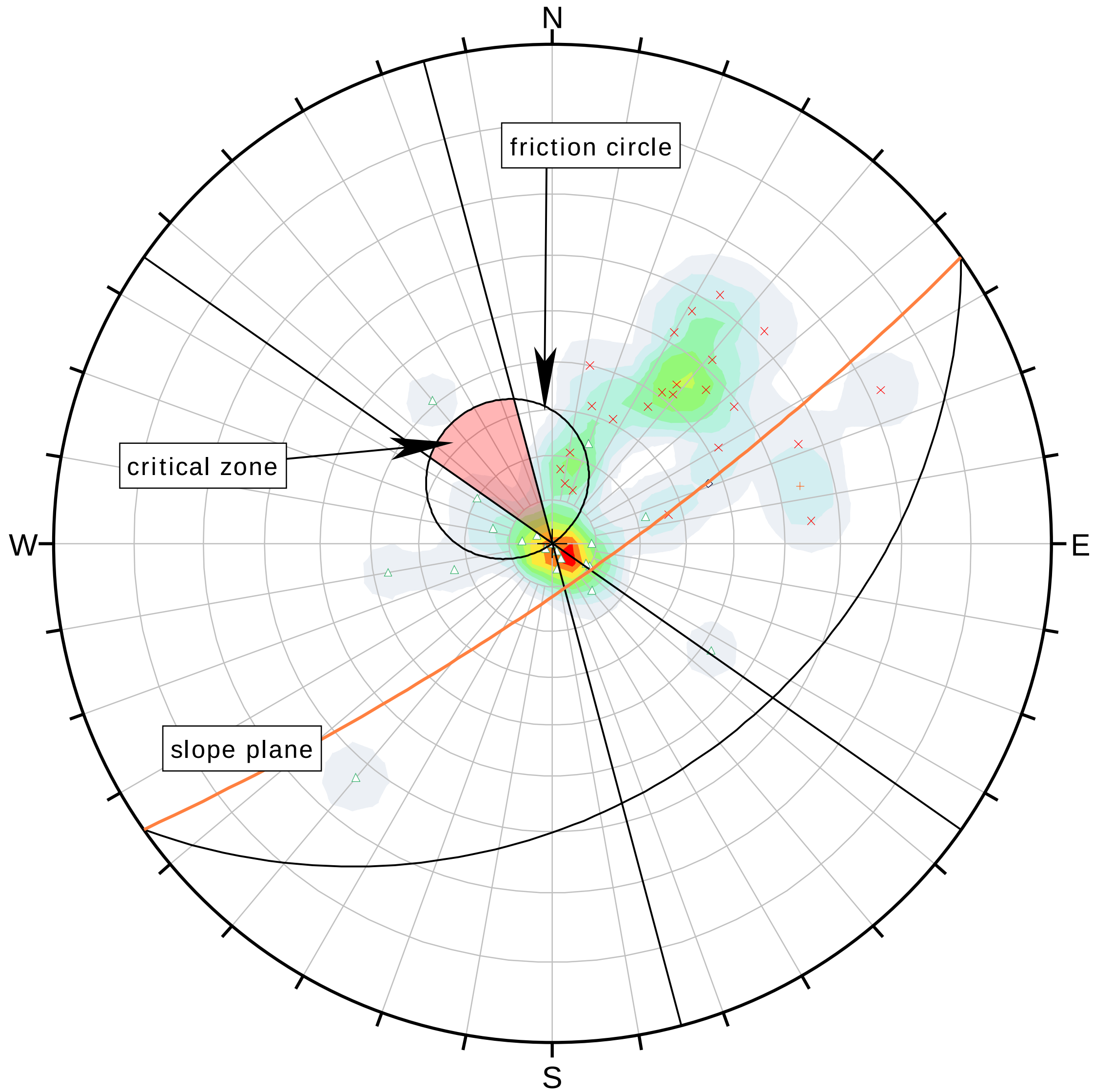
	Critical	Total	%
Flexural Toppling (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Topple Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 145 topl 45 gilman global data.dips7	Enclosure B-2.21

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

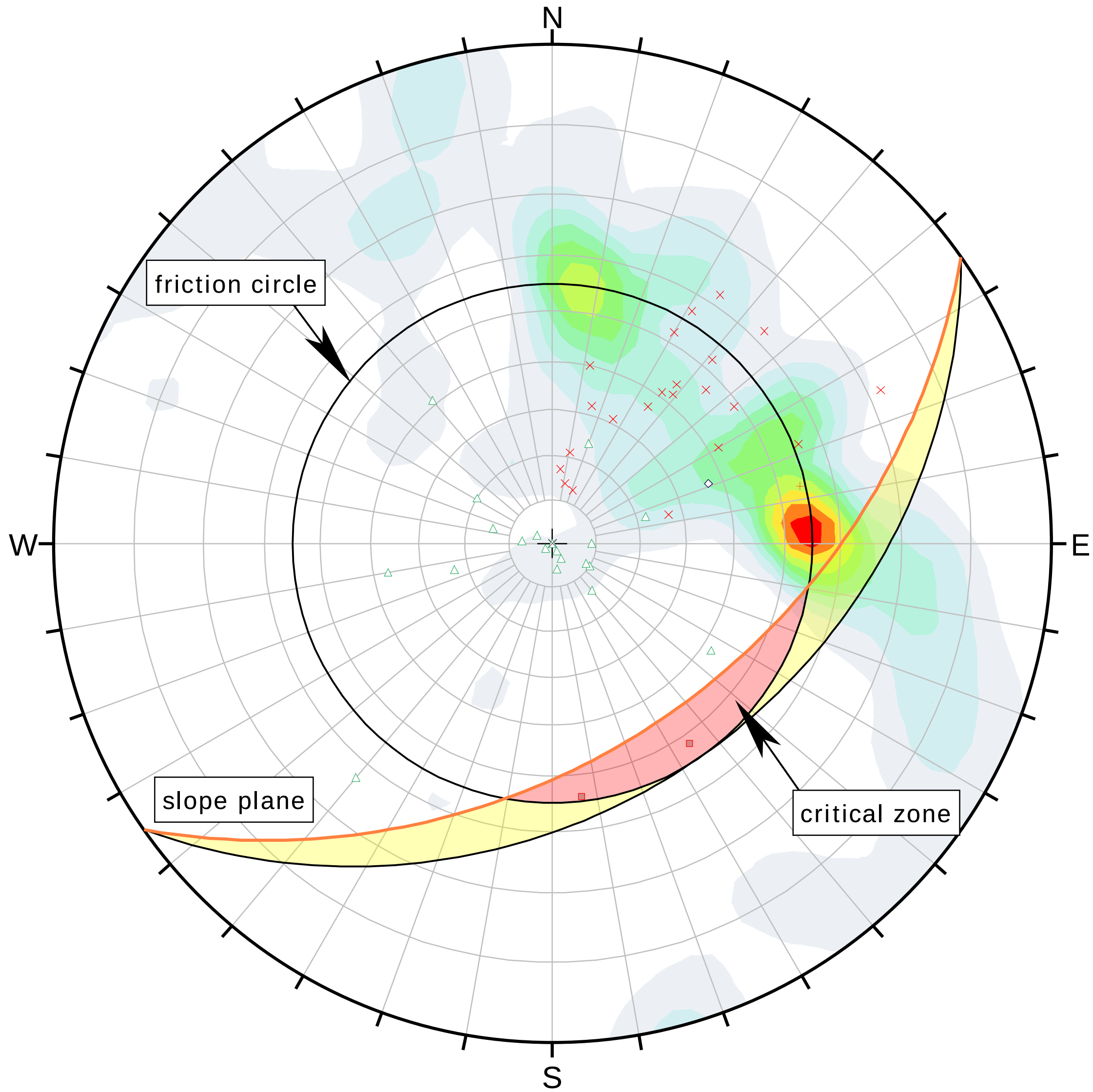
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	80
Slope Dip Direction	145
Friction Angle	45°
Lateral Limits	20°

	Critical	Total	%
Flexural Toppling (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Global Data Topple Analysis		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 145 topl 80 gilman global data.dips7	Enclosure: B-2.22



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	45
Slope Dip Direction	145
Friction Angle	35°

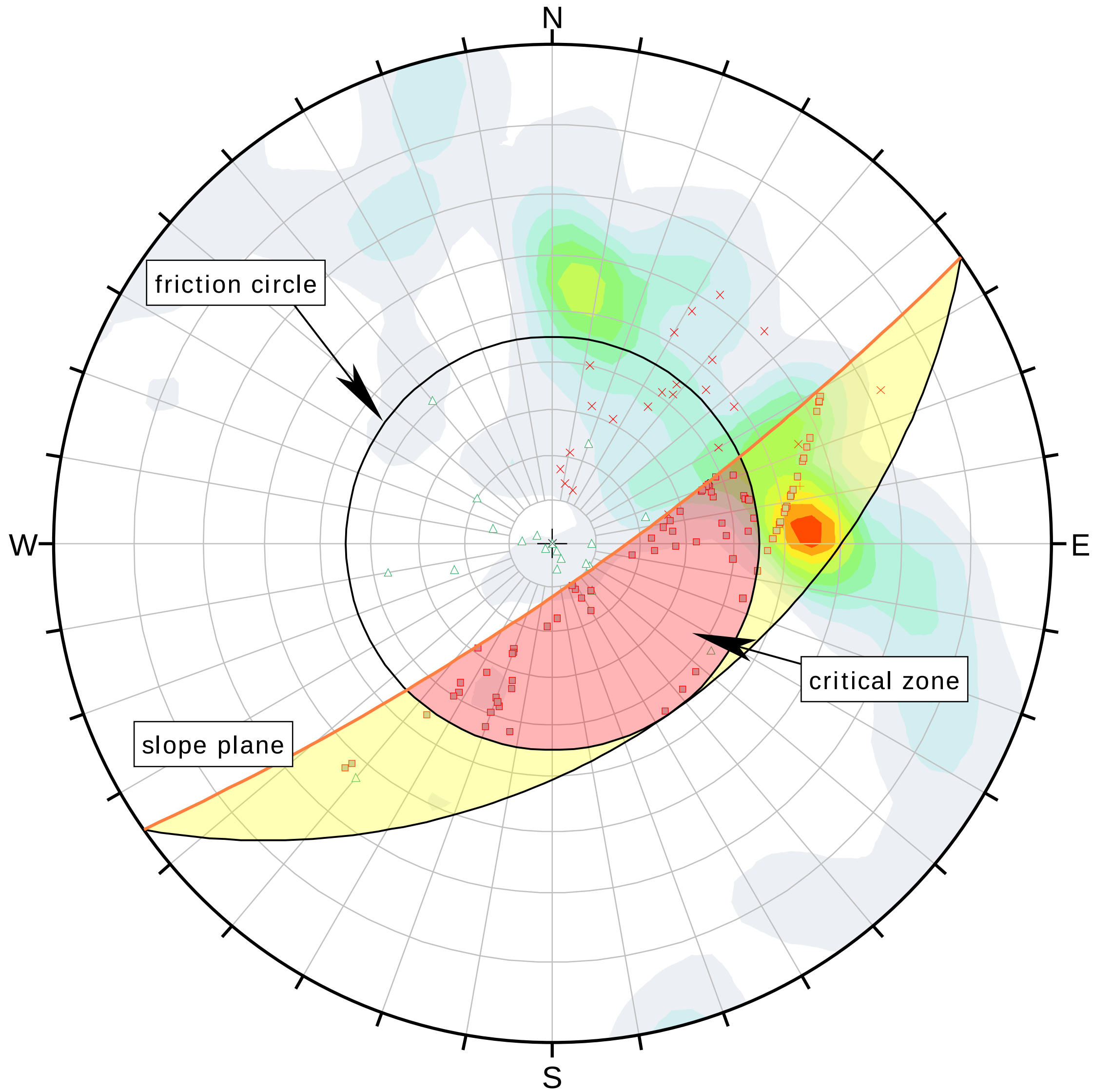
	Critical	Total	%
Wedge Sliding	2	990	0.20%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine
Analysis Description	Wedge Potential - 45-Degree Slope
Drawn By	JMc
Company	Terracon
Date	11/10/2017, 10:04:13 AM
File Name	145 wedg 45 gilman global data.dips7
Enclosure	B-2.23



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

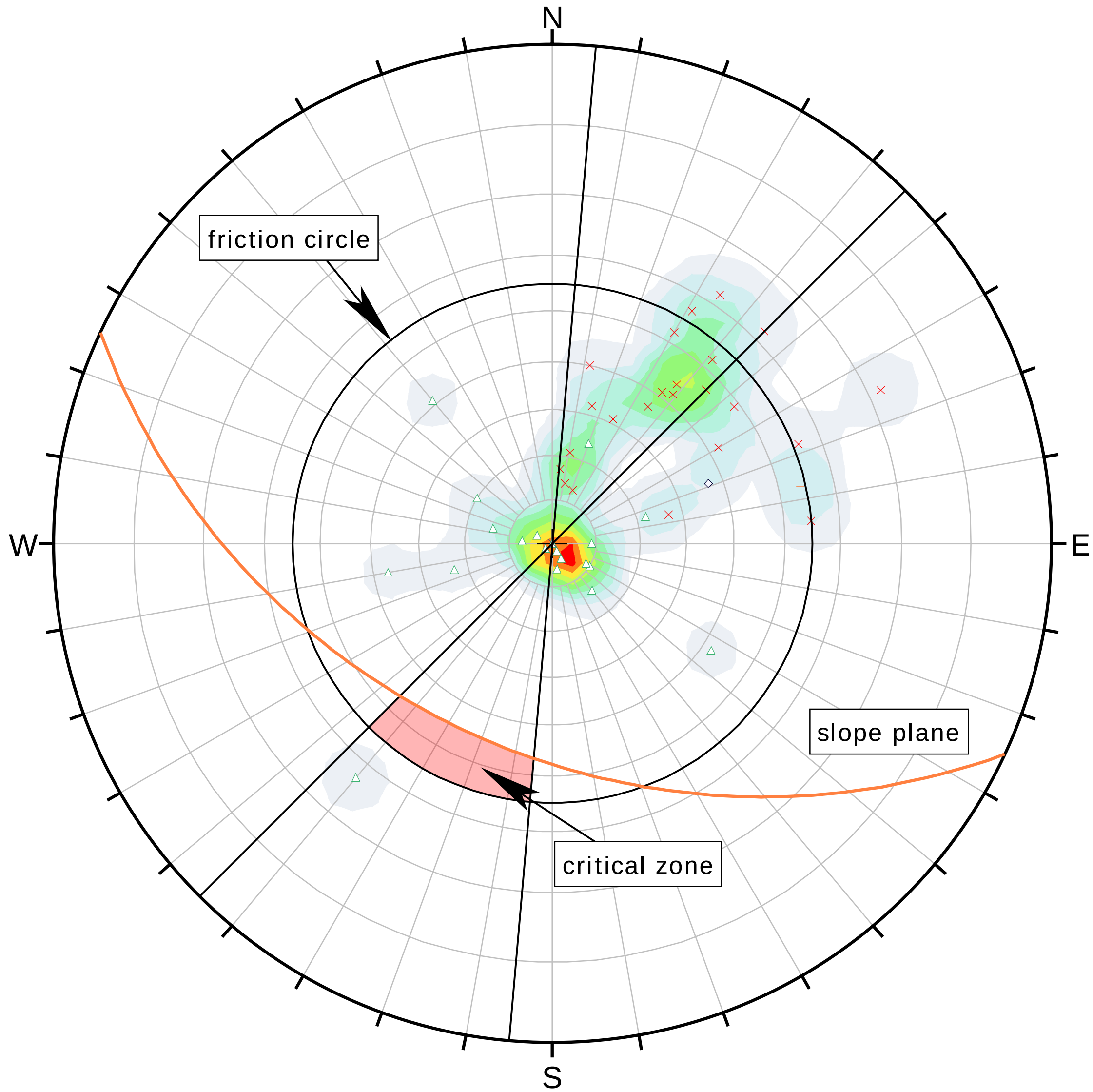
Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	145		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	84	990	8.48%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Global Data Wedge Sliding 80 degree face		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 145 wedg 80 gilman global data.dips7	Enclosure: B-2.24



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	205
Friction Angle	35°
Lateral Limits	20°

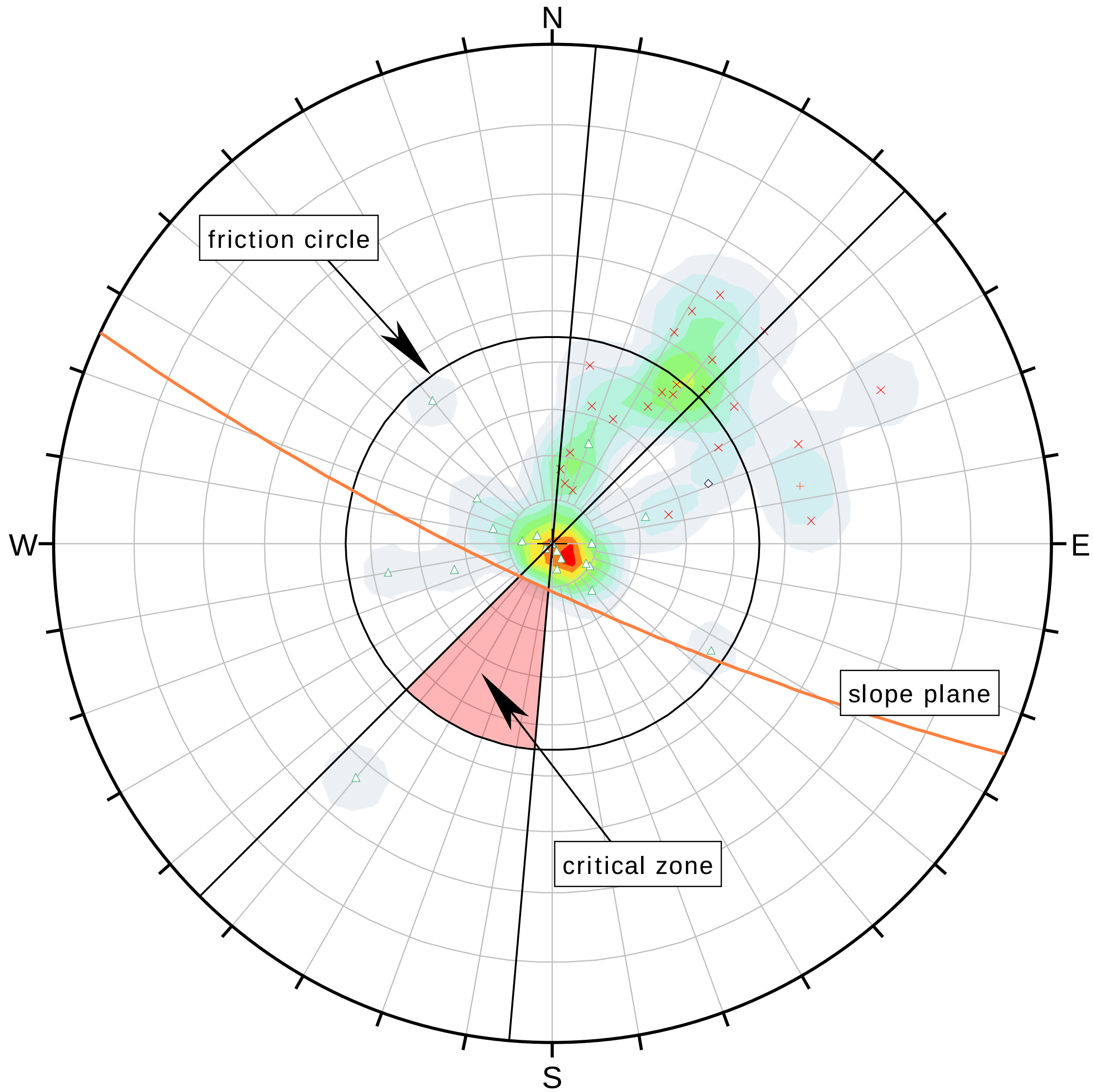
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Planar Sliding - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 205 plan 45 gilman global data.dips7	Enclosure B-2.25



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

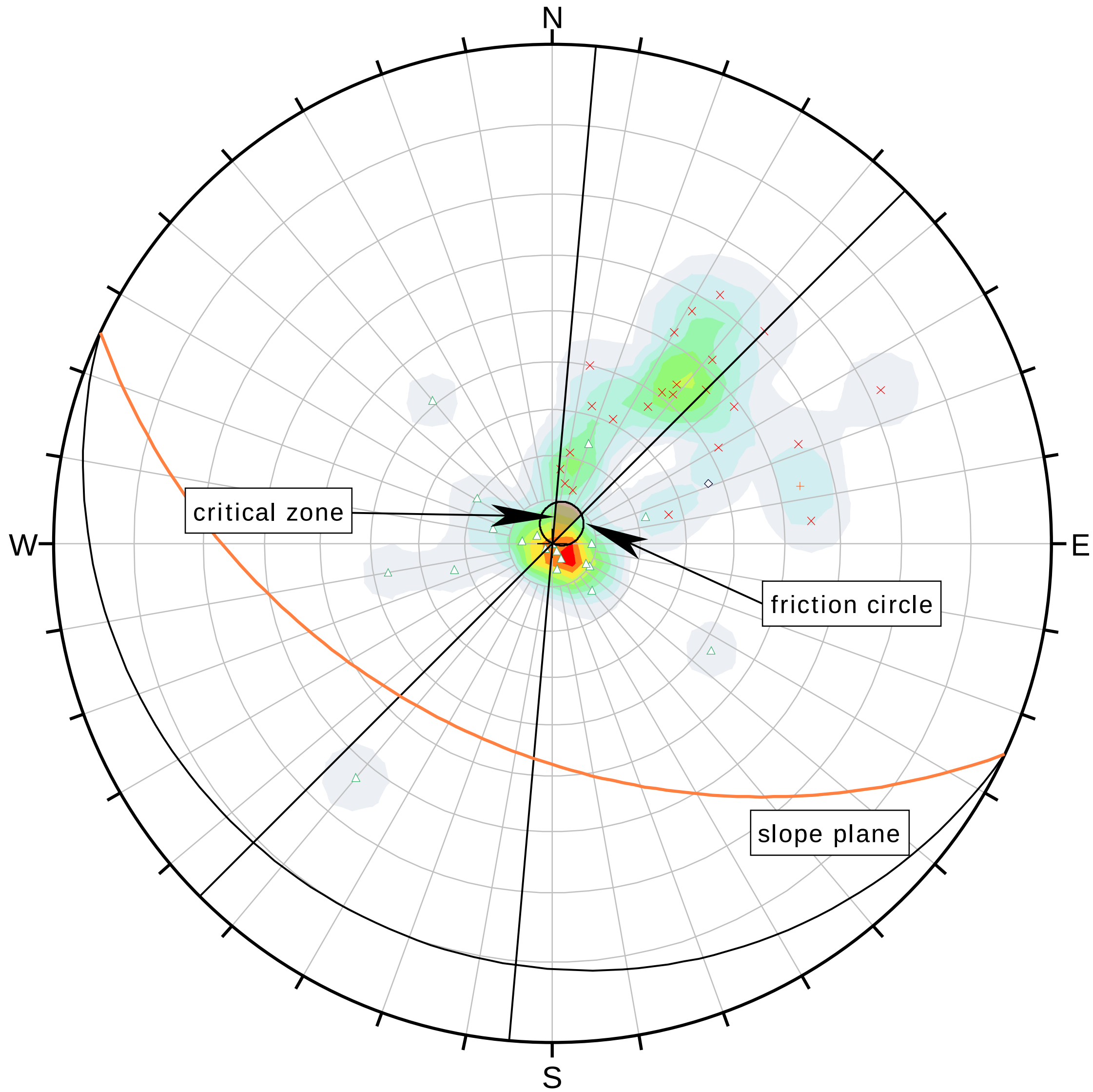
Kinematic Analysis	Planar Sliding		
Slope Dip	80		
Slope Dip Direction	205		
Friction Angle	45°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Global Data Planar Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	205 plan 80 gilman global data.dips7
		Enclosure	B-2.26

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

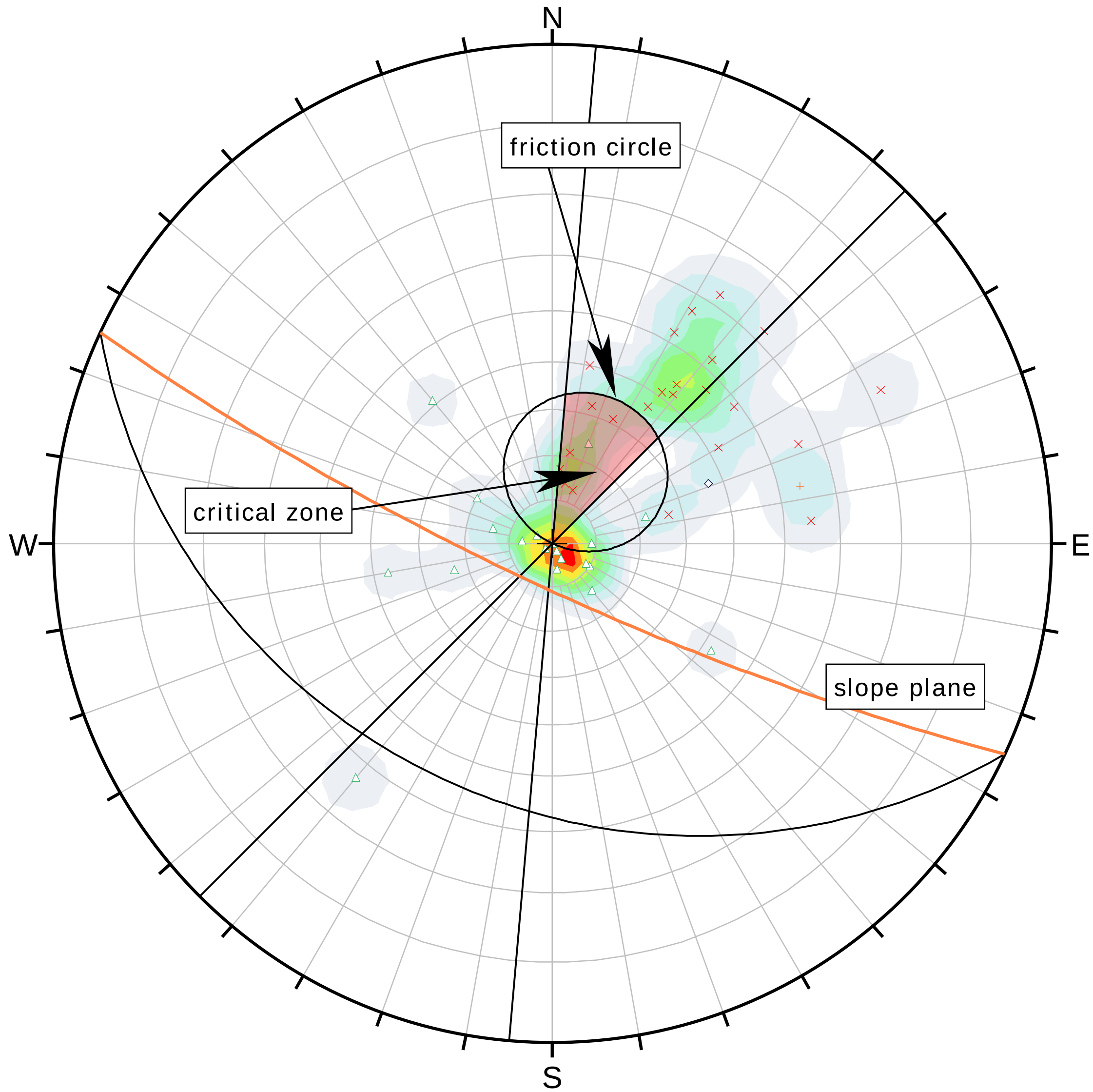
Kinematic Analysis	Flexural Toppling		
Slope Dip	45		
Slope Dip Direction	205		
Friction Angle	35°		
Lateral Limits	20°		
	Critical	Total	%
Flexural Toppling (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine		
Analysis Description	Topple Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	205 topl 45 gilman global data.dips7
		Enclosure	B-2.27

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	80
Slope Dip Direction	205
Friction Angle	45°
Lateral Limits	20°

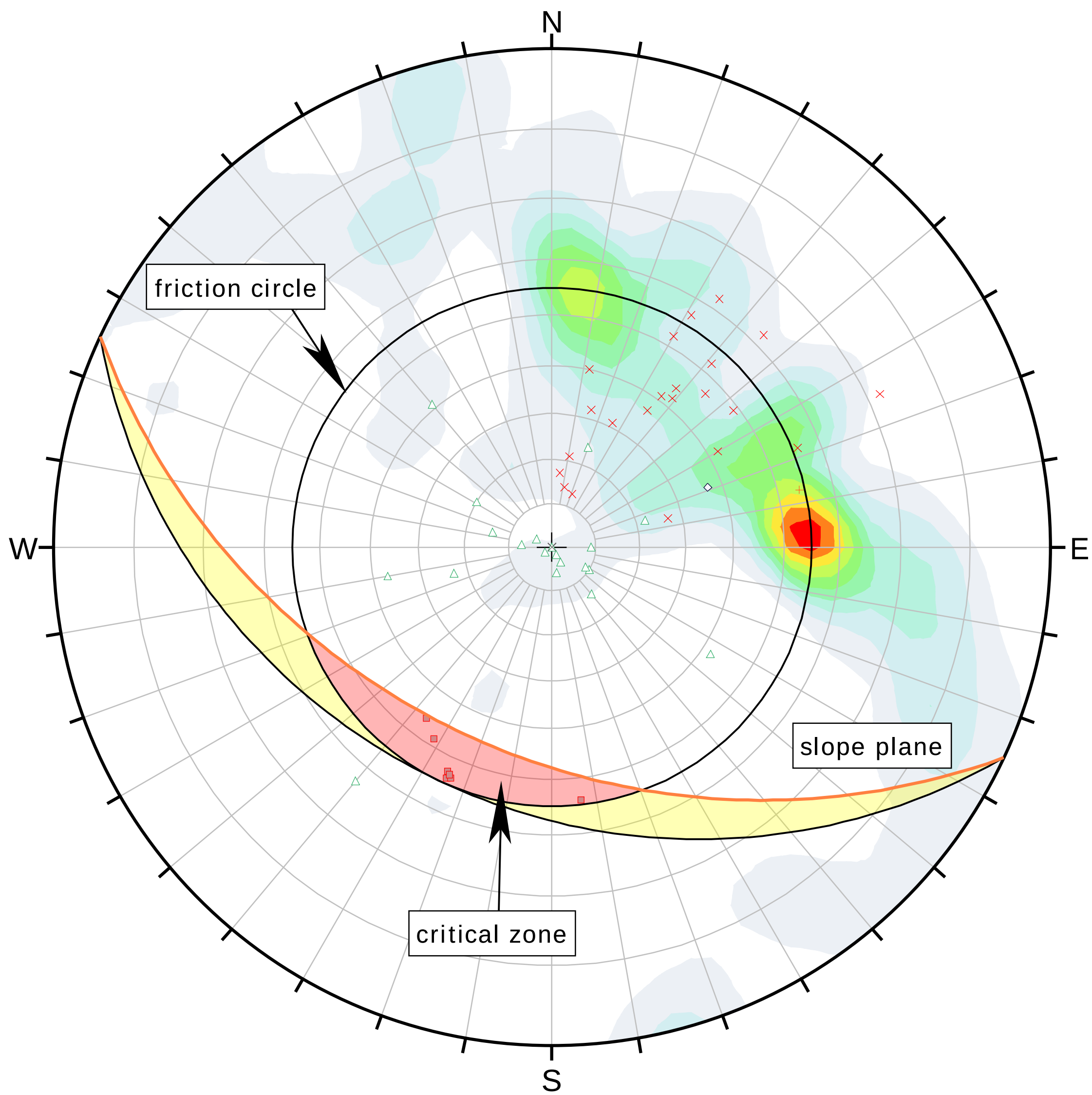
	Critical	Total	%
Flexural Toppling (All)	7	45	15.56%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project Gilman Mine			
Analysis Description: Global Data Topple Analysis			
Drawn By: JMc		Company: Terracon	
Date: 11/10/2017, 10:04:13 AM		File Name: 205 topl 80 gilman global data.dips7	Enclosure: B-2.28



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
▪	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00
Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

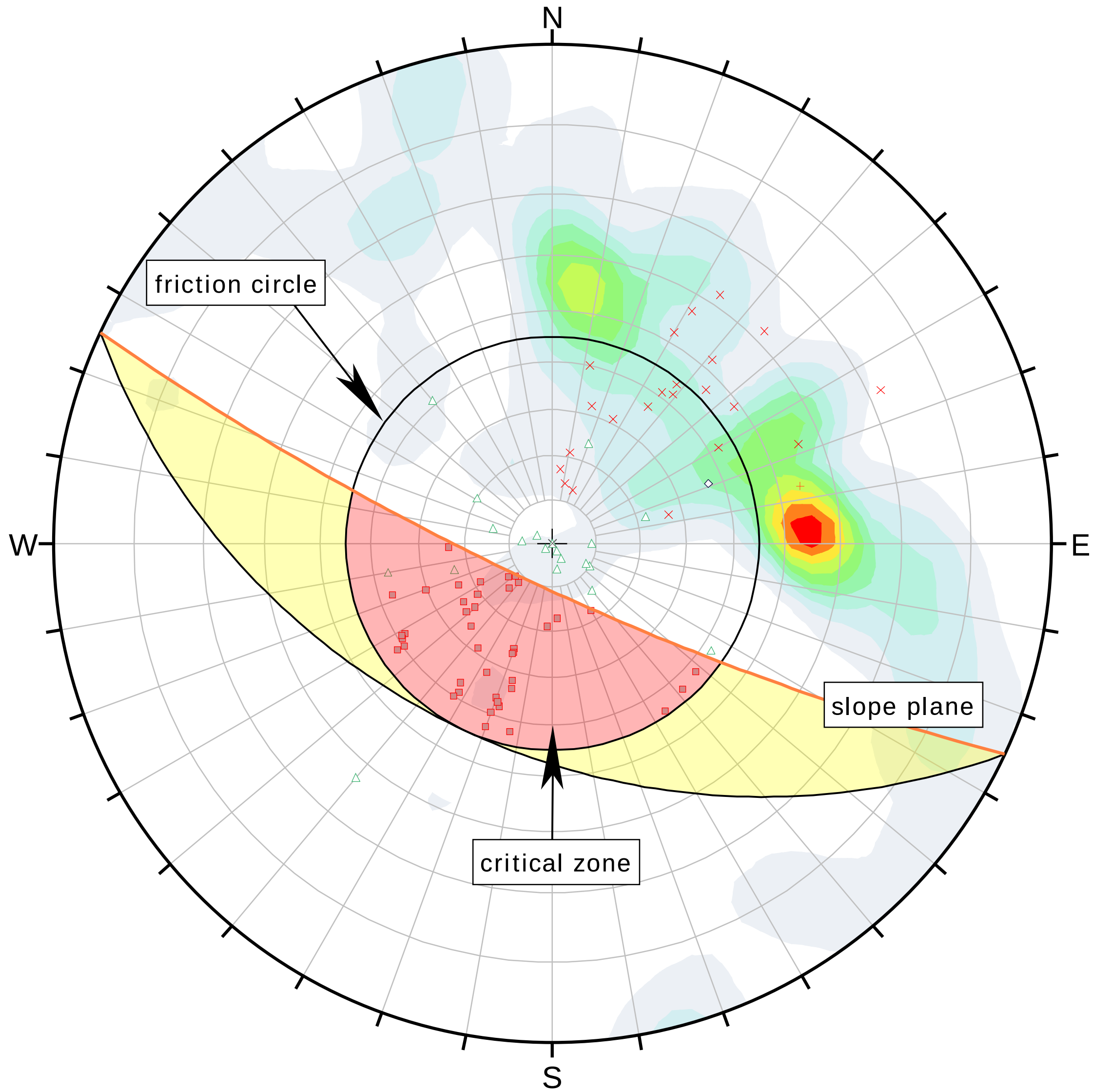
Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	205		
Friction Angle	35°		
	Critical	Total	%
Wedge Sliding	7	990	0.71%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Wedge Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 205 wedg 45 gilman global data.dips7	Enclosure B-2.29



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00
Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

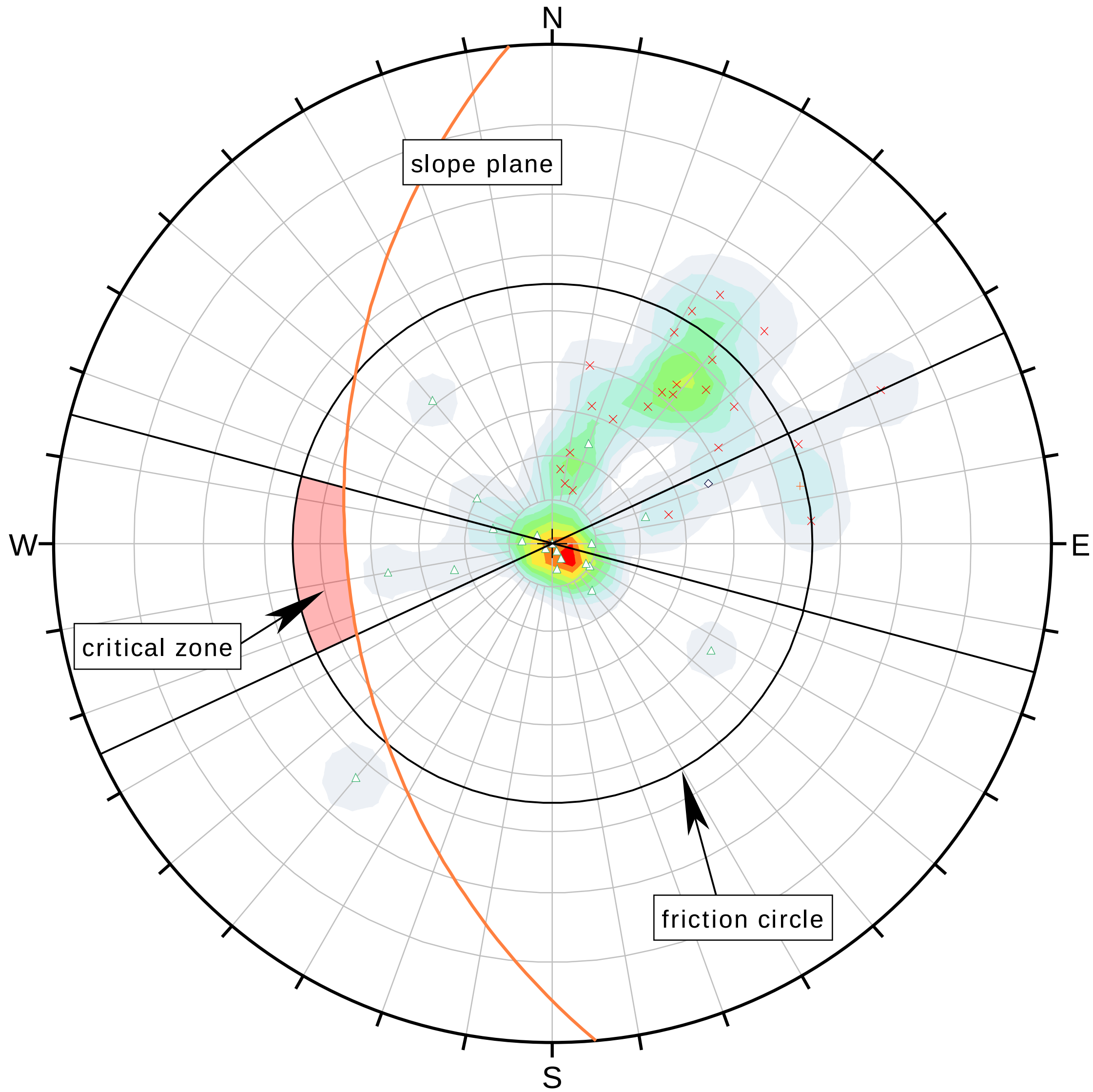
Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	205		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	41	990	4.14%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Global Data Wedge Sliding 80 degree face		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name 205 wedg 80 gilman global data.dips7	Enclosure B-2.30



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

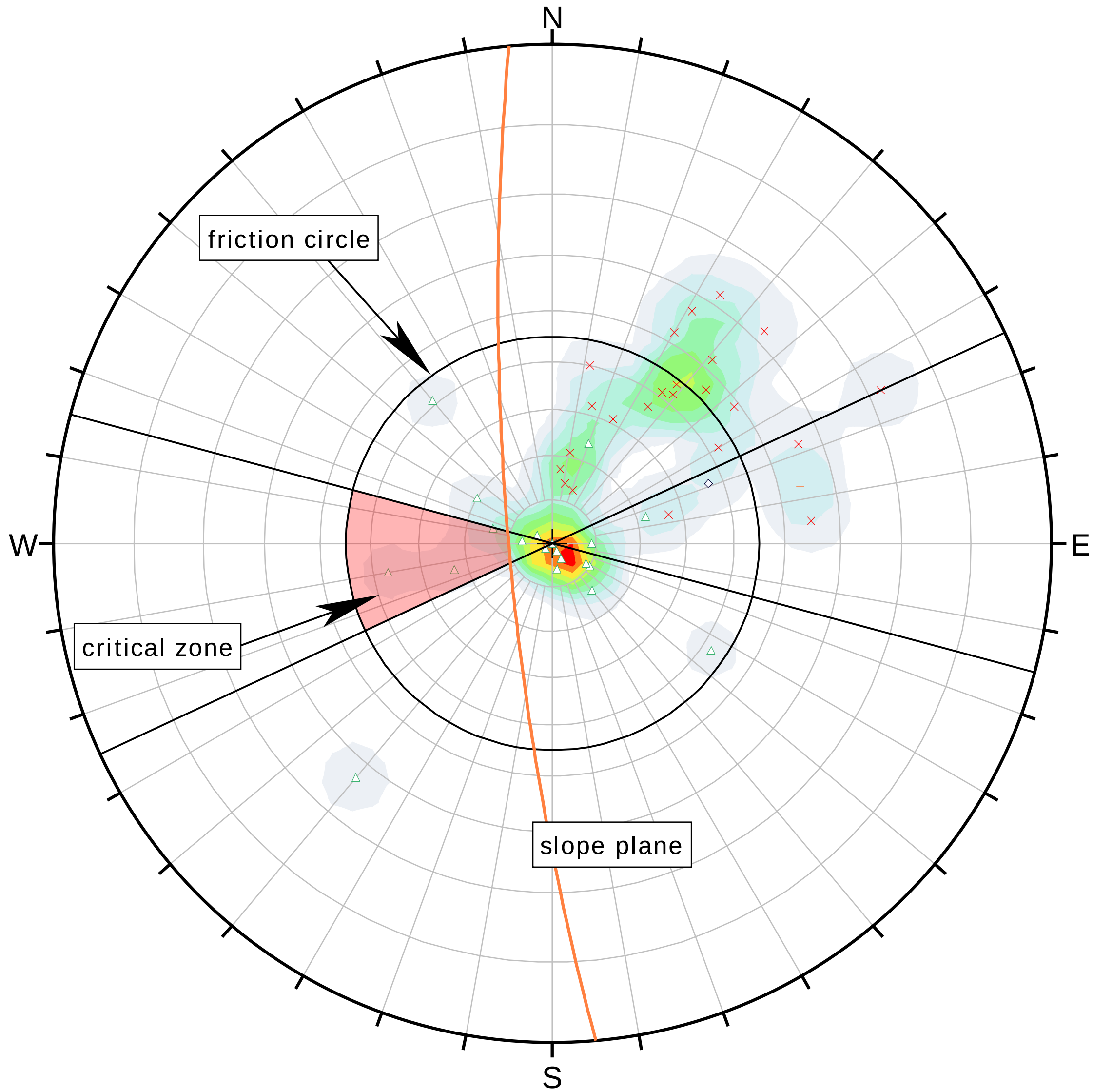
Kinematic Analysis	Planar Sliding		
Slope Dip	45		
Slope Dip Direction	265		
Friction Angle	35°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Planar Sliding - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	265 plan 45 gilman global data.dips7
		Enclosure	B-2.31



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	80
Slope Dip Direction	265
Friction Angle	45°
Lateral Limits	20°

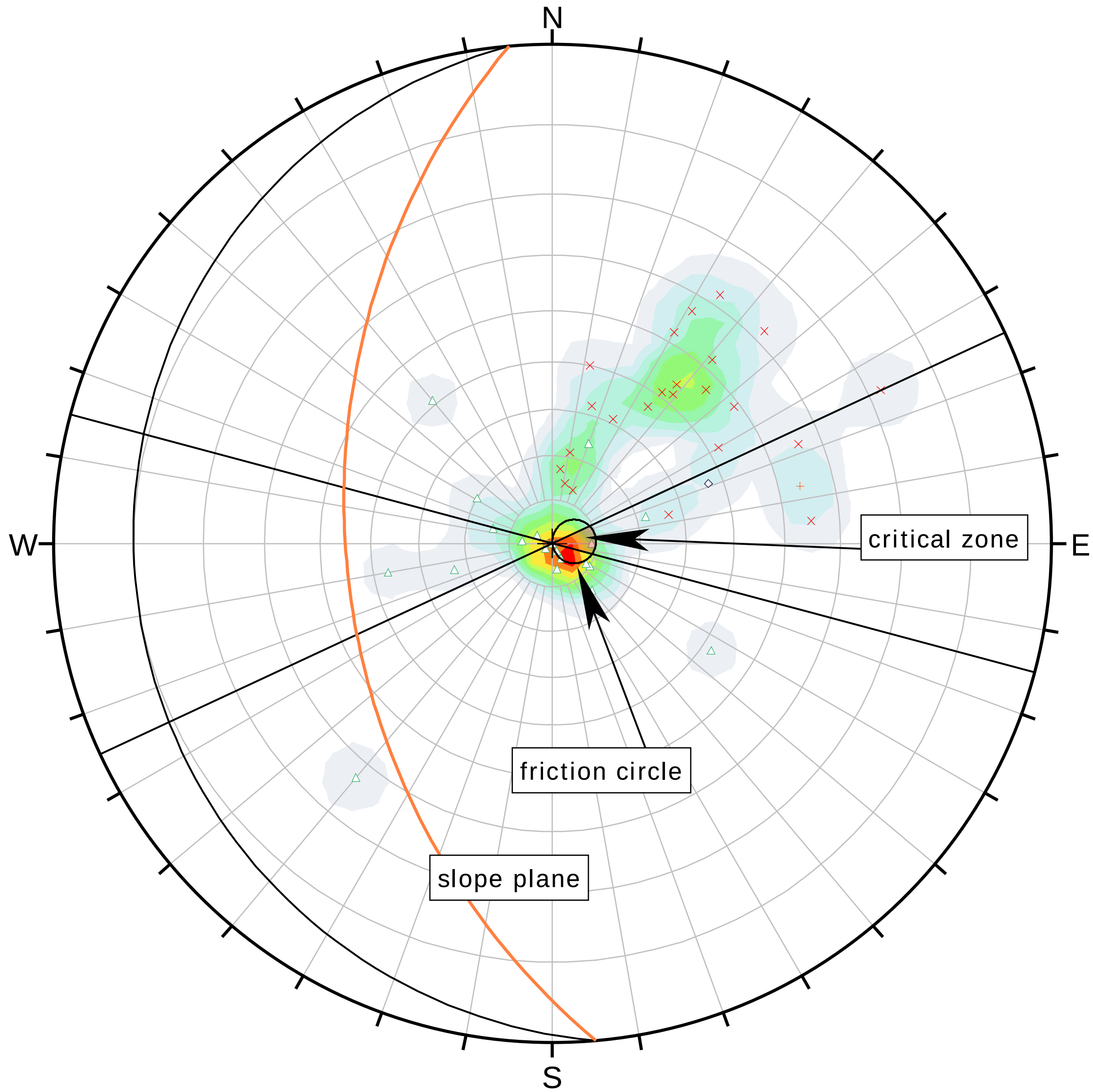
	Critical	Total	%
Planar Sliding (All)	3	45	6.67%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine
Analysis Description	Global Data Planar Sliding 80 degree face
Drawn By	JMc
Company	Terracon
Date	11/10/2017, 10:04:13 AM
File Name	265 plan 80 gilman global data.dips7
Enclosure	B-2.32

DIPS 7.011



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00

Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling
Slope Dip	45
Slope Dip Direction	265
Friction Angle	35°
Lateral Limits	20°

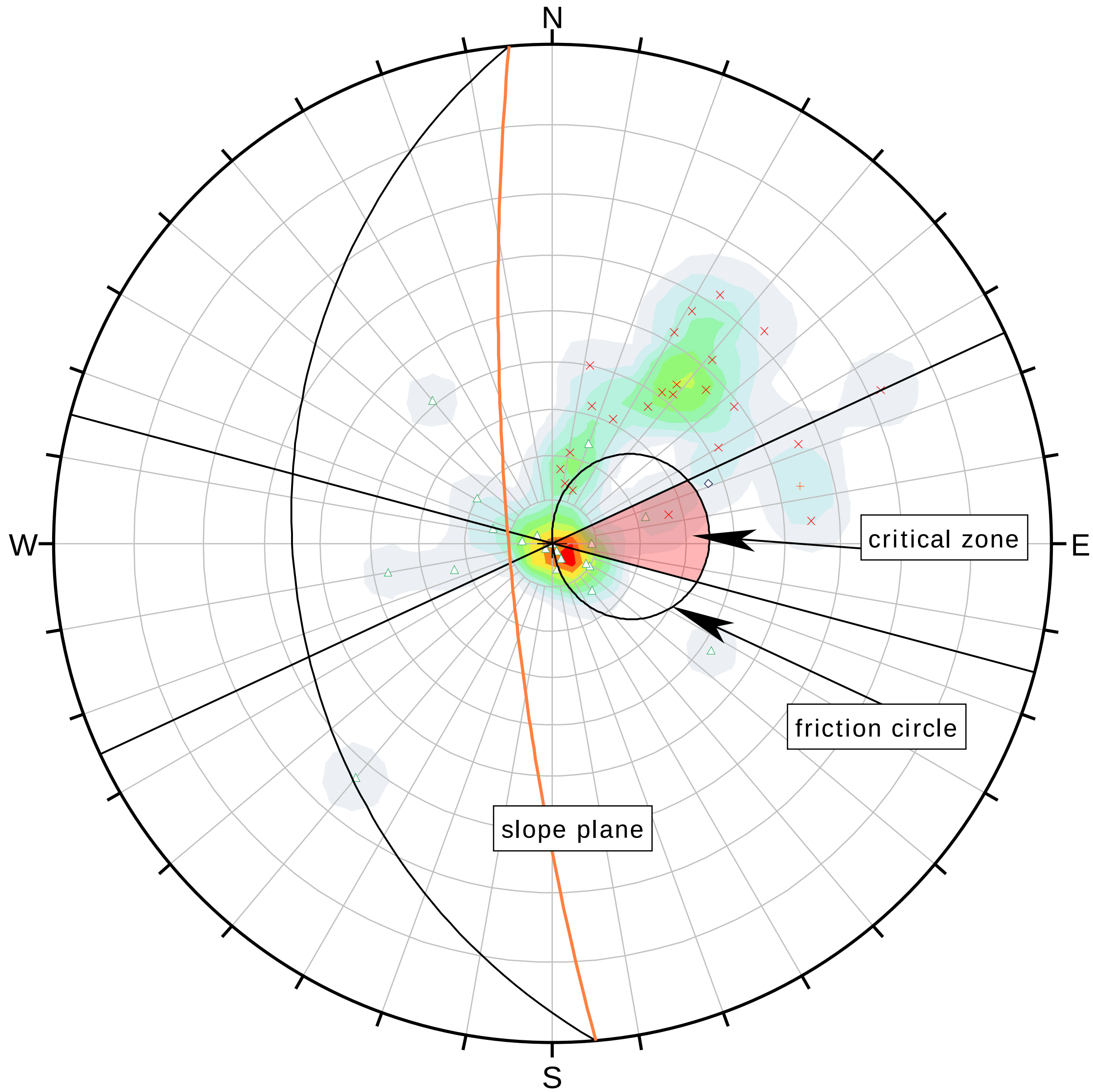
	Critical	Total	%
Flexural Toppling (All)	1	45	2.22%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Topple Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	265 topl 45 gilman global data.dips7
		Enclosure	B-2.33



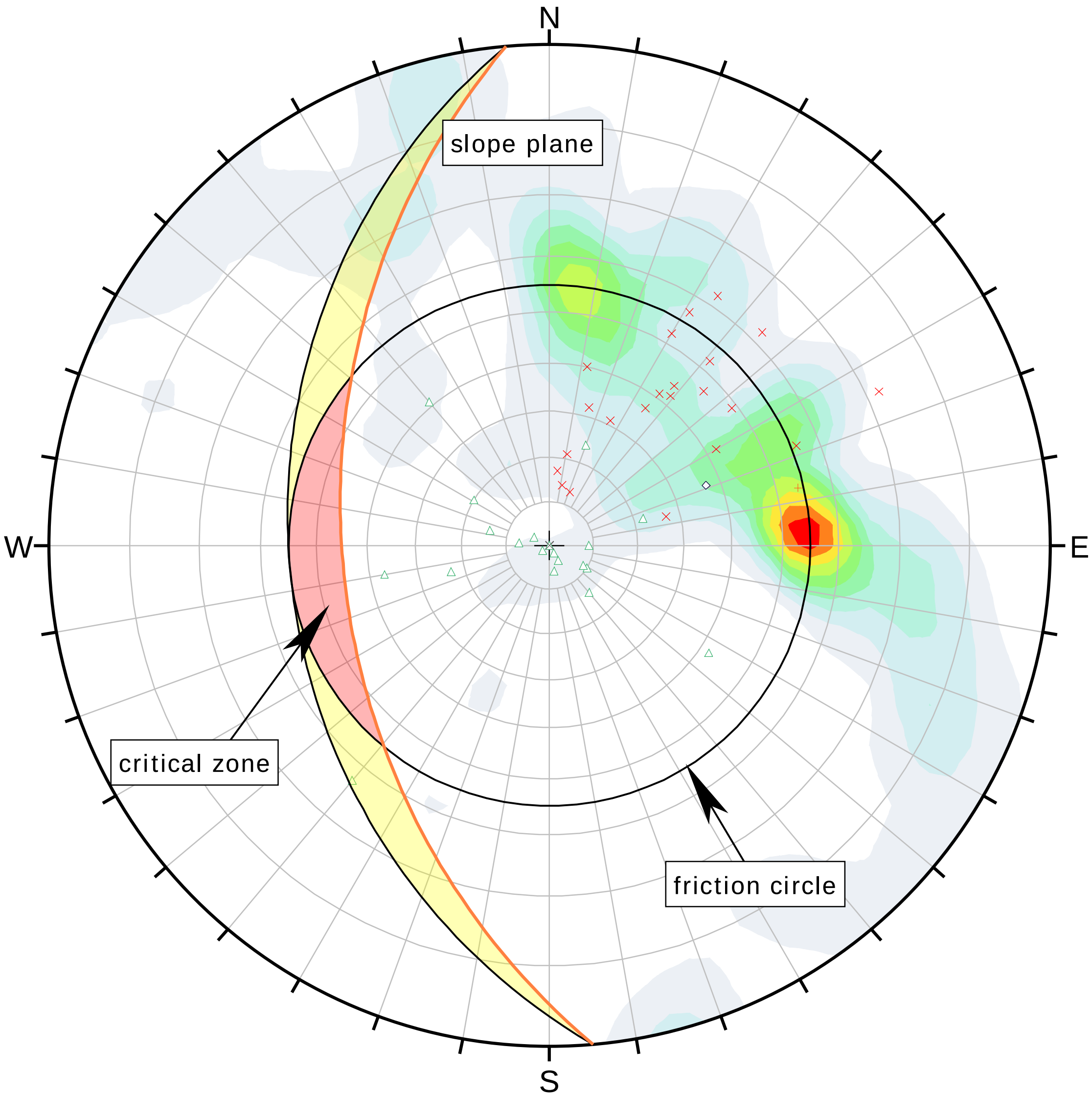
Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Flexural Toppling		
Slope Dip	80		
Slope Dip Direction	265		
Friction Angle	45°		
Lateral Limits	20°		
	Critical	Total	%
Flexural Toppling (All)	3	45	6.67%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine		
	Analysis Description: Global Data Topple Analysis		
	Drawn By: JMc	Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 265 topl 80 gilman global data.dips7	Enclosure: B-2.34



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	**Feature**	
■	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00

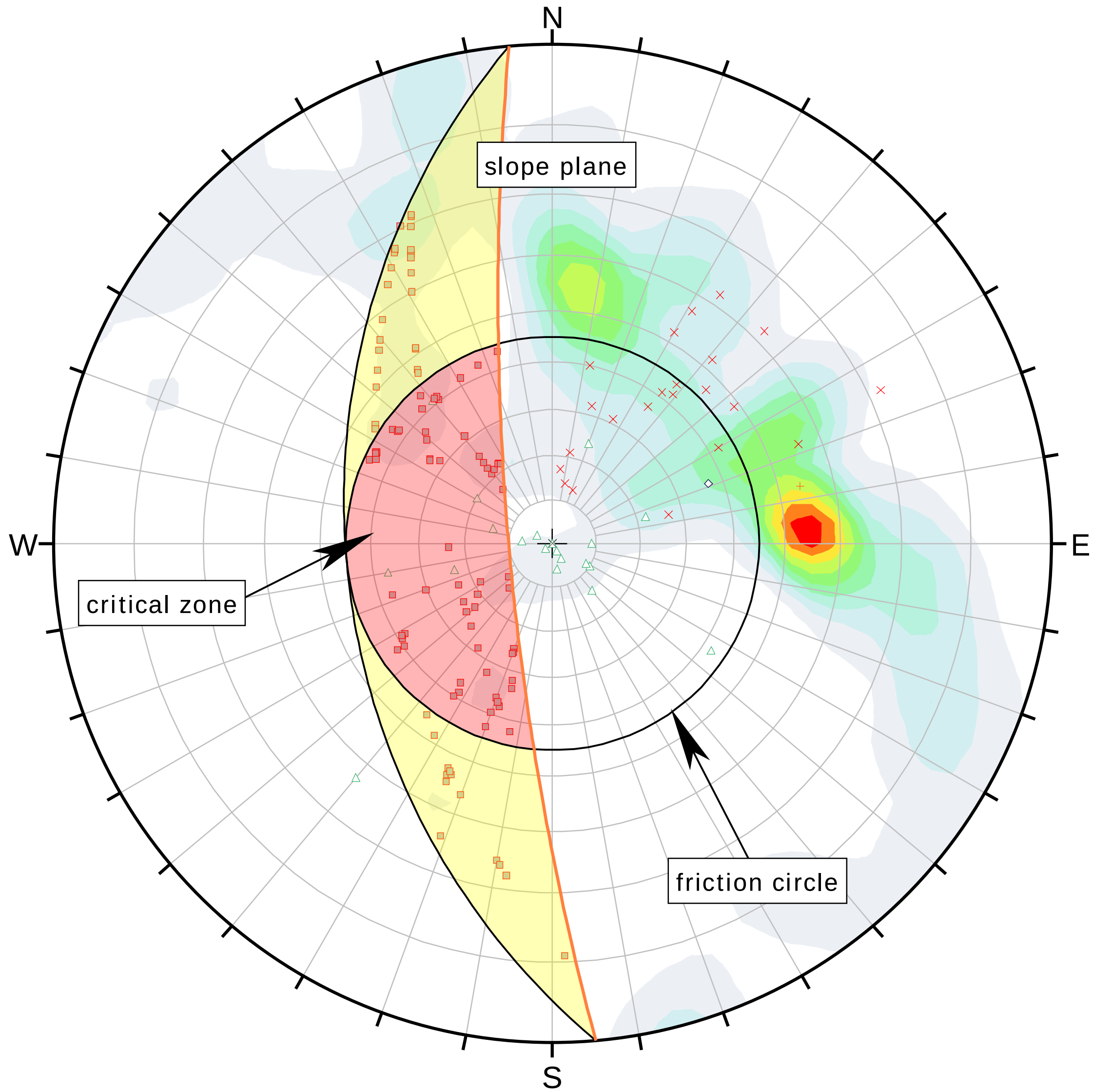
Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	265		
Friction Angle	35°		
	Critical	Total	%
Wedge Sliding	0	990	0.00%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Project	Gilman Mine		
Analysis Description	Wedge Potential - 45-Degree Slope		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	265 wedg 45 gilman global data.dips7
		Enclosure	B-2.35

DIPS 7.011



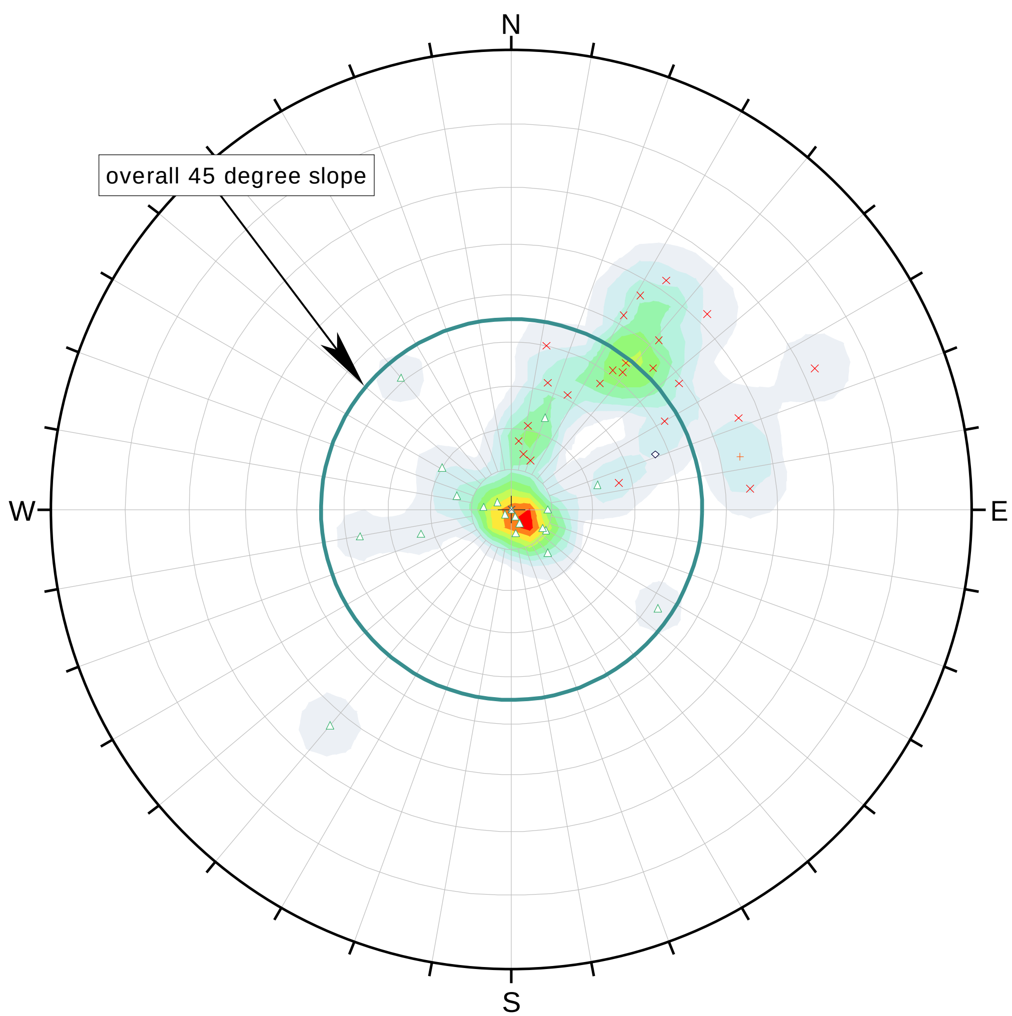
Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1
Symbol	Feature	
▪	Critical Intersection	

Color	Density Concentrations
	0.00 - 0.90
	0.90 - 1.80
	1.80 - 2.70
	2.70 - 3.60
	3.60 - 4.50
	4.50 - 5.40
	5.40 - 6.30
	6.30 - 7.20
	7.20 - 8.10
	8.10 - 9.00
Contour Data	Intersections
Maximum Density	8.66%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	80		
Slope Dip Direction	265		
Friction Angle	45°		
	Critical	Total	%
Wedge Sliding	102	990	10.30%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

Terracon	*Project* Gilman Mine			
	Analysis Description: Global Data Wedge Sliding 80 degree face			
	Drawn By: JMc	Company: Terracon		
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 265 wedg 80 gilman global data.dips7	Enclosure	B-2.36



Symbol	TYPE	Quantity
◇	cont	1
×	fol	23
△	j	20
+	lin	1

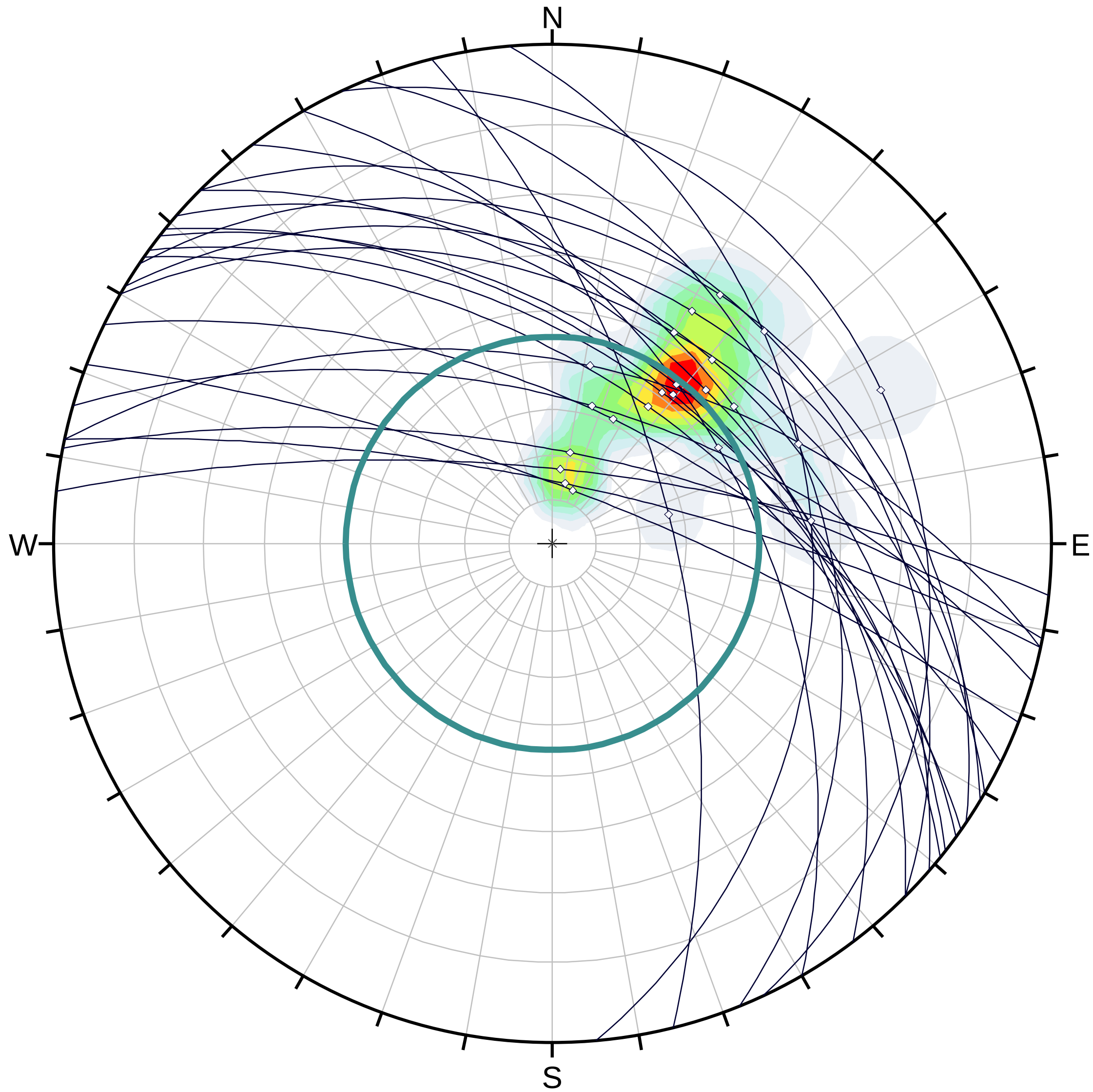
Color	Density Concentrations
	0.00 - 1.80
	1.80 - 3.60
	3.60 - 5.40
	5.40 - 7.20
	7.20 - 9.00
	9.00 - 10.80
	10.80 - 12.60
	12.60 - 14.40
	14.40 - 16.20
	16.20 - 18.00
Contour Data	Dip Vectors
Maximum Density	17.04%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Plot Mode	Dip Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

DIPS 7.011

Project	Gilman Mine		
Analysis Description	Global Data		
Drawn By	JMc	Company	Terracon
Date	11/10/2017, 10:04:13 AM	File Name	gilman global data plus slope cone.dips7
Enclosure	B-3.1		



Symbol	TYPE	Quantity
◇	fol	23

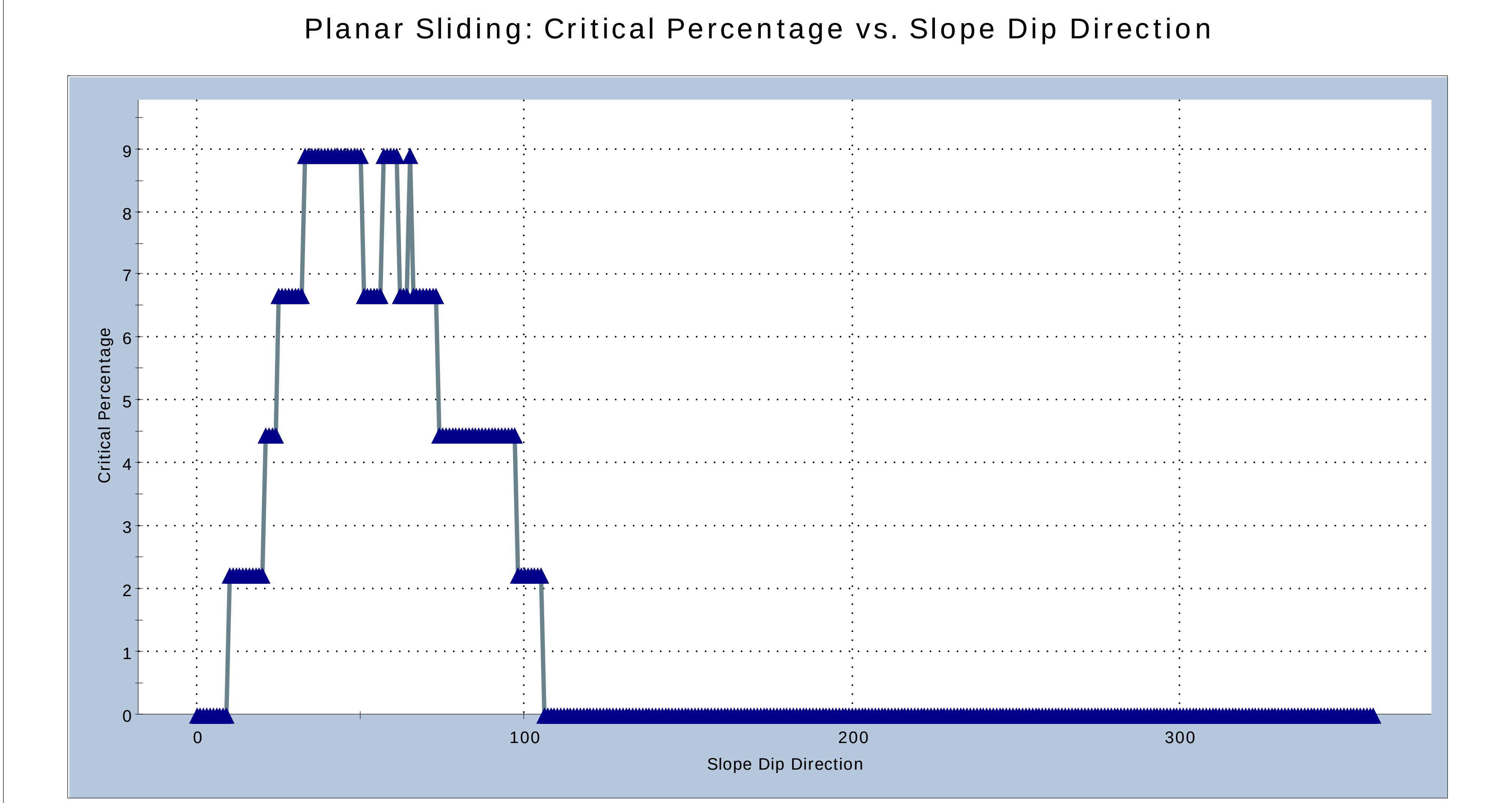
Color	Density Concentrations
	0.00 - 2.20
	2.20 - 4.40
	4.40 - 6.60
	6.60 - 8.80
	8.80 - 11.00
	11.00 - 13.20
	13.20 - 15.40
	15.40 - 17.60
	17.60 - 19.80
	19.80 - 22.00
Contour Data	Dip Vectors
Maximum Density	21.56%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Plot Mode	Dip Vectors
Vector Count	23 (23 Entries)
Hemisphere	Lower
Projection	Equal Angle

Terracon

Project	Gilman Mine	
Analysis Description	Bedding Planes and 45-Degree Slope Cone	
Drawn By: JMc	Company: Terracon	
Date: 11/10/2017, 10:04:13 AM	File Name: bedding vectors with planes.dips7	Enclosure: B-3.2

DIPS 7.011

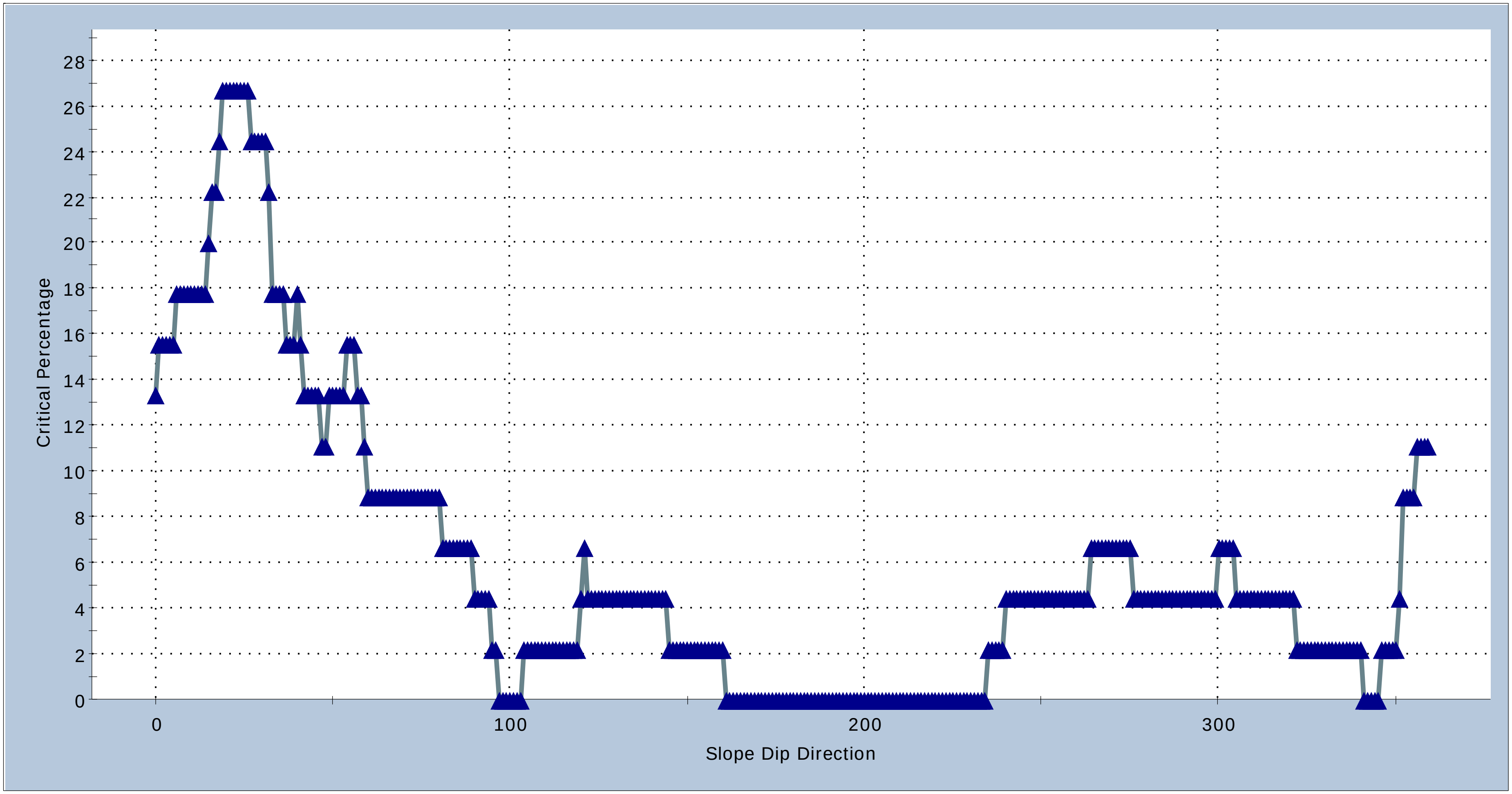


Mean Values

Slope Dip = 45 Slope Dip Direction = 10 Friction Angle = 35 Lateral Limit = 20

Terracon	*Project*	Gilman Mine		
	Analysis Description	Sensitivity Analysis: Planar Sliding - 45-Degree Slope		
	Drawn By	JMc	Company	Terracon
DIPS 7.011	*Date*	11/10/2017, 10:04:13 AM	File Name sens plan 45 gilman global data.dips7	Enclosure B-4.1

Planar Sliding: Critical Percentage vs. Slope Dip Direction

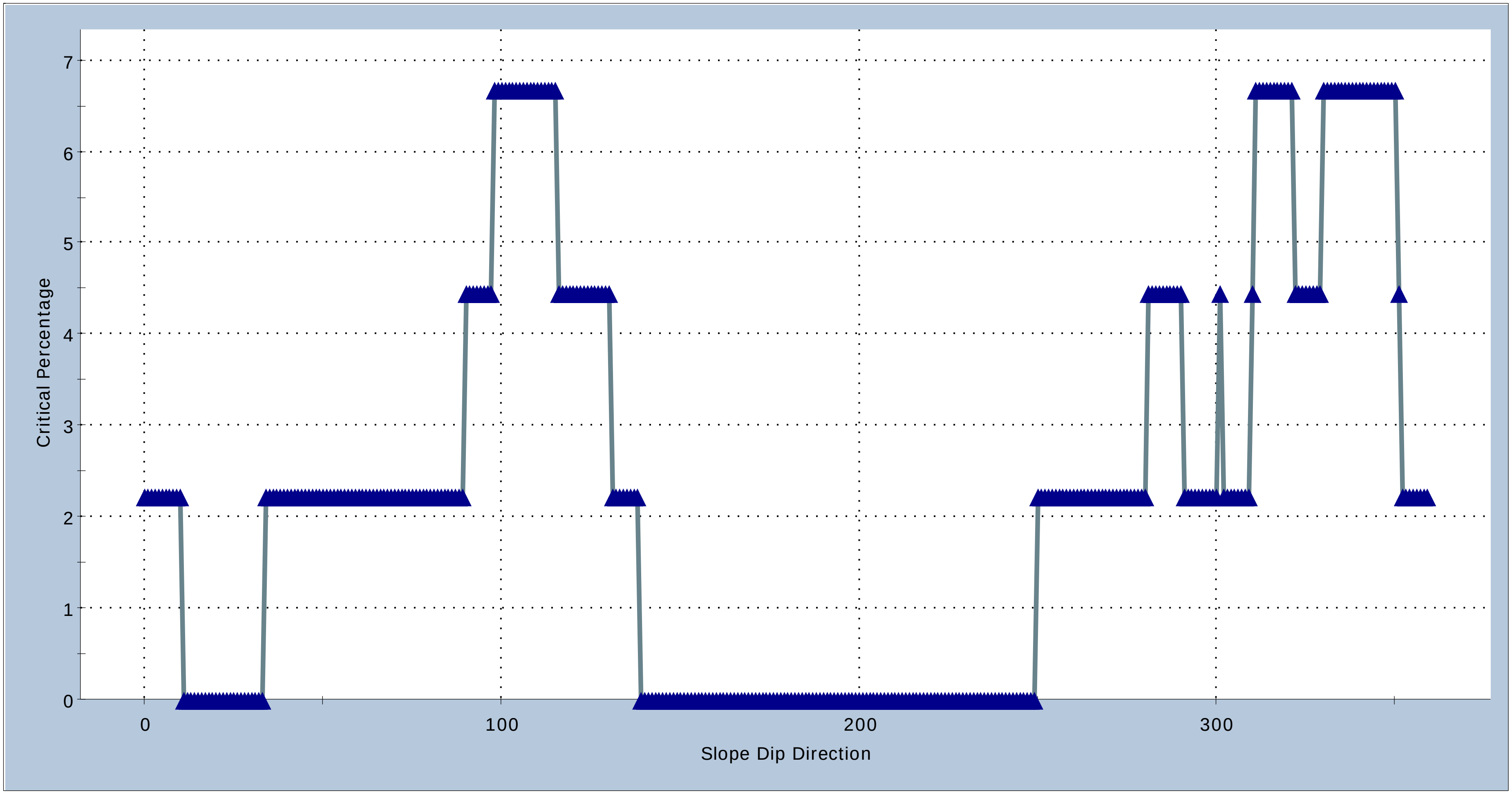


Mean Values

Slope Dip = 80 Slope Dip Direction = 10 Friction Angle = 45 Lateral Limit = 20

Terracon	*Project*	Gilman Mine		
	Analysis Description	Global Data Planar Sliding 80 degree face		
	Drawn By	JMc	Company	Terracon
DIPS 7.011	*Date*	11/10/2017, 10:04:13 AM	File Name 010 plan 80 gilman global data dips7	Enclosure B-4.2

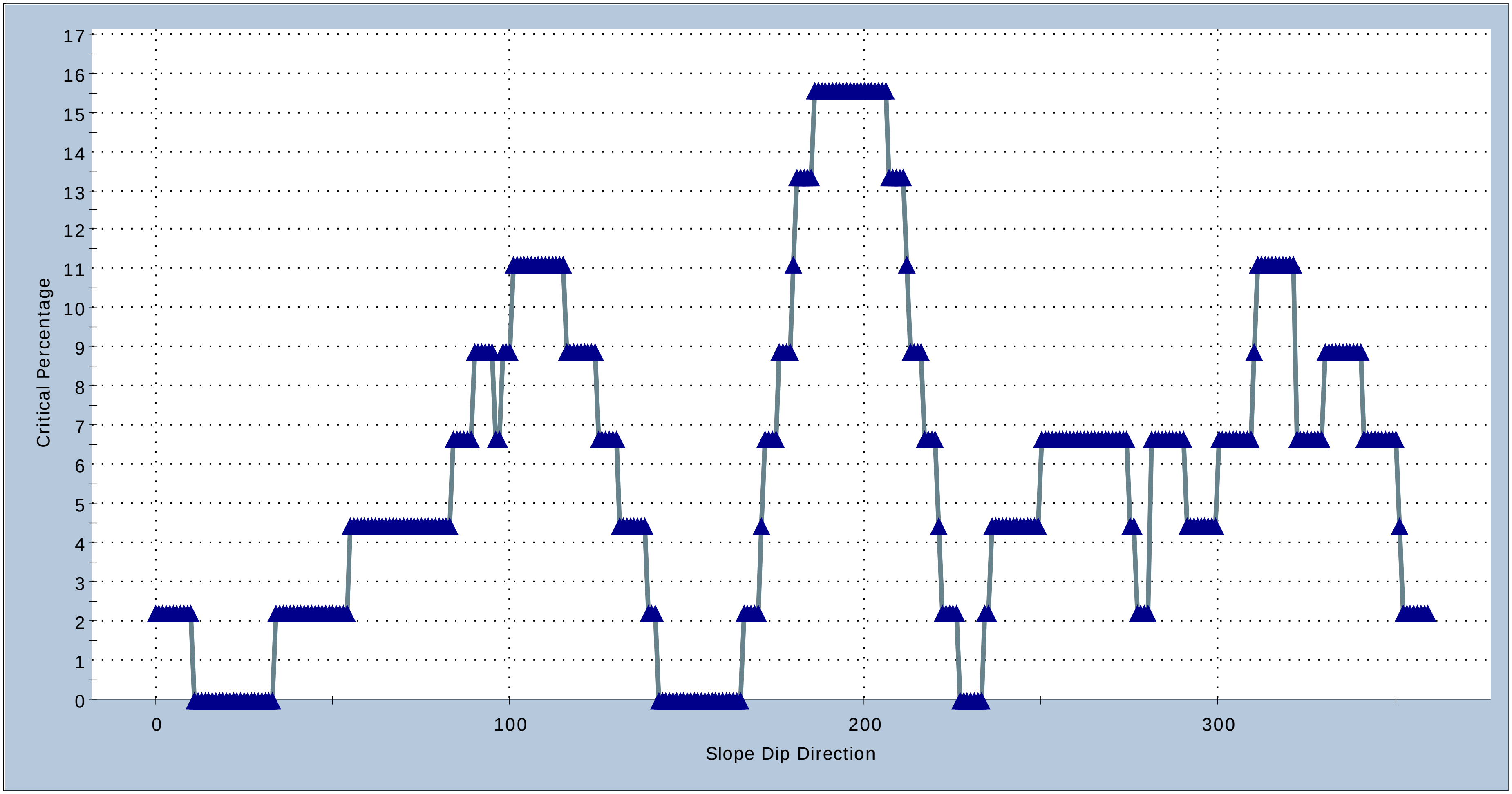
Flexural Toppling: Critical Percentage vs. Slope Dip Direction



Mean Values
Slope Dip = 45 Slope Dip Direction = 10 Friction Angle = 35 Lateral Limit = 20

Terracon	*Project* Gilman Mine			
	Analysis Description: Sensitivity Analysis: Topple Potential - 45-Degree Slope			
	Drawn By: JMc	Company: Terracon		
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: sens topple 45 gilman global data.dips7	Enclosure	B-5.1

Flexural Toppling: Critical Percentage vs. Slope Dip Direction

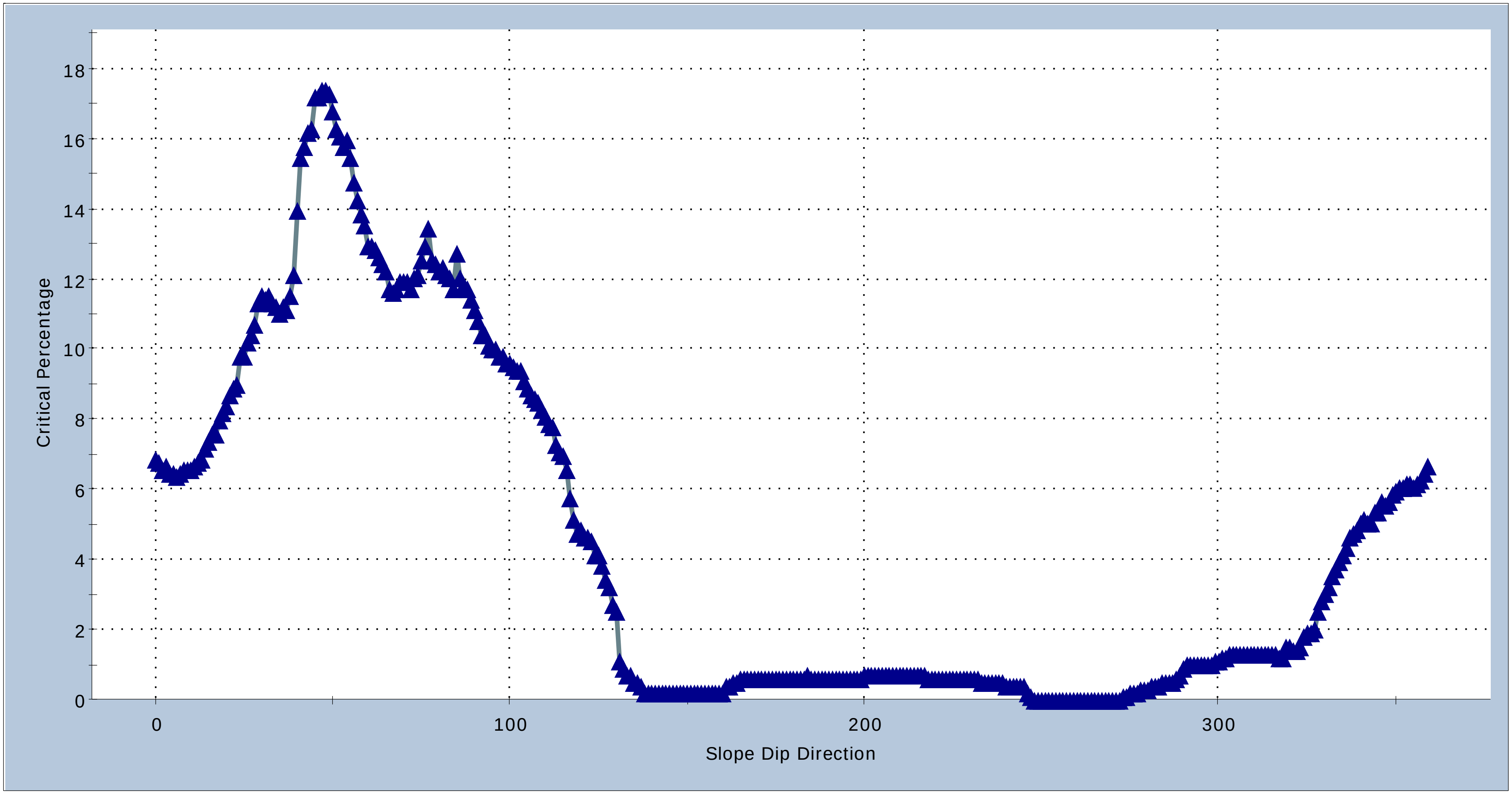


Mean Values

Slope Dip = 80 Slope Dip Direction = 0 Friction Angle = 45 Lateral Limit = 20

Terracon	*Project* Gilman Mine			
	Analysis Description: Global Data Topple Sensitivity Analysis			
	Drawn By: JMc		Company: Terracon	
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM		File Name: 265 topl 80 gilman global data.dips7	Enclosure: B-5.2

Wedge Sliding: Critical Percentage vs. Slope Dip Direction

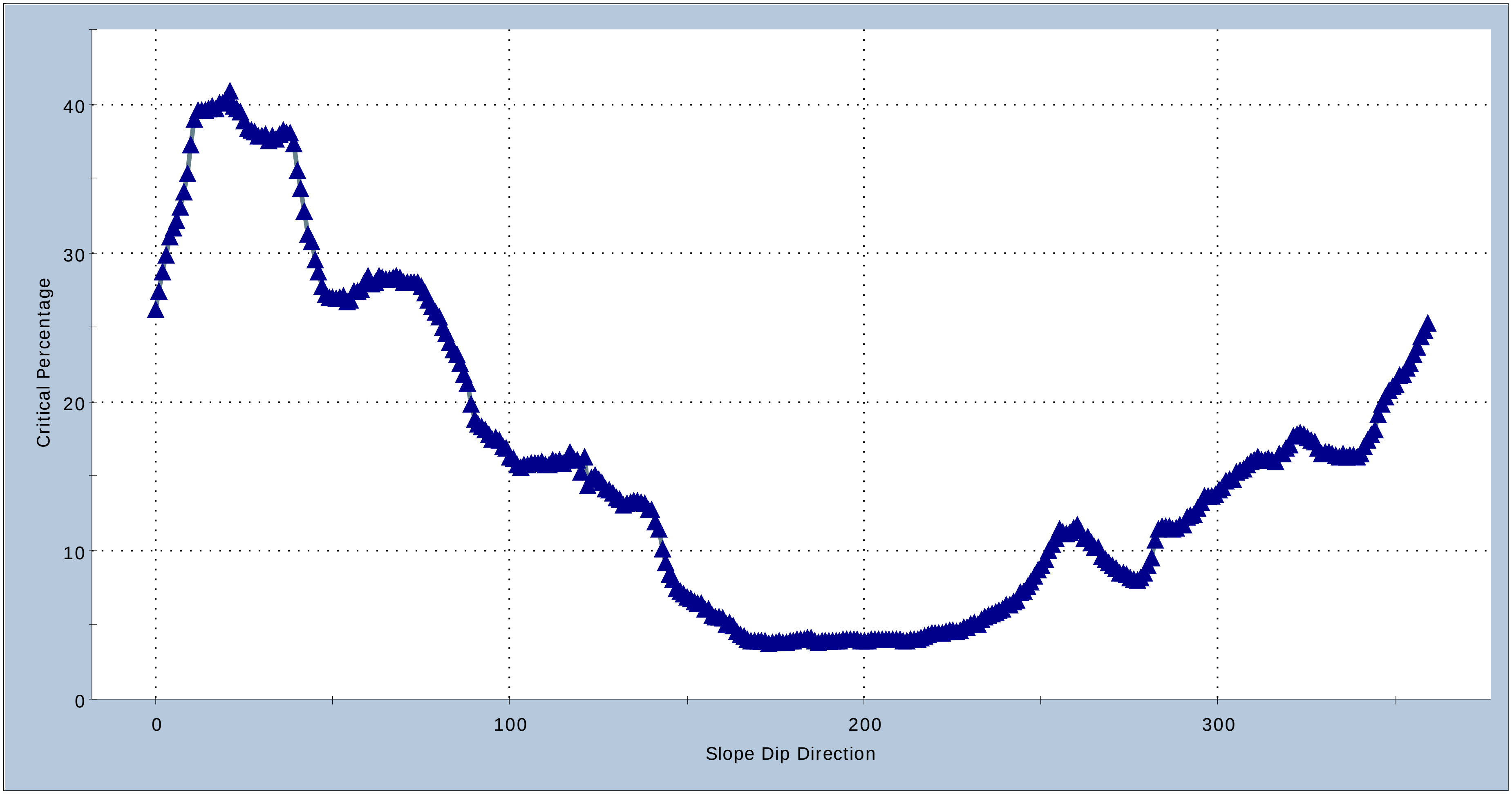


Mean Values

Slope Dip = 45 Slope Dip Direction = 10 Friction Angle = 35 Lateral Limit = 20

Terracon	*Project* Gilman Mine			
	Analysis Description: Sensitivity Analysis: Wedge Sliding - 45-Degree Slope			
	Drawn By JMc	Company: Terracon		
DIPS 7.011	*Date* 11/10/2017, 10:04:13 AM	File Name: sens wedge 45 gilman global data.dips7	Enclosure	B-6.1

Wedge Sliding: Critical Percentage vs. Slope Dip Direction

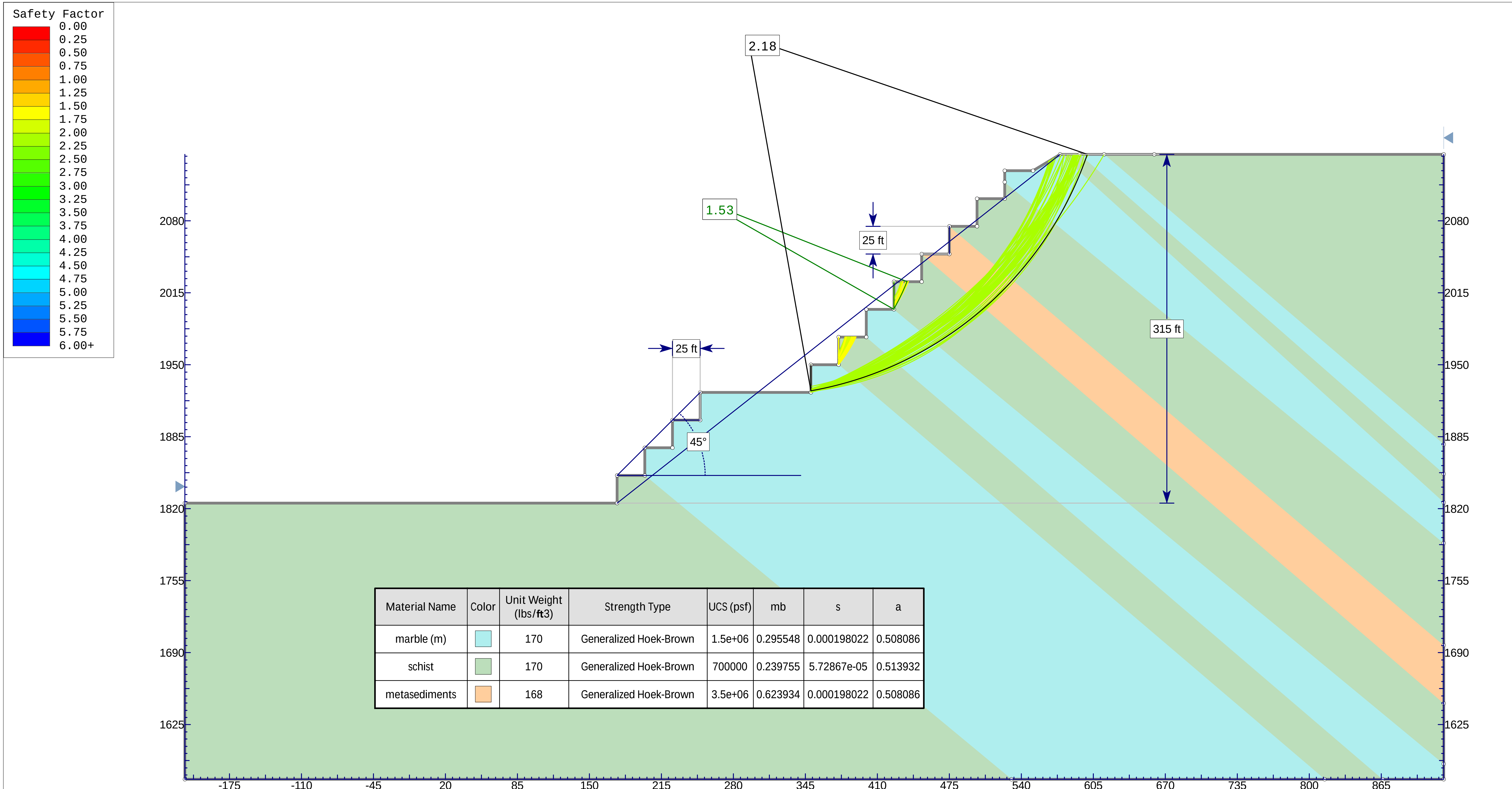


Mean Values

Slope Dip = 80 Slope Dip Direction = 265 Friction Angle = 45 Lateral Limit = 20

Terracon	*Project* Gilman Mine			
	Analysis Description: Global Data Wedge Sliding Sensitivity Analysis			
	Drawn By: JMc	Company: Terracon		
DIPS 7.011	*Date*: 11/10/2017, 10:04:13 AM	File Name: 265 wedg 80 gilman global data dips7	Enclosure: B-6.2	

APPENDIX C – GLOBAL STABILITY CALCULATIONS

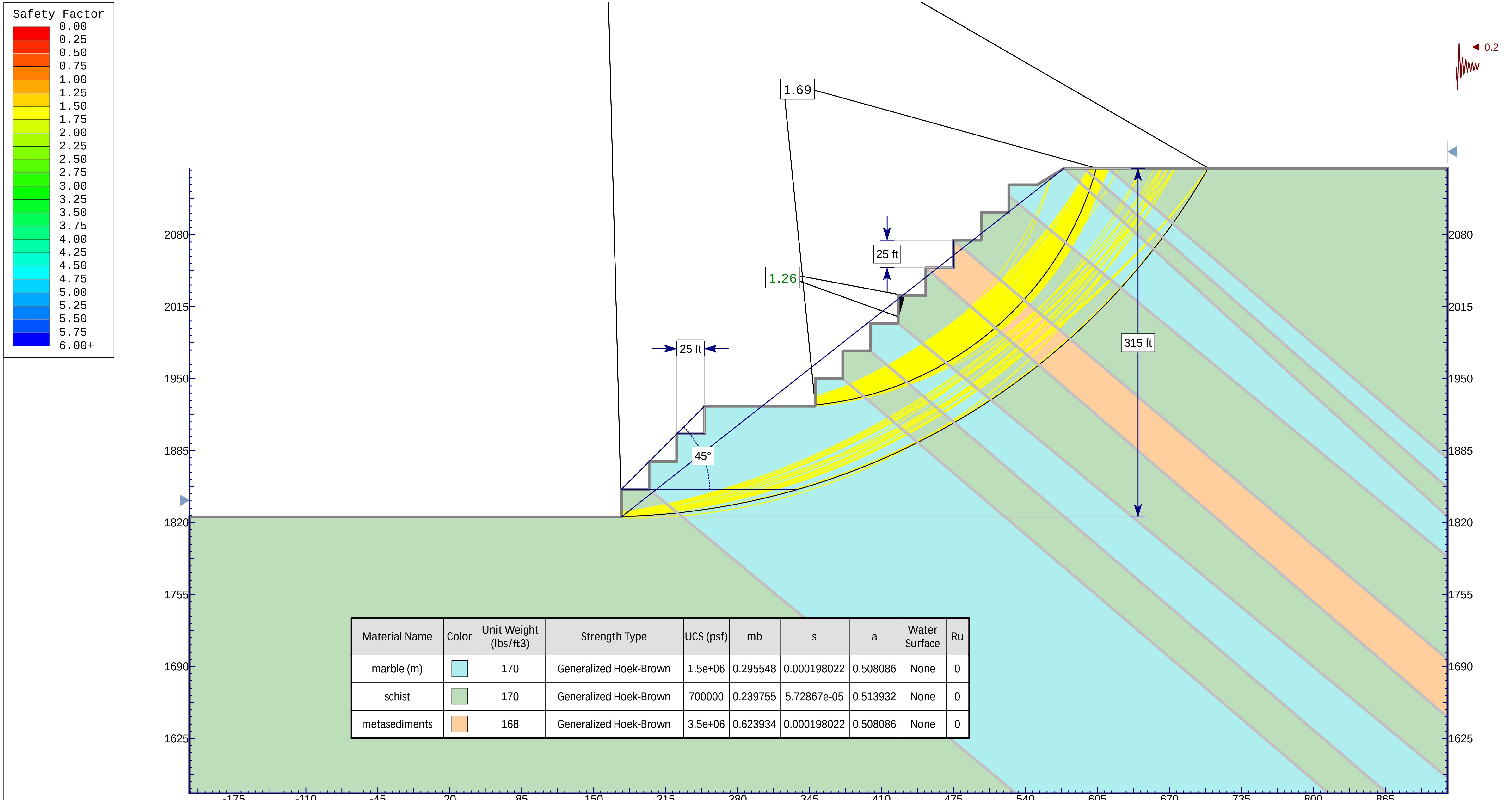


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	UCS (psf)	mb	s	a
marble (m)		170	Generalized Hoek-Brown	1.5e+06	0.295548	0.000198022	0.508086
schist		170	Generalized Hoek-Brown	700000	0.239755	5.72867e-05	0.513932
metasediments		168	Generalized Hoek-Brown	3.5e+06	0.623934	0.000198022	0.508086

Terracon

SLIDEINTERPRET 8.021

Project	Chandler Gilman Mine		
Analysis Description	Section A		
Drawn By	JMc	Company	Terracon
Date	2019	File Name	2019 sect A layer model stat rev benching.slim

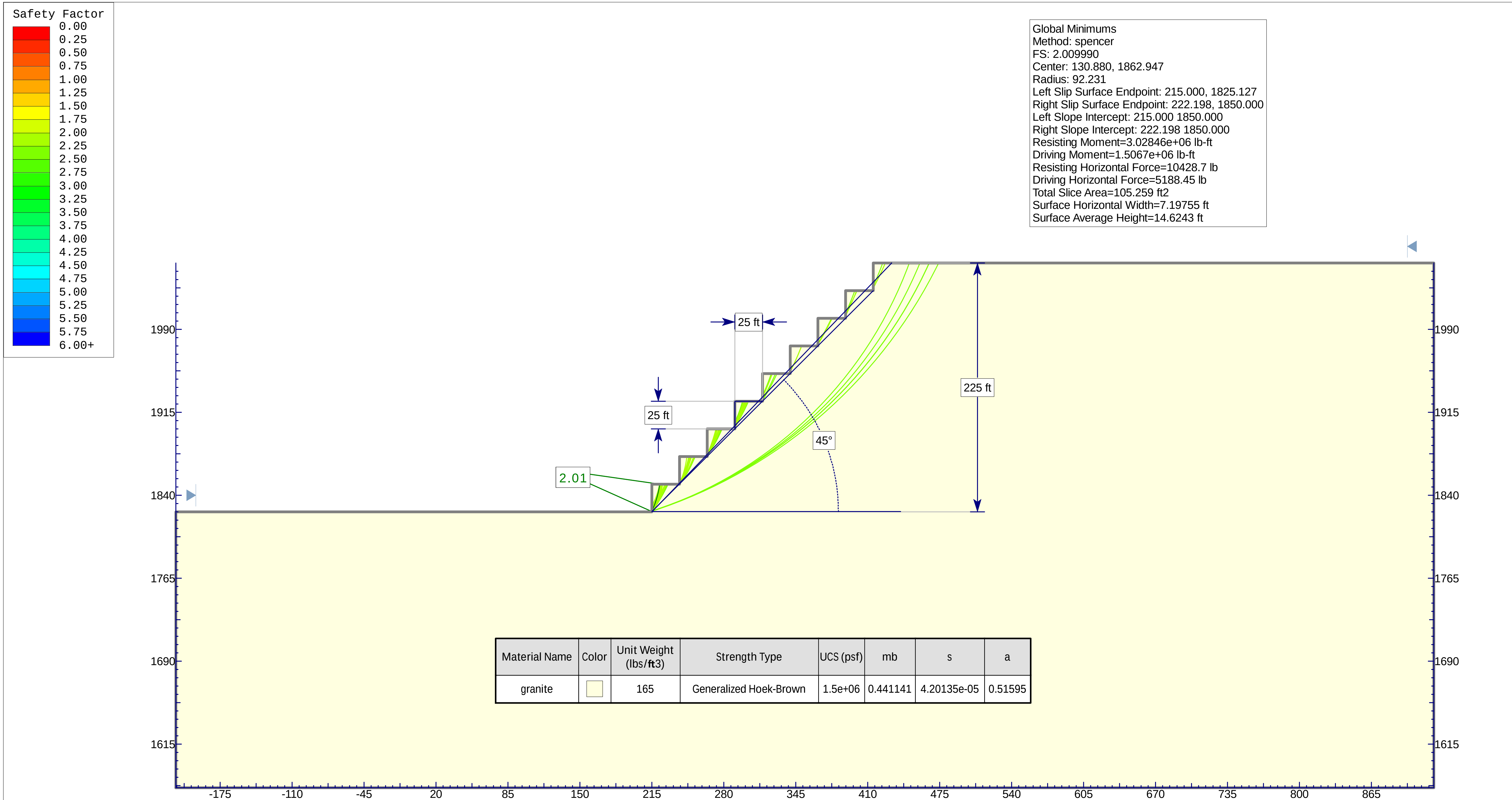


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	UCS (psf)	mb	s	a	Water Surface	Ru
marble (m)		170	Generalized Hoek-Brown	1.5e+06	0.295548	0.000198022	0.508086	None	0
schist		170	Generalized Hoek-Brown	700000	0.239755	5.72867e-05	0.513932	None	0
metasediments		168	Generalized Hoek-Brown	3.5e+06	0.623934	0.000198022	0.508086	None	0

Terracon

SLIDEINTERPRET 8.021

Project	Chandler Gilman Mine
Analysis Description	Section A
Drawn By	JMc
Company	Terracon
Date	2019
File Name	2019 sect A layer model seis rev benching.slim



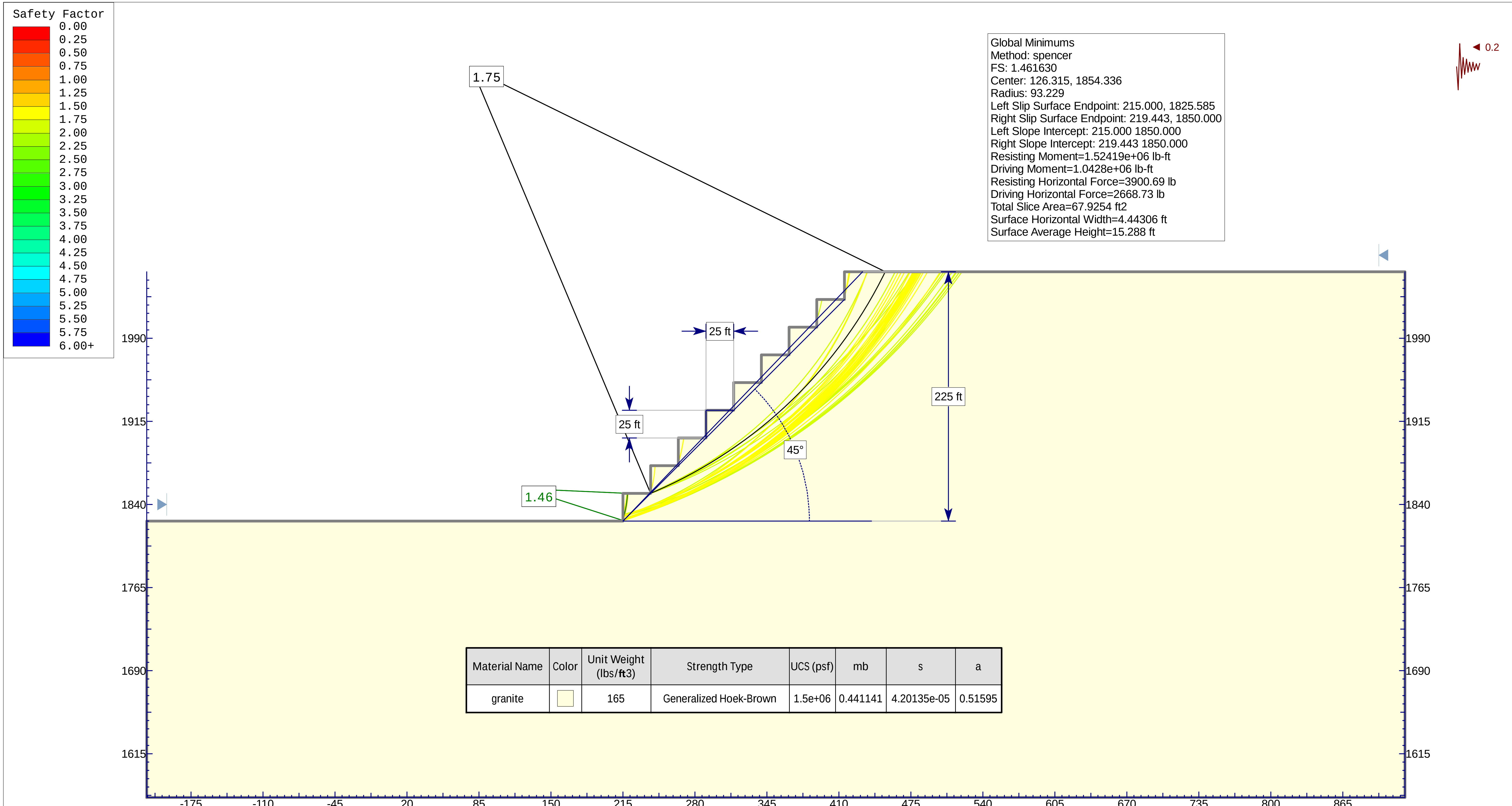
Global Minimums
Method: spencer
FS: 2.009990
Center: 130.880, 1862.947
Radius: 92.231
Left Slip Surface Endpoint: 215.000, 1825.127
Right Slip Surface Endpoint: 222.198, 1850.000
Left Slope Intercept: 215.000 1850.000
Right Slope Intercept: 222.198 1850.000
Resisting Moment=3.02846e+06 lb-ft
Driving Moment=1.5067e+06 lb-ft
Resisting Horizontal Force=10428.7 lb
Driving Horizontal Force=5188.45 lb
Total Slice Area=105.259 ft2
Surface Horizontal Width=7.19755 ft
Surface Average Height=14.6243 ft

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	UCS (psf)	mb	s	a
granite		165	Generalized Hoek-Brown	1.5e+06	0.441141	4.20135e-05	0.51595

Terracon

Project	Chandler Gilman Mine		
Analysis Description	Section B		
Drawn By	JMc	Company	Terracon
Date	APR 2019	File Name	2019 sect B stat rev benching.slim

SLIDEINTERPRET 8.021



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	UCS (psf)	mb	s	a
granite		165	Generalized Hoek-Brown	1.5e+06	0.441141	4.20135e-05	0.51595

Terracon

SLIDEINTERPRET 8.021

Project	Chandler Gilman Mine
Analysis Description	Section B
Drawn By JMc	*Company* Terracon
Date APR 2019	*File Name* 2019 sect B seis rev benching.slim

APPENDIX D – SITE PHOTOGRAPHS (2018)

Photo 1: Foliation in metasediments (schist)

Photo 2: Marble bed as quarry (foreground) and native (background) outcrops

Photo 3: Calcite as large crystals in native marble outcrop.

Photo 4: Foliation in marble outcrop.

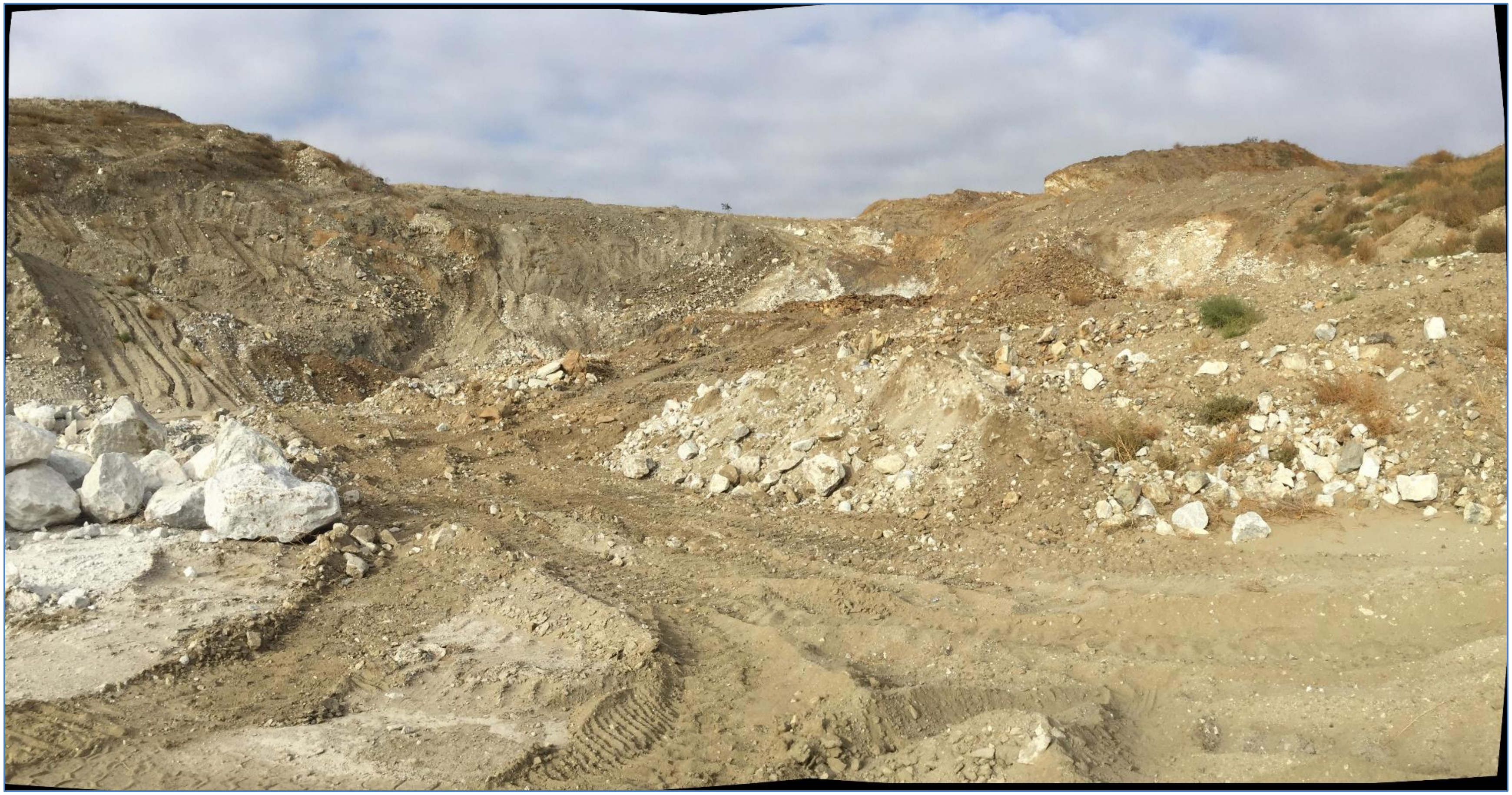


Photo 5: Location 1 – open excavation of marble in schist.

Photo 6: Location 1A – Road cut-type excavation along up dip section of marble bed in schist.

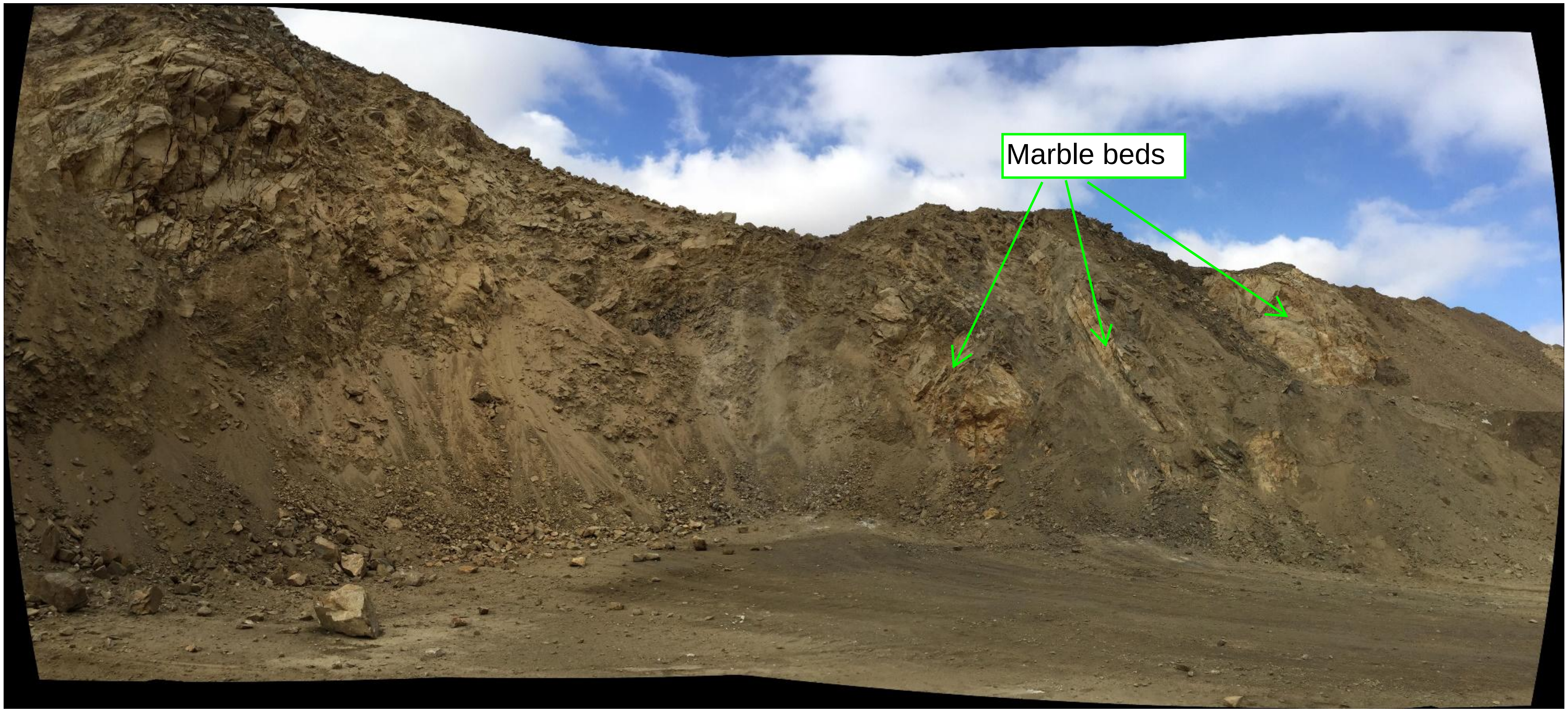


Photo 7: Location 2 – Marble in granitics. Bedding dips steeply toward viewer.

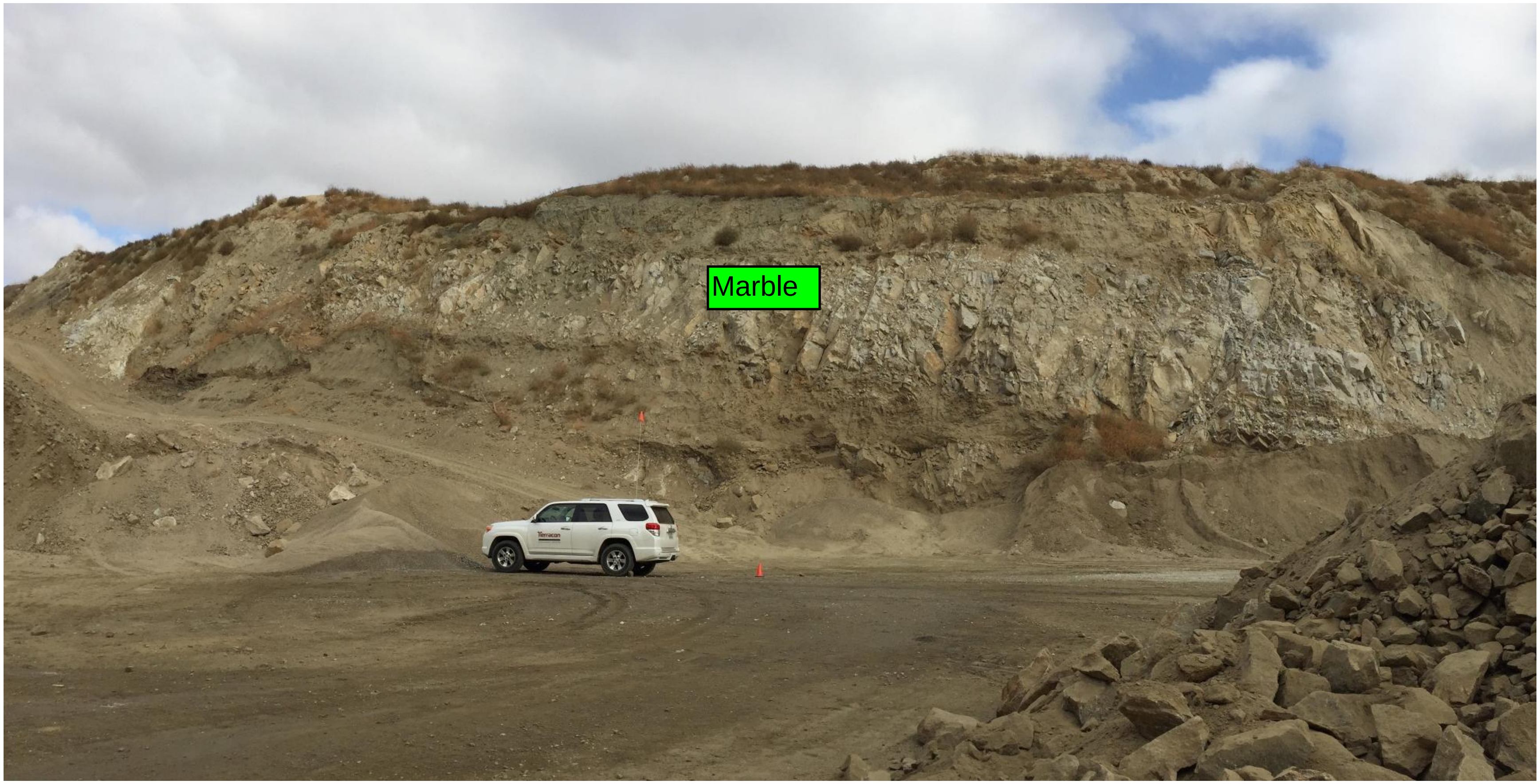


Photo 8: Location 2 – north cut. Marble bed dipping away from viewer.

Photo 9: Location 3 – Shallow quarry in marble (white) bounded by metasediments (schist).

Photo 10: Expansion Area – Marble beds form resistant ridgelines between recessive metasedimentary beds.