CALWEST GEOTECHNICAL
CONSULTING ENGINEERS

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SUBJECT: **UPDATE GEOTECHNICAL ENGINEERING REPORT AND CHANGE OF GEOTECHNICAL CONSULTANT, PROPOSED CUSTOM SINGLE-FAMILY RESIDENTIAL DEVELOPMENT, 1420 (also known as *1400* Bella Drive) BELLA DRIVE, BEVERLY HILLS AREA, CITY OF LOS ANGELES, CALIFORNIA**

REFERENCE: REPORT OF UPDATE ENGINEERING GEOLOGIC STUDY, PROPOSED CUSTOM SINGLE-FAMILY RESIDENTIAL DEVELOPMENT, 1420 BELLA DRIVE, BEVERLY HILLS AREA, CITY OF LOS ANGELES, CALIFORNIA, PREPARED BY LAND PHASES INC., PROJECT NO. LP1174, DATED JANUARY 7, 2015.

GEOLOGIC AND GEOTECHNICAL ENGINEERING REPORT, PROPOSED ACCESSORY BUILDING REMODEL, LOT 11 (ARB 1), TRACT 6774, 1436 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY BYER GEOTECHNICAL, INC., PROJECT NO. BG 20434, DATED APRIL 24, 2012.

GEOLOGIC AND SOILS ENGINEERING EXPLORATION UPDATE, PROPOSED GUEST HOUSE, LOT 11 (ARB 1), TRACT 6774, 1436 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY THE J. BYER GROUP, INC., PROJECT NO. JB 17824-B, DATED NOVEMBER 5, 2004.

SUPPLEMENTAL GEOTECHNICAL ENGINEERING LETTER, ADDITIONAL COMMENTS TO OUR ADDENDUM GEOTECHNICAL ENGINEERING REPORT # 4 (PREVIOUSLY SUBMITTED) DATED DECEMBER 13, 1999, PROPOSED TENTATIVE TRACT 51825 AND SLOPE STABILIZATION, LOT 16, TRACT 6224, 1400 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY WEST COAST GEOTECHNICAL, PROJECT NO. 3267, DATED APRIL 5, 2000.

UPDATE GEOTECHNICAL ENGINEERING GEOLOGIC REPORT AND RESPONSE TO THE CITY OF LOS ANGELES DEPARTMENT OF BUILDING AND SAFETY REVIEW LETTER, PROPOSED TENTATIVE TRACT 51825, SLOPE STABILIZATION, LOT 16, TRACT 6224, 1400 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY WEST COAST GEOTECHNICAL, PROJECT NO. 3267, DATED NOVEMBER 12, 1998.

UPDATED ENGINEERING GEOLOGIC INVESTIGATION AND ADDENDUM REPORT, TENTATIVE TRACT 51825 AND SLOPE STABILIZATION, ORDER TO COMPLY B74437, LOT 16, TRACT 6224, 1420 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY MOUNTAIN GEOLOGY, INC., PROJECT NO. JH2348, DATED MARCH 9, 1995.

SOILS ENGINEERING INVESTIGATION REPORT, PROPOSED SLOPE STABILIZATION, LOT 16, TRACT 6224, 1420 BELLA DRIVE, LOS ANGELES, CALIFORNIA, PREPARED BY COASTLINE GEOTECHNICAL CONSULTANTS, INC., PROJECT NO. 715C-033, DATED SEPTEMBER 29, 1993.

ADDITIONAL REFERENCES ARE INCLUDED IN THE ABOVE REFERENCED REPORT.

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INTRODUCTION

This Update Geotechnical Engineering and Change of Geotechnical Consultant has been prepared at your request and presents the results of our geotechnical engineering review and evaluation performed for the proposed custom single-family residential development at 1420 Bella Drive, Beverly Hills area, City of Los Angeles, California. The Vicinity Map showing the location of the subject site is included in Appendix A. This report has been coordinated with and prepared subsequent to the referenced Report of Update Engineering Geologic Study prepared by Land Phases, Inc., dated January 7, 2015.

This Update Geotechnical Engineering Report and Change of Geotechnical Consultant is based wholly on information contained in the referenced reports, review of the current site development plans, and a recent site reconnaissance by a representative of this office. Additionally, this office has reviewed the referenced reports prepared by West Coast Geotechnical, and generally concurs with their findings and laboratory analysis of the underlying earth materials presented therein, therefore, this office accepts responsibility as geotechnical consultant of record for the continuing geotechnical studies and current proposed development of the site.

The following report describes our scope of work and presents our professional opinions regarding the proposed development, in the form of findings, conclusions, and geotechnical recommendations.

SCOPE OF WORK

Our review and evaluation was conducted during January through February 2015, and included, but may not have been limited to, the following tasks:

- Consultation with the client and project engineering geologist, Land Phases, Inc., during the site reconnaissance, geotechnical engineering review and evaluation of the available geotechnical engineering data, and subsequent report preparation.
- Review of the referenced reports and City correspondence.
- Reviewed published geotechnical information, relevant to the site and surrounding areas, available in our files.
- Performed a site reconnaissance to assess the surficial conditions at the subject site.
- Preparation of a Geotechnical Map and Cross-sections, utilizing the Geologic Map and Cross-sections prepared by Land Phases, Inc. The Geotechnical Map and Cross-sections are included in Appendix B. We make no representations regarding the accuracy of the supplied map and cross-sections.

- Preparation of updated slope stability analysis, utilizing the Geotechnical Map and Cross-sections and data retrieved from the aforementioned records review. The slope stability analyses are included in Appendix C.
- Preparation of this formal Update Report presenting our professional opinions regarding the proposed development, in the form of findings, conclusions and geotechnical recommendations.

PROPOSED DEVELOPMENT

Information concerning the proposed development was provided by the project engineering geologist, Land Phases, Inc. It is our understanding the proposed development consists of the construction of a custom single family residence in the northeast region of the subject site, and a guesthouse in the northwest region of the subject site. The proposed development will also include a swimming pool and access driveway for the main residence, and decks to the south of the main residence and guesthouse. Additionally, a soldier pile system will be required to satisfy the slope stability requirements of the City of Los Angeles and provide a factor of safety of the site of 1.5 and 1.0 for static and seismic conditions, respectively.

The structures which comprise the proposed development are designated Occupancy Category II Structures, per the 2013 California Building Code. The Geotechnical Map and Cross-section, included in Appendix B, delineate the topographic conditions and the configuration of the proposed development. Comprehensive plans have not been prepared and await, in part, the preparation of this report.

The subject site is located on the face of a south to southwest facing ≈1.3:1 (H:V) slope. The subsurface environment within the area of the proposed development generally consists of slate bedrock which is unfavorably oriented, and a thin layer of landslide debris in the northeast and east region of the subject site. Landslide debris is located outside the area of the proposed development. The landslide debris thickness varies from approximately 15 feet in the northeast, to up to approximately 30 feet in the most east region of the subject site. Accordingly, slope stability analyses were prepared as part of the preparation of this report. The slope stability analyses derived substandard factors of safety.

Based on the slope stability analyses, it is recommended the foundation system for the proposed development be comprised of soldier piles tied together with structural grade beams. All soldier piles should be founded a minimum of 15 feet below the Geotechnical Foundation Setback Plane (GFSP), which is defined by the lowermost set of non-compliant potential failures, or to a depth determined by the project civil/structural engineer, whichever is greater.

Moreover, the soldier piles should be designed to resist the force required to attain code compliant factors of safety (i.e. 1.5 or 1.0 for static and pseudo-static conditions, respectively), as presented in the later sections of this report.

Grading associated with the proposed development should be limited to the development area where relatively thin landslide debris are present. Grading will consist of a cut and fill grading operation to remove and/or recompact the landslide debris to a certified fill condition, and that necessary to achieve the desired grade configurations. Specific grading and foundation recommendations are included in later portions of this report.

PREVIOUS GEOTECHNICAL STUDIES

West Coast Soils and Mountain Geology, Inc. prepared Update and Addendum Geotechnical Engineering Reports of the subject site circa 1998 and 1995, respectively, in regards to a previously proposed residential development of the subject site. Their studies concluded the site was suitable for the proposed development provided their recommendations were implemented during the design and construction. It appears approval of these reports was not granted by the City of Los Angeles Department of Building and Safety, which included a proposed landslide stabilization and residential development project. The detailed findings, conclusions, and recommendations of the previous investigations can be found in the referenced reports dated November 12, 1998 and March 9, 1995 for West Coast Soils, and Mountain Geology, Inc., respectively, on file at the City of Los Angeles Department of Building and Safety.

Further **description of the subject site,** including an account of the **recent geological history** and the **previous geotechnical and geological investigations,** as well as additional explanation of the **subsurface conditions** are included in the referenced report dated January 7, 2015, prepared by Land Phases, Inc.

SEISMIC CONSIDERATIONS

The subject site is not located within any California Special Studies Zone. The site, however, as all the Southern California area, is located in a seismically active region and will be subject to moderate to strong ground shaking should any of the many active Southern California faults produce an earthquake. Potential hazards from earthquakes in the vicinity of the site, aside from strong ground shaking, may include fault rupture, seismically induced settlement, liquefaction, and landslides.

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. The seismicity, or seismic activity, of an area refers to the frequency, type and size of earthquakes experienced over a period of time.

Lateral forces due to earthquake loading may be calculated utilizing the formulas presented in the 2013 edition of the California Building Code (CBC), based on the following parameters, which should be ratified by the project structural engineer:

Latitude	34.0959°
Longitude	-118.4342°

Parameter		**Table No.**
Site classification	C	ASCE 7-10 T) 20.3-1
0.2 sec Spectral response acceleration	S_S = 2.352 g	USGS*
1.0 sec Spectral response acceleration	S_1 = 0.839 g	USGS*
Design Spectral Response, short period	S_{DS} = 1.568 g	USGS*

* Data from: *http://earthquake.usgs.gov/designmaps/us/application.php*

Conformance with the above listed criteria for seismic design does not constitute any kind of warranty, guarantee, or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and limb, and catastrophic failure, and not to avoid all damage, since such design may be economically prohibitive.

Fault Rupture

An earthquake is caused when strain energy in rocks is suddenly released by movement along a plane. Occasionally, fault movement propagates upward through the subsurface materials and causes displacement of the ground surface. Surface rupture usually occurs along the traces of known active or potentially active faults, although many historic events have occurred on faults not previously known to be active. For additional general information regarding faults please refer the referenced report by Land Phases, Inc., dated January 7, 2015.

Liquefaction Potential

According to the State of California Division of Mines and Geology (CDMG), the subject site is not in an area subject to liquefaction. Many factors influence a soils potential for liquefaction during an earthquake. These factors include magnitude and proximity of the earthquake, duration of shaking, soil types, grain size distribution, clay fraction content, density, angularity, effective overburden, location of groundwater table, and soils transmissivity among others.

Accordingly, under the influence of severe ground shaking, the materials underlying the subject site in the areas of the proposed development, based upon the known consistency of the earth materials and depth to groundwater, are not considered prone to liquefaction.

Slope Stability

Revised static and seismic (i.e. displacement) slope stability analyses have been completed for the south to southwest facing slope utilizing the Cross-sections provided by the project engineering geologist, Land Phases, Inc. Calculations are based on shear strength resistance parameters presented in the referenced reports prepared for the subject site.

The slope stability analyses focused on potential translational failures along both the mapped shear planes and along the less competent unfavorably oriented foliation planes, and on random rotational failures. As previously mentioned, the slope stability analysis derived substandard factors of safety, as such, the slope stability analysis was expanded to calculate the lateral load required to achieve Code compliant factors of safety.

For the slope stability analyses, we determined the seismic coefficients k_{eq} per the Special Publication 117A, 2008 "*Guidelines for Evaluating and Mitigating Seismic Hazards in California*"; which in essence is the horizontal acceleration that will result in the allowable displacement for a slope stability factor of safety of one. k_{eq} is based on two-thirds of the peak ground acceleration adjusted for Site Class effects PGA_M (which is approximately 0.897g) and the modal magnitude and distance from a deaggregation analyses with a 10% probability of exceedance in 50 years, of 6.5 and 3.4 km, respectively. The deaggregation analysis considers a V_{s30} of 700 m/s, which is based on an estimated average shear wave velocity of 700 m/s for the slate bedrock. The afore described calculations resulted in the seismic coefficients (k_{eq}) that are summarized in the following table for the allowable displacements (*u'*) of five (5) and 15 cm.

k_{eq} (g)	*u'* (cm)	For use when
0.271	5	Potential failures intercept deformation sensible improvements (i.e. pools and buildings).
0.2	15	Otherwise.

The deaggregation analyses, the summary for the site specific seismic design map and the calculations to obtain k_{eq} , and the slope stability calculations and summaries are included in Appendix C. The critical failures and the corresponding factors of safety are depicted in the Geotechnical Map and Cross-sections included in Appendix B.

Slope Stability Calculations. Static and pseudo-static slope stability analyses were performed using the computer program SLIDE 5.03, developed by Rocscience Inc. Analyses were performed using the corrected Janbu method which is adequate for translational failures.

CONCLUSIONS AND RECOMMENDATIONS

CalWest Geotechnical has prepared this Update Geotechnical Engineering Report for the construction of the proposed custom single-family residential development at 1420 Bella Drive, Beverly Hills area, City of Los Angeles, California. Based upon our geotechnical engineering review and evaluation presented in this report, it is the opinion of this office, given the geologic/geotechnical setting of unfavorably oriented slate bedrock with relatively deep noncompliant potential translational failures, the required design loads to satisfy the satisfy the Code compliance slope stability factors of safety, will necessitate an extensive foundation/soldier pile system. The project civil/structural engineer should evaluate the design data presented herein, and based on their evaluation, provide the pertinent required plans and details.

The recommendations which follow are presented as guidelines to be utilized during the design and construction of the proposed development, and have been prepared with the understanding that CalWest Geotechnical will be given the opportunity to review the development plans prior to construction, and will observe, test and advise during site grading and foundation construction to allow this office to provide certification of the finished project. Prior to construction, it is recommended that a meeting be held with the project engineering consultants, owner and general contractor to review the plans and specifications, and to discuss scheduling of the project.

GRADING

All grading operations should be performed in compliance with all applicable grading codes and the minimum specifications outlined below. Observation and testing will be necessary during these phases of the project to allow CalWest Geotechnical to provide certification of the finished project.

Site Preparation and Excavation

A. Any trees or shrubs designated for removal should be cut down and all stumps and roots should be removed. All major vegetation and debris material should be stripped and wasted from the site.

B. All abandoned utility lines designated for removal should be excavated and removed from the site. Unreinforced concrete irrigation lines may be crushed to a size acceptable to the geotechnical consultants and distributed in the future compacted fill. Abandoned cesspools and seepage pits encountered during grading should be excavated under the observation of a representative of this office and backfilled with pea gravel, or where possible, with certified compacted fill.

C. Any artificial fill and colluvium deposits located in areas to be constructed upon with new reinforced concrete slabs-on-grade should be excavated to provide a minimum of two (2) feet of compacted fill below the bottom of future slabs-on-grade, or to a depth that exposes the in-place slate bedrock, whichever is deeper. The excavation should extend at least two (2) feet beyond the edge of concrete slabs-on-grade or for a distance equal to the depth of fill, whichever is greater.

D. In the area to the north of the subject site, where relatively thin landslide debris are present (i.e. up to 12 feet in thickness), the landslide debris should be removed to expose the slate bedrock.

E. The approximate horizontal and vertical extent of these excavations should be verified by the project geotechnical consultant in the field.

F. The exposed surface should be scarified to a minimum depth of six (6) inches, moisture conditioned to produce a soil-water content of about two (2) percent above optimum moisture and compacted to a minimum 90 percent relative compaction, based on ASTM Test D1557.

Fill Placement

A. At the completion of scarification, compacted fill may be placed to design grades using onsite inorganic soils or approved import.

B. All fill placed on sloping ground (greater than 5:1 H:V) should be keyed and benched into the in-place slate bedrock as described below under “Keyways, Benching, and Subdrains”.

C. Soil proposed for use as structural fill should be inorganic, free from deleterious materials, and contain no more than 15 percent by weight of rocks larger than four (4) inches (largest dimension).

D. If excavations within well-cemented bedrock units produce irreducible rock that exceeds a maximum dimension of 12 inches, it should not be placed in certified compacted fill without specific geotechnical approval of the material, the disposal location and the disposal method.

E. Rocks larger than six (6) inches should not be placed in the upper ten (10) feet of any certified compacted fill.

F. Materials excavated onsite will be suitable for use as certified compacted fill provided they do not contain appreciable quantities of organic debris.

G. Where in place moisture content exceeds optimum values, the materials may need to be spread and dried, or mixed with dryer material. Final determination will be provided in the field by the project geotechnical consultants at the time the excavations take place.

H. Excavated material containing excessive organic debris will not be suitable for use in the certified compacted fill. Materials deemed unsuitable should be wasted offsite or as designated by the project architect or geotechnical consultant.

I. The approved material should be placed in layers, each not exceeding six (6) inches in thickness (before compaction), water conditions to about two percent above optimum moisture content and compacted to a minimum 90 percent relative compaction based on ASTM Test D1557.

J. Fill compaction tests should be performed during placement of the future fills to verify acceptable compaction and moisture content. At a minimum, one test should be performed within each 12 to 24 inches (vertical depth) or 500 cubic yards of fill (whichever is less). More frequent testing may be required by the geotechnical consultant.

K. Graded slopes should be constructed at a maximum gradient of 2:1 (H:V). Fill slopes should be constructed by overfilling and cutting back to the compacted core. Cut slopes should be observed and approved by the project engineering geological and geotechnical consultants.

L. The upper 12 inches of pavement subgrade should be compacted to a minimum relative compaction of 95 percent.

M. If construction takes place during the winter months or unseasonable rainy periods, additional winterizing and erosion-control recommendations may be necessary.

Keyways, Benching, and Subdrains

A. All fill placed on slopes exceeding a 5:1 (H:V) gradient should be provided with a keyway at the toe of the fill slope. The keyway should have a minimum width of 15 feet and extend below the surficial soil deposits to expose a minimum of three (3) feet of the in-place slate bedrock on the downhill side of the key. The bottom of the key should be inclined into the slope at a minimum gradient of two (2) percent.

B. Fill placed above the level of the keyway should be placed above horizontal benches excavated into site bedrock. Benches should be a minimum width of four (4) feet. A minimum 12" of site bedrock material must be visible above the fill level at all times.

C. Subdrains should be placed below all canyon fills and in all fill slope keyways. Subdrains should consist of perforated SDR-35 PVC pipe placed with the perforations downward in a blanket of ¾-inch durable aggregate such that the subdrain pipe is surrounded by a minimum 12 inches of gravel on all sides. The gravel blanket should be wrapped with a geosynthetic filter such as Mirafi 140 or suitable equivalent. Fabric joints should be overlapped a minimum of three (3) feet. Minimum specifications for pipe diameter, aggregate volume and fabric width are provided as follows:

Run Length (ft)	Pipe Diameter (in)	Aggregate Volume (ft)	Fabric Width (ft)
0 – 200	4”	4.5	10.5’
200 – 400	6”	5.0	11.0’
400 – 600	8”	5.6	11.5’

The project geotechnical consultants should observe and approve all subdrain installations prior to placing compacted fill.

Utility Trench Backfill

Contractors should strictly adhere to specifications set forth in the State of California Construction Safety Orders for "Excavations, Trenches, Earthwork". For the purposes of this section of the report, bedding is defined as material placed in a trench up to two (2) feet above a utility pipe, and backfill is defined as all material placed in a trench above the bedding.

A. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use in bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted to achieve at least 90 percent relative density based on ASTM Test D1557.

B. Ponding and jetting compaction methods are not permitted.

C. Until the total backfill above the top of the pipe exceeds two (2) feet, machine-placed backfill material shall not be allowed to *freefall* more than two (2) feet.

D. Approved, onsite, inorganic soil or imported materials may be used above the base as utility trench backfill. If imported material is proposed for this use, a sample should be tested and approved by the project geotechnical engineer before any is delivered to the site.

E. Proper compaction of trench backfill will be necessary under and adjacent to certified compacted fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be conditioned with water to produce a soil-water content of about two percent above optimum content, and placed in horizontal layers not exceeding six (6) inches in thickness (before compaction).

F. Each layer should be compacted to at least 90 percent relative compaction based on ASTM Test D1557. The upper 12 inches of trench backfill under vehicle pavements should be compacted to at least 95 percent relative compaction.

G. Where any trench crosses the perimeter foundation line of any building, the trench should be completely plugged and sealed with compacted clay soil for a horizontal distance of two feet on either side of the foundation.

Temporary Excavations and Shoring

For preliminary planning purposes, all excavations that exceed five (5) feet in vertical height should have the upper portion trimmed to a 1:1 (H:V) gradient. Otherwise, these excavations should be supported by a temporary shoring system. The geotechnical consultant should be present during grading to observe the temporary excavation. All excavations should be stabilized within 30 days of initial excavation. Water should not be allowed to pond on top of the excavations, or to flow towards it. No vehicular surcharge should be allowed within five feet of the top of the cut.

FOUNDATIONS

Soldier/Friction Piles: The foundation of the proposed development should be comprised of soldier/ friction piles tied together with structural grade beams. The soldier/friction piles should be a minimum of 24 inches in diameter and founded a minimum of ten (10) feet below the Geotechnical Foundation Setback Plane (GFSP), to a depth that complies with the foundation setback recommendations presented in the following sections of this report, or as specified by the project civil/structural engineer, whichever is deeper. Size, reinforcement, and spacing of friction/soldier piles should be specified by the project civil/structural engineer utilizing the following design parameters:

FOUNDATIONS BEARING INTO SLATE BEDROCK

Foundation Type	Minimum Diameter (in)	Allowable Skin Friction (psf)	Allowable Passive Earth Pressure (psf)	Maximum Passive Earth Pressure (psf)	Minimum Embedment Depth (ft)
Soldier/ Friction Piles	24	500	1,000	15,000	10

The bearing values presented above are net bearing values; the weight of concrete below grade may be neglected. Embedment depths should be measured from the Geotechnical Foundation Setback Plane (GFSP).

During foundation construction, care should be taken to minimize evaporation of water from foundation and floor subgrades. Scheduling the construction sequence to minimize the time intervals between foundation excavation and concrete placement is important. Concrete should be placed only on foundation excavations that have been kept moist and free from drying cracks and that contain no loose debris or soil.

LATERAL DESIGN

The bearing values provided above include the total dead plus frequently applied live loads. As previously stated, the foundation system for the proposed development is to be comprised of friction/soldier piles tied together with structural grade beams designed to resist the force required to attain Code compliant factors of safety (i.e. 1.5 or 1.0 for static and seismic conditions, respectively).

The project civil/structural engineer should keep in mind the purpose of the proposed soldier pile system is to achieve Code-compliant factors of safety for the entire site, and as such, the proposed soldier/friction pile system should include soldier/friction piles along the property lines, where the slope stability analyses resulted in non-compliant factors of safety.

Additional rows of soldier piles may be required and designed by the project civil/structural engineer, utilizing the design loads presented herein, between the southernmost, or lowermost, row of soldier/friction piles and the area of the proposed development, as determined necessary by their engineer evaluation and design.

The friction/soldier piles should be founded a minimum of 10 feet below the Geotechnical Foundation Setback Plane (GFSP) which is defined by the lowermost set of non-compliant potential failures, or to comply with the foundation setback recommendations presented herein, or to a depth determined by the project civil/structural engineer, whichever is greater. The following table presents a summary of the lateral loads:

The analyses derived the following factors of safety and pertinent design loads:

Cross/section	F.S. Translational (static/seismic)	F.S. Rotational (static/seismic)	Design Load (kips) (static/seismic)
A	1.57 / 0.98	1.96 / 1.19	- / 6.6
B	1.32 / 0.83	1.59 / 1.01	29.7 / 66.1
C	1.30 / 0.79	0.93 / 1.46	49.6 / 115.7
D	1.43 / 0.84	0.93 / 0.69	44.5 / 210.8
E	1.48 / 0.91	1.21 / 0.80	10.1 / 28.8
F	1.36 / 0.94	0.97 / 0.68	109.6 / 126.7
G	1.46 / 0.97	1.05 / 0.76	81.9 / 73.5

The depth at which the passive resistance may commence to accrue is defined by the seismic translational random failure, which presented the lowermost set of non-compliant failures; thus, the design load must be transferred and dissipated below the limits of the non-compliant potential failures, referred to herein as the Geotechnical Foundation Setback Plane (GFSP).

For design purposes, the recommended design load may be distributed as an equivalent fluid pressure acting on all of the rows of soldier/friction piles placed along the dip of the descending slope. The lateral load may be resisted by the combined effect of the residence foundation system, the (if necessary) additional rows of soldier/friction piles, and the peripheral soldier/friction pile/system.

This approach allows the lateral load to be distributed below the Geotechnical Foundation Setback Plane (GFSP) through the combined capacity of all foundation and friction/soldier piles.

To convert the design load, in kips, to an equivalent fluid pressure the following equation may be used:

$$efp = \frac{2000P_a}{h^2}$$

where:

P_a = design load (kips)
h = retained height (ft)
efp = equivalent fluid pressure design load (pcf)

When designing soldier piles, the allowable passive earth pressure may be increased by 100 percent for piles that are considered isolated. Piles are considered isolated when spaced laterally (i.e. perpendicular to the lateral thrust) more than two and a half (2 $^1/_2$) diameters, measured center to center. For design purposes, it may be considered that piles commence to accrue passive resistance immediately below the Geotechnical Foundation Setback Plane (GFSP).

FOUNDATION SETTLEMENT

Settlement occurs as a result of stresses imposed on a soil. Typically, the most significant stress is the weight of structure(s). However, in certain soils, significant variation of moisture content may also induce volumetric strains. When water infiltrates the soil pore space, depending on the quantity, it has the potential to increase the density or reduce the effective overburden pressure and in certain soils it can reduce the matric suction or leach out cementing agents.

Considering the known consistency of the recommended bearing material (sedimentary bedrock), seismically induced settlement is not anticipated to influence the proposed development. Soils susceptible to seismically induced settlement are typically noncemented cohesionless soils such as dry and loose sands or gravels, which during ground shaking may reach higher relative densities, resulting in volumetric strain.

Likewise, hydroconsolidation is not anticipated to occur within the subject site. Soils susceptible to hydroconsolidation are characterized by internal support systems consisting of cementing or other bonding agents which may leach out during a wetting process, resulting in a sudden decrease in the volume of voids. Typical soils that are prone to this phenomenon include: loess, valley alluvium in a low-rain fall climate and certain residual porous clays.

Based on the anticipated foundation loading and corresponding foundation design, in accordance with the preceding sections of this report, the differential settlement is not expected to exceed a $^1/_4$ inch, in 20 feet, the maximum settlement is not expected to exceed $^1/_2$ inch.
The majority of the settlement should occur during the construction phase, with post construction settlement being within acceptable ranges for the proposed type of structure.

FOUNDATION SETBACK

The foundation for all structures, except swimming pools, should be embedded such that the minimum horizontal distance from the face of the slope to the bottom of the foundation is at least $^1/_3$ the overall height of the adjacent descending slope that is steeper than 3:1 (H:V). The minimum setback is five (5) feet; the maximum required setback is 40 feet.

The foundation for all swimming pools should be embedded such that the minimum horizontal distance from the face of the slope to the bottom of the foundation is at least $^1/_6$ the overall height of the adjacent descending slope that is steeper than 3:1 (H:V). The minimum setback is five (5) feet; the maximum required setback is 20 feet.

EXPANSIVE SOILS

Expansion tests performed, as part of the referenced report dated November 12, 1998, indicate the on site soil has an expansion index (E.I.) range between 21 - 50. However, since bedrock is used as bearing material, noteworthy volumetric stain as a function of moisture variations are not expected.

Expansive soils are typically a problem in arid climates, as the variation in moisture content will cause a volume change in the soil. Expansive soil tends to be active near the ground surface, where greater moisture variations can easily occur, however, the actual depth varies with the specific soil and environmental differences. During inclement weather or excessive landscaping, moisture will infiltrate the soil and cause the soil to expand. When drying occurs, the loss of moisture content will cause soil to shrink, and extreme dryness may cause shrinkage (desiccation) cracks to develop, thus promoting moisture variations at greater depths.

Expansion and contraction of soils can cause pavement, concrete slabs-on-grade, foundations and overlying structures to fracture. To reduce the effect of expansive soil on surface structures, foundation systems are typically deepened or their rigidity is increased. Slabs-on-grade and foundations are reinforced to increase their resistance to differential movement. When planning for site improvements, it is recommended the landscape theme take into consideration maintaining uniform moisture conditions around isolated structures and concrete slabs-on-grade. During grading operations the soils exhibiting plastic behavior (i.e. clayey materials) should be kept on the moist side.

SWIMMING POOL/SPA

The following criteria are provided as guidelines for the proposed swimming pool/spa construction:

A. The swimming pool and spa should be designed considering a free-standing design and an equivalent fluid pressure of 65 pcf.

B. The swimming pool/spa foundation should maintain a minimum horizontal setback from descending slopes equal to $^{1}/_{6}$ the overall height of the slope, with a maximum setback of 20 feet.

C. The swimming pool/spa should be provided with a subdrain system or a hydrostatic pressure relief valve. If the subdrain system is opted, it should consist of a four (4) inch diameter SDR-35 perforated pipe encased in two (2) cubic feet per lineal foot of gravel, running the longitudinal length of the pool. Where the subdrain exits the pool, a non-perforated pipe should extend to an outlet discharge location designed by the project civil engineer.

D. The swimming pool/spa decking should be cast free of the swimming pool bond beam via an expansion joint. Water stops should be provided between the bond beam and the pool deck.

E. The swimming pool/spa should be founded entirely into the in-place slate bedrock per the foundation recommendations presented herein.

F. Standard pool detail sheets may be utilized provided they are in compliance with our recommendations presented herein. It is recommended that a civil/structural engineer be retained to verify or provide specific structural design and detail for the swimming pool/spa and decking, based upon the criteria presented in this report. We further recommend that the project civil/structural engineer review steel placement prior to placing gunite and that the gunite be placed under deputy inspection.

G. The swimming pool/spa excavation should be observed and approved by the project geotechnical consultants prior to the placement of reinforcing steel and gunite.

H. Surface drainage around the swimming pool/spa must be maintained to prevent water from ponding or from concentrating and flowing over natural or constructed slopes in an uncontrolled fashion. All surface water should be collected and conducted to appropriate discharge facilities via non-erodible devices.

I. Leakage from swimming pool/spas and appurtenant plumbing can create artificial ground water conditions that may adversely affect the pool, spa and adjacent structures or slopes. Therefore, the necessary precautions should be taken to ensure that the pool and plumbing are absolutely leak free.

J. The swimming pool/spa decking should be constructed in accordance with the slab-on-grade recommendations, included herewith.

RETAINING WALLS

Standard cantilevered retaining walls and restrained walls may be designed utilizing the following parameters. Retaining wall foundations should be designed in accordance with the recommendations presented in previous sections of this report. The design parameters presented below incorporate the active and at-rest soil pressures, backfill gradient and expansive potential of the backfill material.

A. The average bulk density of material placed on the backfill side of the wall will be approximately 125 pcf.

B. Standard cantilever retaining wall, may be designed for the following equivalent fluid weights (adapted from Terzaghi and Peck, 1967; soil type: in-house regression, based on expansion index):

- 40 pcf/ft for level backfill behind the retaining wall
- 55 pcf/ft for 2:1 (H:V) slope behind the retaining wall

C. Restrained walls (i.e. at rest) without a surcharge and with a level backfill may be designed for an equivalent fluid weight of 70 pcf (Broker, E. W. & Ireland, H. O. "Earth Pressures at Rest Related to the Stress History" Canadian Geotechnical Journal, 2 (1): 1-15 (1965)). Except if superseded by the slope stability design loads, which resulted in a equivalent fluid pressure on the proposed cut depicted on Geotechnical Cross-section D-D'.

D. To account for seismic loading conditions, the proposed retaining walls should be designed to resist an additional inverted equivalent fluid weight of 29 pcf (i.e. resultant applied at the upper third of the retained height), based on Seed and Whitman (1970) and half the peak horizontal ground acceleration of 0.63 g.

E. An increase in these pressures may be necessary if vehicular traffic or any building structures are to be located adjacent to the retaining wall. Ideally, construction traffic and compaction equipment of substantial mass should be kept a minimum of half the retaining wall height away from the retaining wall unless these surcharges are accounted for in the design. Nonetheless, if it is necessary to take vehicle surcharge load into consideration, the design active load (in the form of an equivalent fluid pressure) should be assumed to commence three (3) feet above the top retaining wall; this results in the original recommended equivalent fluid pressure plus a uniform load equal to the recommended equivalent fluid pressure at a depth of three (3) feet.

F. Subdrains should be placed behind all retaining walls. Subdrains should consist of perforated SDR-35 PVC pipe placed with the perforations downward in a blanket of $^{3}/_{4}$" durable aggregate such that the subdrain pipe is surrounded by a minimum of 12" of gravel on all side. A curtain gravel drain (or approved equivalent), at least 12 inch thick, should extend from the subdrain pipe upwards to a height of two (2) feet below surface grade. Additionally, the gravel blanket should be wrapped with a geosynthetic filter fabric such as Mirafi 140 or a suitable equivalent. Fabric joints should be overlapped a minimum of three feet.

Minimum specifications for pipe diameter, aggregate volume and fabric width are provided as follows:

SUBDRAIN SPECIFICATIONS

Run Length (ft)	Pipe Diameter (in)	Aggregate Volume (ft^3)	Fabric Width (ft)
0 - 200'	4"	4.5	10.5'
200 - 400'	6"	5.0	11.0'
400 - 600'	8"	5.6	11.5'

The project geotechnical consultants should observe and approve all subdrain installations prior to placing compacted fill.

G. Wall backfill areas not occupied by specified drainage materials should be backfilled with structural fill placed as specified above under “Grading”.

H. The backfill should be capped with hardscape (i.e. sidewalk or drainage swale), or with clayey compacted fill in the upper two (2) feet.

CONCRETE SLABS-ON-GRADE

Reinforced concrete slabs-on-grade should be a minimum of four (4) inches thick and should be reinforced with a minimum of #4 bars spaced at 16 inches on center in each direction. Concrete should be cast over a minimum four (4) inch thickness of ½ inch clean aggregate base, placed over certified compacted fill prepared in accordance with the preceding sections of this report. To minimize floor dampness, a 10 mil visqueen moisture barrier should be placed over the aggregate base, to be in direct contact with the concrete.

Non-supported edges should be provided with a thickened slab edge, which has nominal dimensions of eight (8) inches in width and 12 inches in depth. The thickened slab edge should be reinforced with a minimum of one #4 bar placed near the top and bottom of the thickened slab edge.

Recommendations presented in the American Concrete Institute should be complied with for all concrete placement and curing operations. Improper curing techniques or excessive slump (water-cement ratio) could cause excessive shrinkage, cracking or curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture-sensitive floor coverings.

DRAINAGE AND MOISTURE PROTECTION

The site should be fine graded to direct drainage away from any structures. Drainage should not be allowed to pond anywhere on the pad, against foundations or pavements, and should be directed toward suitable collection discharge facilities.
Where possible, the grade should slope away from buildings (i.e. foundations) at a minimum 5% grade for at least ten (10) feet.

To promote the rapid drainage of surface water from pavements and to minimize the risk of water ponding on pavements, we recommend that pavements be designed with surface gradients of at least one percent along principal directions of drainage. Water seepage or the spread of extensive root systems into the soil subgrades of foundations, slabs or pavements could cause differential movements and consequent distress in these structural elements. This potential risk should be given consideration in the landscape design.

Walls located below grade have a history of moisture intrusion and leakage. Conventional water proofing materials, such as asphalt emulsion have often proved ineffective. Certain precautions can be taken to reduce the possibility of future water proofing problems. Super plasticized and water retardant concrete may be utilized to make pouring easier and reduce cracking and shrinkage. Water proofing paints, such as "Thoroseal" may be used, as they have been proven more effective than conventional asphalt emulsion. It is recommended that the project architect provide waterproofing specifications for all below grade walls and structures.

ADDITIONAL SERVICES

It is recommended that this office be provided an opportunity for a general review of the final design plans and supporting documents for overall compliance with recommendations presented in this report. Additionally, this office should be retained to provide services during grading, foundation excavation and overall construction phases of the project.

Observation of foundation excavations should be performed prior to the placement of concrete and reinforcing steel to confirm that the foundations are founded in the recommended bearing materials. Field and laboratory testing of compacted fill should be performed to verify compliance with recommendations presented herein.

PLAN REVIEW

CalWest Geotechnical should review all final design plans and supporting documents. This will allow us to perform a general review for compliance with recommendations presented in this report.

SITE OBSERVATIONS

Prior to the start of construction, we recommend that a meeting be held with the contractor to discuss the project and that a representative of CalWest Geotechnical be present at that meeting. We further recommend that CalWest Geotechnical perform the following tasks prior to and during, construction of the project:

1. Review all final design plans and supporting documents;
2. Observe and advise during all excavations (grading and foundations);
3. Observe and advise during the installation of sub drainage systems;
4. Observe, test and advise during all grading and placement of certified compacted fill;
5. Observe the construction of all temporary excavations and temporary shoring systems (if utilized).

ACKNOWLEDGEMENTS

California, historically, has experienced major destruction due to storms, flooding, firestorms, and earthquakes. The design of drainage control devices is based on rainfall records and the requirements of the authoritative building department agencies. Even so, the capacity of drainage devices often is exceeded, which results in considerable damage. Slopes associated with hillside developments, which have performed satisfactorily over a long period of time, in a majority of cases, could fail as a result, even though such slopes have been designed to the minimum standards set forth by the Uniform Building Code or other authoritative codes.

As for the design of earthquake forces, the records on which engineering design is based, have been accumulated over a relatively short time frame. Every earthquake provides new information and data as to the cause and effect of large earthquakes. As an example, the January 17, 1994 Northridge earthquake recorded ground accelerations that exceeded all previous earthquake records. In addition, the engineering industry has learned that there are many blind-thrust faults present in Southern California.

The presence of these faults were known by petroleum geologists, but without much significance attached to the information by seismologists.

It should be understood that residential and commercial structures are constructed to the minimum standards as set forth by the California Building Code and other authoritative codes. Higher standards are utilized for hospitals, schools, and other critical structures, that must remain serviceable in the event of a disaster. Generally, Building Code requirements provide minimum standards to prevent catastrophic failure. Accordingly, it is believed that site structures are not likely to collapse, although considerable damage may occur.

PROPERTY OWNER'S RESPONSIBILITY

The property owner should care for drainage around the site structures and all graded slopes. To maintain the continued effectiveness of onsite drainage devices, there are important procedures that must be undertaken by the property owner on a regular basis.
These procedures are specifically for drainage and debris protection, and therefore, the procedures should be performed prior to each rainy season, with sufficient time to allow for thorough maintenance.

In addition to maintenance of drainage devices, an inspection should be made for rodent activity. Small, burrowing rodents, such as ground squirrels and gophers, create avenues for infiltration of surface water, which could create surficial slope failures. Evidence of rodent infestation should result in the employment of a licensed exterminator. It should be emphasized that these procedures may require periodic performance if reinfestation occurs.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report is prepared for use by Gabriel Perez and his authorized agents, and should not be considered transferable. Prior to use by others, the subject site and this report should be reviewed by CalWest Geotechnical to determine if any additional work is required to update this report.

The findings presented in this report are valid as of this date and may be invalidated wholly or partially by changes outside our control. Therefore, this report should be subject to review and should not be relied upon after a period of one year or if any significant changes are made.

It is the intent of this report to aid in the design and construction of the described project. Implementation of the advice presented in the “Conclusions and Recommendations” sections of this report are intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual conditions will not be discovered during or after construction.

The conclusions and recommendations contained within this report are based on field observations of the site conditions. Recommendations are based on the assumption that the subsurface conditions do not deviate appreciably from those indicated by the individual test pits placed on the subject site. If conditions encountered during construction appear to differ from those described in this report, this office should be notified so we may determine if any modifications are necessary. In this way, any required supplemental recommendations can be made with a minimum delay to the project.

The recommendations are based on preliminary information provided to us at the start of the investigation. Any changes of this information may require additional work. This report has been prepared in accordance with generally accepted engineering practices and makes no warranties, either express or implied, as to the professional opinions included in this report.

Respectfully submitted,

Leonard Liston
President
RCE 31902

Ruben Haro
Project Engineer
RCE 72213

Enc: Appendix A- Vicinity Map
Appendix B- Geotechnical Map and Cross-sections
Appendix C- Slope Stability Input/Output Summaries

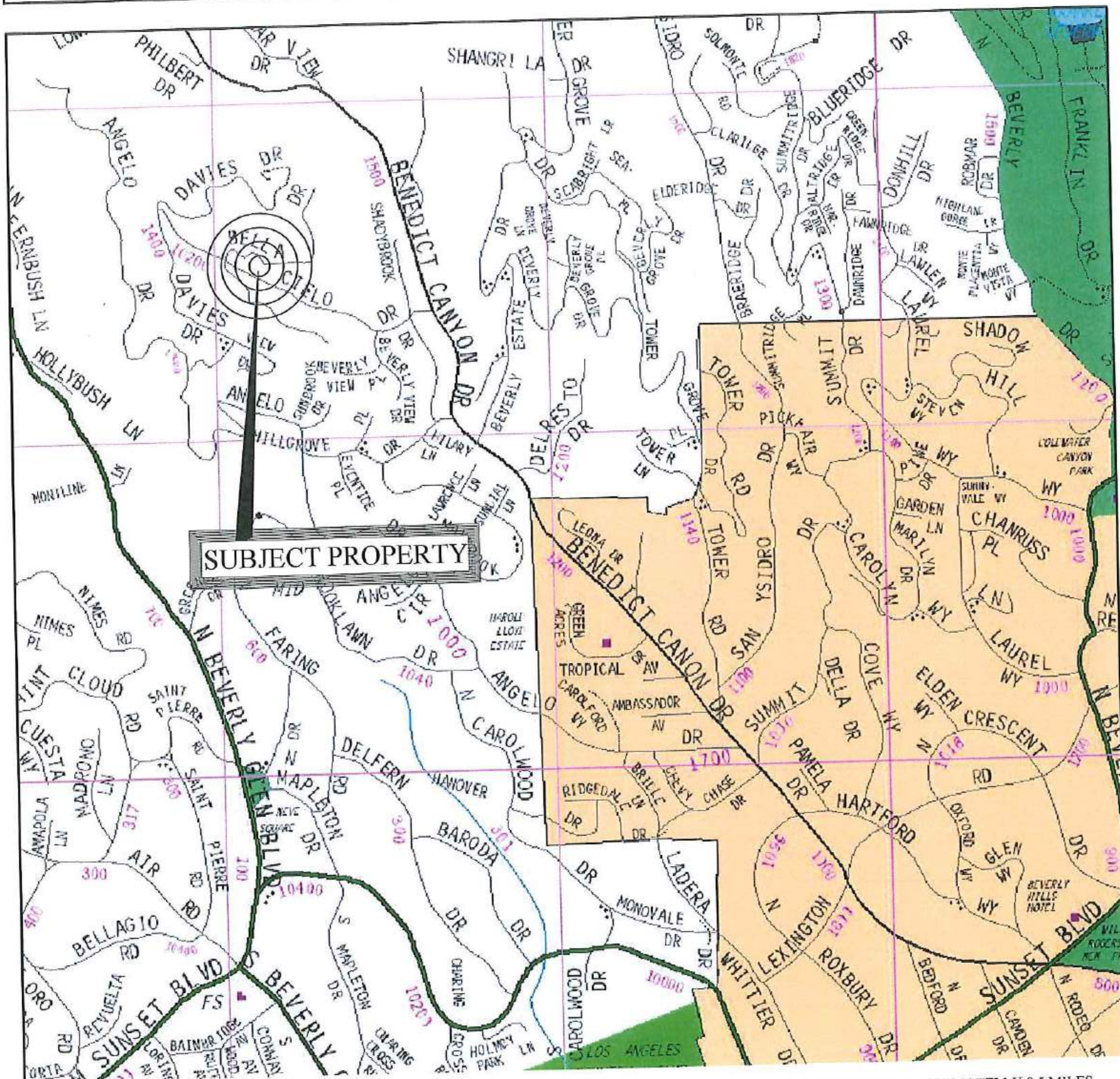
cc: Land Phases, Inc.

APPENDIX A

CALWEST GEOTECHNICAL CONSULTING ENGINEERS	PROJECT: Perez	
A DIVISION OF LC ENGINEERING, INC.	ADDRESS: 1400 or 1420 Bella Drive, Beverly Hills CA	
889 PIERCE COURT, SUITE 101 THOUSAND OAKS, CA. 91360 (818)991-7148 (805)497-1244	DRAWN: RH	REF.: 592 C5
	DATE: March, 2015	JOB #: G 5568

VICINITY MAP

SHEET TITLE



GRIDLINES ARE OFFSET BY APPROXIMATELLY 0.5 MILES.

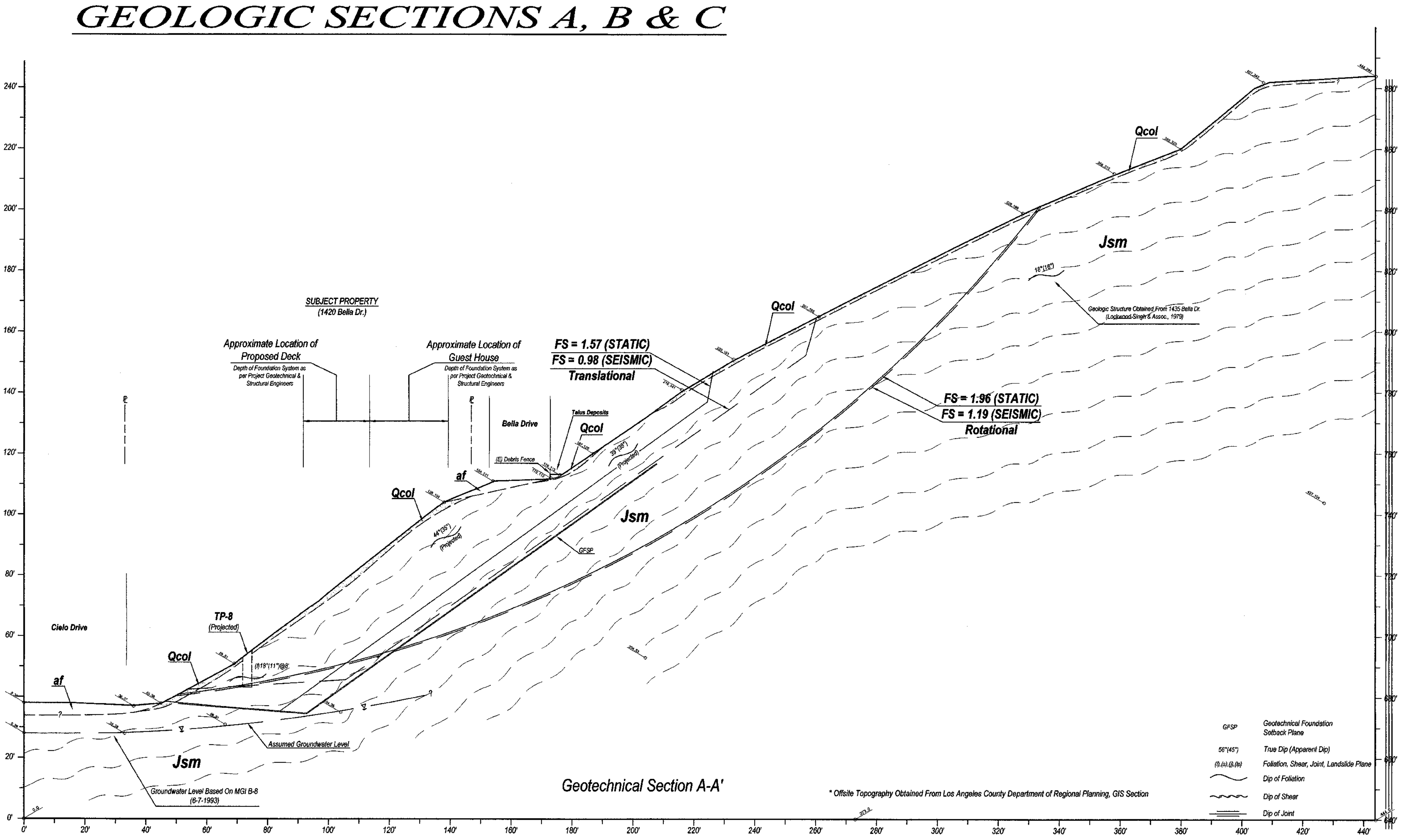
N
NORTH

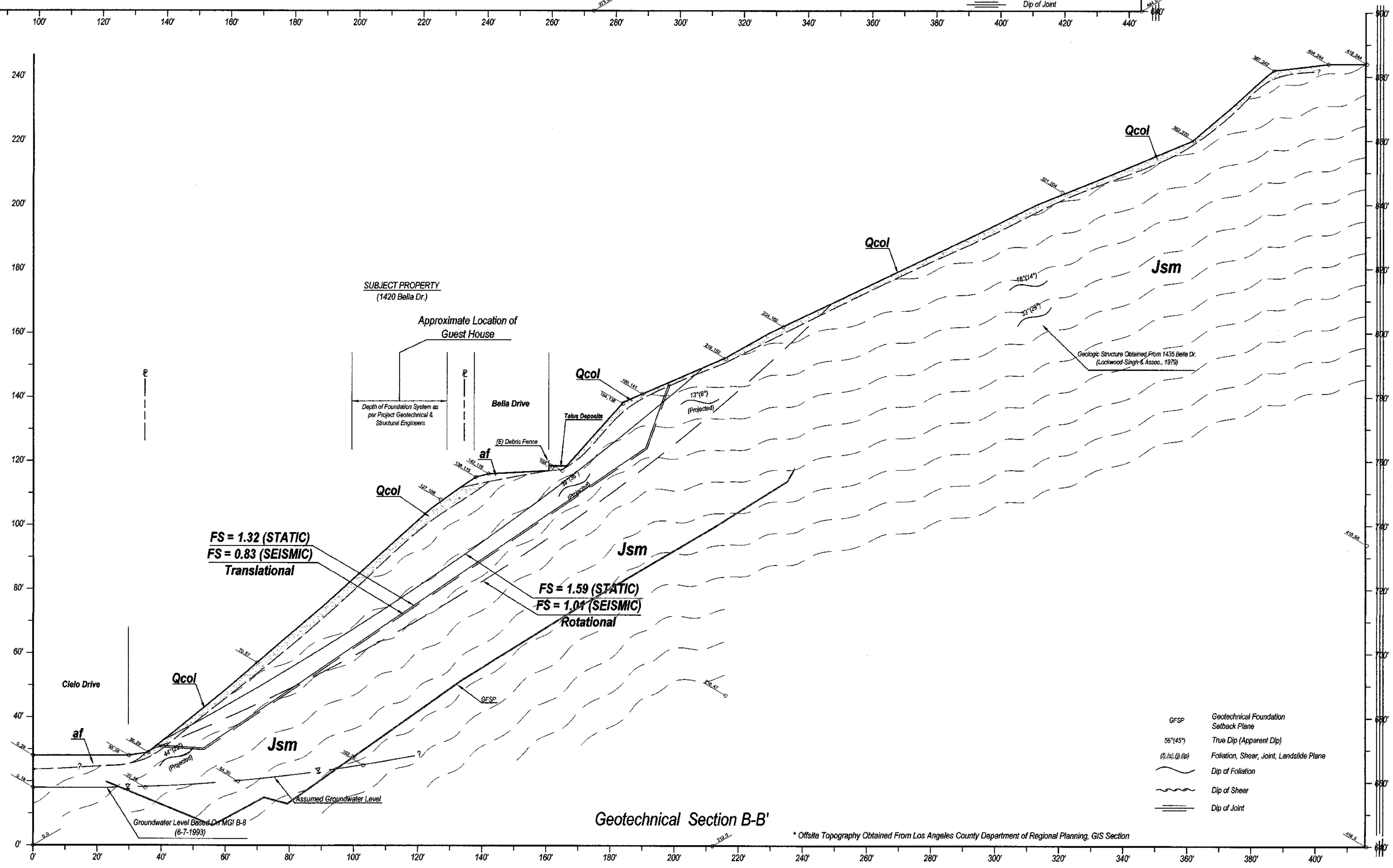
REFERENCE: THOMAS BROTHERS MAP GUIDE, PAGE: 592

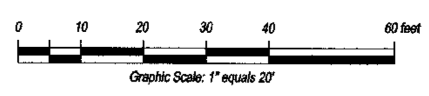
APPENDIX B


GEOLOGIC MAP
GEOTECHNICAL MAP
BELLA DRIVE
CIELO DRIVE
SUBJECT PROPERTY
(1420 Bella Dr.)
Approximate Location of Proposed Residence
Approximate Location of Proposed Guest House
Approximate Location of Proposed Driveway
Approximate Location of Proposed Pool
Approximate Location of Proposed Deck
Recent Storm Erosion Detritus
Mitigate Cut-Slope Located on North Side of Drainage Bench As Per Project Geotechnical Engineer
Stabilize Landslide Debris Within Subject Property As Specified by Project Geotechnical & Civil / Structural Engineers
(E) Steel "I" Beam and Wood Lagging Wall
(E) Retaining Wall
VACANT LOT
PORTION OF LOT 16 TRACT NO. 6774 M.B. 70-44-47 (NOT A PART)
Test Pit and Boring Log Summaries
(1420 Bella Dr.)
Graphic Scale: 1" equals 20'
EXPLANATION
GEOLOGIC SYMBOLS
Geologic Contact - approximately located, queried where uncertain, dotted where concealed
Fault Contact - Approximately located, queried where uncertain, dotted where concealed, arrow indicates dip of fault plane
Strike and dip of foliation
Strike and dip of relict foliation
Strike and dip of shearing
Strike and dip of landslide plane
Strike and dip of contact
Strike and dip of joint plane
Strike of vertical joint plane
Subject Property
(1420 Bella Dr.)
B-16 Location of boring - Mountain Geology, Inc., 1990-1997
B-1 Thru B-7 excavated by hand-labor
B-8 Thru B-11 excavated by hollow-stem-auger drill-rig
B-12,13,15 & 16 excavated by track-mounted drill-rig
B-14 excavated by bucket drill-rig
TP-16, TP-X,Y,Z Location of test pit - Mountain Geology, Inc., 1989-1996
TP-1 Thru TP-3 excavated by hand-labor
TP-4 Thru TP-12 excavated by backhoe
TP-X,Y,Z excavated by hand-labor
(1436 Bella Dr.)
JB-1 Location of boring - The J. Byer Group, Inc., 1993
JTP-2 Location of test pit - The J. Byer Group, Inc., 1993
Arrows within mapped landslide show interpreted failure direction, barbed contacts denote interpreted limits of landslide headscarp
GEOLOGIC UNITS
Surficial Sediments:
sf Surficial Failure
af Artificial Fill
Qcol Colluvium
Qlsr Landslide Debris - Historically Active
Qls Landslide Debris - Prehistoric
Bedrock:
Jsm Santa Monica Slate
LANDPHASES INC
CONSULTING ENGINEERING GEOLOGISTS
5158 COCHRAN ST., SIMI VALLEY, CA., 93063
www.landphases.com
(805) 522-5174
(805) 582-1228 (FAX)
JOB NAME: Perez
JOB NUMBER: LP 1147
DATE: Jan., 2015
DRAFTED BY: BAS
PLATE 1
No: DATE: REVISION DESCRIPTION:
CALWEST GEOTECHNICAL
CONSULTING ENGINEERS
A DIVISION OF LC ENGINEERING, INC.
889 PIERCE COURT, SUITE 101
THOUSAND OAKS, CA. 91360
(818)991-7148
(805)497-1244
CLIENT: Perez
JOB #: 5568
LOCATION: 1420 Bella Drive, City of L.A.
SCALE: 1" = 20'
DATE: February, 2015
DRAWN BY: RH

GEOLOGIC SECTIONS A, B & C







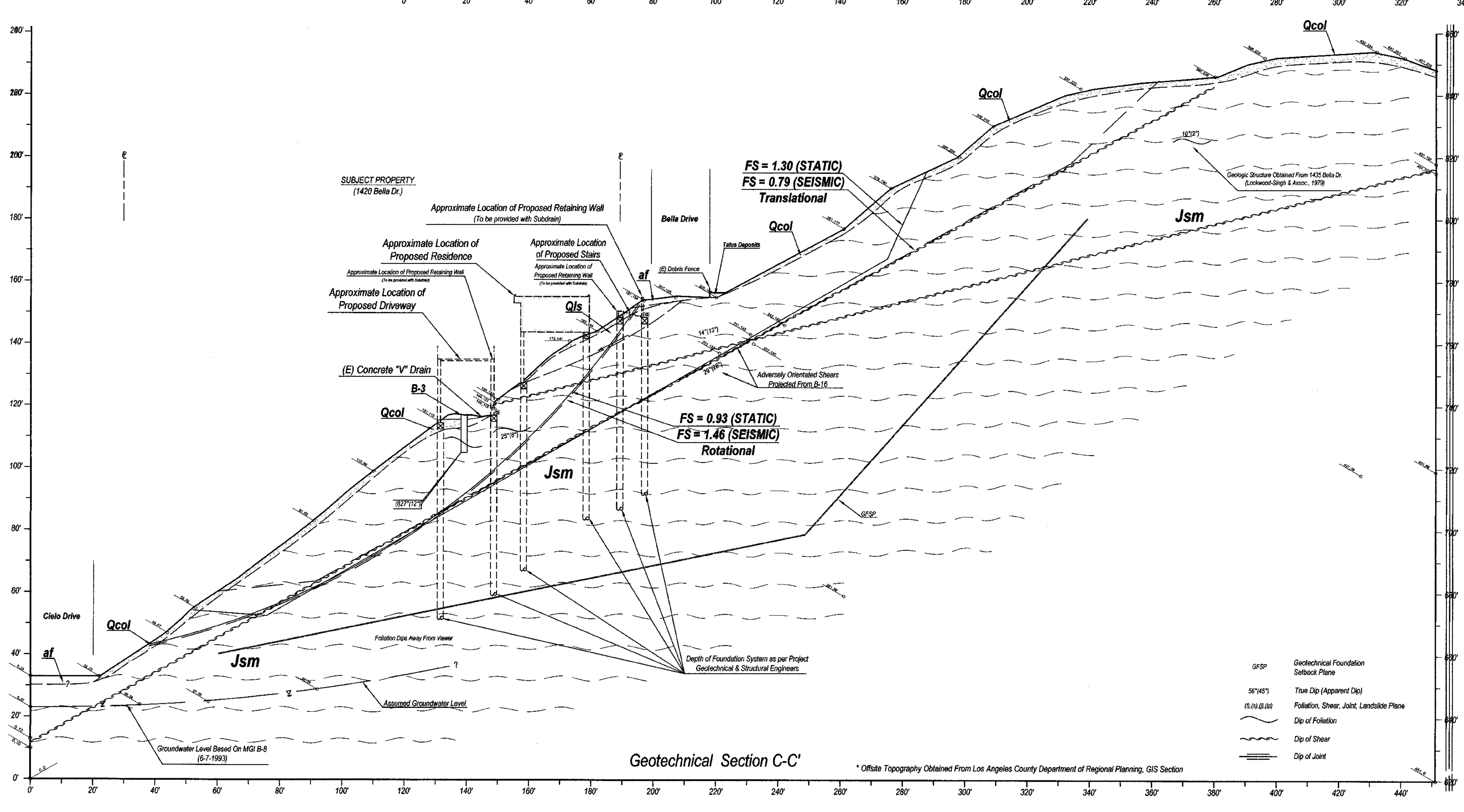
GEOLOGIC UNITS

Surficial Sediments:

sf	Surficial Failure
af	Artificial Fill
Qcol	Colluvium
Qlsr	Landslide Debris - Historically Active
Qls	Landslide Debris - Prehistoric

Bedrock:

Jsm	Santa Monica Slate



LANDPHASES INC
CONSULTING ENGINEERING GEOLOGISTS

5158 COCHRAN ST.,
SIMI VALLEY, CA., 93063
www.landphases.com

(805) 522-5174
(805) 582-1228 (FAX)

JOB NAME:	JOB NUMBER:	DATE:	DRAFTED BY:	PLATE 2
Perez	LP 1147	Jan., 2015	BAS	

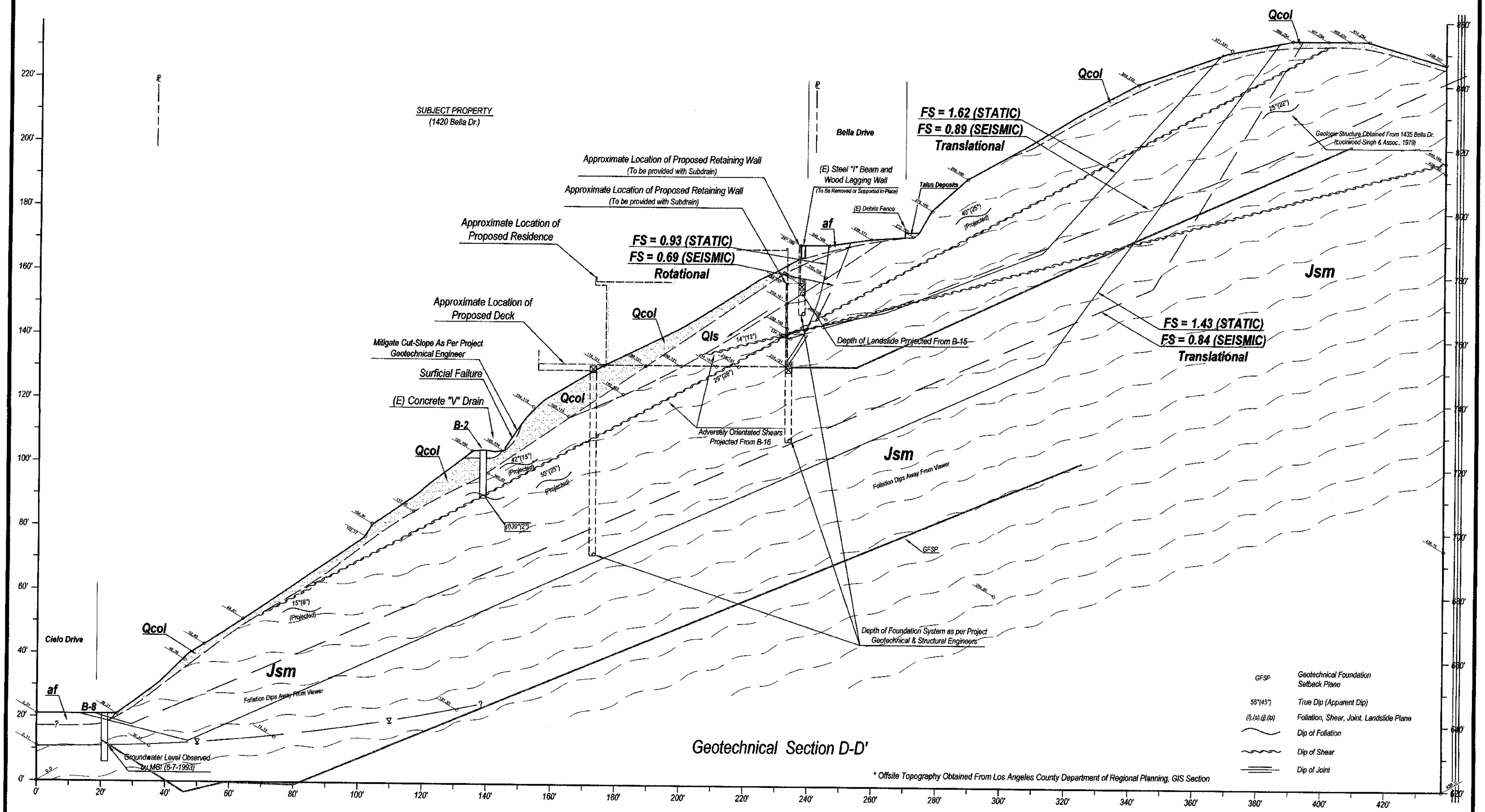
No.	DATE:	REVISION DESCRIPTION

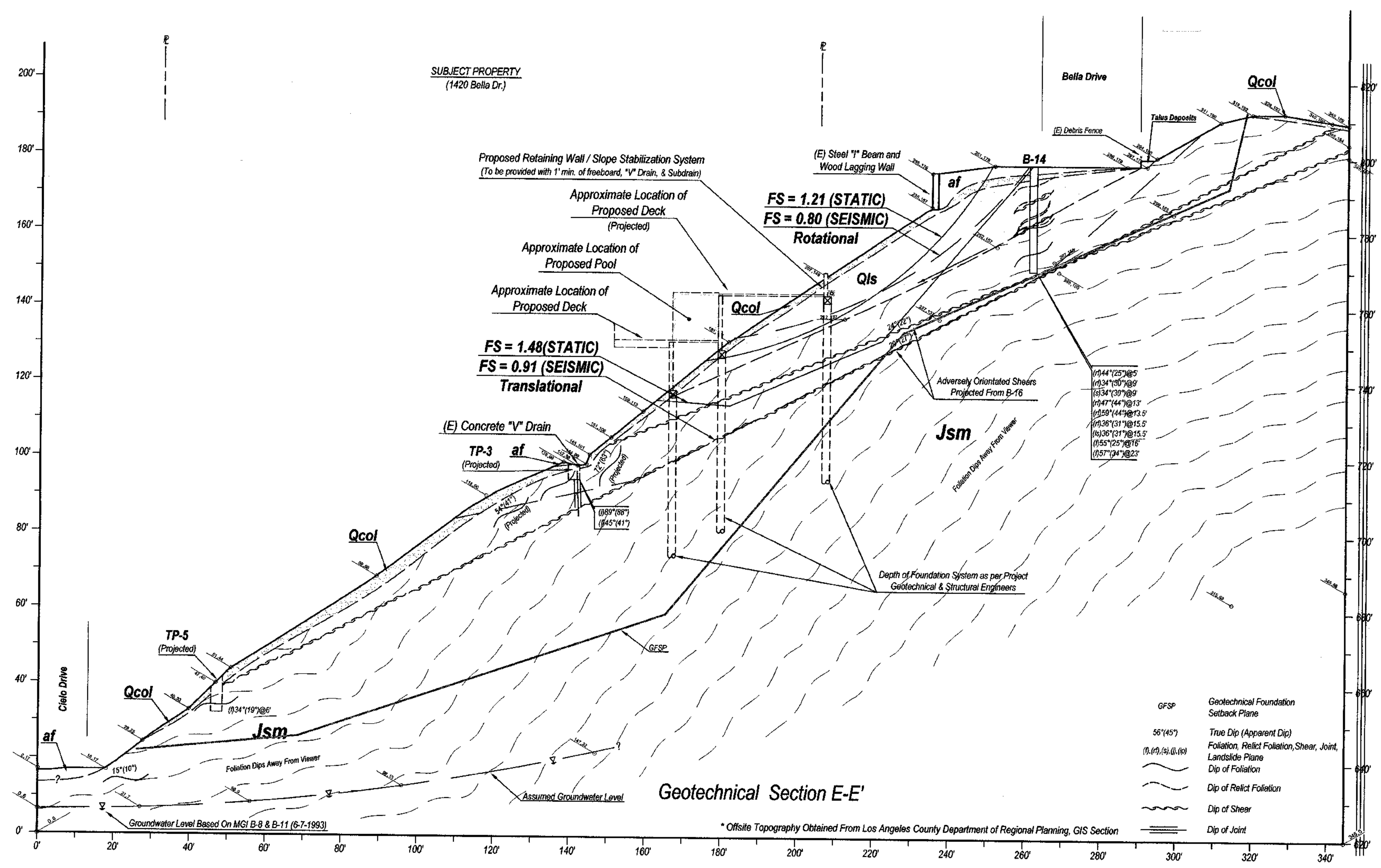
CALWEST GEOTECHNICAL
CONSULTING ENGINEERS

A DIVISION OF LC ENGINEERING, INC.
889 PIERCE COURT, SUITE 101 (818)991-7148
THOUSAND OAKS, CA. 91360 (805)497-1244

CLIENT: Perez JOB #: 5568
LOCATION: 1420 Bella Drive, City of L.A. SCALE: 1" = 20'
DATE: February, 2015 DRAWN BY: RH

GEOLOGIC SECTIONS D & E





GEOLOGIC UNITS

Surficial Sediments:

sf	Surficial Failure
af	Artificial Fill
Qcol	Colluvium
Qlsr	Landslide Debris - Historically Active
Qls	Landslide Debris - Prehistoric

Bedrock:

Jsm	Santa Monica Slate

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JOB NAME: Perez	JOB NUMBER: LP 1147	DATE: Jan., 2015	DRAFTED BY: BAS	PLATE 2
No:	DATE:	REVISION DESCRIPTION:		

0 10 20 30 40 60 feet
Graphic Scale; 1" equals 20'

CALWEST GEOTECHNICAL
CONSULTING ENGINEERS

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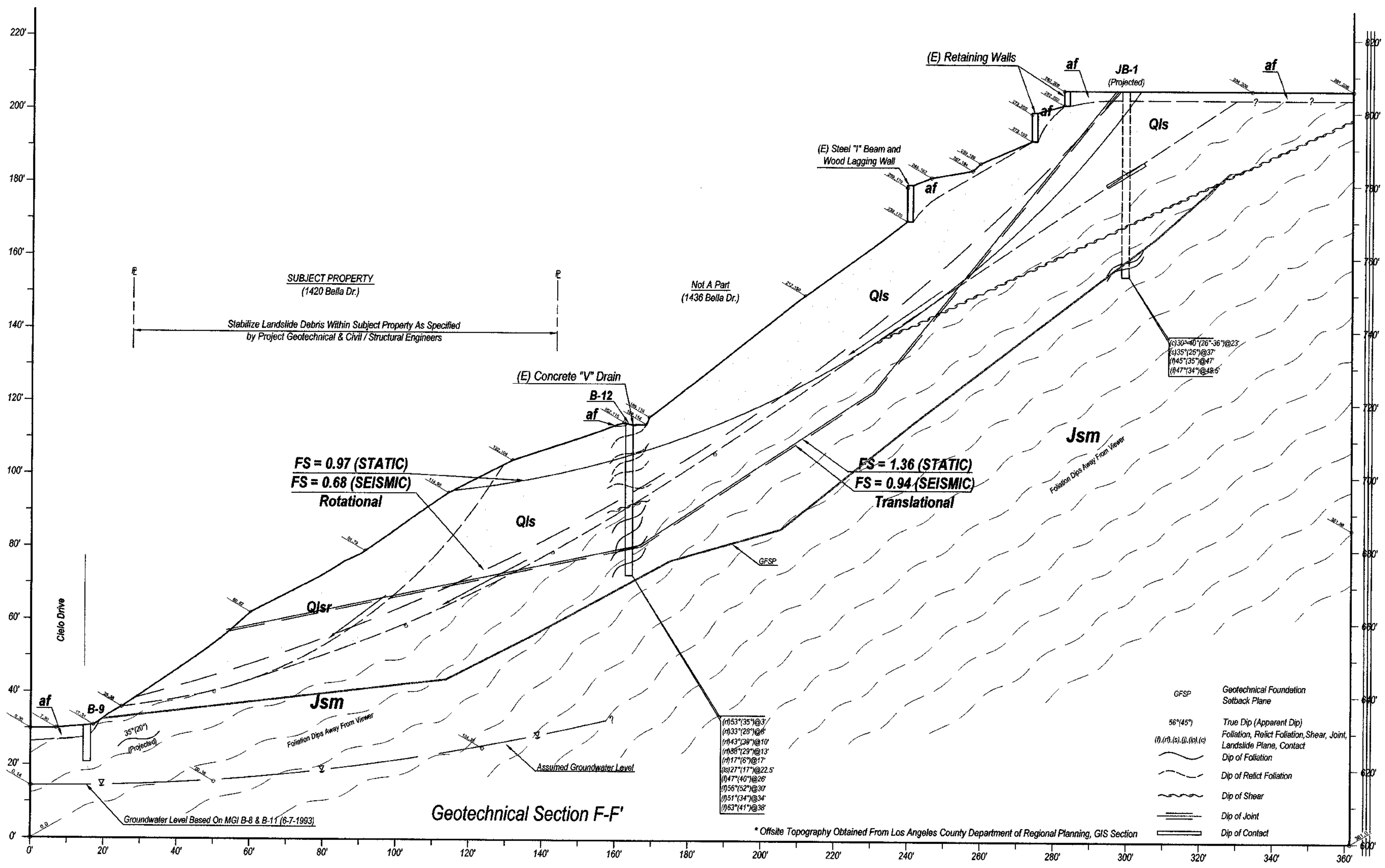
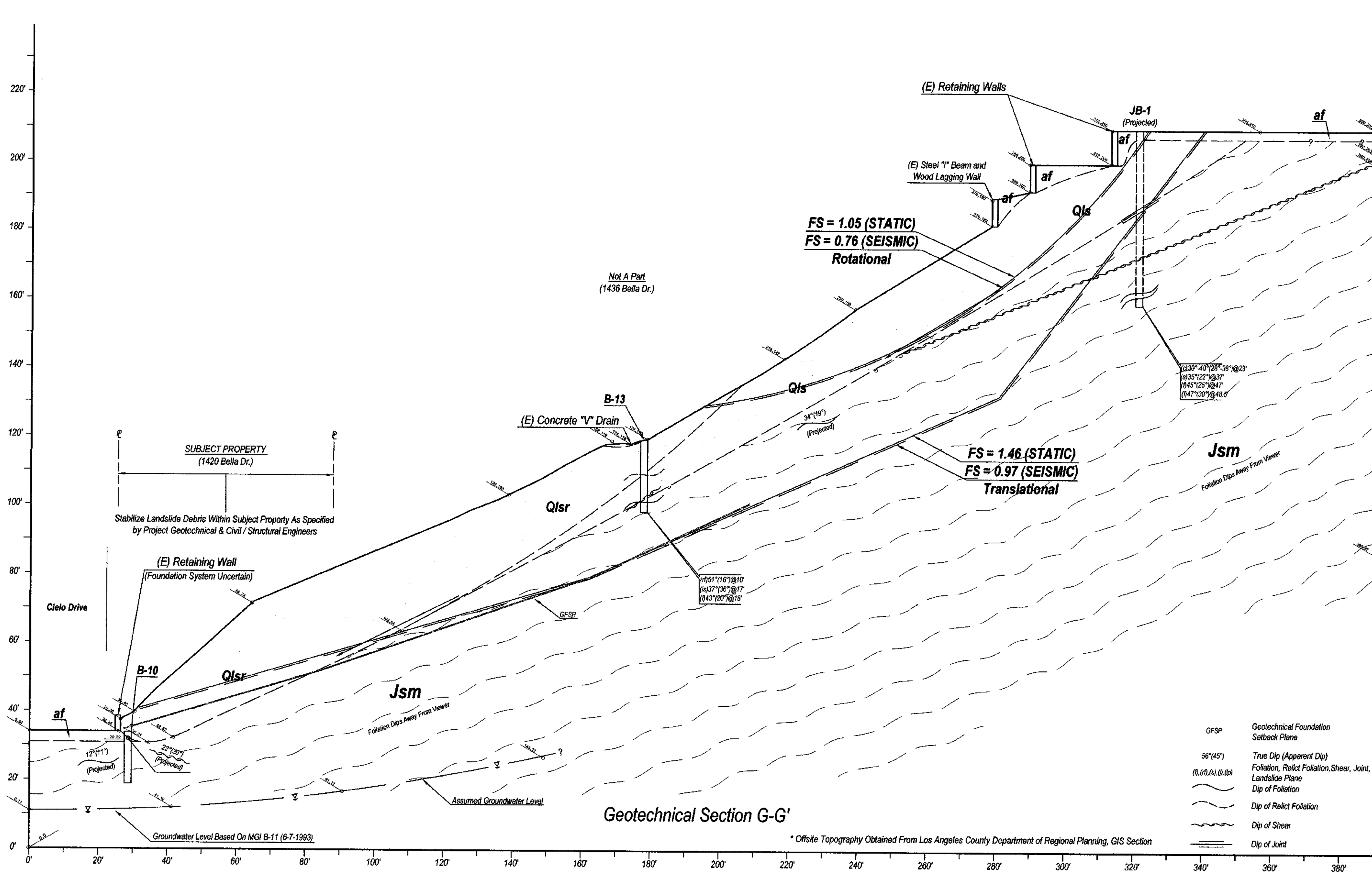
889 PIERCE COURT, SUITE 101
THOUSAND OAKS, CA. 91360

(818)991-7148
(805)497-1244

CLIENT: Perez	JOB #: 5568
LOCATION: 1420 Bella Drive, City of L.A.	SCALE: 1" = 20'
DATE: January, 2015	DRAWN BY: RH

GEOLOGIC SECTIONS F & G





GEOLOGIC UNITS

Surficial Sediments:

sf	Surficial Failure
af	Artificial Fill
Qcol	Colluvium
Qlsr	Landslide Debris - Historically Active
Qls	Landslide Debris - Prehistoric

Bedrock:

Jsm	Santa Monica Slate

Graphic Scale: 1" equals 20' (0, 10, 20, 30, 40, 60 feet)

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SIMI VALLEY, CA., 93063
www.landphases.com

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(805) 582-1228 (FAX)

JOB NAME:	JOB NUMBER:	DATE:	DRAFTED BY:	
Perez	LP 1147	Jan., 2015	BAS	PLATE 2

No.	DATE:	REVISION DESCRIPTION

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CONSULTING ENGINEERS

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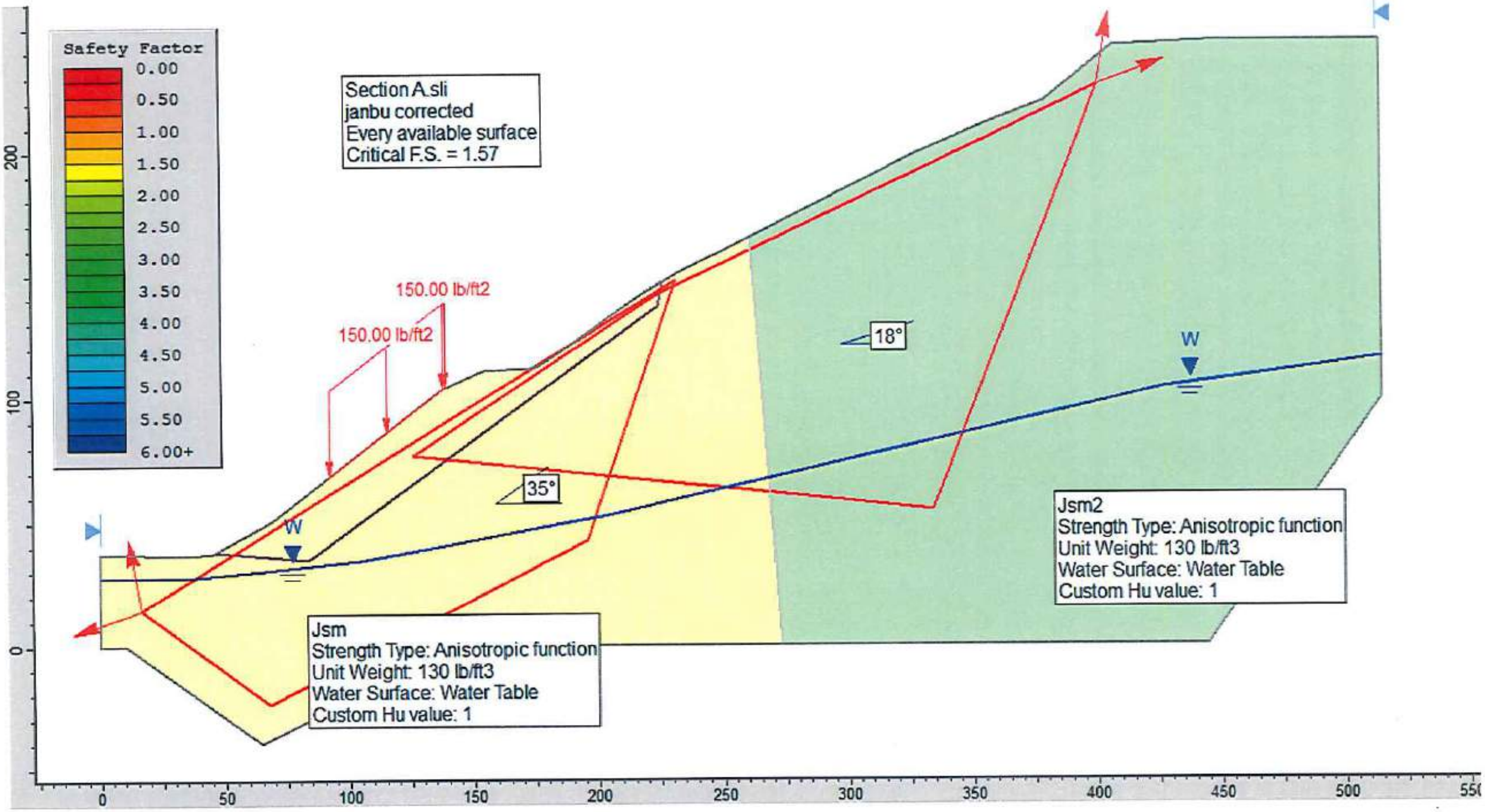
889 PIERCE COURT, SUITE 101 (818)991-7148
THOUSAND OAKS, CA. 91360 (805)497-1244

CLIENT: Perez	JOB #: 5568
LOCATION: 1420 Bella Drive, City of L.A.	SCALE: 1" = 20'
DATE: January, 2015	DRAWN BY: RH

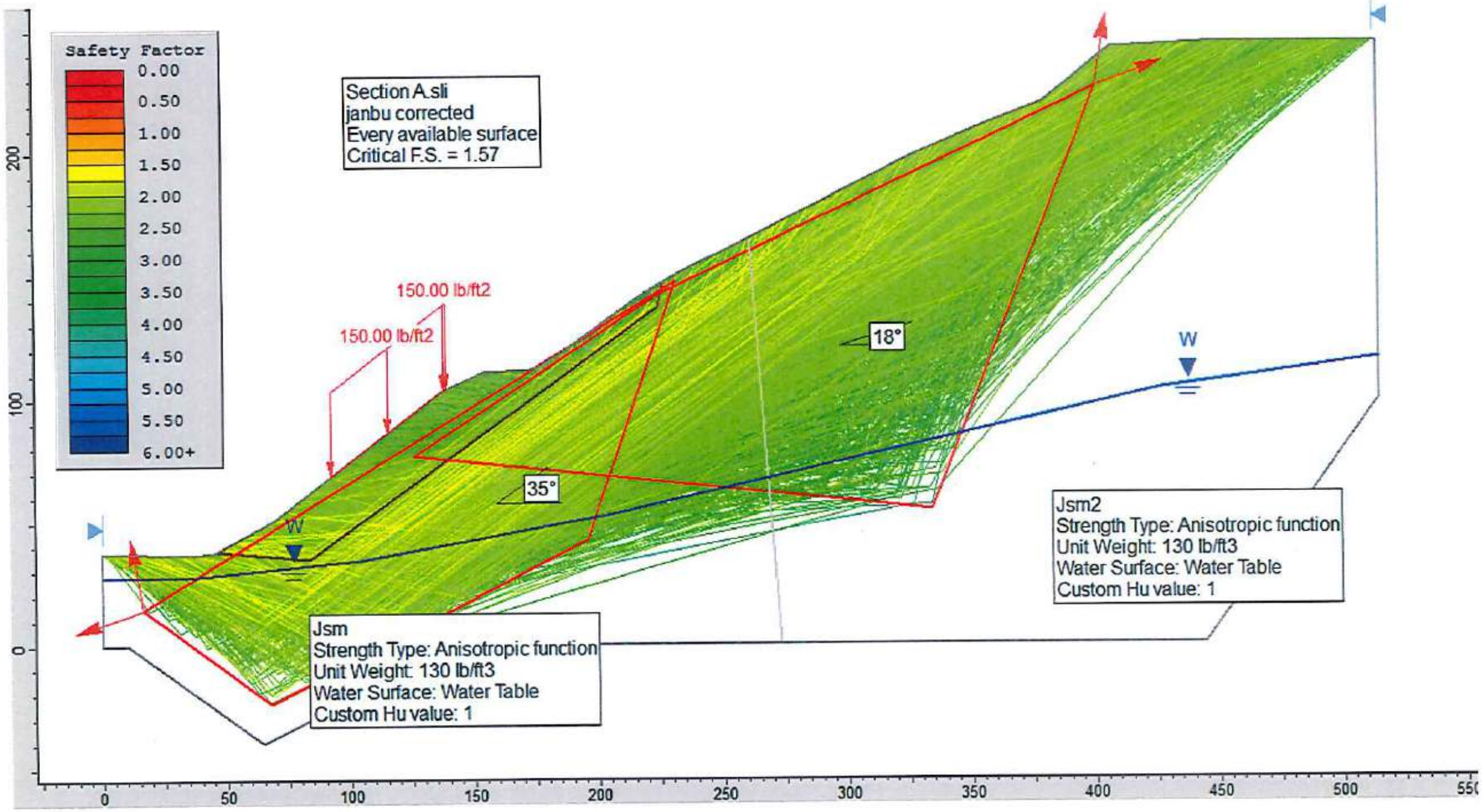
APPENDIX C

Slope Stability Summary

Geotechnical Cross-Section		F.S. Translational	F.S. Rotational	Comments and Observations
A-A'	Static	1.57	1.96	G F S P & design load.
	Seismic	0.98	1.19	
B-B'	Static	1.32	1.59	G F S P & design load.
	Seismic	0.83	1.01	
C-C'	Static	1.30	0.93	G F S P & design load.
	Seismic	0.79	1.46	
D-D'	Static	1.43	0.93	G F S P & design load.
	Seismic	0.84	0.69	
E-E'	Static	1.48	1.21	G F S P & design load.
	Seismic	0.91	0.80	
F-F'	Static	1.36	0.97	**G F S P &design load;** however, it should be understood, that in order for the desing load to be effective it must be applied beyond the limits of the subject site. To summarize, it is not possible to stabilize Qls within the constraints of the subject site.
	Pseudo-static	0.94	0.68	
G-G'	Static	1.46	1.05	
	Pseudo-static	0.97	0.76	



Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section A.sli
janbu corrected
Every available surface
Critical F.S. = 1.57
150.00 lb/ft2
150.00 lb/ft2
W
35°
18°
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
100
200
0
50
100
150
200
250
300
350
400
450
500



Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section A.sli
janbu corrected
Every available surface
Critical F.S. = 1.57
150.00 lb/ft2
150.00 lb/ft2
18°
35°
W
W
Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
100
0
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: A.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 100
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.571480
Axis Location: 27.818, 272.934
Left Slip Surface Endpoint: 46.175, 38.636
Right Slip Surface Endpoint: 226.270, 147.041
Resisting Horizontal Force=301920 lb
Driving Horizontal Force=192124 lb

List of All Coordinates

Focus/Block Search Window

67.7	-23.4
195.5	42.9
231.6	147.8
16.4	15.0

Focus/Block Search Window

223.6	142.0
125.7	77.2
334.3	54.9
401.2	226.4

Material Boundary

261.0	165.2
273.0	0.0

External Boundary

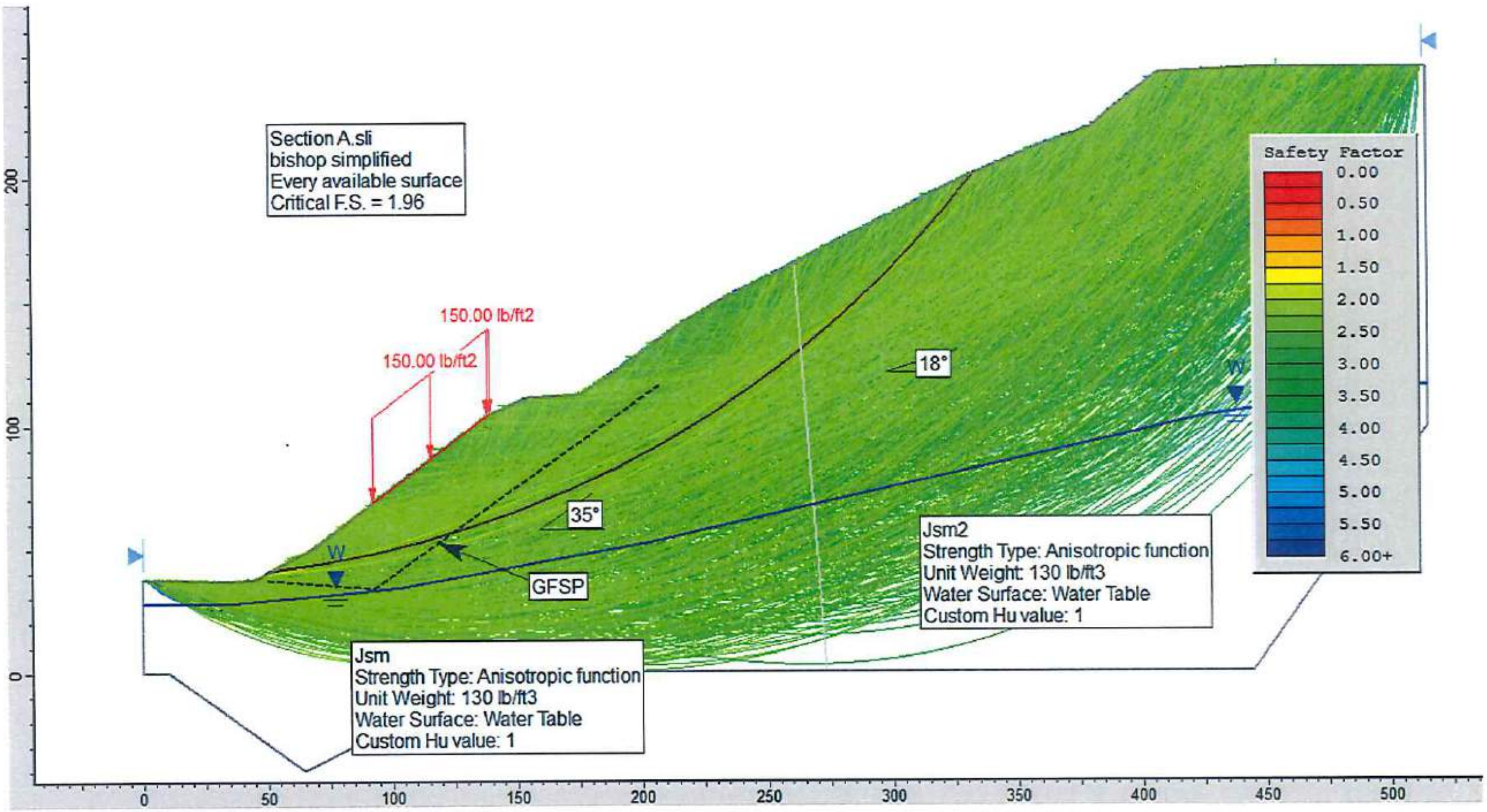
407.0	242.0
380.0	220.0
358.0	212.0
328.0	199.0
261.0	165.2
233.0	151.0
216.0	141.0
187.0	120.0
176.0	113.0
173.0	112.0
154.0	111.0
138.0	104.0
69.0	51.0
45.0	38.0
36.0	37.0
0.0	38.0
0.0	0.0
10.6	0.0
64.3	-38.9
143.0	0.0
273.0	0.0
444.0	0.0
515.0	99.5
515.0	244.0
444.0	244.0

Water Table

0.0	28.0
33.0	28.0
66.0	31.0
104.0	35.0
204.0	53.0
427.0	104.0
515.0	115.8

Distributed Load

92.2	68.8
138.0	104.0
138.8	104.4


Section A.sli
bishop simplified
Every available surface
Critical F.S. = 1.96
150.00 lb/ft2
150.00 lb/ft2
18°
35°
GFSP
W
W
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500
0
100
200

Document Name

File Name: A.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

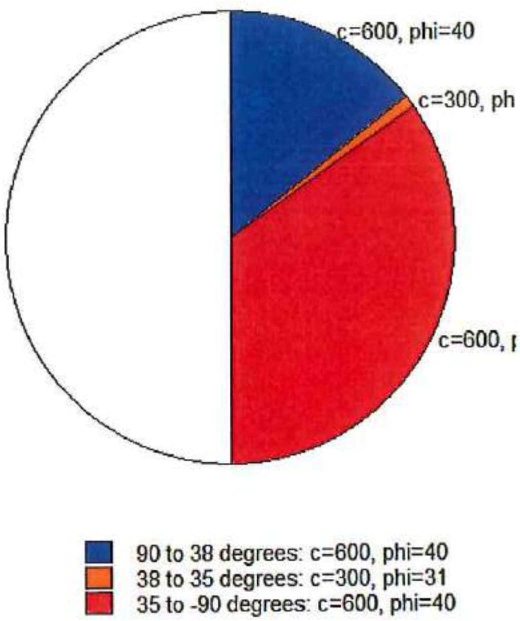
Loading

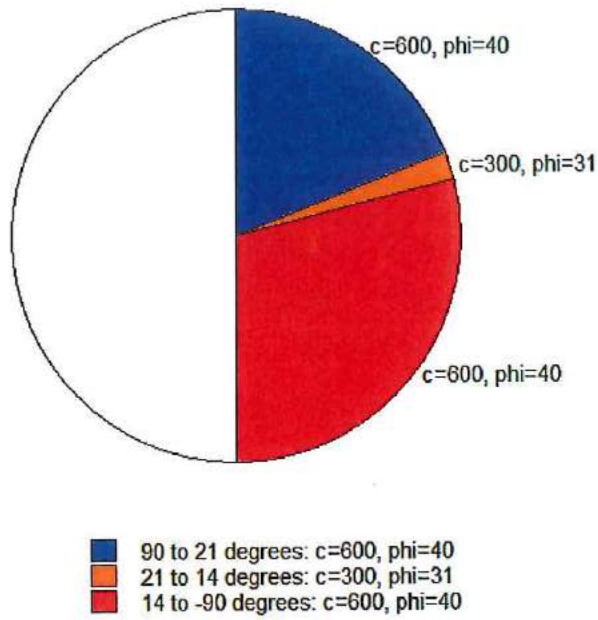
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1





Global Minimums

Method: bishop simplified
FS: 1.964440
Center: 2.873, 454.929
Radius: 416.704
Left Slip Surface Endpoint: 50.444, 40.949
Right Slip Surface Endpoint: 333.596, 201.425
Resisting Moment=4.24618e+008 lb-ft
Driving Moment=2.16152e+008 lb-ft

List of All Coordinates

Material Boundary

261.0	165.2
273.0	0.0

External Boundary

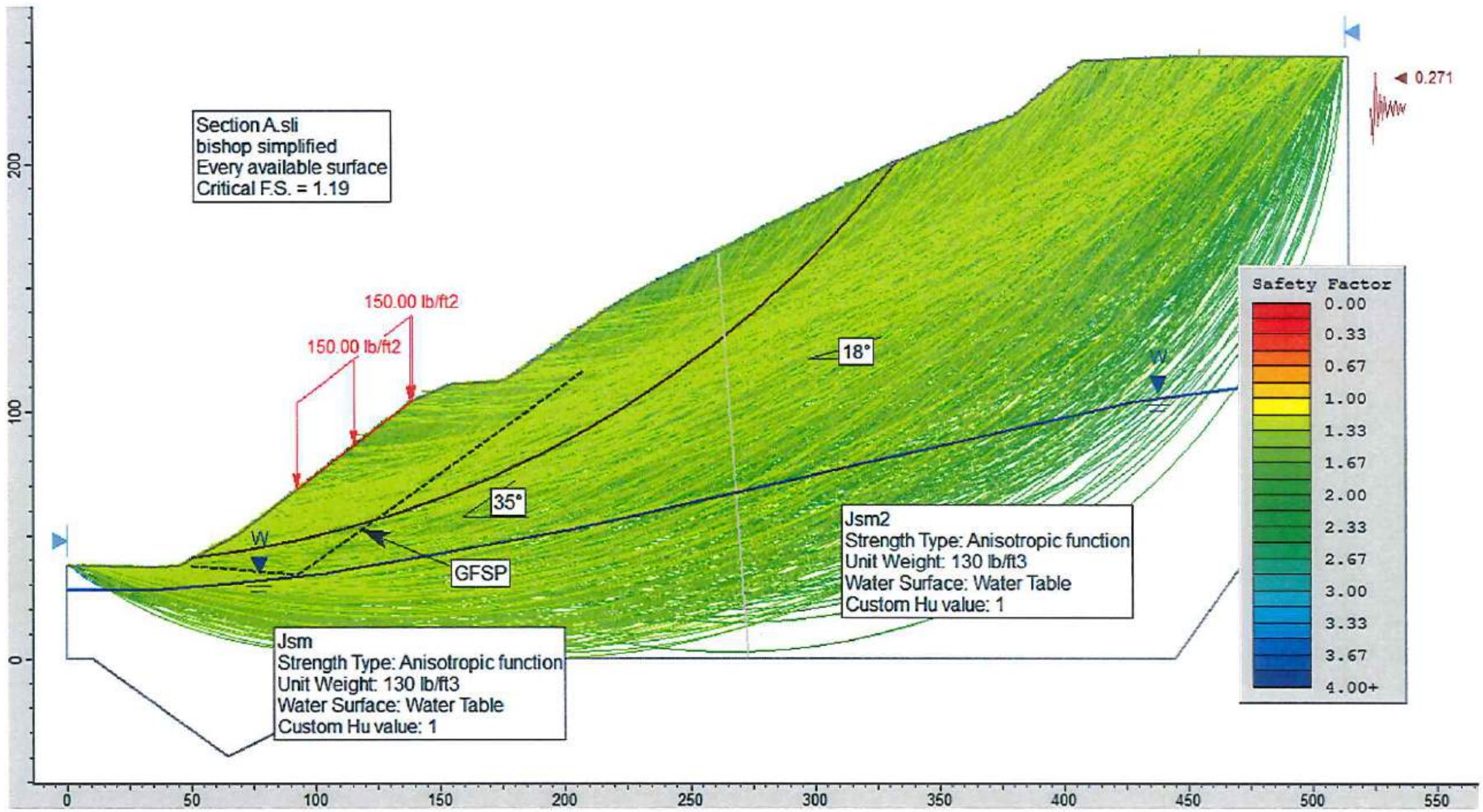
407.0	242.0
380.0	220.0
358.0	212.0
328.0	199.0
261.0	165.2
233.0	151.0
216.0	141.0
187.0	120.0
176.0	113.0
173.0	112.0
154.0	111.0
138.0	104.0
69.0	51.0
45.0	38.0
36.0	37.0
0.0 38.0	
0.0 0.0	
10.6	0.0
64.3	-38.9
143.0	0.0
273.0	0.0
444.0	0.0
515.0	99.5
515.0	244.0
444.0	244.0

Water Table

0.0 28.0	
33.0	28.0
66.0	31.0
104.0	35.0
204.0	53.0
427.0	104.0
515.0	115.8

Distributed Load

92.2	68.8
138.0	104.0
138.8	104.4



Section A.sli
bishop simplified
Every available surface
Critical F.S. = 1.19
150.00 lb/ft2
150.00 lb/ft2
18°
35°
GFSP
W
W
0.271
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
0
50
100
150
200
250
300
350
400
450
500
550
0
100
200

Document Name

File Name: A.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

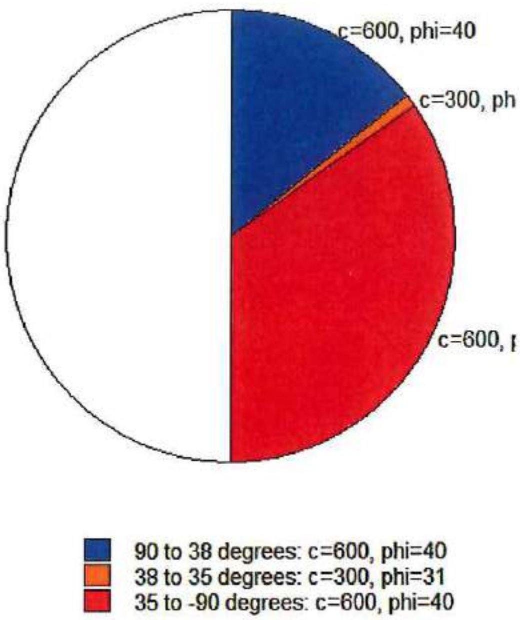
Loading

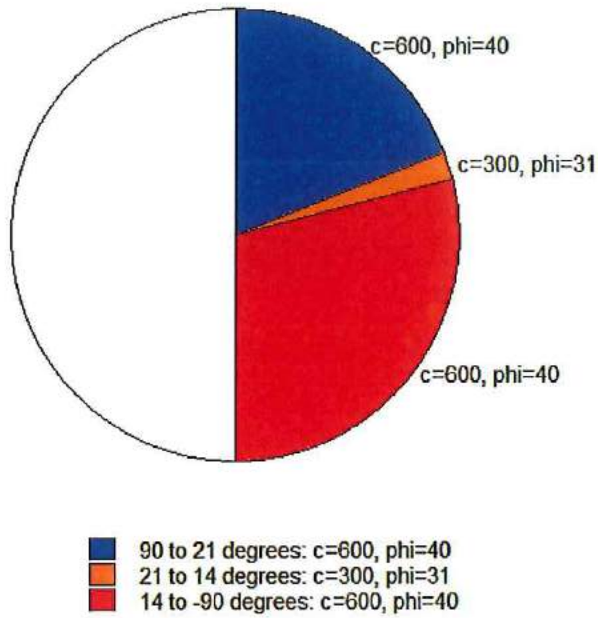
Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

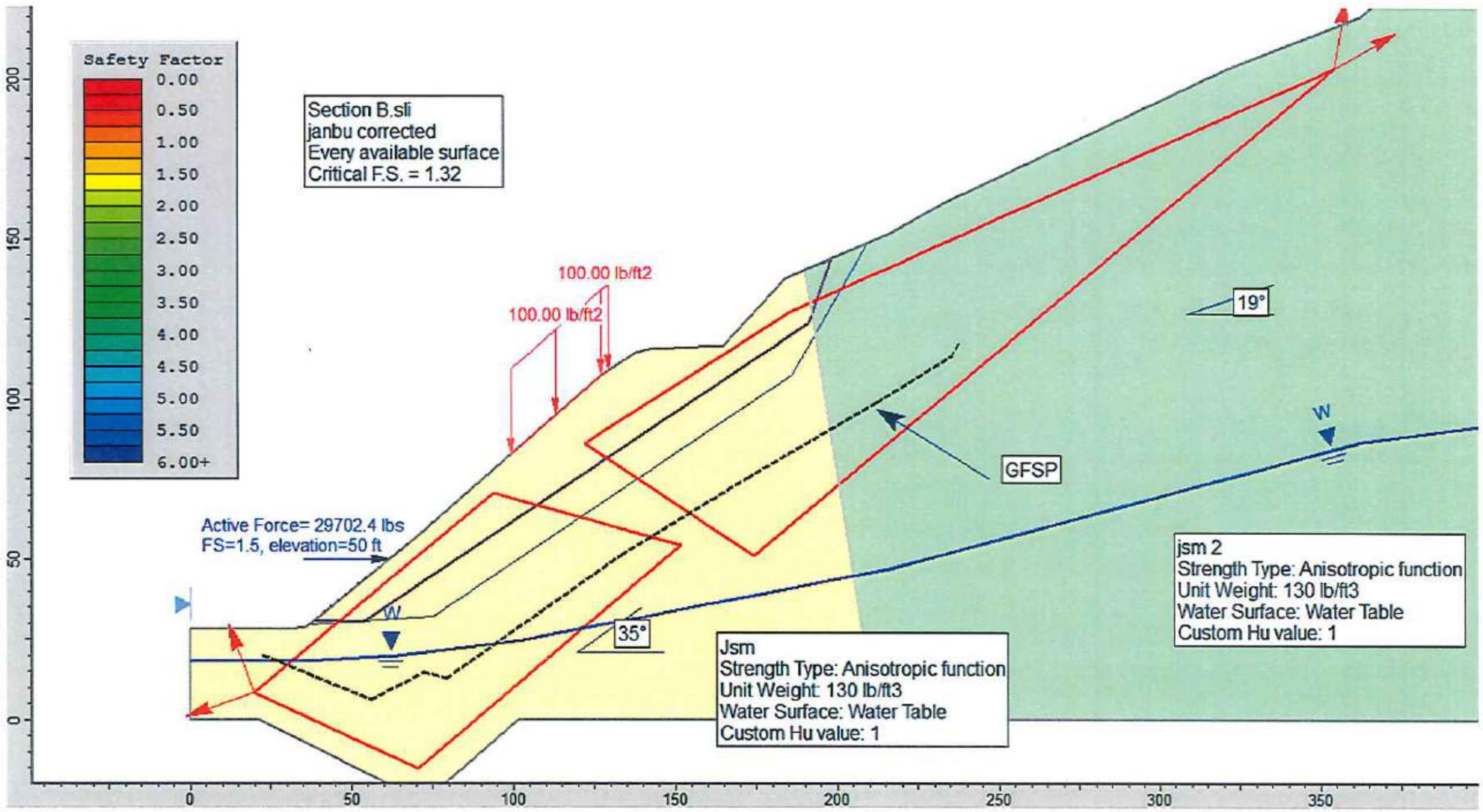
Material: Jsm2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

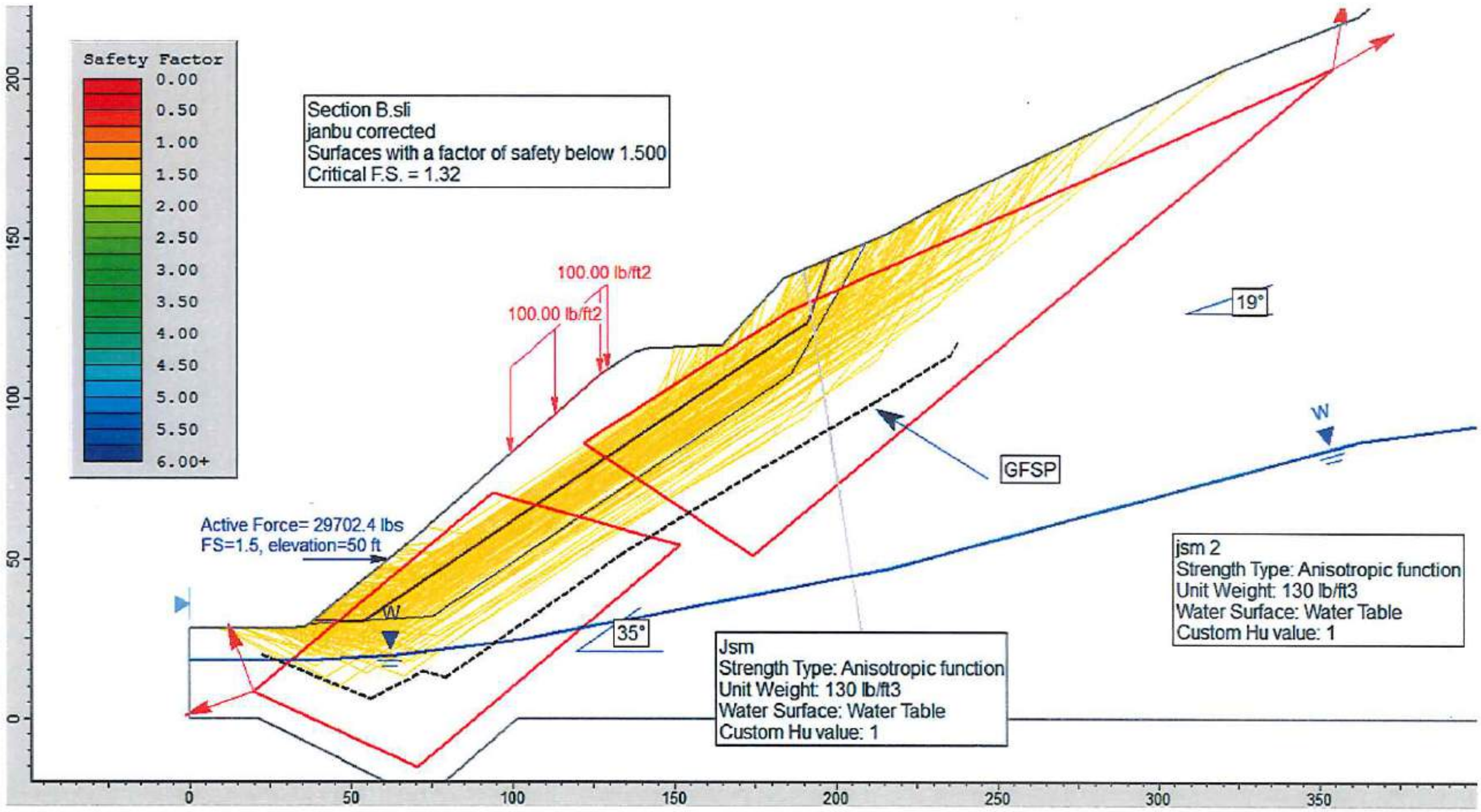


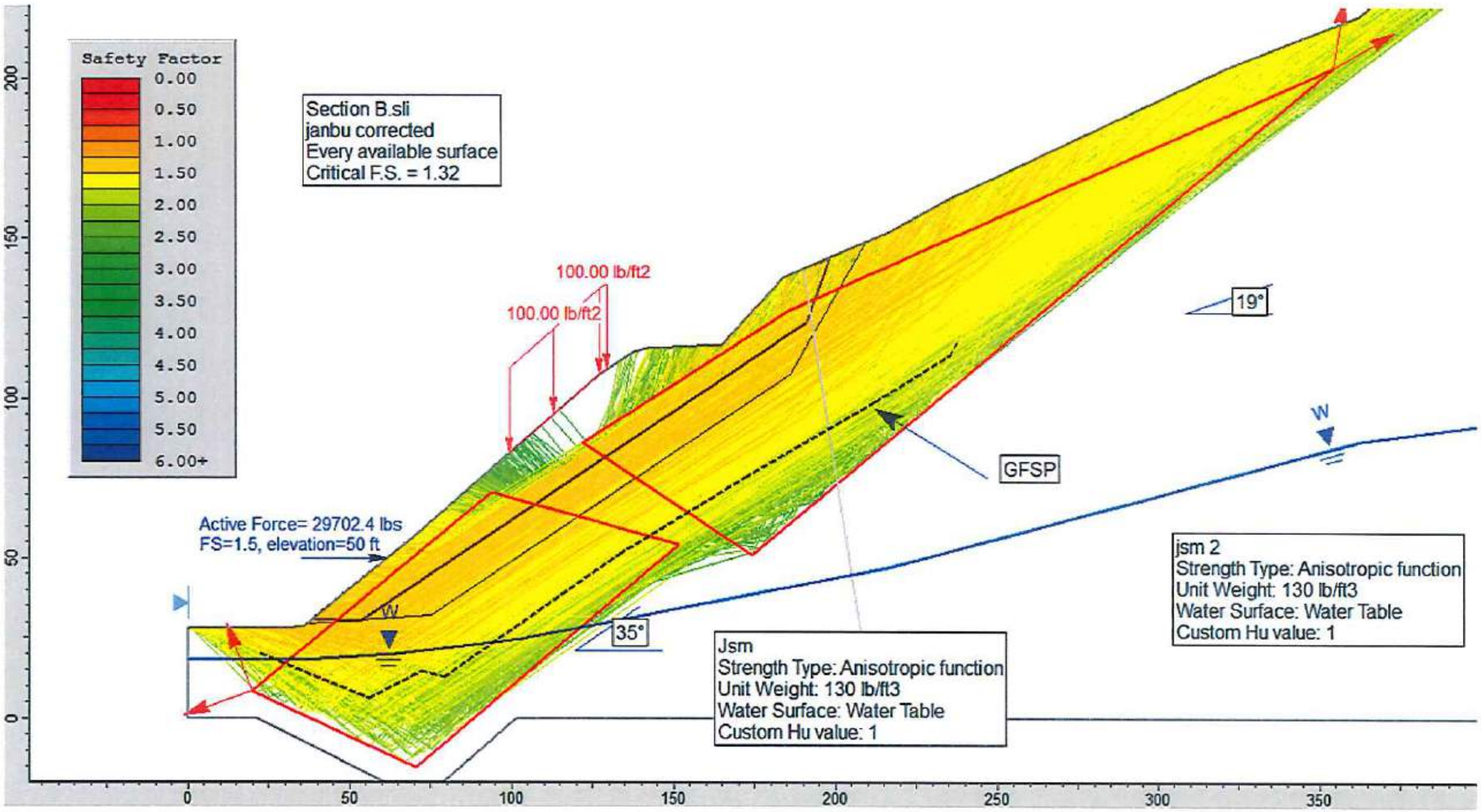


Global Minimums

Method: bishop simplified
FS: 1.186680
Center: 2.873, 454.929
Radius: 416.704
Left Slip Surface Endpoint: 50.444, 40.949
Right Slip Surface Endpoint: 333.596, 201.425
Resisting Moment=3.79874e+008 lb-ft
Driving Moment=3.20116e+008 lb-ft


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section B.sli
janbu corrected
Every available surface
Critical F.S. = 1.32
100.00 lb/ft2
100.00 lb/ft2
Active Force= 29702.4 lbs
FS=1.5, elevation=50 ft
W
35°
19°
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
0
0
50
100
150
200
250
300
350


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section B.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.32
100.00 lb/ft2
100.00 lb/ft2
Active Force= 29702.4 lbs
FS=1.5, elevation=50 ft
W
35°
19°
W
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350



Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section B.sli
janbu corrected
Every available surface
Critical F.S. = 1.32
100.00 lb/ft2
100.00 lb/ft2
Active Force= 29702.4 lbs
FS=1.5, elevation=50 ft
W
35°
19°
W
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350

Document Name

File Name: B.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

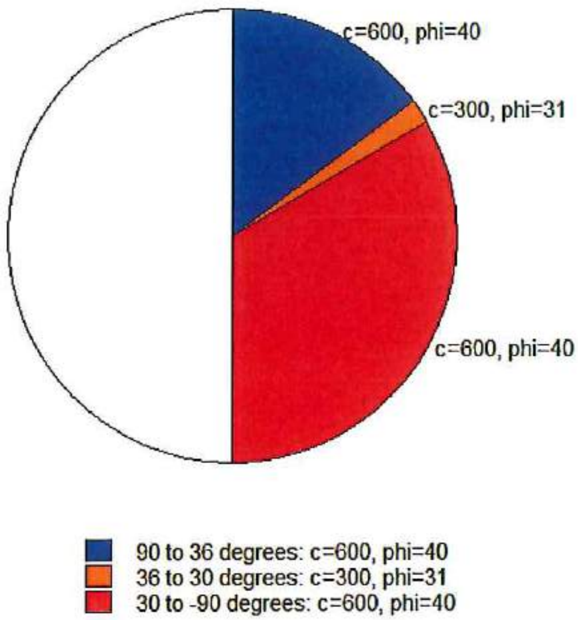
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 50 ft

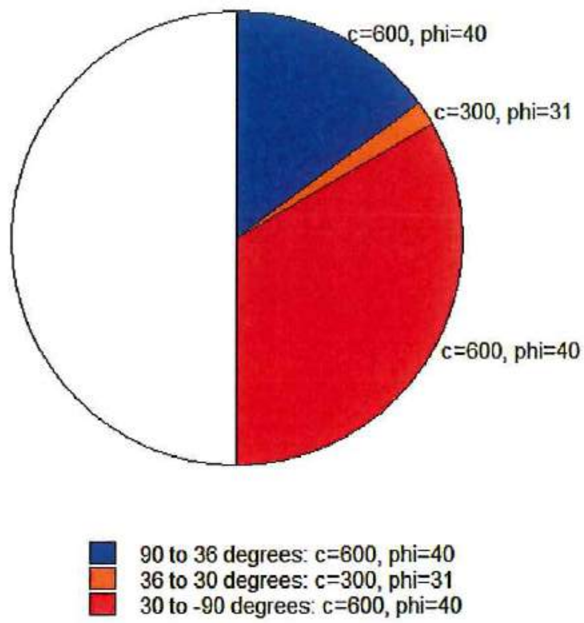
janbu corrected Active Force: 29702.4 lb
Center (3.642, 261.943) Radius 237.194

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 1.318100
Axis Location: 5.419, 247.269
Left Slip Surface Endpoint: 38.667, 31.196
Right Slip Surface Endpoint: 198.226, 144.224
Resisting Horizontal Force=221558 lb
Driving Horizontal Force=168088 lb

List of All Coordinates

Focus/Block Search Window

70.5	-15.3
151.6	54.4
93.9	70.6
19.5	8.6

Focus/Block Search Window

174.3	51.1
354.1	203.8
185.4	127.4
121.9	86.2

Material Boundary

190.1	140.6
212.0	0.0

External Boundary

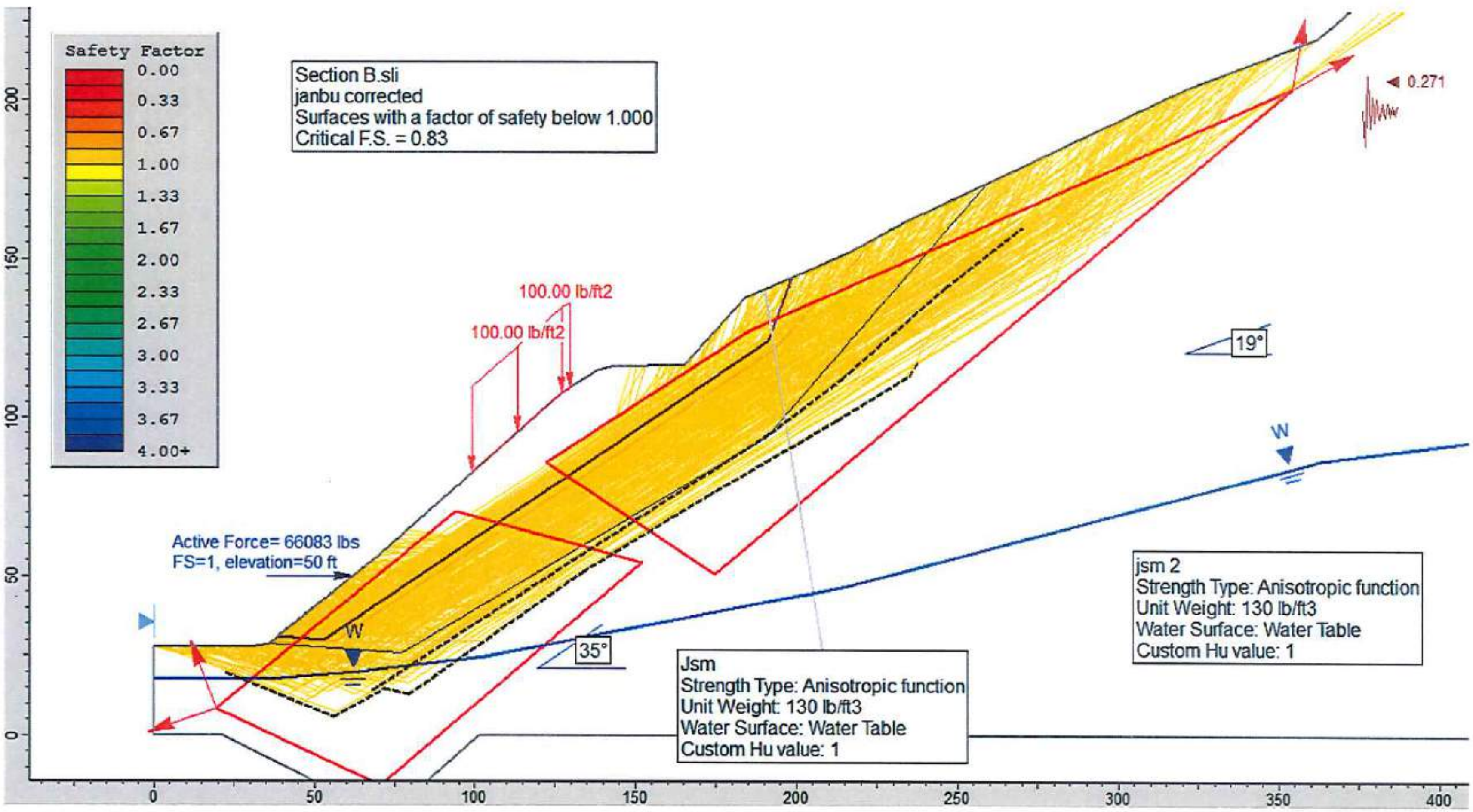
416.0	244.0
404.0	244.0
387.0	242.0
362.0	220.0
321.0	204.0
234.0	162.0
216.0	152.0
190.1	140.6
184.0	138.0
165.0	117.0
142.0	116.0
138.0	115.0
127.0	108.0
70.0	57.0
36.0	29.0
30.0	28.0
0.0	28.0
0.0	0.0
21.6	0.0
72.2	-25.6
101.1	0.0
212.0	0.0
416.0	0.0

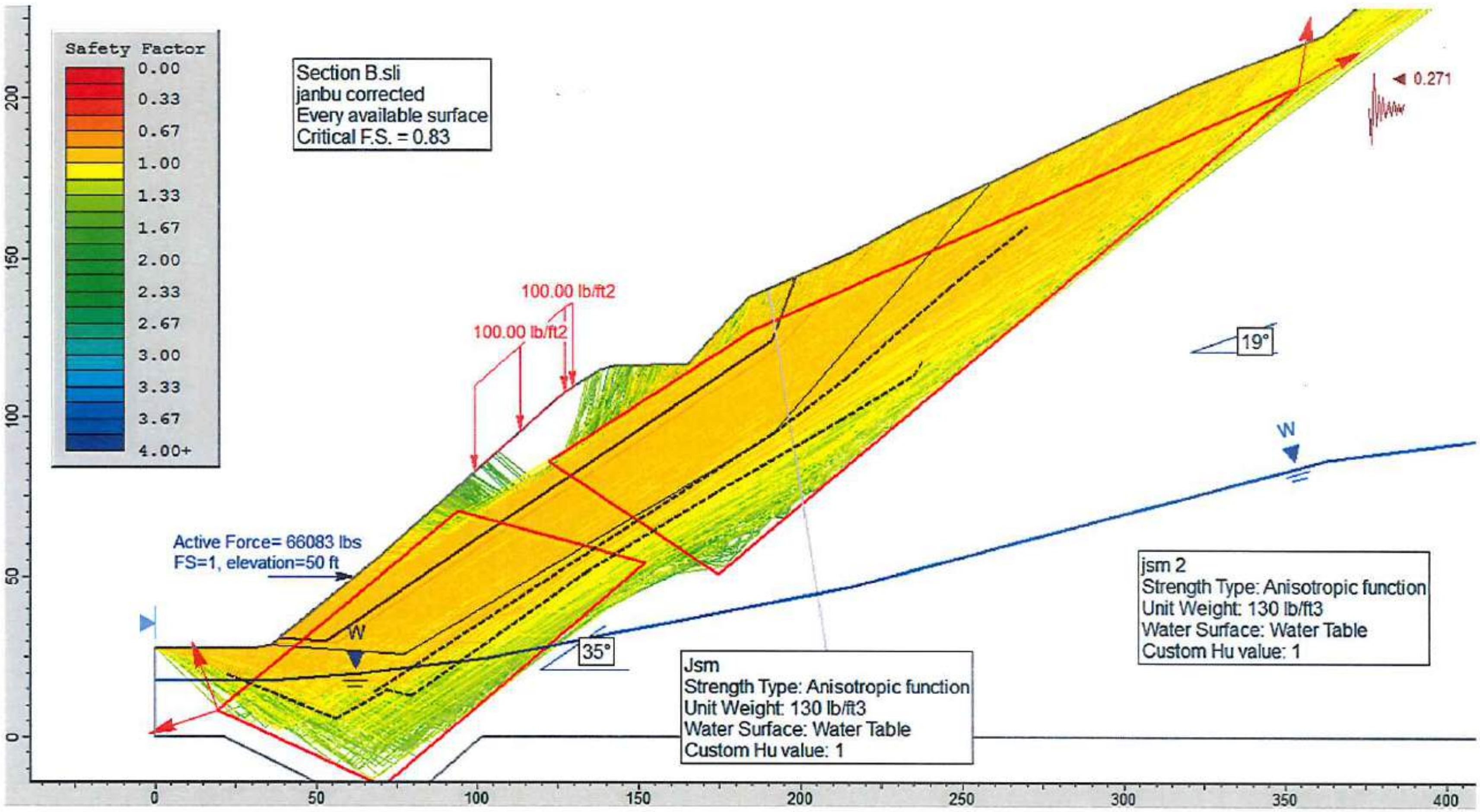
Water Table

0.0	18.0
35.0	18.0
64.0	20.0
103.0	25.0
216.0	47.0
363.0	87.0
416.0	94.0

Distributed Load

99.2	83.2
127.0	108.0
129.3	109.5


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section B.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.83
100.00 lb/ft2
100.00 lb/ft2
Active Force= 66083 lbs
FS=1, elevation=50 ft
0.271
19°
35°
W
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section B.sli
janbu corrected
Every available surface
Critical F.S. = 0.83
100.00 lb/ft2
100.00 lb/ft2
0.271
19°
W
Active Force= 66083 lbs
FS=1, elevation=50 ft
W
35°
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
0
0
50
100
150
200
250
300
350
400

Document Name

File Name: B.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

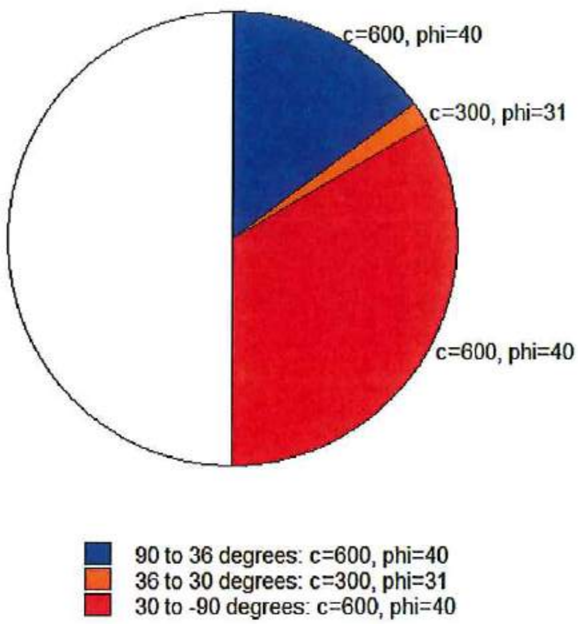
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 50 ft

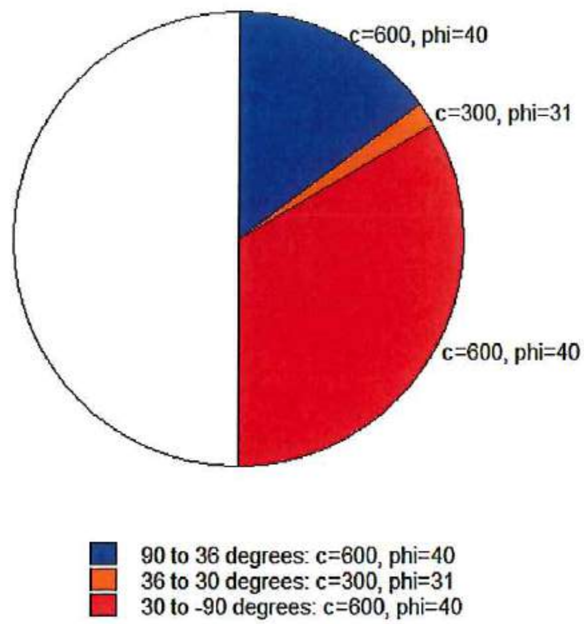
janbu corrected Active Force: 66083 lb
Center (2.060, 325.267) Radius 300.762

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

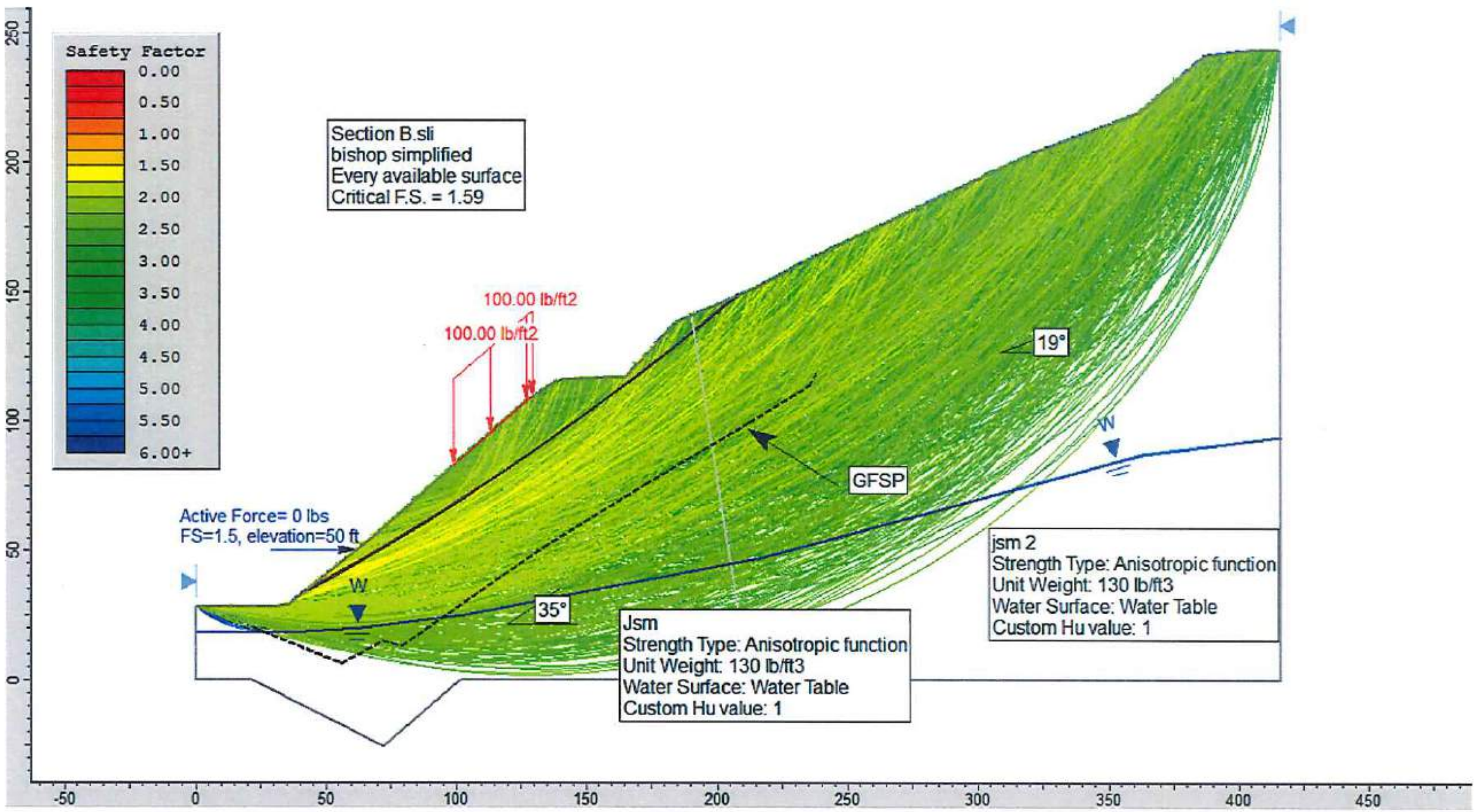


Material: jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 0.828065
Axis Location: 5.419, 247.269
Left Slip Surface Endpoint: 38.667, 31.196
Right Slip Surface Endpoint: 198.226, 144.224
Resisting Horizontal Force=196245 lb
Driving Horizontal Force=236992 lb


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section B.sli
bishop simplified
Every available surface
Critical F.S. = 1.59
100.00 lb/ft2
100.00 lb/ft2
19°
GFSP
W
Active Force= 0 lbs
FS=1.5, elevation=50 ft
W
35°
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
250
200
150
100
50
0
-50
0
50
100
150
200
250
300
350
400
450

Document Name

File Name: B.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

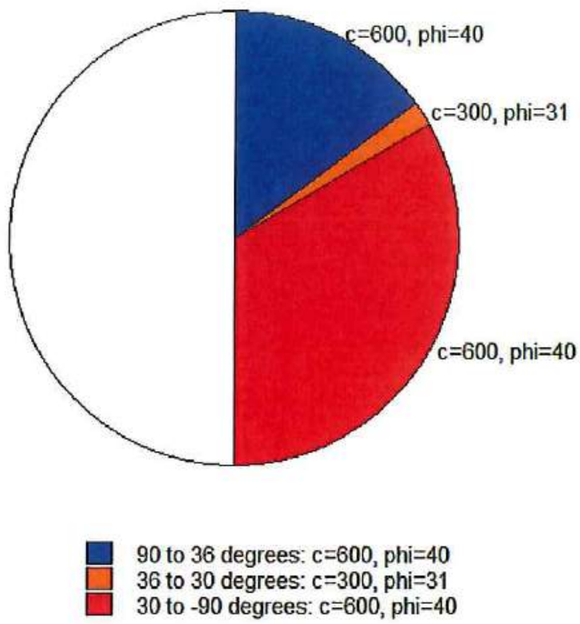
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 50 ft

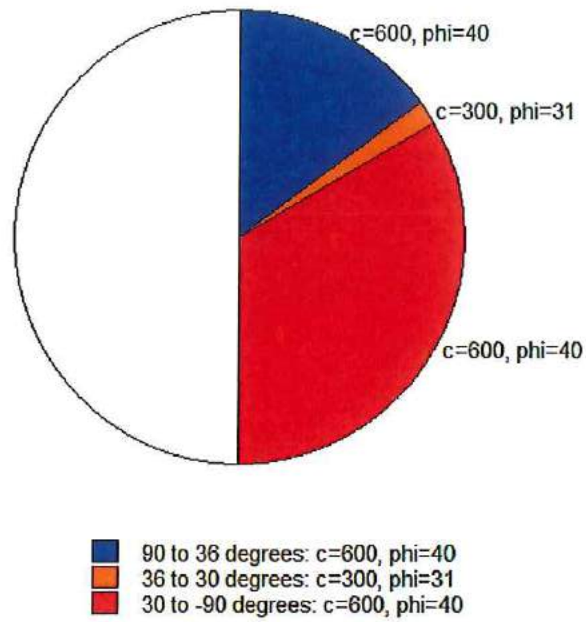
bishop simplified Active Force: 0 lb
Center (-453.740, 927.442) Radius 1022.200

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: bishop simplified
FS: 1.585890
Center: -453.740, 927.442
Radius: 1022.200
Left Slip Surface Endpoint: 40.361, 32.591
Right Slip Surface Endpoint: 208.378, 148.666
Resisting Moment=2.15851e+008 lb-ft
Driving Moment=1.36107e+008 lb-ft

List of All Coordinates

Material Boundary

190.1	140.6
212.0	0.0

External Boundary

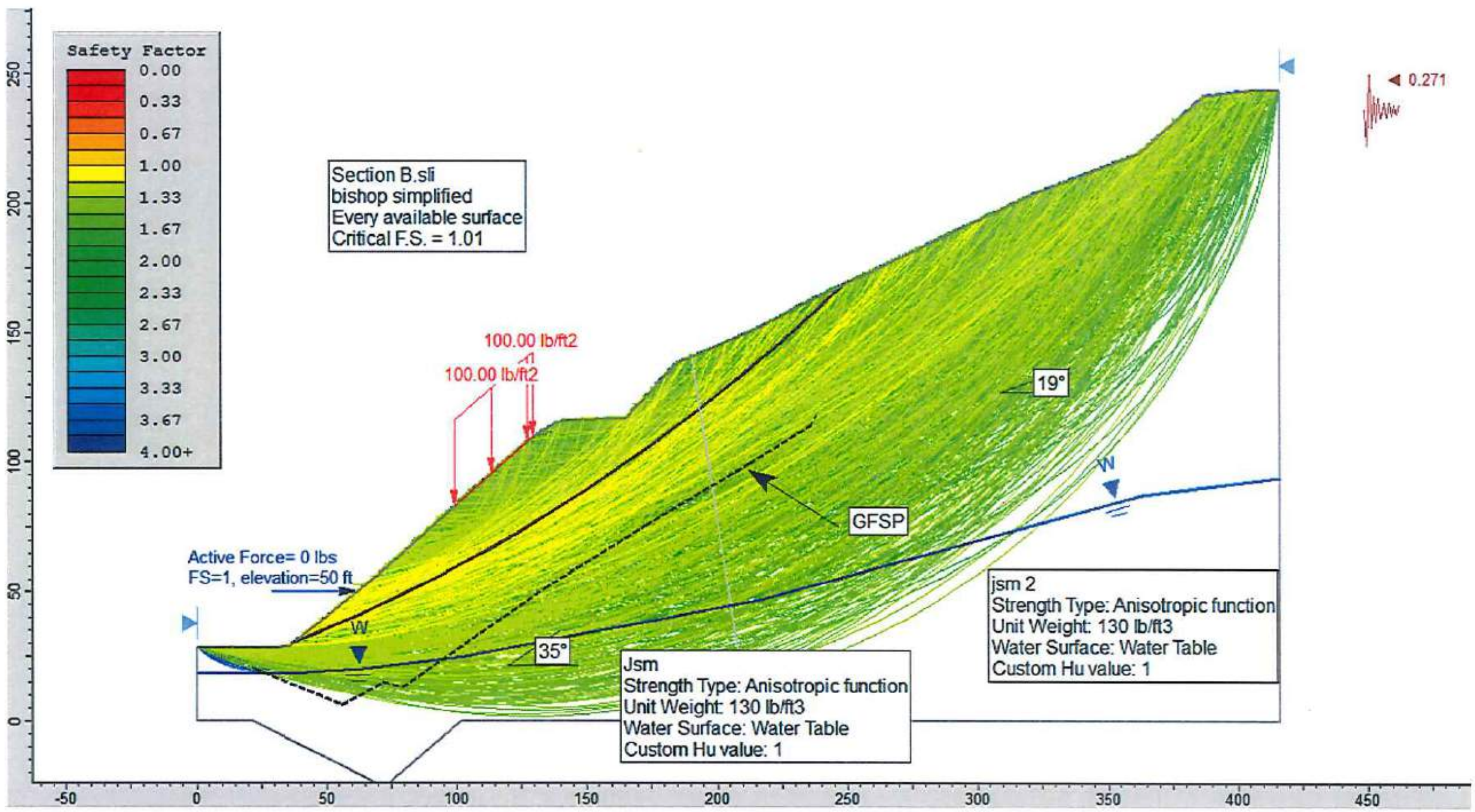
416.0	244.0
404.0	244.0
387.0	242.0
362.0	220.0
321.0	204.0
234.0	162.0
216.0	152.0
190.1	140.6
184.0	138.0
165.0	117.0
142.0	116.0
138.0	115.0
127.0	108.0
70.0	57.0
36.0	29.0
30.0	28.0
0.0 28.0	
0.0 0.0	
21.6	0.0
72.2	-25.6
101.1	0.0
212.0	0.0
416.0	0.0

Water Table

0.0 18.0	
35.0	18.0
64.0	20.0
103.0	25.0
216.0	47.0
363.0	87.0
416.0	94.0

Distributed Load

99.2	83.2
127.0	108.0
129.3	109.5


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section B.sli
bishop simplified
Every available surface
Critical F.S. = 1.01
100.00 lb/ft2
100.00 lb/ft2
0.271
Active Force= 0 lbs
FS=1, elevation=50 ft
W
W
35°
19°
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Document Name

File Name: B.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

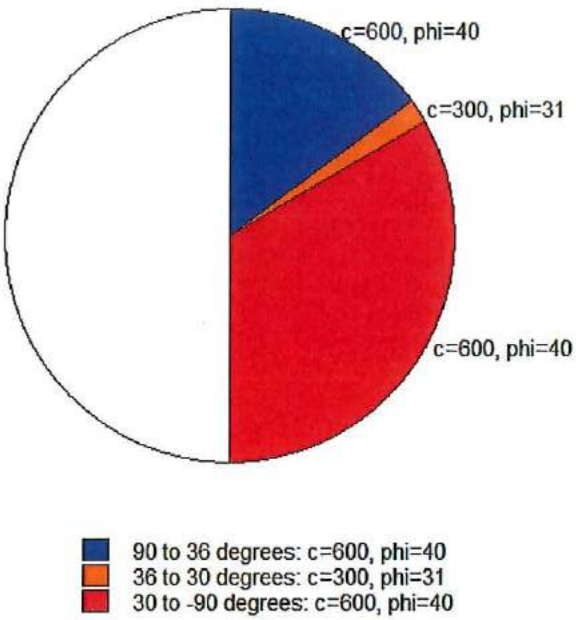
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 50 ft

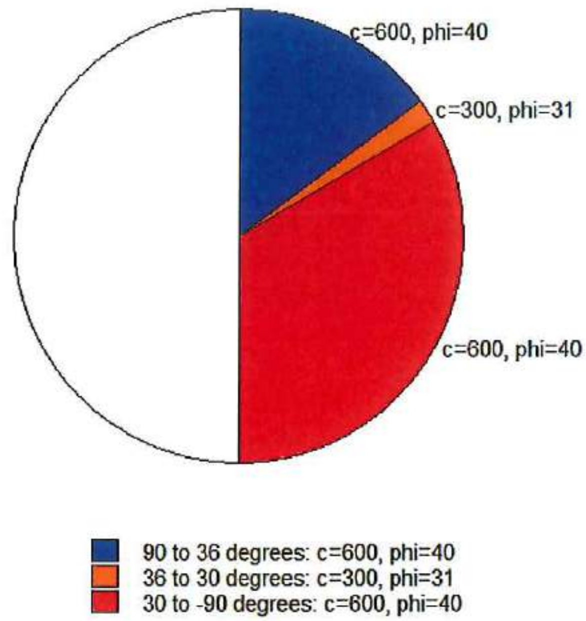
bishop simplified Active Force: 0 lb
Center (-207.477, 632.742) Radius 650.607

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

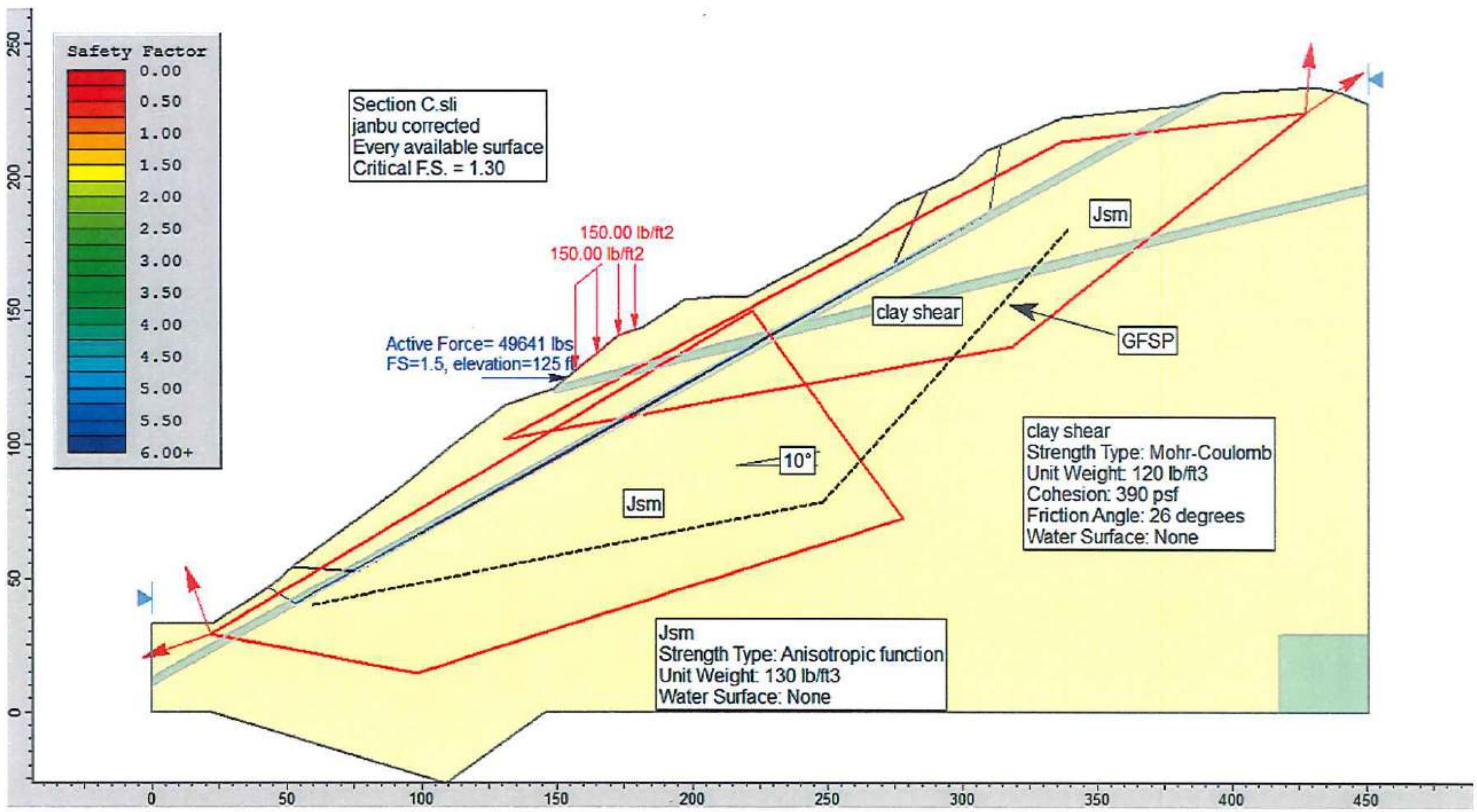


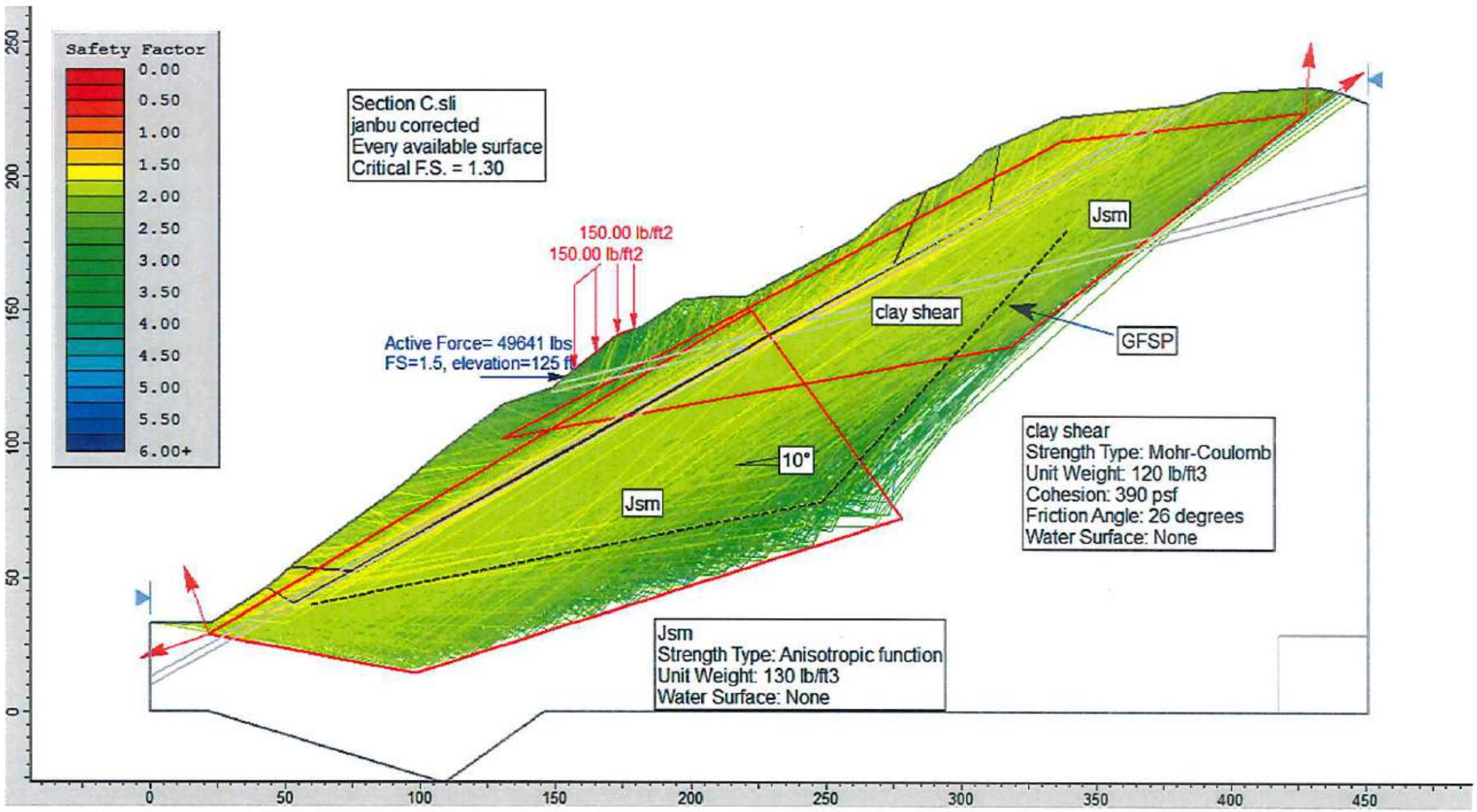
Material: jsm 2
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

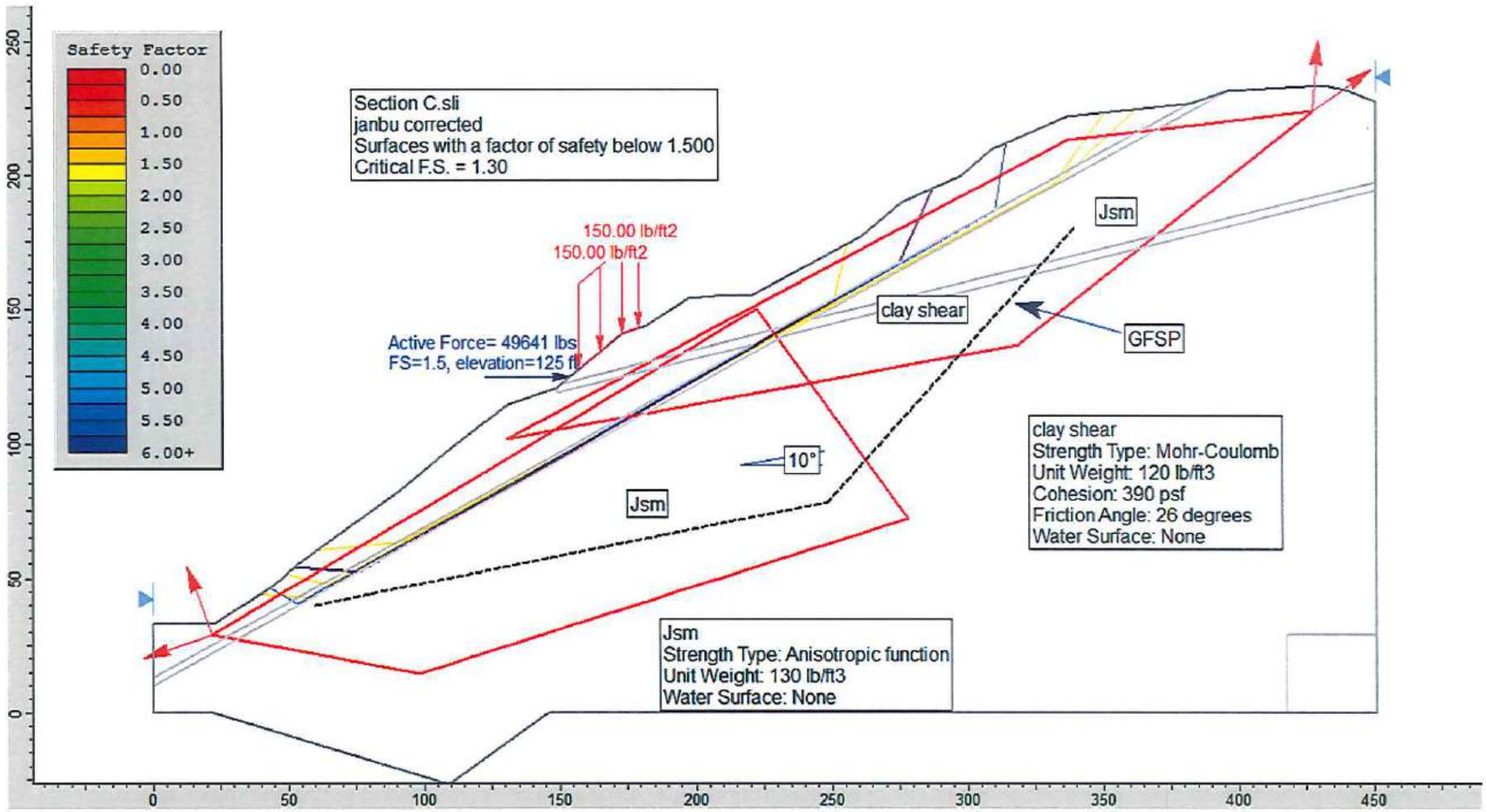


Global Minimums

Method: bishop simplified
FS: 1.009250
Center: -207.477, 632.742
Radius: 650.607
Left Slip Surface Endpoint: 36.980, 29.807
Right Slip Surface Endpoint: 249.184, 169.330
Resisting Moment=2.54094e+008 lb-ft
Driving Moment=2.51765e+008 lb-ft


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section C.sli
janbu corrected
Every available surface
Critical F.S. = 1.30
150.00 lb/ft2
150.00 lb/ft2
Active Force= 49641 lbs
FS=1.5, elevation=125 ft
Jsm
clay shear
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
250
200
150
100
50
0
0
50
100
150
200
250
300
350
400
450


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section C.sli
janbu corrected
Every available surface
Critical F.S. = 1.30
150.00 lb/ft2
150.00 lb/ft2
Active Force= 49641 lbs
FS=1.5, elevation=125 ft
clay shear
Jsm
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section C.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.30
150.00 lb/ft2
150.00 lb/ft2
Active Force= 49641 lbs
FS=1.5, elevation=125 ft
Jsm
clay shear
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450

Slide Analysis Information

Document Name

File Name: C.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 35
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 125 ft

janbu corrected Active Force: 49641 lb
Center (12.831, 400.296) Radius 359.600

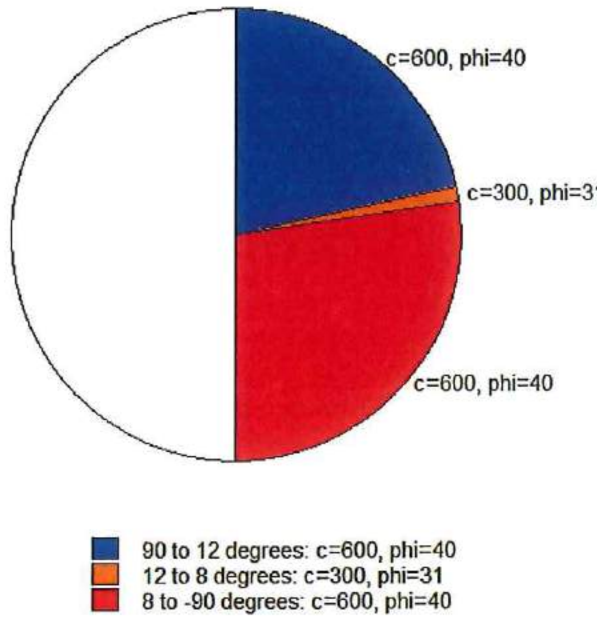
Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None

Global Minimums

Method: janbu corrected
FS: 1.301460
Axis Location: 28.871, 359.951
Left Slip Surface Endpoint: 52.174, 54.266
Right Slip Surface Endpoint: 287.401, 195.182
Resisting Horizontal Force=375783 lb
Driving Horizontal Force=288740 lb



List of All Coordinates

Focus/Block Search Window

318.8	136.7
427.5	224.5
336.9	213.5
130.2	102.0

Focus/Block Search Window

98.3	14.5
278.0	72.4
222.5	150.1
21.4	29.1

Material Boundary

396.0	232.0
242.0	146.0
451.0	198.0

Material Boundary

0.0	10.0
232.0	140.0
451.0	195.0

Material Boundary

150.3	122.1
231.0	143.0
381.8	227.3

Material Boundary

0.0	13.0
221.0	137.0
149.0	119.0
149.0	121.0

Material Boundary

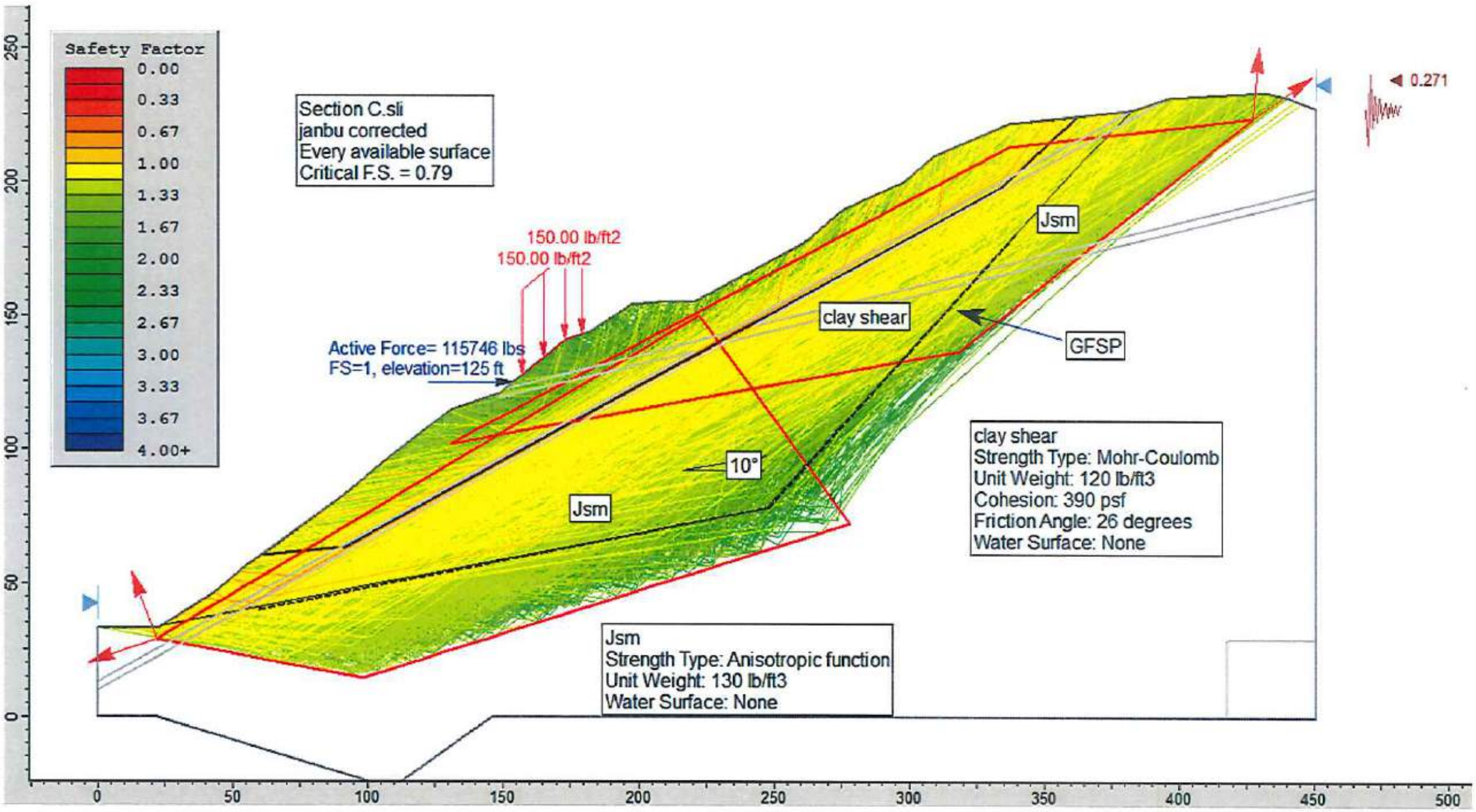
417.7	0.0
417.7	28.9
451.0	28.9

External Boundary

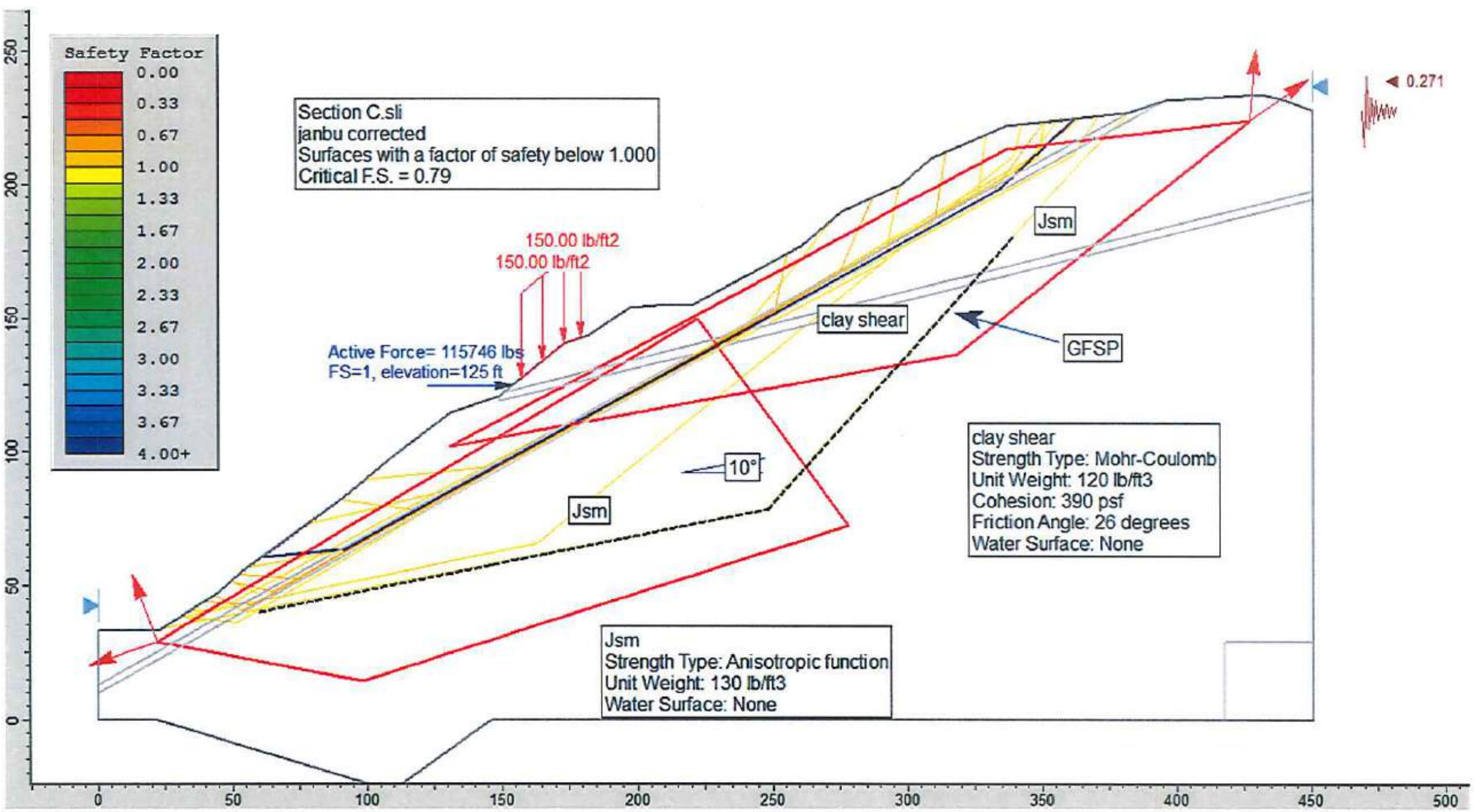
451.0	228.0
441.0	232.0
432.0	234.0
396.0	232.0
381.8	227.3
381.0	227.0
337.0	222.0
309.0	210.0
298.0	200.0
276.0	190.0
261.0	177.0
220.0	155.0
207.0	155.0
197.0	154.0
182.0	144.0
173.0	141.0
150.3	122.1
149.0	121.0
131.0	115.0
110.0	99.0
91.0	83.0
53.0	55.0
44.0	47.0
22.0	33.0
0.0	33.0
0.0	13.0
0.0	10.0
0.0	0.0
22.0	0.0
108.9	-26.5
145.6	0.0
417.7	0.0
451.0	0.0
451.0	28.9
451.0	195.0
451.0	198.0

Distributed Load

157.1	127.7
173.0	141.0
179.2	143.1



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section C.sli
janbu corrected
Every available surface
Critical F.S. = 0.79
150.00 lb/ft2
150.00 lb/ft2
Active Force= 115746 lbs
FS=1, elevation=125 ft
clay shear
Jsm
GFSP
10°
Jsm
0.271
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450
500


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section C.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.79
150.00 lb/ft2
150.00 lb/ft2
Active Force= 115746 lbs
FS=1, elevation=125 ft
0.271
Jsm
clay shear
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450
500
0
50
100
150
200
250

Document Name

File Name: C.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 35
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Back Analysis

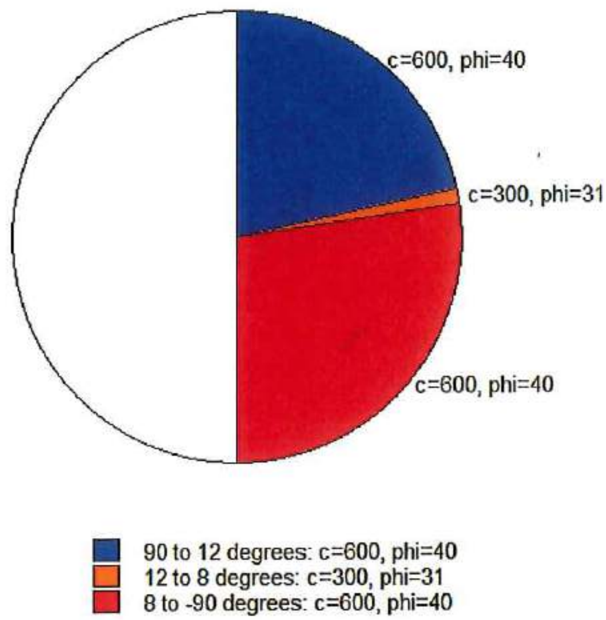
Required Factor of Safety: 1
Reinforcement Load Elevation: 125 ft

janbu corrected Active Force: 115746 lb
Center (46.760, 444.232) Radius 382.342

Material Properties

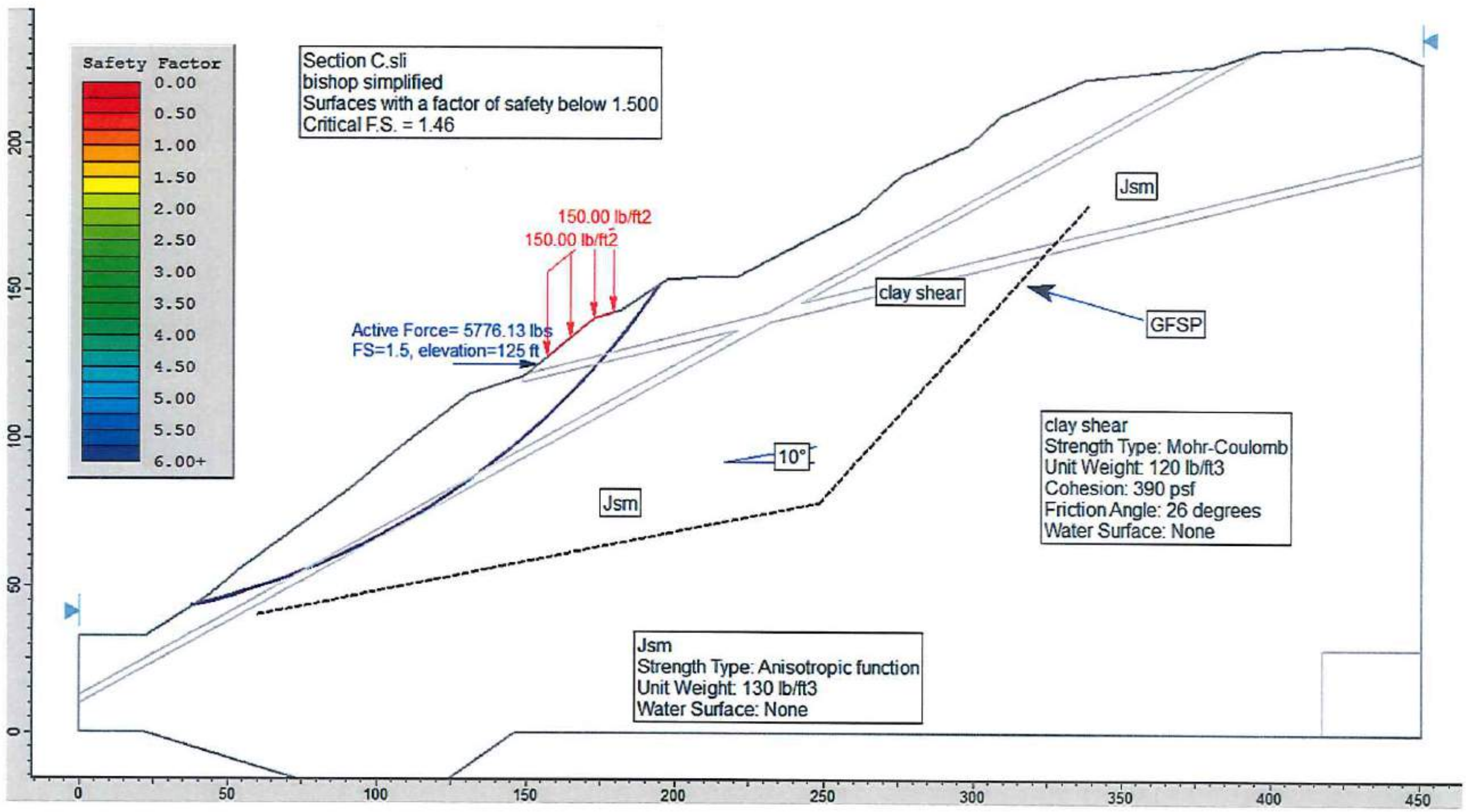
Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None

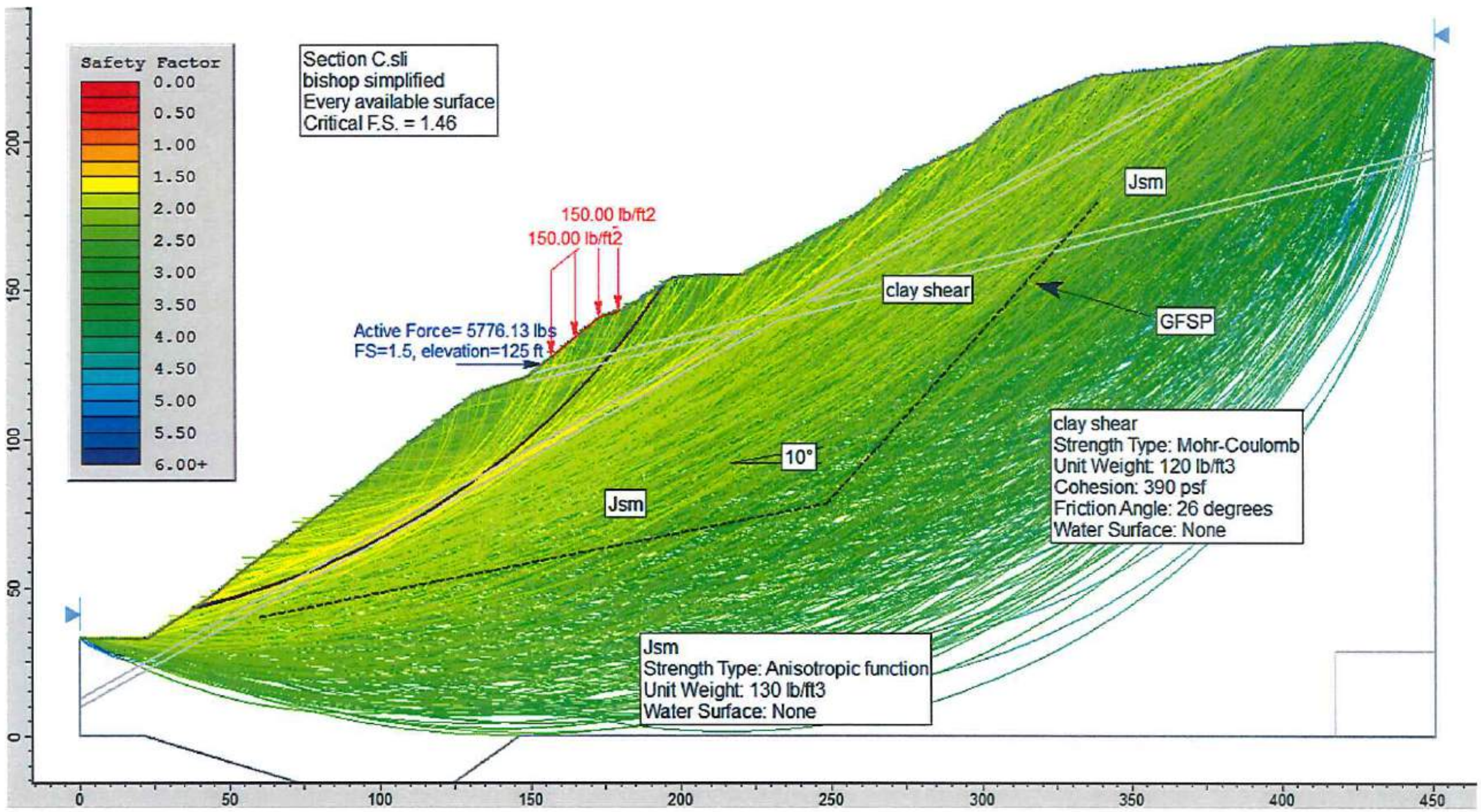
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None



Global Minimums

Method: janbu corrected
FS: 0.790977
Axis Location: 46.760, 444.232
Left Slip Surface Endpoint: 60.369, 60.429
Right Slip Surface Endpoint: 361.967, 224.837
Resisting Horizontal Force=429205 lb
Driving Horizontal Force=542626 lb


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section C.sli
bishop simplified
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.46
150.00 lb/ft2
150.00 lb/ft2
Active Force= 5776.13 lbs
FS=1.5, elevation=125 ft
clay shear
Jsm
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section C.sli
bishop simplified
Every available surface
Critical F.S. = 1.46
150.00 lb/ft2
150.00 lb/ft2
Active Force= 5776.13 lbs
FS=1.5, elevation=125 ft
clay shear
Jsm
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450

Document Name

File Name: C.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 125 ft

bishop simplified Active Force: 5776.13 lb
Center (-20.658, 294.688) Radius 258.257

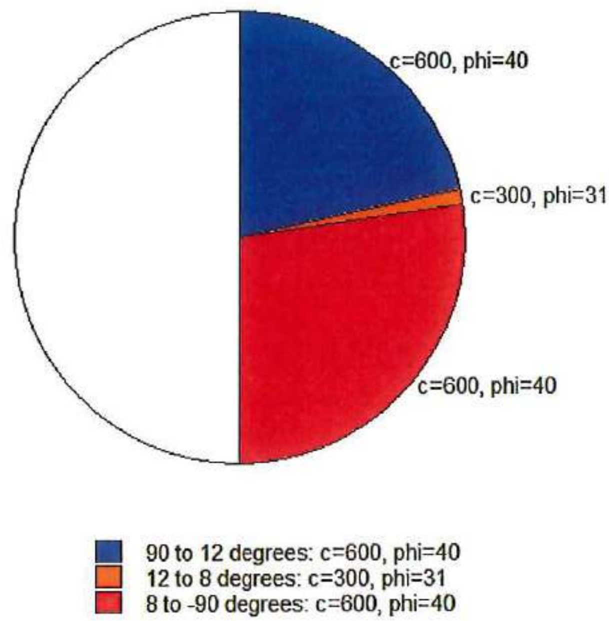
Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None

Global Minimums

Method: bishop simplified
FS: 1.461860
Center: -20.658, 294.688
Radius: 258.257
Left Slip Surface Endpoint: 37.996, 43.180
Right Slip Surface Endpoint: 195.076, 152.717
Resisting Moment=7.56154e+007 lb-ft
Driving Moment=5.17253e+007 lb-ft



List of All Coordinates

Material Boundary

396.0	232.0
242.0	146.0
451.0	198.0

Material Boundary

0.0	10.0
232.0	140.0
451.0	195.0

Material Boundary

150.3	122.1
231.0	143.0
381.8	227.3

Material Boundary

0.0	13.0
221.0	137.0
149.0	119.0
149.0	121.0

Material Boundary

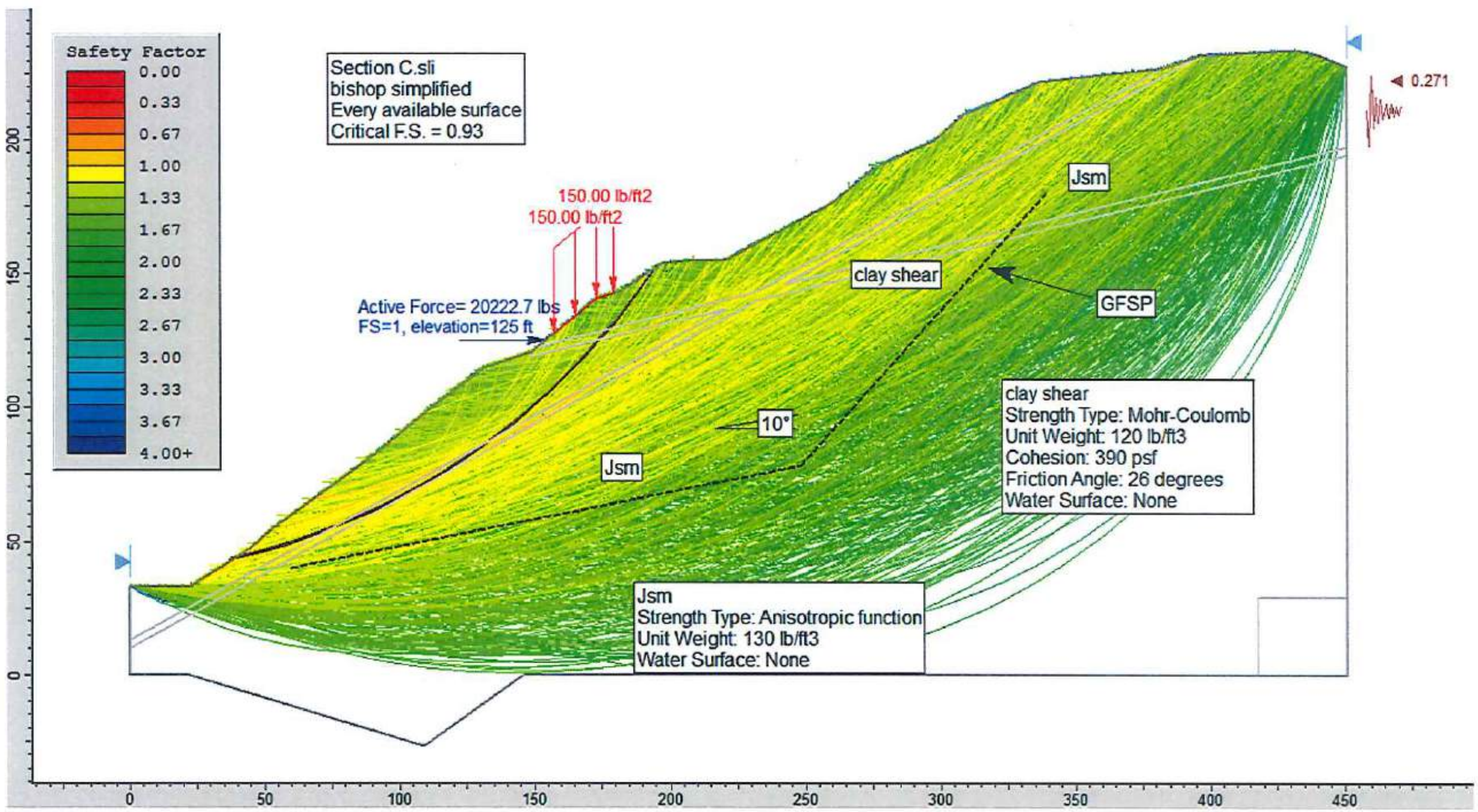
417.7	0.0
417.7	28.9
451.0	28.9

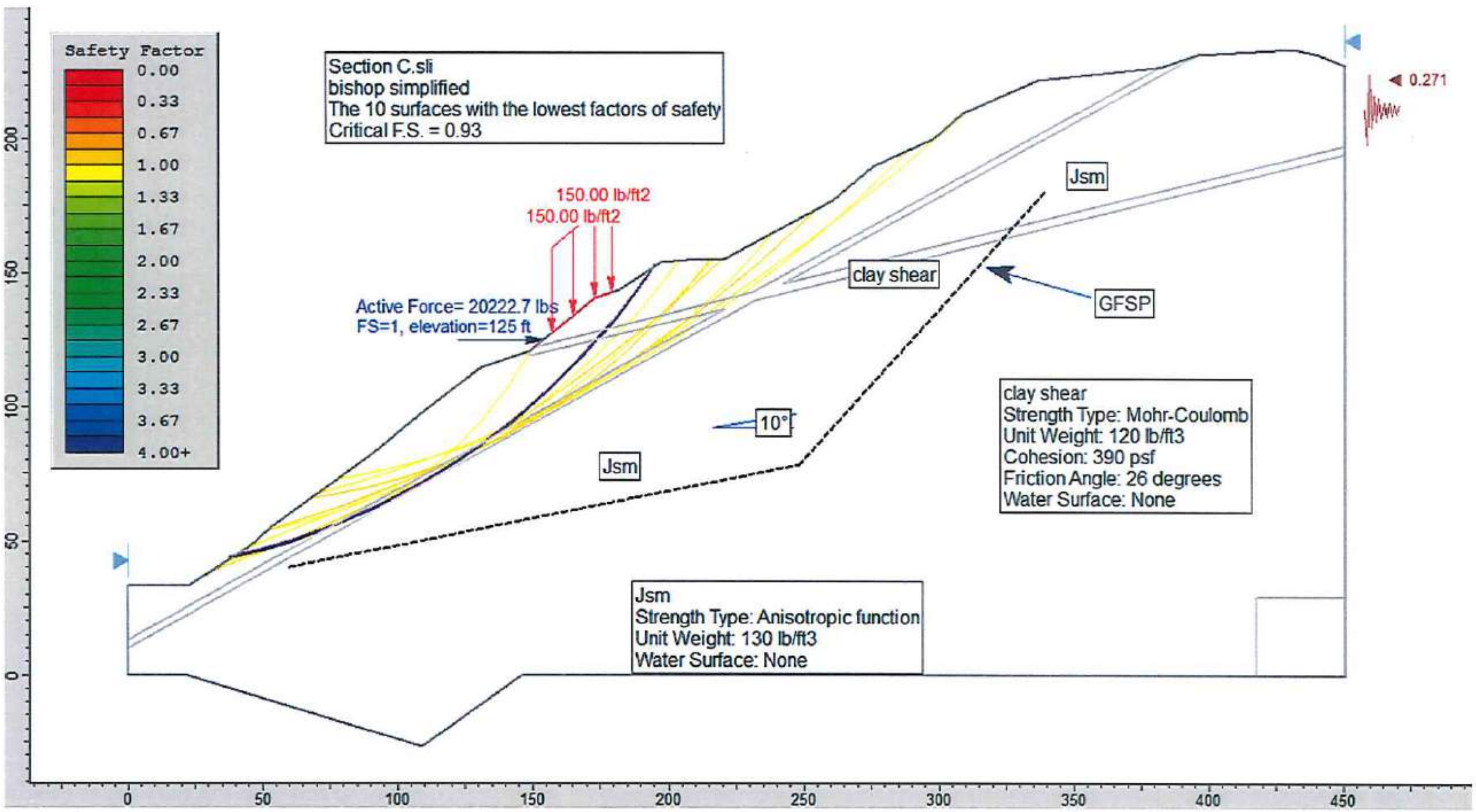
External Boundary

451.0	228.0
441.0	232.0
432.0	234.0
396.0	232.0
381.8	227.3
381.0	227.0
337.0	222.0
309.0	210.0
298.0	200.0
276.0	190.0
261.0	177.0
220.0	155.0
207.0	155.0
197.0	154.0
182.0	144.0
173.0	141.0
150.3	122.1
149.0	121.0
131.0	115.0
110.0	99.0
91.0	83.0
53.0	55.0
44.0	47.0
22.0	33.0
0.0	33.0
0.0	13.0
0.0	10.0
0.0	0.0
22.0	0.0
108.9	-26.5
145.6	0.0
417.7	0.0
451.0	0.0
451.0	28.9
451.0	195.0
451.0	198.0

Distributed Load

157.1	127.7
173.0	141.0
179.2	143.1


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section C.sli
bishop simplified
Every available surface
Critical F.S. = 0.93
150.00 lb/ft2
150.00 lb/ft2
Active Force= 20222.7 lbs
FS=1, elevation=125 ft
Jsm
clay shear
GFSP
10°
Jsm
0.271
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450
0
50
100
150
200



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section C.sli
bishop simplified
The 10 surfaces with the lowest factors of safety
Critical F.S. = 0.93
150.00 lb/ft2
150.00 lb/ft2
Active Force= 20222.7 lbs
FS=1, elevation=125 ft
0.271
Jsm
clay shear
GFSP
10°
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None
0
50
100
150
200
250
300
350
400
450

Document Name

File Name: C.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 150 lb/ft2

Back Analysis

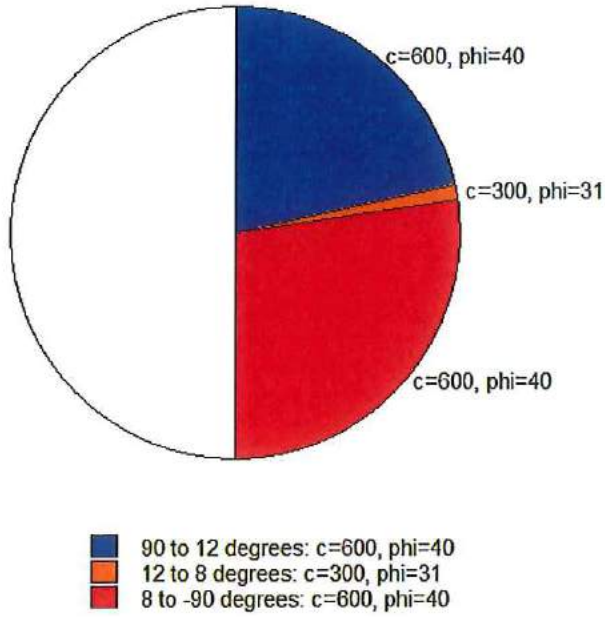
Required Factor of Safety: 1
Reinforcement Load Elevation: 125 ft

bishop simplified Active Force: 20222.7 lb
Center (-20.658, 294.688) Radius 258.257

Material Properties

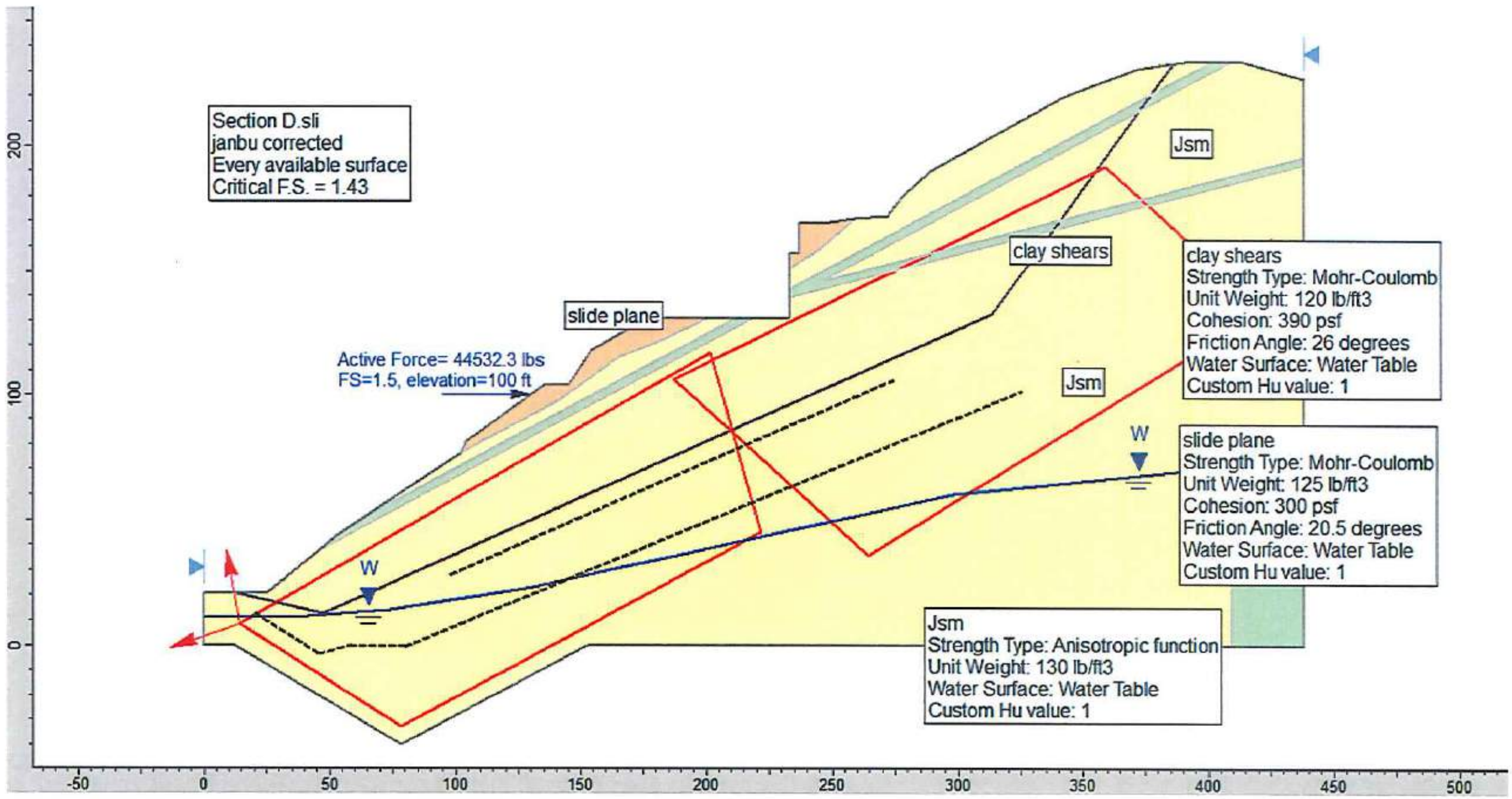
Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: None

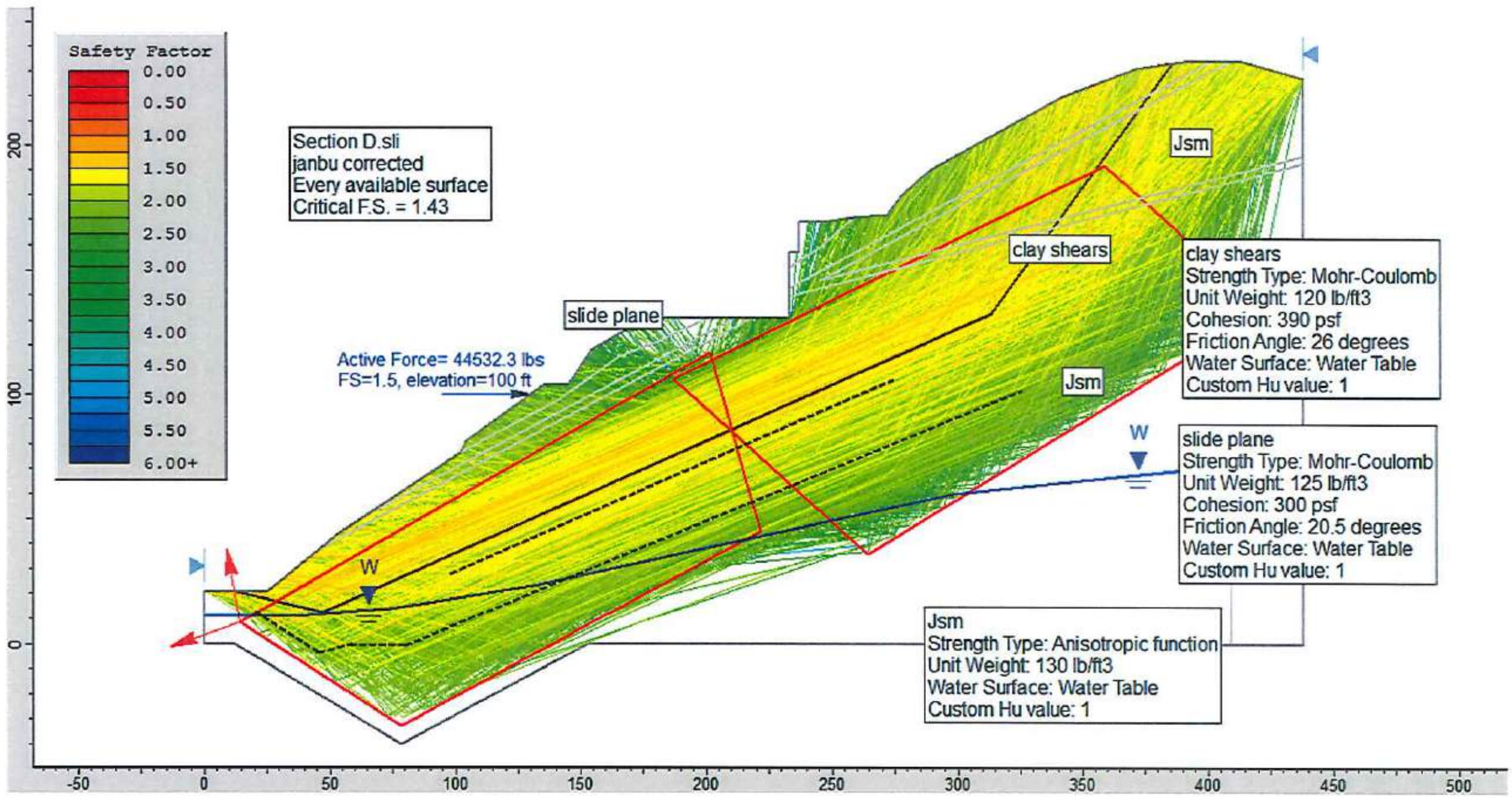
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: None

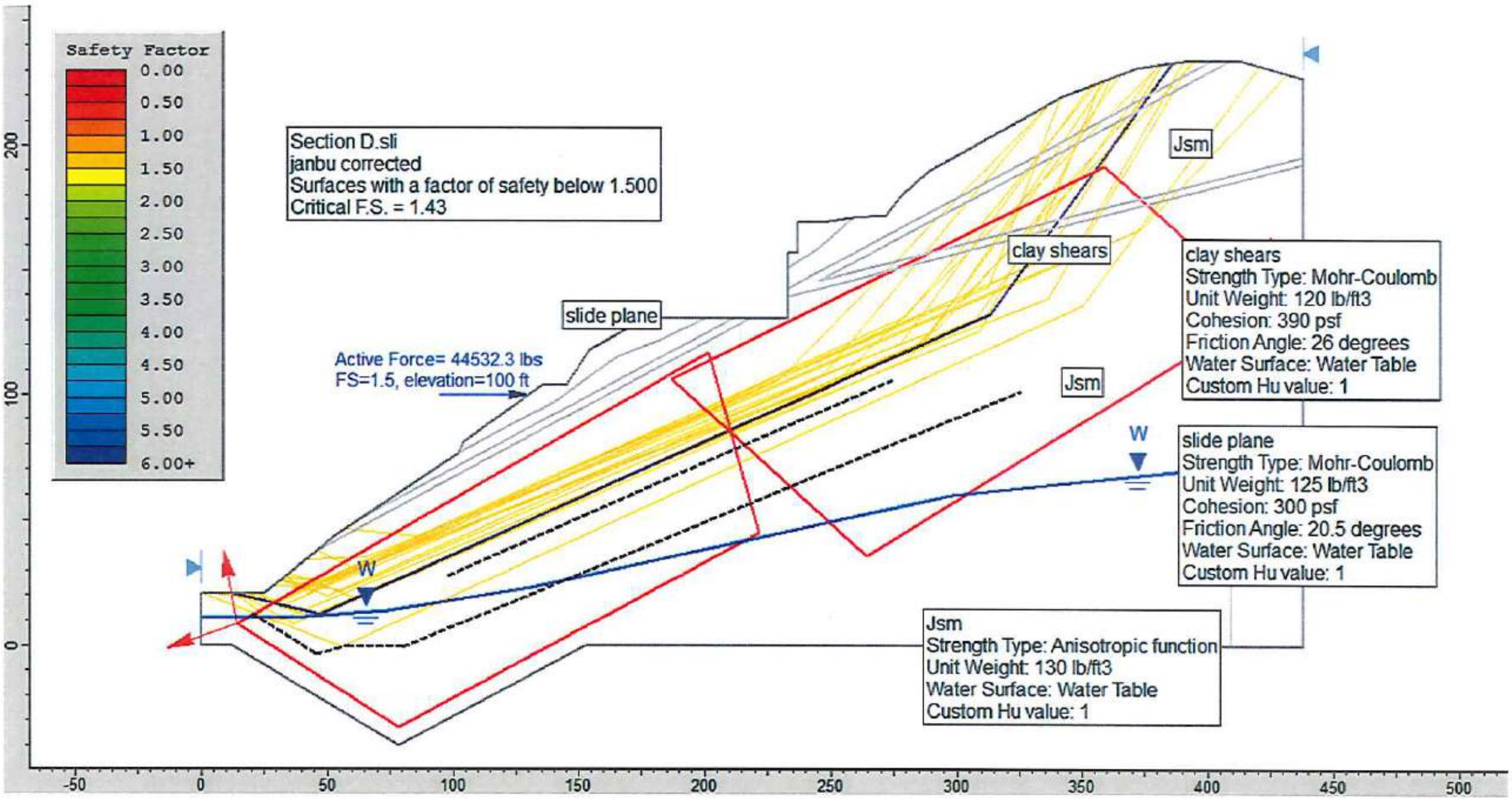


Global Minimums

Method: bishop simplified
FS: 0.932409
Center: -20.658, 294.688
Radius: 258.257
Left Slip Surface Endpoint: 37.996, 43.180
Right Slip Surface Endpoint: 195.076, 152.717
Resisting Moment=6.66179e+007 lb-ft
Driving Moment=7.14471e+007 lb-ft


Section D.sli
janbu corrected
Every available surface
Critical F.S. = 1.43
Active Force= 44532.3 lbs
FS=1.5, elevation=100 ft
slide plane
clay shears
Jsm
Jsm
W
W
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
-50
0
50
100
150
200
250
300
350
400
450
500
0
100
200


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section D.sli
janbu corrected
Every available surface
Critical F.S. = 1.43
Active Force= 44532.3 lbs
FS=1.5, elevation=100 ft
slide plane
clay shears
Jsm
Jsm
W
W
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
100
0
-50
0
50
100
150
200
250
300
350
400
450
500


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section D.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.43
slide plane
Active Force= 44532.3 lbs
FS=1.5, elevation=100 ft
clay shears
Jsm
W
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
-50
0
50
100
150
200
250
300
350
400
450
500
200
100
0

Document Name

File Name: D.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 100
Left Projection Angle (End Angle): 200
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

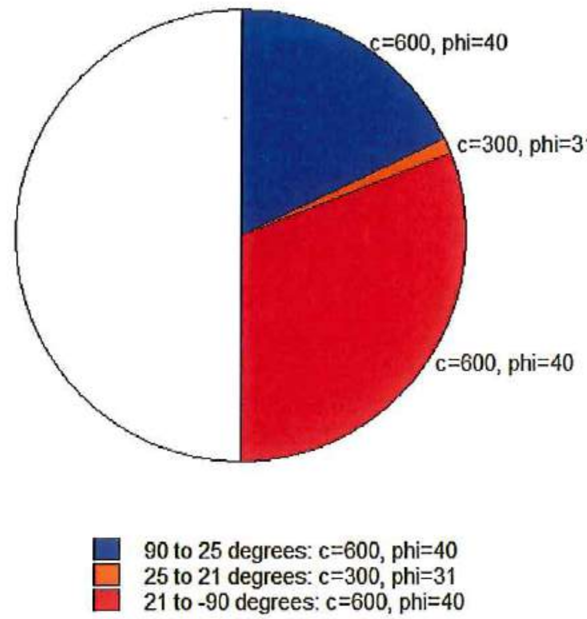
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 100 ft

janbu corrected Active Force: 44532.3 lb
Center (-12.783, 500.068) Radius 485.464

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.431900
Axis Location: -12.783, 500.068
Left Slip Surface Endpoint: 13.150, 21.000
Right Slip Surface Endpoint: 386.032, 233.373
Resisting Horizontal Force=1.25649e+006 lb
Driving Horizontal Force=877501 lb

List of All Coordinates

Focus/Block Search Window

78.2	-32.5
221.2	45.0
201.5	117.3
13.9	8.7

Focus/Block Search Window

264.3	35.8
422.2	134.5
358.7	192.3
186.8	106.5

Material Boundary

233.0	151.0
245.0	159.0
259.0	171.0

Material Boundary

102.0	77.0
117.0	85.0
140.0	97.0
165.0	115.0

Material Boundary

165.0	115.0
182.0	122.0
200.0	131.0

Material Boundary

408.0	234.0
245.0	146.0
438.0	196.0

Material Boundary

233.0	143.0
401.0	234.0

Material Boundary

233.0	139.7
438.0	193.0

Material Boundary

45.7	37.9
218.0	131.0

Material Boundary

63.5	50.8
211.0	131.0

Material Boundary

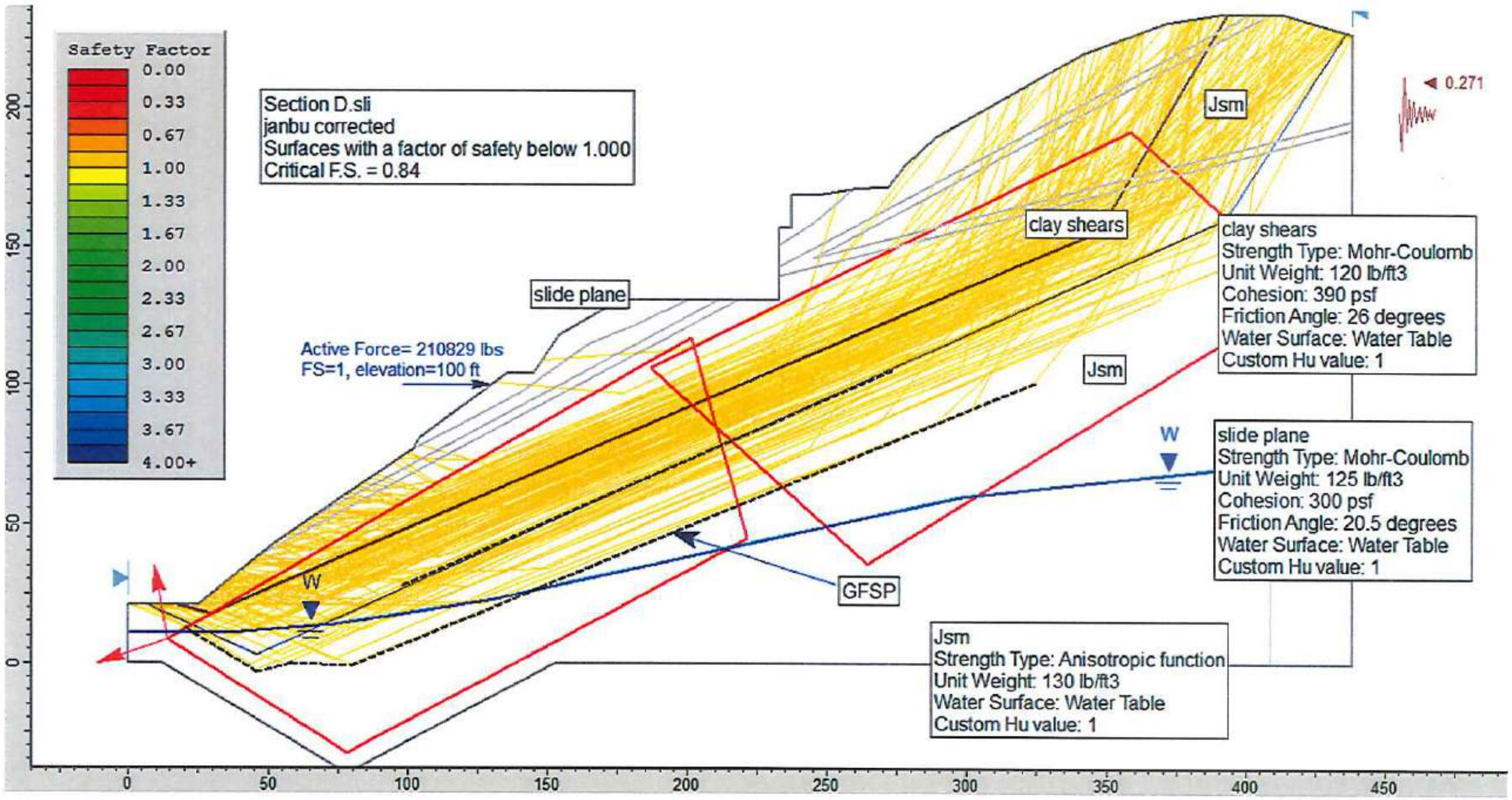
409.0	0.0
409.0	30.6
438.0	30.6

External Boundary

438.0	227.0
414.0	234.0
408.0	234.0
401.0	234.0
390.0	234.0
371.0	231.0
342.0	220.0
289.0	190.0
278.0	180.0
272.0	172.0
259.0	171.0
246.0	169.0
237.0	169.0
237.0	157.0
233.0	157.0
233.0	151.0
233.0	143.0
233.0	139.7
233.0	131.0
218.0	131.0
211.0	131.0
200.0	131.0
176.0	131.0
154.0	118.0
145.0	104.0
135.0	104.0
104.0	81.0
102.0	77.0
63.5	50.8
52.0	43.0
45.7	37.9
25.0	21.0
0.0	21.0
0.0	0.0
12.2	0.0
78.2	-40.0
152.3	0.0
409.0	0.0
438.0	0.0
438.0	30.6
438.0	193.0
438.0	196.0

Water Table

0.0	11.0
35.0	11.0
74.0	14.0
131.0	23.0
298.0	60.0
438.0	75.0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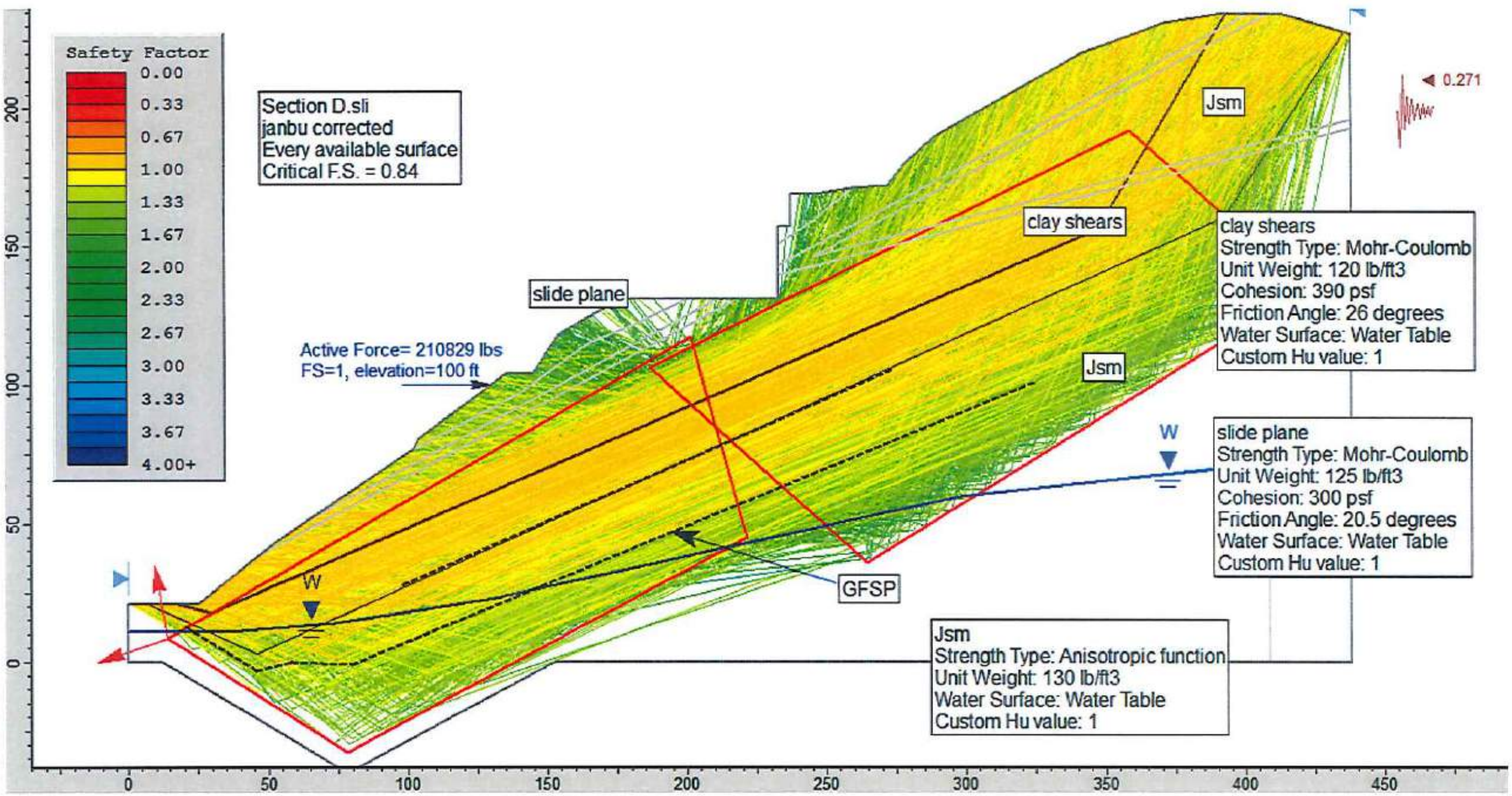
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section D.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.84
slide plane
Active Force= 210829 lbs
FS=1, elevation=100 ft
clay shears
Jsm
Jsm
W
W
GFSP
0.271
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section D.sli
janbu corrected
Every available surface
Critical F.S. = 0.84
Active Force= 210829 lbs
FS=1, elevation=100 ft
slide plane
clay shears
Jsm
0.271
W
GFSP
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450

Document Name

File Name: D.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 100
Left Projection Angle (End Angle): 200
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271

Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 100 ft

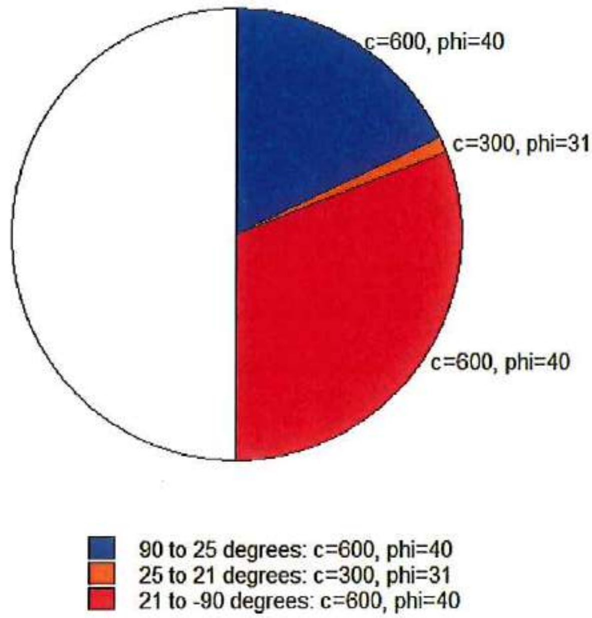
janbu corrected Active Force: 210829 lb
Center (14.580, 553.196) Radius 540.156

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

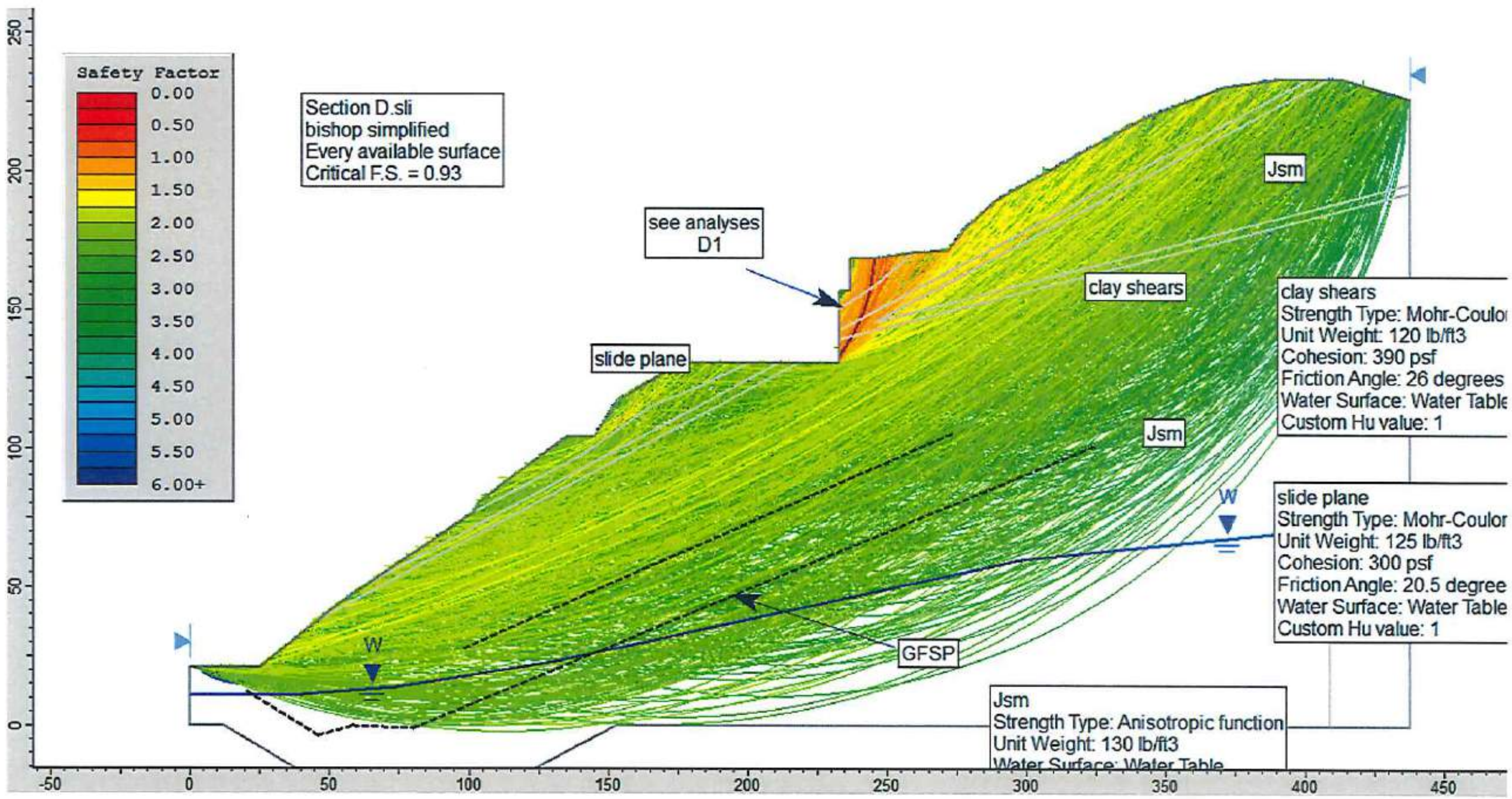
Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

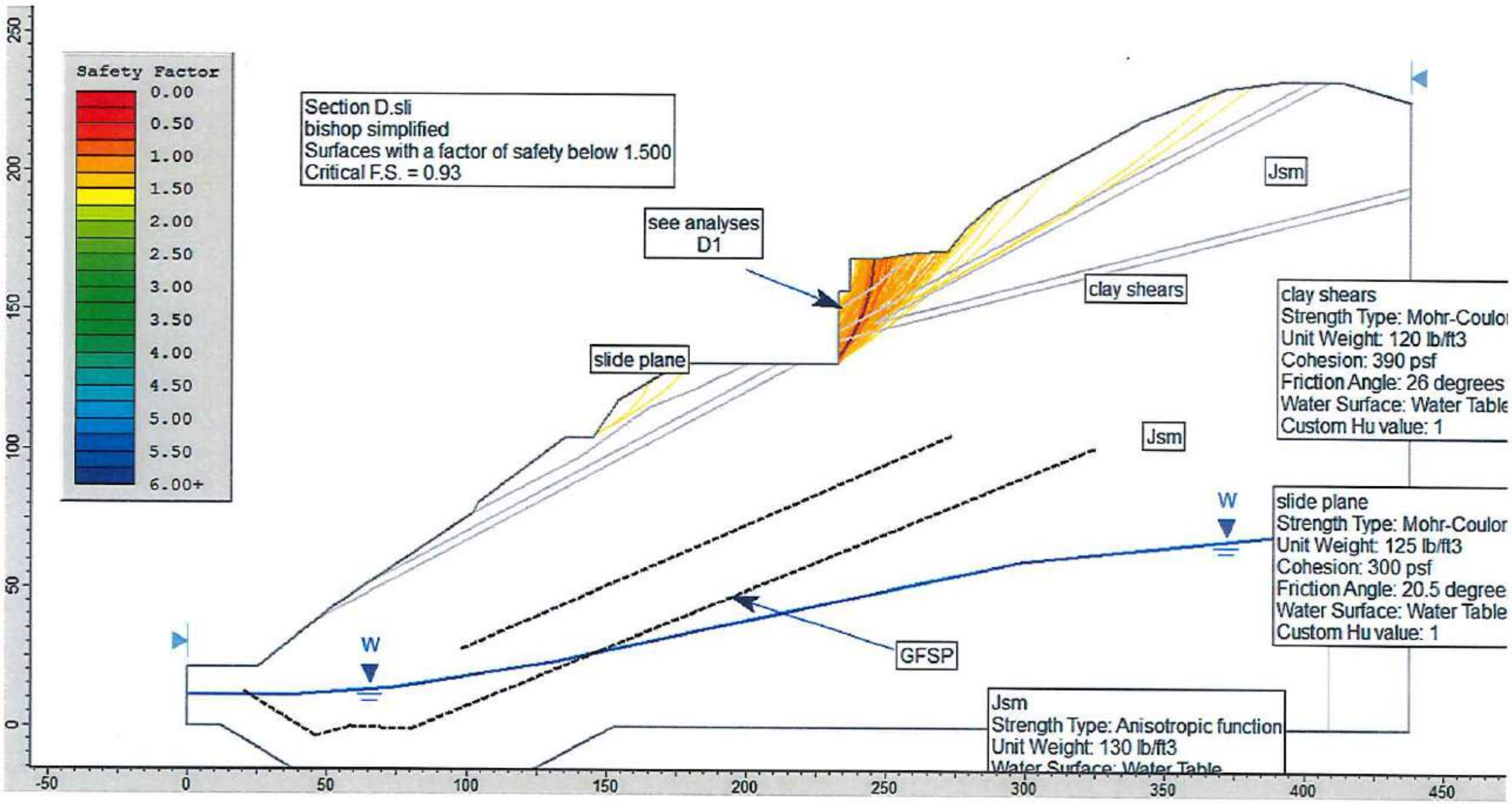
Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 0.842092
Axis Location: -7.458, 502.639
Left Slip Surface Endpoint: 17.972, 21.000
Right Slip Surface Endpoint: 393.112, 234.000
Resisting Horizontal Force=959710 lb
Driving Horizontal Force=1.13967e+006 lb


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section D.sli
bishop simplified
Every available surface
Critical F.S. = 0.93
see analyses
D1
slide plane
clay shears
Jsm
Jsm
GFSP
W
W
clay shears
Strength Type: Mohr-Coulo
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulor
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degree
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
-50
0
50
100
150
200
250
300
350
400
450
0
50
100
150
200
250



Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section D.sli
bishop simplified
Surfaces with a factor of safety below 1.500
Critical F.S. = 0.93
see analyses D1
slide plane
clay shears
Jsm
Jsm
clay shears
Strength Type: Mohr-Coulo
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
W
W
slide plane
Strength Type: Mohr-Coulor
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degree
Water Surface: Water Table
Custom Hu value: 1
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
-50
0
50
100
150
200
250
300
350
400
450
0
50
100
150
200
250

Document Name

File Name: D.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

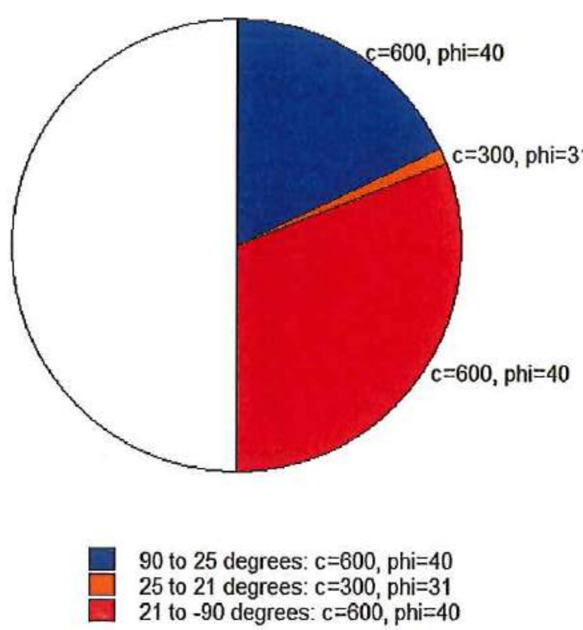
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.930144
Center: 178.916, 172.407
Radius: 66.914
Left Slip Surface Endpoint: 233.000, 133.007
Right Slip Surface Endpoint: 245.743, 169.000
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 245.743 169.000
Resisting Moment=1.76921e+006 lb-ft
Driving Moment=1.90208e+006 lb-ft

List of All Coordinates

Material Boundary

233.0	151.0
245.0	159.0
259.0	171.0

Material Boundary

102.0	77.0
117.0	85.0
140.0	97.0
165.0	115.0

Material Boundary

165.0	115.0
182.0	122.0
200.0	131.0

Material Boundary

408.0	234.0
245.0	146.0
438.0	196.0

Material Boundary

233.0	143.0
401.0	234.0

Material Boundary

233.0	139.7
438.0	193.0

Material Boundary

45.7	37.9
218.0	131.0

Material Boundary

63.5	50.8
211.0	131.0

Material Boundary

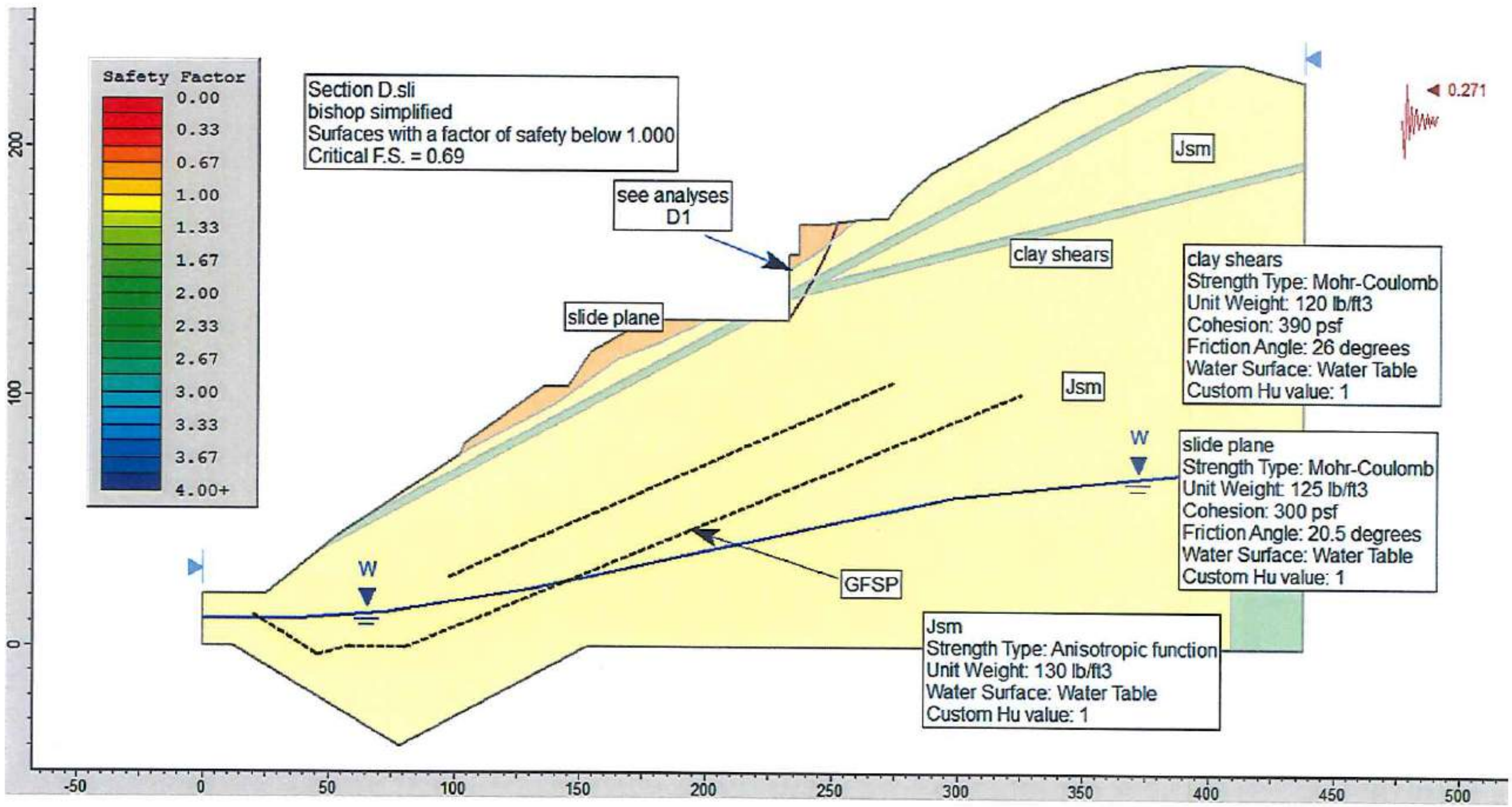
409.0	0.0
409.0	30.6
438.0	30.6

External Boundary

438.0	227.0
414.0	234.0
408.0	234.0
401.0	234.0
390.0	234.0
371.0	231.0
342.0	220.0
289.0	190.0
278.0	180.0
272.0	172.0
259.0	171.0
246.0	169.0
237.0	169.0
237.0	157.0
233.0	157.0
233.0	151.0
233.0	143.0
233.0	139.7
233.0	131.0
218.0	131.0
211.0	131.0
200.0	131.0
176.0	131.0
154.0	118.0
145.0	104.0
135.0	104.0
104.0	81.0
102.0	77.0
63.5	50.8
52.0	43.0
45.7	37.9
25.0	21.0
0.0	21.0
0.0	0.0
12.2	0.0
78.2	-40.0
152.3	0.0
409.0	0.0
438.0	0.0
438.0	30.6
438.0	193.0
438.0	196.0

Water Table

0.0	11.0
35.0	11.0
74.0	14.0
131.0	23.0
298.0	60.0
438.0	75.0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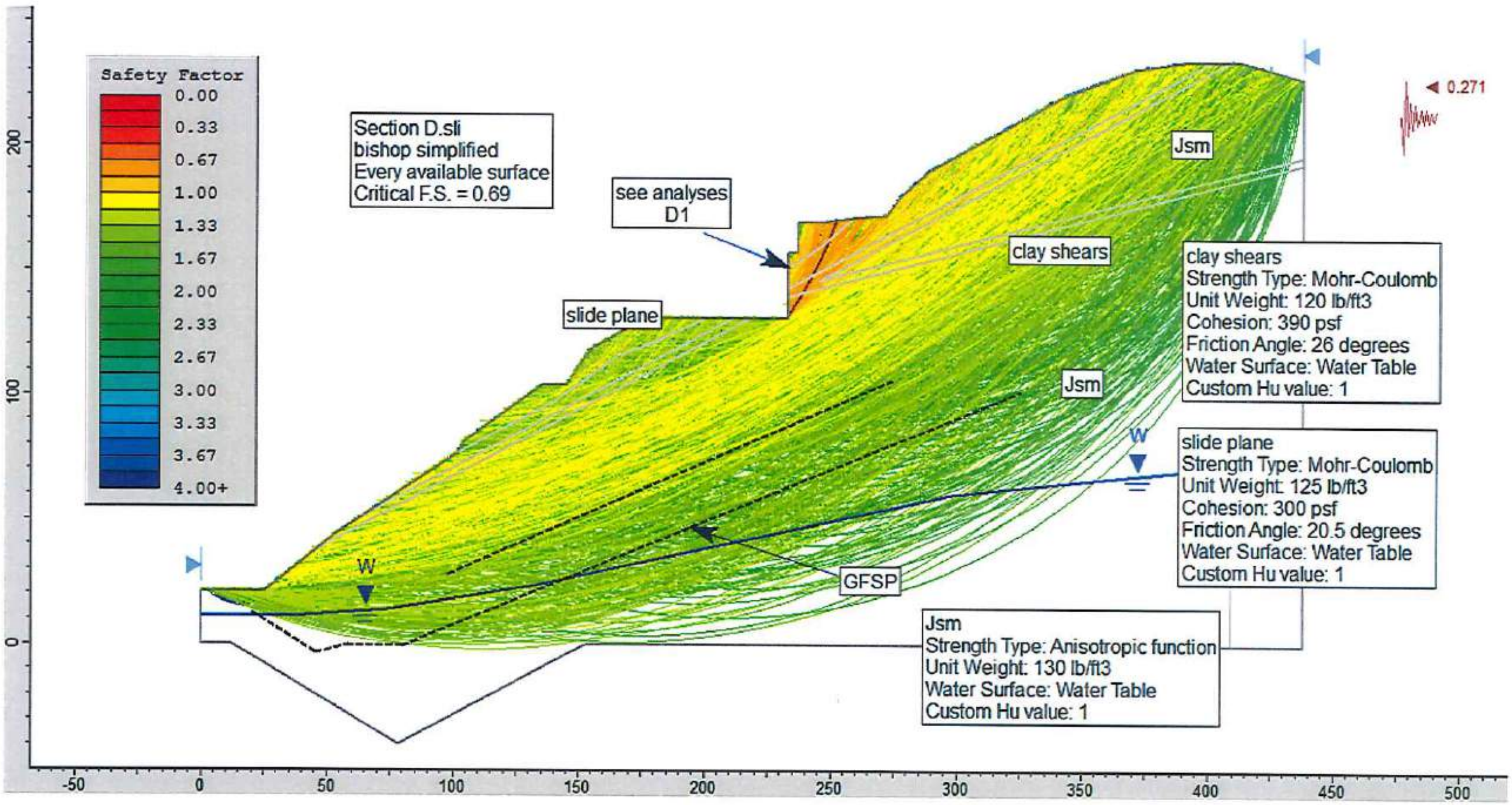
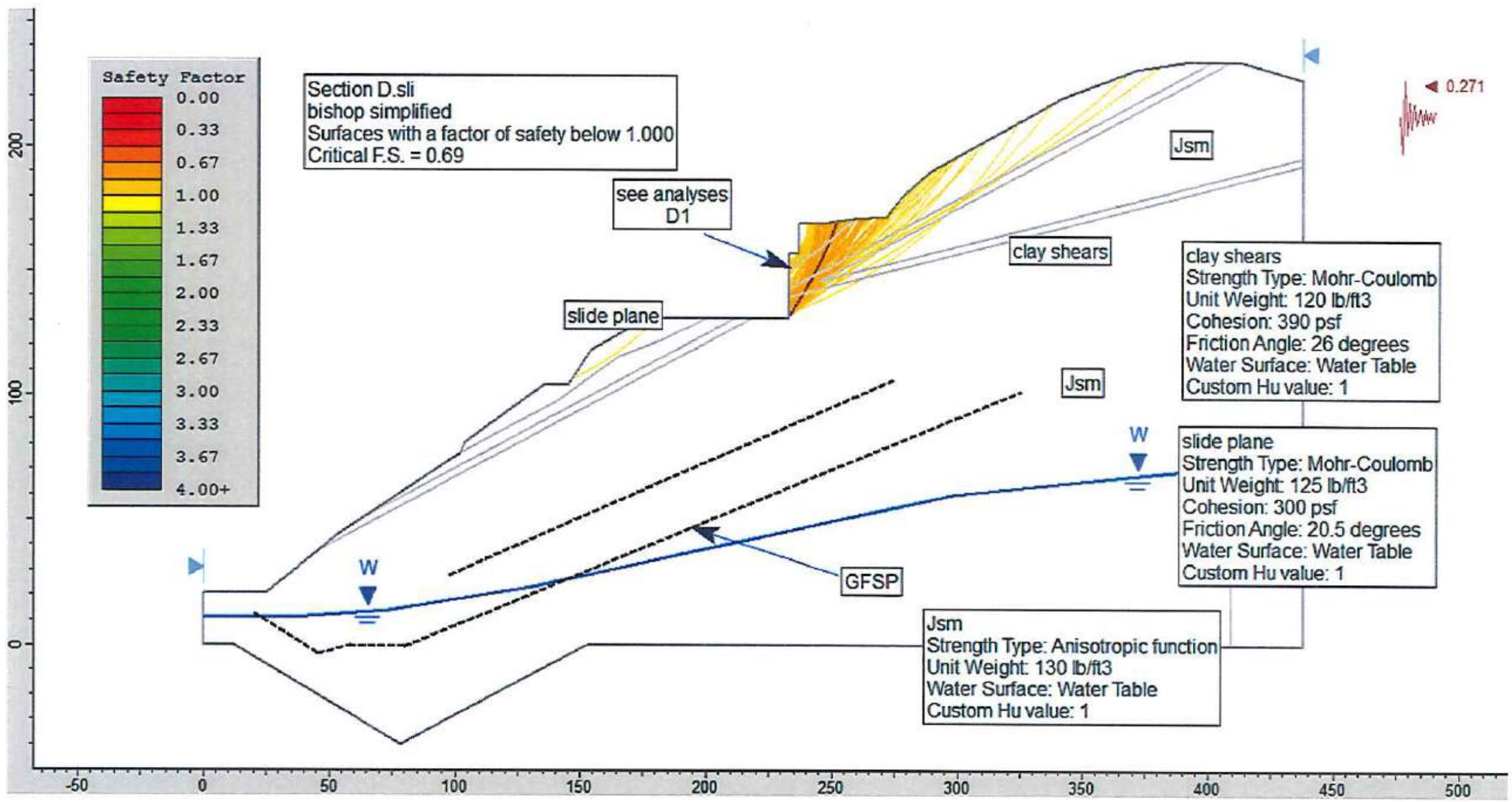
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section D.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.69
see analyses D1
slide plane
clay shears
Jsm
Jsm
W
W
GFSP
0.271
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
100
0
-50
0
50
100
150
200
250
300
350
400
450
500


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section D.sli
bishop simplified
Every available surface
Critical F.S. = 0.69
see analyses D1
slide plane
clay shears
Jsm
Jsm
GFSP
W
W
0.271
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
100
0
-50
0
50
100
150
200
250
300
350
400
450
500



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section D.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.69
see analyses D1
slide plane
clay shears
Jsm
Jsm
W
W
GFSP
0.271
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
100
0
-50
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: D.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

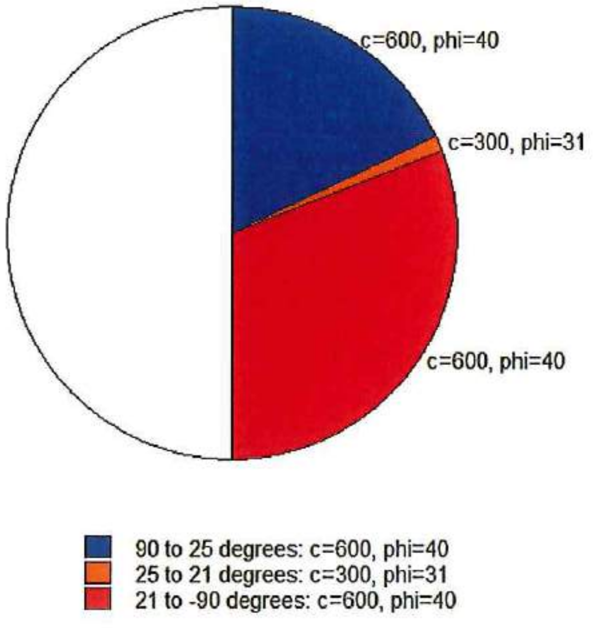
Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

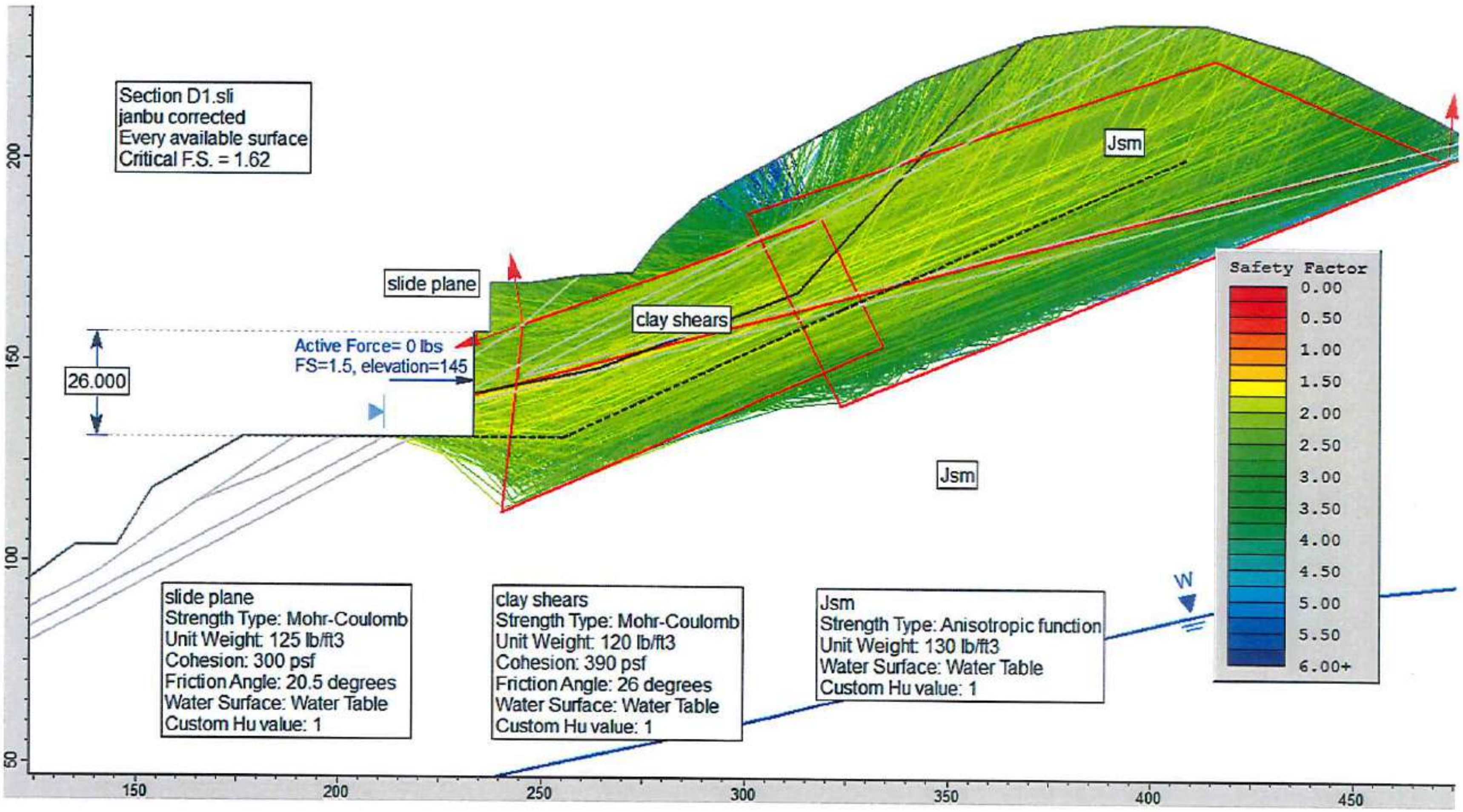


Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.689402
Center: 108.265, 218.094
Radius: 152.004
Left Slip Surface Endpoint: 233.000, 131.223
Right Slip Surface Endpoint: 252.459, 169.994
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 252.459 169.994
Resisting Moment=4.66686e+006 lb-ft
Driving Moment=6.76944e+006 lb-ft



Section D1.sli
janbu corrected
Every available surface
Critical F.S. = 1.62
slide plane
clay shears
Jsm
Jsm
26.000
Active Force= 0 lbs
FS=1.5, elevation=145
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
W
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
50
100
150
200
150
200
250
300
350
400
450

Document Name

File Name: D1.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 100
Left Projection Angle (End Angle): 200
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 145 ft

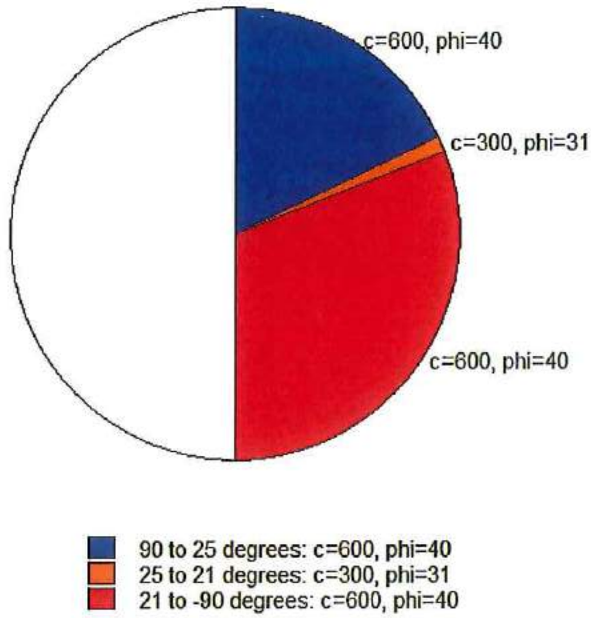
janbu corrected Active Force: 0 lb
Center (212.483, 321.133) Radius 181.216

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 1.621860
Axis Location: 212.483, 321.133
Left Slip Surface Endpoint: 233.000, 141.815
Right Slip Surface Endpoint: 368.247, 229.956
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 368.247 229.956
Resisting Horizontal Force=261958 lb
Driving Horizontal Force=161517 lb

List of All Coordinates

Non-Circ. Failure Surface

233.0	141.4
478.4	206.5

Focus/Block Search Window

333.8	154.1
318.5	185.7
245.0	159.0
240.2	112.7

Focus/Block Search Window

323.4	139.1
472.8	200.9
415.3	225.6
300.4	186.8

Material Boundary

233.0	151.0
245.0	159.0
259.0	171.0

Material Boundary

102.0	77.0
117.0	85.0
140.0	97.0
165.0	115.0
189.0	131.0

Material Boundary

165.0	115.0
182.0	122.0
200.0	131.0

Material Boundary

408.0	234.0
245.0	146.0
478.4	206.5

Material Boundary

233.0	143.0
401.0	234.0

Material Boundary

233.0	139.7
482.7	204.6

Material Boundary

45.7	37.9
218.0	131.0

Material Boundary

63.5	50.8
211.0	131.0

Material Boundary

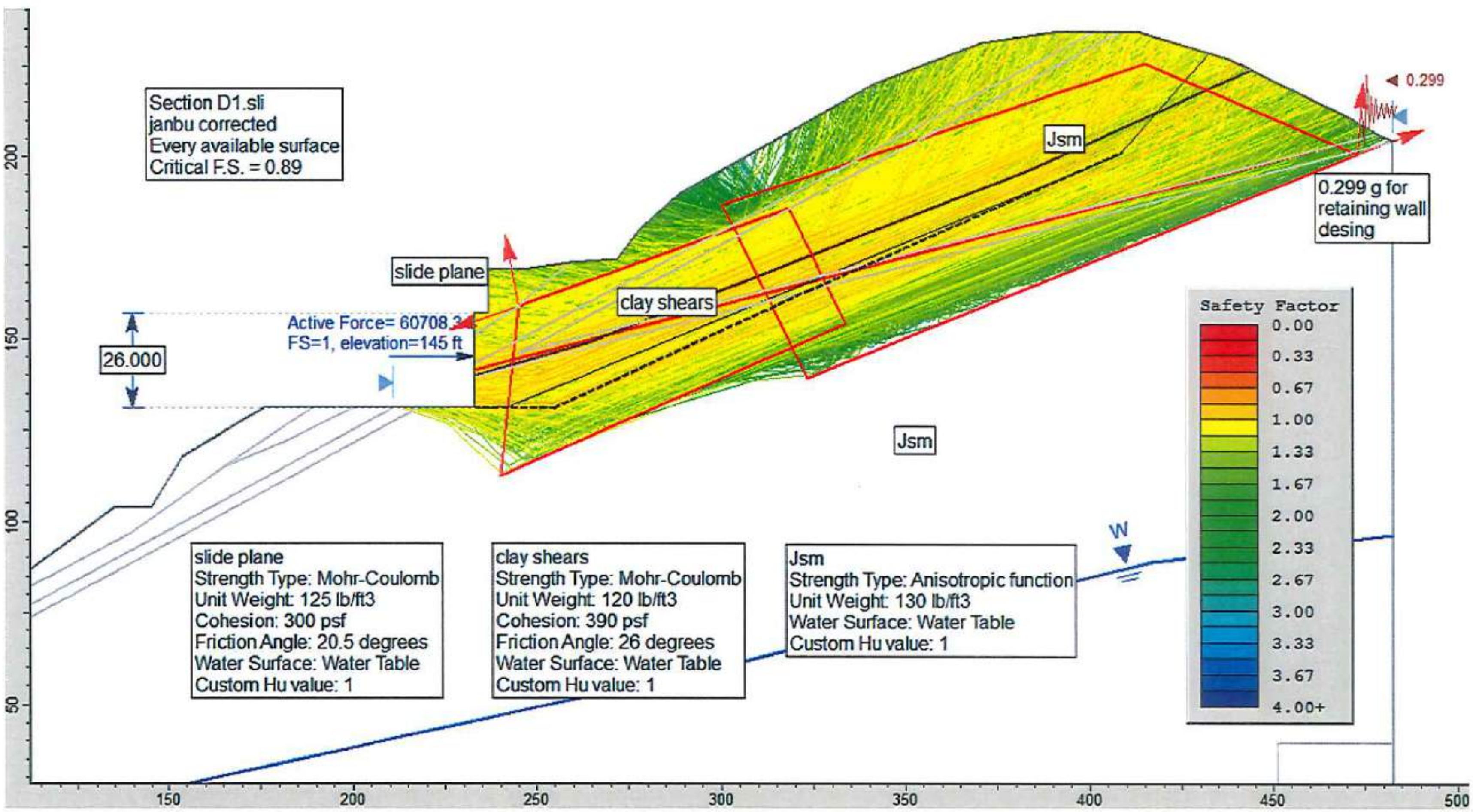
451.3	0.0
451.3	39.6
482.7	39.6

External Boundary

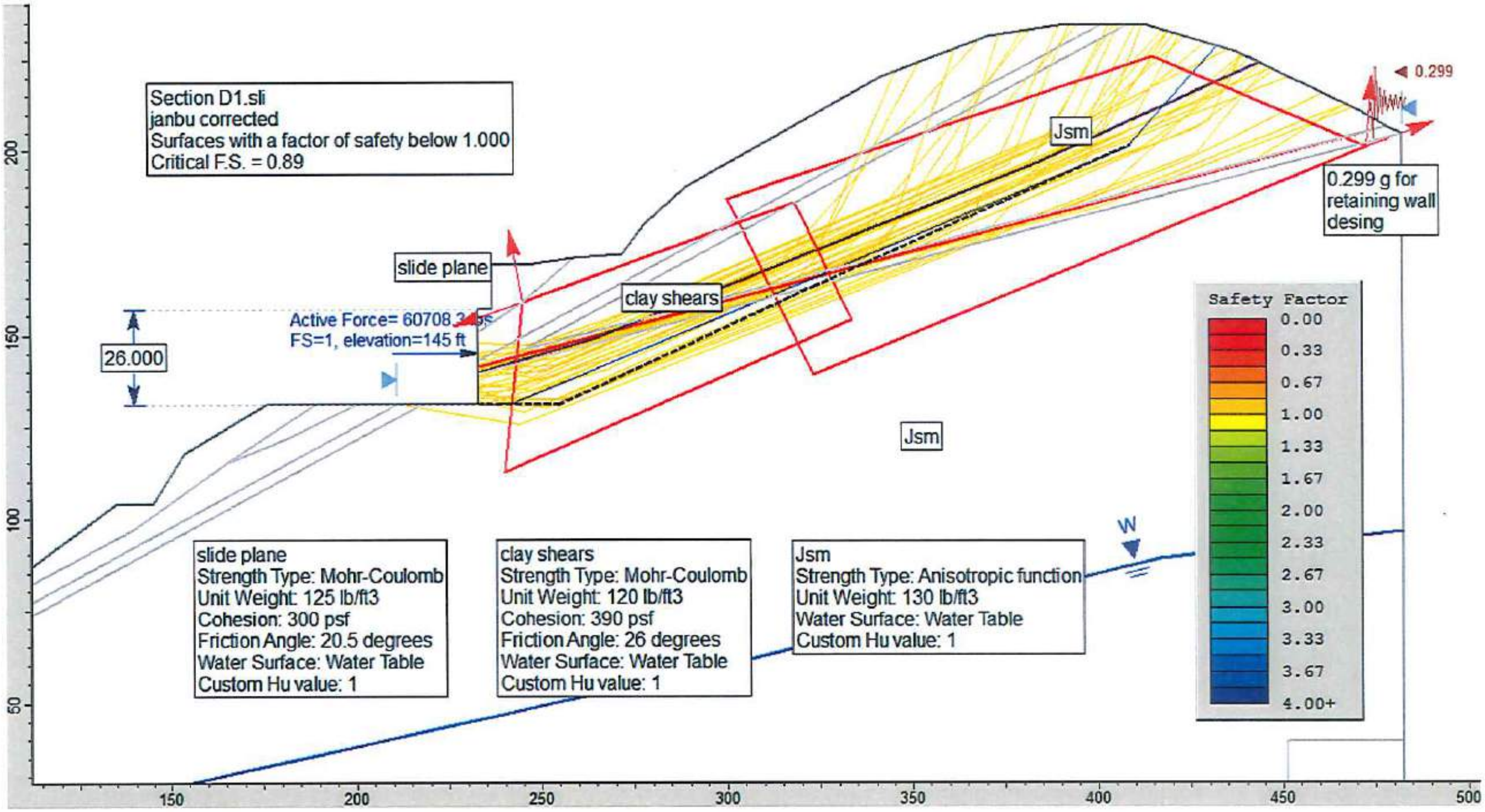
438.0	227.0
414.0	234.0
408.0	234.0
401.0	234.0
390.0	234.0
371.0	231.0
342.0	220.0
289.0	190.0
278.0	180.0
272.0	172.0
259.0	171.0
246.0	169.0
237.0	169.0
237.0	157.0
233.0	157.0
233.0	151.0
233.0	143.0
233.0	139.7
233.0	131.0
218.0	131.0
211.0	131.0
200.0	131.0
189.0	131.0
176.0	131.0
154.0	118.0
145.0	104.0
135.0	104.0
104.0	81.0
102.0	77.0
63.5	50.8
52.0	43.0
45.7	37.9
25.0	21.0
0.0	21.0
0.0	0.0
23.7	0.0
76.3	-25.7
124.0	0.0
451.3	0.0
482.7	0.0
482.7	39.6
482.7	204.6
478.4	206.5
471.3	210.8

Water Table

0.0	11.0
35.0	11.0
74.0	14.0
131.0	23.0
298.0	60.0
416.7	89.1
482.7	96.4



Section D1.sli
janbu corrected
Every available surface
Critical F.S. = 0.89
0.299
0.299 g for retaining wall desing
Jsm
slide plane
clay shears
Active Force= 60708.3
FS=1, elevation=145 ft
26.000
Jsm
W
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
150
200
250
300
350
400
450
500



Section D1.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.89
slide plane
clay shears
Jsm
Jsm
Active Force= 60708.3 lbs
FS=1, elevation=145 ft
26.000
0.299
0.299 g for retaining wall desing
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
W
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
150
200
250
300
350
400
450
500
50
100
150
200

Document Name

File Name: D1.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 100
Left Projection Angle (End Angle): 200
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.299

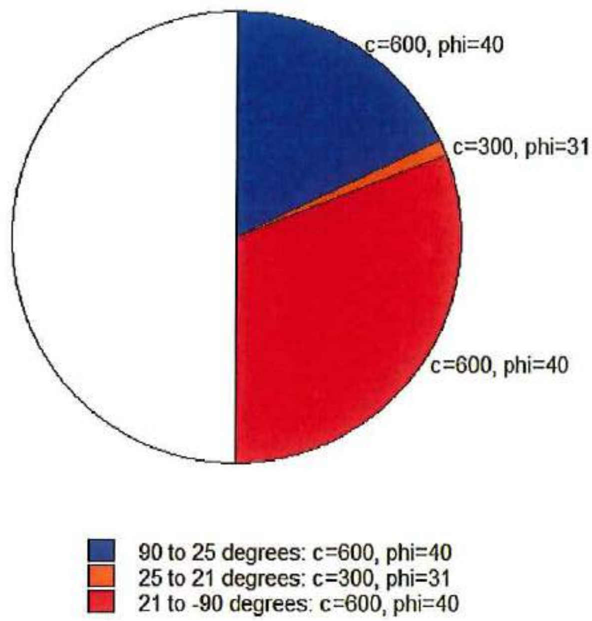
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 145 ft

janbu corrected Active Force: 60708.3 lb
Center (235.655, 379.729) Radius 248.523

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

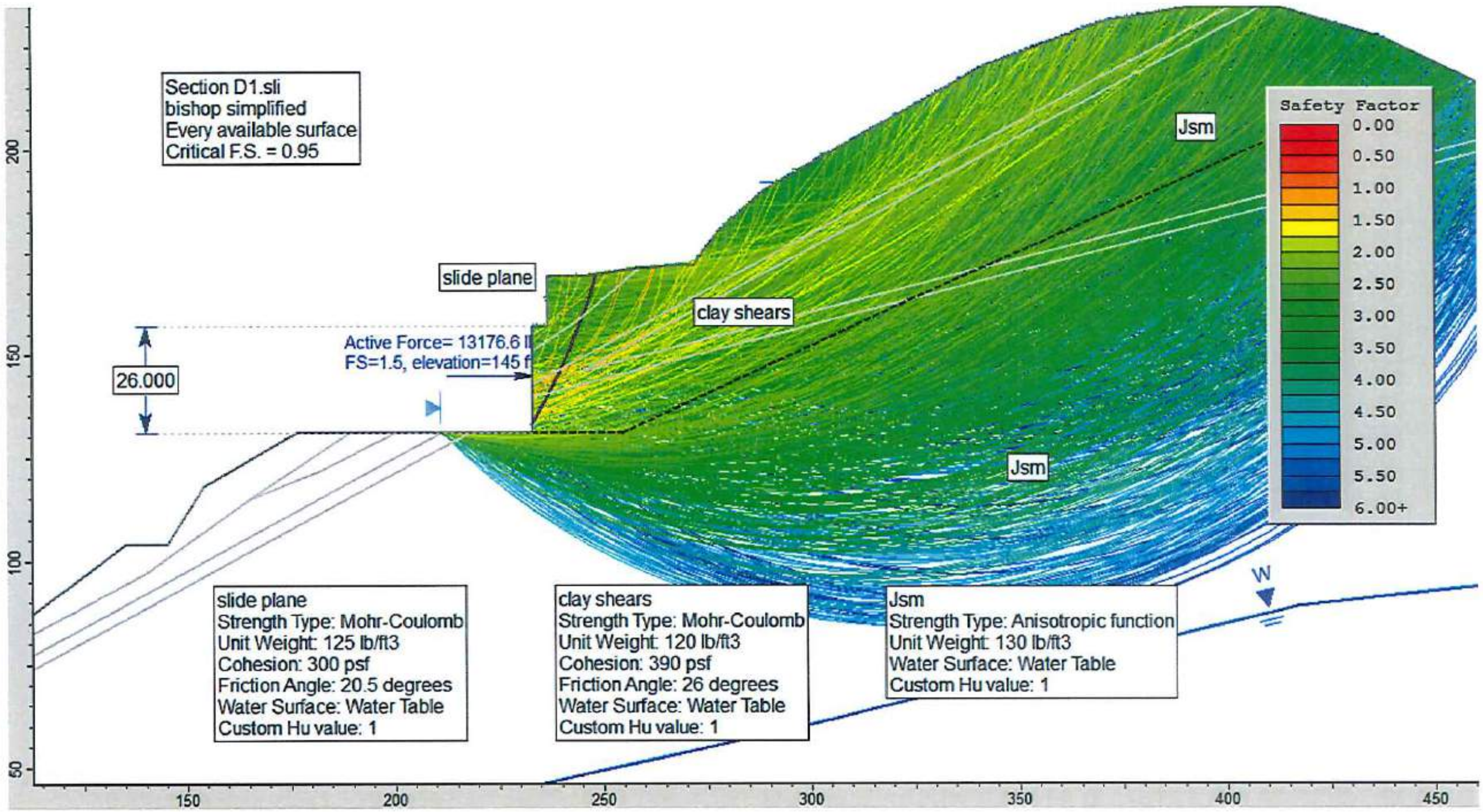


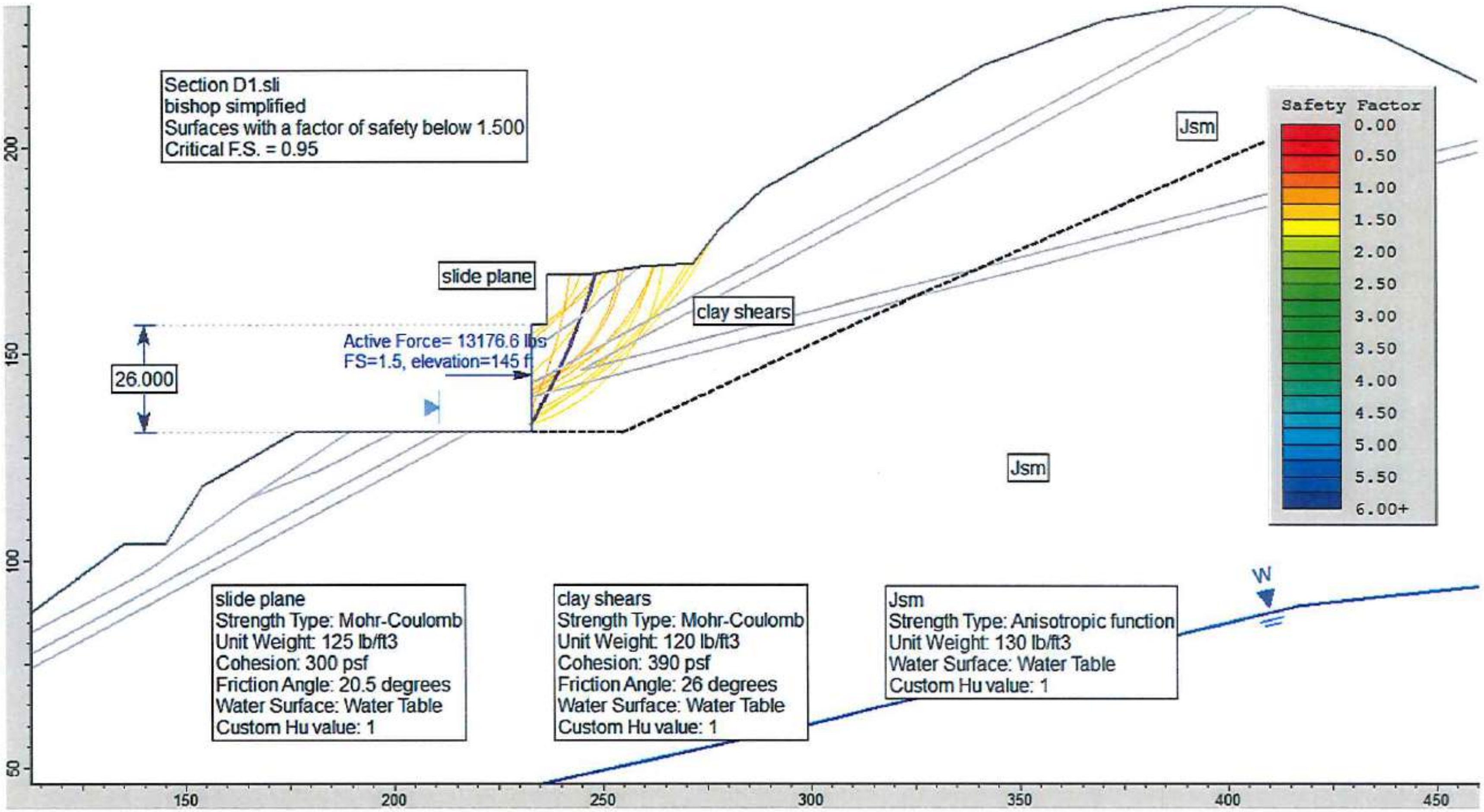
Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 0.885316
Axis Location: 254.528, 393.138
Left Slip Surface Endpoint: 233.000, 139.928
Right Slip Surface Endpoint: 444.179, 223.989
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 444.179 223.989
Resisting Horizontal Force=421303 lb
Driving Horizontal Force=475879 lb


Section D1.sli
bishop simplified
Every available surface
Critical F.S. = 0.95
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Jsm
slide plane
clay shears
26.000
Active Force= 13176.6 l
FS=1.5, elevation=145 f
Jsm
W
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
150
200
250
300
350
400
450


Section D1.sli
bishop simplified
Surfaces with a factor of safety below 1.500
Critical F.S. = 0.95
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Jsm
slide plane
clay shears
26.000
Active Force= 13176.6 lbs
FS=1.5, elevation=145 ft
Jsm
W
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
150
200
250
300
350
400
450

Document Name

File Name: D1.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

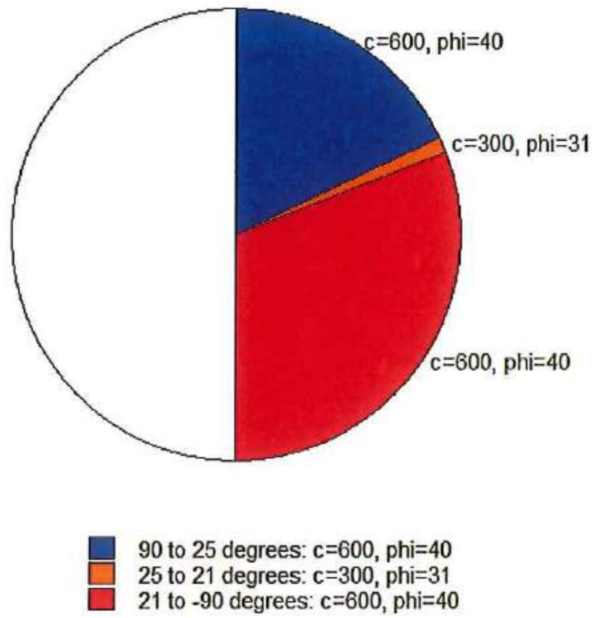
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 145 ft

bishop simplified Active Force: 13176.6 lb
Center (83.497, 218.657) Radius 172.430

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.950851
Center: 83.497, 218.657
Radius: 172.430
Left Slip Surface Endpoint: 233.000, 132.745
Right Slip Surface Endpoint: 248.748, 169.423
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 248.748 169.423
Resisting Moment=4.96902e+006 lb-ft
Driving Moment=5.22587e+006 lb-ft

List of All Coordinates

Material Boundary

233.0	151.0
245.0	159.0
259.0	171.0

Material Boundary

102.0	77.0
117.0	85.0
140.0	97.0
165.0	115.0
189.0	131.0

Material Boundary

165.0	115.0
182.0	122.0
200.0	131.0

Material Boundary

408.0	234.0
245.0	146.0
478.4	206.5

Material Boundary

233.0	143.0
401.0	234.0

Material Boundary

233.0	139.7
482.7	204.6

Material Boundary

45.7	37.9
218.0	131.0

Material Boundary

63.5	50.8
211.0	131.0

Material Boundary

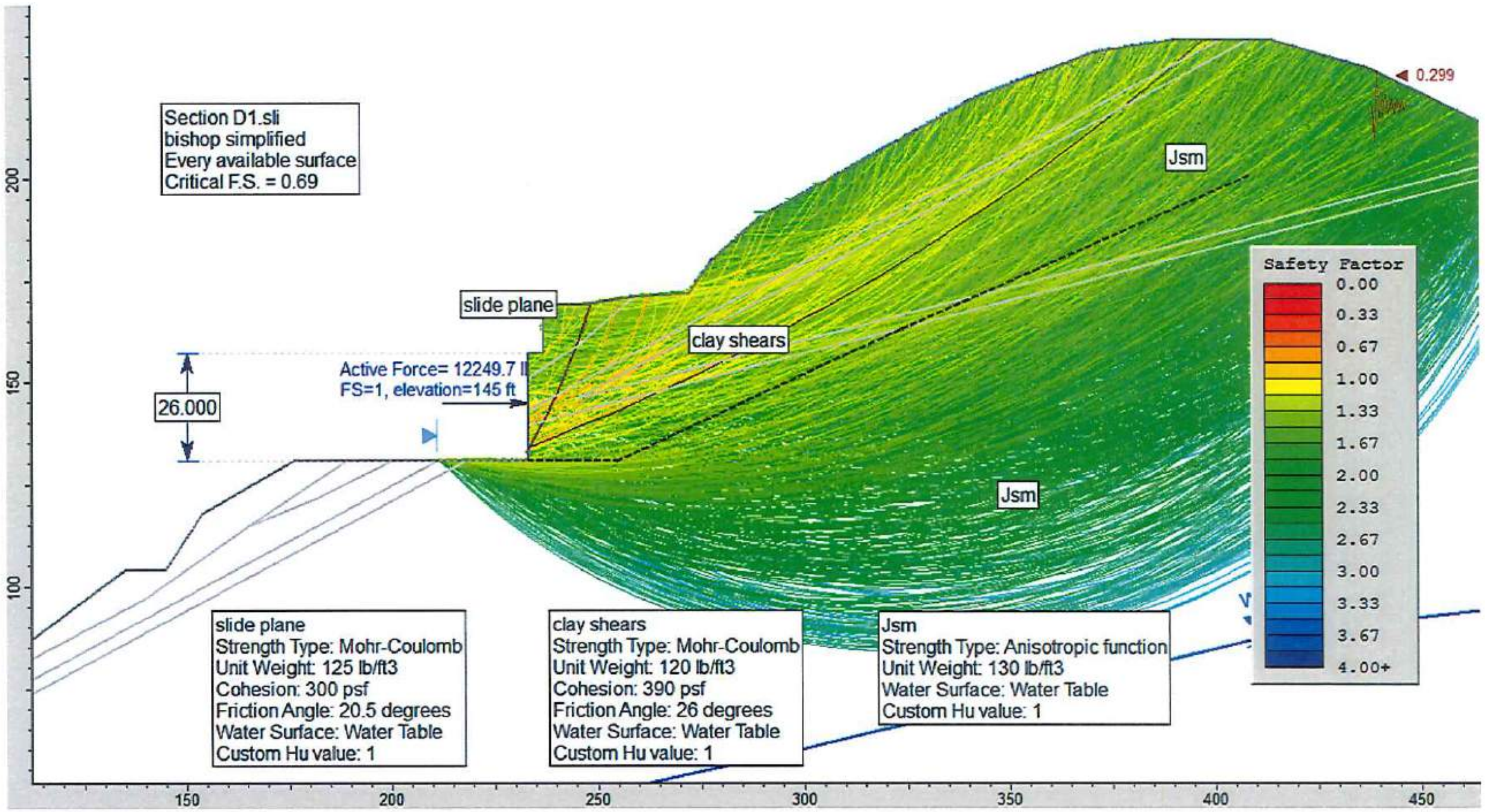
451.3	0.0
451.3	39.6
482.7	39.6

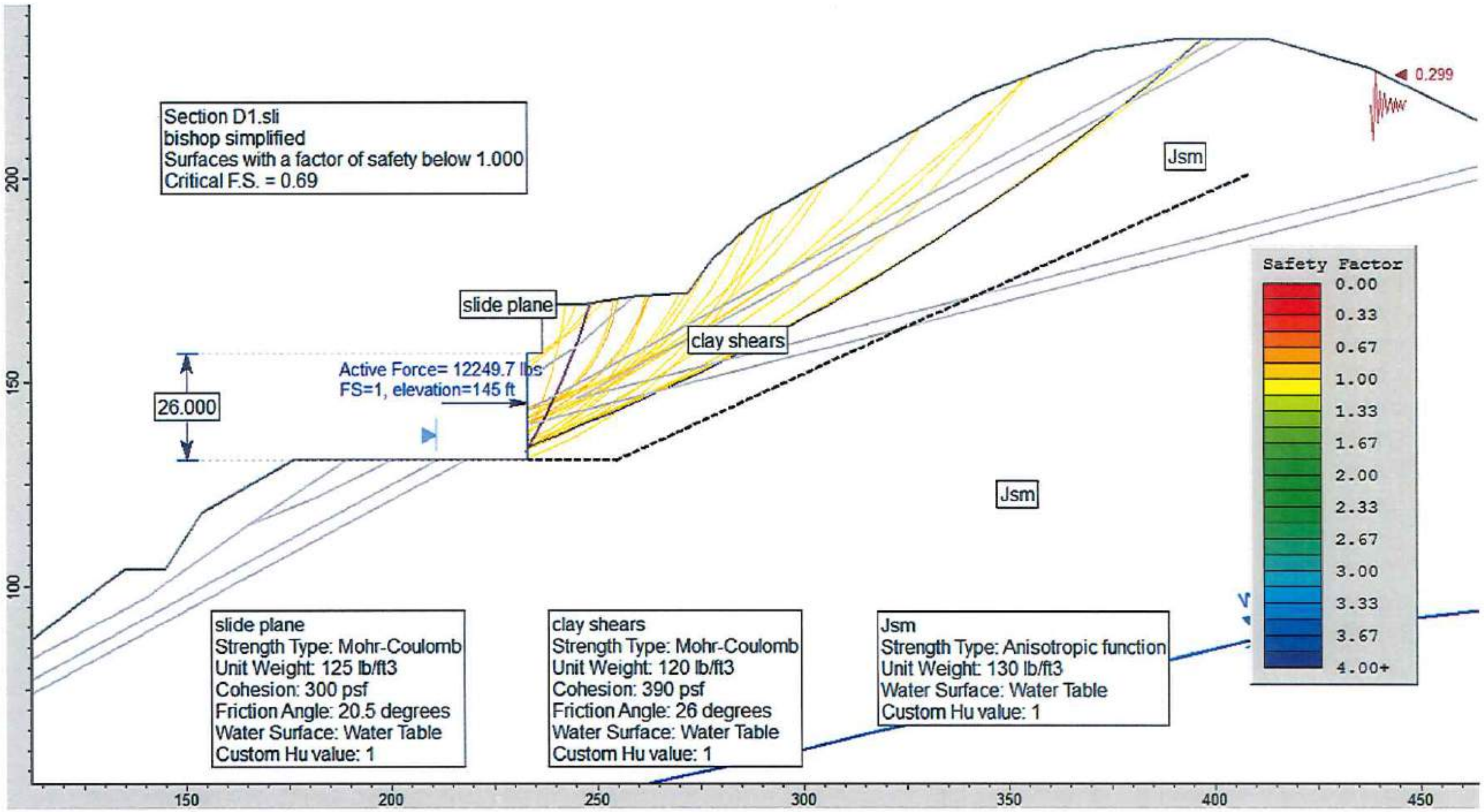
External Boundary

438.0	227.0
414.0	234.0
408.0	234.0
401.0	234.0
390.0	234.0
371.0	231.0
342.0	220.0
289.0	190.0
278.0	180.0
272.0	172.0
259.0	171.0
246.0	169.0
237.0	169.0
237.0	157.0
233.0	157.0
233.0	151.0
233.0	143.0
233.0	139.7
233.0	131.0
218.0	131.0
211.0	131.0
200.0	131.0
189.0	131.0
176.0	131.0
154.0	118.0
145.0	104.0
135.0	104.0
104.0	81.0
102.0	77.0
63.5	50.8
52.0	43.0
45.7	37.9
25.0	21.0
0.0	21.0
0.0	0.0
23.7	0.0
76.3	-25.7
124.0	0.0
451.3	0.0
482.7	0.0
482.7	39.6
482.7	204.6
478.4	206.5
471.3	210.8

Water Table

0.0	11.0
35.0	11.0
74.0	14.0
131.0	23.0
298.0	60.0
416.7	89.1
482.7	96.4


Section D1.sli
bishop simplified
Every available surface
Critical F.S. = 0.69
26.000
Active Force= 12249.7 l
FS=1, elevation=145 ft
slide plane
clay shears
Jsm
Jsm
0.299
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
150
200
250
300
350
400
450



Section D1.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.69
0.299
Jsm
slide plane
clay shears
Active Force= 12249.7 lbs
FS=1, elevation=145 ft
26.000
Jsm
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
150
200
250
300
350
400
450

Document Name

File Name: D1.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.299

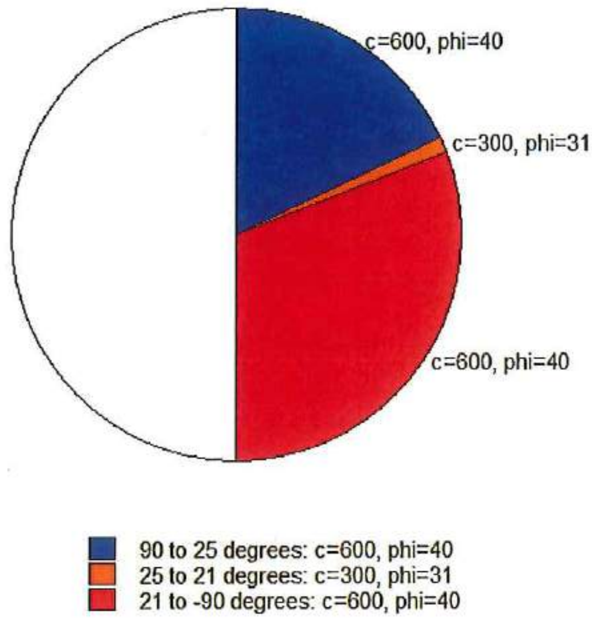
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 145 ft

bishop simplified Active Force: 12249.7 lb
Center (38.126, 638.749) Radius 540.898

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

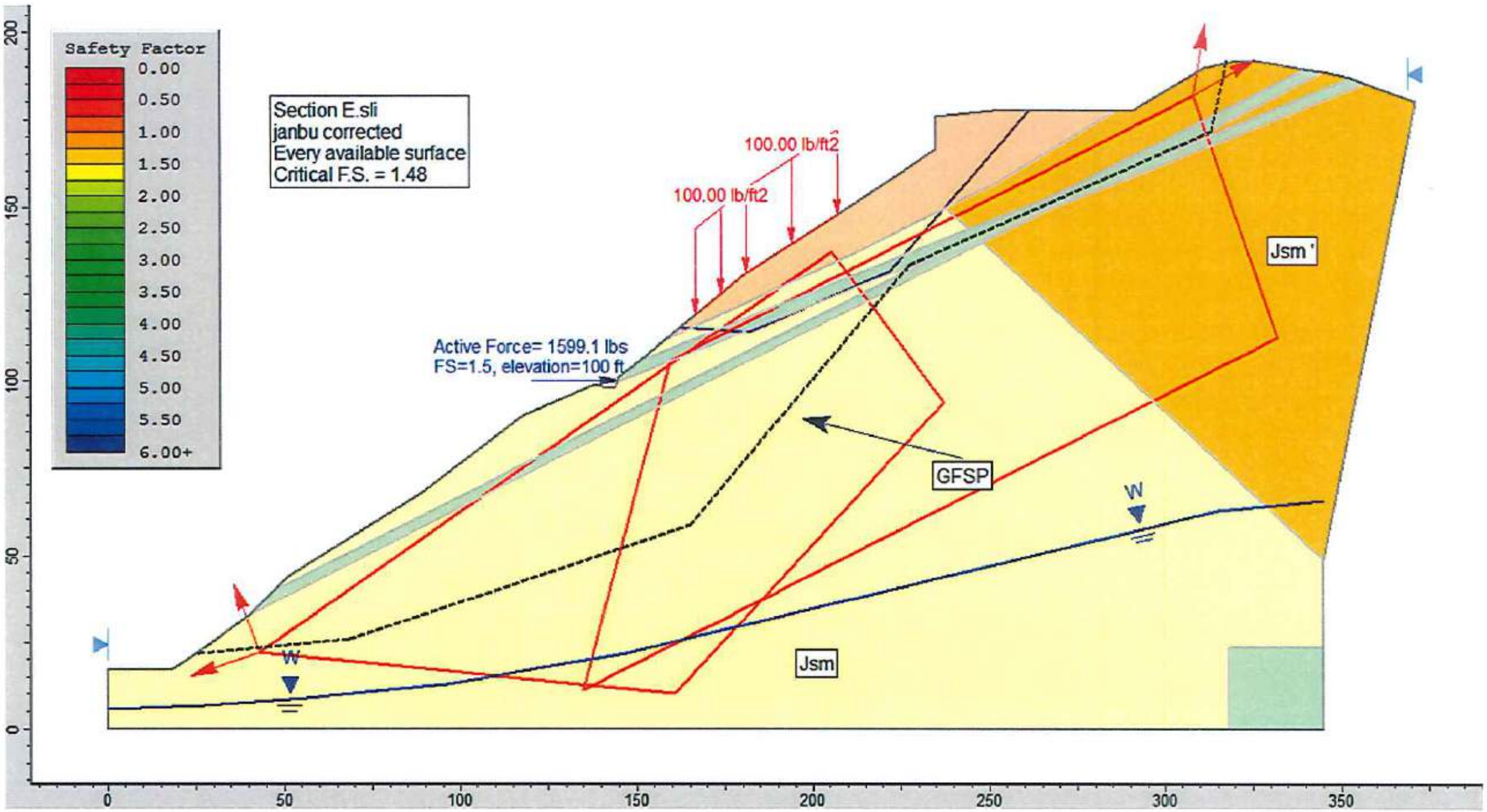


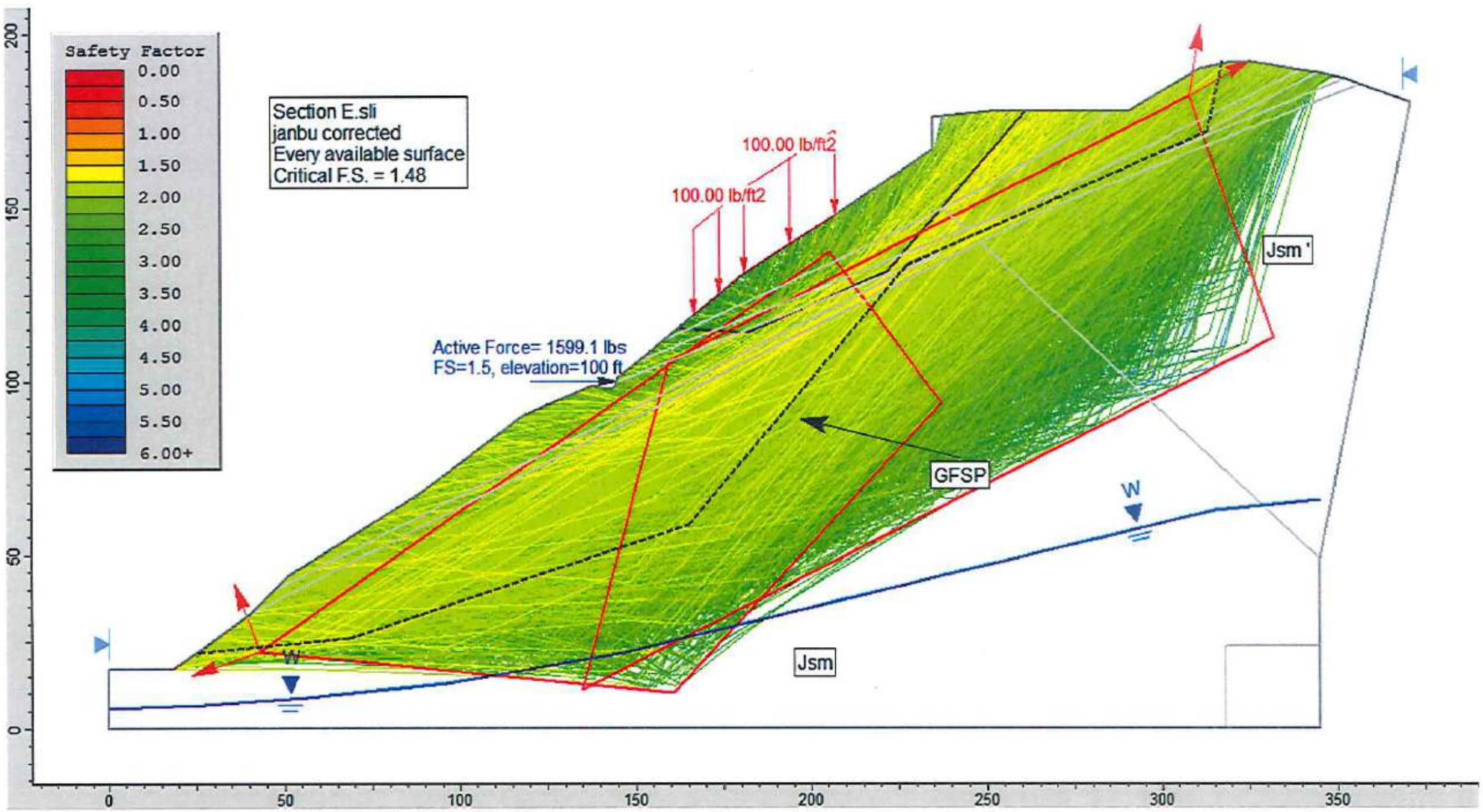
Material: clay shears
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

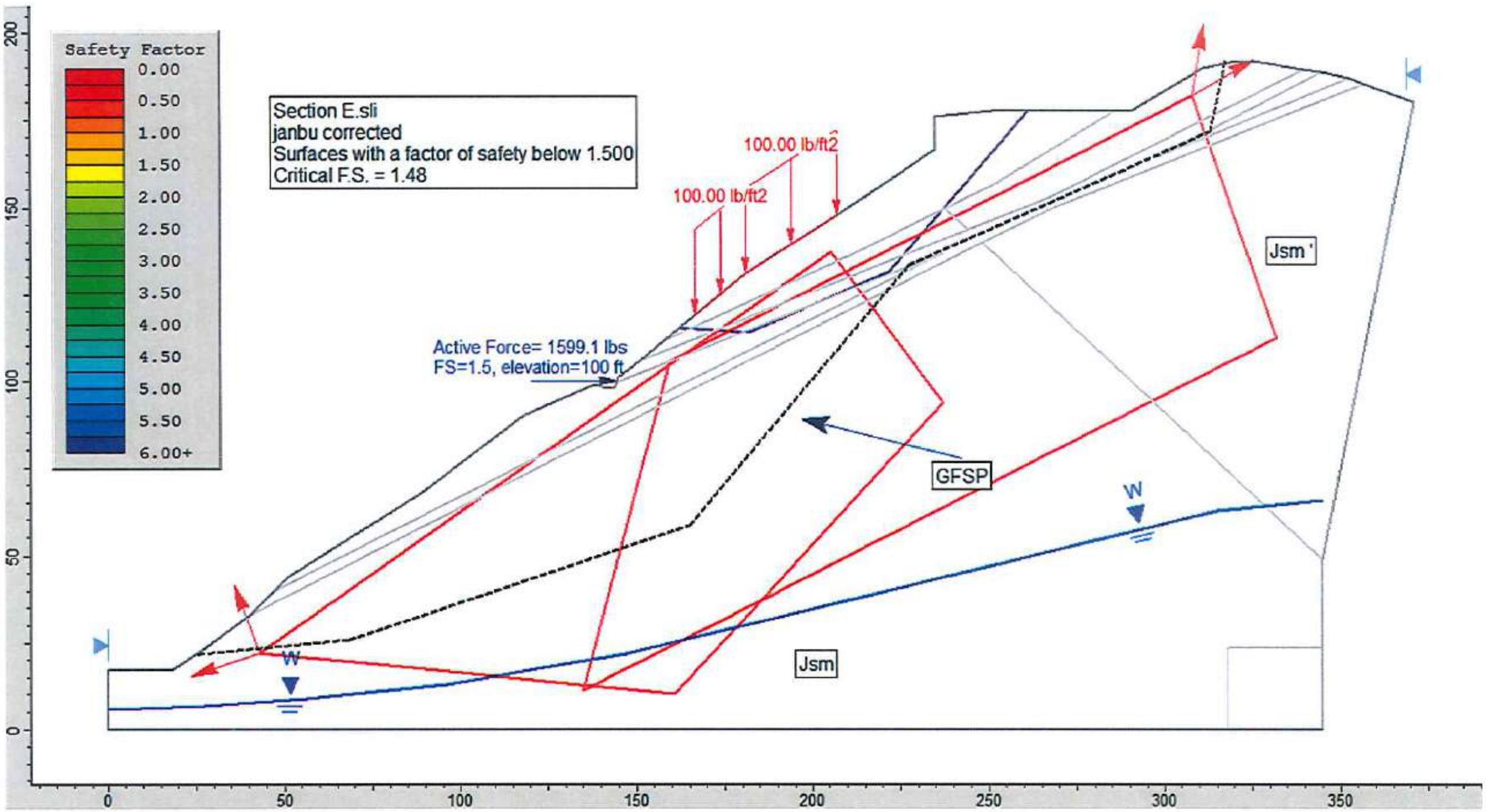
Material: slide plane
Strength Type: Mohr-Coulomb
Unit Weight: 125 lb/ft3
Cohesion: 300 psf
Friction Angle: 20.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.687145
Center: 83.497, 218.657
Radius: 172.430
Left Slip Surface Endpoint: 233.000, 132.745
Right Slip Surface Endpoint: 248.748, 169.423
Left Slope Intercept: 233.000 157.000
Right Slope Intercept: 248.748 169.423
Resisting Moment=4.02947e+006 lb-ft
Driving Moment=5.86408e+006 lb-ft


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section E.sli
janbu corrected
Every available surface
Critical F.S. = 1.48
100.00 lb/ft2
100.00 lb/ft2
Active Force= 1599.1 lbs
FS=1.5, elevation=100 ft
Jsm '
GFSP
W
W
Jsm
0
50
100
150
200
0
50
100
150
200
250
300
350


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section E.sli
janbu corrected
Every available surface
Critical F.S. = 1.48
100.00 lb/ft2
100.00 lb/ft2
Active Force= 1599.1 lbs
FS=1.5, elevation=100 ft
GFSP
Jsm '
Jsm
W
W
0
50
100
150
200
250
300
350


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section E.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.48
100.00 lb/ft2
100.00 lb/ft2
Active Force= 1599.1 lbs
FS=1.5, elevation=100 ft
Jsm'
GFSP
W
W
Jsm
0
50
100
150
200
0
50
100
150
200
250
300
350

Document Name

File Name: E.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

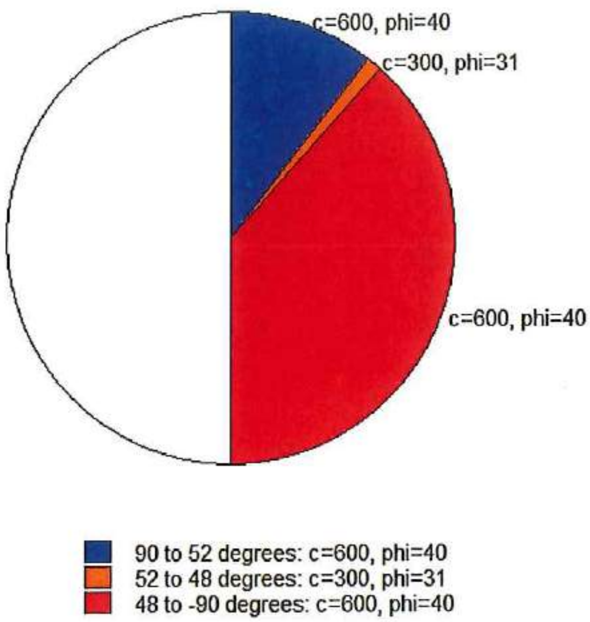
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 100 ft

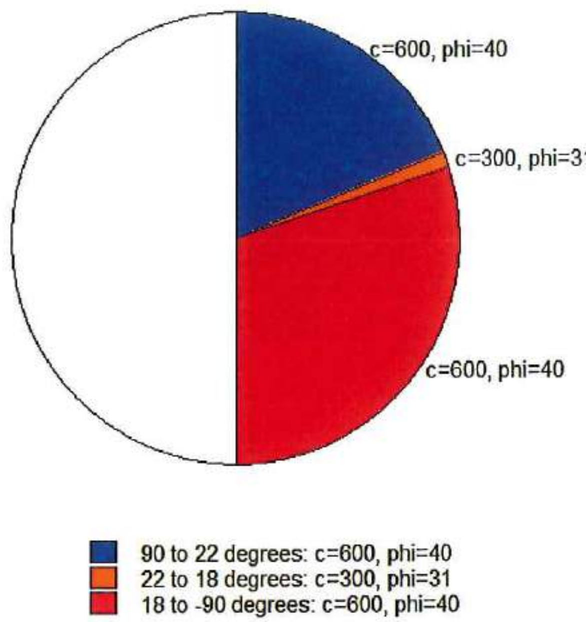
janbu corrected Active Force: 1599.1 lb
Center (149.336, 245.655) Radius 133.085

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: Jsm '
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 1.478750
Axis Location: 149.336, 245.655
Left Slip Surface Endpoint: 162.390, 115.492
Right Slip Surface Endpoint: 261.299, 178.000
Resisting Horizontal Force=145115 lb
Driving Horizontal Force=98133 lb

List of All Coordinates

Focus/Block Search Window

134.5	11.4
331.9	112.8
307.9	182.4
159.4	105.7

Focus/Block Search Window

160.7	10.4
237.1	93.9
205.4	137.4
42.9	22.2

Material Boundary

157.8	111.6
212.0	137.0
237.8	149.9
252.0	157.0
286.0	178.0

Material Boundary

40.0	33.0
248.4	139.9
268.0	150.0
356.9	185.8

Material Boundary

151.0	106.0
244.3	143.8
267.0	153.0
339.8	189.9

Material Boundary

345.0	189.0
299.0	165.0
352.8	187.3

Material Boundary

47.0	40.0
237.0	137.0
144.6	99.7

Material Boundary

248.4	139.9
345.0	49.0

Material Boundary

237.8	149.9
244.3	143.8

Material Boundary

317.9	0.0
317.9	23.7
345.0	23.7

External Boundary

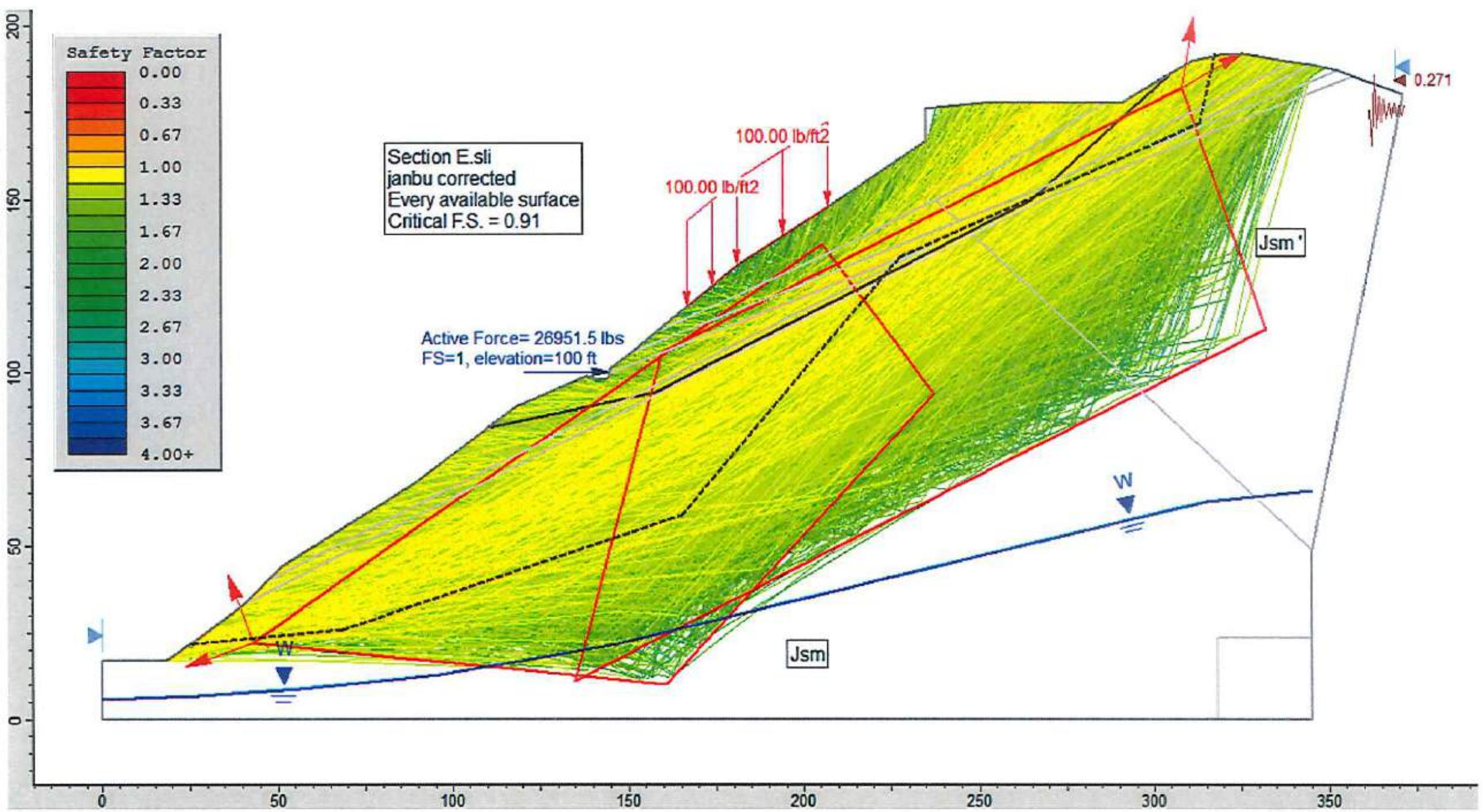
345.0	189.0
339.8	189.9
328.0	192.0
319.0	192.0
311.0	190.0
294.0	180.0
291.0	178.0
286.0	178.0
251.0	178.0
235.0	176.0
235.0	167.0
226.1	160.9
207.0	148.0
181.0	131.0
157.8	111.6
151.0	106.0
145.0	101.0
144.6	99.7
144.0	98.0
142.0	98.0
138.0	99.0
118.0	90.0
89.0	68.0
51.0	44.0
47.0	40.0
40.0	33.0
28.0	24.0
18.0	17.0
0.0	17.0
0.0	0.0
12.9	0.0
122.3	-0.0
317.9	0.0
345.0	0.0
345.0	23.7
345.0	49.0
371.2	180.5
356.9	185.8
352.8	187.3

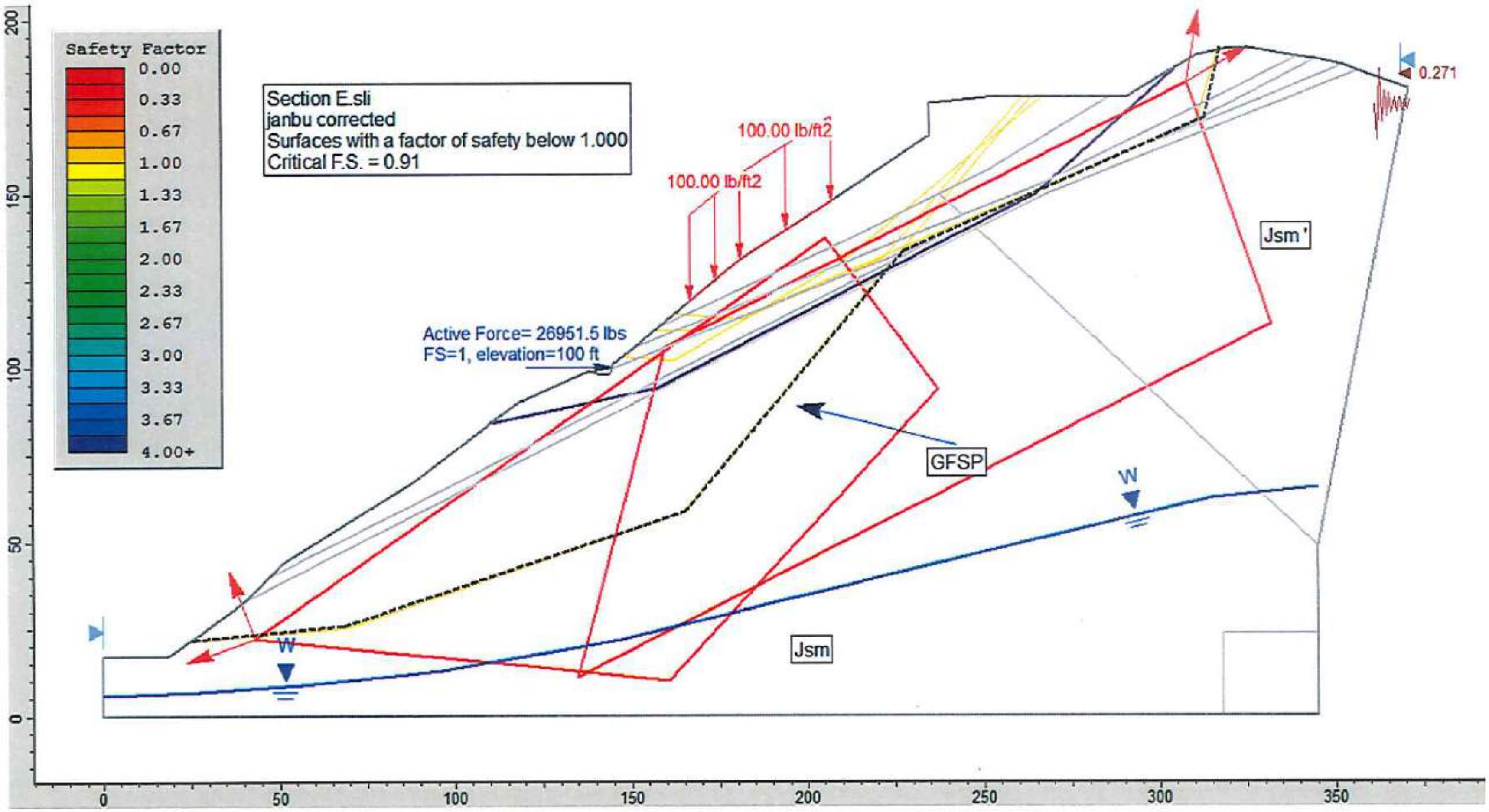
Water Table

0.0	6.0
27.0	7.0
56.0	9.0
96.0	13.0
147.0	22.0
315.0	63.0
345.0	66.0

Distributed Load

166.6	119.0
181.0	131.0
207.0	148.0


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section E.sli
janbu corrected
Every available surface
Critical F.S. = 0.91
100.00 lb/ft2
100.00 lb/ft2
Active Force= 26951.5 lbs
FS=1, elevation=100 ft
0.271
Jsm'
Jsm
W
W
200
150
100
50
0
0
50
100
150
200
250
300
350


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section E.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.91
100.00 lb/ft2
100.00 lb/ft2
Active Force= 26951.5 lbs
FS=1, elevation=100 ft
0.271
Jsm'
GFSP
W
W
Jsm
200
150
100
50
0
0
50
100
150
200
250
300
350

Document Name

File Name: E.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 30
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

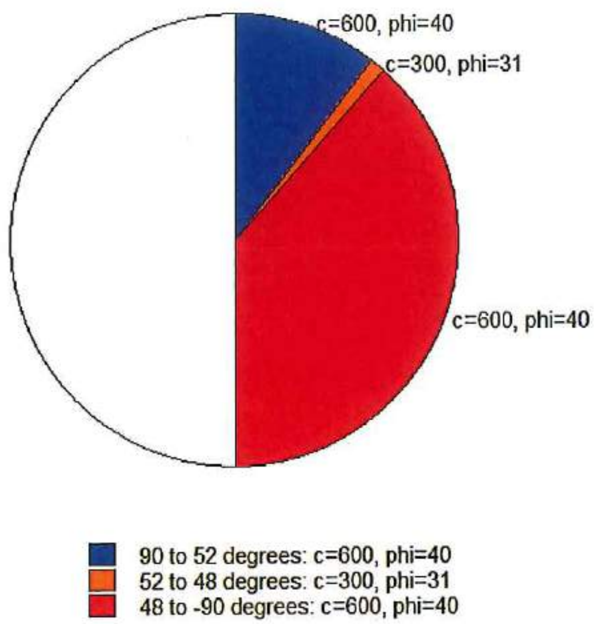
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 100 ft

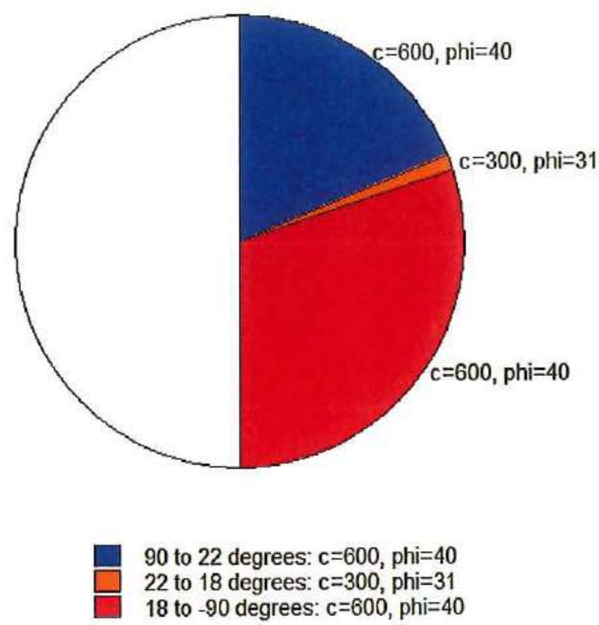
janbu corrected Active Force: 26951.5 lb
Center (104.805, 330.782) Radius 244.440

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: Jsm '
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

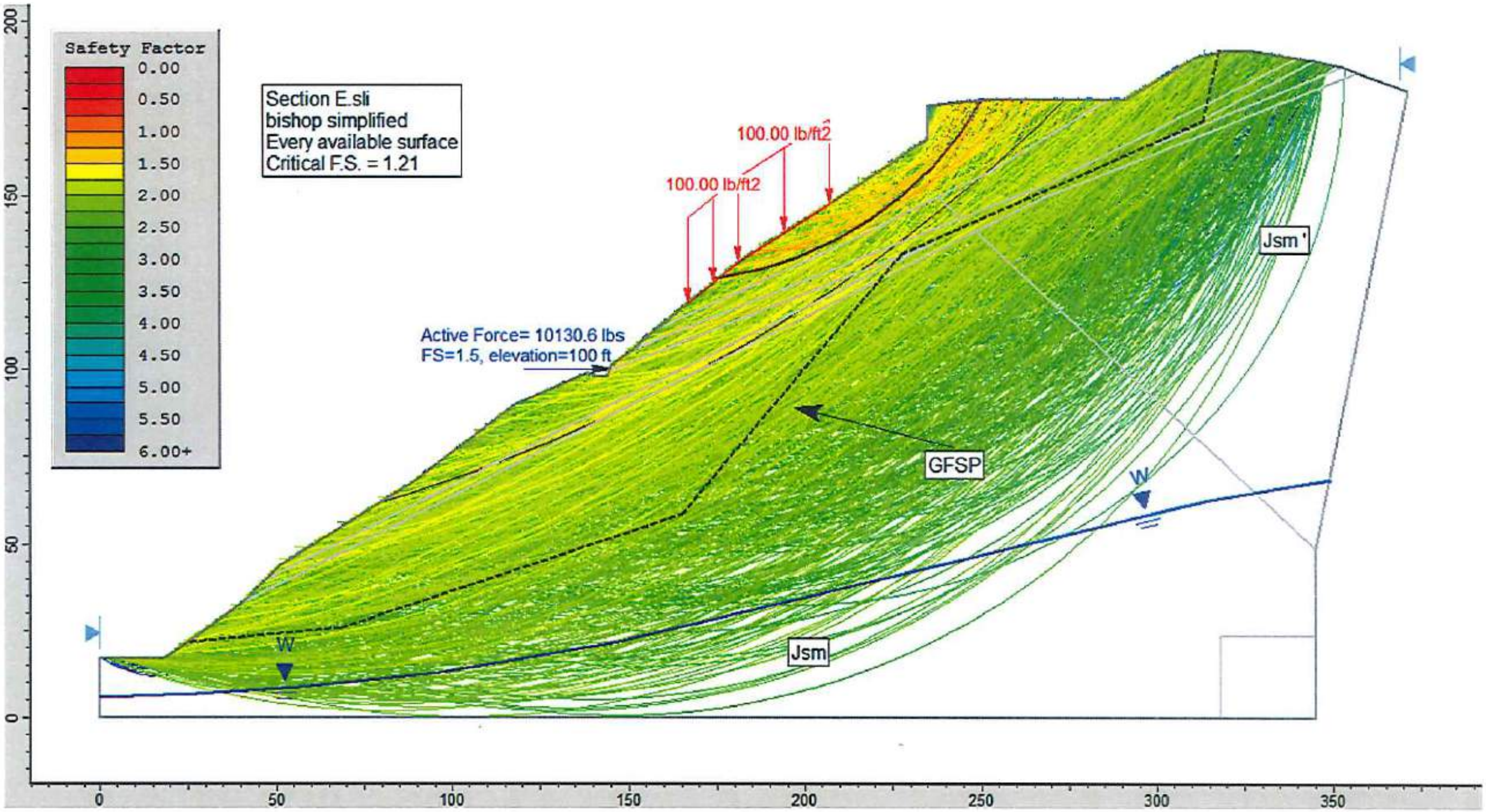


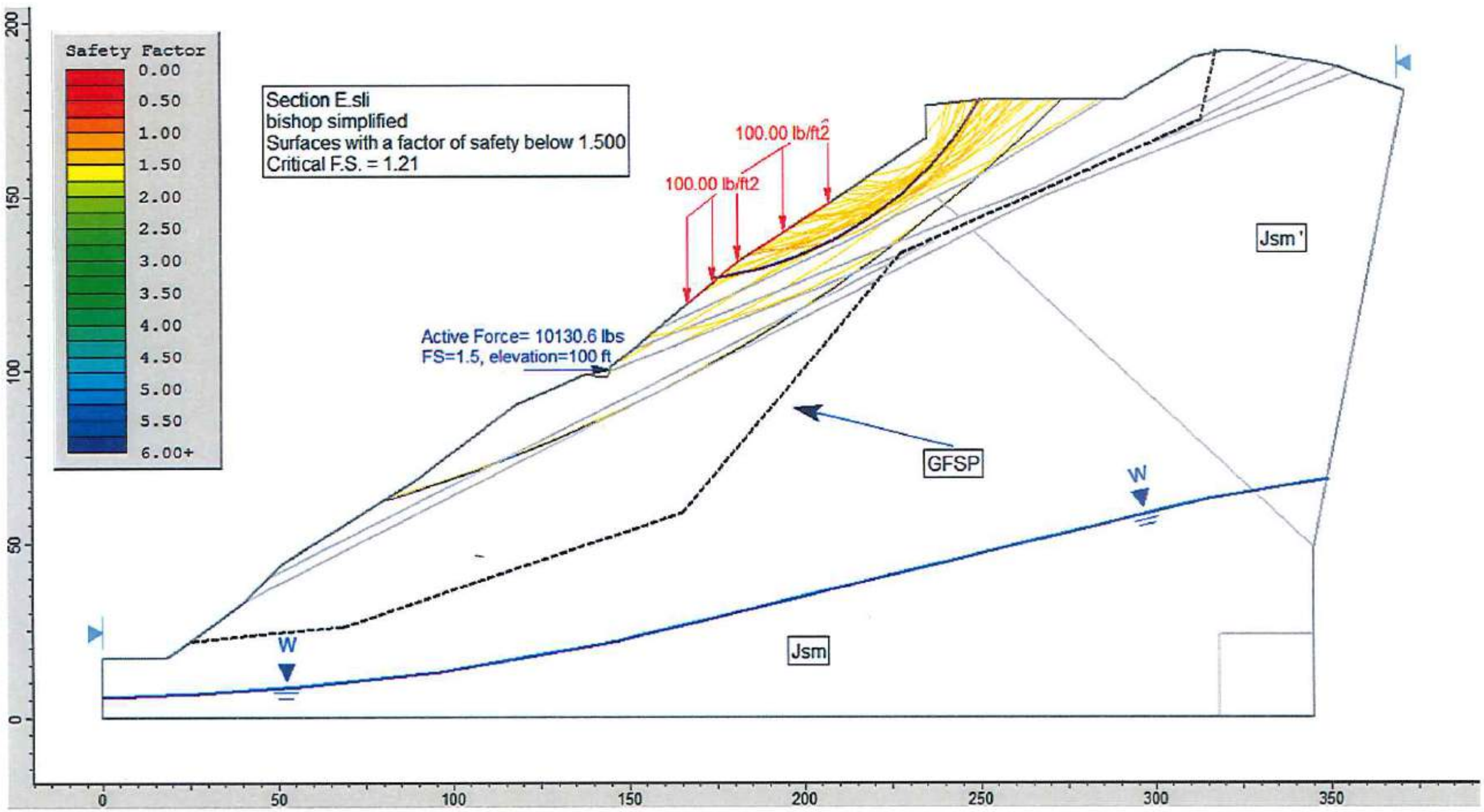
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 0.910160
Axis Location: 104.805, 330.782
Left Slip Surface Endpoint: 109.904, 83.859
Right Slip Surface Endpoint: 305.403, 186.708
Resisting Horizontal Force=275196 lb
Driving Horizontal Force=302360 lb


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section E.sli
bishop simplified
Every available surface
Critical F.S. = 1.21
100.00 lb/ft2
100.00 lb/ft2
Active Force= 10130.6 lbs
FS=1.5, elevation=100 ft
GFSP
Jsm'
Jsm
W
W
200
150
100
50
0
0
50
100
150
200
250
300
350


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section E.sli
bishop simplified
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.21
100.00 lb/ft2
100.00 lb/ft2
Active Force= 10130.6 lbs
FS=1.5, elevation=100 ft
GFSP
Jsm'
Jsm
W
W
0
50
100
150
200
250
300
350

Document Name

File Name: E.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

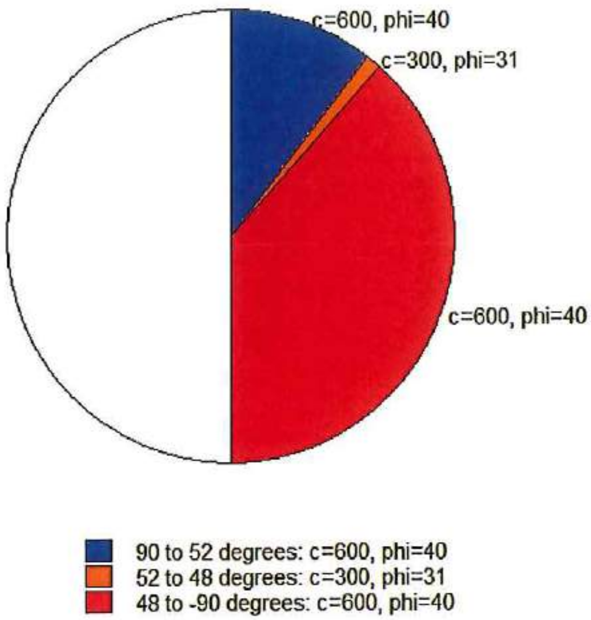
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 100 ft

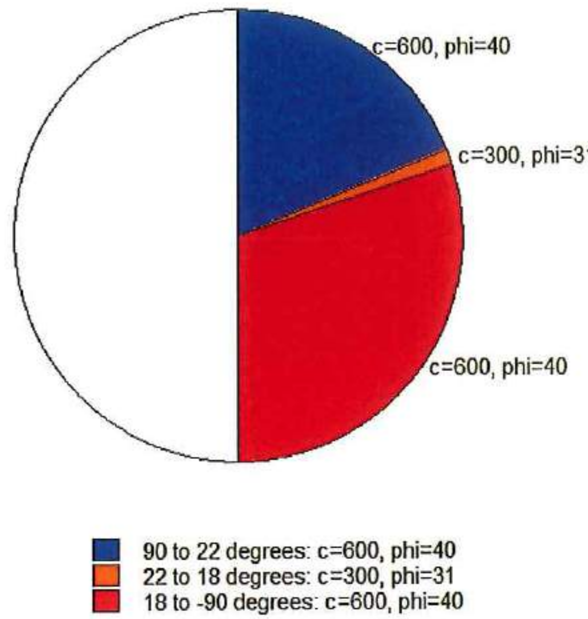
bishop simplified Active Force: 10130.6 lb
Center (-49.776, 499.653) Radius 456.187

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: Jsm '
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 1.206780
Center: 160.112, 228.954
Radius: 103.983
Left Slip Surface Endpoint: 175.062, 126.051
Right Slip Surface Endpoint: 250.736, 177.967
Resisting Moment=6.25437e+006 lb-ft
Driving Moment=5.1827e+006 lb-ft

List of All Coordinates

Material Boundary

157.8	111.6
212.0	137.0
237.8	149.9
252.0	157.0
286.0	178.0

Material Boundary

40.0	33.0
248.4	139.9
268.0	150.0
356.9	185.8

Material Boundary

151.0	106.0
244.3	143.8
267.0	153.0
339.8	189.9

Material Boundary

345.0	189.0
299.0	165.0
352.8	187.3

Material Boundary

47.0	40.0
237.0	137.0
144.6	99.7

Material Boundary

248.4	139.9
345.0	49.0

Material Boundary

237.8	149.9
244.3	143.8

Material Boundary

317.9	0.0
317.9	23.7
345.0	23.7

External Boundary

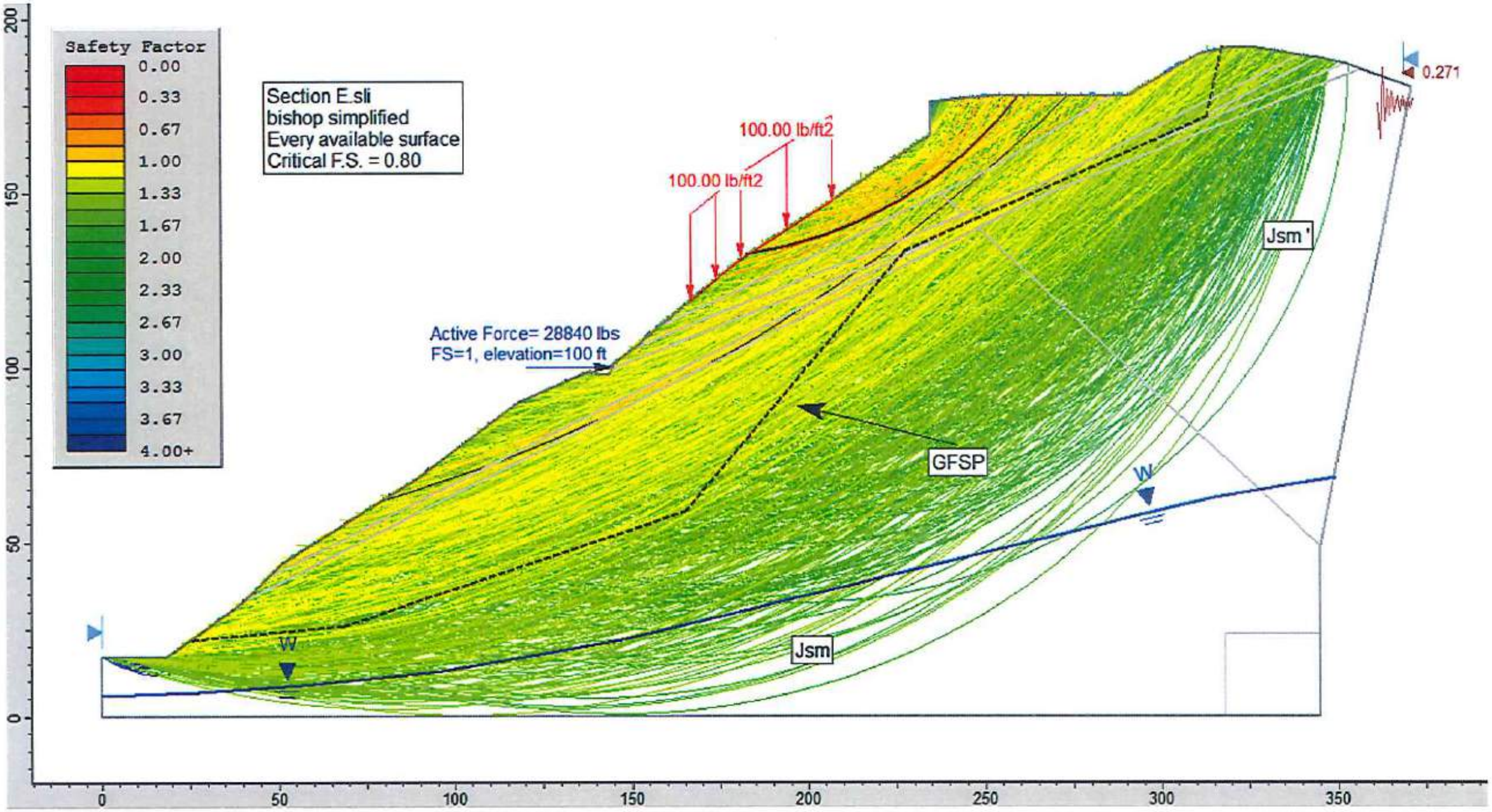
345.0	189.0
339.8	189.9
328.0	192.0
319.0	192.0
311.0	190.0
294.0	180.0
291.0	178.0
286.0	178.0
251.0	178.0
235.0	176.0
235.0	167.0
226.1	160.9
207.0	148.0
181.0	131.0
157.8	111.6
151.0	106.0
145.0	101.0
144.6	99.7
144.0	98.0
142.0	98.0
138.0	99.0
118.0	90.0
89.0	68.0
51.0	44.0
47.0	40.0
40.0	33.0
28.0	24.0
18.0	17.0
0.0	17.0
0.0	0.0
12.9	0.0
122.3	-0.0
317.9	0.0
345.0	0.0
345.0	23.7
345.0	49.0
371.2	180.5
356.9	185.8
352.8	187.3

Water Table

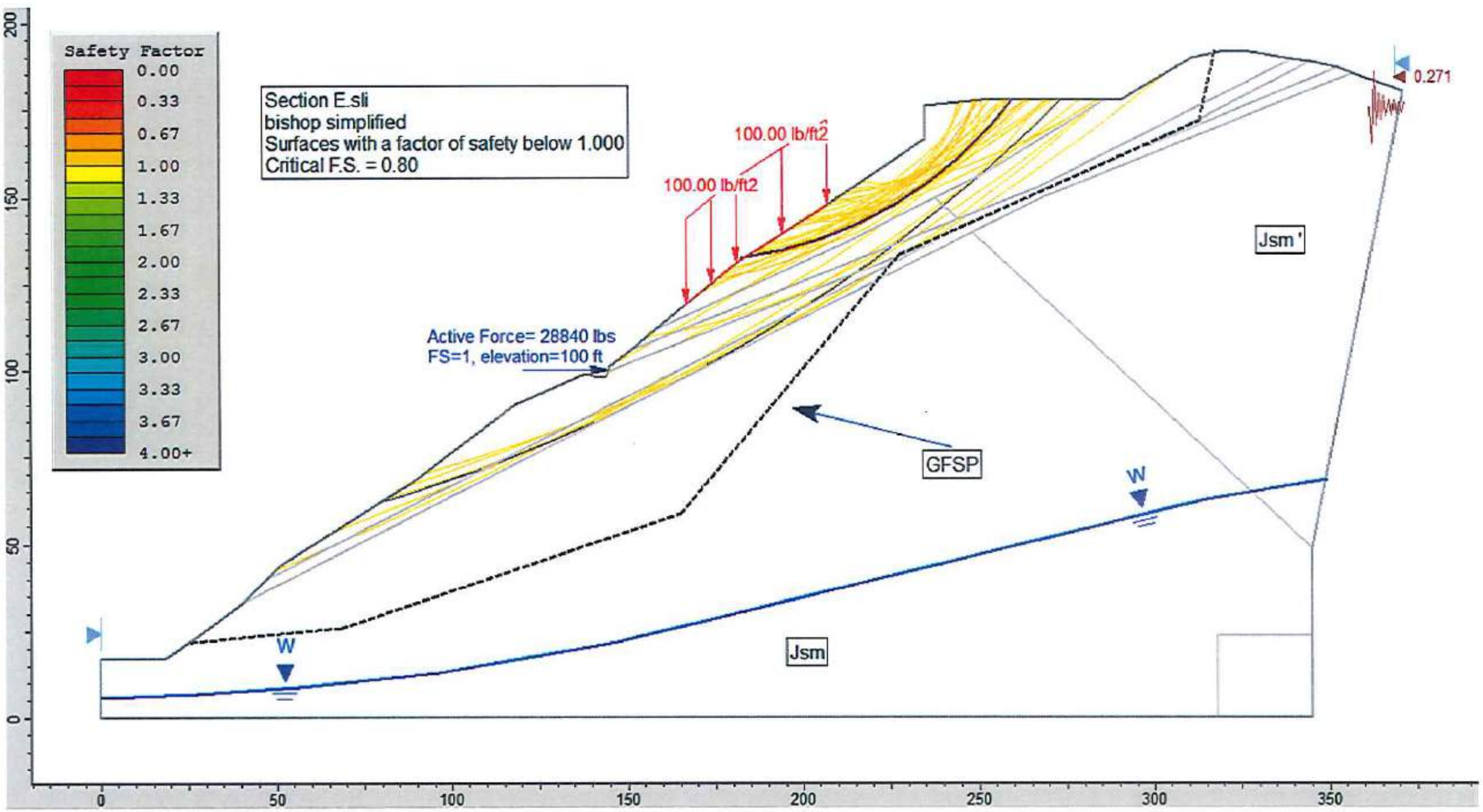
0.0	6.0
27.0	7.0
56.0	9.0
96.0	13.0
147.0	22.0
315.0	63.0
349.5	68.7

Distributed Load

166.6	119.0
181.0	131.0
207.0	148.0



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section E.sli
bishop simplified
Every available surface
Critical F.S. = 0.80
100.00 lb/ft2
100.00 lb/ft2
Active Force= 28840 lbs
FS=1, elevation=100 ft
GFSP
Jsm '
Jsm
W
W
0.271
0
50
100
150
200
250
300
350
0
50
100
150
200



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section E.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.80
100.00 lb/ft2
100.00 lb/ft2
Active Force= 28840 lbs
FS=1, elevation=100 ft
0.271
Jsm'
GFSP
W
W
Jsm
0
50
100
150
200
250
300
350
0
50
100
150
200

Document Name

File Name: E.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.271
1 Distributed Load present:
Distributed Load Constant Distribution, Orientation: Vertical, Magnitude: 100 lb/ft2

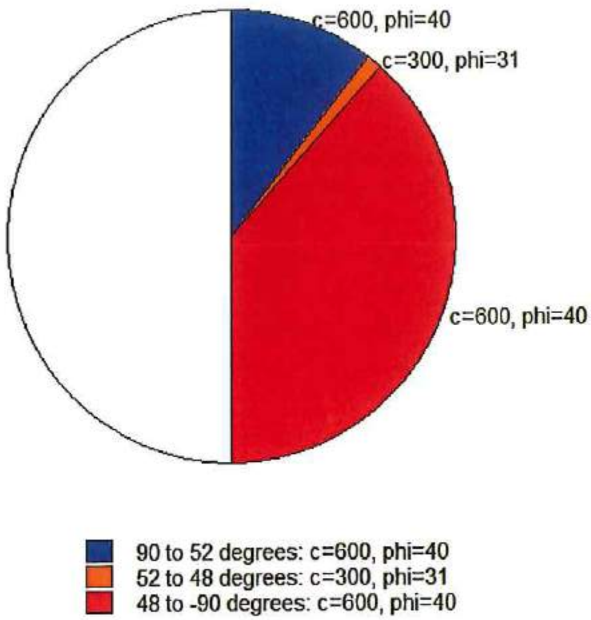
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 100 ft

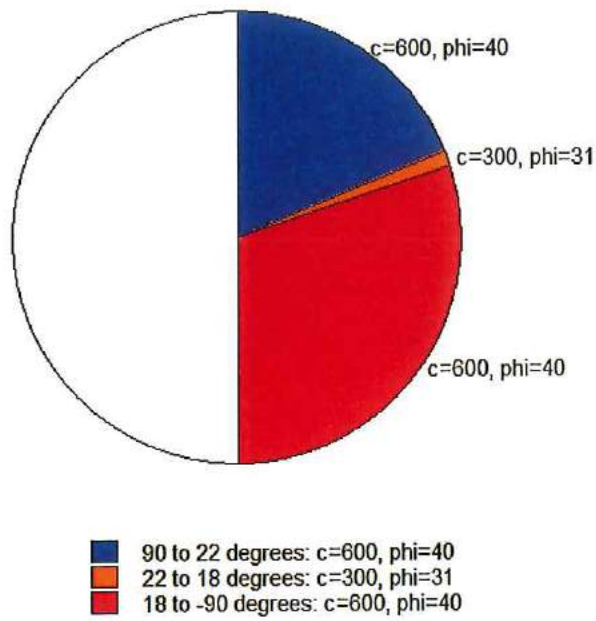
bishop simplified Active Force: 28840 lb
Center (-49.776, 499.653) Radius 456.187

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: Jsm '
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

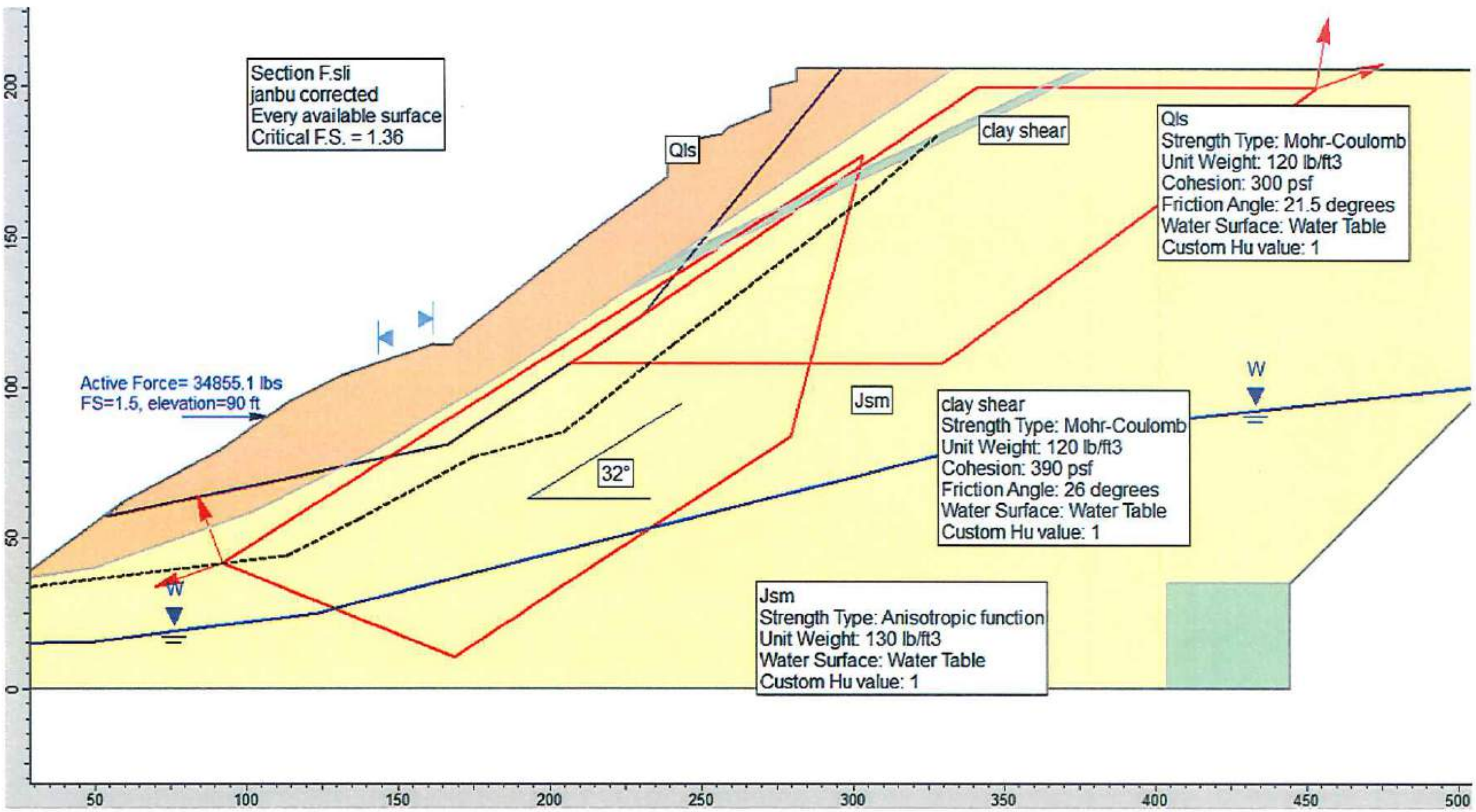


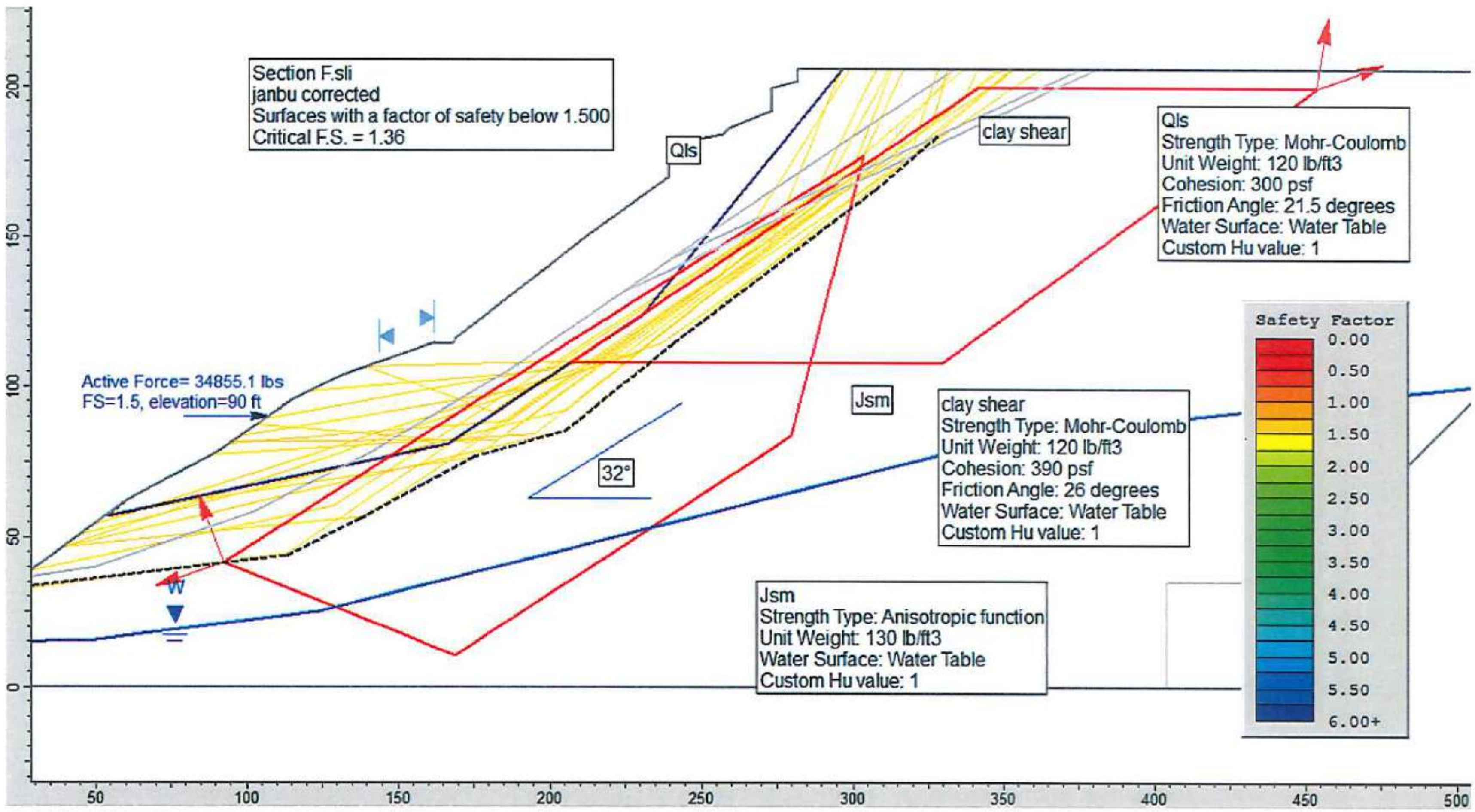
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

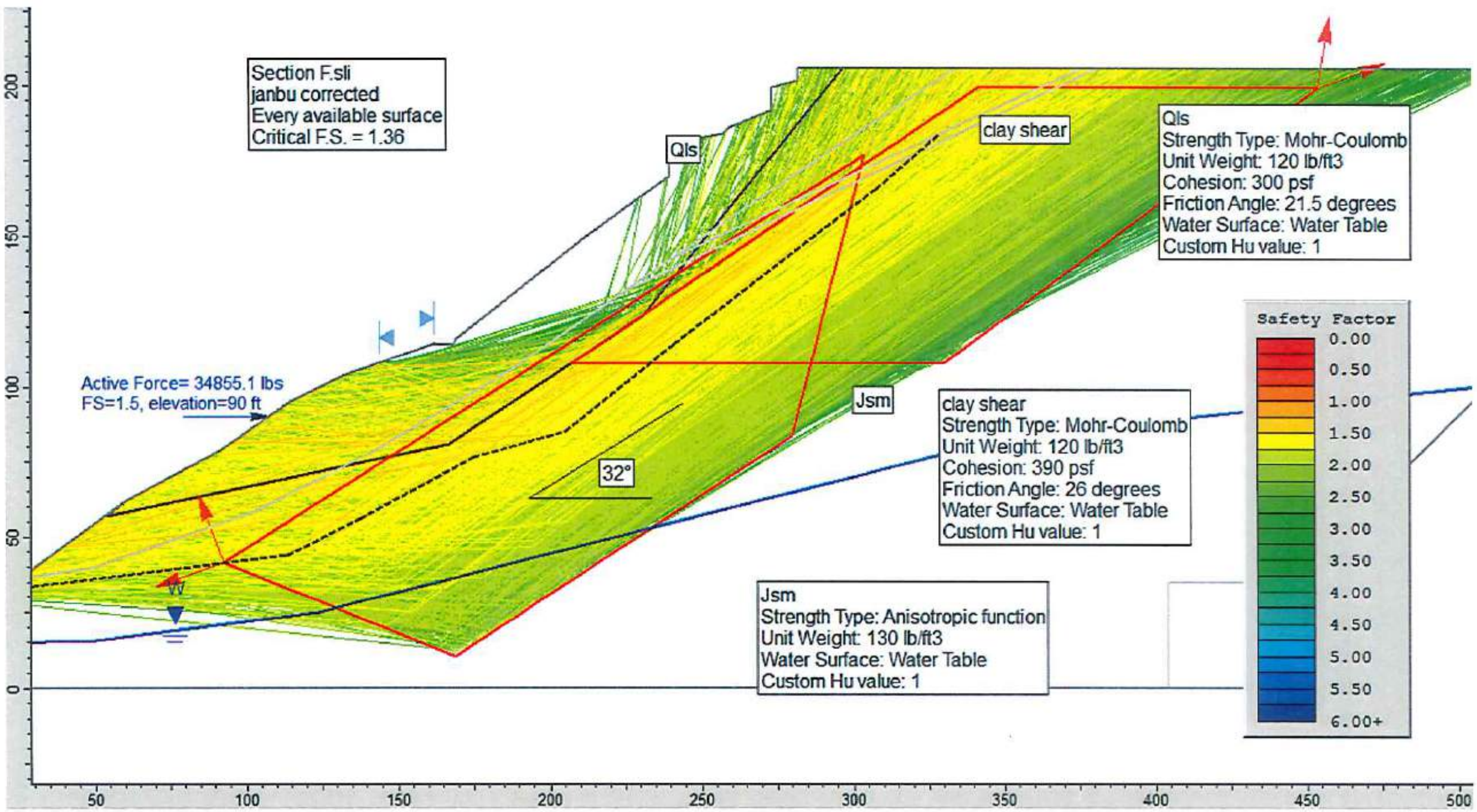
Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.804581
Center: 166.406, 248.458
Radius: 117.427
Left Slip Surface Endpoint: 182.808, 132.182
Right Slip Surface Endpoint: 260.346, 178.000
Resisting Moment=6.77598e+006 lb-ft
Driving Moment=8.42174e+006 lb-ft


Section F.sli
janbu corrected
Every available surface
Critical F.S. = 1.36
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 34855.1 lbs
FS=1.5, elevation=90 ft
Jsm
W
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
32°
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
50
100
150
200
250
300
350
400
450
500


Section F.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.36
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Active Force= 34855.1 lbs
FS=1.5, elevation=90 ft
W
Jsm
32°
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
200
150
100
50
0
50
100
150
200
250
300
350
400
450
500


Section F.sli
janbu corrected
Every available surface
Critical F.S. = 1.36
Active Force= 34855.1 lbs
FS=1.5, elevation=90 ft
Qls
clay shear
Jsm
32°
W
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: F.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 90 ft

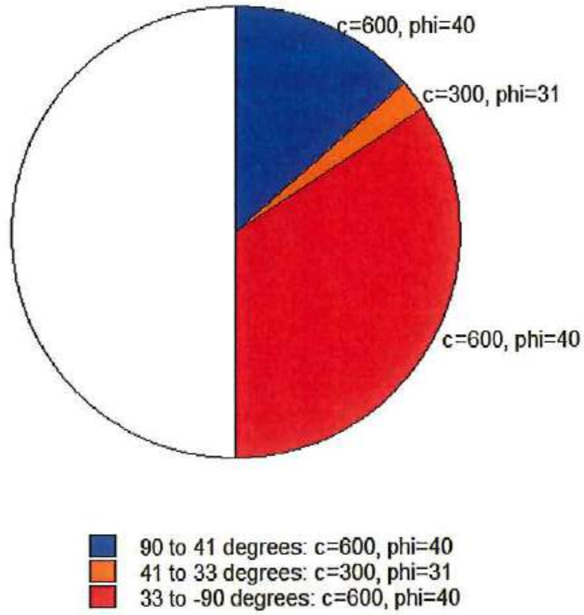
janbu corrected Active Force: 34855.1 lb
Center (26.082, 374.569) Radius 321.643

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 1.364600
Axis Location: 26.082, 374.569
Left Slip Surface Endpoint: 53.471, 57.103
Right Slip Surface Endpoint: 296.488, 206.000
Resisting Horizontal Force=454951 lb
Driving Horizontal Force=333395 lb

List of All Coordinates

Focus/Block Search Window

168.5	10.3
279.8	83.7
303.8	177.3
92.2	41.8

Focus/Block Search Window

329.3	107.7
453.4	199.4
341.2	199.4
206.7	107.7

Material Boundary

24.9	36.0
50.2	40.2
102.6	58.5
142.7	78.9
144.0	79.7
187.0	106.0
224.1	131.6
240.0	142.4
299.6	183.5
333.8	206.0

Material Boundary

240.0	142.4
375.0	206.0

Material Boundary

224.1	131.6
380.0	206.0

Material Boundary

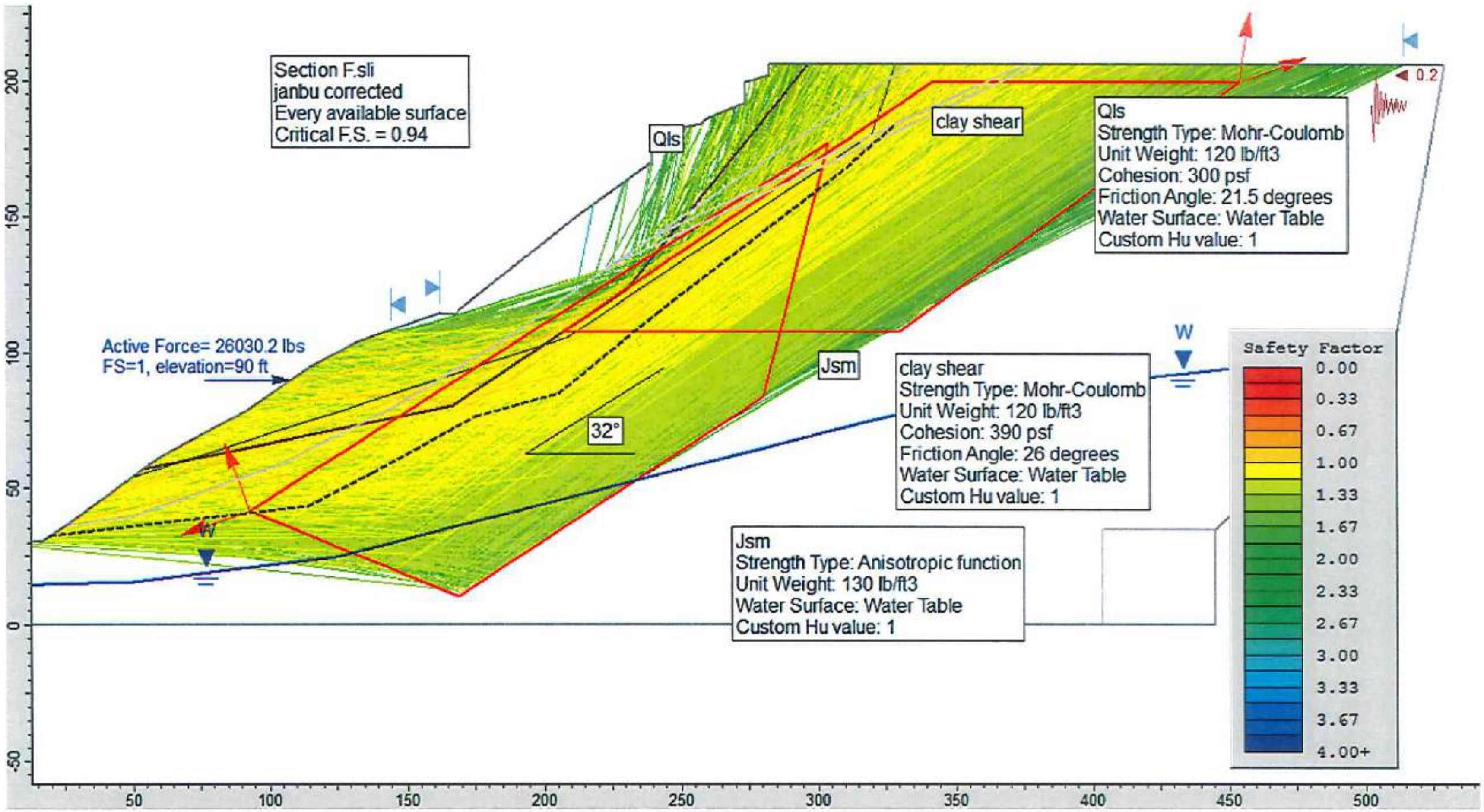
403.6	0.0
403.6	35.0
444.5	35.0

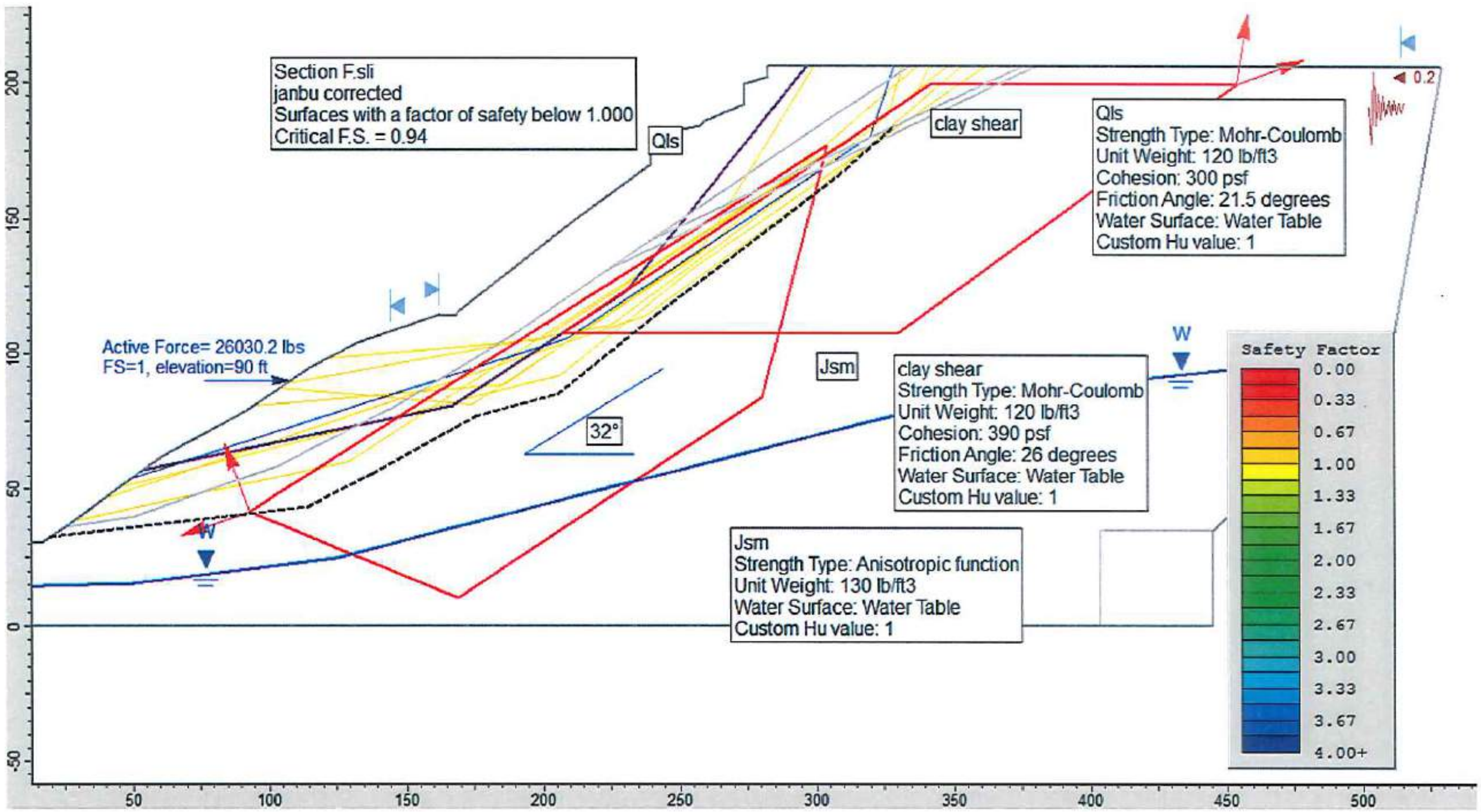
External Boundary

444.5	0.0
444.5	35.0
509.9	100.8
528.8	206.0
398.5	206.0
380.0	206.0
375.0	206.0
333.8	206.0
282.2	206.0
282.2	202.0
273.4	199.5
273.4	192.1
259.3	186.0
257.2	184.0
245.9	182.0
239.4	179.3
239.4	170.0
211.6	149.5
169.1	116.0
168.3	114.0
162.1	114.6
144.0	108.3
131.6	104.0
114.2	95.0
91.4	79.0
60.1	62.0
24.9	36.0
24.9	36.0
17.2	31.0
6.8	30.1
0.0	30.0
0.0	0.0
403.6	0.0

Water Table

0.0	14.4
50.1	15.7
123.7	25.0
352.0	83.3
509.9	100.8


Section F.sli
janbu corrected
Every available surface
Critical F.S. = 0.94
Active Force= 26030.2 lbs
FS=1, elevation=90 ft
Qls
clay shear
Jsm
32°
W
0.2
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
200
150
100
50
0
-50
50
100
150
200
250
300
350
400
450
500


Section F.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.94
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
0.2
Active Force= 26030.2 lbs
FS=1, elevation=90 ft
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
32°
W
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
200
150
100
50
0
-50
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: F.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.2

Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 90 ft

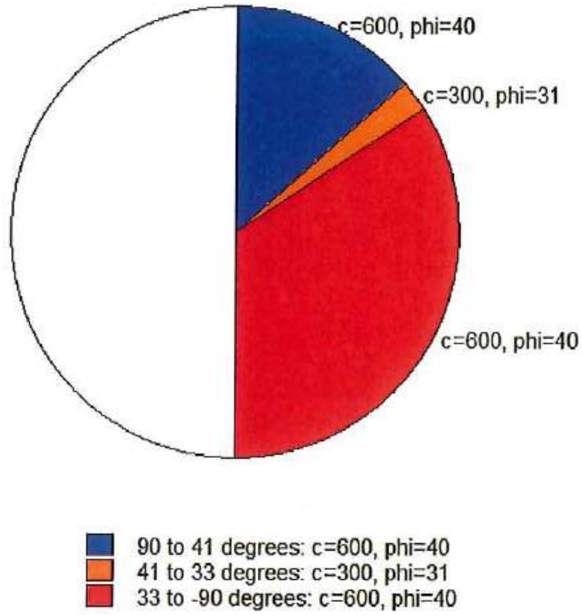
janbu corrected Active Force: 26030.2 lb
Center (37.026, 408.635) Radius 355.251

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

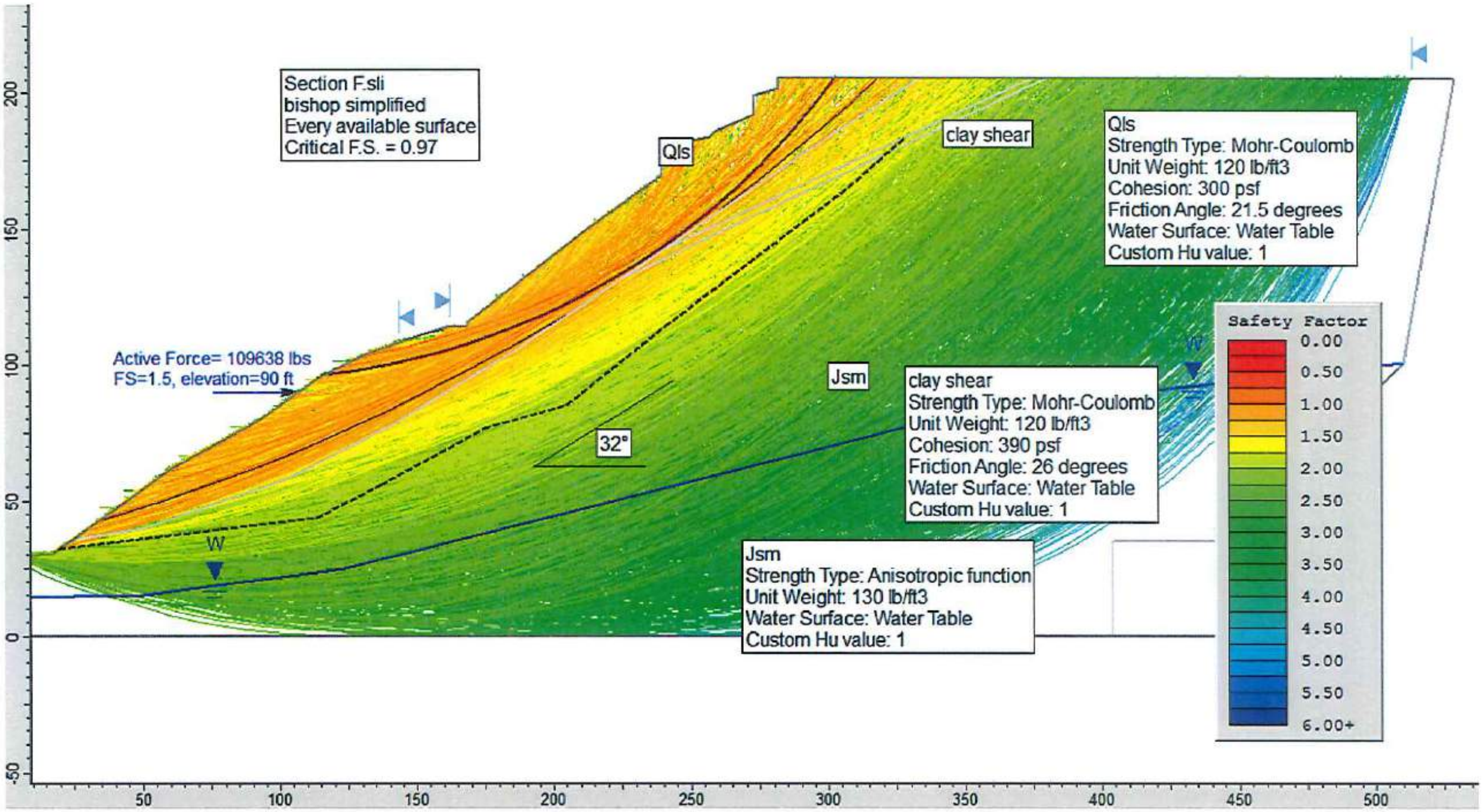
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

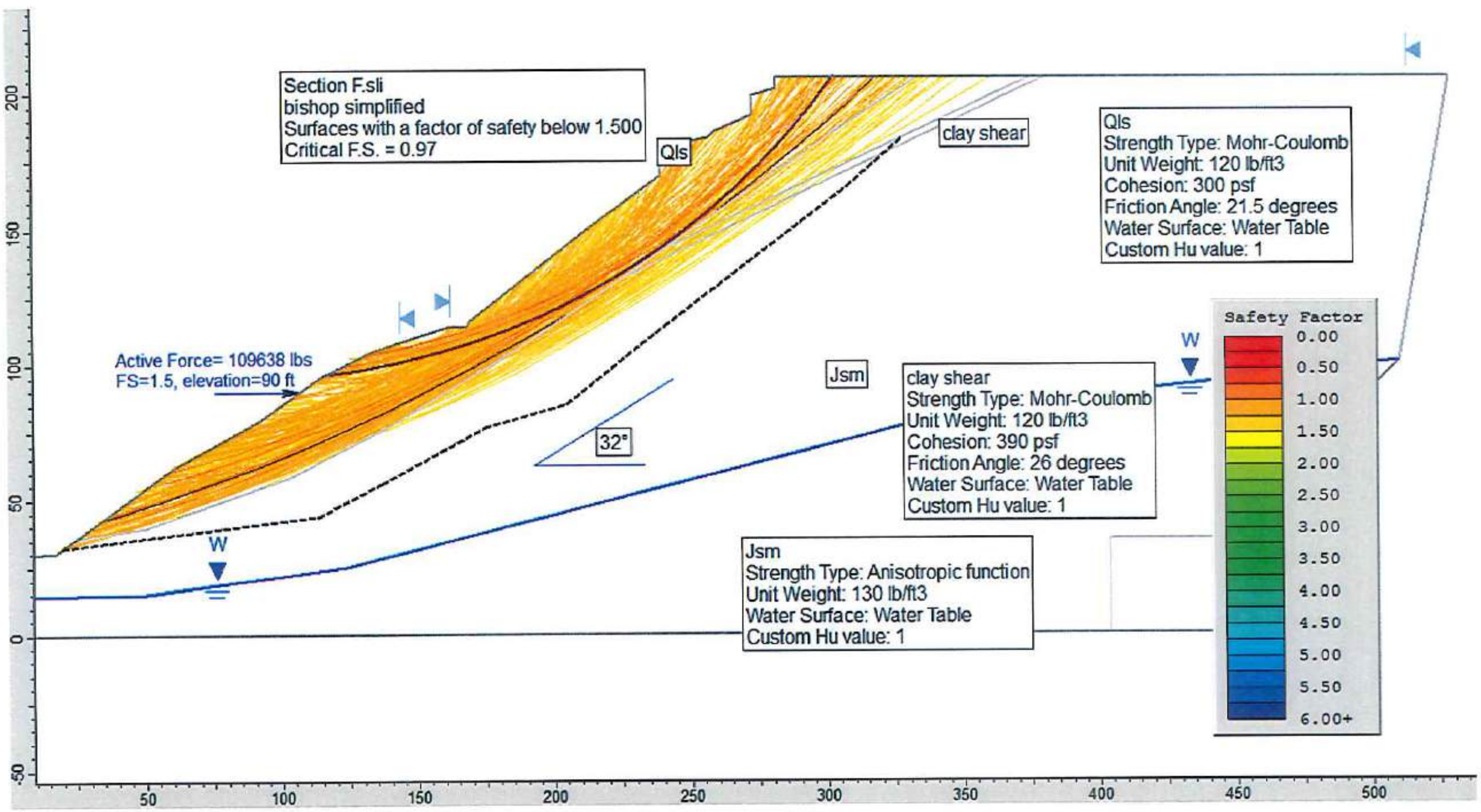
Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 0.944771
Axis Location: 26.082, 374.569
Left Slip Surface Endpoint: 53.471, 57.103
Right Slip Surface Endpoint: 296.488, 206.000
Resisting Horizontal Force=418302 lb
Driving Horizontal Force=442755 lb


Section F.sli
bishop simplified
Every available surface
Critical F.S. = 0.97
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 109638 lbs
FS=1.5, elevation=90 ft
Jsm
32°
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
W
W
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
200
150
100
50
0
-50
50
100
150
200
250
300
350
400
450
500


Section F.sli
bishop simplified
Surfaces with a factor of safety below 1.500
Critical F.S. = 0.97
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 109638 lbs
FS=1.5, elevation=90 ft
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
32°
W
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
200
150
100
50
0
-50
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: F.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

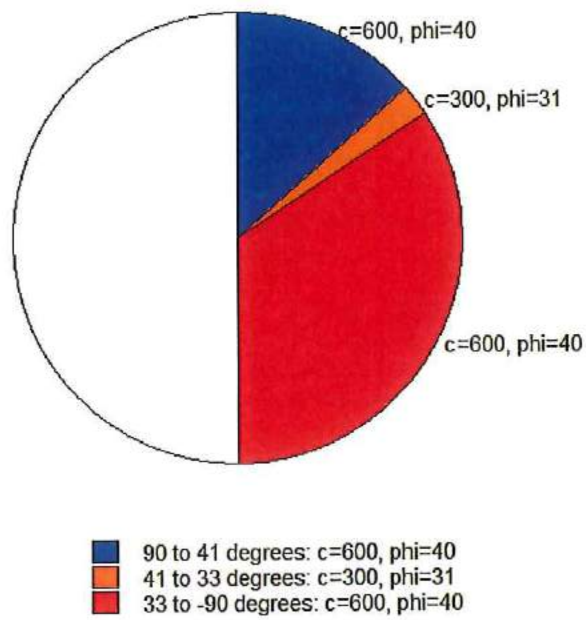
Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 90 ft

bishop simplified Active Force: 109638 lb
Center (-161.063, 713.559) Radius 698.317

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.966363
Center: 86.163, 360.796
Radius: 266.689
Left Slip Surface Endpoint: 115.631, 95.740
Right Slip Surface Endpoint: 303.329, 206.000
Resisting Moment=5.44111e+007 lb-ft
Driving Moment=5.6305e+007 lb-ft

List of All Coordinates

Material Boundary

24.9	36.0
50.2	40.2
102.6	58.5
142.7	78.9
144.0	79.7
187.0	106.0
224.1	131.6
240.0	142.4
299.6	183.5
333.8	206.0

Material Boundary

240.0	142.4
375.0	206.0

Material Boundary

224.1	131.6
380.0	206.0

Material Boundary

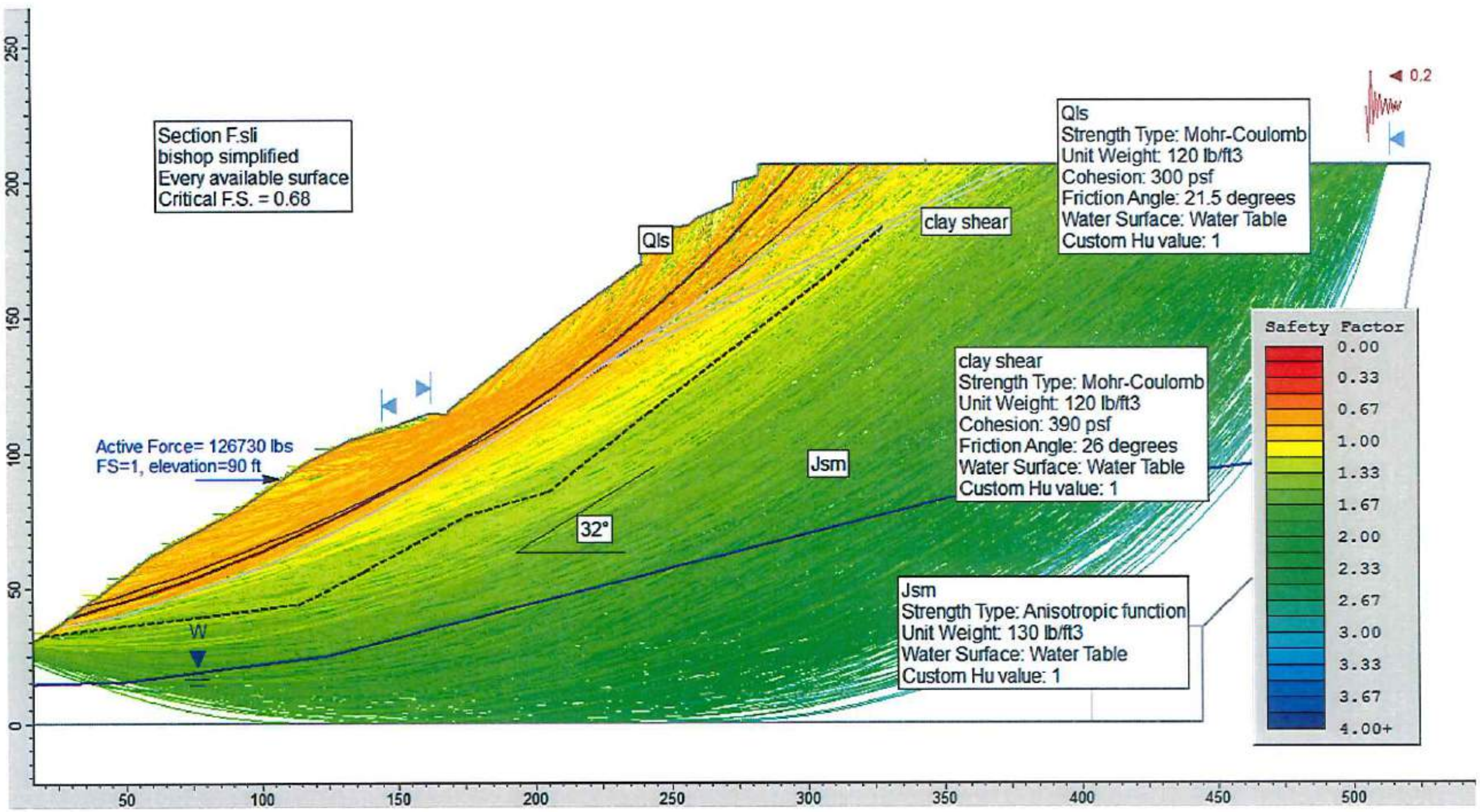
403.6	0.0
403.6	35.0
444.5	35.0

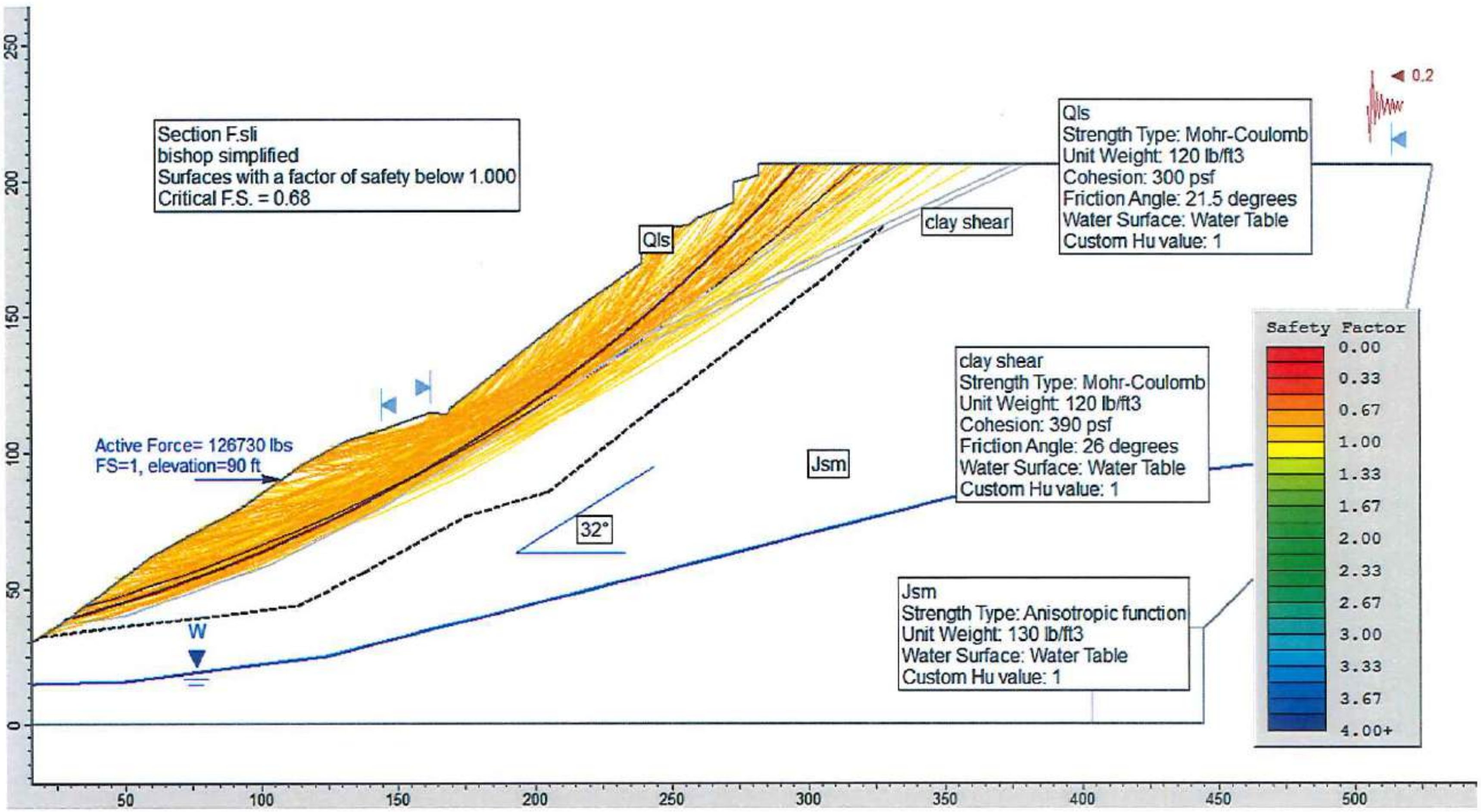
External Boundary

444.5	0.0
444.5	35.0
509.9	100.8
528.8	206.0
398.5	206.0
380.0	206.0
375.0	206.0
333.8	206.0
282.2	206.0
282.2	202.0
273.4	199.5
273.4	192.1
259.3	186.0
257.2	184.0
245.9	182.0
239.4	179.3
239.4	170.0
211.6	149.5
169.1	116.0
168.3	114.0
162.1	114.6
144.0	108.3
131.6	104.0
114.2	95.0
91.4	79.0
60.1	62.0
24.9	36.0
24.9	36.0
17.2	31.0
6.8	30.1
0.0	30.0
0.0	0.0
403.6	0.0

Water Table

0.0	14.4
50.1	15.7
123.7	25.0
352.0	83.3
509.9	100.8


Section F.sli
bishop simplified
Every available surface
Critical F.S. = 0.68
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
0.2
Qls
clay shear
Active Force= 126730 lbs
FS=1, elevation=90 ft
Jsm
32°
W
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
0
50
100
150
200
250
50
100
150
200
250
300
350
400
450
500



Section F.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.68
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
0.2
clay shear
Qls
Active Force= 126730 lbs
FS=1, elevation=90 ft
Jsm
32°
W
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: F.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.2

Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 90 ft

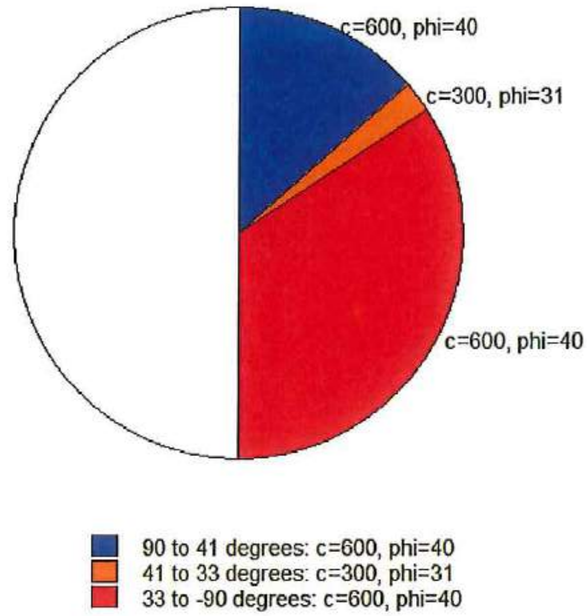
bishop simplified Active Force: 126730 lb
Center (-161.063, 713.559) Radius 698.317

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

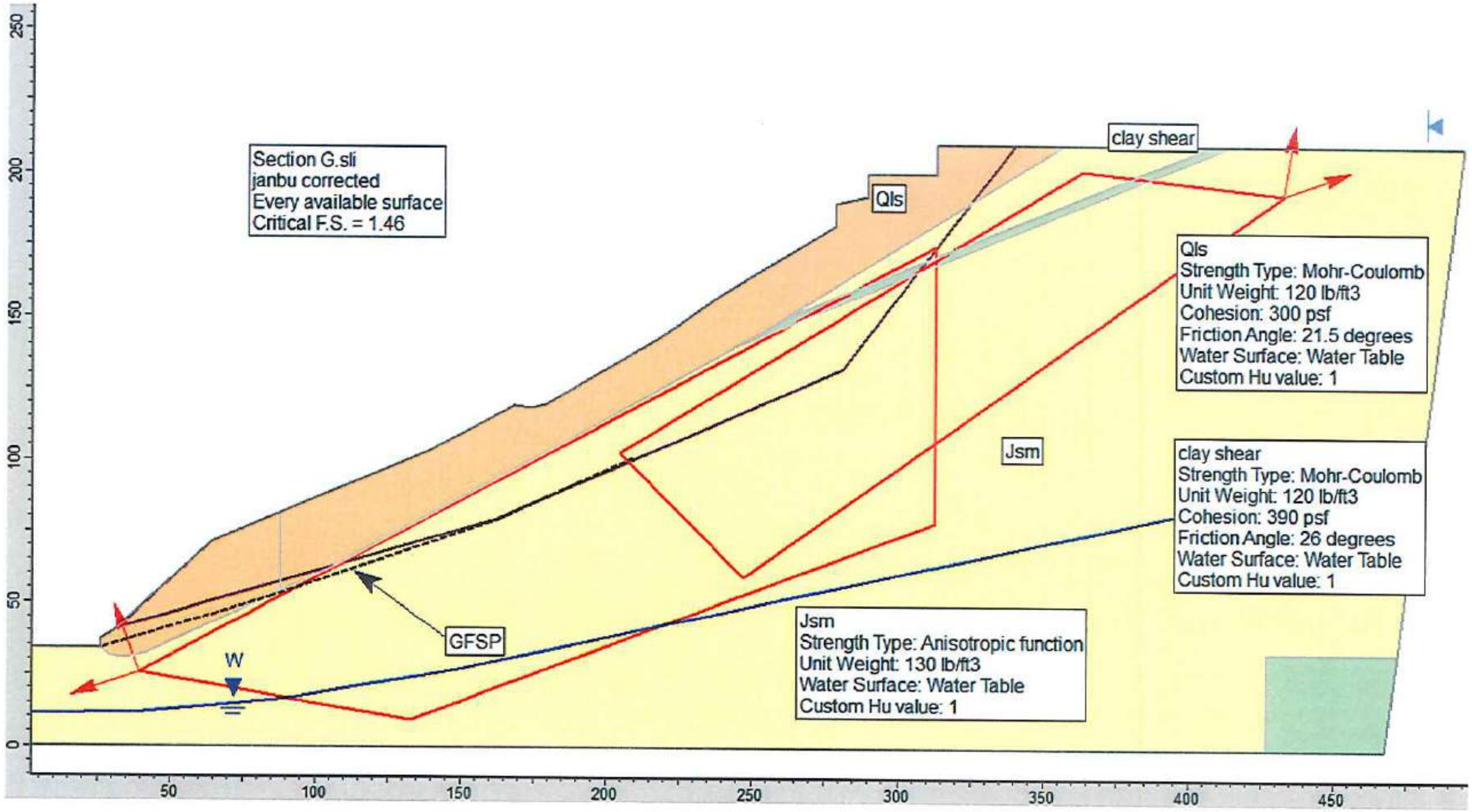
Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

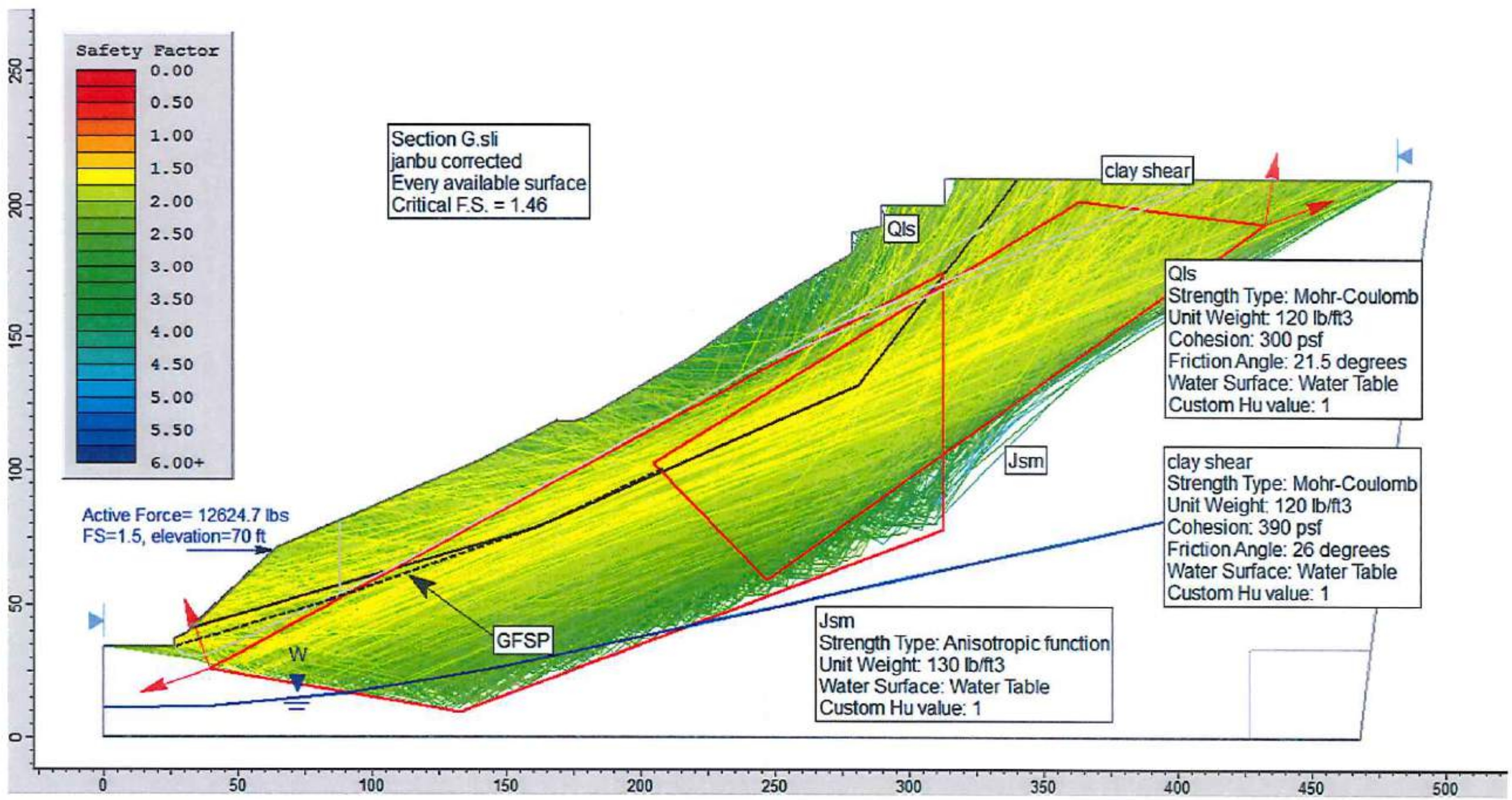
Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1



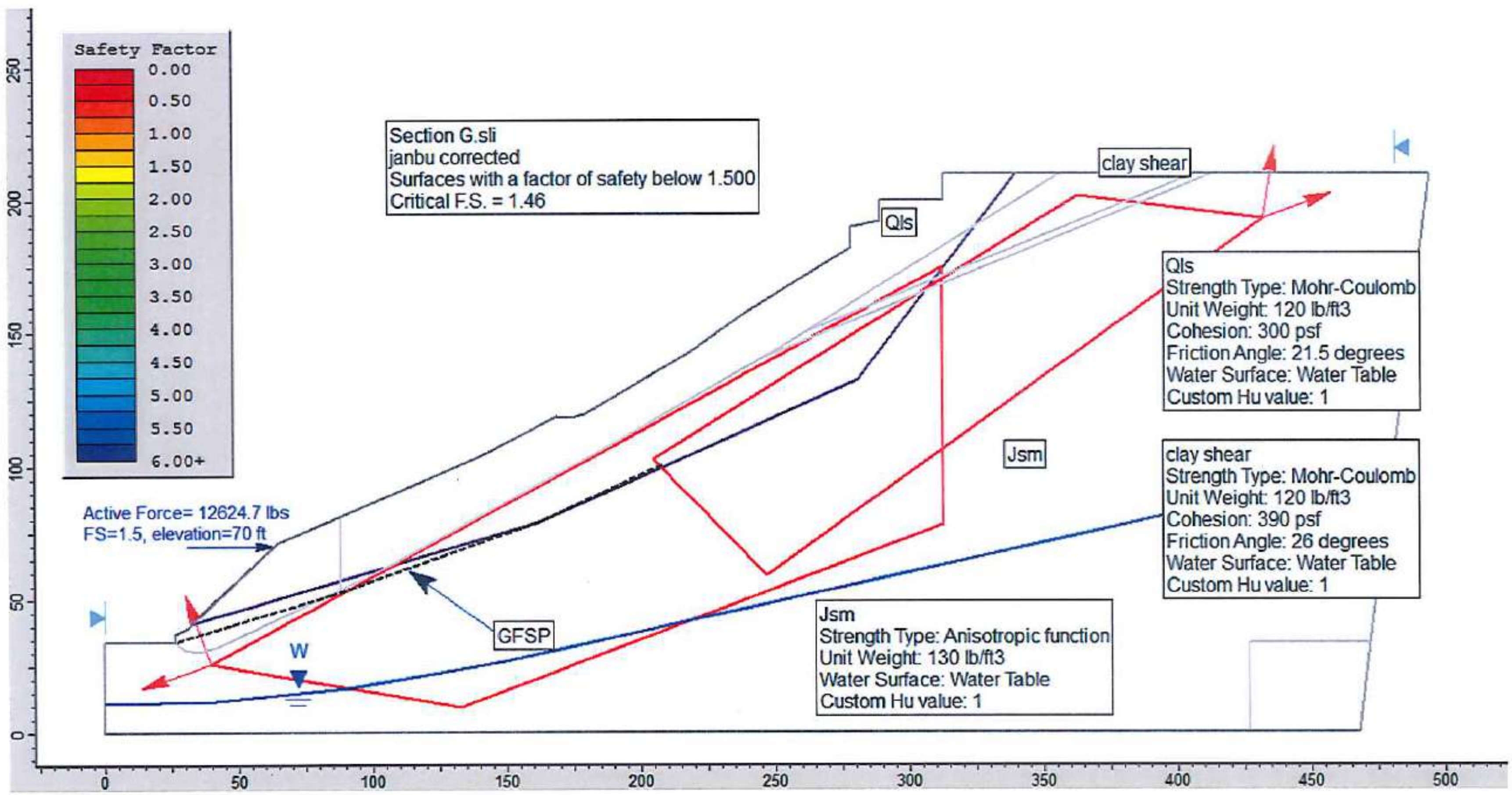
Global Minimums

Method: bishop simplified
FS: 0.678662
Center: -115.188, 569.564
Radius: 550.224
Left Slip Surface Endpoint: 28.017, 38.303
Right Slip Surface Endpoint: 297.810, 206.000
Resisting Moment=1.53957e+008 lb-ft
Driving Moment=2.26853e+008 lb-ft


Section G.sli
janbu corrected
Every available surface
Critical F.S. = 1.46
Qls
clay shear
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
50
100
150
200
250
300
350
400
450



Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section G.sli
janbu corrected
Every available surface
Critical F.S. = 1.46
clay shear
Qls
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 12624.7 lbs
FS=1.5, elevation=70 ft
W
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500


Safety Factor
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00+
Section G.sli
janbu corrected
Surfaces with a factor of safety below 1.500
Critical F.S. = 1.46
clay shear
Qls
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 12624.7 lbs
FS=1.5, elevation=70 ft
W
GFSP
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: G.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 70 ft

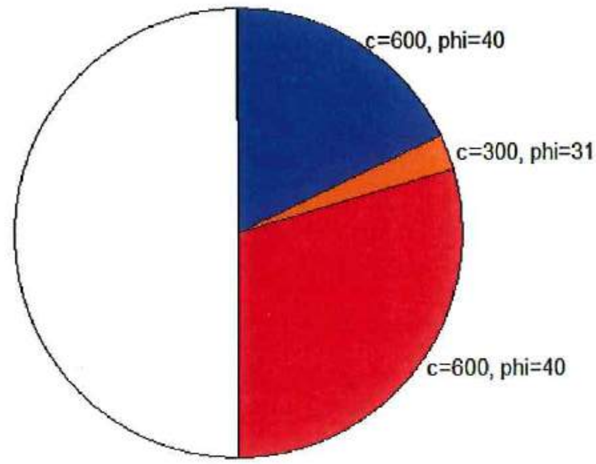
janbu corrected Active Force: 12624.7 lb
Center (16.805, 433.594) Radius 392.337

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: janbu corrected
FS: 1.463890
Axis Location: 16.805, 433.594
Left Slip Surface Endpoint: 31.853, 40.873
Right Slip Surface Endpoint: 340.010, 210.000
Resisting Horizontal Force=694302 lb
Driving Horizontal Force=474287 lb

List of All Coordinates

Focus/Block Search Window

246.8	59.3
432.5	193.2
363.0	201.4
204.5	102.9

Focus/Block Search Window

132.7	9.7
312.7	78.5
312.7	174.9
39.2	25.8

Material Boundary

26.4	34.0
29.2	31.5
34.6	30.6
41.8	32.3
88.1	54.3
107.8	63.6
185.1	105.9
244.7	140.1
252.0	144.3
261.1	150.0
356.2	210.0

Material Boundary

261.1	150.0
406.8	210.0

Material Boundary

244.7	140.1
413.0	210.0

Material Boundary

88.1	54.3
88.1	81.6

Material Boundary

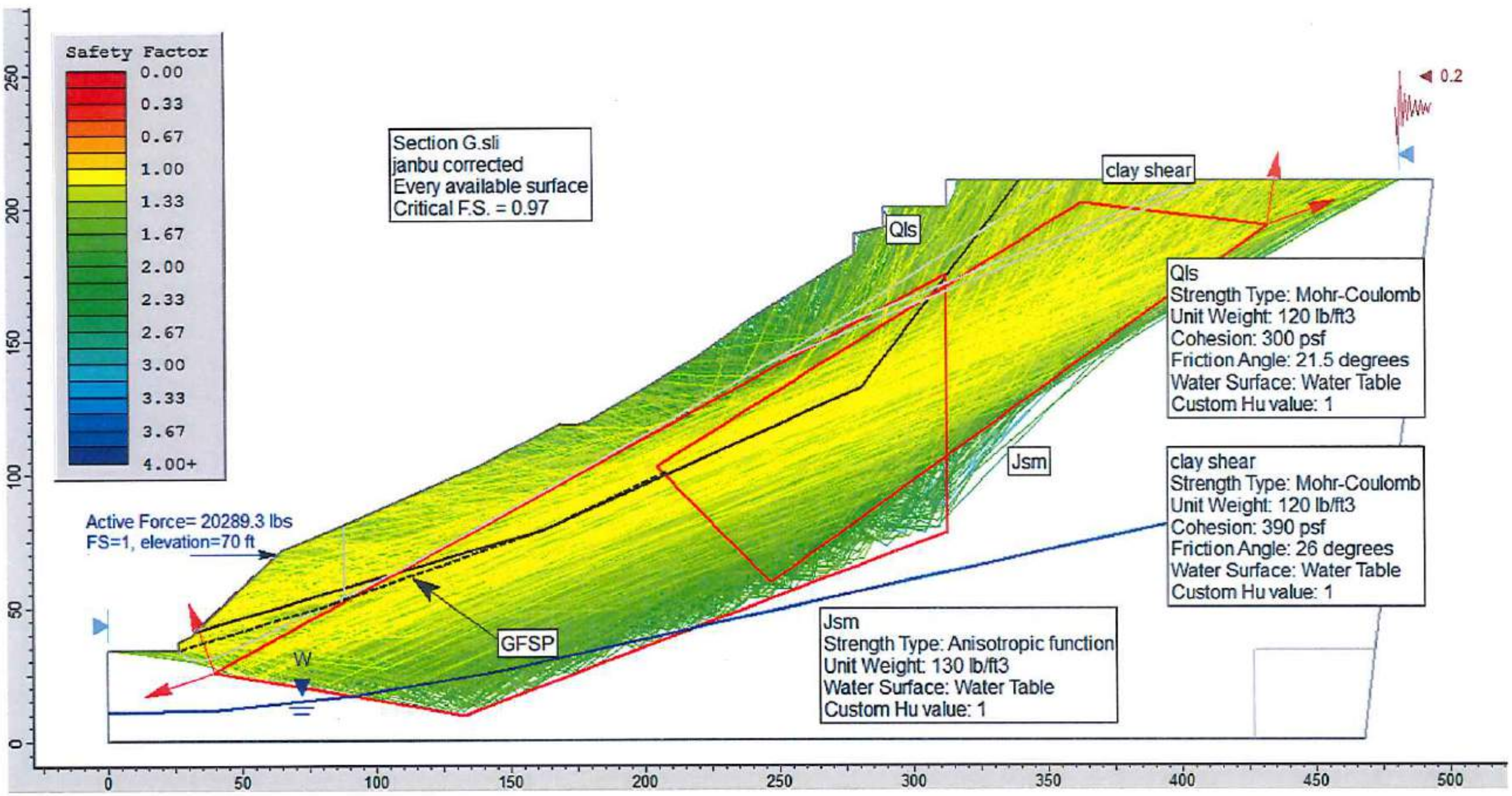
426.9	0.0
426.9	33.7
472.1	33.7

External Boundary

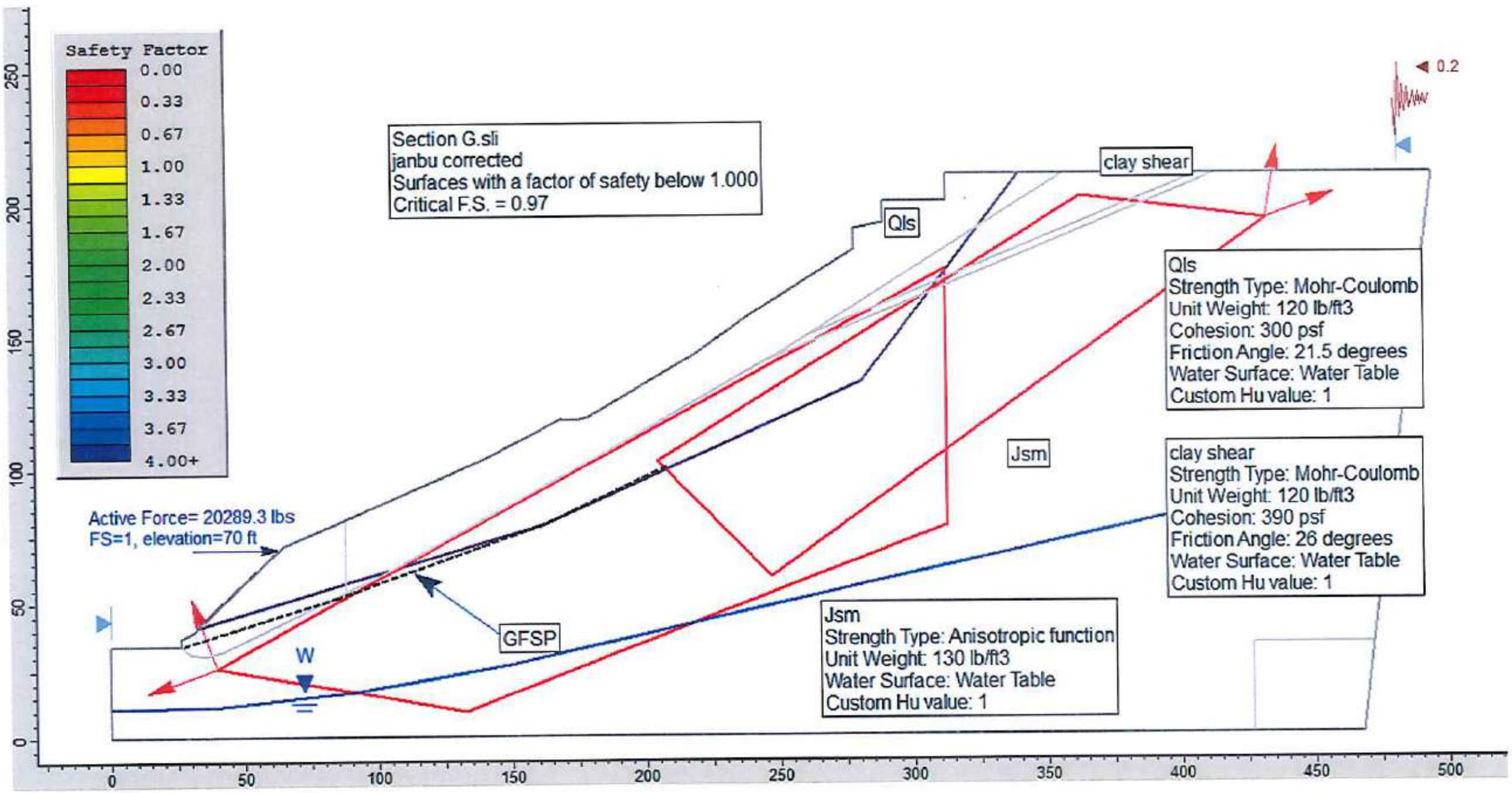
0.0 0.0	
426.9	0.0
467.7	0.0
472.1	33.7
494.7	210.0
413.0	210.0
406.8	210.0
356.2	210.0
313.1	210.0
313.1	200.0
289.4	200.0
289.4	192.0
278.5	189.6
278.5	182.0
239.0	157.5
218.4	143.0
178.8	119.6
174.0	118.2
168.5	119.0
138.7	103.3
88.1	81.6
64.4	71.5
30.5	39.6
26.4	37.5
26.4	34.0
0.0 34.0	
0.0 0.0	

Water Table

0.0 11.0	
41.2	12.1
90.8	17.0
149.1	27.0
393.4	81.0
441.3	88.0
481.4	92.6



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section G.sli
janbu corrected
Every available surface
Critical F.S. = 0.97
Active Force= 20289.3 lbs
FS=1, elevation=70 ft
GFSP
W
Qls
clay shear
Jsm
0.2
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section G.sli
janbu corrected
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.97
0.2
clay shear
Qls
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 20289.3 lbs
FS=1, elevation=70 ft
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: G.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Janbu corrected

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 200
Left Projection Angle (End Angle): 110
Right Projection Angle (Start Angle): 80
Right Projection Angle (End Angle): 20
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.2

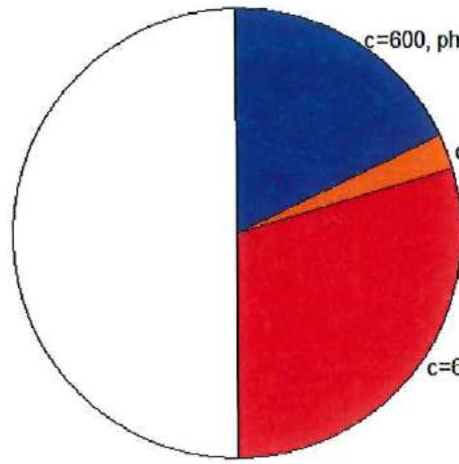
Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 70 ft

janbu corrected Active Force: 20289.3 lb
Center (16.805, 433.594) Radius 392.337

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

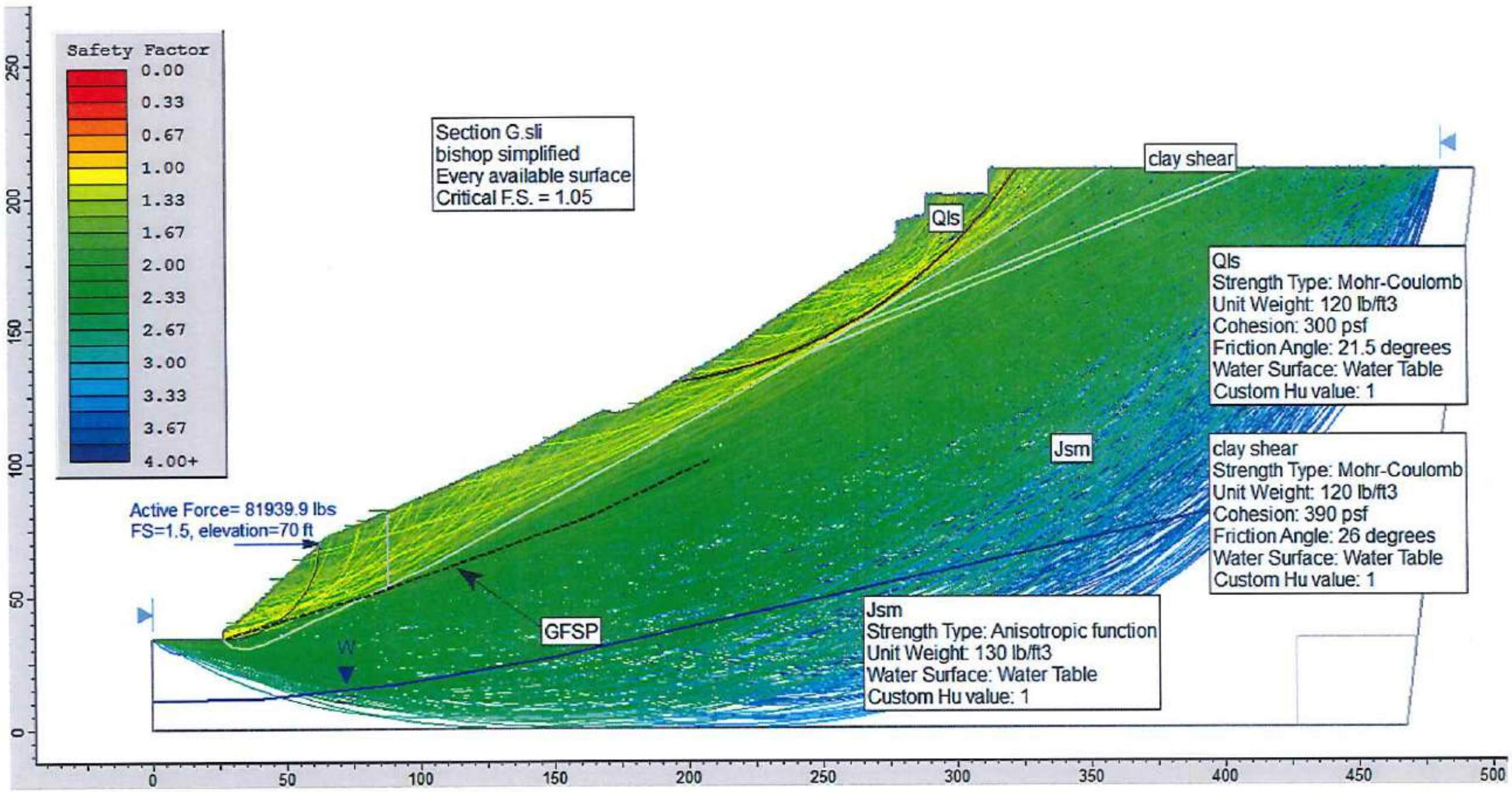


Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: janbu corrected
FS: 0.969011
Axis Location: 16.805, 433.594
Left Slip Surface Endpoint: 31.853, 40.873
Right Slip Surface Endpoint: 340.010, 210.000
Resisting Horizontal Force=634562 lb
Driving Horizontal Force=654855 lb



Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section G.sli
bishop simplified
Every available surface
Critical F.S. = 1.05
clay shear
Qls
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
Active Force= 81939.9 lbs
FS=1.5, elevation=70 ft
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: G.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Back Analysis

Required Factor of Safety: 1.5
Reinforcement Load Elevation: 70 ft

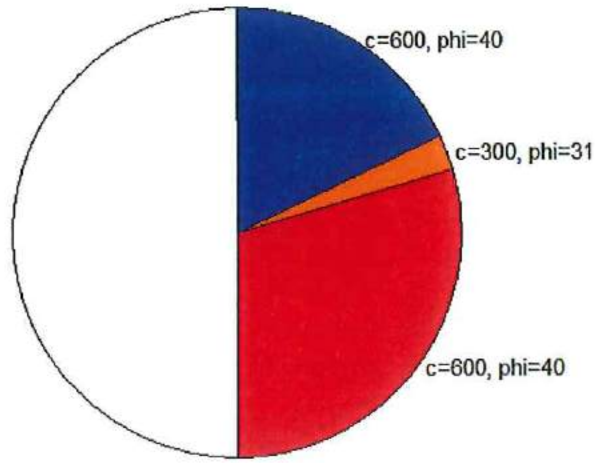
bishop simplified Active Force: 81939.9 lb
Center (25.242, 71.732) Radius 37.428

Material Properties

Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1



Global Minimums

Method: bishop simplified
FS: 1.054940
Center: 171.590, 309.875
Radius: 181.993
Left Slip Surface Endpoint: 195.480, 129.457
Right Slip Surface Endpoint: 323.730, 210.000
Resisting Moment=2.26908e+007 lb-ft
Driving Moment=2.15091e+007 lb-ft

List of All Coordinates

Material Boundary

26.4	34.0
29.2	31.5
34.6	30.6
41.8	32.3
88.1	54.3
107.8	63.6
185.1	105.9
244.7	140.1
252.0	144.3
261.1	150.0
356.2	210.0

Material Boundary

261.1	150.0
406.8	210.0

Material Boundary

244.7	140.1
413.0	210.0

Material Boundary

88.1	54.3
88.1	81.6

Material Boundary

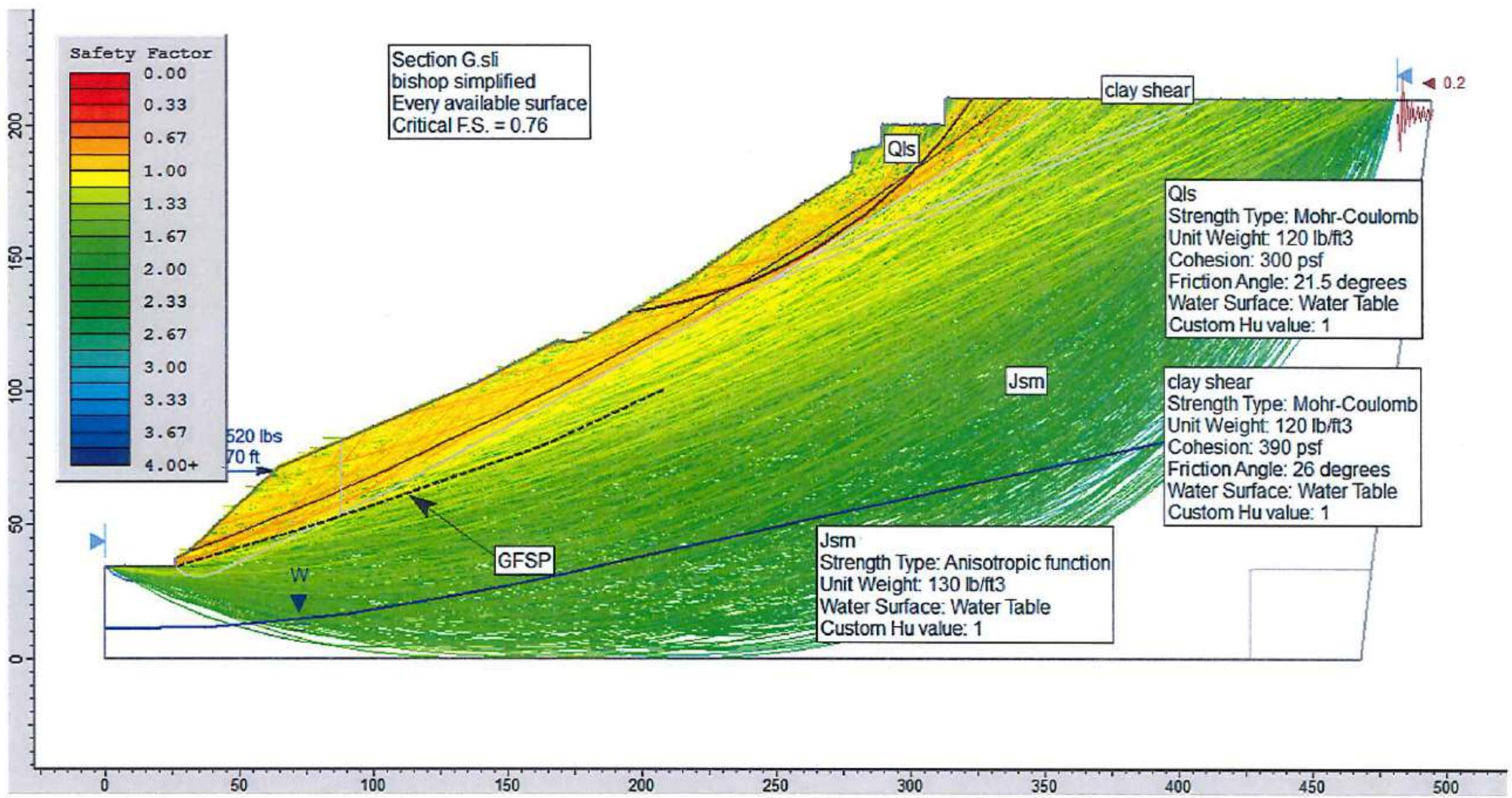
426.9	0.0
426.9	33.7
472.1	33.7

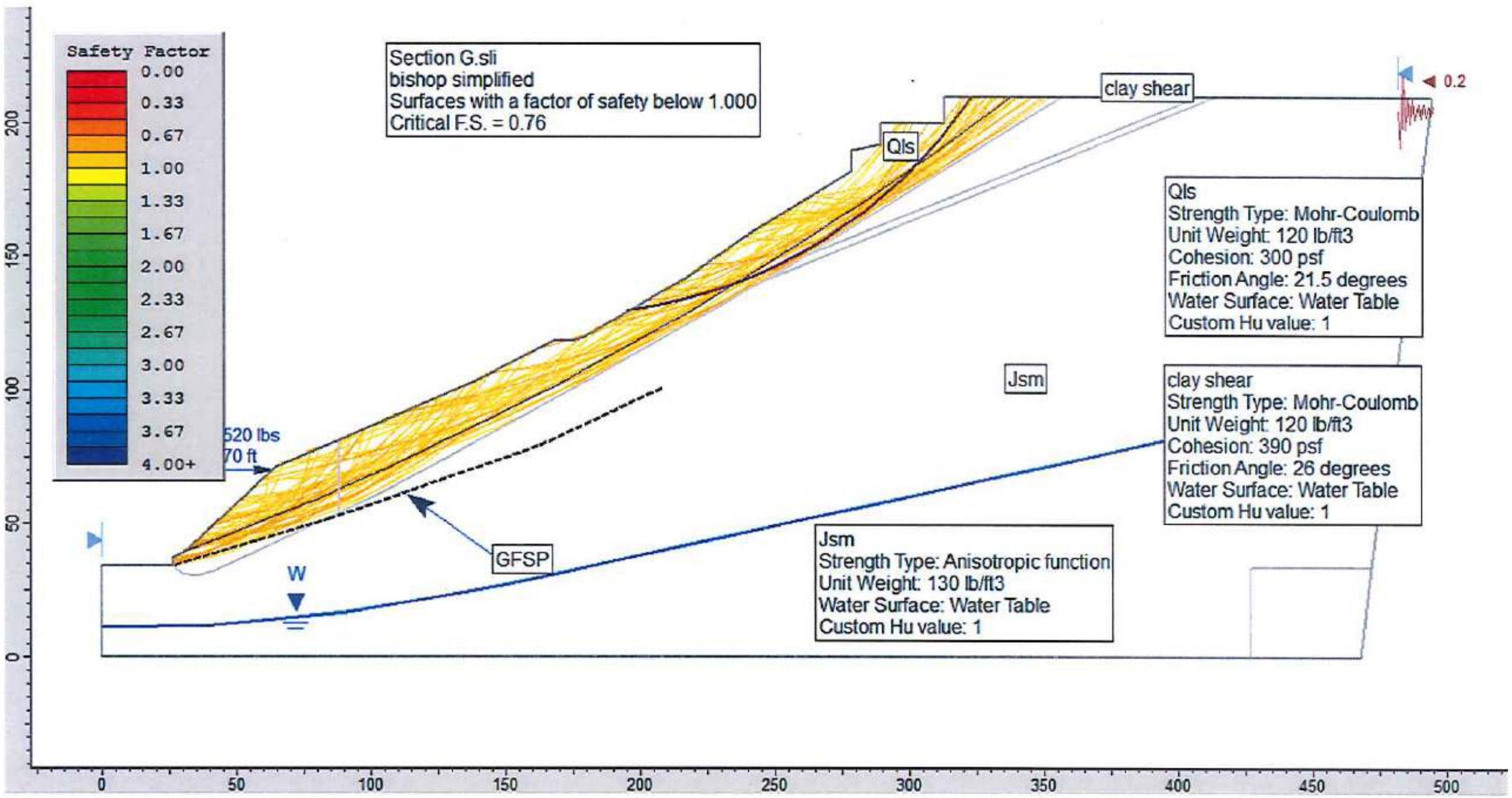
External Boundary

0.0 0.0	
426.9	0.0
467.7	0.0
472.1	33.7
494.7	210.0
413.0	210.0
406.8	210.0
356.2	210.0
313.1	210.0
313.1	200.0
289.4	200.0
289.4	192.0
278.5	189.6
278.5	182.0
239.0	157.5
218.4	143.0
178.8	119.6
174.0	118.2
168.5	119.0
138.7	103.3
88.1	81.6
64.4	71.5
30.5	39.6
26.4	37.5
26.4	34.0
0.0 34.0	
0.0 0.0	

Water Table

0.0 11.0	
41.2	12.1
90.8	17.0
149.1	27.0
393.4	81.0
441.3	88.0
481.4	92.6


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section G.sli
bishop simplified
Every available surface
Critical F.S. = 0.76
clay shear
Qls
0.2
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
520 lbs
70 ft
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0
50
100
150
200
250
300
350
400
450
500


Safety Factor
0.00
0.33
0.67
1.00
1.33
1.67
2.00
2.33
2.67
3.00
3.33
3.67
4.00+
Section G.sli
bishop simplified
Surfaces with a factor of safety below 1.000
Critical F.S. = 0.76
clay shear
Qls
Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1
Jsm
clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1
520 lbs
70 ft
GFSP
W
Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1
0.2
0
50
100
150
200
0
50
100
150
200
250
300
350
400
450
500

Document Name

File Name: G.sli

Project Settings

Project Title: SLIDE - An Interactive Slope Stability Program
Failure Direction: Right to Left
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft3
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Slope Search
Number of Surfaces: 5000
Upper Angle: Not Defined
Lower Angle: Not Defined
Composite Surfaces: Disabled
Reverse Curvature: Invalid Surfaces
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

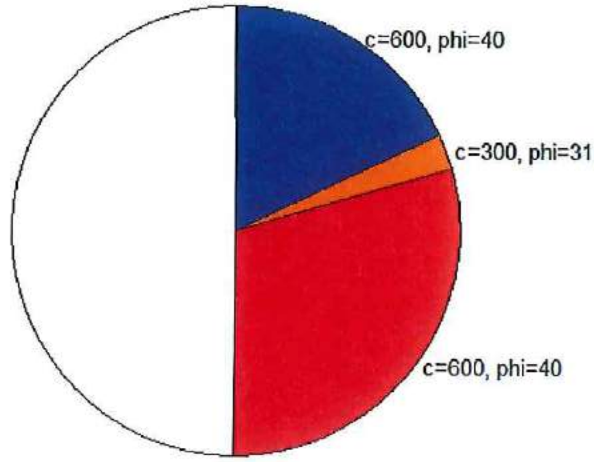
Seismic Load Coefficient (Horizontal): 0.2

Back Analysis

Required Factor of Safety: 1
Reinforcement Load Elevation: 70 ft

bishop simplified Active Force: 73520 lb
Center (-403.793, 1185.374) Radius 1225.354

Material Properties



Material: Jsm
Strength Type: Anisotropic function
Unit Weight: 130 lb/ft3
Water Surface: Water Table
Custom Hu value: 1

Material: clay shear
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 390 psf
Friction Angle: 26 degrees
Water Surface: Water Table
Custom Hu value: 1

Material: Qls
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft3
Cohesion: 300 psf
Friction Angle: 21.5 degrees
Water Surface: Water Table
Custom Hu value: 1

Global Minimums

Method: bishop simplified
FS: 0.755739
Center: 171.590, 309.875
Radius: 181.993
Left Slip Surface Endpoint: 195.480, 129.457
Right Slip Surface Endpoint: 323.730, 210.000
Resisting Moment=2.11225e+007 lb-ft
Driving Moment=2.79495e+007 lb-ft