



GEOTECHNICAL • GEOLOGY • HYDROGEOLOGY • MATERIALS TESTING • INSPECTION

Freeman Associates LLC
994 San Antonio Road
Palo Alto CA 94303

December 10, 2015

Attention: Mr. Verne Freeman

Subject: **GEOTECHNICAL SLOPE STABILITY ANALYSIS REPORT**
Sargent Ranch Quarry Site
Sargent, Santa Clara County, California

Reference: **GEOLOGIC HAZARDS ASSESSMENT AND PRELIMINARY SLOPE STABILITY EVALUATION**
Sargent Ranch Quarry Site
Sargent, Santa Clara County, California

Dear Mr. Freeman:

SGSI is pleased to submit this report summarizing our geotechnical slope stability analysis study for the proposed Sargent Ranch Quarry Site. Our study was focused on adverse slope stability impacts both during operations and following reclamation and providing mitigation measures for incorporation in the design of the Reclamation Plan.

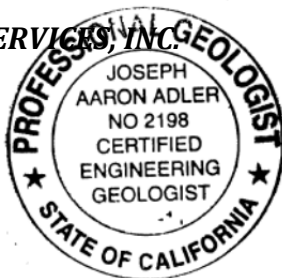
This report presents our findings, conclusions, and recommendations for quarry slope stability and potential site geologic hazards as they affect the proposed project. The proposed four phase project includes the development of open pits for the production of construction aggregates.

We appreciate the opportunity to be of service to you. Should you have any questions regarding this report, please do not hesitate to contact us.

Respectfully,

SIERRA GEOTECHNICAL SERVICES, INC.

Joseph A. Adler
Principal Geologist
CEG 2198 (exp 3/31/2017)



Thomas A. Platz
Principal Engineer
PE 41039 (exp 3/31/2017)



GEOTECHNICAL SLOPE STABILITY ANALYSIS REPORT

FOR

PROPOSED SARGENT RANCH QUARRY SITE SARGENT, CALIFORNIA



**DECEMBER 10, 2015
PROJECT NO. 3.31274**

Prepared By:

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1.0 PURPOSE AND SCOPE OF SERVICES

This report presents the result of our slope stability evaluation for the stability of the anticipated cut slopes and for final reclamation of slopes at the future Sargent Ranch Quarry site. It is our understanding that the project will include extraction of roughly 38.2 million cubic yards of material, for use in construction aggregates, in four phases over an approximate 30 year period.

Our evaluation and analysis had the primary objectives:

- Compilation and Review of Available Data – including available published and unpublished data concerning site geology and seismic setting. In addition grading and reclamation plans and cross sections prepared by Triad/Holmes Associates, dated 10/2015 were also reviewed.
- Perform a subsurface investigation which included geotechnical borings and test pits to better define the geologic orientations of the subsurface deposits. The collected data, coupled with the above referenced report, were used to develop a subsurface geologic model used in the analysis of the existing slope stability.
- Data analysis and a slope stability evaluation using GSTABL7 software.
- Preparation of this written report presenting the results of our findings, conclusions, recommendations, and construction considerations for the proposed development.

2.0 SITE DESCRIPTION AND PROPOSED PROJECT

The project site is located to the west of Highway 101, approximately 6 miles south of Gilroy, in Sargent, Santa Clara County, California (36.9169°;-121.5647°). The approximate location of the project site is depicted on the Regional and Vicinity Maps, Figures 1 and 2, respectively.

Site topography consists of gently rolling to moderately steep hillsides with moderate to well incised drainages. Relief at the project site ranges from approximately 800 feet mean sea level (MSL) along the higher ridge crests to less than 150 feet MSL along the eastern portions of site. Average overall slope angles are typically around 15° in the proposed development areas. Vegetation includes a light to moderate growth of grasses, shrubs, and some riparian habitat in drainage areas. The site is bisected by the south-

flowing Sargent Creek. There are currently no structures in the proposed development areas.

The proposed project will consist of surface mining excavations, overburden stockpiling, crushing and processing facilities, access roads, administrative offices and equipment storage areas. Disturbance is estimated at approximately 200 acres. The mining quarries will be excavated in four phases. Phases 1 and 2 as well as the Plant and office sites are located at the northern end of the property. Phases 3 and 4 are to be located to the south and will be accessed via a haul road adjacent Sargent Creek.

We anticipate operations will take place over an approximate 30 year time interval. The proposed mine limits as well as the processing plant site and stockpile areas are shown on the site Geologic Map (Figure 3). The applicant proposes to mine the site for aggregates as open pit, to bottom elevations and cubic yardage as follows in the below Table I.

TABLE I

Phase	Max Bottom of Quarry and Total Cut (ft/yds³)
Phase 1	130' / 13.3 mil yds ³
Phase 2	200' / 16.3 mil yds ³
Phase 3	250' / 5.0 mil yds ³
Phase 4	250' / 3.6 mil yds ³

The grading plan includes slope cuts of greater than 2:1 (H:V) with 20 foot wide benches every 30 foot vertical for excavation, and final reclamation slopes of 3:1 for all phases. Drainage during excavation will be directed away from pit areas via brow ditches and culverts and will be discharged into existing drainage areas.

For final reclamation, wedge fills will be placed over cut slopes to achieve the final geometry. Fill materials will be generated from overburden soils, produced during excavation, which will be stockpiled in areas as per plan. Pit bottoms will be fine graded to achieve a 1% gradient for drainage, which will be directed toward retention basins.

3.0 FIELD AND LABORATORY WORK

Subsurface Investigation, 2015: A comprehensive subsurface field investigation consisting of 43 test pits, and 11 thirty-inch diameter borings was performed between June and August, 2015. A geologist from our office logged the excavations as they were advanced. Approximate locations of the exploratory excavations are shown on the Subsurface Geotechnical Map (Figure 3). Logs of the subsurface conditions encountered are provided in Appendix A. Geotechnical laboratory testing of representative soil samples collected from the excavations was performed. Testing included Atterberg limits, direct shear, expansion potential, gradation, and maximum density. The results of the laboratory tests performed are presented in Appendix B.

Test pits TP-1 through TP-31 were located in Phases 1 and 2. Test Pits TP-32 through TP-38 were located in Phase 4, and Test Pits TP-39 through TP-43 were located in Phase 3. The test pits were on the order of 4 to 8.5 feet in depth. Soils types, bedding attitudes, faulting/fractures, and other features are noted on the logs. Groundwater was not encountered in any of the pits. In TP-17 a minor tar seep was noted. No other signs or indications of hydrocarbons were observed in any other pits or borings.

Borings BH-1 through BH-7 were located within Phases 1 and 2. BH-9 and BH-10 were located in Phase 3, and BH-8 and BH-11 were located in Phase 4. Soils types, bedding attitudes, faulting/fractures, and other features are noted on the logs. Perched groundwater conditions were noted in Phase 1/2 boreholes BH-1 through BH-4, and BH-6 through BH-7. Groundwater was not encountered in Phases 3 and 4. Section 5.0 below includes a comprehensive discussion of groundwater.

3.1 Previous Work

SGSI performed a field reconnaissance/mapping study in October 2014 which consisted of geologic observations, mapping of surface expressed geologic features such as joints, contacts, faults, bedding attitudes etc., and limited surface sampling of soil materials from previous borings for laboratory testing. Results of the field mapping are included on Figure 3. Geotechnical laboratory testing of soil samples for preliminary characterization included Atterberg limits, gradation, shear strength, and LA Abrasion. Results of the laboratory testing are included in Appendix B.

SGS was also provided with logs of three borings (SRB07-1, SRB07-2, and SRB07-3) drilled in 2007. The location of the borings is shown on Figure 3. Logs of the borings are included in Appendix A. In-situ soil samples were not obtained during drilling. All borings were located in the north area of the site in the vicinity of Phases 1 and 2. Borings contained interbedded granular deposits along with fine silts and clay. Perched water was noted at the bottom of excavation SRB07-2 at approximately 129 feet MSL.

4.0 GEOLOGY

Site Geology: Per the Geologic Map of Monterey 30'x 60' Quadrangle, and the Map of the Southernmost Geology of Santa Clara County (Figures 4 and 5), Tertiary marine and nonmarine sediments are prevalent throughout the site. The marine and non-marine units, denoted as Tscm and Tscn respectively, were mapped by Dibble and Brabb (1978) as Pliocene age and included as part of the Etchegoin Formation. The Etchegoin consists of siltstone, sandstone, and conglomerate. The sediments making up these rocks were deposited in shallow-marine, marginal marine and non-marine environments.

Geologic deposits more specifically consist of conglomerate, sandstone, and siltstones (Graymer, 1997). The sediments contain inter-bedded pebble and cobble conglomerates; coarse- to fine-grained lithic, mica-lithic, and quartz-lithic sandstones; and brown siltstone and silty claystones. Clasts in the conglomerate are well rounded to sub-rounded, and contain: greenstone, greywacke, white weathered siliceous mudstone, laminated chert, red chert and meta-chert, laminated fine-grained white quartz sandstone, and serpentine.

The site geologic units encountered during our study included marine and non-marine units noted above, as well as Topsoil/Colluvium, Alluvium, and Landslide deposits. A brief description of the units follows.

4.1 Topsoil/Colluvium (Unmapped)

Modern unconsolidated topsoil/colluvial materials were observed outside of the drainages along the slope faces, and atop the ridges. These deposits were also observed as the overlying deposits within all the test pits and borings. In general, these deposits consisted of a dark brown to yellowish-brown, and black, damp to moist, loose to medium dense silty to clayey (Unified Soil Classification Symbols:

SM, and SC-SM), very fine to coarse sand, with minor gravels and cobbles. Average thickness of this deposit was approximately 3-feet. These soils exhibit weak shear strengths and where situated on slopes that are steeper than 2:1 will be unstable when saturated (see Section 8.0).

4.2 Alluvium (Qal)

Modern unconsolidated alluvial deposits were observed along Sargent Creek and its tributary drainages. These deposits appeared to be comprised of a poorly-sorted mixture of cobbles, gravels, sand, silt and clays. Alluvium was not encountered in the excavations. We expect the alluvium deposits to range from a few inches thick in the upper reaches of the watershed areas where erosion has cut the channels, to multiple feet thick where the channels widen and deepen as they approach the flatter terrain of the Pajaro River Valley.

4.3 Non Marine and Marine Deposits (Tscn and Tscm)

Tscn- non-marine deposits consisting of fine to coarse sands, silts and clays, with rounded gravels and cobbles were observed in the test pits and borings. In general, these deposits consisted of a yellowish-brown to brown, and reddish-brown to orange, moist, dense silty to clayey (Unified Soil Classification Symbols: SM, SC-SM, ML-SM, SM-CL, and SM-GM), very fine to coarse sand, sandy silt, and sandy clays with minor to abundant gravels and cobbles up to 8" diameter. These deposits were massive, cross bedded, and interbedded. Clasts varied from granitic and greywacke, predominantly in the southern and central portions of the site, to mudstone and shale in the north.

Tscm - marine deposits were observed and mapped during our work for the above referenced report, but were not observed during the subsurface investigation. Differentiation of the two units is made only based on the presence of fossils. Marine fossils were observed to the west of Sargent Creek, predominantly along the upper benches/knobs.

5.0 GROUNDWATER

A static groundwater table was not encountered. Groundwater seepage, which appears to be perched, was recorded in Borings BH-1 to BH-4, and BH-6 to BH-7 which are located

at the north end of the site in Phases 1 and 2. Groundwater was not encountered to the south in Phases 3 and 4. Depth to water varied from 258' MSL to 166' MSL and the overall gradient of flow, except where displaced by faulting, is to the east. Groundwater seepage was low to moderate in volume and primarily observed at the contact between the granular soils and the underlying clay deposits

Deeper and possibly static groundwater was encountered in boring log SRB07-2 at 112 feet MSL (Appendix A). Static groundwater therefore is likely near 100' MSL and will not be a factor as the bottom of the pit excavations are somewhat higher (approximately 130 - 250 feet MSL).

Groundwater seepage was considered within the slope stability analysis and indicates that the factor of safety against sliding is reduced by approximately 15%. It must be noted that depth to groundwater data for the site area is limited and that levels will fluctuate as a direct result of variable topography, sediment permeability, proximity to faults, and precipitation variances. During excavation of the quarry pits, groundwater seepage will likely be encountered and should be mitigated for. This may include dewatering by use of horizontal drains, deep cutoff trenches, or gabion buttresses.

6.0 LANDSLIDES

Landslides were observed in the field during our reconnaissance/mapping and explorations. Several surficial to moderately deep seated (backscarps of up to 40 feet in height) sized landslides were mapped in multiple areas across the property (Figure 3). These landslides appear to be relatively recent, and are identified on the basis of geomorphic features such as eroded scarps and irregular topography. The majority of the slides appear to be surficial translational and originate at the contact with the Topsoil/Colluvium and the underlying tertiary deposits along the sideslopes of incised drainages. In a few areas however, the landslides did extend below the surficial deposits into the underlying bedrock. Closer examination of the back scarps revealed that the slides appeared to originate along fault planes and fractures in the underlying deposits. The possibility also exists that the failure planes may have occurred along the interbedded silts and clays which occur at depth throughout the site. Some of the deeper slides noted near future Phases 1, 2 and 4 appear to follow the direction of bedding in these areas and are rotational in nature.

The presence of landslides could be problematic for the slope angles associated with the quarry excavations. While the vast majorities of slides are shallow/surficial and will be removed during excavation, some basal surfaces were observed to be deep seated and may daylight onto cut slope faces. In addition, landslide debris above top-of-slope cuts may be encountered and the slides re-activated by the excavations that will take place. Monitoring during excavation will be needed to identify the extent and nature of the slides and to provide appropriate mitigation recommendations.

7.0 FAULTING

The project site area is located in an extremely tectonically active area between the San Andreas Fault located approximately 2 miles to the south, and the Sargent fault which runs through the northern portion of the site (Figure 4). The Sargent fault has evidence of Holocene offset along much of its length (McLaughlin, 1974, Hart, 1988). Previous estimates of fault movement inferred from geomorphic expression are right-lateral reverse-oblique with the southwest side up.

During this investigation multiple areas of faulting were observed in the test pits and borings (Appendix A). Faults/fractures were observed in the Tscn and terminated at the basal contact with the overlying Topsoil/Colluvium. Locations of faults as observed via aerial photograph as well as those encountered in the excavations are noted on Figure 3 as well as the Geologic Cross Sections (Appendix C).

8.0 SLOPE STABILITY

A slope stability evaluation was performed for the proposed 3:1 reclamation slopes as well as the proposed overburden stockpiles. Geologic cross sections were prepared for representation of the slope conditions forming the geometric configurations for the individual analyses. Cross Sections are included in Appendix C, and their locations are indicated on Figure 3. Utilizing field and laboratory data nineteen slope conditions were evaluated and the calculations are included in Appendix D and results in Tables II and III. Groundwater levels were approximated at an elevation the northern pits of 190' and 255' MSL. Slope angles and bench configurations were taken from the Triad-Holmes Grading and Reclamation Plans. Calculations were performed using the program GSTABL7. The program performs a two dimensional limit equilibrium analyses to compute the factor of safety for a layered slope using the simplified Bishop slip circle and Janbu block slide methods. Slopes are required by code to have a minimum factor of safety of 1.5.

Soil and bedrock strengths were developed using a combination of laboratory data (direct shear tests), back-calculated failure strengths in existing landslides, and experience with similar materials. The data developed are shown here in Table II.

TABLE II- Summary of Soil Strength

Description	Test Method	Unit Weight (pcf)	ϕ	C
Tscn	Cross Bedded By Lab Test	110	32°	300 psf
Clay Bedding Planes	By Back-Calculation	110	12°	375 psf to 675 psf
Topsoil 0 – 3'	By Back-Calculation	110	12°	150 psf
Stockpile materials	Assumed	110	12°	Phase 1 (older) 675 psf Phase 2 (newer) 375 psf

The site geology, particularly near areas that are faulted is highly complex and variable. There are faults that affect bedding partially down the cut face and there are folds that change bedding. As a result it is difficult to accurately identify the orientations of the deposits from the data presently available. Calculated slope stabilities, as shown in the Table III, were therefore computed assuming different geologic scenarios. For example analyses were run assuming daylighted (clay layers exposed in the cut) orientations of bedding, and orientations which crossed the slope face.

TABLE III- Summary of Calculations (STABL7)

Location	Phase	Type Failure	Factor of Safety	Comments
1. Section A-A'	1/2	Cross Bedded	2.08	West facing Slopes
2a. Section B-B'	1/2	Daylight	0.76	Would be stable at 4:1
2b. Section B-B'	1/2	Cross Bedded	1.73	Verify during ex
3a. Section C-C'	1/2	Daylight	0.81	Bedding parallel to slope
3b. Section C-C'	1/2	Cross Bedded	1.85	Verify during ex

3c. Section C-C'	1/2	Cross Bedded	1.26	0.15g pseudo
3d. Section C-C'	1/2	Daylight	0.81	Water at 190' (5' head)
3e. Section C-C'	1/2	Cross Bedded	1.85	Water at 190' (5' head)
3f. Section C-C'	1/2	Daylight	0.95	Water at 255' (5' head)
4a. Section E-E'	1/2	Daylight	0.69	Planar Failure
4b. Section E-E'	1/2	Daylight	0.61	Circular Failure
4c. Section E-E'	1/2	Cross Bedded	1.52	Circular Mode
5. Section L-L'	4	Back-Calculated	1.00	Verify during ex
6. Section G-G'	1/2	Back-Calculated	1.00	Verify during ex
7. Topsoil (0 -3')	All	Surficial (3:1) Surficial (2:1)	1.84 1.00	Clay
8a. Section Q-Q'	4	Cross Bedded	2.13	Verify during ex
8b. Section Q-Q'	4	Cross Bedded	1.34	0.15g pseudo
9a. Civil Section A-A'	1/2	Overburden	1.45	Verify lab strength
9b. Civil Section A-A'	1/2	Overburden	0.95	0.15g pseudo

As expected, areas that have bedding dipping between 0° to 17° that are daylighted, have a factor of safety of 0.61 to 0.81 which indicates these slopes may fail at 3:1 orientations. Areas that have cuts that are cross bedded show a factor of safety of 1.5 to 2.1. The analysis was also run assuming perched groundwater conditions (5' head) for a Section C-C' (worst case cut), which will be assumed representative for any scenario where seepage is present. Again, where clay was daylighted, the factor of safety was less than 1.0.

Seismic stability calculations were also performed for two of the highest worst-case cuts (Sections C-C' and Q-Q'). A pseudo-static analysis was performed using 0.15g horizontal and 0.15g vertical simultaneously. The test results showed a seismic factor of safety of 1.26 to 1.34. The required seismic factor of safety is 1.1.

The natural topsoil areas steeper than 2:1 are unstable for shallow failure (under three feet deep) when saturated. Most of the cuts though are deeper so this will be only a localized condition.

For the overburden and topsoil stockpile areas adjacent Phases 1 and 2 (Civil Section A-A') we assume the material will be a combination of clays, silt, and sand, with minor amount of gravels and cobbles. We assume that minimal compactive effort will be using in placing the stockpile. Due to the setback distance shown on the plan, the stockpiles will not have a negative impact on the Phase 1 mining limit backcut. However, based on our analysis of the stability of the stockpiles themselves, the factor of safety will be 1.45, static and 0.95 seismic against sliding. As a result, we recommend that the Phase 2 stockpile be setback from the top edge of Phase 1, on its east face, at least an additional 20 feet (total 35').

9.0 CONCLUSIONS AND RECOMMENDATIONS

The Sargent Ranch Quarry site is presently undeveloped open space and it is understood that the end use will be the same. Thus, slope stability will not represent a hazard to structures or human occupancy. The pits and stockpile areas will have no impact on adjacent properties, or watersheds due to their relative locations. In addition, the reclamation plan shows no direct impact to, or alteration of any watersheds. Also, drainage as shown on the plans appears to be retained within the pits which would remove the potential for offsite transport. It is our opinion that the primary slope stability issue is in compliance with SMARA.

However, based on our investigation and analysis, minor to moderate failure of pit walls could occur both during excavation and at final reclaimed orientations. The site geology is complex. The lithology as well as the highly sheared and deformed character of the sediments near the faults, will affect the overall mass strength of the bedrock materials creating localized conditions susceptible to potential slope instabilities.

Generally speaking, where clay beds will daylight out of the slope face and in combination with water seepage, the slopes will be susceptible to failure in the 3:1 orientation. Where clay beds do not daylight out of slope, the slope should be grossly stable. Small scale, shallow wedge failures, may also occur as a result of the nature of the site soils. These small scale features will not represent a significant slope stability impact. The overburden stockpile area will be gross stability based upon the configuration as

shown in the plans. However, the seismic factor of safety was lower than required, and therefore the Phase 2 stockpile should be relocated an additional 20' from the top of slope.

Based upon the limited geometric data available with respect to the complexities of the site we recommended that the following, as well as general recommendation in Appendix E, be implemented during construction to ensure that slopes will be grossly stable both during construction and for reclamation. The recommendations presented are based upon a review of the project plans, our field work, and engineering and geologic analyses of the collected data as well as our professional opinion and judgment. In the event that significant changes are made to the proposed site excavation or reclamation, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed and the recommendations of this report are evaluated or modified in writing by our office.

- Observation and inspection during excavation of the pits is highly recommended. Geologic inspections by a California Certified Engineering Geologist are considered essential to identify field conditions that differ from those anticipated, and to adjust design to actual field conditions.
- Localized layback, earth buttresses, and/or stabilization fills of individual slopes may be needed to accommodate for unfavorable bedding.
- Raveling of slope materials can be anticipated, but can be mitigated by staging and temporary safety measures. Berms and fencing can be used to reduce pedestrian access. Waste pile buttress fills or backfill can be used to contain and or mitigate surficial and/or minor translational failures.
- Remedial grading to remove in-place clayey topsoil/colluvium below the proposed stockpiles was not noted in the project plans. The in-place topsoil/colluvium is not suitable to support stockpiled fill on sloping ground and should be removed prior to fill placement.
- Localized erosion and small scale failures are likely unless "inactive" slopes are vegetated or otherwise protected. In addition, a drainage catchment ditch should be maintained at the toe of the stockpiles to prevent direct discharge of sheet flow or debris.
- Groundwater seepage will likely be encountered during excavation and should be mitigated for. This may include dewatering by use of horizontal drains, deep cutoff trenches, or gabion buttresses.

10.0 LIMITATIONS

This document has been prepared for the sole use and benefit of our client. The conclusions of this document pertain only to the site(s) investigated. It should be understood that the consulting provided and the contents of this document may not be perfect. Any errors or omissions noted by any party reviewing this document and/or any other geologic or geotechnical aspects of the project should be reported to this office in a timely fashion. The client is the only party intended by this office to directly receive this advice. Unauthorized use of or reliance on this document constitutes an agreement to defend and indemnify Sierra Geotechnical Services Incorporated from and against any liability, which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Sierra Geotechnical Services Incorporated.

Conclusions presented herein are based upon the evaluation of technical information gathered, experience, and professional judgment. Other consultants could arrive at different conclusions and recommendations. Final decisions on matters presented are the responsibility of the client and/or the governing agencies. No warranties in any respect are made as to the performance of the project.

Please also note that our evaluation was limited to assessment of the geologic aspects of the project, and did not include evaluation of structural issues, environmental concerns or the presence of hazardous materials. Our study did not have the benefit of the performance of subsurface exploration across the site area.

11.0 REFERENCES

Bryant, W.A., 1980, SE segments of Sargent and Castro faults: California Division of Mines and Geology Fault Evaluation Report FER-96, microfiche copy in Division of Mines and Geology Open-File Report 90-11, 19 p., scale 1:24,000.

Bryant, W.A., Smith, D.P., and Hart, E.W., 1981, Sargent, San Andreas, and Calaveras fault zones—Evidence for recency in the Watsonville East, Chittenden, and San Felipe quadrangles, California: California Division of Mines and Geology Open-File Report OFR 81-7SF, scale 1:24,000.

McLaughlin, R.J., Langenheim, V.E., Jachens, R.C., Jayko, A.S., Stanley, R.G., and Valin, Z.C., 1997, Neogene transpressional range-front deformation, southwestern Silicon Valley, San Francisco Bay region, California [abs.]: EOS, Transactions of the American Geophysical Union, 1997 Annual Fall Meeting, v. 78, no. 46, p. F436.

Nolan, J.M., Zinn, E.N., and Weber, G.E., 1995, Paleoseismic study of the southern Sargent fault, Santa Clara and San Benito Counties, California: Unpublished U.S. Geological NEHRP Final Technical Report 1434-94-G-2466, 23 p.



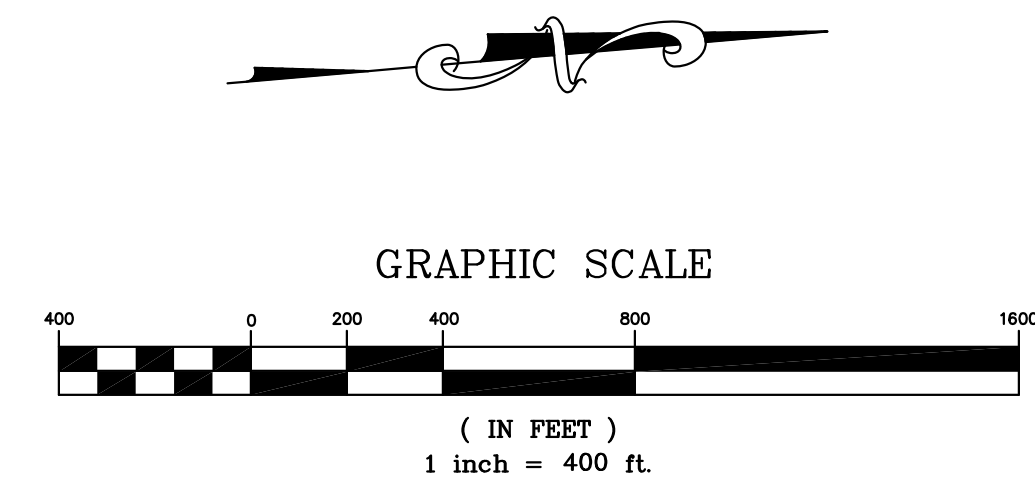
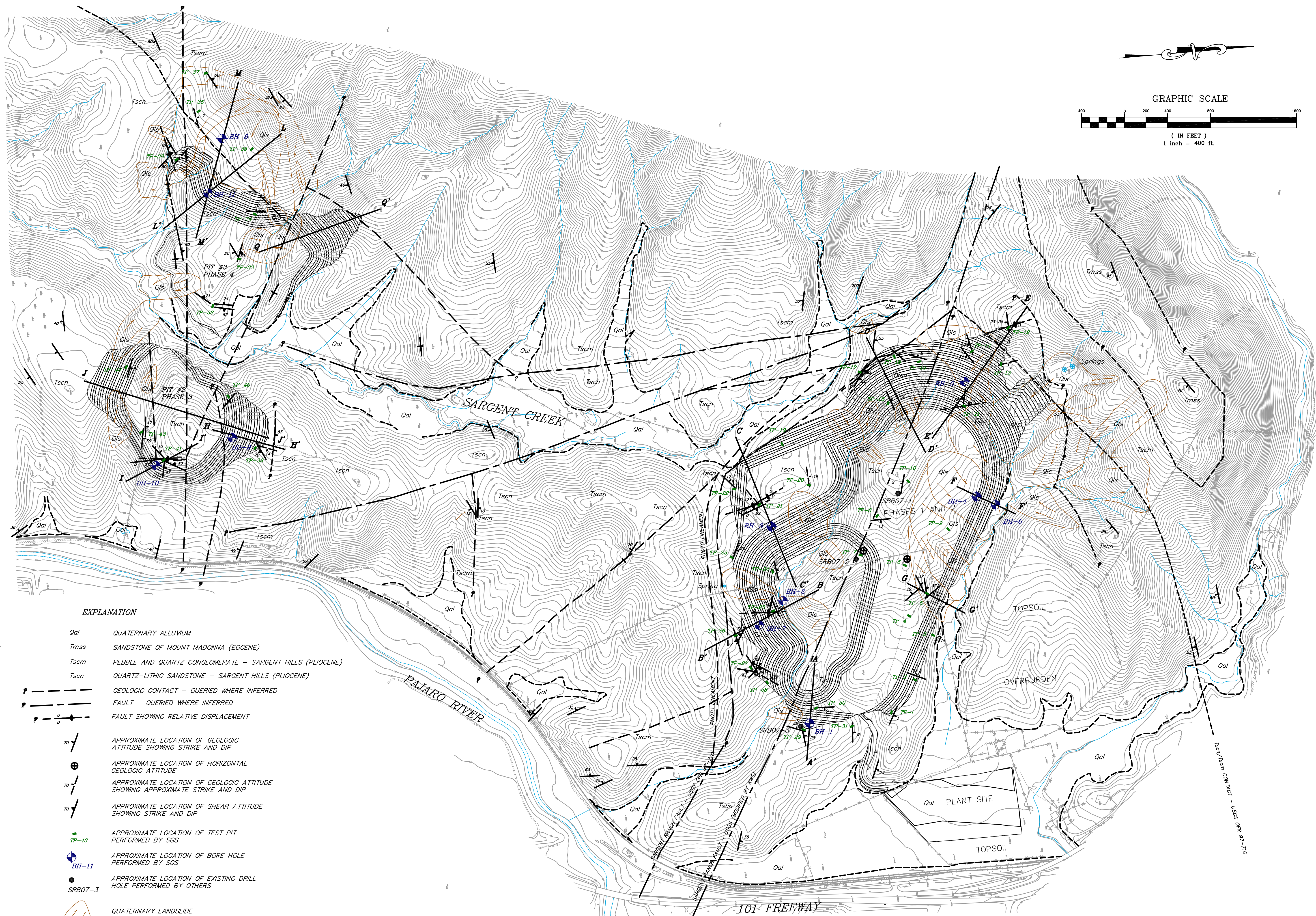
PROJECT:	REGIONAL MAP SARGENT RANCH		
COORD:	36.9169; -121.5647	DATE:	12/2015
DRAWING:	FIGURE 1.DWG	DRAWN BY:	JAA
JOB NO.:	3.31274	FIGURE:	FIGURE 1



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PROJECT: VICINITY MAP SARGENT RANCH	
COORD: 36.9169; -121.5647	DATE: 12/2015
DRAWING: FIGURE 2.DWG	DRAWN BY: JAA
JOB NO: 3.31274	FIGURE: FIGURE 2



EXPLANATION

- Qal QUATERNARY ALLUVIUM
- Tmss SANDSTONE OF MOUNT MADONNA (EOCENE)
- Tscm PEBBLE AND QUARTZ CONGLOMERATE - SARGENT HILLS (PLIOCENE)
- Tscn QUARTZ-LITHIC SANDSTONE - SARGENT HILLS (PLIOCENE)
- GEOLOGIC CONTACT - QUERIED WHERE INFERRED
- FAULT - QUERIED WHERE INFERRED
- FAULT SHOWING RELATIVE DISPLACEMENT
- 70° / APPROXIMATE LOCATION OF GEOLOGIC ATTITUDE SHOWING STRIKE AND DIP
- ⊕ APPROXIMATE LOCATION OF HORIZONTAL GEOLOGIC ATTITUDE
- 70° / APPROXIMATE LOCATION OF GEOLOGIC ATTITUDE SHOWING APPROXIMATE STRIKE AND DIP
- 70° / APPROXIMATE LOCATION OF SHEAR ATTITUDE SHOWING STRIKE AND DIP
- TP-43 APPROXIMATE LOCATION OF TEST PIT PERFORMED BY SGS
- BH-11 APPROXIMATE LOCATION OF BORE HOLE PERFORMED BY SGS
- SRB07-3 APPROXIMATE LOCATION OF EXISTING DRILL HOLE PERFORMED BY OTHERS
- Qls QUATERNARY LANDSLIDE DASHED WHERE QUERIED

SARGENT RANCH
GEOLOGIC MAP
SARGENT RANCH LLC

SGS
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SCALE 1"=400'

DRAWN DD

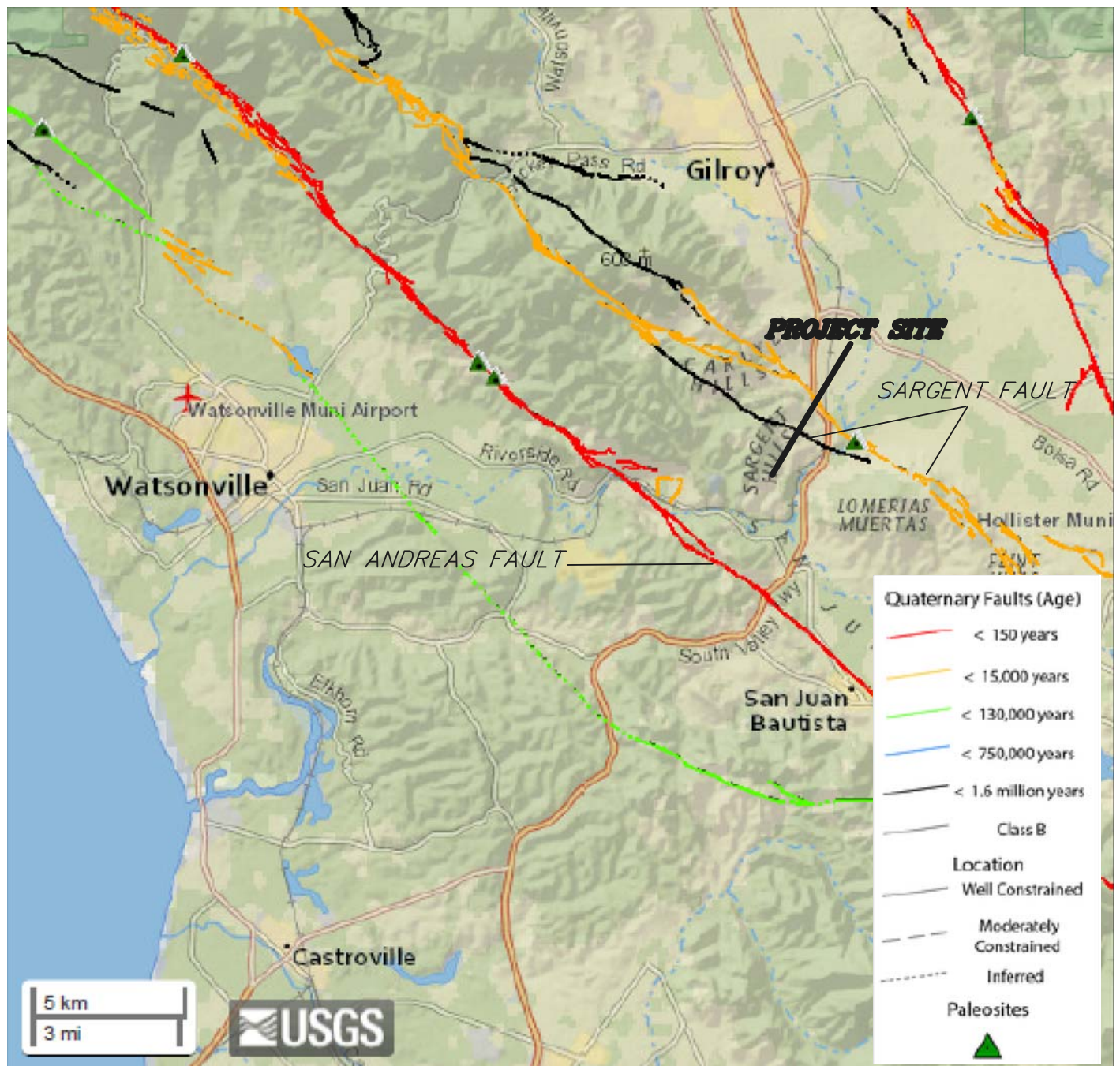
JOB NO. 3.31274

DWG GEOLOGY.DWG

SHEET

FIGURE 3

OF 4 SHEETS



NOT TO SCALE

SIERRA GEOTECHNICAL SERVICES INC.
SGSI

PROJECT:	<i>REGIONAL FAULT MAP SARGENT RANCH</i>	
COORD:	<i>36.9169; -121.5647</i>	DATE: <i>12/2015</i>
DRAWING:	<i>FIGURE 7.DWG</i>	DRAWN BY: <i>JAA</i>
JOB NO:	<i>3.31274</i>	FIGURE: <i>FIGURE 4</i>

APPENDIX A

EXPLORATORY BORING

AND

TEST PIT LOGS

SIERRA GEOTECHNICAL SERVICES873 NORTH MAIN STREET, SUITE 150, BISHOP, CA 93514 PHONE: (760) 937-4789 www.sgsi.us
Caltrans Lab No. 214; AMRL Lab No. 2460; CCRL Lab No. 2081; DSA LEA Lab No. 189

SIERRA GEOTECHNICAL SERVICES, INC.

BORING NO: BH-1

JOB NO: 3.31274

GEOTECHNICAL BORING LOG

PROJECT: Sargent Ranch

START DATE: 8/20/15

LOCATION: Phase 1 - East side

CLIENT: Freeman Associates

START TIME: 09:27

DRILLER: TriValley

DRILLING METHOD: Bucket Auger - 30 inch

RIG: Caldwell

END DATE: 8/20/15

LOGGED BY: JA/RWS

GROUNDWATER DEPTH: 86.5 ft.

GROUND ELEVATION: 280 ft.

TOTAL DEPTH: 97 ft.

END TIME: 19:10

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0				sc-sm	0-3' - Topsoil; Dark brown, clayey, silty vf sand and vf sandy clay. Moist, loose to mod. dense.
4					Olive gray and orange brown (FeO stained), silty vf sand and vf sandy silt. Moist, dense.
6					6'3" to 7'3" - One foot thick bed of yellow brown, vf sand. Basal contact: N78E 30NW.
8					
10					10' to 11'3" - Unconformity. Contact; nearly level on south east, to ~60° north.
12					Light red brown and light olive brown, FeO stained beds, silty vf-m sand with tr. gravel, some concretions, laminated to bedded and x-bedded, liquifaction features, poss. folding, micaceous.
14					
16					
18					
20					21' - Bedding: N44E 40NW
22					22' - Bedding: N69E 5NW on c sand & gravel lens.
24					25' - Trace gravel to 1" diameter.
26					
28					28' - Light red brown, orange brown, light gray, Interbedded and x-bedded f-c sand. Beds are 3"-6" thick. Moderately dense, firm. X-bedding? N70W 58SE.
30					
32					
34					
36					
38					39' - ~10% c sand and gravel to 1/2" diameter, rounded to well rounded, mod. dense, firm
40					39.5' - Contact: N72E 18NW. Concretions at contact. Dusky yellow brown (black) clay and dark gray silty clay, bedded, v stiff, v plastic, internally sheared.
42					41'-41.5' - Ring and bulk samples BH-1 41'-41.5' Bluish gray silty clay.
44					42' - Bedding: N77E 18NW. Thin bed of gray clay.
46					44' - Olive gray silty clay, bedded, v stiff, v plastic.
48					
50					
52					

CODES:

SHEET 1 OF 2

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SGS

GEOTECHNICAL BORING LOG

BORING NO: BH-1

JOB NO: 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
54'		12/12			54' - Black silty clay, v stiff, v plastic. Ring sample BH-1 54'-55'.
56'					
60'					61' - Contact: 66E 16 NW. Dark greenish gray, silty vf sand, v stiff, v moist. Carbonate concretions and stringers at contact.
64'					64' - Contact: Light olive brown, vf sandy silt, v stiff, sl plastic, v moist. Channeled.
68'					67' - Contact: N49E 25NW. Dark yellow orange, interbedded and x-bedded, f-c sand, gravelly sand, silty vf sand and silty f-m sand.
72'					71' - Contact: N74W 30NE. Dark green gray, vf sandy silt with clay. V stiff, sl plastic.
76'					
80'					78' - Increase silt content.
84'					
88'					86.5' - Slight Ground Water seepage along joints. Affected silt/clay is highly plastic. Joints: N25W 90, N34W 90, N43W 83SW.
92'					90' - Grades into Dark gray to dark greenish gray, silty vf sand. Dense, wet, non-plastic.
96'					
100'					97' - Total Depth
104'					
108'					
112'					

CODES:

SHEET 2 OF 2

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Caltrans Lab No. 214; AMRL Lab No. 2460; CCRL Lab No. 2081; DSA LEA Lab No. 189BORING NO: BH-2
JOB NO: 3.31274**GEOTECHNICAL BORING LOG**

PROJECT: Sargent Ranch

START DATE: 8/21/15

LOCATION: Phase 1 - South side

CLIENT: Freeman Associates

START TIME: 08:05

DRILLER: TriValley

DRILLING METHOD: Bucket Auger - 30 inch

RIG: Caldwell

END DATE: 8/21/15

LOGGED BY: JA/RWS

GROUNDWATER DEPTH: 79 ft.

GROUND ELEVATION: 245 ft.

TOTAL DEPTH: 99 ft.

END TIME: 16:00

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
	S				
	N				
0-6'					Topsoil/colluvium: Dark brown, silty vf-m sand with clay.
6'-8'					Contact: Topsoil contact dips from 6 ft. on north side of boring to 8 ft. on south side of boring. Light yellow brown, silty vf sand, dense, moist.
8'					Bedding or Joint: N82E 7NW. Dark brown soil and root lined, 1/4 to 1/2 inch thick.
9'					Fault: N53E 50SE. 1/16 to 1/4 inch thick, light brown gouge. No visible offset.
14'4"					Contact: N82E 8NW: Root lined. light yellow brown/tan, vf sandy silt with light brown to light orange brown, silty f-m sand in liquefaction features (eroded sand volcanoes). Thin FeO staining along and across bedding.
16'2"					Contact: N17E 3NW. Light brown to light orange brown, silty f-m sand with trace c sand.
19'					Bedding: N49W 14NE.
21'					Bedding: N87W 11NE. Top of interbeds of dark orange brown, silty f-c sand with gravel to 3/4 inch diameter.
22.5'					Bedding: N81W 23NE. Top of x-bedding.
27'					Joints: N19W 90 and N39W 84SW. Top of joints at bedding plane. Sediments are loose between joints.
39'					Joint: N36E 90.
40'					Bulk sample. BH-2 40ft.
43'					Joint: N6E 90. Sediments still loose.
47'					Bedding: N58E 23NW. One inch thick gravel bed. Sediments are loose and caving.

CODES:

SHEET 1 OF 2

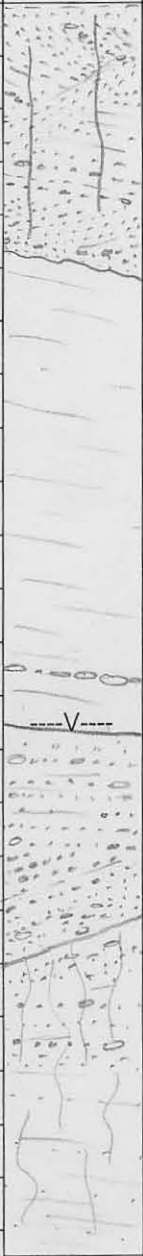
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SCS

BORING NO: BH-2

GEOTECHNICAL BORING LOG

JOB NO: 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					56'7"-57'3" - FeO stained band. Sediments are soft and caving around joints.
60					61.5' - Contact: N66W 11NE. Undulatory. Blue gray, clayey silt. Top 1/2 to 2 inches is bleached. Very plastic, wet. Sand above contact is FeO cemented.
64					
68					
72					72' - Interbeds of one ft. thick, blue gray, clayey, vf sandy silt, sl plastic, and clayey silt, mod. plastic.
76					75' to 77' - Olive black, clayey, vf sandy silt.
80					77' - CaCO3 nodules to 3 inches long, along contact, v hard. Blue gray, clayey, vf sandy silt and clayey silt.
84					79' - Groundwater seepage from Fault: N25W 9NE, slicks plunge 74NE. 1/8 inch thick dark brown, gouge.
88					79'8" - Dark blue gray, clayey silt.
92					83' - Blue gray, silty, vf sandy gravel to 1 inch diameter. Seeping water.
96					86.5' - Fault: N81E 18SE. Blocky jointing below. Caving.
100					92' - Blue gray, clayey, silty vf sand. Dense, spoils are producing fumes.
104					Note: Basal plane of slide may be located below TD, due to loose sediments and blocky jointing. Need to evaluate during grading.
108					99' - Total Depth
112					

CODES:

SHEET 2 OF 2

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						JOB NO: 3.31274			
GEOTECHNICAL BORING LOG				PROJECT: Sargent Ranch		START DATE: 8/21/15			
LOCATION: Phase				CLIENT: Freeman Associates		START TIME: 16:45			
DRILLER: TriValley				DRILLING METHOD: Bucket Auger - 30 inch		RIG: Caldwell			
LOGGED BY: JA/RWS				GROUNDWATER DEPTH: 93 ft.		GROUND ELEVATION: 360 ft.			
				TOTAL DEPTH: 99 ft.		END DATE: 8/22/15			
		END TIME: 15:00							

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
	S N				0-5' - Topsoil: Dark brown, silty, vf-m sand with clay. Dense.
4					5' - Light brown to light yellow brown, vf sandy silty with silty vf sand. Moist, dense.
8					
9					9' - Transition to silty, vf sand.
11					11'10" - Contact: Silt. FeO concretions at contact. Bedding dips 6SE.
12					12'9" - Vf sandy silt.
13					13'1" - Contact: N2W 10NE. Light to medium brown, silty, vf-f sand. Loose.
16					
20					
23					23' - M-c sand. x-bedded.
24					25' - Light red brown and light orange brown silty, vf-m sand with thin interbedded gravels.
28					28' - Contact: N55W 18NE. C sand to f sand contact.
32					
36					36' - Light reddish brown, increased sand, less color changes.
40					
41					41'7" - Contact: N54W 23NE. Olive brown, silty clay.
44					45' - Contact: N8E 70SE. Dark blue gray, silty clay.
45.5					45.5' - Infilled fracture, FeO stained.
48					
50					50' - Contact: N69E 60SE.
52					

CODES:	SHEET 1 OF 2
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SIERRA GEOTECHNICAL SERVICES

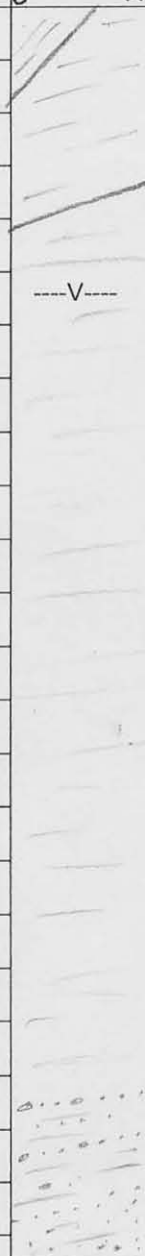
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BORING NO. BH-3

GEOTECHNICAL BORING LOG

JOB NO. 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					
59'					Slide Plane: N30W 35SW. Slicks plunging downdip. N15E 51SE, N34W 29SW with slicks.
63'					Groundwater seepage, minor. Wood fragments.
93'					Transition to clayey, silty f-c sand with small gravel. Moderate groundwater seepage.
99'					Total Depth
100					
104					
108					
112					

CODES:

SHEET 2 OF 2

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GEOTECHNICAL BORING LOG						PROJECT: Sargent Ranch		START DATE: 8/22/15	
LOCATION: Phase 2 - North edge						CLIENT: Freeman Associates		START TIME: 15:44	
DRILLER: TriValley						DRILLING METHOD: Bucket Auger - 30 inch		RIG: Caldwell	
LOGGED BY: RWS		GROUNDWATER DEPTH: 94.5 ft.		GROUND ELEVATION: 350 ft.		TOTAL DEPTH: 103 ft.		END DATE: 8/23/15	
END TIME: 15:46									
DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS				
0 4 8 12 16 20 24 28 32 36 40 44 48 52					0-2' - Topsoil. 2' - Very pale orange, silty, vf sand. 2.5' - Joints: N34W 72 NE. Several parallel joints, root lined. 5' - Top of multiple 2" to 4" thick laminated beds, bracketed by orange brown FeO seams. Mod. orange brown, FeO stained, f-m sand with trace c sand. 7.5' - Bedding: N19W 10NE. Thin, Dark brown, FeO cemented seam at top and bottom of 2 inch vf sand bed. Laminated, interbedded, Light olive brown, vf sandy silt, sl plastic and very pale orange, silty, vf sand. 9' - Joint: N38W 88NE. 10'8" - Interbedded f-c sands and silty sands. 12' - Bedding: N83E 10NW. 6 inch bed of silty vf-f sand. Interbedded sands. 16.5' - FeO concretions around silt clasts to 8 inches diameter. 17' - Bedding: N79W 4NE. F-c sand interbed. ~20' - Dark orange brown, sandy cobbles with f-c sand interbeds. Interbeds are x-bedded to massive. 22' - Bulk Sample: BH-4 22 ft. 26' - Fault: N25E 41NW. Mid-section of thin fault, down on the west side ~8-10". Small drag folds in silty sand and sand interbeds. Gray with FeO streaks, gravelly sand and sandy gravel, with cobbles, clean. 35' - Contact: N84W 4NE. Gray, m sand with f-c sand. Clean.				
CODES:						SHEET 1 OF 2			

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BORING NO: BH-4
JOB NO: 3.31274

GEOTECHNICAL BORING LOG

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					56.5' - Dark orange brown, FeO cemented cobbles with sand and gravel. Clast supported, hard. Interbedded and x-bedded sand and gravel. 60' - Irregular horizontal contact. Olive gray, f sand. 61.5' - With gravel. 62' - Bedding: N31E 4NW. 6 inch thick, olive gray, f sand. X-bedded. 62.5' - Mottled, dark orange brown and olive gray, sandy, gravelly cobbles. FeO cemented, dense, clast supported. 67'4" - Interbedded sand and gravel. 82' - Orange brown and olive gray, f-c sand. Clean, dense, thinly bedded and x-bedded. - Joint: N25W 88NE. 86' - Contact: N19W 7NE. Dark orange brown, interbedded sand and and gravel. 90' - Contact: N45W 8NE. Irregular, FeO cemented gravel. Dense. 94.5' - Contact: ~N30E 11NW, irregular. Groundwater seepage at top of brown, clayey, FeO cemented gravel. Hard, well cemented. 96.5' - Contact: Blue gray, clayey gravel. 97.5' - Blue gray, vf sandy clay, vf sandy silt and silty vf sand. Dense, interbedded. 99' - Contact: N45W 11NE. Dark brown, clayey silt. Dense. 100' - Olive brown, vf sandy silt and silty vf sand. Dense. 103' - Total Depth
56					
60					
64					
68					
72					
76					
80					
84					
88					
92					
96					
100					
104					
108					
112					

CODES:

SHEET 2 OF 2

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BORING NO:	BH-5
JOB NO:	3.31274
START DATE:	8/23/15
START TIME:	16:08
END DATE:	8/24/15
END TIME:	15:49

GEOTECHNICAL BORING LOGPROJECT: **Sargent Ranch**LOCATION: **Phase 2 - West End**CLIENT: **Freeman Associates**DRILLER: **TriValley**DRILLING METHOD: **Bucket Auger - 30 inch**RIG: **Caldwell**

LOGGED BY:

RWS

GROUNDWATER DEPTH:

Not Reached

GROUND ELEVATION:

480 ft.

TOTAL DEPTH:

100 ft.

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-3' - Topsoil.
4					3' - Light olive gray, vf sandy silt. Dense, irregular blocky jointing.
					4' - 4 inch thick bed of orange brown f sand. Truncated by fault at 5.5 ft..
					5.5' - Fault: N22W 34SW. 1/4 inch brown clay gouge, unknown offset. Joint: N78E 49 NW. No visible offset, sl jumbled adjacent to plane, root lined, MnO stained.
8					Med. olive brown with light olive brown, vf sandy silt and clay.
					7' - Fault: N73W 53NE. 1-3 inch thick, jumbled, mottled, Dark brown, orange brown, olive gray clay gouge, root lined, down on north side 2 inches.
					7.5' - Fault: N74E 76SE. Slicks N84E 14. 1/16 to 1/8 inch gouge. Truncates fault at 7 ft. Joint: N75E 84SE. Offset by fault at 7 ft. ~down on north side 2 inches.
12					9.5' - Shear: N60W 78NE. Prominent of many shears in all directions.
					10' - Shear: N17W 26SW. Cuts shear at 9.5 ft.
					11'9" - Shear: N24W 45SW. Slicks S83W 18.
16					14' - Multiple Shears: N41W 67SW. Fine sand entrained in clay gouge, FeO lined.
					14.5' - Shear: N37E 53 NW. v thin to 1/4 inch clay gouge, offsets shears at 14 ft. Med. olive brown, silty vf sand.
20					16' - Joint: N76W 90.
					17'4" - Shear: N54W 64NE. Thin, dark brown gouge. Truncates joints above and below.
					18' - Joint: N63W 90.
					18'4" - Fault: E-W 22S. 1/8 to 1/2 inch brown clay gouge, carbon rich.
24					19'8" - Bedding: N86W 7SW. one inch thick, orange brown, f sand bed, undulatory, carbon rich. Truncated by fault at 18'4".
					22.5' - Fault: N75E 25NW. Thin, orange brown, silty, vf sandy gouge.
28					Average bedding: N38E 18SE. Interbedded, silt and f sand, displaced by multiple faults down on east side 1-3 inches each fault.
					28' - Mod. olive brown, silty clay and clayey silt with interbeds of clayey, silty vf sand.
32					32.5' - Fault: N48W 43NE.
					33' - Fault: N71W 55NE.
					34' - Fault: N34W 90. Slicks are horizontal.
36					34.5' - Fault: N52E 11SE. Slicks dip to south.
					37' - Shears: N74W 68SW, N59W 90, N72W 90 with slicks 9S, FeO stained. Nearly vertical clayey silt and clay, mod. to very plastic, highly contorted, very stiff.
40					40' - Fault: N74E 3SE. FeO stained.
					41' - Fault: N51W 72NE. 1 to 1.5 inch thick gouge. CaCO3 lined fault up to 1.5 inches thick. Offset by shear above. Small joints and faults below fault at 40 ft. and above ~44 ft. distort bedding.
44					~44' - Fault: N24E 46SE, Joint: N39W 77NE.
					46.5' - Fault 11E 43SE. 1/2 inch thick blue gray clay gouge (dragged in from below). Bedding is ~horizontal. Mod. olive brown, vf sandy silt.
48					49'10" - Fault: N4W 68NE. Truncated by fault at 50.5 ft. Nearly vertical jointing between ~44 ft. and 50.5 ft.
52					50.5' - Fault: N6E 68SE. Slicks S10E 43.
					52' - Light olive brown, silty vf-f sand.

CODES:

SHEET 1 OF 2

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SGS

BORING NO. BH-5
JOB NO. 3.31274

GEOTECHNICAL BORING LOG

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
54.5'					- Fault: N22W 51NE. Drag folded bedding, down on north 3 inches. Light olive brown, silty vf-f sand.
56'					- Fault: N30W 63 NE. down on north 3 inches.
59.5'					- CaCO3 seam. 1/2 to 2 inches thick, offset by fault, crossed by sand stringers from below.
61.5'					- Sand bed, 2 inches thick, down 8 inches on north side.
63' 2"					- Fault: N82W 59NE. 1/2 to 2 inch wide, orange brown, FeO lined, vertical and irregular, f-m sand stringers, rising off fault through olive brown silt and vf-f sand with silt.
					Light gray and orange brown, f-c sand with gravel to 1/2 inch diameter, x-bedded, loose,
66'					- Bedding: Horizontal. Interbedded of vf sandy silt.
68'					- Fault: N74W 81NE. Down 5 inches on north side.
73'					- Fault: N46W 72NE. Down 2 ft. on north side, 1/4 - 1/2 inch thick clay gouge. Drag folds.
76' 3"					- Laminated sands.
79.5'					- Bedding: N36E 7SE. vf-f sandy, clayey silt, Light olive gray top, light orange brown to brown at base, laminated.
83.5'					- Bedding: N53W 16SW. Light gray and olive brown, f-c sand, interbedded, x-bedded, ave. foresets trend N40E.
84.5'					- Orange brown (FeO stained), light olive gray, light grey, light orange brown, f-c sand and gravelly sand with cobbles to 3 inches diameter, interbedded and x-bedded, dense.
91'					- Bedding: N64W 6SW. Light gray, f-m sand bed, 3-4 inches thick.
100'					- Total Depth

CODES:

SHEET 2 OF 2

SIERRA GEOTECHNICAL SERVICES

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BORING NO.	BH-6
JOB NO.	3.31274
START DATE	8/24/15
START TIME	16:55
END DATE	8/25/15
END TIME	14:30

GEOTECHNICAL BORING LOG		PROJECT: Sargent Ranch	
LOCATION: Phase 2 - North Side		CLIENT: Freeman Associates	
DRILLER: TriValley		DRILLING METHOD: Bucket Auger - 30 inch	RIG: Caldwell
LOGGED BY: RWS	GROUNDWATER DEPTH: 42.5 ft.	GROUND ELEVATION: 295 ft.	TOTAL DEPTH: 70 ft.

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-15' - Topsoil/Colluvium: Mottled, dark brown, mod. brown, mod. orange brown, and light orange gray, clayey, vf-c sand with gravel and cobbles to 5 inches diameter. Massive, sl plastic, sticky, dense. Clasts are clay coated. Resembles artificial fill.
4					
8					
12					
16					15' - Grades into vf-c sandy gravel and cobbles with clay. Massive, matrix supported, sl plastic, sticky, dense. Clasts are clay coated.
20					16' - Increased cobbles, up to 10 inches diameter, matrix supported, FeO staining in seams and as coating on clasts.
24					20' - Mod. orange brown, vf-c sandy gravel and cobbles with less clay, mod. sticky. Massive to slightly graded upwards.
28					~23' - Groundwater level rose to here after logging.
32					26.5' - Contact: Horizontal, undulatory. Dark orange brown, f-c sand and gravel, sticky, sl plastic, v moist, x-bedded.
36					29.5' - Fault: N76W 37NE, 3/8 inch thick, clayey sand, gouge.
40					31.5' - Bedding: N2E 11SE. X-bedded.
44					32.5' - Fault/shear: N58E 10 SE, slicks S35W on thin clay seam, 1/4 to 1/2 inch thick. Mostly sand lined, root lined, v plastic.
48					34.5' - Bedding?: N44E 10NW. Possible thin bed of silt.
52					37'5" - Fault: N63W 42NE.
					42.5' - Wet. FeO stained, sandy gravel, x-bedded. Caving.
					45' - Caved to 4 ft. beyond boring diameter. Sandy gravel and gravelly sand with cobbles, x-bedded.
					47' - Groundwater level. All lithology below this point is from bucket spoils.
					49' - Gray yellow, dark yellow orange, v pale orange, vf sand with silt.
					~52' - Blue gray, clayey, sandy, gravel with light brown and dark blue gray mottling.

CODES:

SHEET 1 OF 2

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SCS

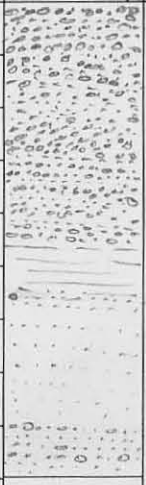
BORING NO:

BH-6

JOB NO:

3.31274

GEOTECHNICAL BORING LOG

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					Blue gray, clayey, sandy, gravel with light brown and dark blue gray mottling.
60					61.5' - Dark olive gray to olive black clay. V plastic, v stiff.
64					63' - Olive gray and olive brown, vf-f sand with trace silt.
68					66' - Dark yellow brown, f sand with trace silt.
72					68' - Dark orange brown and olive brown, gravelly f-m sand with f-c sand, interbedded.
76					70' - Total Depth
80					
84					
88					
92					
96					
100					
104					
108					
112					

CODES:

SHEET 2 OF 2

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BORING NO:	BH-7
JOB NO:	3.31274
START DATE:	8/25/15
START TIME:	15:00
END DATE:	8/26/15
END TIME:	10:24

GEOTECHNICAL BORING LOG

PROJECT: Sargent Ranch

LOCATION: Phase 1 - South side

CLIENT: Freeman Associates

DRILLER: TriValley

DRILLING METHOD: Bucket Auger - 30 inch

RIG: Caldwell

LOGGED BY: RWS

GROUNDWATER DEPTH: 35 ft.

GROUND ELEVATION: 293 ft.

TOTAL DEPTH: 47 ft.

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-7.5' - Topsoil.
4					
8					7.5'-9' - Gradational contact: From Dark brown topsoil to mod. brown clayey, f-m sand with trace gravel. Mod. plastic.
12					9' - Mottled light olive gray, olive gray with orange brown FeO stains around clasts, f-m sand with c sand and gravel, clasts of silty vf sand to 6 inches diameter. Jumbled together similar to artificial fill.
16					14'-16' - Fault contact: N62E 45NW. Down on northeast side >2 ft. Silty sand clasts and gravels drag folded into fault alignment across 1 ft. wide zone. Light orange brown to dark orange brown (FeO stained) f-m sand with trace silt and occasional gravel and cobbles to 6 inches diameter. Sand beds are contorted to: N88E 57-70NW. Several sand beds are speckled throughout with oil stains up to 1/4 inch diameter, in beds up to 6 inches thick.
20					19'4" - Fault: N88W 55NE. Down on northeast side several feet. 1/8 inch thick gouge.
24					20'10" - Fault contact. Bedding: N66W 43NE. Lith. east side; as above with a 1 ft. thick olive brown, clayey silty vf sand. West side; orange brown FeO stained, f-c sandy gravel with cobbles up to 3 inches diameter. Displacement >4 ft.
28					22' - Faults: N56E 49NW: Parallel, down on west.
32					23' - Light orange brown f-m sand with trace silt, oil sand blobs up to 2 ft. long x 4" thick.
36					23'10" - Fault: as above at 22 ft..
40					24' - Fault: as above at 22 ft. Contact: FeO stained, orange brown and olive gray, silty f-c sandy gravel with cobbles to 6 inches diameter. Dense.
44					26' 3" - Contact: ~N-S 2 E. Faulted, light olive gray, clayey f-c sand with ~3" thick FeO stained base, v plastic. Liquifaction features in sand beds.
48					26'9"-27.5' - Shears: N69E 44NW. Multiple, weakens BH walls. Bedding: E-W 49N, gravel lined.
52					28' - Fault or joint: N15E 86NW.
					29' - Fault: N30E 77NW. No gouge, clay dragged into fault, down on SE 10 inches. X-bedded.
					31.5' - Top of cave in. Multiple joints and faults causing caving.
					33.5' - Fault/bedding contact: E-W 49N. Orange brown, f-c sand with gravel, loose.
					35' - Fault: N9W 47SW. Orange brown, f-c sand, loose. Groundwater seepage. Caving.
					~37' - Bottom of cavern, ~15 ft. wide. All lithology below this point from bucket spoils.
					40' - Med. olive brown, f-m sand, loose, wet.
					45' - Light olive gray, silty vf-f sand, laminated, dense.
					46.5' - Gray, olive gray and blue gray, clays.
					47' - Total Depth. Due to caving.

CODES:

SHEET 1 OF 1

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BORING NO:	BH-8
JOB NO:	3.31274
START DATE:	8/26/15
START TIME:	12:05
END DATE:	8/27/15
END TIME:	12:30

GEOTECHNICAL BORING LOG		PROJECT:	Sargent Ranch	
LOCATION:	Phase 4 - West end	CLIENT:	Freeman Associates	
DRILLER:	TriValley	DRILLING METHOD:	Bucket Auger - 30 inch	RIG: Caldwell
LOGGED BY:	RWS	GROUNDWATER DEPTH:	Not Reached	GROUND ELEVATION: 410 ft. TOTAL DEPTH: 99.5 ft.

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-5' - Topsoil.
4					
5					5' - Dark yellow orange, f-m sand with clay, mod. plastic, moist.
8					8' - Variegated, light to olive dark brown, dark yellow orange, silty vf sand, dense, Soft, white, CaCO3 stringers along shears. Multiple, multi-directional, small shears throughout. Bedding is highly contorted and sheared to Total Depth.
12					
13					13' - Variegated, light to medium olive gray with dark orange brown (FeO) stringers, vf sandy silt, sl plastic, moist.
16					
18					18' - Multiple faults and shears: N80W 66NE. Undulatory.
20					
24					
28					
32					
34					34' - Shear: N48W 90 with horizontal slicks, and Shear/joint: N75E 79SE. Multi-directional small interconnected shears to 39 ft. depth.
36					
37					37' - Shears: N79E 90, N72W 90, N70E 77NW. Dark olive gray and med. orange brown, clay with blue gray clay in fractures and shears to 1/8 inch thick.
40					39' - Top of blue gray clay, plastic, moist. Shears: N20W 29NE. N60E 49SE. Wood fragments, very dark brown, hard.
43					43' - Fault: N-S 31E. 1/4 - 1/2 inch black gouge, multiple shears above and below.
44					
49					49'-50' - Large piece of wood, 3x14 inches, very dark brown, hard.
50					50' - Shear: N31W 69NE. Crosses fault zone with no visible displacement. Large pieces of wood and fragments of fossil shells in bucket spoils. Region of multiple shears. Mottled light and dark blue gray, clay, v plastic.
50					50'-51' - Fault: N31W 22NE. 6 inch zone of thin black clay gouge lined faults. V. plastic.
51					51' - Fault/shear: N21W 63NE.
52					52 - Shear: N20W 51NE. Dark blue gray, clay.

CODES:

SHEET 1 OF 2

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BORING NO. BH-8

GEOTECHNICAL BORING LOG

JOB NO. 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
52.5'					- Fault: N30W 31NE. 1/2 to 1 inch thick, black, clay gouge, root lined.
53.5'					- Fault: N3W 41NE. 1/4 inch black. clay gouge. Shear: N26E 69SE.
55'8"					- Fault: N-S 46E. Slicks down dip. Contact: Light blue gray clayey, silty vf sand, mod plastic above fault and silty, vf sandy clay below fault.
57.5'					- Shears: N12E 60SE, slicks 47S. N3E 57NW, horizontal slicks. Mod. blue gray, clayey, v fine, sandy silt.
58.5'					- Main shear: N28W 63NE. FeO stained.
60.5'					- Shear: N32W 44NE. Main shear among innumerable small shears.
64'					- Shear: N31E 90. Vertical slicks. Blue gray, clay. With multi directional small shears adjacent to the main shear.
					Multi directional small shears, most are curved and with steep dips.
70'			BH-8 70 to 72 ft.		- Shear: N49E 64SE. No gouge. Contact: Mottled, light blue gray with olive gray, clay.
71'					- Shear: N53E 56NW. Bulk Sample: BH-8 70 to 72 ft.
72'					- Shear: N70W 22NE. Dominant shear.
72.5'					- Shear: N16W 90. Undulatory.
74'					- Fault: N80W 36NE 1/4 inch black, clay gouge. Shear: N48W 12NE. Wood fragments.
75.5'			BH-8 75 to 80 ft.		- Fault: N63W 39NE. v thin and MnO stained. Bulk Sample: BH-8 75 to 80 ft.
					Multiple shears: N20W 90, slicks 59S. N1E 63SE, slicks 46S. Others - horizontal slicks.
77.5'					- Faults: N68E 21NW. Parallel. 1/16 inch thick, black, clay gouge.
79.5'					- Fault: N62W 19NE, slicks N41W 3-5, crenulated. 1/2 inch thick, black clay zone with polished MnO on all sheared surfaces.
80'					- Shears: N23E 71NW. N22E 32SE, minor. Slicks are multi directional, horizontal to ~30S. All shears are crenulated and undulatory.
82.5'					- Shears: N70W 59NE, slicks N39W 41. N11E 28NE, horizontal slicks, N84W 63NE slicks N56W 56.
85'-86'					- Faults: N66W 47NE, slicks N8E 34. N88W 55NE, slicks 47NW. N62W 31NE, slicks down dip. All with 1/8 inch thick, black, clay gouge, MnO stained, polished.
87.5'					- Fault: N16E 33SE. 1/2 inch black, clay gouge. Slicks due east. Gradational contact; dark blue gray, clay, v plastic.
88'					- Shears: N86W 69NE and N64E 90. Undulatory. Many smaller shears.
91'					- Shears: N18E 26SE and N10W 25NE. Both slicks S26E 14.
94'					- Shear: N22W 90, slicks 64S.
98'					- Top of Slough
99.5'					- Total Depth
100'					
104'					
108'					
112'					

CODES:

SHEET 2 OF 2

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BORING NO. BH-9
JOB NO. 3.31274

GEOTECHNICAL BORING LOG		PROJECT: Sargent Ranch		START DATE: 8/27/15
LOCATION: Phase 3 - North side		CLIENT: Freeman Associates		START TIME: 13:32
DRILLER: TriValley		DRILLING METHOD: Bucket Auger - 30 inch	RIG: Caldwell	END DATE: 8/28/15
LOGGED BY: RWS	GROUNDWATER DEPTH: Not Reached	GROUND ELEVATION: 417 ft.	TOTAL DEPTH: 100 ft.	END TIME: 12:03

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0'-2' - Topsoil.
2					2' - Light gray orange, silty, vf sand, with gravel and cobbles to 4 inches diameter. Dense, moist.
4					4' - Fault or joint: N78W 80NE. CaCO ₃ and root lined.
8					2'-9' - Contact: N50W 90, undulatory bedding. South side; light orange brown and light orange gray, interbedded, v-m sand and silty sand. North side; silty, vf sand with gravel. Sandstone clasts to 4 inches diameter aligned at contact, hard.
12					Lith: Mod. orange brown, vf sandy silt and clay, with clayey, silty vf sand, dense, sl plastic.
16					9' - Contact exits BH on south side, dip now 70S. Lithology on north side; olive brown, silty, vf sandy clay, sheared, grades to clayey sand on north side of BH.
20					14' - Bedding: N62W 83SW. Light gray orange, silty, vf sand. Dense, blocky, sl plastic.
24					16' - Joints?: N57E 57NW and N70W 56NE, thin FeO stained lines. Multiple interconnecting.
28					Increase gravel content.
32					21' - Joint: N10E 79SE. FeO stained, 1/8 inch thick.
36					23' - Joints: N2W 83SW, N32E 46 NW, N15E 82SE, N7W 89NE. FeO lined.
40					Bedding as above at 14 ft.
44					24.5' - Gravel bed exits BH.
48					Lithology: Olive gray and light orange brown vf-f sand with silt and trace gravel.
52					Non-plastic, FeO stringers and stains.
					30' - Joint: N10W 65SW. FeO lined.
					31' - Mottled orange brown, olive gray, olive brown, gravelly sand with trace clay, sl plastic, matrix supported.
					32' - Joints: N80W 71SW, N64W 80SW.
					35' - Joint: N80E 85SE.
					40' - Bedding: ~N64W 75SW. Exit sand beds from BH. Gravelly sand with cobbles.
					48' - Becoming clast supported, increase cobbles to 60%. Cobbles are mostly sandstone clasts, hard, well rounded, some chert, clay coated, plastic, to 8 inches diameter. ~20% is quartz, granite and metamorphics.

CODES:

SHEET 1 OF 2

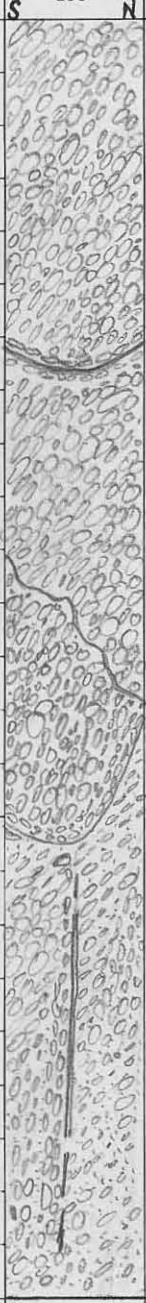
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BORING NO: BH-9
JOB NO: 3.31274

GEOTECHNICAL BORING LOG

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					65'4" - Fault: N-S 61W, slicks down dip. 1/2 to 3/4 inch thick, dark olive gray, clay, v plastic, wet (no seepage), 4 inch thick zone of aligned clasts, pulverized.
60					69' - Greenish gray and blue gray, clayey, sand and gravel with cobbles. Gradually more bluish with depth to 72ft. Clast supported
64					72'2" - Contact: ~N30E 65NW, very irregular. Dark blue gray, sandy gravel and cobbles with clay, clast supported, sl plastic.
68					75'8" - 3 inch piece of v dark brown wood, hard.
72					77' - Becoming greenish.
76					Dark greenish gray, gravel and cobbles, clast supported.
80					83' - Fault: N29W 80SW. Dark blue gray, clay gouge, 1/4 inch thick. Aligned cobbles. Light greenish gray, clayey, gravelly sand with cobbles to 4 inches diameter, matrix supported, mod. plastic, massive. Still mostly sandstone clasts, well rounded, hard.
84					85' - Becomes dark greenish gray and clast supported with depth, clasts become aligned.
88					88' - Fault: N83W 87SW. 6inch zone of aligned clasts, alignment increases closer to fault. Multiple shears at contact in dark greenish gray clay stringers to 1/8 inch thick. Blue green on south side of fault, olive brown and light orange brown on north side. Bedding appears to parallel fault.
92					95' - Lose track of fault.
96					100' - Total Depth
100					
104					
108					
112					
CODES:					SHEET 2 OF 2

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Caltrans Lab No. 214; AMRL Lab No. 2460; CCRL Lab No. 2081; DSA LEA Lab No. 189BORING NO: BH-10
JOB NO: 3.31274

GEOTECHNICAL BORING LOG		PROJECT: Sargent Ranch	START DATE: 8/28/15
LOCATION: Phase 3 - East side	CLIENT: Freeman Associates	START TIME: 12:10	
DRILLER: TriValley	DRILLING METHOD: Bucket Auger - 30 inch	RIG: Caldwell	END DATE: 8/29/15
LOGGED BY: RWS	GROUNDWATER DEPTH: Not Reached	GROUND ELEVATION: 340 ft.	TOTAL DEPTH: 99 ft.
			END TIME: 10:30

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-2' - Topsoil.
4					Light olive gray and light gray, interbedded, f-m sand with f-c sand and trace gravel to 1/2 inch diameter. X-bedded.
6					6' - Faults: N11E86SE, down on east side 1 ft., 1/8 inch thick, light brown, sandy gouge. Multiple x-faults with minor offset.
8					Bedding: N89W 39NE.
12					12' - Fault: N13E 31SE, cuts main nearly vertical faults, down 3 inches on the east side.
14.5					14.5' - Fault exits BH.
16					16'2" - Bedding: N76E 49NW. Top of cobble bed, light gray, light olive gray, with black, MnO stains, f-m sandy cobbles with c-sand and gravel, 60% cobbles to 3 inches diameter, clast supported. With interbeds of cobbly, gravelly sand, matrix supported. Lith: Granite, diorite, gneiss, quartz, jasper.
20					
24					24' - Bottom of cobble bed. Light gray, f-c sand, x-bedded.
26					26' - Bedding: N85E 39NW. F-c sandy gravel with cobbles to 3 inches diameter, matrix supported and gravelly, f-c sand. FeO staining along bedding. Increase in granite and grano-diorite clasts.
28					
32					32' - Base of cobble bed. F-c sand as above.
34					34' - F-c sandy cobbles with gravel, Lith: as above.
36					35' - F-c sand with gravel interbeds in f-c sand.
40					
44					41'3" - F-c sandy gravel with cobbles, FeO stained, some sandstone clasts to 6 inches.
48					42'3" - 5 inch thick bed as above with mod. olive gray, silt and sandstone clasts to 6 inches diameter, well rounded, hard.
52					

CODES:

SHEET 1 OF 2

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BORING NO. BH-10

GEOTECHNICAL BORING LOG

JOB NO. 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
54.5'					Contact: N87W 49NE. Mod. olive gray, clay, sheared, mod. plastic, with clayey, vf sand and silty sand, volcano features and v irregular contacts. channeling.
56'					Contact: N74W 44NE. Bottom contact with sand volcano features. Light gray, light olive gray, mottled with dark blue gray, interbedded, f-c sand and gravelly, f-c sand with trace gravel, x-bedded, minor FeO staining along some beds.
60'					
63.5'					Contact: N88W 56NE. 1.5 inch thick oil sand bed, discontinuous. Top of mod. olive gray, vf-f sand, dense.
67.5'					Light gray and light olive gray, f-c sand with gravel and trace cobbles interbedded with f-c sand. Minor FeO staining along bedding, x-bedded. Oil sand blebs up to 2 inches diameter at contact.
72'					
74'					2 inch thick cobble bed.
76'					
78'					2 inch thick cobble bed.
79'					2 inch thick cobble bed.
80'					
84'					
85'					2 inch thick cobble bed. N88W-42NE. With oil sand blebs.
87'					2 inch thick cobble bed. With oil sand blebs. Sand beds typically grade upwards within several inches then restart in new bed.
91.5'					Fault: N12E 71SE. 1/2 to 1 inch thick, light brown, sandy gouge. Down on southeast side at least 5 ft., past BH floor.
95'					Bedding: N25E ~35SE. Orange brown, FeO stained and partially cemented f-c sand and f-c sandy gravel, interbedded.
98'					Slough.
99'					Total Depth
100'					
104'					
108'					
112'					

CODES:

SHEET 2 OF 2

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BORING NO:	BH-11
JOB NO:	3.31274
START DATE:	8/29/15
START TIME:	11:26
END DATE:	8/29/15
END TIME:	19:20

GEOTECHNICAL BORING LOG		PROJECT:	Sargent Ranch	
LOCATION:	Phase 4 - West center	CLIENT:	Freeman Associates	
DRILLER:	TriValley	DRILLING METHOD:	Bucket Auger - 30 inch	RIG: Caldwell
LOGGED BY:	RWS	GROUNDWATER DEPTH:	Not Reached	GROUND ELEVATION: 371 ft. TOTAL DEPTH: 85 ft.

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
0					0-4' - Topsoil.
4					4'-5' - Large burrow.
5					5' 2" - Light gray, f sand, with small shell fragments, loose.
6					6.5' - Bedding: N65E 17NW. on 1 inch, light orange brown, silty vf sand bed.
8					Interbedded, light gray and light olive gray, f-c sand with gravel.
12					9' - Contact: N70E 20NW. Top of gravels. Light gray, med. gray and light olive gray, interbedded and x-bedded, f-c sand, gravelly sand and sandy gravel with cobbles to 10 inches diameter. Beds are graded upwards. Lith: granite, quartz, gneiss, granodiorite, jasper and metamorphics. Caving of gravel and cobbles to 6 ft. diameter.
16					12' - Fault: N64E 64NW. Down on southeast side.
20					17.5' - Bedding? Fault?: N27E 30NW, Crossing bed of med. gray f sand, 3-5 inches thick.
24					18' - Bedding: N64E 42NW. Gravel bed.
28					20' - Fault: N76E 72NW. No gouge.
32					21.5' - Contact/Bedding: N65E 34NW. Irregular, 6 inch thick gravelly cobble bed in gravelly sand, graded upward.
36					23.5' - Fault: N79E 60NW, slicks 56NW. Minor parallel shears: N55W 40NE, FeO stained. Possible bedding plane/contact shear. Mod. olive gray, silty, vf sandy clay.
40					25' - Grades into; Light olive brown, clayey, vf sand, mod. plastic, dense.
44					28' - Variegated and mottled, Blue gray, olive brown, olive gray, light brown, silty, vf sandy clay with random cobbles. Plastic, stiff, with minor shears.
48					30' - Multiple random shears.
52					30'4" - Shear: N67E 70NW. Slicks down dip, undulatory.
					31' - Grades to light orange brown, vf-f sand with trace silt.
					32' - Shear: N78W 56NE. FeO stained.
					39' - Contact: ~N75W 56NE, very irregular, 1/16 to 1/8 inch CaCO3 lined. Variegated and mottled, Blue gray, olive brown, olive gray, light brown, silty, vf sandy clay with random cobbles. Plastic, stiff, with minor shears. Graded up from clayey, vf sand at fault contact below.
					~40' - Fault Contact: (see 47.5 ft.) Light olive gray, silty vf-f sand with random cobbles to 8 inches diameter.
					46' - Contact: N86E 65NW. Sandy gravel with lense of silty, vf-f sand.
					47.5' - Fault: N89W 71NE, slicks 58W. 3/4 inch thick, clay gouge, v plastic.
					48.5' - Contact: Wedge of silty, vf-f sand.
					51' - Contact: N72W 76NE. Sandy gravel and cobbles.

CODES:

SHEET 1 OF 2

SIERRA GEOTECHNICAL SERVICES


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BORING NO. BH-11

GEOTECHNICAL BORING LOG

JOB NO. 3.31274

DEPTH	GRAPHIC LOG	BLOW COUNT	SAMPLE NO	U.S.C.S.	FIELD DESCRIPTIONS
56					~51'~60' - Sandy gravel with a one inch thick bed of clayey gravel. Dips 79NW. Wedge of Silty vf-f sand. Sandy gravel and cobbles.
60					
64					
68					65.5' - Contact: N87W 47NE. Light olive gray, light gray, and light orange brown, f sand. Interbedded and x-bedded. Top of cave in.
72					68' - Joints: N84W 73SW, multiple, parallel. Causing caving of the BH to ~10 ft. wide and down to ~80 ft.
76					
80					~80' - Contact
84					82' - Gray green, vf sandy clay, sheared, stiff, moist.
88					
92					
96					
100					
104					
108					
112					85' - Total Depth
CODES:					SHEET 2 OF 2

BH-1		TD 97 ft.	Notes
Description	Attitude	Depth bgs	
Bedding	N78E 30NW	7.25 ft.	
Bedding	N44E 40NW	21 ft.	
Bedding	N69E 5NW	22 ft.	
Bedding	N70W 58SE	28 ft.	
Contact	N72E 18NW	39.5 ft.	
Bedding	N77E 18NW	42 ft.	
Contact	N66E 16NW	61 ft.	
Contact	N49E 25NW	67 ft.	
Contact	N74W 30NE	71 ft.	
Ground Water		86.5 ft.	
Joint	N25W 90	86.5 ft.	
Joint	N34W 90	86.5 ft.	
Joint	N43W 83SW	86.5 ft.	
BH-2		TD 99 ft.	Notes
Description	Attitude	Depth bgs	
Bedding/Joint	N82E 7NW	8 ft.	Slicks; N74E
Fault	N53E 50SE	9 ft.	
Contact	N82E 8NW	14.3 ft.	
Contact	N17E 3NW	16.2 ft.	
Bedding	N49W 14NE	19 ft.	
Bedding	N87W 11NE	21 ft.	
Bedding	N81W 23 NE	22.5 ft.	
Joints	N19W 90	27 ft.	
Joint	N39W 84SW	27 ft.	
Joint	N36E 90	39 ft.	
Joint	N6E 90	43 ft.	
Bedding	N58E 23 NW	47 ft.	
Contact	N66W 11NE	61.5 ft.	
Fault	N25W 9NE	79 ft.	
Ground Water		79 ft.	
Fault	N81E 18SE	86.5 ft.	
Joints	Blocky	-86.5 ft.	
BH-3		TD 99 ft.	Fault Notes
Description	Attitude	Depth bgs	
Contact	Dips 6SE	11.8 ft.	Slicks; S60W
Contact	N2W 10NE	13.1 ft.	
Contact	N55W 18NE	28 ft.	
Contact	N54W 23NE	41.6 ft.	
Contact	N8E 70 SE	45 ft.	
Contact	N69E 60SE	50 ft.	
Fault	N30W 35SW	59 ft.	
Fault	N34W 29SW	59 ft.	
Bedding	N15E 51SE	59 ft.	
Ground Water		63 ft.	

BH-4		TD 103 ft.	Notes
Description	Attitude	Depth bgs	
Joints	N34W 72NE	2.5 ft.	
Bedding	N19W 10NE	7.5 ft.	
Joint	N38W 88NE	9 ft.	
Bedding	N83E 10NW	12 ft.	
Bedding	N79W 4NE	17 ft.	
Fault	N25E 41NW	26 ft.	
Contact	N84W 4NE	35 ft.	
Contact	Horizontal	60 ft.	
Bedding	N31E 4NW	62 ft.	
Joint	N25W 88NE	82 ft.	
Contact	N19W 7NE	86 ft.	
Contact	N45W 8NE	90 ft.	
Contact	N30E 11NW	94.5 ft.	
Ground Water		94.5 ft.	
Contact	N45W 11 NE	99 ft.	

BH-5		TD 100 ft.	Notes
Description	Attitude	Depth bgs	
Fault	N22W 34SW	5.5 ft.	
Fault	N73W 53NE	7 ft.	Dn on N, 2in.
Fault	N74E 76SE	7.5 ft.	Slicks; N84E 14, Dn on N, 2 in.
Joint	N75E 84SE	7.5 ft.	
Shear	N60W 78NE	9.5 ft.	
Shear	N17W 26SW	10 ft.	
Shear	N24W 45SW	11.75 ft.	Slicks; S83W 18
Shears	N41W 67SW	14 ft.	
Shear	N37E 53NW	14.5 ft.	
Joint	N76W 90	16 ft.	
Shear	N54W 64NE	17.3 ft.	
Joint	N63W 90	18 ft.	
Fault	E-W 22S	18.3 ft.	
Bedding	N86W 7SW	19.7 ft.	
Faults	N75E 25NW	22.5 ft.	Dn on S, 1-3in.
Bedding	N38E 18SE	22.5 ft.	
Fault	N48W43NE	32.5 ft.	
Fault	N71W 55NE	33 ft.	
Fault	N34W 90	34 ft.	Slicks; Horiz.
Fault	N52E 11SE	34.5 ft.	Slicks; Dip to S.
Shears	N74W 68SW	37 ft.	
Shears	N59W 90	37 ft.	
Shears	N72W 90	37 ft.	Slicks; 9S
Fault	N74E 3SE	40 ft.	
Fault	N51W 72 NE	41 ft.	
Fault	N24E 46SE	44 ft.	
Joint	N39W 77NE	44 ft.	
Fault	N11E 43SE	46.5 ft.	
Bedding	Horizontal	46.5 ft.	
Fault	N4W 68NE	49.9 ft.	
Joints	Vertical	44 ft. to 50 ft.	
Fault	N6E 68SE	50.5 ft.	Slicks; S10E 43
Fault	N22W 51NE	54.5 ft.	Dn on N, 3in.
Fault	N30W 63NE	56.7 ft.	Dn on N, 3in.
Fault	N82W 59NE	63.1 ft.	
Bedding	Horizontal	66 ft.	
Fault	N74W 81NE	68 ft.	Dn on N, 5in.
Fault	N46W 72NE	73 ft.	Dn on N, 2ft.
Bedding	N36E 7SE	79.5 ft.	
Bedding	N53W 16SW	83.5 ft.	
Bedding	N64W 6SW	91 ft.	

BH-6		TD 70 ft.	
Description	Attitude	Depth bgs	Notes
Contact	Horizontal	26.5 ft.	
Fault	N76W 37NE	29.5 ft.	
Bedding	N2E 11SE	31.5 ft.	
Fault	N58E 10SE	32.5 ft.	Slicks; S35W
Bedding	N44E 10NW	34.5 ft.	
Fault	N63W 42NE	37.5 ft.	
Ground Water		47 ft.	

BH-7		TD 47 ft.	
Description	Attitude	Depth bgs	Notes
Fault	N632E 45NW	14 ft.	Dn on S, >2ft.
Bedding	N88E 57-70NW	14 ft.	
Fault	N88W 55NE	19.3 ft.	Dn on N, >3ft.
Fault/Contact	N66W 43NE	20.9 ft.	Disp. >4 ft.
Faults	N56E 49NW	22 ft.	Dn on N.
Fault	N56E 49NW	23.9 ft.	
Fault	N56E 49NW	24 ft.	
Contact	N-S 2E	26.25 ft.	
Shears	N69E 44NW	26.8 to 27.5 ft.	
Bedding	E-W 49N	27 ft.	
Fault	N15E 86NW	28 ft.	
Fault	N30E 77NW	29 ft.	Dn on S, 10in.
Fault/Contact	E-W 49N	33.5 ft.	
Fault	N9W 47SW	35 ft.	
Ground Water		35ft.	

BH-8		TD 99.5 ft.	
Description	Attitude	Depth bgs	Notes
Faults/Shears	N80W 66NE	8 to 39 ft.	
Shear	N48W 90	34 ft.	Slicks; Horiz.
Shear/Joint	N75E 79SE	34 ft.	
Shears	N79E 90	37 ft.	
Shear	N72W 90	37 ft.	
Shear	N70E 77NW	37 ft.	
Shear	N20W 29NE	39 ft.	
Shear	N60E 49SE	39 ft.	
Fault	N-S 31E	43 ft.	
Shear	N31W 69NE	50 ft.	
Fault	N21W 63NE	51 ft.	
Shear	N20W 51NE	52 ft.	
Fault	N30W 31NE	52.5 ft.	
Fault	N3W 41NE	53.5 ft.	
Shear	N26E 69SE	53.5 ft.	
Fault/Contact	N-S 46E	55.7 ft.	Slicks; Dn dip
Shears	N12E 60SE	57.5 ft.	Slicks; 47S
Shears	N3E 57NW	57.5 ft.	Slicks; Horiz.
Fault/Shear	N28W 63NE	58.5 ft.	
Shears	N32W 44NE	60.5 ft.	
Shear	N31E 90	64 ft.	Slicks; Vert.
Shear/Contact	N49E 64SE	70 ft.	
Shear	N53E 56NW	71 ft.	
Shear	N70W 22NE	72 ft.	
Shear	N16W 90	72.5 ft.	
Fault	N80W 36NE	74 ft.	
Shear	N48W 12 NE	74 ft.	
Fault	N63W 39NE	75.5 ft.	
Shears	N20W 90	75.5 ft.	Slicks; 59S
Shears	N1E 63NE	75.5 ft.	Slicks; 46S
Faults	N68E 21NW	77.5 ft.	Parallel
Fault	N62W 19NE	79.5 ft.	Slicks; N41W 3-5
Shears	N23E 71NW	80 ft.	
Shears	N22E 32SE	80 ft.	
Shears	N70W 59NE	82.5 ft.	Slicks; N39W 41
Shears	N11E 28NE	82.5 ft.	Slicks; Horiz.
Shears	N84W 63NE	82.5 ft.	Slicks; N56W 56
Fault	N66W 47NE	85 to 86 ft.	Slicks; N8E 34
Fault	N88W 55NE	85 to 86 ft.	Slicks; 47NW
Fault	N62W 31NE	85 to 86 ft.	Slicks; Dn dip
Fault	N16E 33SE	87.5 ft.	Slicks; E
Shears	N86W 69NE	88 ft.	
Shears	N64E 90	88 ft.	
Shear	N18E 26SE	91 ft.	Slicks; S26E 14
Shear	N10W 25NE	91 ft.	Slicks; S26E 14
Shear	N22W 90	94 ft.	Slicks; 64S

BH-9		TD 100 ft.	Notes
Description	Attitude	Depth bgs	
Fault	N78W 80NE	4 ft.	Slicks; Dn dip
Contact	N50W 90	2 to 9 ft.	
Bedding	N62W 83SW	14 ft.	
Joint	N57E 57NW	16 ft.	
Joint	N70W 56NE	16 ft.	
Joint	N10E 79SE	21 ft.	
Joint	N2W 83SW	23 ft.	
Joint	N32E 46NW	23 ft.	
Joint	N15E 82 SE	23 ft.	
Joint	N7W 89NE	23 ft.	
Bedding	N62W 83SW	23 ft.	
Joint	N10W 65SW	30 ft.	
Joint	N80W 71SW	32 ft.	
Joint	N64W 80SW	32 ft.	
Joint	N80E 85SE	35 ft.	
Bedding	N64W 75SW	40 ft.	
Fault	N-S 61W	65.3 ft.	
Contact	N30E 65NW	72.1 ft.	
Fault	N29W 80SW	83 ft.	
Fault	N83W 87SW	88 ft.	

BH-10		TD 99 ft.	Notes
Description	Attitude	Depth bgs	
Faults	N11E 86SE	6 ft.	Dn on S, 1ft.
Bedding	N89W 39NE	6 ft.	
Fault	N13E 31SE	12 ft.	Dn on S, 3in.
Bedding/Contact	N76E 49NW	16.2 ft.	
Bedding	N85E 39NW	26 ft.	
Contact	N87W 49NE	54.5 ft.	
Contact	N74W 44NE	56.5 ft.	
Contact	N88W 56NE	63.5 ft.	
Bedding	N88W 42NE	85 ft.	
Fault	N12E 71SE	91.5 ft.	
Bedding	N25E 35SE	95 ft.	

BH-11		TD 85 ft.	Notes
Description	Attitude	Depth bgs	
Bedding	N65E 17NW	6.5 ft.	Dn on S,
Contact	N70E 20NW	9 ft.	
Fault	N64E 64NW	12 ft.	
Bedding	N64E 42NW	18 ft.	Slicks; 56NW
Fault	N76E 72NW	20 ft.	
Bedding/Contact	N65E 34NW	21.5 ft.	
Fault/Contact	N79E 60NW	23.5 ft.	
Shears	N55W 40NE	23.5 ft.	
Shear	N67E 70NW	30.3 ft.	
Shear	N78W 56NE	32 ft.	
Contact	N75W 56NE	39 ft.	
Contact	N86E 65NW	46 ft.	
Fault/Contact	N89W 71NE	36 to 47.5 ft.	Slicks; 58W
Contact	N72W 76NE	51 ft.	
Bedding	79NW	51 to 60 ft.	
Contact	N87W 47NE	65.5 ft.	
Joints	N84W 73SW	68 ft.	

SAND AND GRAVEL LOG

PROJECT NAME: Sargent Ranch HOLE #: SRB07-1 GEOLOGIST: TMF DATE: 06/6/2007

LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION:
UTM ZONE: 10 DATUM: NAD83 EASTING: 628215 NORTHING: 4087578 ELEVATION: 490'
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"
HOLE TOTAL DEPTH: 360' ANGLE: -90 BEARING:
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A

Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
0					(0) OB	
5					(2) silty sand with 20% 1x4, angular, well graded	
10					(5) clayey sand and 1x4, clay clasts and coating on rock	
15					(8) clayey/silty sand, medium grained, 10% rock	
20					(12) dirty sand and gravel, 30% rock, sub rounded, dirty	
25						
30					(29) silty sand, red	
35					(32) silty sand and rock, 30-40% gravel, fine sand	
40					(35) clayey silty sand, coarser, 30% rock	
45					(42) clay	
50						
55					(54) blue gray clay	
60					(59) silty clay	
65					(62) silt	
70						
75					(72) clean sand, well graded, angular no rock	
80						
85					(83) clean coarse sand with pea gravel and 1x4 30-50%	
90						
95					(95) silty sand, some rock	



SAND AND GRAVEL LOG

PROJECT NAME: Sargent Ranch HOLE #: SRB07-1 GEOLOGIST: TMF DATE: 06/6/2007

LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION:
UTM ZONE: 10 DATUM: NAD83 EASTING: 628215 NORTHING: 4087578 ELEVATION: 490'
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"
HOLE TOTAL DEPTH: 360' ANGLE: -90 BEARING:
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A

Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
100					(98) clean sand and some rock, <10%	
105						
110						
115					(116) gravel with silt coating little sand	
120					(120) rock, little fines, hard, angular, 1" pieces, blue, crystalline?	
125						
130					(130) clay, very hard, some supported gravel	
135						
140					(140) sandy clay	
145					(145) clay coated pea gravel and little sand, gravel is angular, clay is very hard	
150					(152) silty clay	
155					(153) silty sand with rock, pea gravel and 1x4, dirty silt coated	
160					(154) dirty sand and gravel but with 2" sub rounded cobbles of very hard rock	
165					(163) silty clay with minor entrapped gravel, dark brown	
170					(171) reddish silty sand	
175					(172) reddish brown clay	
180					(173) fine red silty sand	
185					(176) grayish silty clay	
190					(177) red silt	
					(180) blue clay	
					(187) reddish silty sand	



SAND AND GRAVEL LOG

PROJECT NAME: Sargent Ranch HOLE #: SRB07-1 GEOLOGIST: TMF DATE: 06/6/2007

LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION:
UTM ZONE: 10 DATUM: NAD83 EASTING: 628215 NORTHING: 4087578 ELEVATION: 490'
DRILLING INFORMATION: CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker
DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"
HOLE INFORMATION: TOTAL DEPTH: 360' ANGLE: -90 BEARING:
PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A

Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
195					(191) gray silt and clay, hard	
200					(202) black sand and gravel	
205					(205) silty black sand	
210					(213) brown silt	
215					(214) silt and gravel, hard, dark blue/gray, 90% rock, hard and angular	
220					(220) silt and gravel, dirty, angular	
225					(225) clean silty sand no rock, well graded, sub rounded	
230					(234) clay with silt, blue gray and tan	
235					(240) dirty silty sand and gravel, hard dark blue, angular	
240					(247) blue gray clay	
245					(250) dark blue silt, about 256 started to coarsen up with more sand and <10% pea gravel, some silt cemented sand clasts	
250					(260) blue silt with occasional coarse layers, 265 silty clay clasts	
255					(270) silty clay, getting harder	
260					(280) blue clay	using water
265						
270						
275						
280						
285						




SAND AND GRAVEL LOG

PROJECT NAME: Sargent Ranch HOLE #: SRB07-1 GEOLOGIST: TMF DATE: 06/6/2007

LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION:
UTM ZONE: 10 DATUM: NAD83 EASTING: 628215 NORTHING: 4087578 ELEVATION: 490'
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"
HOLE TOTAL DEPTH: 360' ANGLE: -90 BEARING:
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A


Depth	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
290					(290) blue clay	
295						
300					(300) blue clay	
305						
310					(310) blue clay	
315						
320					(320) clay	
325						
330					(330) clay	
335					(335) clay supported rock fragments, all sizes including sand, chert, metaseds, greenish clay	
340					(340) same except more clay and small layer of all gravel, angular, basalt?	
345						
350					(350) clay	
355						
360						

SAND AND GRAVEL LOG					
PROJECT NAME: Sargent Ranch HOLE #: SRB07-2 GEOLOGIST: TMF DATE: 06/09/2007					
LOCATION:		BRANCH: Monterey Bay PROJECT CONTACT:Kashawagi STATE:CA COUNTY:Santa Clara SECTION:			
		UTM ZONE: 10 DATUM:NAD83 EASTING:628421 NORTHING: 4087463 ELEVATION: 362'			
DRILLING		CONTRACTOR: Great West Drilling DRILLER: Benson		DRILL RIG TYPE: Becker	
INFORMATION:		DRILLING METHOD: Air Hammer		HOLE SIZE [OD/ID]: 6"/4"	
HOLE		TOTAL DEPTH: 250'		ANGLE: -90	
INFORMATION:		PLUG TYPE: N/A		DEPTH: N/A	
				BEARING:	
				WATER LEVEL DEPTH: N/A	
Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description
					Field Notes (Testing Data, Other Observations)
0					(0) topsoil
5					(2) silt and gravel, 1x4
10					(6) dirty sand and gravel, mostly pea gravel some 1/2" rock
15					(12) clean sand and gravel, some clay coating on rock
20					(17) more coarse sand less rock only pea gravel orangish gold in color
25					
30					(30) same
35					
40					(40) same
45					(45) dirty sand and gravel, more gravel, some silty clay clasts, rock is hard and sub rounded and breaks on angular clasts
50					
55					
60					(60) dirty sand and gravel
65					(62) clay with sand and gravel
70					(65) silty sand and gravel with clay clasts
75					
80					(75) clay with silty sand
85					(79) clayey sand and gravel
90					(82) blue clay
95					(86) silt
100					
105					(96) blue silty clay
110					(102) brown clay using water more silty



Exploration Services


Granite Construction, Inc.




Project: Sargent Ranch

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SAND AND GRAVEL LOG							
PROJECT NAME: Sargent Ranch HOLE #: SRB07-2 GEOLOGIST: TMF DATE: 06/09/2007							
LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION: UTM ZONE: 10 DATUM: NAD83 EASTING: 628421 NORTHING: 4087463 ELEVATION: 362'							
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker							
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"							
HOLE TOTAL DEPTH: 250' ANGLE: -90 BEARING:							
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A							
Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)	
110					(111) silty sand, cemented clasts of sand and pea gravel that are silty coated		
115							
120							
125							
130							
135							
140							
145							
150							
155							
160							
165							
170						(168) blue silty clay, hard, comes out in fragments	
175							
180						(178) black silt some cemeneted	
185						(184) blue silt and gravel	
190					(185) blue clayey silt brown, silty sand layers		
195							
200							
205							
210					(211) blue silt		
215					(213) brown silt		
					(216) silty sand		



Exploration Services
Granite Construction, Inc.



GRANITE
CONSTRUCTION MATERIALS


Project: Sargent Ranch
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SAND AND GRAVEL LOG

PROJECT NAME: Sargent Ranch HOLE #: SRB07-2 GEOLOGIST: TMF DATE: 06/09/2007


LOCATION: BRANCH: Monterey Bay PROJECT CONTACT:Kashawagi STATE:CA COUNTY:Santa Clara SECTION:
UTM ZONE: 10 DATUM:NAD83 EASTING:628421 NORTHING: 4087463 ELEVATION: 362'
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"
HOLE TOTAL DEPTH: 250' ANGLE: -90 BEARING:
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A

Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
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220					(217) silty sand and pea gravel	
225					(228) blue silt	
230					(233) brown silty sand, perched water	
235						
240						
245						
250						



SAND AND GRAVEL LOG						
PROJECT NAME: Sargent Ranch HOLE #: SRB07-3 GEOLOGIST: TMF DATE: 06/12/2007						
LOCATION: BRANCH: Monterey Bay PROJECT CONTACT: Kashawagi STATE: CA COUNTY: Santa Clara SECTION: UTM ZONE: 10 DATUM: NAD83 EASTING: 628902 NORTHING: 4087279 ELEVATION: 270'						
DRILLING CONTRACTOR: Great West Drilling DRILLER: Benson DRILL RIG TYPE: Becker						
INFORMATION: DRILLING METHOD: Air Hammer HOLE SIZE [OD/ID]: 6"/4"						
HOLE TOTAL DEPTH: 150' ANGLE: -90 BEARING:						
INFORMATION: PLUG TYPE: N/A DEPTH: N/A WATER LEVEL DEPTH: N/A						
Depth (ft.)	Graphic Log	Sample Interval	Sample ID	USCS	Lithologic Description	Field Notes (Testing Data, Other Observations)
0					(0) OB	
5					(4) sand and rock, clay clasts	
10					(12) silty sand	
15					(18) coarse sand with fines	
20					(23) sand and <10% rock	
25						
30						
35						
40						
45					(46) blue clay	
50						
55						
60						
65						
70					(70) silty sand	
75						
80					(77) hard clay	
85						
90						
95						
100						
105					(104) silty clay	
110						
115						
120					(118) clay	
125						
130						
135						
140						
145						
150						



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GRANITE
CONSTRUCTION MATERIALS

Project: Sargent Ranch
Page 1

TEST PIT LOGS

JOB NO: 3.31274
 DATE: 6/15/2015
 LOCATION: Phase 1/2, East Side (See Map)

PROJECT: Sargent Ranch
 LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
1	0 - 2.5	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND, trace gravels.
	2.5 - 5	SM				<u>Non Marine Sediments -Tscn</u> Yellowish-brown to light reddish brown, moist, dense, silty, very fine SAND. Bed N63°W, 3°NE.
	5 - 8	SM				Yellowish-brown, with trace gravels. Cross bedding noted. ----- <i>Total Depth 8-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Northeast Side (See Map)

2	0 - 2	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to black, damp to moist, loose to medium dense, silty to clayey, very fine SAND, trace gravels.
	2 - 4	SM				Gradational contact - Yellowish-brown to grayish-orange, dense, silty to clayey, very fine SAND, with rounded cobbles to 4" diameter.
	4 - 6	SM				<u>Tscn</u> Yellowish-brown to light reddish brown, moist, dense, silty, very fine SAND. N63°W, 3°NE.
	6 - 8.5	ML-SM				Very fine sandy gravels to 2" diameter overlying very fine sandy SILT, with trace Clay. Sharp contact at 7 feet, N24°E, 13°NW. ----- <i>Total Depth 8.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/15/2015
LOCATION: Phase 1/2, Northeast Side (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
3	0 - 3	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine to medium SAND. Bioturbated.
	3 - 5	SM				<u>Tscn</u> Yellowish-brown to light reddish brown, moist, dense, silty, very fine to coarse SAND. Bedding 14° NE. ----- <i>Total Depth 5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Northeast Side (See Map)

4	0 - 3.5	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND, with trace gravels.
	3.5 - 7	SM				<u>Tscn</u> Olive-brown, moist, firm, silty to clayey, very fine to coarse SAND with trace rounded gravels to 1" diameter. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/15/2015
LOCATION: Phase 1/2, Northeast Side (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
5	0 - 3	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark to medium brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels.
	3 - 8.5	SM				<u>Tscn</u> Brown to yellowish-brown, moist, dense, silty, very fine SAND. @ 43" possible slide plane N35°W, 4°NE. Light olive to light gray silt to medium SAND, with cross beds - N37°W, 19°SW and N69°E, 37°NW. ----- <i>Total Depth 8.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, North Central (See Map)

6	0 - 3.5'	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND, with trace gravels and cobbles to 6" diameter. Carbonate staining between 2-3.5'.
	3.5 - 7	SM				<u>Tscn</u> Brown. moist, dense, silty, very fine SAND, with trace clay, and interbeds of very fine sandy gravel. Cobbles to 4"diameter. Horizontal Bedding. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/16/2015
LOCATION: Phase 1/2, North Central (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
7	0 – 34"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to light reddish brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 6" diameter.
	34" – 8.5	SM				<u>Tscn</u> Yellowish-brown, moist, dense, silty, very fine SAND with thin interbeds of light olive gray silt, and sandy gravels. Increase of gravels and cobbles up to 60% of deposit. Horizontal bedding. ----- <i>Total Depth 8.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, North Central (See Map)

8	0 – 33"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND, with trace white mudstone clasts.
	3.5 - 7	ML-SM				<u>Tscn</u> Dark gray to yellowish-brown. moist, dense, silty, very fine SAND, with interbeds of sandy and clayey SILT. Iron and Manganese staining. N-S, 13°E at 58". ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/16/2015
LOCATION: Phase 1/2, North Central (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
9	0 – 15"	SC-SM				<u>TOPSOIL/LANDSLIDE DEPOSITS</u> Dark brown to light reddish brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 6" diameter.
	15" – 5	SM				<u>Landslide Deposits (Ols)</u> Medium brown to reddish-brown, moist, medium dense, fine to coarse sandy gravels and cobbles. Iron and Manganese staining. Apparent dip 12° NE. No bedding. ----- <i>Total Depth 5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, North Central (See Map)

10	0 – 18"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to dark yellowish-brown, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 6" diameter.
	18" – 6.5'	ML-SM				<u>Tscn</u> Medium brown to dark orange-brown, moist, dense, silty, very fine SAND, with gravels and cobbles to 6" diameter. Minor clay. At 6' approximate 4" thick sand bed, very fine to coarse. N76°W, 2S°W. ----- <i>Total Depth 6.5 feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/16/2015
LOCATION: Phase 1/2, West (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
11	0 - 2	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish brown, moist, loose to medium dense, silty to very fine to coarse SAND with fine to coarse sandy gravels. Minor cobbles to 6" diameter.
	2 - 6.5	SM				<u>Tscn</u> Dark reddish-brown to yellowish gray, moist, medium dense, silty, very fine to coarse SAND, trace clay, moderate gravels and cobbles, iron stringers. Multiple fractures, clay infill. Average attitude - N40°W, 40-50°SW. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, West (See Map)

12	0 - 18"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 5" diameter. Clasts are mudstone/shale.
	18" - 7	SM				<u>Tscn</u> Dark orange-brown to gray, moist, dense, silty, very fine to coarse SAND, with gravels and cobbles to 6" diameter (mudstone). Minor clay. Iron and manganese staining throughout. 30% clasts. Faulting/fracturing (?) along south side of trench noted (N15°W, 90°) from bottom to base of contact with topsoil. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/16/2015
LOCATION: Phase 1/2, West (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
13	0 – 32"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to dark yellowish-brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 1" diameter.
	32" – 7	SC-SM				<u>Tscn</u> Dark yellowish-brown, moist, medium dense to dense, very fine to coarse silty to clayey SAND. Gravels and cobbles to 3" diameter. 20% clasts. N12°W, 7°NE, thin sand interbed at approximately 6'. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, West (See Map)

14	0 – 24"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, moist, loose to medium dense, silty, very fine to coarse SAND, with trace gravels and cobbles to 2.5" diameter.
	24" – 7	SM				<u>Qls</u> Gray to light reddish-brown, moist, dense, silty, very fine to coarse SAND, with trace gravels and cobbles to 2" diameter. Few, thin interbeds of silty to clayey fine sand. N52°E 12°SE. At 6.5' slide plane – N75°E, 20°SE. Calcium carbonate lined. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
 DATE: 6/17/2015
 LOCATION: Phase 1/2, Southwest (See Map)

PROJECT: Sargent Ranch
 LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
15	0 – 16"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 3" diameter.
	16" – 8	SM				<u>Tscn</u> Mottled grayish-brown to medium brown, moist, medium dense to dense, very fine to coarse silty to clayey SAND. Gravels and cobbles to 2" diameter. 40-45% clasts. N19°E, 8°NW. ----- <i>Total Depth 8-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Southwest (See Map)

16	0 – 42"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, moist, loose to medium dense, silty, very fine to coarse SAND, with trace gravels and cobbles to 2" diameter.
	42" – 6.5'	SM				<u>Tscn</u> Dark brown to dark yellowish-brown, moist, dense, silty, very fine to coarse SAND, with trace gravels and cobbles to 1" diameter. Few, thin interbeds of silty to clayey fine sand. N41°E, 9°NW. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/17/2015
LOCATION: Phase 1/2, Southwest (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
17	0 – 12"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 3" diameter.
	16" – 8	SM				<u>Tscn - Faulted</u> Mottled grayish-brown to medium brown, moist, medium dense to dense, very fine to coarse silty to clayey SAND. Multiple carbonate stringers, iron stains, shears. Few tar blebs. Fault/fractures – N38°W, 44°NE; N57°W, 28°NE. ----- <i>Total Depth 8-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Southwest (See Map)

18	0 – 15"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark Grayish-brown, moist, loose, silty, very fine to coarse SAND, with trace gravels and cobbles to 3" diameter.
	42" – 6.5'	SM				<u>Tscn</u> Dark yellowish-brown to medium brown, moist, medium dense, silty, very fine to coarse SAND, with trace gravels and cobbles to 6" diameter. Few, thin interbeds of fine sand and gravels. N67°E, 32°NW. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/17/2015
LOCATION: Phase 1/2, Southwest (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
19	0 – 22"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 3" diameter.
	22" – 7.5	SM				<u>Tscn</u> Grayish-brown to orange brown, moist, dense, very fine to coarse silty to clayey SAND with abundant rounded gravels and cobbles to 6" diameter. 80% clasts. From 84-90", yellowish-brown, frim. very fine to coarse sandy CLAY lense. ----- <i>Total Depth 7.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, South (See Map)

20	0 – 20"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 4" diameter.
	42" – 6.5'	SM				<u>Tscn</u> Dark yellowish-brown to medium brown, moist, dense, silty, very fine to coarse SAND, with abundant rounded gravels and cobbles to 5" diameter. 50% clasts. Apparent dip based on line of clasts - 16°N. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/17/2015
LOCATION: Phase 1/2, South (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
21	0 – 36"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to reddish-brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Minor cobbles to 2" diameter.
	36" – 7.5	SM				<u>Tscn</u> Grayish-brown to orange brown, moist, dense, very fine to coarse silty SAND with trace clay, and few gravels. Multiple Faults/fractures on east wall – N22°W, 82°NE; N16°W, 90°; east side down 3.5'. Minor folding observed. Fractures penetrate to approximately 20" below surface. ----- <i>Total Depth 7.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, South (See Map)

22	0 – 36"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to black, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 1" diameter.
	36" – 8	CL-SM				<u>Tscn</u> Olive gray to yellowish-brown to medium brown, moist, dense, silty, very fine to coarse SAND with thin interbeds of fine to medium sandy CLAY. Iron stained stringers. Multiple shears below 5' – N24°E, 85°SE; N42°E 90°. ----- <i>Total Depth 8-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/17/2015
LOCATION: Phase 1/2, Southwest (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
23	0 – 19"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with fine to coarse sandy gravels. Moderate cobbles to 6" diameter.
	19" – 7.75	SM				<u>Tscn</u> Grayish-brown to orange brown, moist, dense, very fine to coarse silty SAND with abundant rounded gravels and cobbles to 6" diameter. Trace clay, 60% clasts. @ 88" undulating contact (channel?) with gray to yellow very fine sandy silt. ----- <i>Total Depth 7.75-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, South (See Map)

24	0 – 24"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown, moist, loose to medium dense, silty to clayey, very fine to coarse SAND, with gravels and cobbles to 4" diameter.
	42" – 7.25'	SM				<u>Tscn</u> Medium yellowish-brown to light brown, moist, dense, silty, very fine to coarse SAND, with interbeds of sandy silt, and trace clay. Few rounded mudstone clasts to 10" diameter. Cross bedding observed, ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/18/2015
LOCATION: Phase 1/2, Southeast (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
25	0 - 36"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, moist, loose to medium dense, silty to, very fine to medium SAND, with gravels.
	22" - 7.5	SM				<u>Tscn</u> Light brown to yellowish-brown, moist, dense, very fine to coarse silty SAND with trace clay and moderate rounded gravels to 2" diameter. Bedding N69°E, 26°NW. Angular unconformity at Topsoil/Tscn contact. N75°W, 11°SW. ----- <i>Total Depth 7.5-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Southeast (See Map)

26	0 - 32"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to yellowish-brown, moist, loose to medium dense, silty to clayey, very fine to coarse SAND, with gravels to 1" diameter.
	42" - 6.5'	SM				<u>Tscn</u> Dark yellowish-brown to olive gray, moist, dense, silty, very fine to coarse SAND. Multiple fractures/faults with offset to NW and SE which stop at basal contact with Topsoil. Minor folding noted at 5'. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/18/2015
LOCATION: Phase 1/2, Southeast (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
27	0 - 22"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to dark olive brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with trace gravels.
	22" - 6	SM				<u>Tscn</u> Yellowish-brown, moist, dense, very fine to coarse silty to SAND with few rounded gravels. Abundant fractures, no offset noted. At 45" bedding N60°E, 33°NW. ----- <i>Total Depth 6-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, Southeast (See Map)

28	0 - 44"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to dark olive brown, damp to moist, loose to medium dense, silty to clayey, very fine SAND with trace gravels
	44" - 7.5'	SC- SM				<u>Tscn</u> Dark yellowish-brown to medium brown, moist, dense, silty to clayey, very fine SAND, Massive, few carbonate stringers to depth. ----- <i>Total Depth 7.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/18/2015
LOCATION: Phase 1/2, East (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
29	0 - 44"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Light olive brown, moist, loose to medium dense, silty to clayey, very fine SAND with trace gravels. Bioturbation observed,
	44" - 7	SM				<u>Tscn</u> Light grayish-brown to light brown, moist, dense, silty, very fine SAND with trace medium to coarse sand. Crossbedded, iron staining and concretions. Bedding varied from N19°E, 38°NW to N80°E, 29°NW. ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

LOCATION: Phase 1/2, East (See Map)

30	0 - 32"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to black, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 5" diameter. 20% clasts.
	32" - 8.5'	SM				<u>Tscn</u> Medium yellowish-brown, moist, dense, silty, very fine to coarse SAND, with trace to few rounded gravels. At 59" - 6" thick sand bed N3°E, 6°SE. ----- <i>Total Depth 8.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/18/2015
LOCATION: Phase 1/2, East (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
31	0 - 24"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose to medium dense, silty, very fine to coarse SAND with minor gravels and cobbles to 3" diameter.
	24" - 6	SM				<u>Tscn</u> Medium yellowish-brown, moist, medium dense to dense, interbedded silty, very fine to coarse SAND and sandy gravels to 1.5" diameter. Iron staining, trace clay. Undulatory bedding at 36" N87°W, 9°NE. ----- <i>Total Depth 6-feet. No groundwater encountered.</i>

LOCATION: Phase 4, East (See Map)

32	0 - 20"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown to black, moist, loose to medium dense, silty, very fine to coarse SAND, with trace clay, and gravels and cobbles to 1" diameter. Carbonate staining at 20".
	22" - 67"	SM-CL				<u>Tscn</u> Light to medium olive brown, moist, medium dense, very fine to coarse silty SAND and sandy clay. Clay is plastic. Multiple joint sets throughout N21°E, 29°NW to N40°E, 21°NW.
	67" - 7	SM				At 67" - Light olive brown, silty, very fine SAND ----- <i>Total Depth 7-feet. No groundwater encountered..</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/19/2015
LOCATION: Phase 4, East Central (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
33	0 – 28"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, moist, loose to medium dense, silty to clayey, very fine to coarse SAND with gravels. Minor cobbles to 4" diameter.
	28" – 6.5	SM				<u>Tscn</u> Medium yellowish-brown to light grayish-brown, moist, dense, silty, very fine to coarse SAND with trace clay, abundant rounded gravels and cobbles to 4" diameter. Channeling noted. Bedding at 60" N64°E, 20°SE. Fault/fracture crosscuts bedding and extends from base of trench to basal surface of Topsoil. N69°W, 39°NE. 3" downward displacement on north side. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

LOCATION: Phase 4, West (See Map)

34	0 – 19"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to black, moist, loose to medium dense, silty, very fine to coarse SAND, with gravels and cobbles to 6" diameter.
	19" – 4	SM				<u>Tscn</u> Medium yellowish-brown to light grayish-brown, moist, dense, interbedded silty, very fine to coarse SAND and rounded sandy gravels and cobbles to 4" diameter. 40% clasts. Bedding at 32" N6°E, 3°NW. ----- <i>Total Depth 4-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/19/2015
LOCATION: Phase 4, West (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
35	0 – 51"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Olive black to dark brown, moist, loose to medium dense, silty to clayey, very fine to coarse SAND with gravels. Minor cobbles to 4" diameter. Carbonate at basal contact.
	51" – 8	SM				<u>Tscn</u> Olive brown, moist, dense, very fine to coarse silty to clayey SAND with moderate rounded gravels and cobbles to 4" diameter. 20% clasts. ----- <i>Total Depth 8-feet. No groundwater encountered.</i>

LOCATION: Phase 4, Southwest (See Map)

36	0 – 30"	SC-CL				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown, moist, medium dense, silty to clayey, very fine to coarse SAND, and sandy clay with gravels. Carbonate at basal surface. Bioturbation throughout.
	30" – 49"	SC-SM				<u>Qls</u> Medium yellowish-brown, moist, dense, silty to clayey, very fine to coarse SAND, with moderate rounded gravels and cobbles to 8" diameter. 20% clasts. Carbonate in upper 8".
	49" – 5.5	SC				Clayey SAND, with gravels to 2" diameter. ----- <i>Total Depth 5.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/19/2015
LOCATION: Phase 4, Southwest (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
37	0 – 39"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, damp to moist, loose to medium dense, silty, very fine to coarse SAND with gravels. 20% gravels.
	39" – 6.5	SC-SM				<u>Tscn</u> Brown, moist, dense, silty to clayey, very fine to coarse SAND with abundant rounded gravels to 3" diameter. 25% clasts. Minor jointing – N61°E, 66°NW. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

LOCATION: Phase 4, South (See Map)

38	0 – 38"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown, moist, dense, silty, very fine to coarse SAND, with gravels and cobbles to 8" diameter.
	42" – 60"	SC-SM				<u>Tscn</u> Medium olive brown, moist, dense, silty to clayey, very fine to coarse SAND, with abundant rounded gravels and cobbles to 6" diameter. 30% clasts.
	60" – 6.5					60% clasts. ----- <i>Total Depth 6.5-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/20/2015
LOCATION: Phase 3, North (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
39	0 – 40"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to black, damp to moist, loose to medium dense, silty to clayey, very fine to coarse SAND with minor gravels. Carbonate staining at basal surface.
	40" – 6'	SC-SM				<u>Tscn</u> Light olive gray, moist, dense, silty to clayey, very fine to coarse SAND. Iron staining throughout. Apparent dip 14°E. ----- <i>Total Depth 6-feet. No groundwater encountered.</i>

LOCATION: Phase 3, Northwest (See Map)

40	0 – 43"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark grayish-brown, moist, dense, silty, very fine to coarse SAND, with gravels and cobbles to 4" diameter.
	43" – 6'	SM-GM				<u>Tscn</u> Yellowish-gray, moist, dense, silty, interbedded very fine to coarse SAND, with abundant rounded gravels. At 43" – bedding N46°W, 90° ----- <i>Total Depth 6-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/20/2015
LOCATION: Phase 3, East (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
41	0 – 38"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown to olive brown, damp to moist, loose to medium dense, silty to clayey, very fine to coarse SAND with few gravels. Bioturbated.
	38" – 6.5	ML-SM				<u>Tscn (faulted?)</u> Yellowish-gray to light gray, moist, dense, interbedded silty, very fine to coarse SAND and sandy SILT, with abundant rounded gravels and cobbles to 3" diameter. Iron staining, 10% clasts. Faults/fractures from bottom of trench up to base of topsoil/colluvium contact- N6°E,90°;N14°E,73°NW;N29°E,82°NW ----- <i>Total Depth 6.5 feet. No groundwater encountered.</i>

LOCATION: Phase 3, South/Southwest (See Map)

42	0 – 36"	SM				<u>TOPSOIL/COLLUVIUM</u> Dark yellowish-brown, damp to moist, loose to medium dense, silty, very fine to coarse SAND with few gravels.
	36" – 7	SM				<u>Tscn</u> Dark yellowish-brown, moist, dense, silty, very fine to coarse SAND, with few gravels. Silt increases with depth. At 73" silt lense - N71°W, 4°NE ----- <i>Total Depth 7-feet. No groundwater encountered.</i>

TEST PIT LOGS

JOB NO: 3.31274
DATE: 6/20/2015
LOCATION: Phase 3, Southeast (See Map)

PROJECT: Sargent Ranch
LOGGED BY: RS

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
43	0 – 29"	SC-SM				<u>TOPSOIL/COLLUVIUM</u> Dark brown, damp to moist, loose ot medium dense, silty, very fine to coarse SAND with rounded gravels to 3" diameter.
	22" – 7.5	SM				<u>Tscn</u> Dark yellowish-brown to olive gray, moist, dense, very fine to coarse silty SAND with abundant rounded gravels. Iron staining, 30% gravels. At 46" - bedding N86°W, 47°NE. ----- <i>Total Depth 7.5 feet. No groundwater encountered.</i>

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed on the representative test samples to provide a basis for development of design parameters. Soil materials were visually classified in the field according to the Unified Soil Classification System (USCS). Laboratory tests were performed in general accordance with the American Society of Testing and Materials (ASTM) procedures. The results of our laboratory testing are presented herein. USCS classifications are presented on the boring logs (Appendix A). Selected samples were tested for the following parameters:

Atterberg Limits

Tests were performed on a selected representative fine-grained soil sample to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with USCS.

Expansion Potential

The expansion potential of selected samples was evaluated by the Expansion Index Test per ASTM D4829.

Direct Shear Test

A remolded direct shear test was performed in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of the selected materials.

Gradation Analysis

Gradation analysis tests were performed on a selected representative soil sample in general accordance with ASTM D 422. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

LA Abrasion

A resistance to degradation of small-size coarse aggregate by abrasion and impact test in the Los Angeles machine was performed in accordance with ASTM C131.

Proctor Density Tests

The maximum dry density and optimum moisture content of selected representative soil samples were evaluated using the Modified Proctor method in accordance with ASTM D 1557.

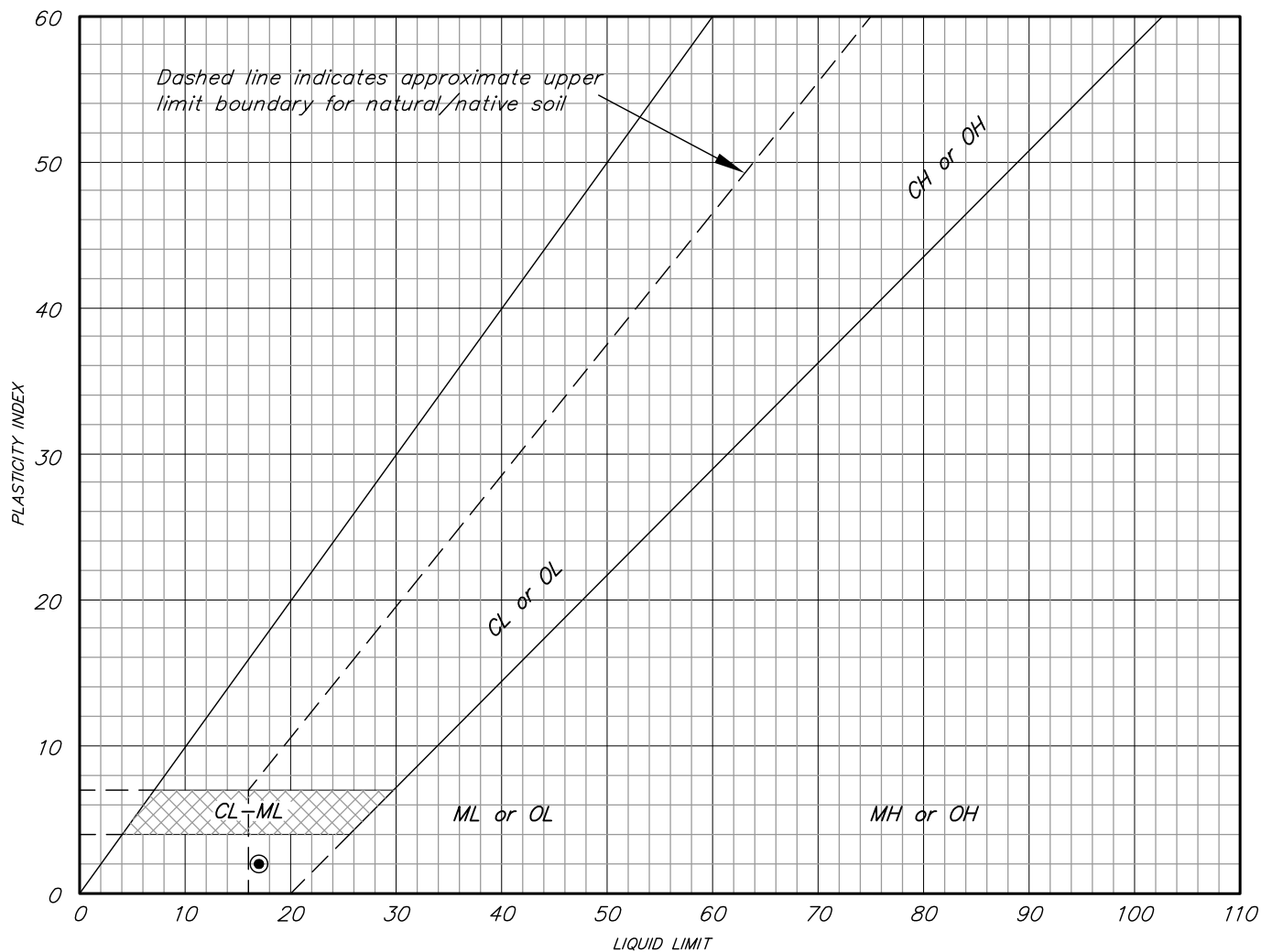
Sand Equivalent

The sand equivalent of selected representative soil samples were evaluated in accordance per ASTM D4829

ATTERBERG LIMITS REPORT

PER ASTM TEST METHOD D4318

JOB NUMBER: 3.31274 SAMPLE DATE: 8/2015
 CLIENT: SARGENT RANCH LLC
 PROJECT: SARGENT RANCH
 SAMPLED BY: JA TESTED BY: CC TESTED ON: 9/15/15
 EXCAVATION: BH-1
 SAMPLING INTERVAL: 54-55'



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Dark brown clay	19	17	2			CL

REMARKS:

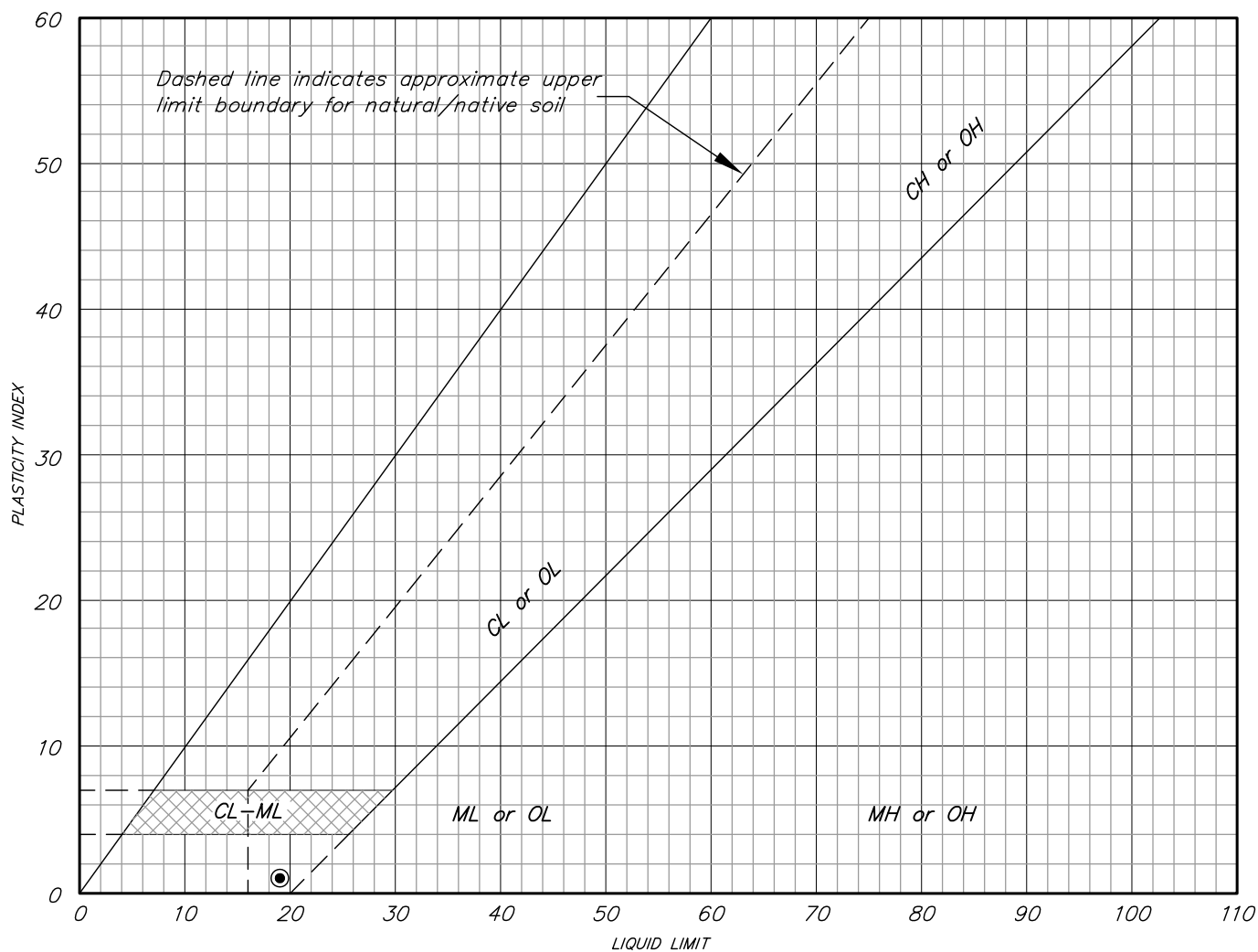
Brian Young
 Brian Young, Certified Laboratory Manager



ATTERBERG LIMITS REPORT

PER ASTM TEST METHOD D4318

JOB NUMBER: 3.31274 SAMPLE DATE: 8/2015
 CLIENT: SARGENT RANCH LLC
 PROJECT: SARGENT RANCH
 SAMPLED BY: JA TESTED BY: CC TESTED ON: 9/15/15
 EXCAVATION: BH-8
 SAMPLING INTERVAL: 70-72'



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Dark brown clay	20	19	1			CL

REMARKS:

Brian Young
 Brian Young, Certified Laboratory Manager



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Caltrans Lab #214 AMRL Lab #2460 CCRL Lab #2081 DSA LEA Lab #189

EXPANSION INDEX TEST (ASTM 4829)

Project Name Sargent Ranch							Project No. 3.31274	
Client Sargent Ranch LLC							Material Clay	
Source BH-1				Soil Description			Delivered By JA	Sample Date 8/7/2015
Test No 1	Test Date 10/28/15	Test Time	Test Pit No	Boring No	Depth 41-41.5'	Specific Gr (Gs)	Tested By BY	Report Date 11/13/15

TIME DEFORMATION MEASUREMENTS	
Elapsed Time	Raw Deformation (inches)
0.00	0.0000
0.10	0.0000
0.25	0.0000
1	0.0001
2	0.0001
4	0.0002
8	0.0003
15	0.0004
30	0.0006
60	0.0007
120	0.0008
240	0.0009
480	0.0010
1440	0.0015

Calculations	Results
D_1 = initial dial reading (mm)	0.0000
D_2 = final dial reading (mm)	0.0381
ΔH = change in height, $D_2 - D_1$	0.0381
H_1 = initial height (mm)	25.4
EI = $\Delta H / H_1 \times 1000$	1.5

Expansion Index Key

0-20 = Very Low
21-50 = Low
51-90 = Medium
91-130 = High
>130 = Very High


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Caltrans Lab #214 AMRL Lab #2460 CCRL Lab #2081 DSA LEA Lab #189

EXPANSION INDEX TEST (ASTM 4829)

Project Name Sargent Ranch							Project No. 3.31274	
Client Sargent Ranch LLC							Material Clay	
Source BH-1				Soil Description			Delivered By JA	Sample Date 8/7/2015
Test No 2	Test Date 10/29/15	Test Time	Test Pit No	Boring No	Depth 54-55'	Specific Gr (Gs)	Tested By BY	Report Date 11/13/15

TIME DEFORMATION MEASUREMENTS	
Elapsed Time	Raw Deformation (inches)
0.00	0.0000
0.10	0.0099
0.25	0.0099
1	0.0098
2	0.0097
4	0.0096
8	0.0092
15	0.0090
30	0.0082
60	0.0079
120	0.0077
240	0.0075
480	0.0074
1440	0.0074

Calculations	Results
D_1 = initial dial reading (mm)	0.0000
D_2 = final dial reading (mm)	-0.1880
ΔH = change in height, $D_2 - D_1$	-0.1880
H_1 = initial height (mm)	25.4
EI = $\Delta H / H_1 \times 1000$	-7.4

Expansion Index Key

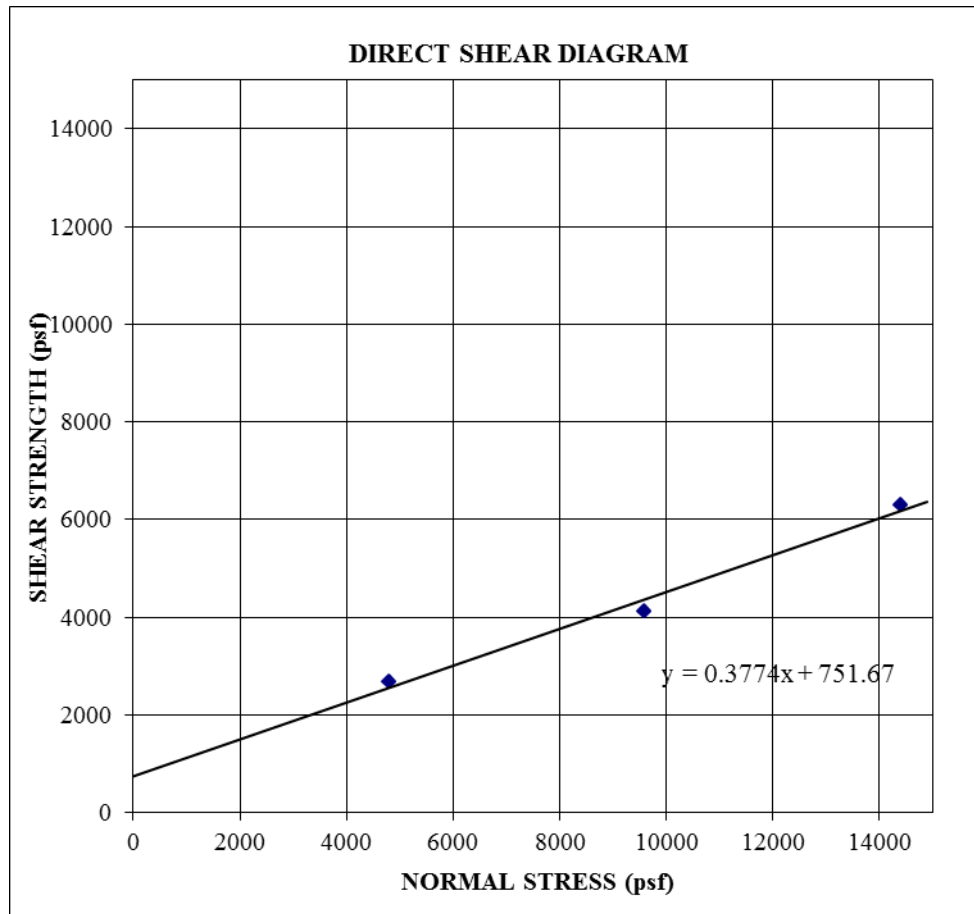
0-20 = Very Low
21-50 = Low
51-90 = Medium
91-130 = High
>130 = Very High


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SIERRA GEOTECHNICAL SERVICES INC.

P.O. BOX 5024, MAMMOTH LAKES, CALIFORNIA 93546



Boring No: BH-1

Sample Depth: 54-55' feet

Friction Angle: 21 degrees

Cohesion: 751 psf

Strain Rate 0.002 in/min

Gray Clay (CL)

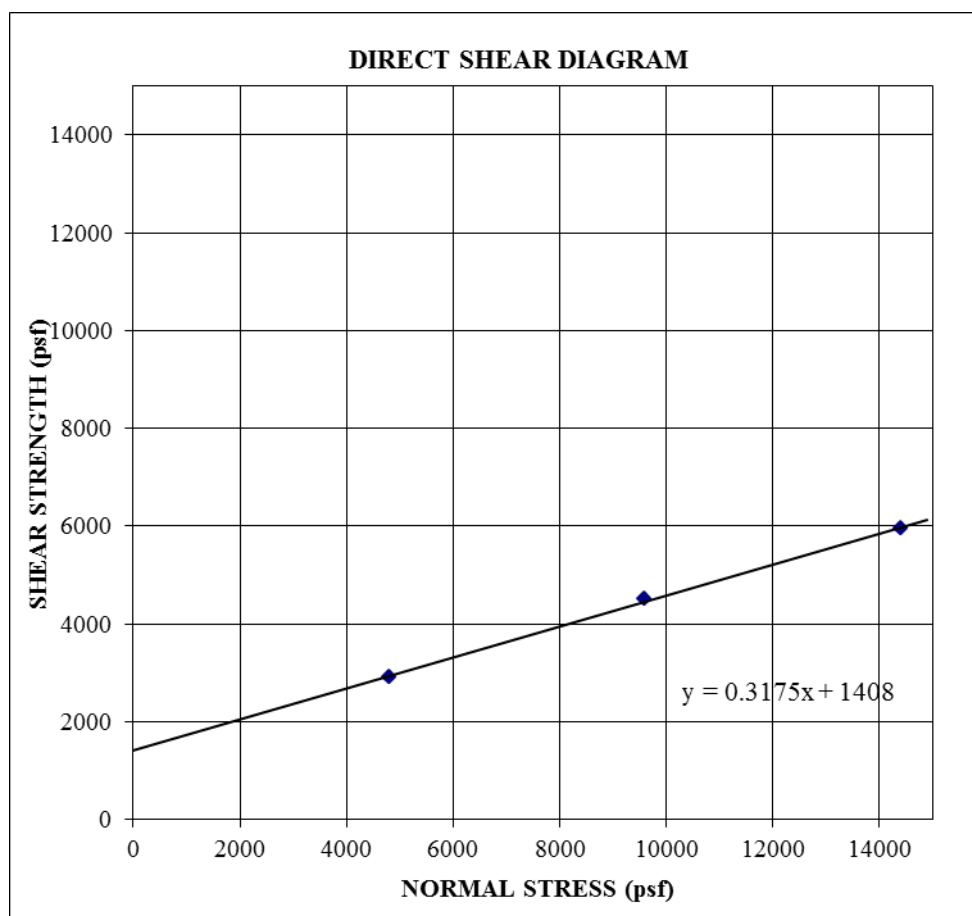
Date Tested: 10/16/2015

PROJECT: SARGENT RANCH

3.31274

SIERRA GEOTECHNICAL SERVICES INC.

P.O. BOX 5024, MAMMOTH LAKES, CALIFORNIA 93546



Boring No: BH-8

Sample Depth: 70-72 feet

Friction Angle: 18 degrees

Cohesion: 1408 psf

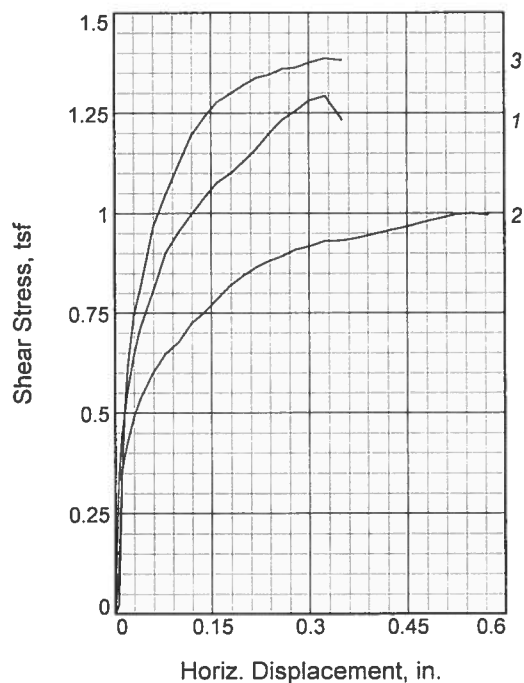
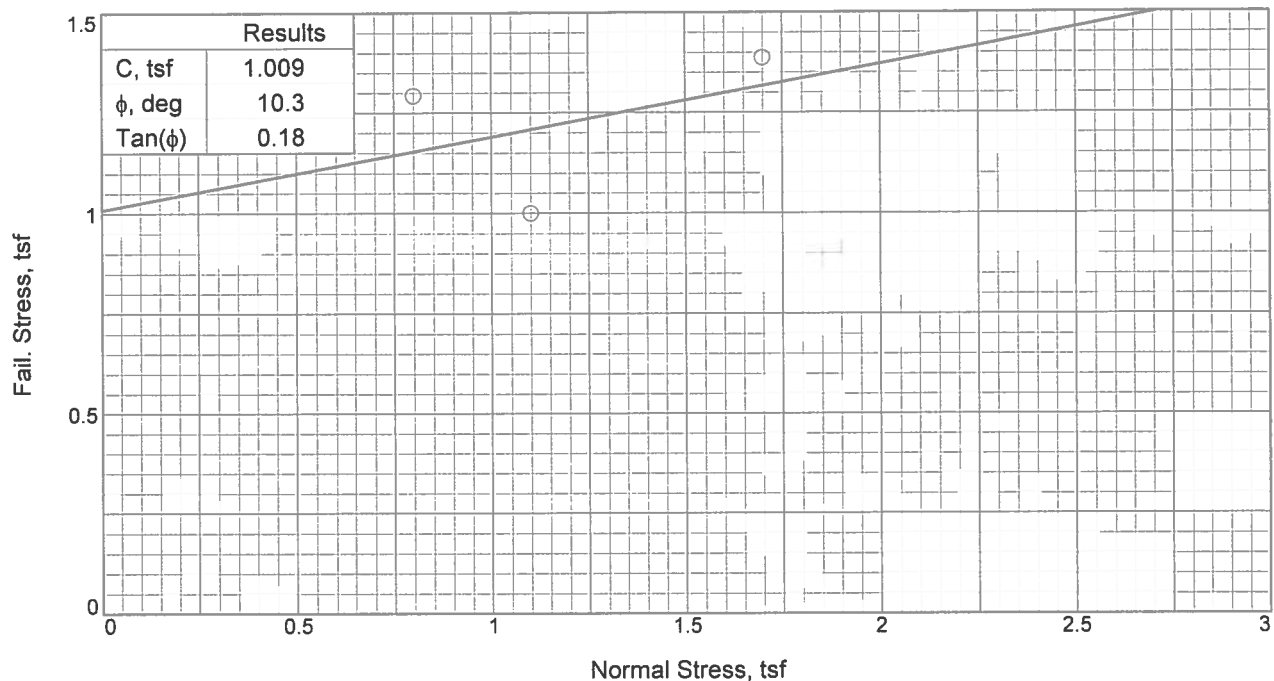
Strain Rate 0.002 in/min

Gray Clay (CL)

Date Tested: 10/16/2015

PROJECT: SARGENT RANCH

3.30632



Sample No.		1	2	3
Initial	Water Content, %	13.2	13.0	13.6
	Dry Density, pcf	100.7	96.2	95.2
	Saturation, %	54.3	47.9	48.8
	Void Ratio	0.6426	0.7189	0.7369
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	23.2	24.2	23.1
	Dry Density, pcf	100.7	96.2	95.2
	Saturation, %	95.6	89.2	83.2
	Void Ratio	0.6426	0.7189	0.7369
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, tsf		0.800	1.100	1.700
Fail. Stress, tsf		1.293	1.000	1.387
Displacement, in.		0.33	0.55	0.33
Ult. Stress, tsf				
Displacement, in.				
Strain rate, in./min.		0.05	0.02	0.02

Sample Type:

Description: Gray clay (CL)

LL= 34

PL= 15

PI= 19

Specific Gravity= 2.65

Remarks:

Plate _____

Client: Sierra Geotechnical Services Inc.

Project: Sierra Geotechnical Services

Misc. Laboratory Testing

Source of Sample: Sargent Ranch Job #3.31274

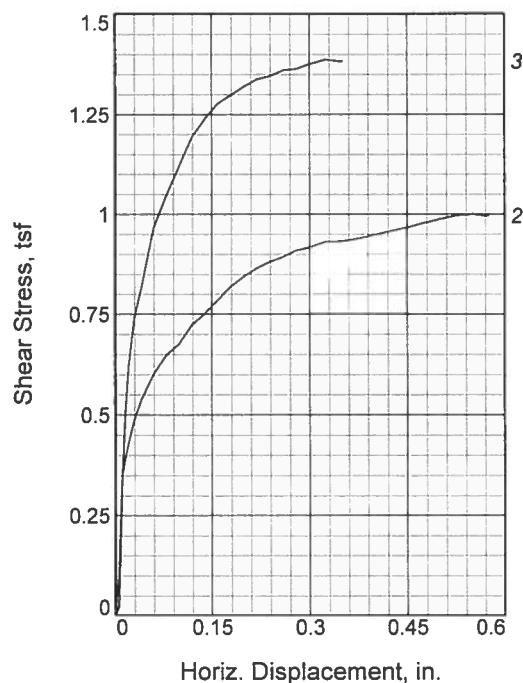
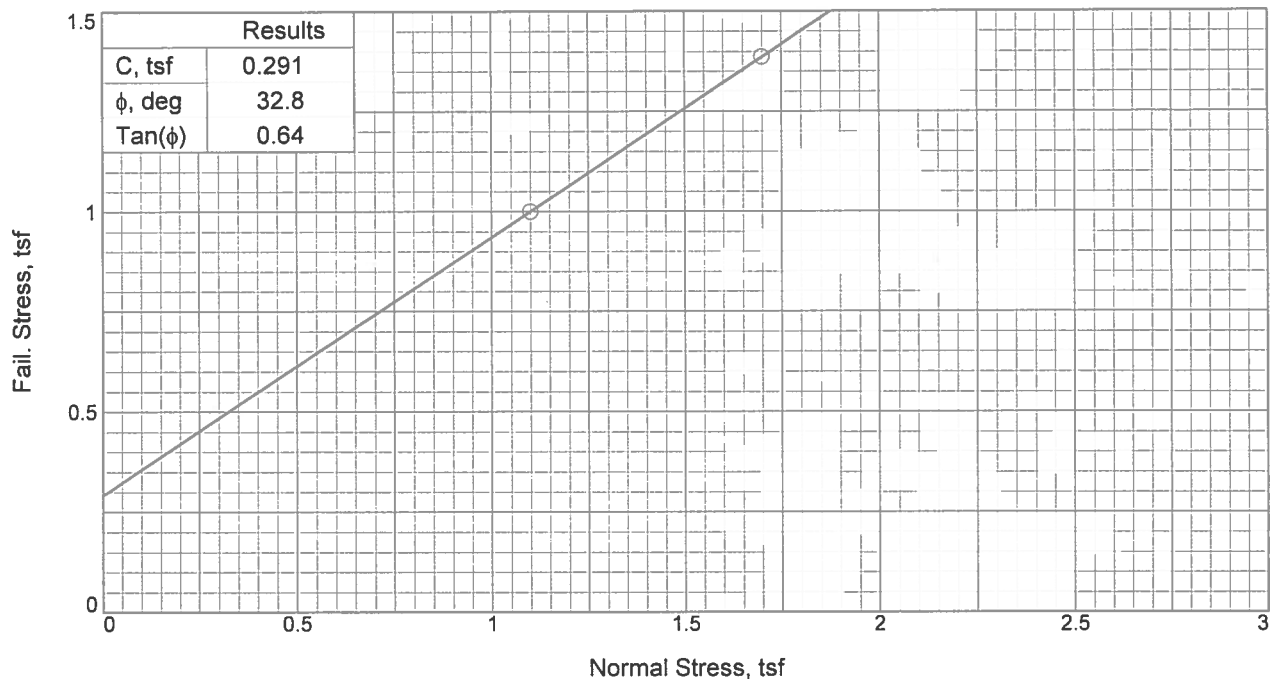
Sample Number: 14-286

Proj. No.: 4437.071

Date Sampled: 11-18-14

DIRECT SHEAR TEST REPORT

PEZONELLA ASSOCIATES, INC.



Sample No.		1	2	3
Initial	Water Content, %	N/A	13.0	13.6
	Dry Density, pcf	N/A	96.2	95.2
	Saturation, %	N/A	47.9	48.8
	Void Ratio	N/A	0.7189	0.7369
	Diameter, in.		2.42	2.42
	Height, in.		1.00	1.00
At Test	Water Content, %	N/A	24.2	23.1
	Dry Density, pcf		96.2	95.2
	Saturation, %		89.2	83.2
	Void Ratio		0.7189	0.7369
	Diameter, in.		2.42	2.42
	Height, in.		1.00	1.00
Normal Stress, tsf		0.800	1.100	1.700
Fail. Stress, tsf			1.000	1.387
Displacement, in.			0.55	0.33
Ult. Stress, tsf				
Displacement, in.				
Strain rate, in./min.		0.05	0.02	0.02

Sample Type:

Description: Gray clay (CL)

LL= 34

PL= 15

PI= 19

Specific Gravity=

Remarks:

Plate _____

Client: Sierra Geotechnical Services Inc.

Project: Sierra Geotechnical Services

Misc. Laboratory Testing

Source of Sample: Sargent Ranch Job #3.31274

Sample Number: 14-286

Proj. No.: 4437.071

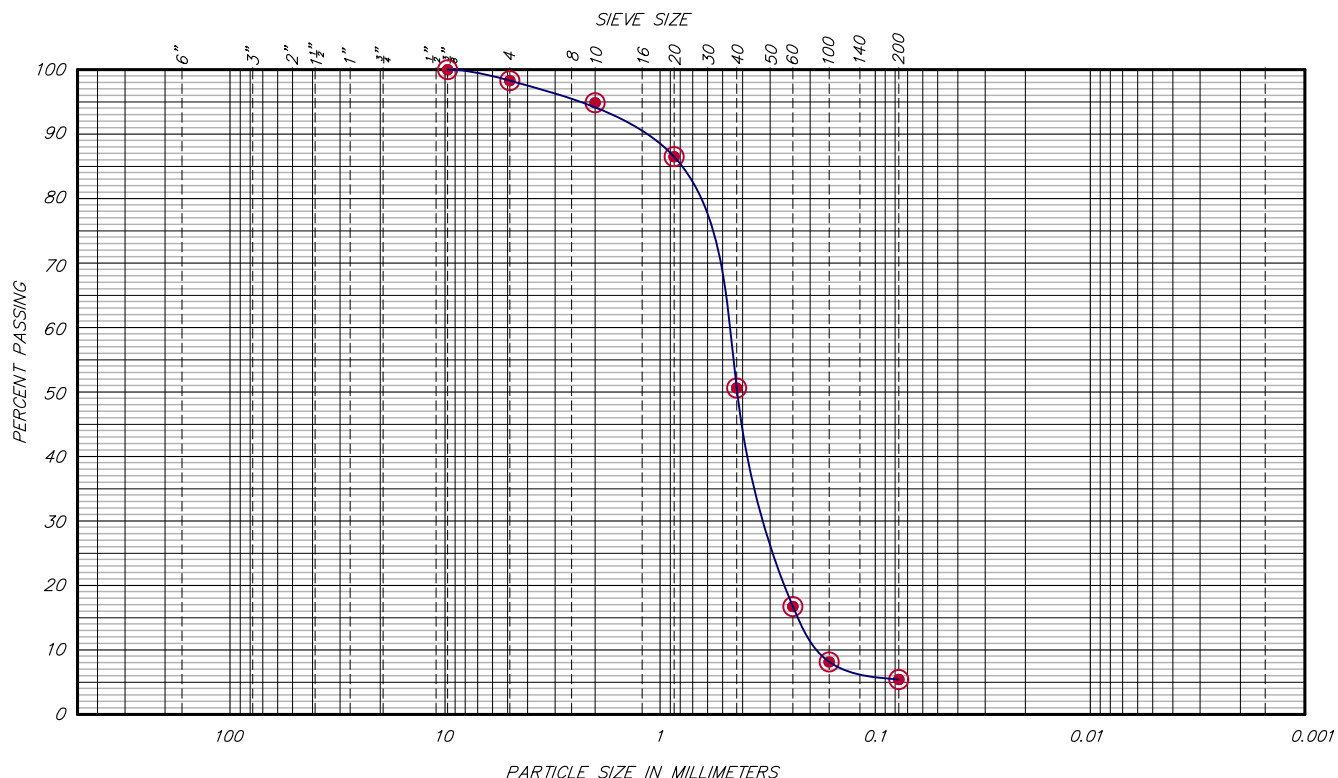
Date Sampled: 11-18-14

DIRECT SHEAR TEST REPORT

PEZONELLA ASSOCIATES, INC.

PARTICLE SIZE DISTRIBUTION REPORT

PER ASTM TEST METHOD D6913



% >3"	% GRAVEL		% SAND			% FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1.7	3.4	44.2	45.3	5.4	n/a

SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFIED PERCENT	PASS? (Yes or No)
2"				
1-1/2"				
1"				
3/4"				
1/2"				
3/8"	0	100		
No. 4	1.7	98.3		
No. 8	--	--		
No. 10	5.1	94.9		
No. 16	--	--		
No. 20	13.5	86.5		
No. 30	--	--		
No. 40	49.3	50.7		
No. 50	--	--		
No. 60	83.3	16.7		
No. 100	91.9	8.1		
No. 140	--	--		
No. 200	94.6	5.4		

SOIL DESCRIPTION	
Poorly Graded Sand with Fines	
ATTERBERG LIMITS	
PL = 0	LL = 0 PI = NP
COEFFICIENTS	
D ₈₅ = n/a	D ₆₀ = 0.440 D ₅₀ = n/a
D ₃₀ = 0.232	D ₁₅ = n/a D ₁₀ = 0.180
C _u = 2.444	C _c = 0.680
CLASSIFICATION	
USCS = SP/SM	AASHTO = n/a
REMARKS	
Specific Gravity (per ASTM D854) = n/a	

SGS
SIERRA GEOTECHNICAL SERVICES, INC.

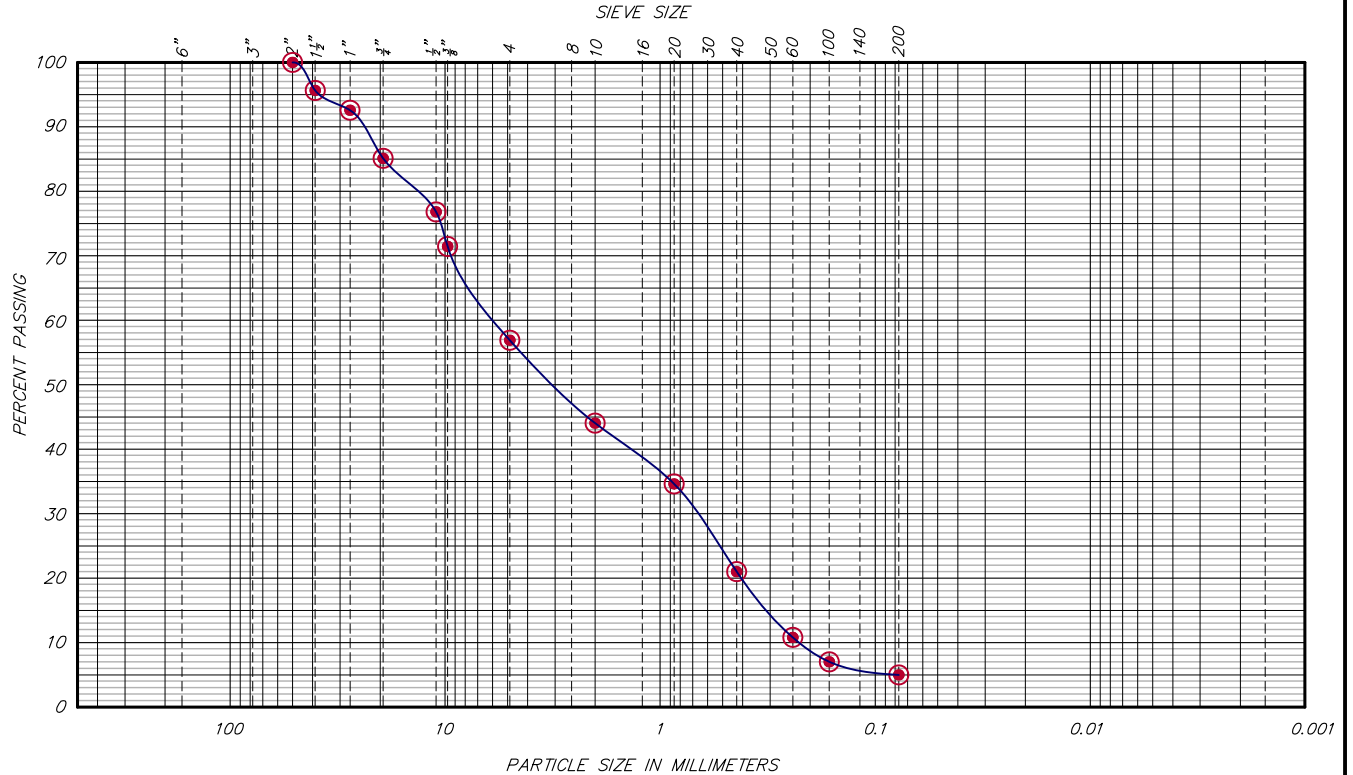
ENVIRONMENTAL GEOTECHNICAL GEOLOGY GROUNDWATER MINING MATERIALS
873 NORTH MAIN STREET, SUITE 150, BISHOP, CALIFORNIA 93514
549 OLD MAMMOTH ROAD, SUITE 222, MAMMOTH LAKES, CALIFORNIA 93546
www.sgsi.us



PROJECT:	Sargent Ranch	CLIENT:	Sargent Ranch LLC
SAMPLE DEPTH:	40'	LOCATION:	BH-2
DATE:	9/11/2015	TESTED BY:	CC
JOB NO.:	3.31274	LAB SUPERVISOR:	DD

PARTICLE SIZE DISTRIBUTION REPORT

PER ASTM TEST METHOD D6913



% > 3"	% GRAVEL		% SAND			% FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	14.9	28.2	12.9	23.0	16.0	5.0	n/a

SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFIED PERCENT	PASS? (Yes or No)
2"	0	100.0		
1-1/2"	4.3	95.7		
1"	7.4	92.6		
3/4"	14.9	85.1		
1/2"	23.2	76.8		
3/8"	28.6	71.4		
No. 4	43.1	56.9		
No. 8	--	--		
No. 10	56.0	44.0		
No. 16	--	--		
No. 20	65.4	35.6		
No. 30	--	--		
No. 40	79.0	21.0		
No. 50	--	--		
No. 60	89.2	10.8		
No. 100	93.0	7.0		
No. 140	--	--		
No. 200	95.0	5.0		

SOIL DESCRIPTION	
Poorly Graded Sand with Gravel and Fines	
ATTERBERG LIMITS	
PL = 0	LL = 0 PI = NP
COEFFICIENTS	
D ₈₅ = n/a	D ₆₀ = 1.600 D ₅₀ = n/a
D ₃₀ = 0.164	D ₁₅ = n/a D ₁₀ = 0.122
C _u = 13.1	C _c = 0.138
CLASSIFICATION	
USCS = SP/SM	AASHTO = n/a
REMARKS	
Specific Gravity (per ASTM D854) = n/a	

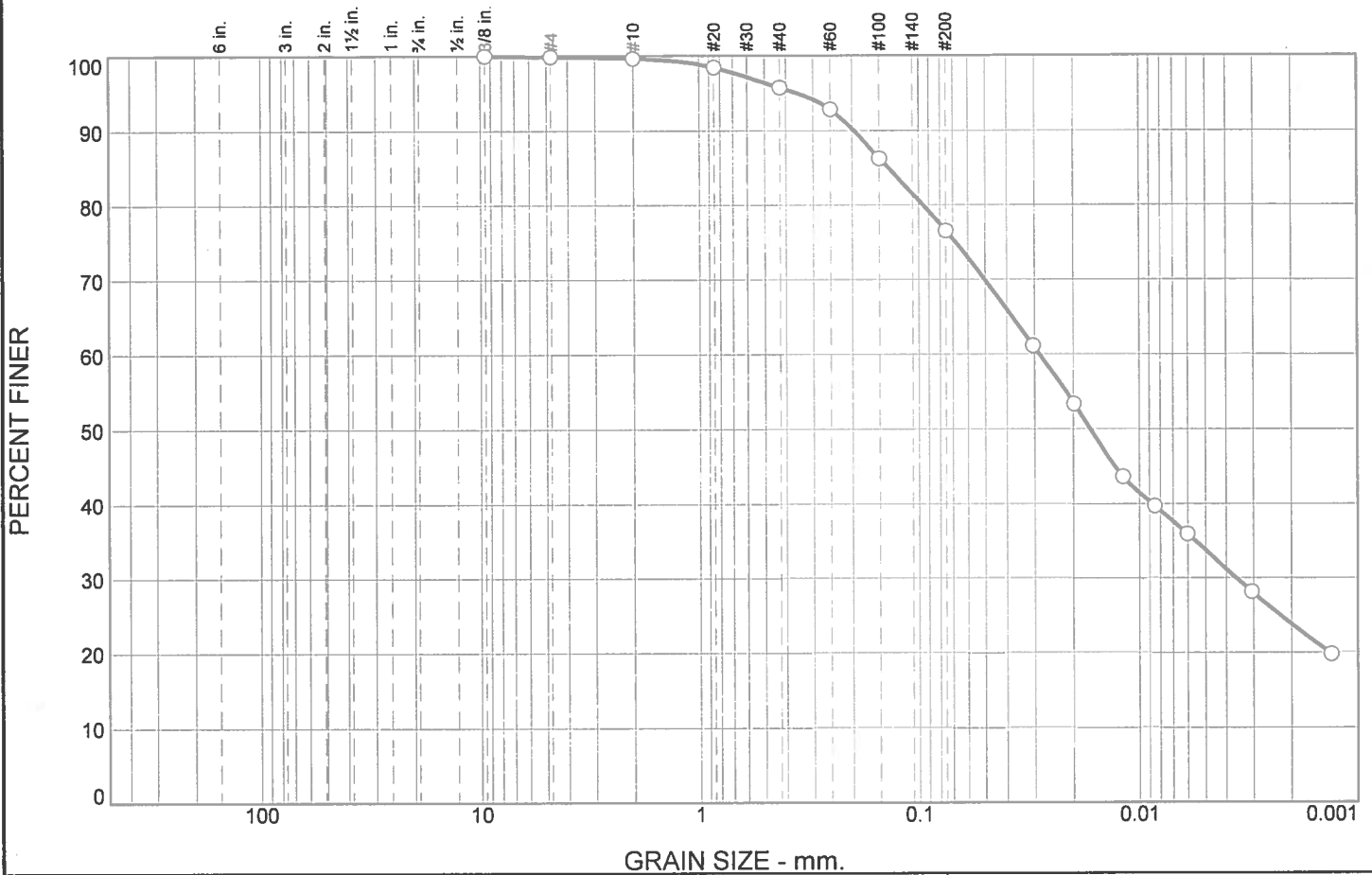
SGS
SIERRA GEOTECHNICAL SERVICES, INC.

ENVIRONMENTAL GEOTECHNICAL GEOLOGY GROUNDWATER MINING MATERIALS
873 NORTH MAIN STREET, SUITE 150, BISHOP, CALIFORNIA 93514
549 OLD MAMMOTH ROAD, SUITE 222, MAMMOTH LAKES, CALIFORNIA 93546
www.sgsi.us



PROJECT:	Sargent Ranch	CLIENT:	Sargent Ranch LLC
SAMPLE DEPTH:	22'	LOCATION:	BH-4
DATE:	9/14/2015	TESTED BY:	CC
JOB NO.:	3.31274	LAB SUPERVISOR:	DD

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	3.9	19.3	42.7	33.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375"	100.0		
#4	99.9		
#10	99.7		
#20	98.5		
#40	95.8		
#60	92.8		
#100	86.2		
#200	76.5		
0.0303 mm.	61.1		
0.0198 mm.	53.3		
0.0118 mm.	43.6		
0.0085 mm.	39.7		
0.0060 mm.	35.9		
0.0030 mm.	28.1		
0.0013 mm.	19.8		

* (no specification provided)

Soil Description

Gray clay (CL)

Atterberg Limits

PL= 15

$$LL = 34$$

P|= 19

Coefficients

$$D_{85} = 0.1375$$
$$D_{60} = 0.0285$$
$$D_{50} = 0.0168$$
$$D_{30} = 0.0036$$
$$D_{15} =$$
$$D_{10}^{50} =$$
$$C_{u=0}$$
 $C_{C_{11}}$

Classification

USCS= CL

AASHTO= A-6(12)

Remarks

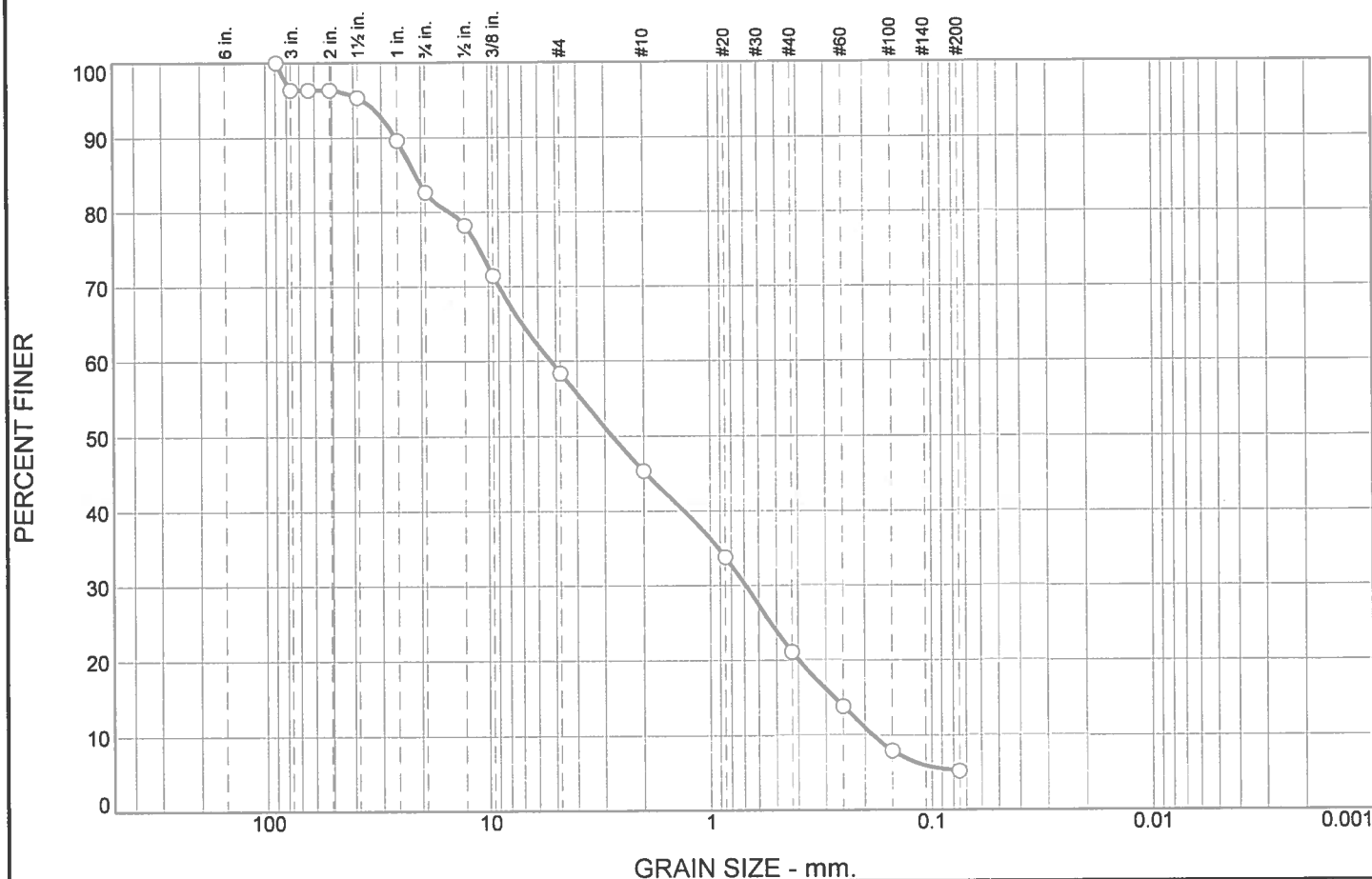
Client: Sierra Geotechnical Services Inc.

Project: Sierra Geotechnical Services
Misc. Laboratory Testing

Project No: 4437.07I

Plate

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
3.6	13.8	24.2	13.1	24.2	15.9	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3.5"	100.0		
3"	96.4		
2.5"	96.4		
2"	96.4		
1.5"	95.3		
1"	89.6		
.75"	82.6		
.5"	78.2		
.375"	71.4		
#4	58.4		
#10	45.3		
#20	33.8		
#40	21.1		
#60	13.9		
#100	7.9		
#200	5.2		

* (no specification provided)

Soil Description

Brown sand (SP-SM) with gravel and cobbles

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 21.2346 D₆₀= 5.2752 D₅₀= 2.7787
D₃₀= 0.6893 D₁₅= 0.2735 D₁₀= 0.1838
C_u= 28.70 C_c= 0.49

Classification

USCS= AASHTO=

Remarks

L.A. Abrasion test results = 25.3% loss

Sample No.: 14-287

Location:

Source of Sample: Sargent Ranch Job #3.31274

Date: 11-18-14

Elev./Depth:

**PEZONELLA
ASSOCIATES, INC.
Reno, Nevada**

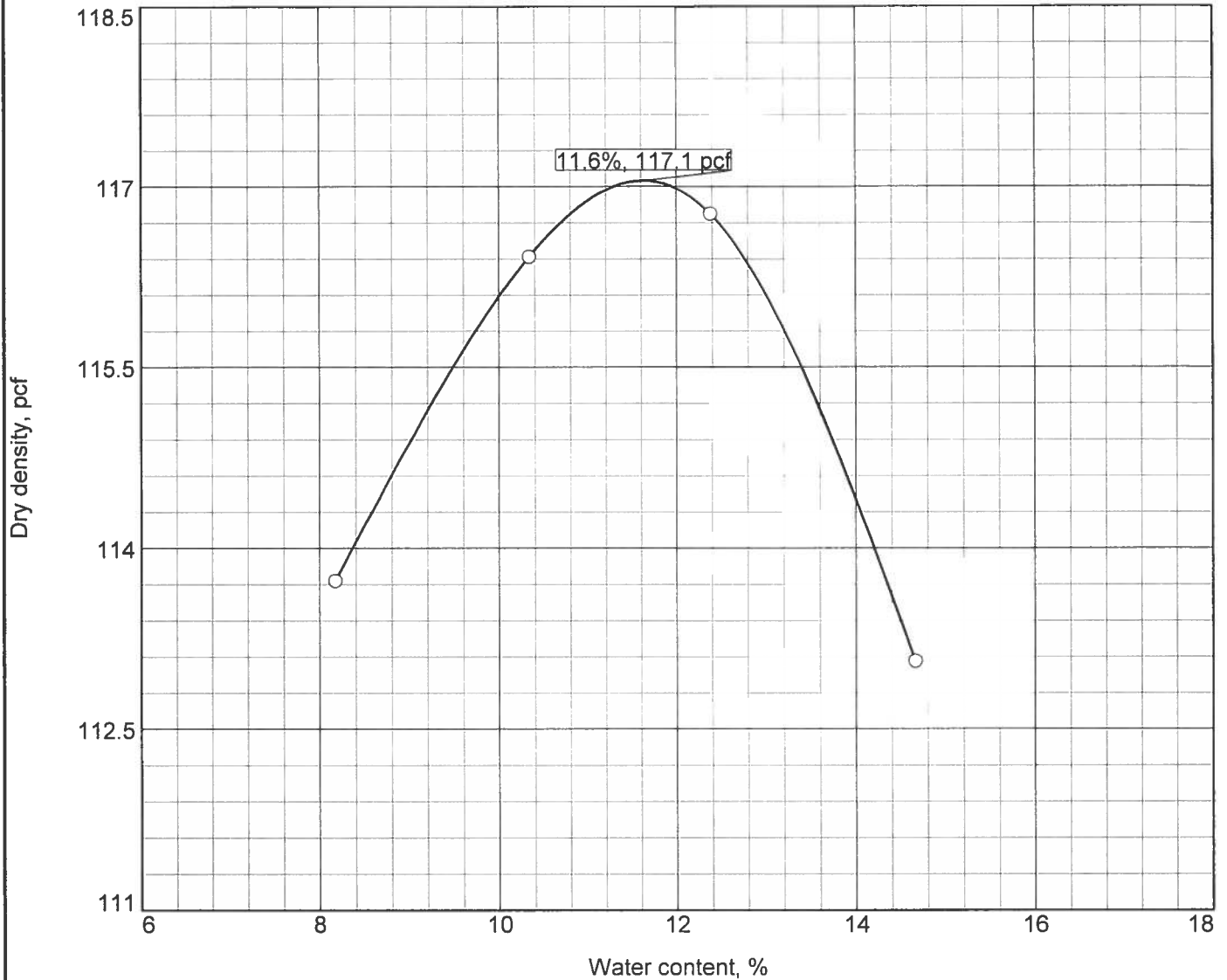
Client: Sierra Geotechnical Services Inc.

Project: Sierra Geotechnical Services
Misc. Laboratory Testing

Project No: 4437.071

Plate

COMPACTION TEST REPORT



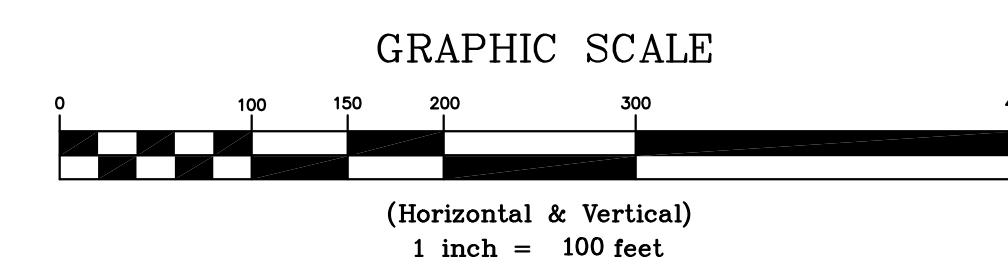
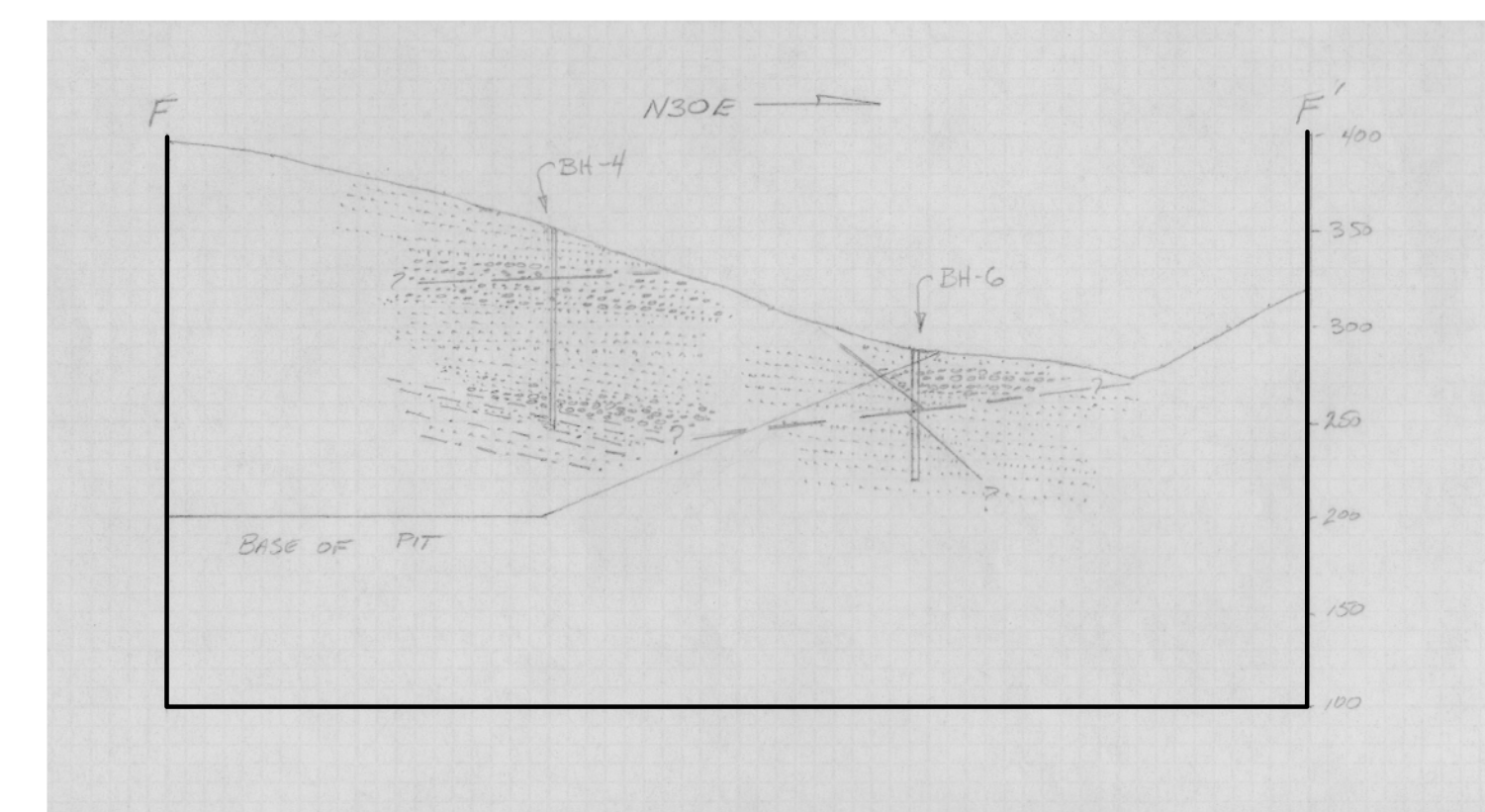
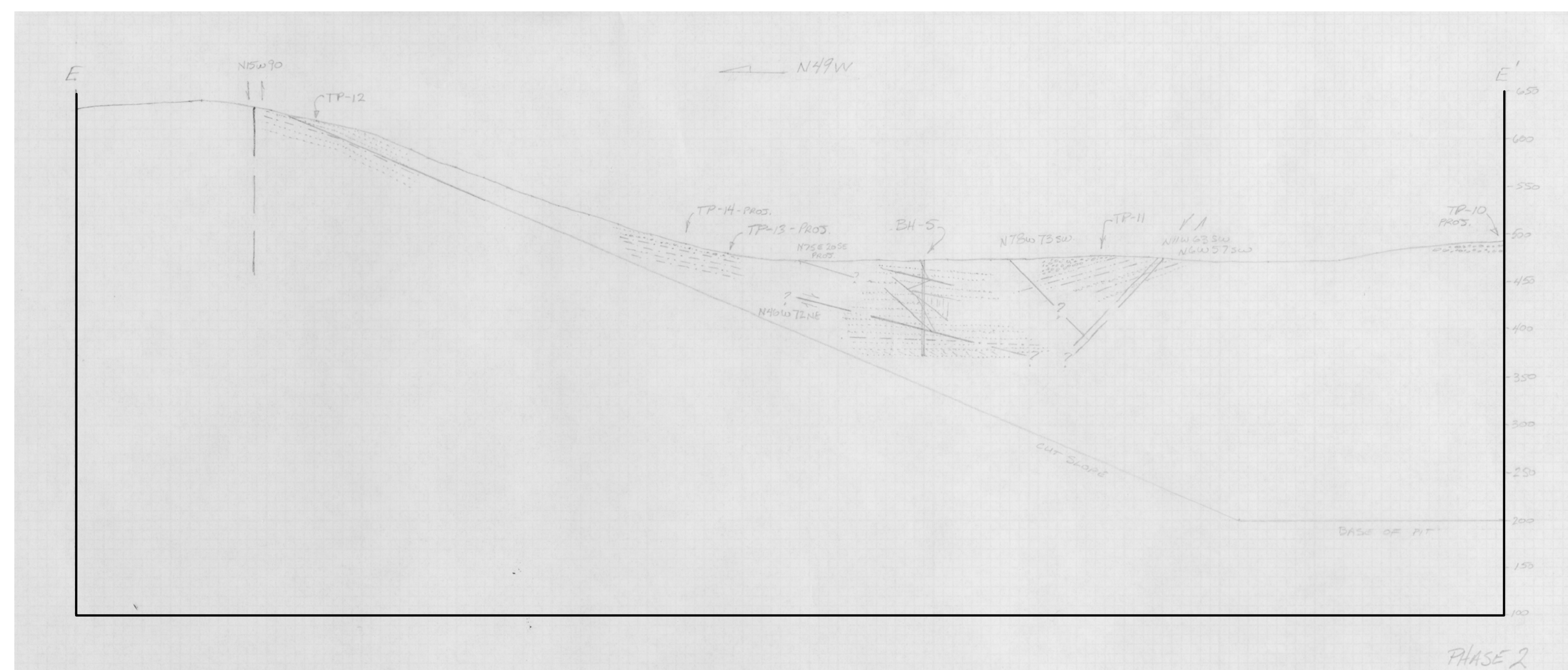
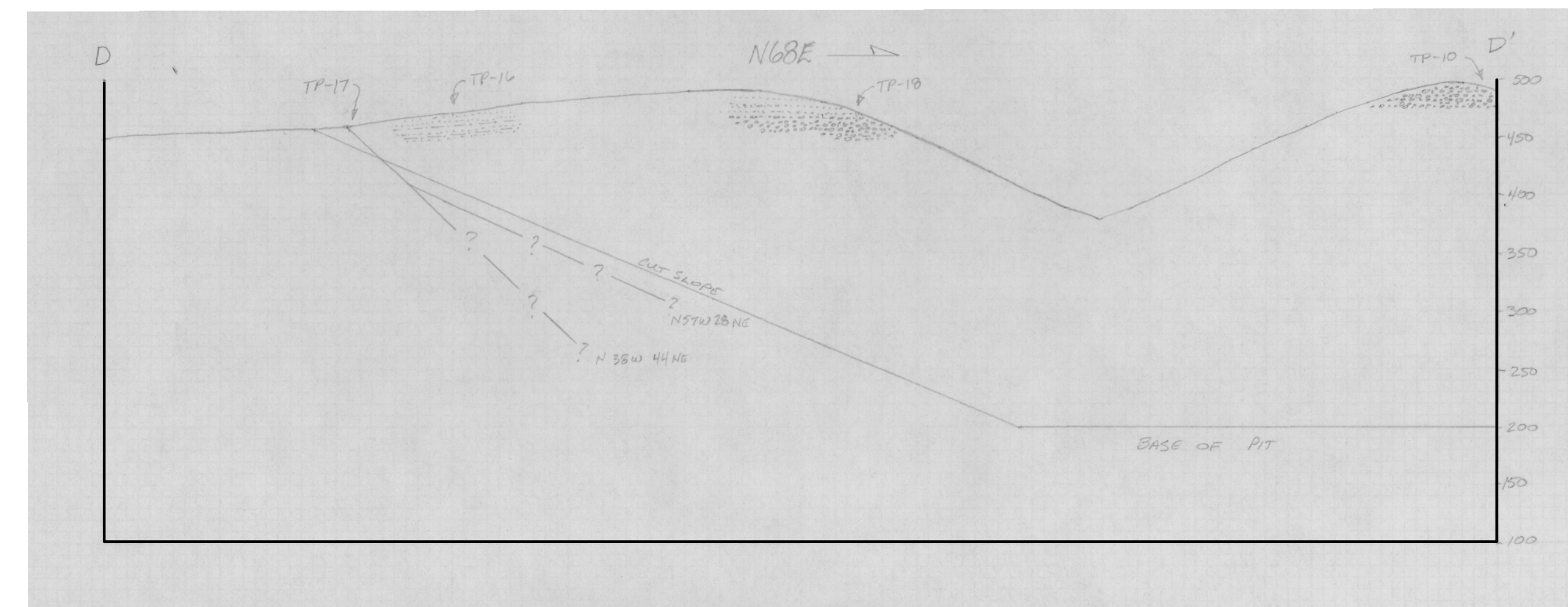
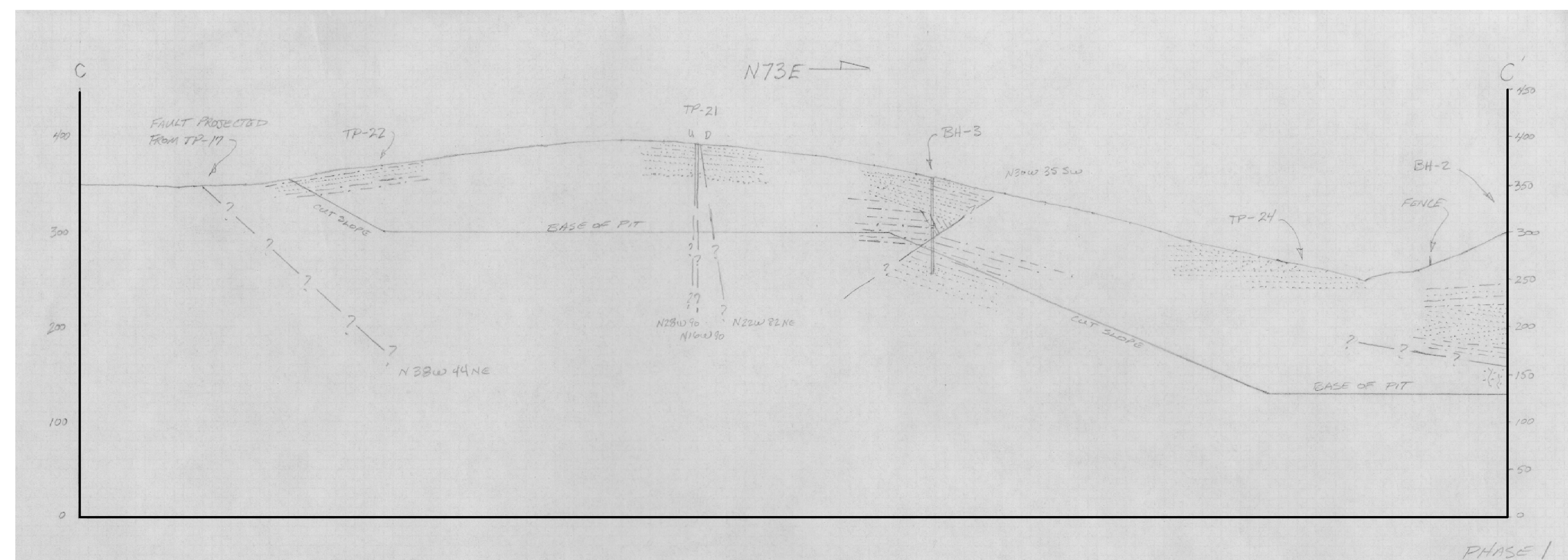
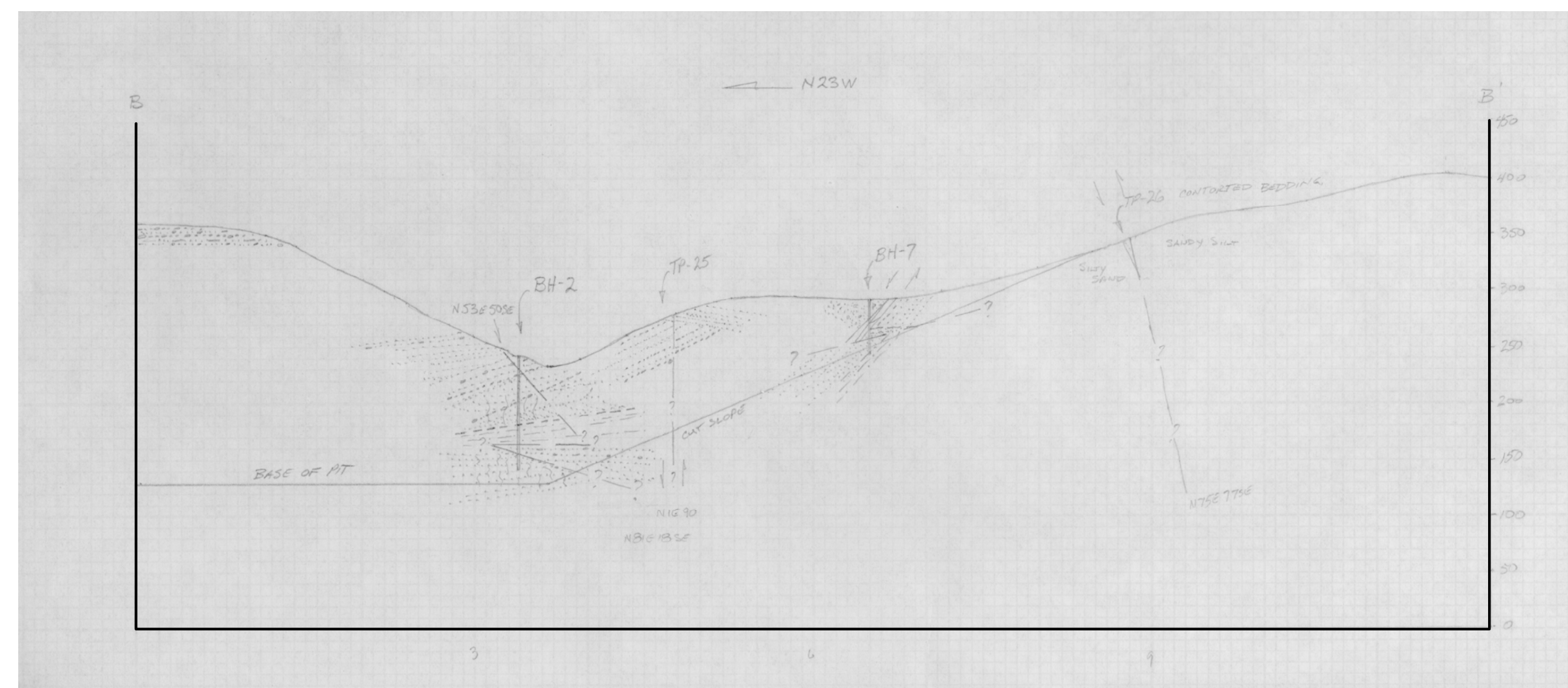
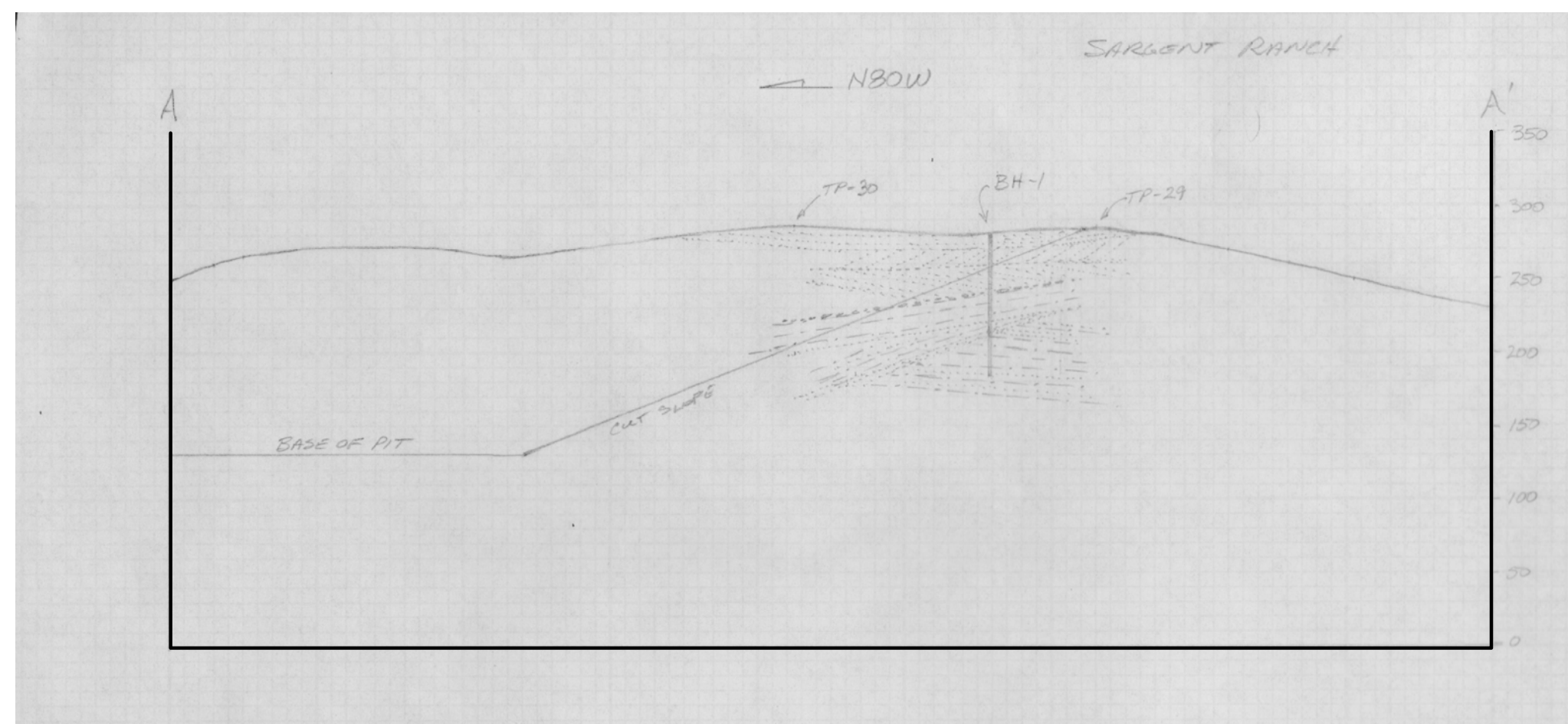
Test specification: ASTM D 1557-02 Method A Modified

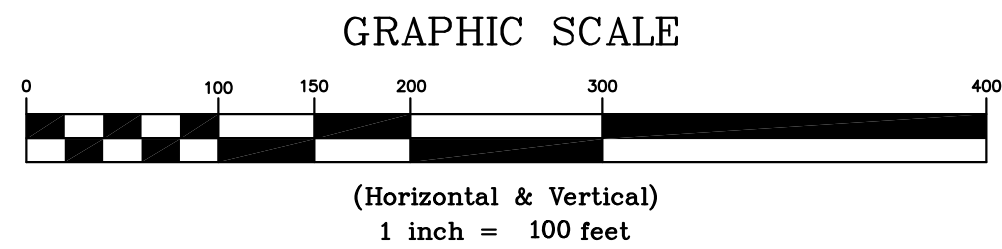
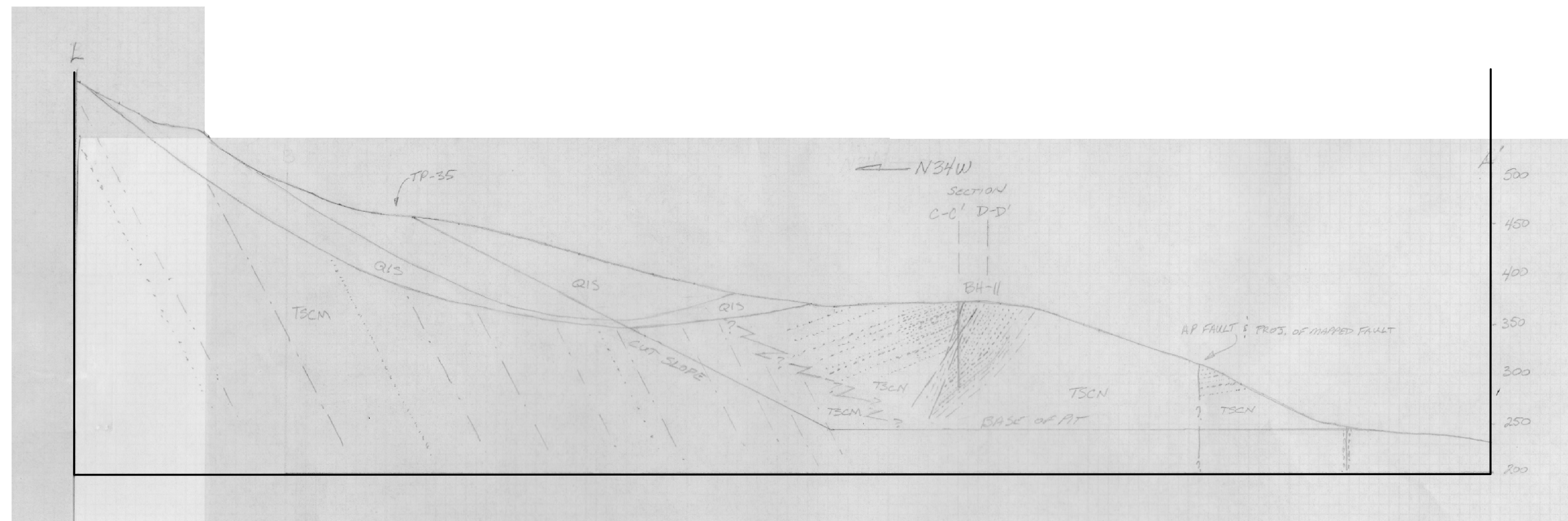
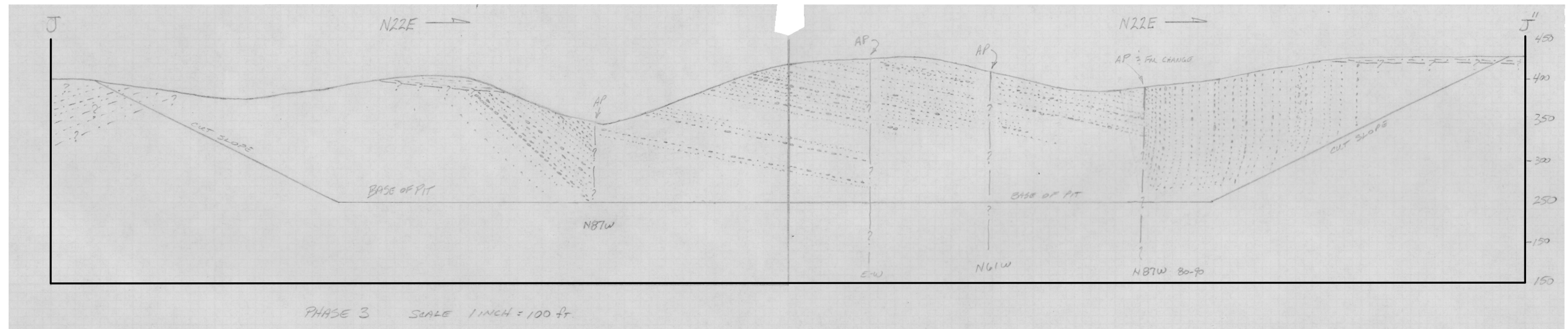
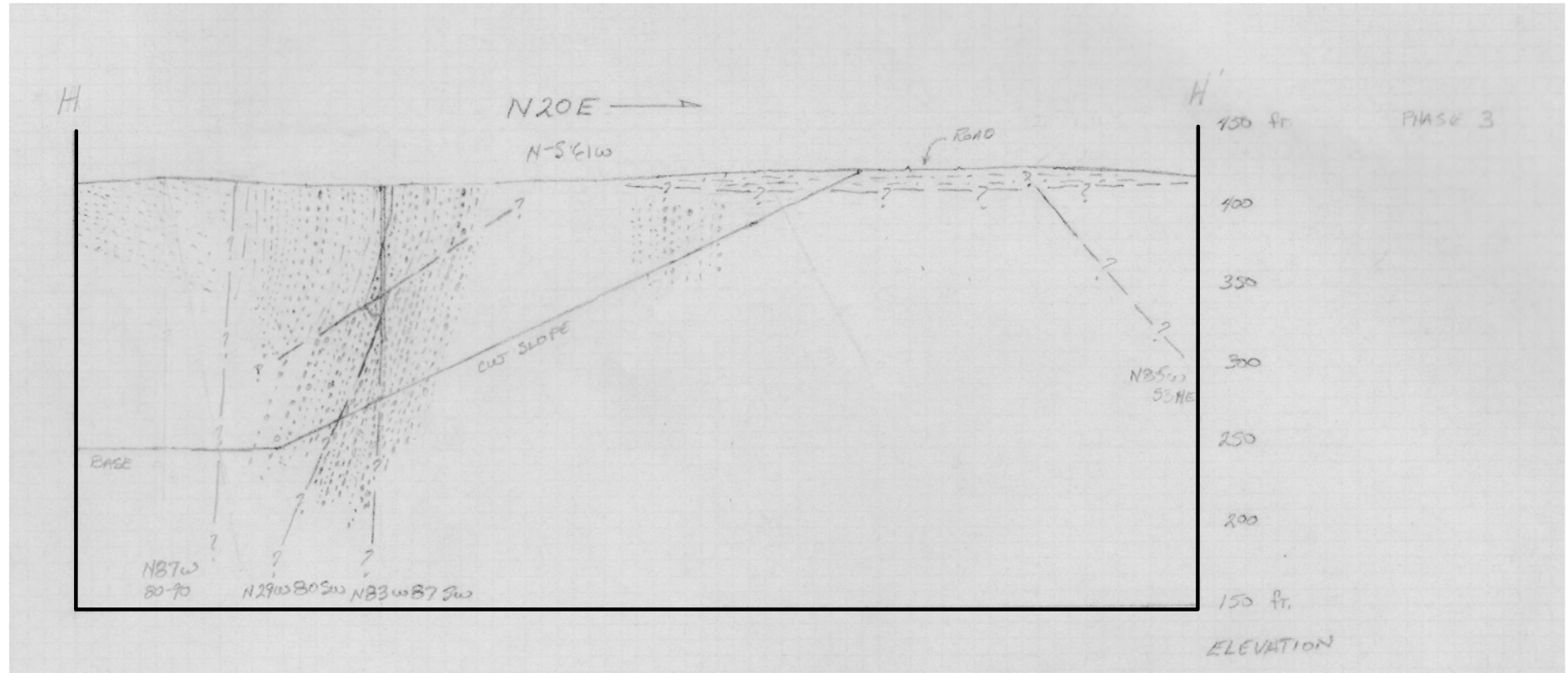
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(12)			34	19	0.1	76.5

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 117.1 pcf Optimum moisture = 11.6 %		Gray clay (CL)	
Project No. 4437.071 Client: Sierra Geotechnical Services Inc. Project: Sierra Geotechnical Services Misc. Laboratory Testing Date: Sample Source: Sargent Ranch Job #3.31274 Sample No.: 14-286		Remarks:	
PEZONELLA ASSOCIATES, INC.			
Reno, Nevada			
		Plate	

APPENDIX C

GEOLOGIC CROSS SECTIONS





SARGENT RANCH
GEOLOGIC CROSS SECTIONS GG', HH', II', JJ' & LL'

SARGENT RANCH

SARGENT RANCH LLC

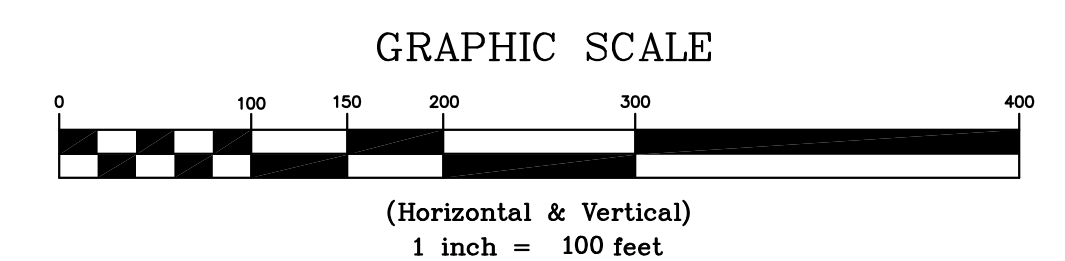
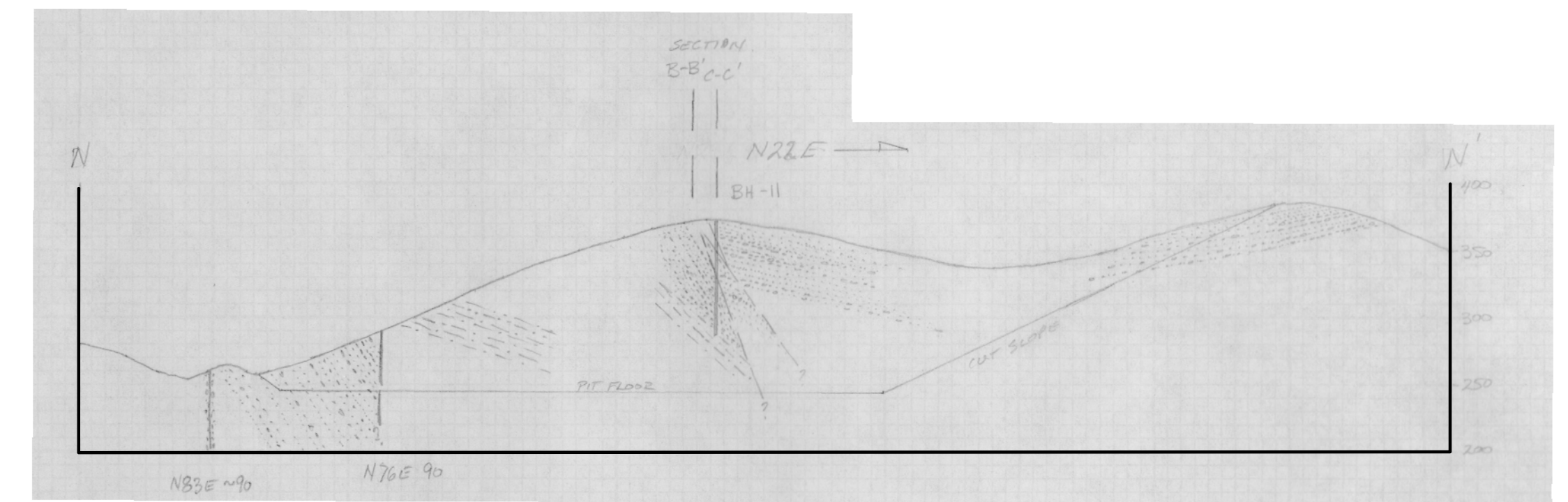
post office box 5024
569 old mammoth rd., ste. 222
MAMMOTH LAKES, ca 93546
phone: (760) 937-4608
email: info@sagsi.us

S&S
SIERRA GEOTECHNICAL SERVICES, INC.

GEOTECHNICAL • GEOLOGY • GROUNDWATER • ENVIRONMENTAL • MATERIALS

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REVISONS	BY
DATE	11/9/2015
SCALE	1"=100'
DRAWN	DD
JOB NO.	3.31274
DWG	GEOLOGY.DWG
SHEET	3
OF 4	SHEETS



*SARGENT RANCH
GEOLOGIC CROSS SECTIONS MM', NN' & QQ'
SARGENT RANCH, LLC*

ARS
SIERRA GEOTECHNICAL SERVICES, INC.

1600
willow street
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1600
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post office box 5024
MAMMOTH LAKES
CA 93546
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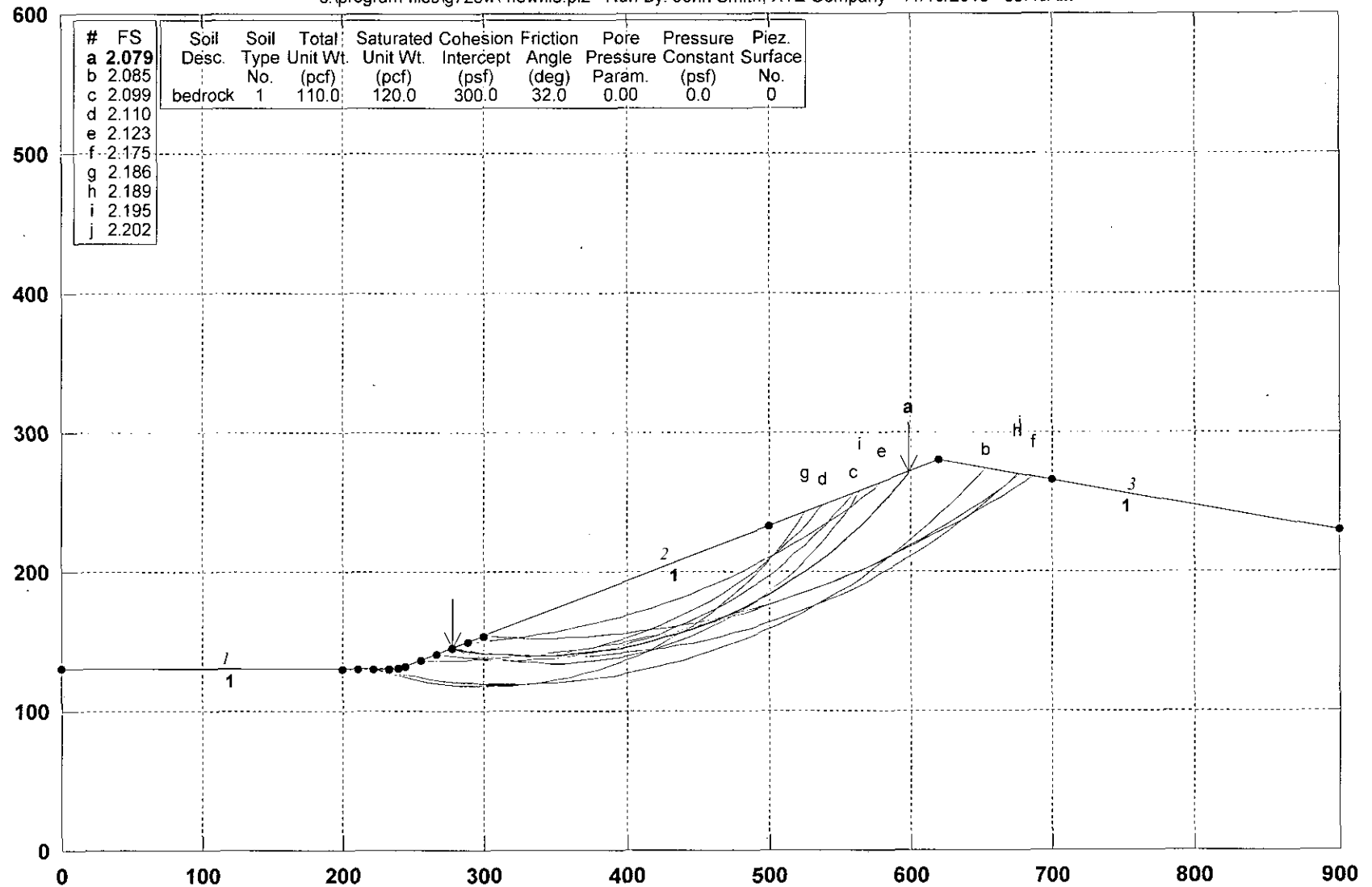
REVISONS		BY
DATE	<i>11/9/2015</i>	
SCALE	<i>1"=100'</i>	
DRAWN	<i>DD</i>	
JOB NO.	<i>3.31274</i>	
DWG	<i>GEOLOGY.DWG</i>	
SHEET	<i>4</i>	
OF	<i>4</i>	SHEETS

APPENDIX D

SLOPE STABILITY ANALYSIS

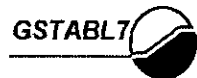
Sargent Ranch Quarry Site Section A-A'

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 09:43AM



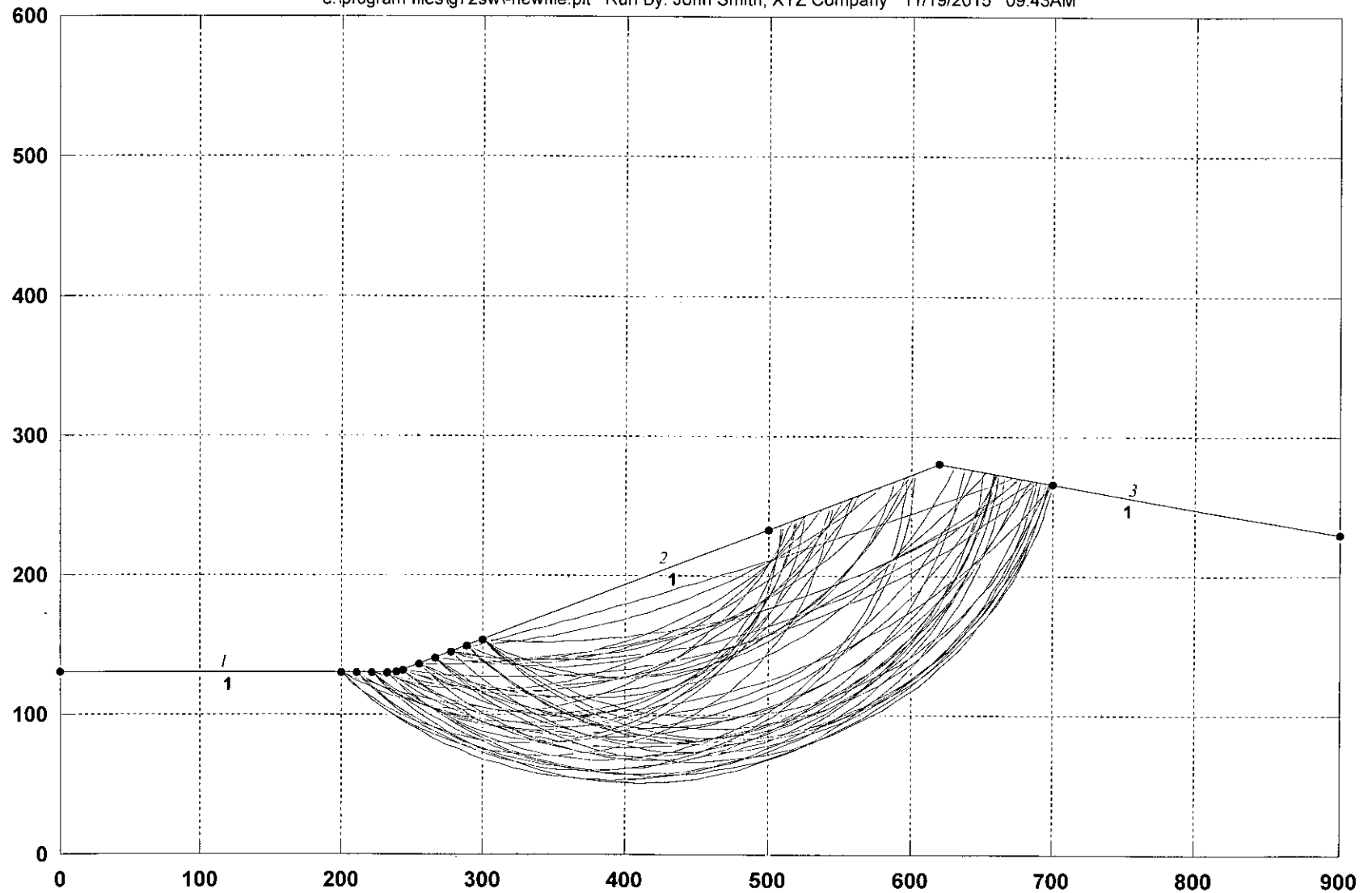
GSTABL7 v.2 FSmin=2.079

Safety Factors Are Calculated By The Modified Bishop Method



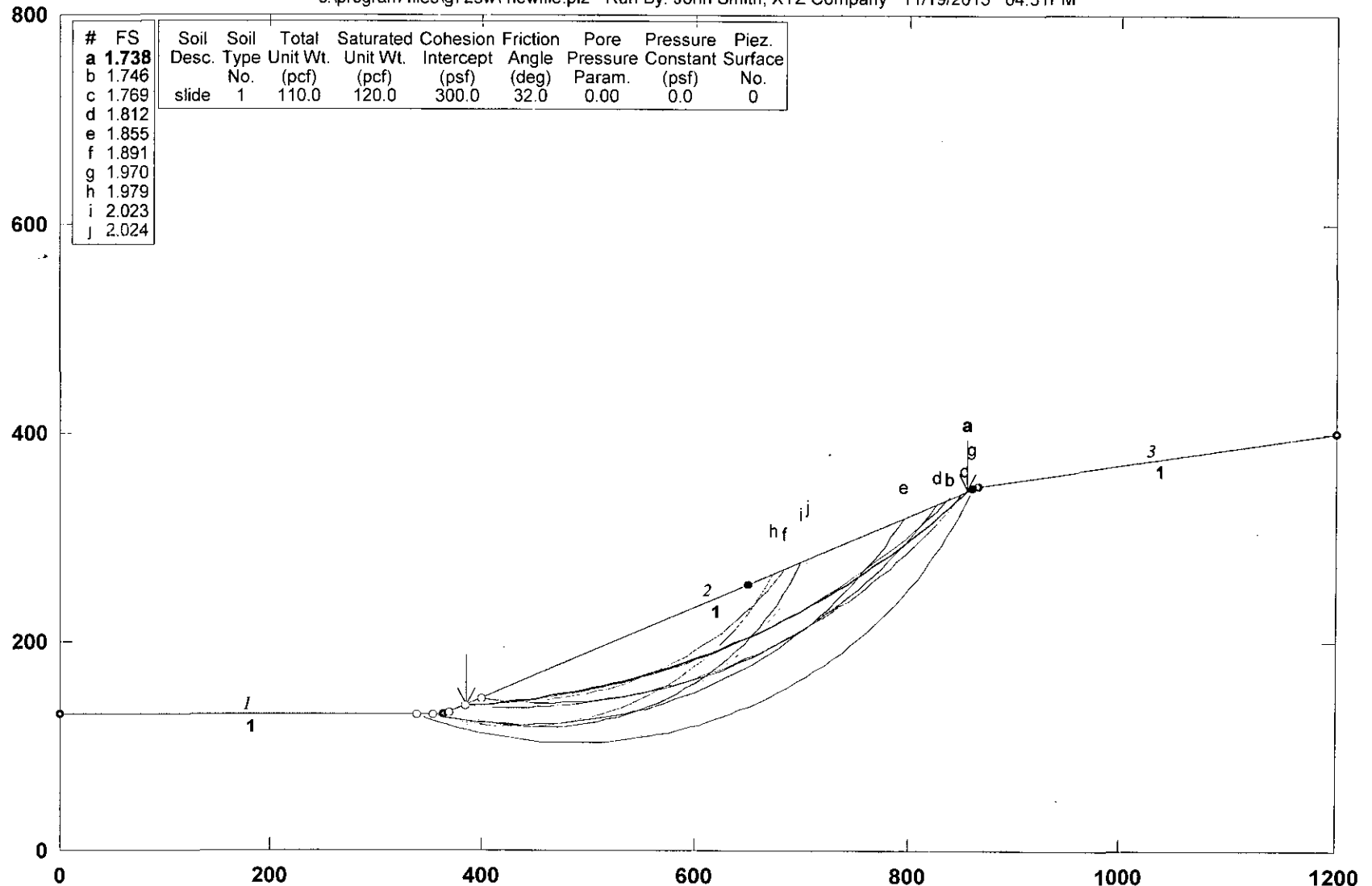
Sargent Ranch Quarry Site Section A-A'

c:\program files\lg72sw\newfile.plt Run By: John Smith, XYZ Company 11/19/2015 09:43AM



Sargent Ranch Quarry Site Section B-B' Deep Clay Bedding

c:\program files\g72sw\newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 04:51PM



GSTABL7 v.2 FSmin=1.738

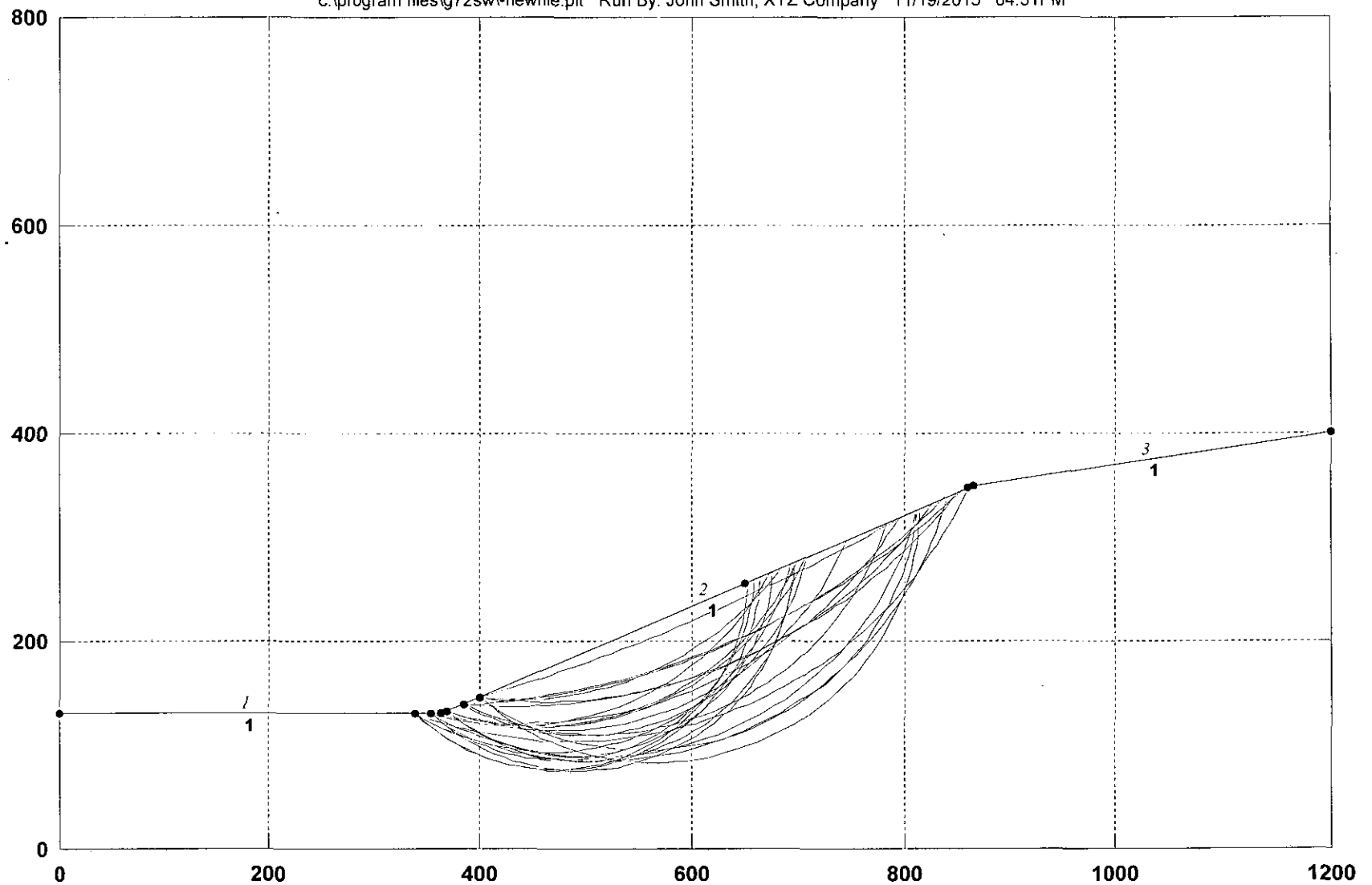
Safety Factors Are Calculated By The Modified Bishop Method



FS, if Cross bedded

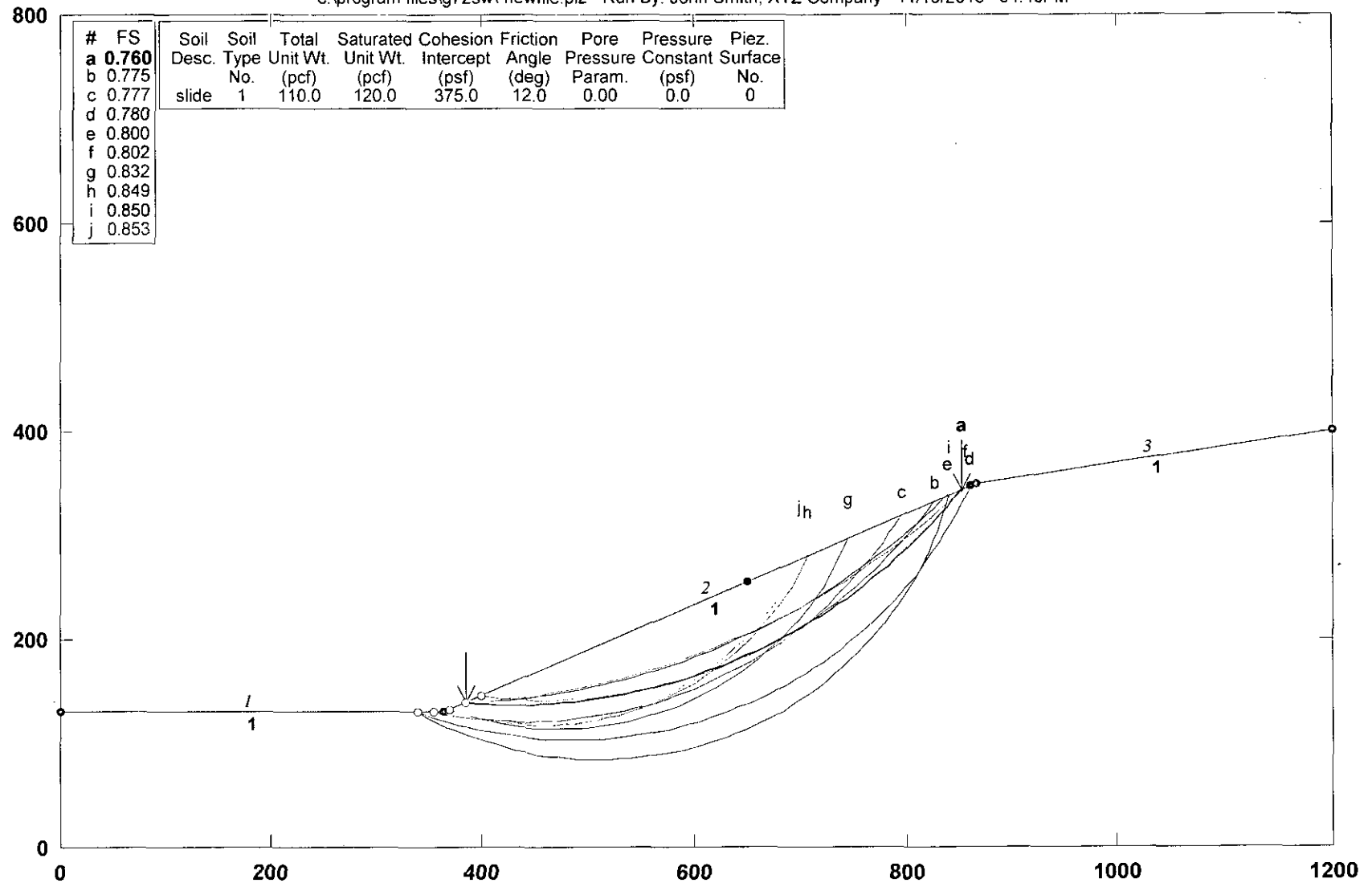
Sargent Ranch Quarry Site Section B-B' Deep Clay Bedding

c:\program files\g72sw\newfile.plt Run By: John Smith, XYZ Company 11/19/2015 04:51PM



Sargent Ranch Quarry Site Section B-B' Deep Clay Bedding

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 04:46PM



GSTABL7 v.2 FSmin=0.760

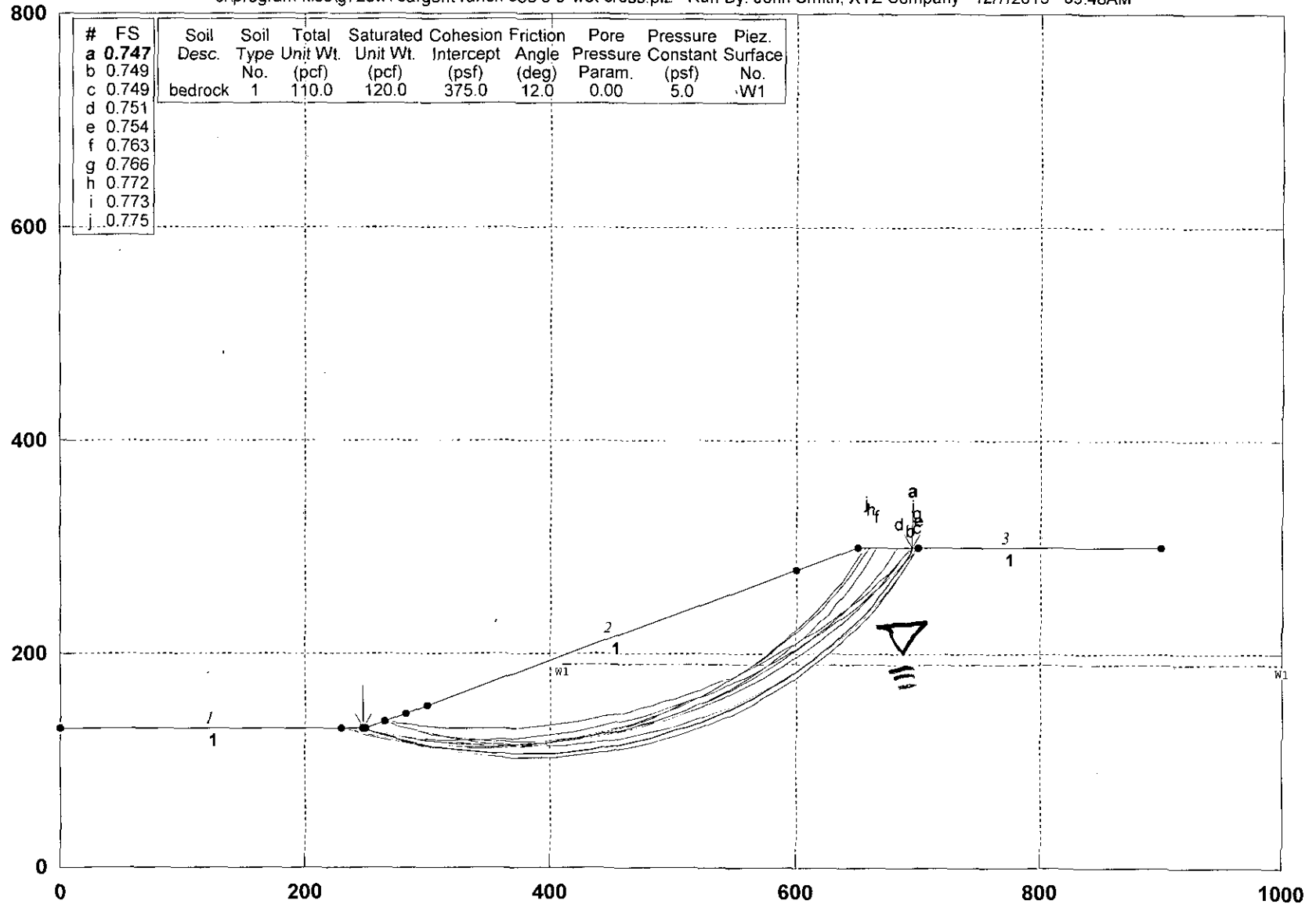
Safety Factors Are Calculated By The Modified Bishop Method



If Bedding Plane Failure Clay

Sargent Ranch Quarry Site Section C-C' with water

c:\program files\g72swl-sargent ranch sec c-c' wet cross.pl2 Run By: John Smith, XYZ Company 12/7/2015 09:48AM



GSTABL7 v.2 FSmin=0.747

Safety Factors Are Calculated By The Modified Bishop Method



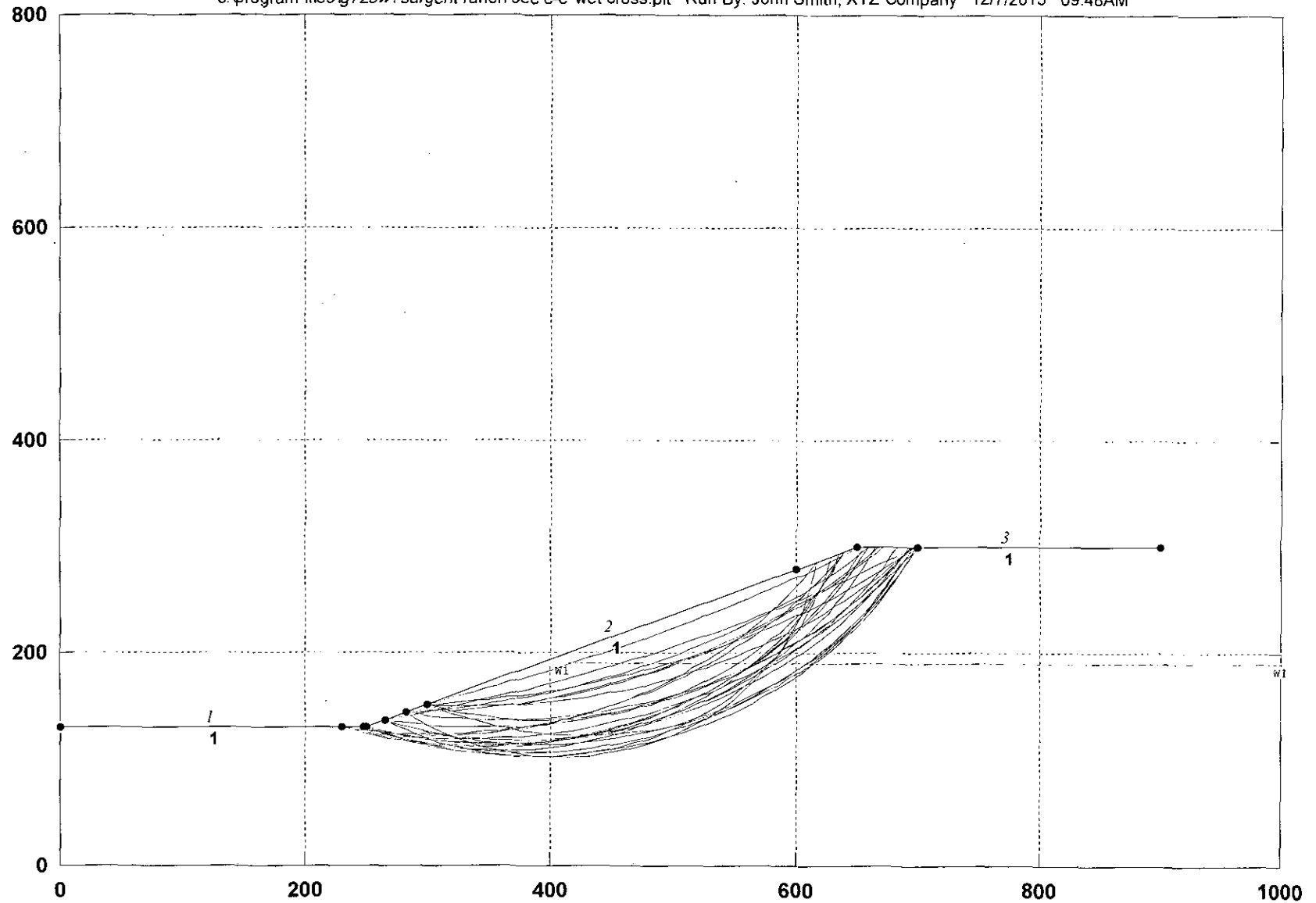
No water F.S. = .81

See C-C' Daylight

Water 5' head at el 190

Sargent Ranch Quarry Site Section C-C' with water

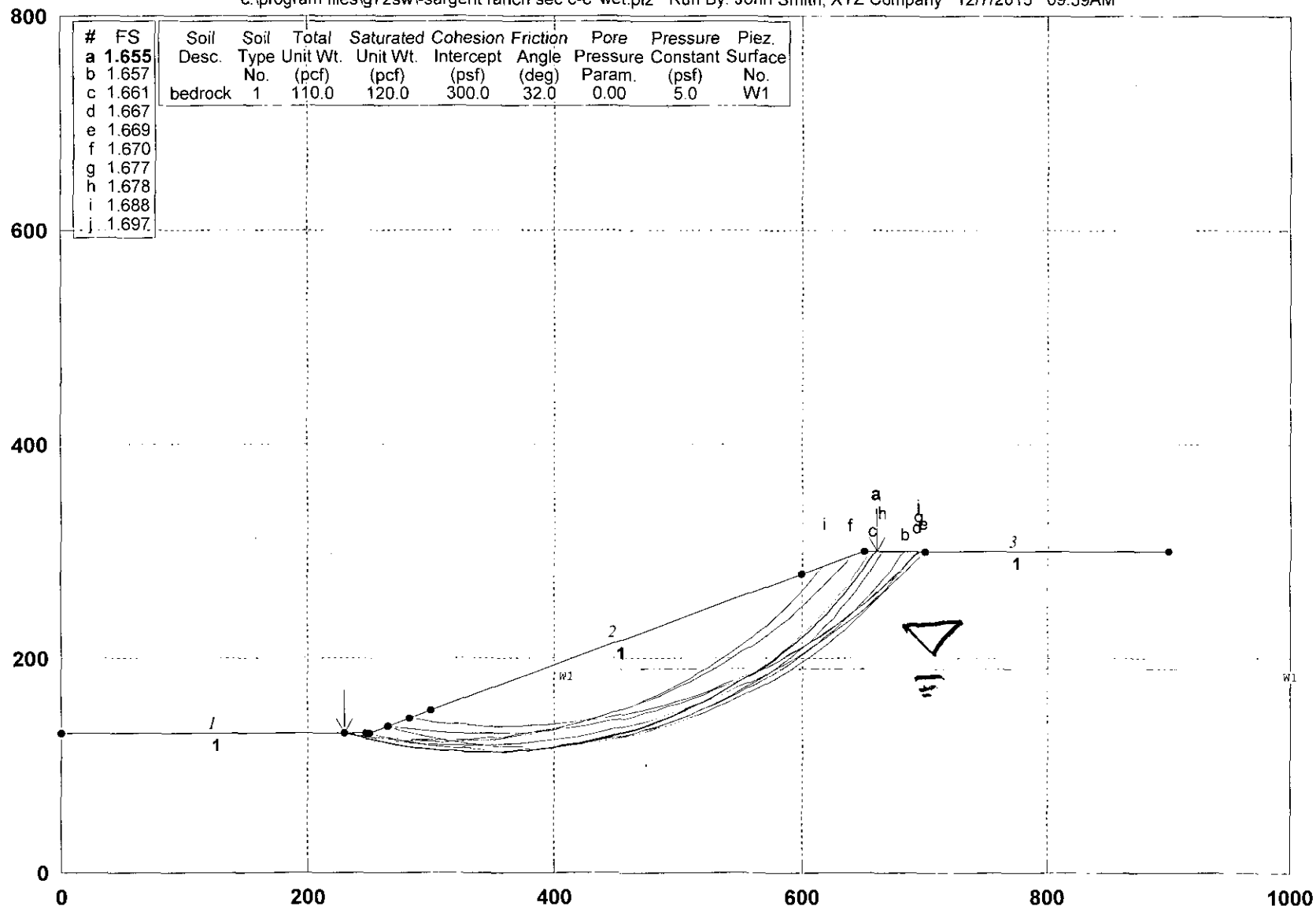
c:\program files\g72swl-sargent ranch sec c-c' wet cross.plt Run By: John Smith, XYZ Company 12/7/2015 09:48AM



Sec C-C' - Daylight
Water 5' head @ el 190

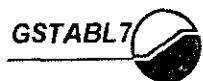
Sargent Ranch Quarry Site Section C-C' Typical Seismic

c:\program files\g72sw\sargent ranch sec c-c' wet.pl2 Run By: John Smith, XYZ Company 12/7/2015 09:39AM



GSTABL7 v.2 FSmin=1.655

Safety Factors Are Calculated By The Modified Bishop Method

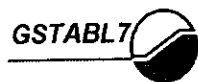
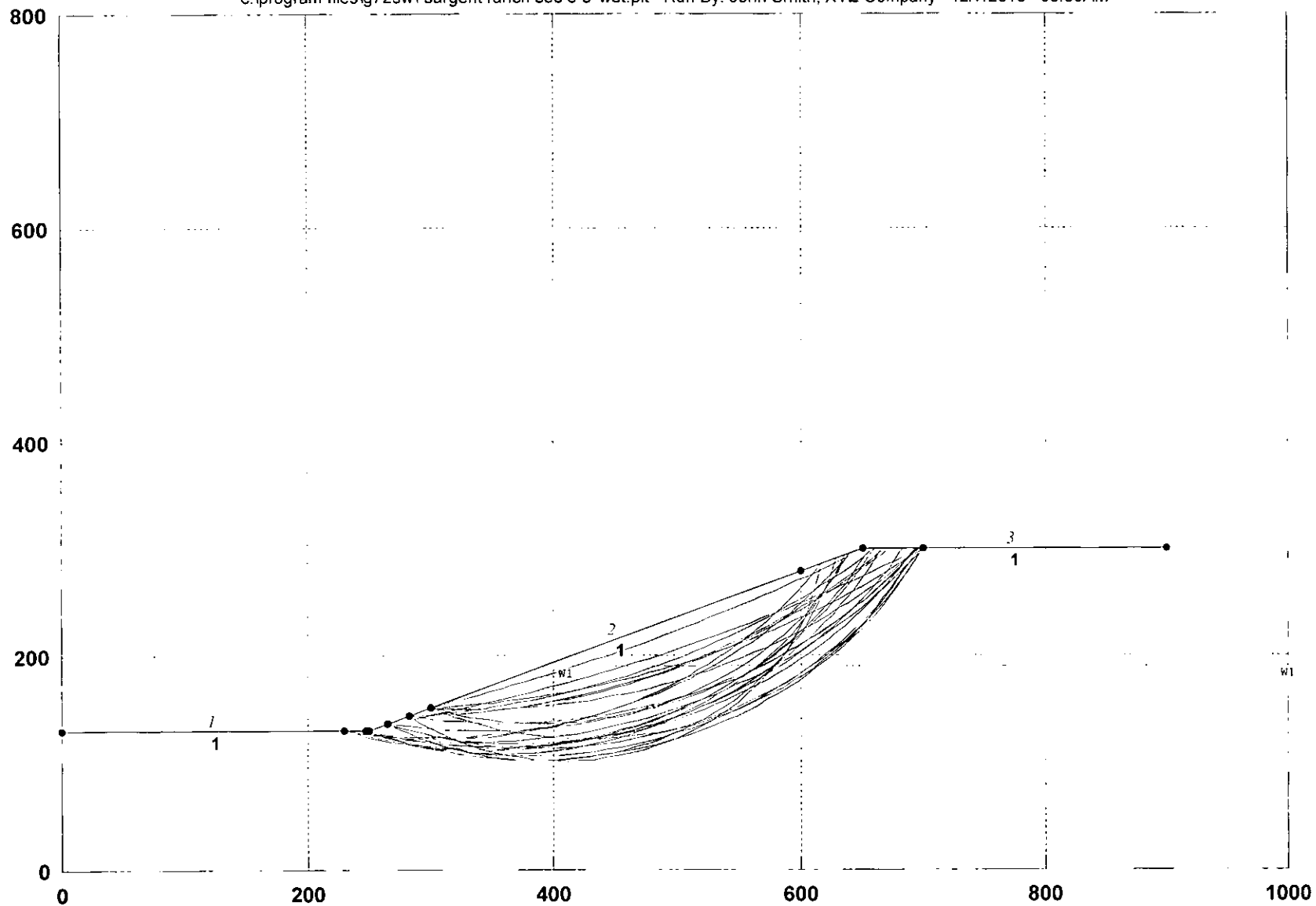


No Water RS. = 1.85

Sec C-C' - Cross
Water 5' head @ 190'

Sargent Ranch Quarry Site Section C-C' Typical Section

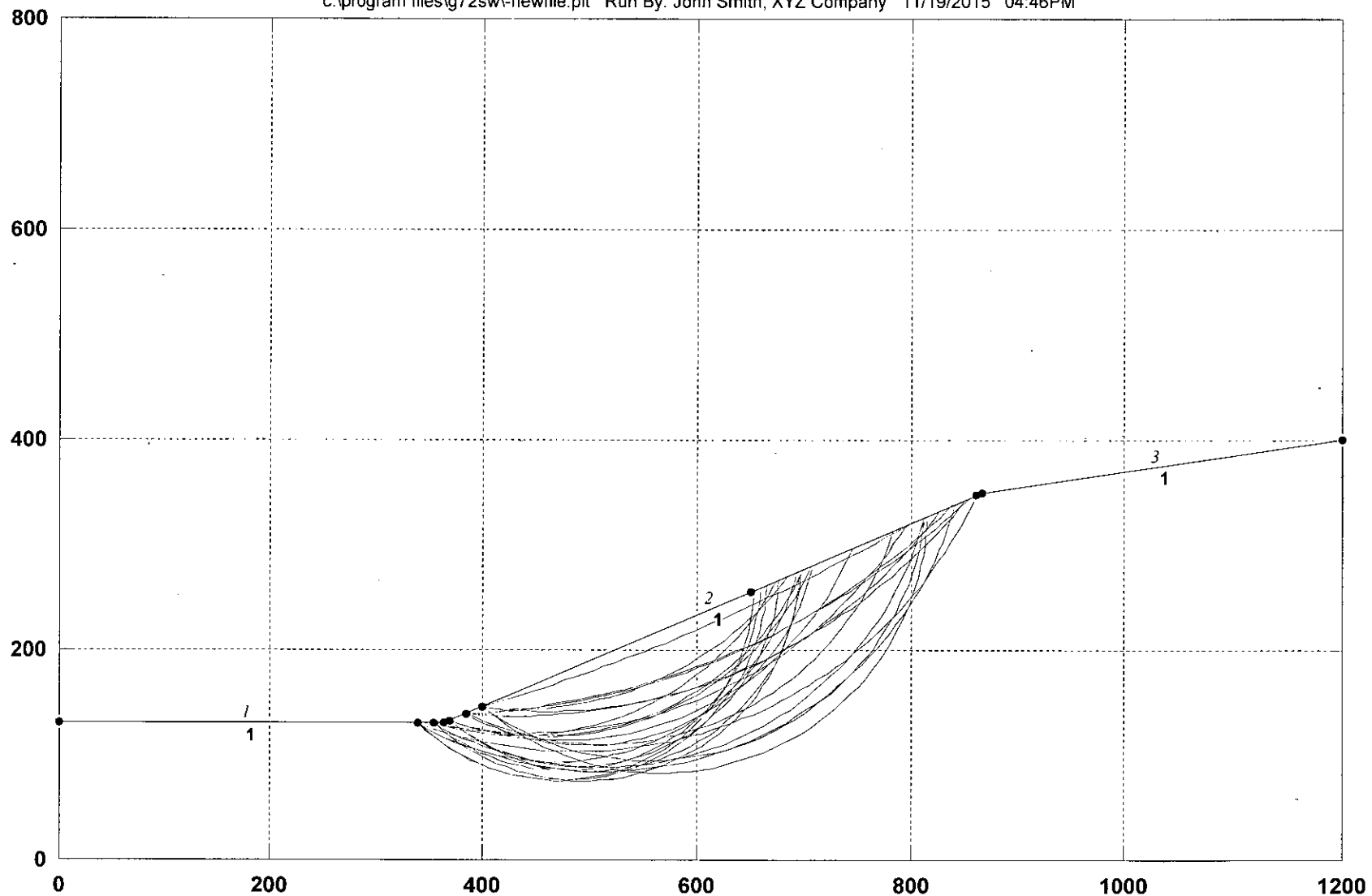
c:\program files\g72swl-sargent ranch sec c-c' wet.plt Run By: John Smith, XYZ Company 12/7/2015 09:39AM



Sec C-C' Cross
Water at elev 99, 5' head

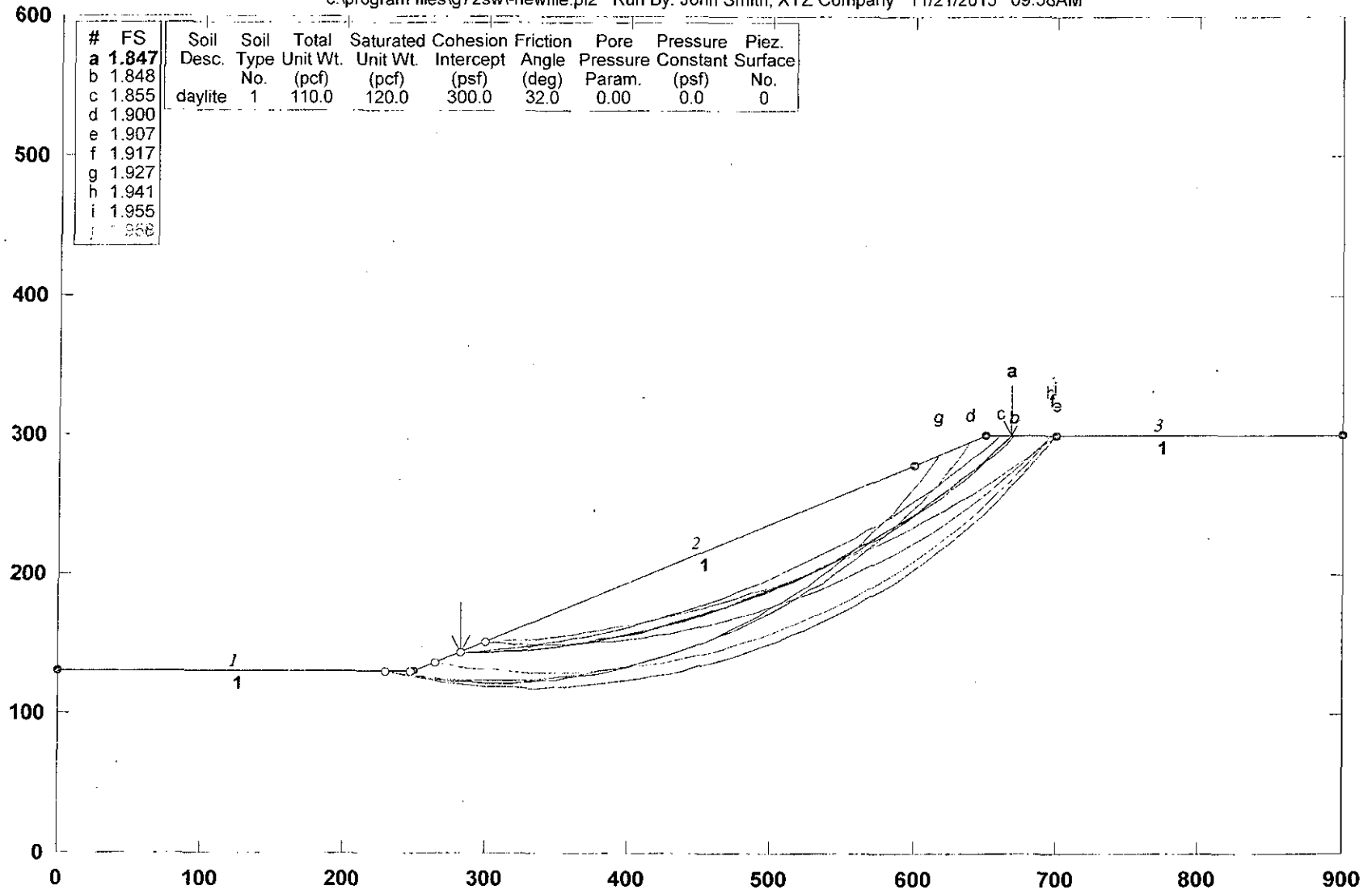
Sargent Ranch Quarry Site Section B-B' Deep Clay Bedding

c:\program files\g72sw\newfile.plt Run By: John Smith, XYZ Company 11/19/2015 04:46PM



Sargent Ranch Quarry Site Section C-C' Daylighted Clay Bedding Low

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/21/2015 09:38AM



GSTABL7 v.2 FSmin=1.847

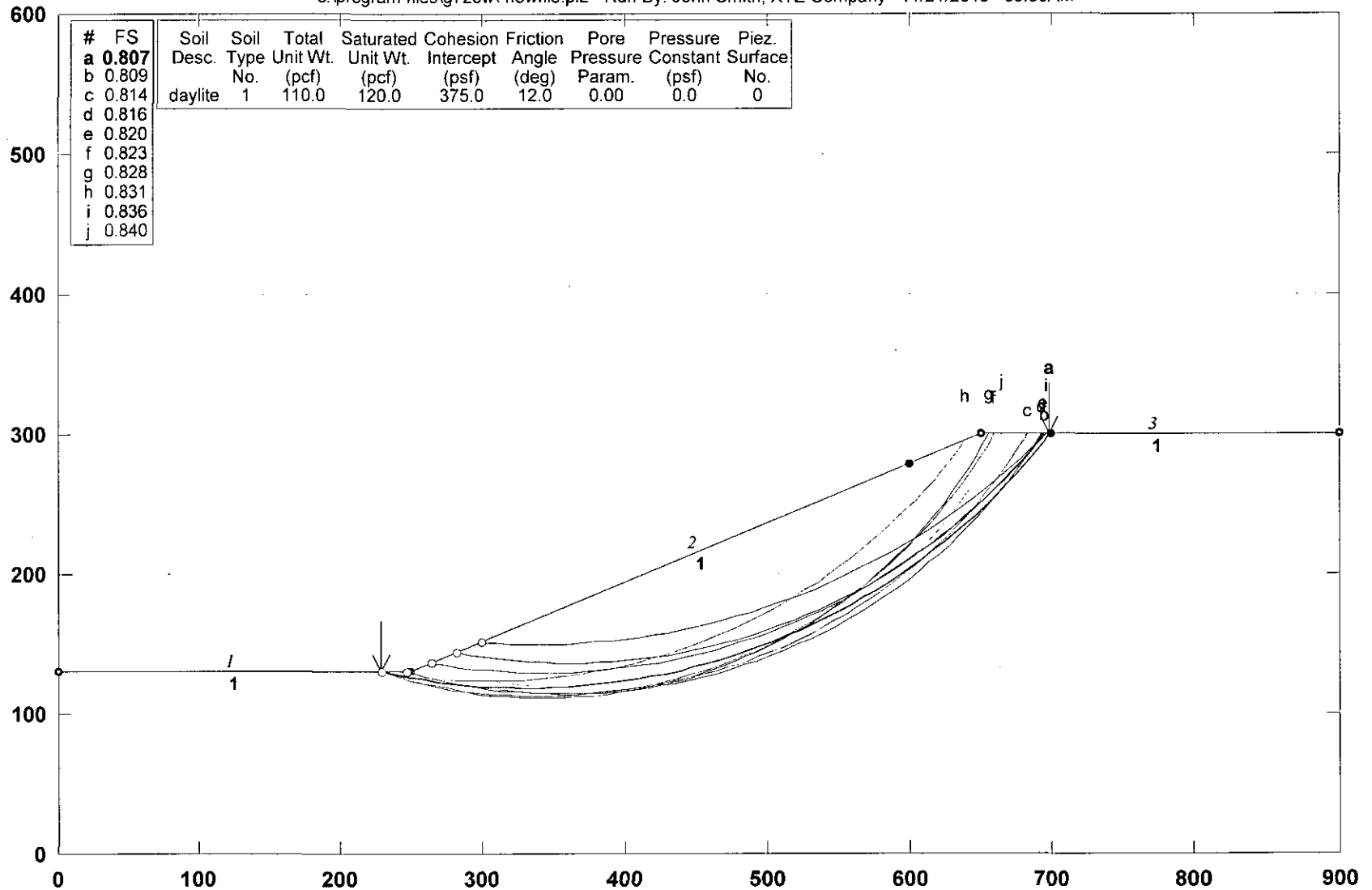
Safety Factors Are Calculated By The Modified Bishop Method



Cross Bedded

Sargent Ranch Quarry Site Section C-C' Daylighted Clay Bedding Low

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/21/2015 09:33AM



GSTABL7 v.2 FSmin=0.807

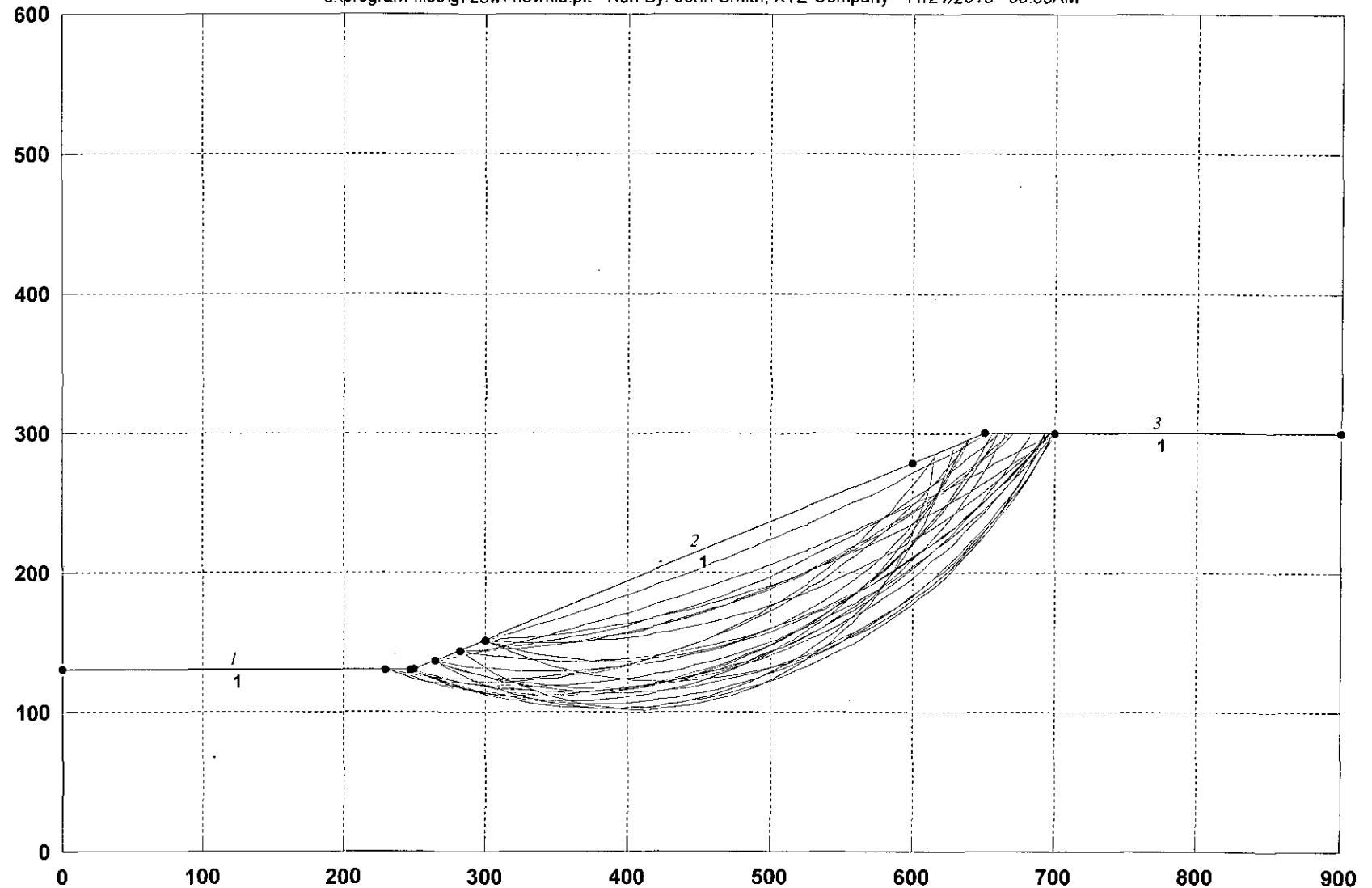
Safety Factors Are Calculated By The Modified Bishop Method



Daylighted Bedding

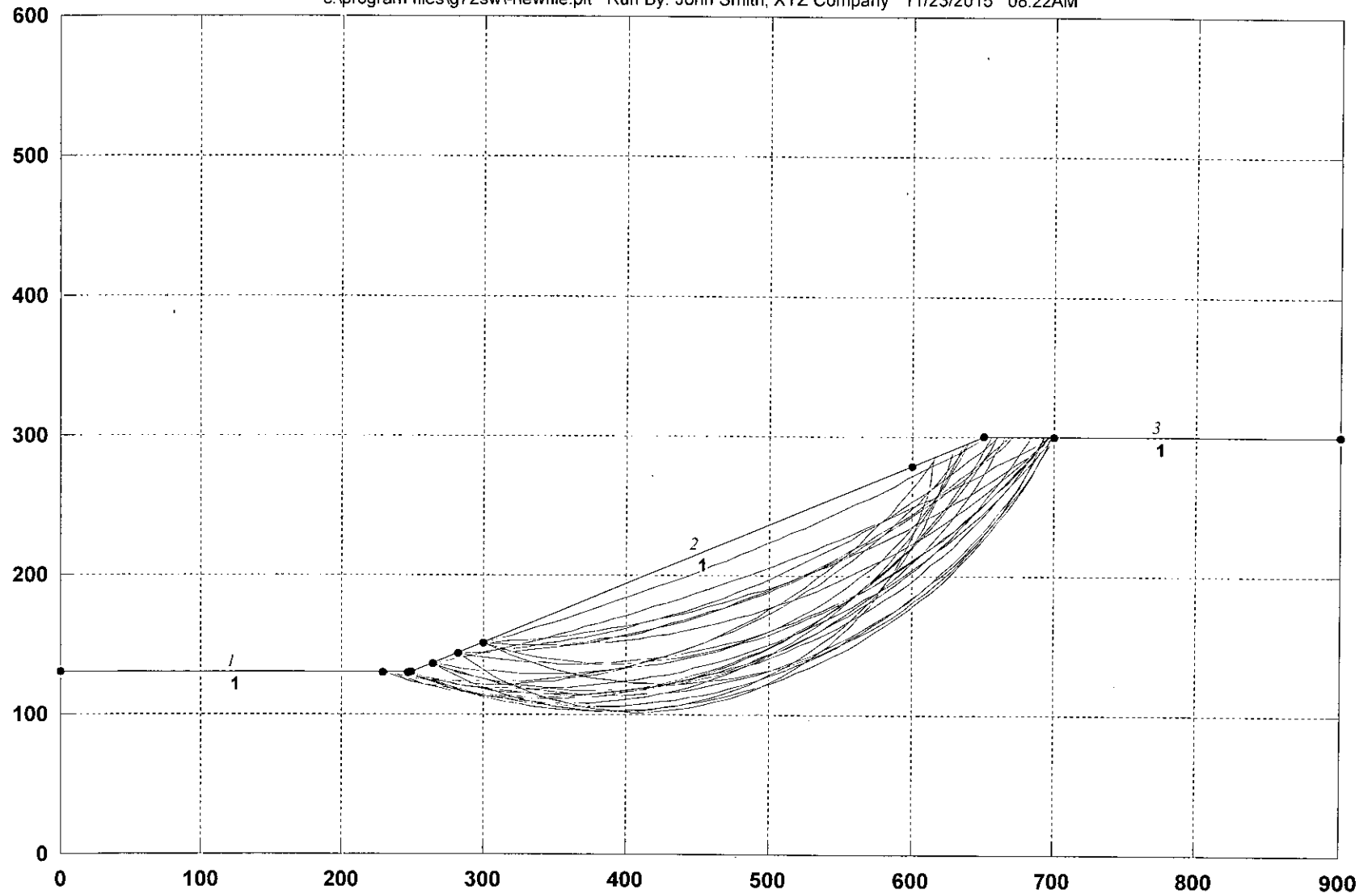
Sargent Ranch Quarry Site Section C-C' Daylighted Clay Bedding Low

c:\program files\lg72sw\newfile.plt Run By: John Smith, XYZ Company 11/21/2015 09:33AM



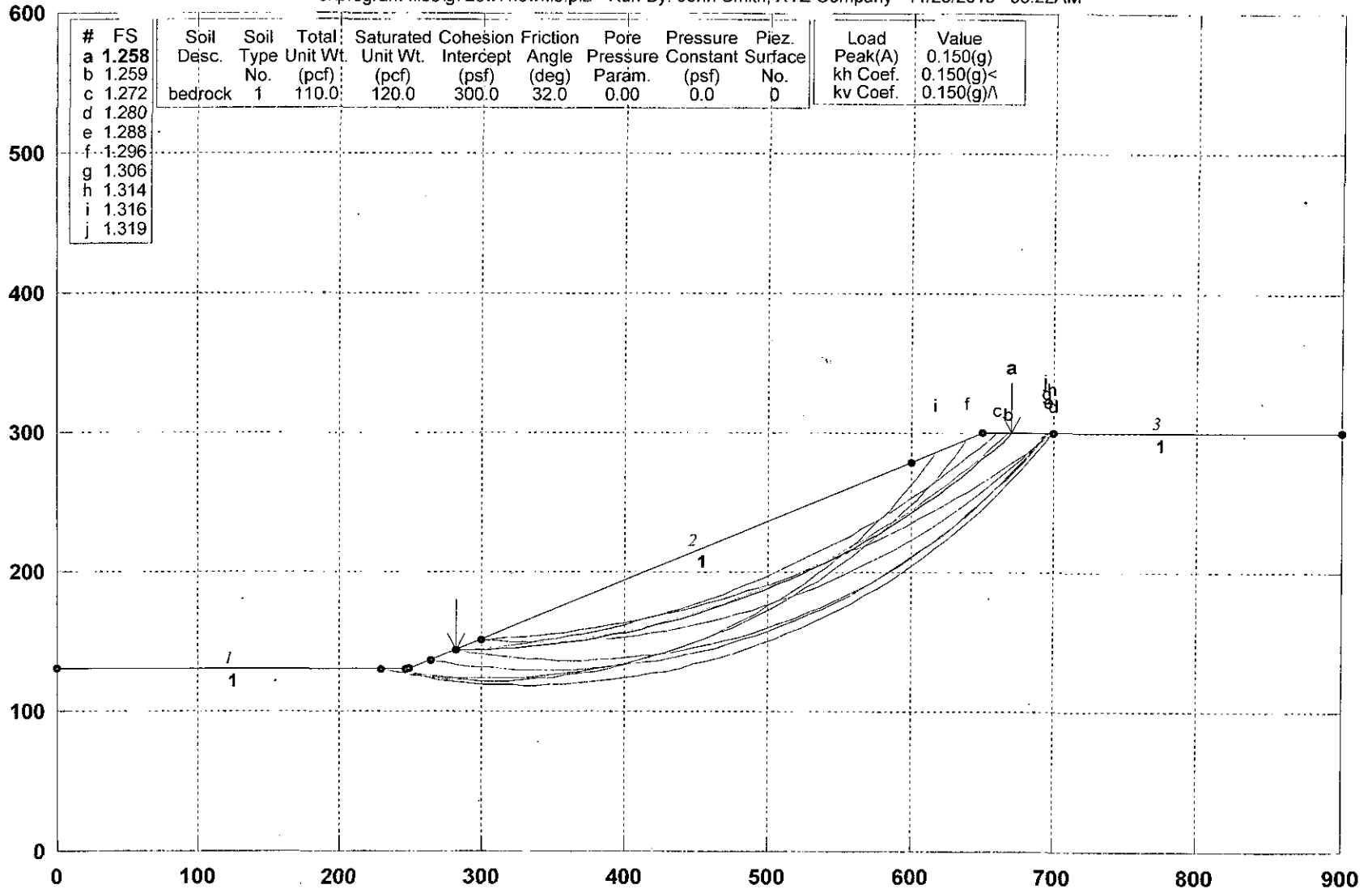
Sargent Ranch Quarry Site Section C-C' Typical Seismic

c:\program files\lg72sw\newfile.plt Run By: John Smith, XYZ Company 11/23/2015 08:22AM



Sargent Ranch Quarry Site Section C-C' Typical Seismic

c:\program files\lg72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/23/2015 08:22AM



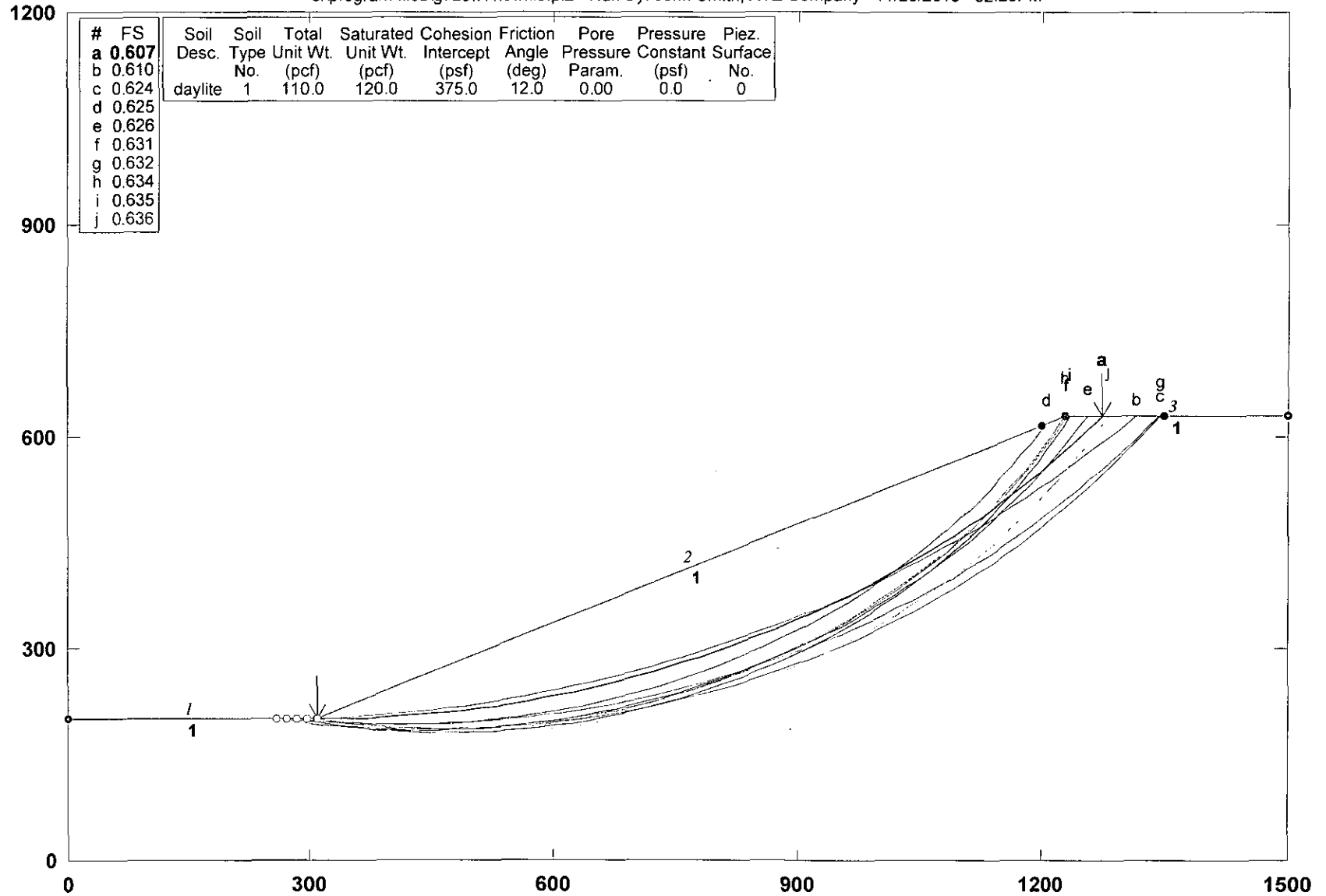
GSTABL7 v.2 FSmin=1.258

Safety Factors Are Calculated By The Modified Bishop Method



Sargent Ranch Quarry Site Section E-E' Daylighted Clay Bedding

c:\program files\g72sw\newfile.pl2 Run By: John Smith, XYZ Company 11/20/2015 02:26PM



GSTABL7 v.2 FSmin=0.607

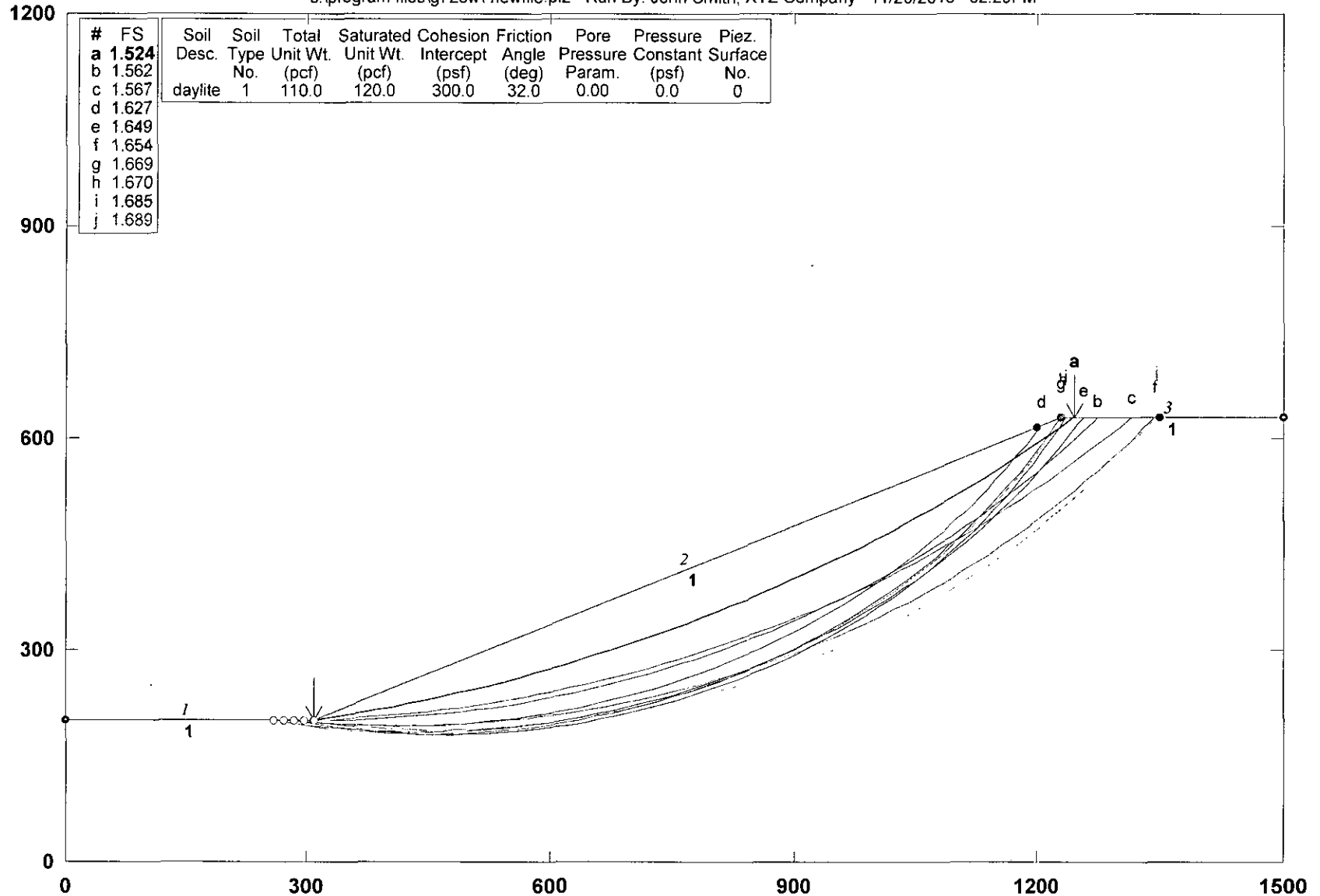
Safety Factors Are Calculated By The Modified Bishop Method



Daylight Bedding Cond.

Sargent Ranch Quarry Site Section E-E' Daylighted Clay Bedding

c:\program files\g72sw\newfile.pl2 Run By: John Smith, XYZ Company 11/20/2015 02:20PM



GSTABL7 v.2 FSmin=1.524

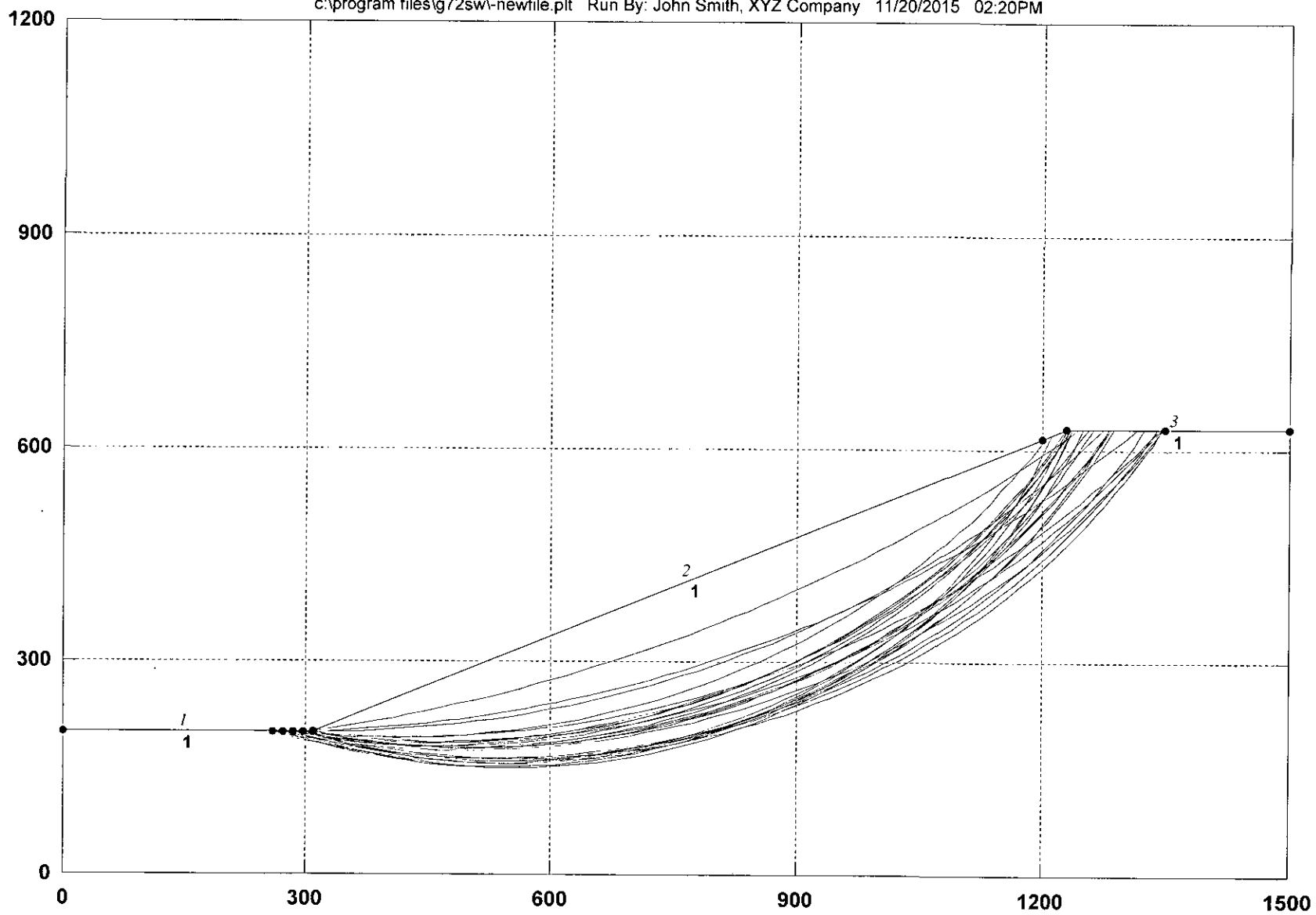
Safety Factors Are Calculated By The Modified Bishop Method



Cross Bedded

Sargent Ranch Quarry Site Section E-E'Daylighted Clay Bedding

c:\program files\g72sw\newfile.plt Run By: John Smith, XYZ Company 11/20/2015 02:20PM



Sargent Ranch Quarry Site Section E-E'Daylighted Clay Bedding

c:\program files\g72swl-newfile.plt Run By: John Smith, XYZ Company 11/20/2015 02:35PM

1200

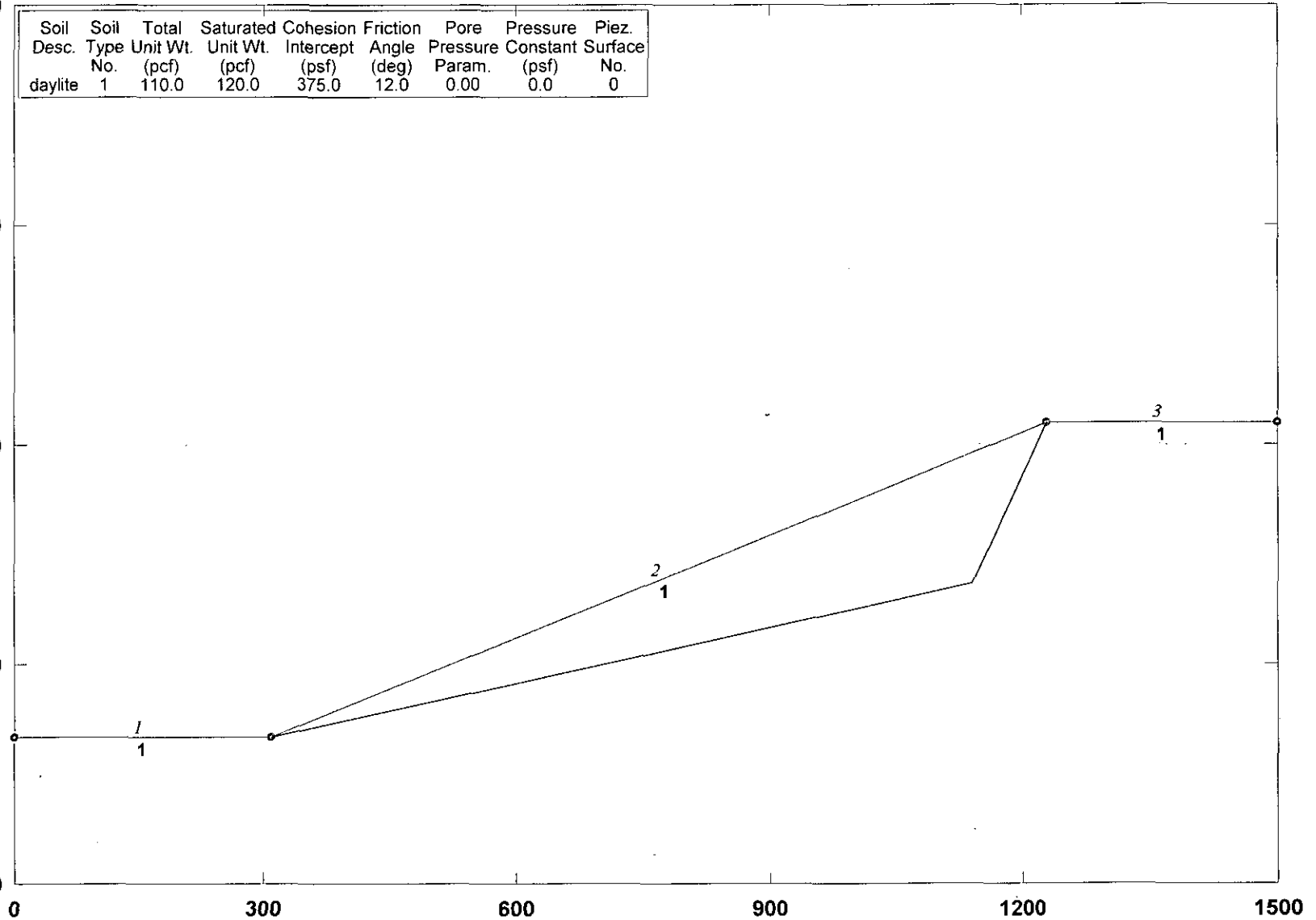
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param. (psf)	Pressure Constant (psf)	Piez. Surface No.
daylite	1	110.0	120.0	375.0	12.0	0.00	0.0	0

900

600

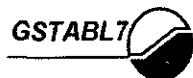
300

0



GSTABL7 v.2 FSmin=0.687

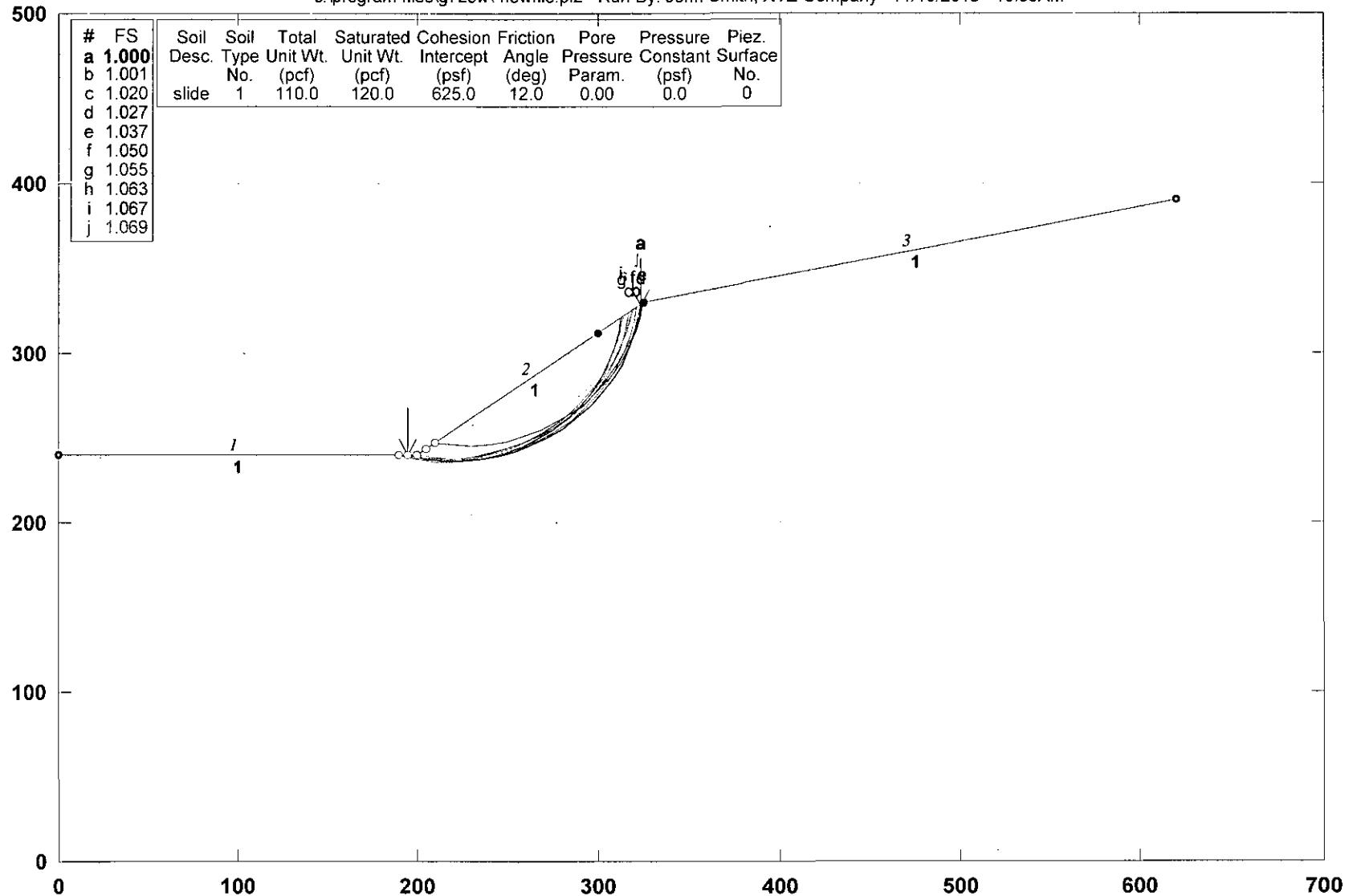
Factor Of Safety Is Calculated By The Simplified Janbu Method



Block Failure 13° Daylighted Bedding

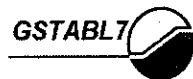
Sargent Ranch Quarry Site Section G-G' Back Calc Shallow

c:\program files\g72sw\newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 10:55AM



GSTABL7 v.2 FSmin=1.000

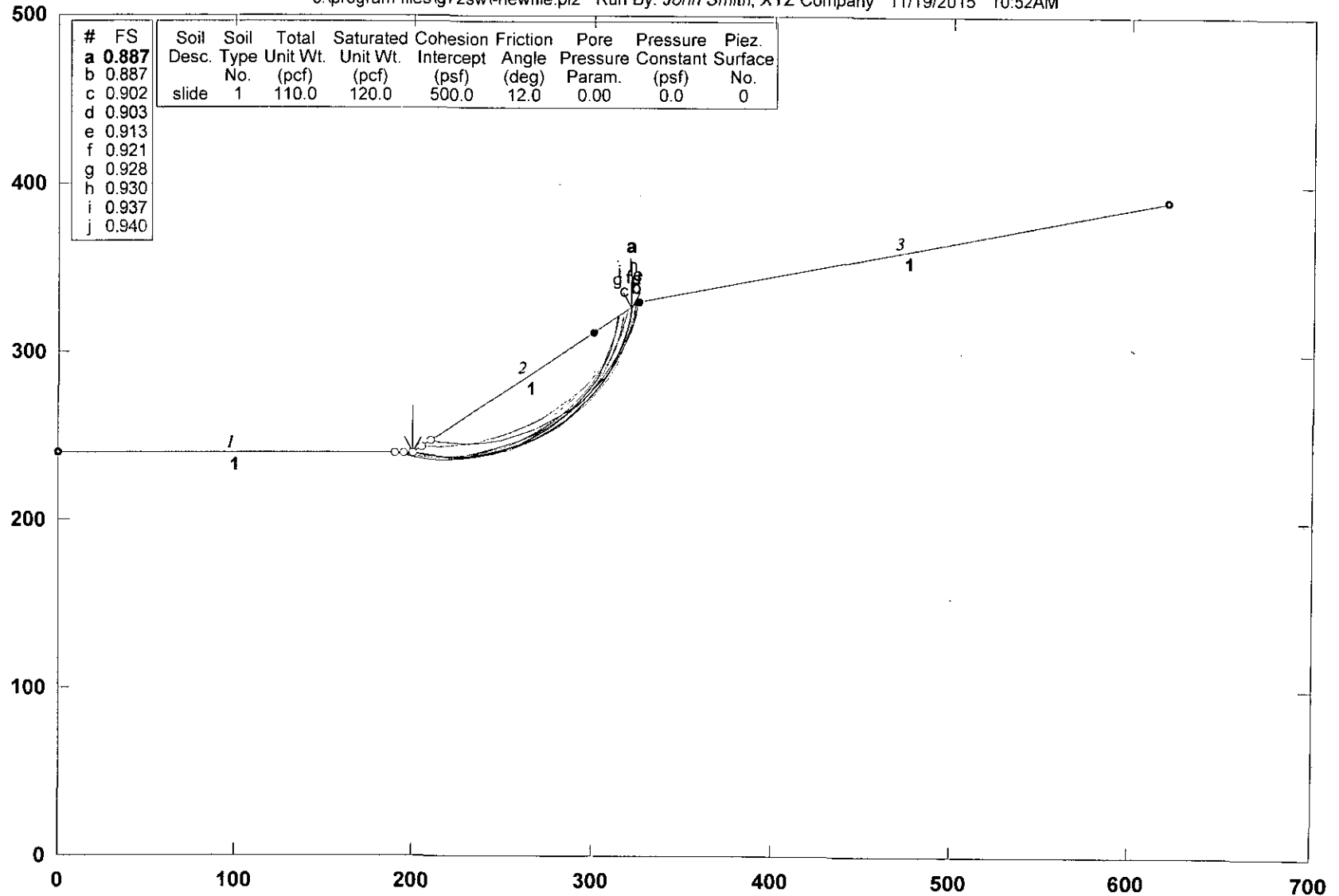
Safety Factors Are Calculated By The Modified Bishop Method



Back Calc Surface

Sargent Ranch Quarry Site Section G-G' Back Calc Shallow

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 10:52AM



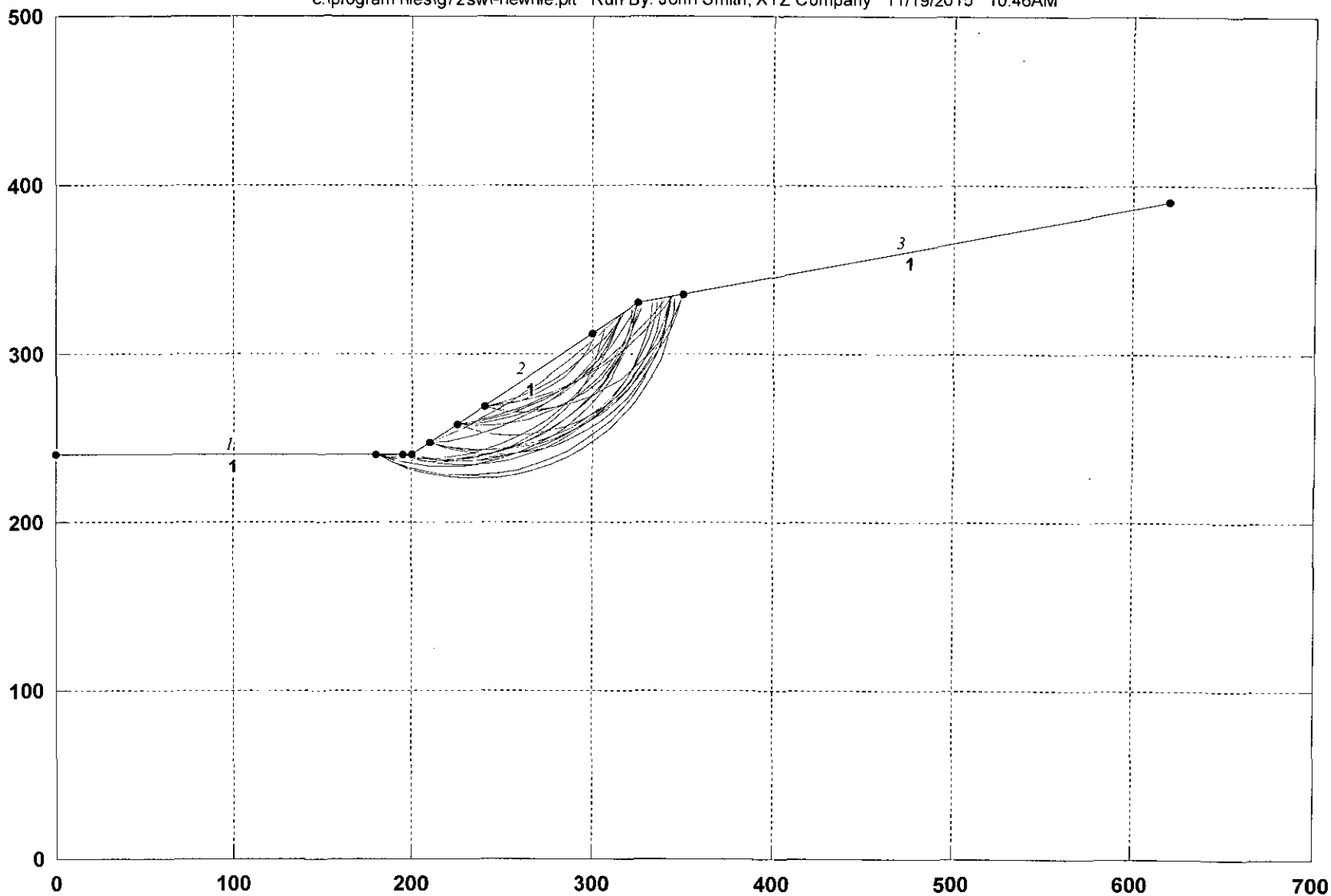
GSTABL7 v.2 FSmin=0.887

Safety Factors Are Calculated By The Modified Bishop Method



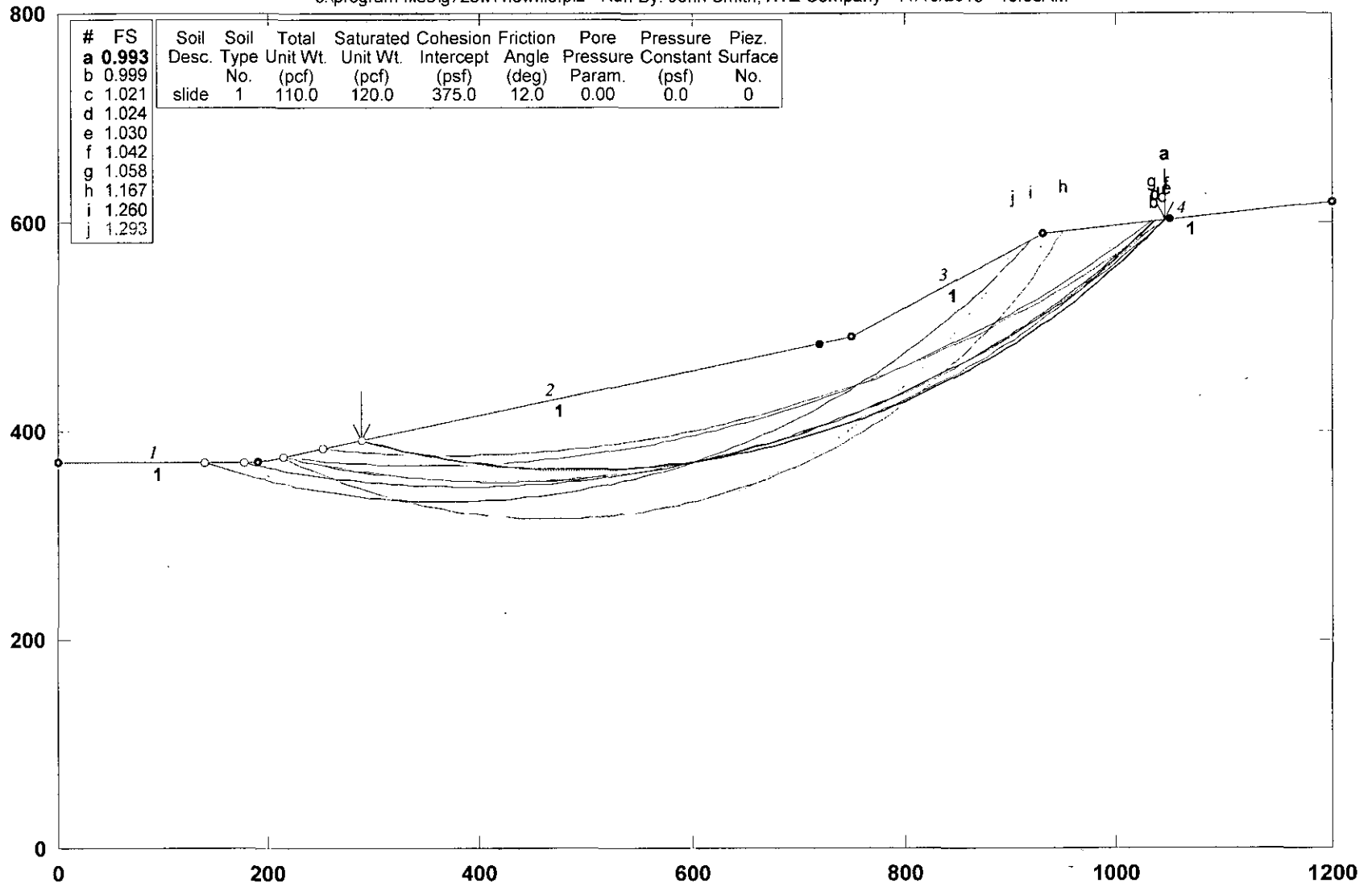
Sargent Ranch Quarry Site Section G-G' Back Calc Shallow

c:\program files\g72sw\newfile.plt Run By: John Smith, XYZ Company 11/19/2015 10:46AM



Sargent Ranch Quarry Site Section L-L' Back Calc

c:\program files\g72sw\newfile.pl2 Run By: John Smith, XYZ Company 11/19/2015 10:33AM



GSTABL7 v.2 FSmin=0.993

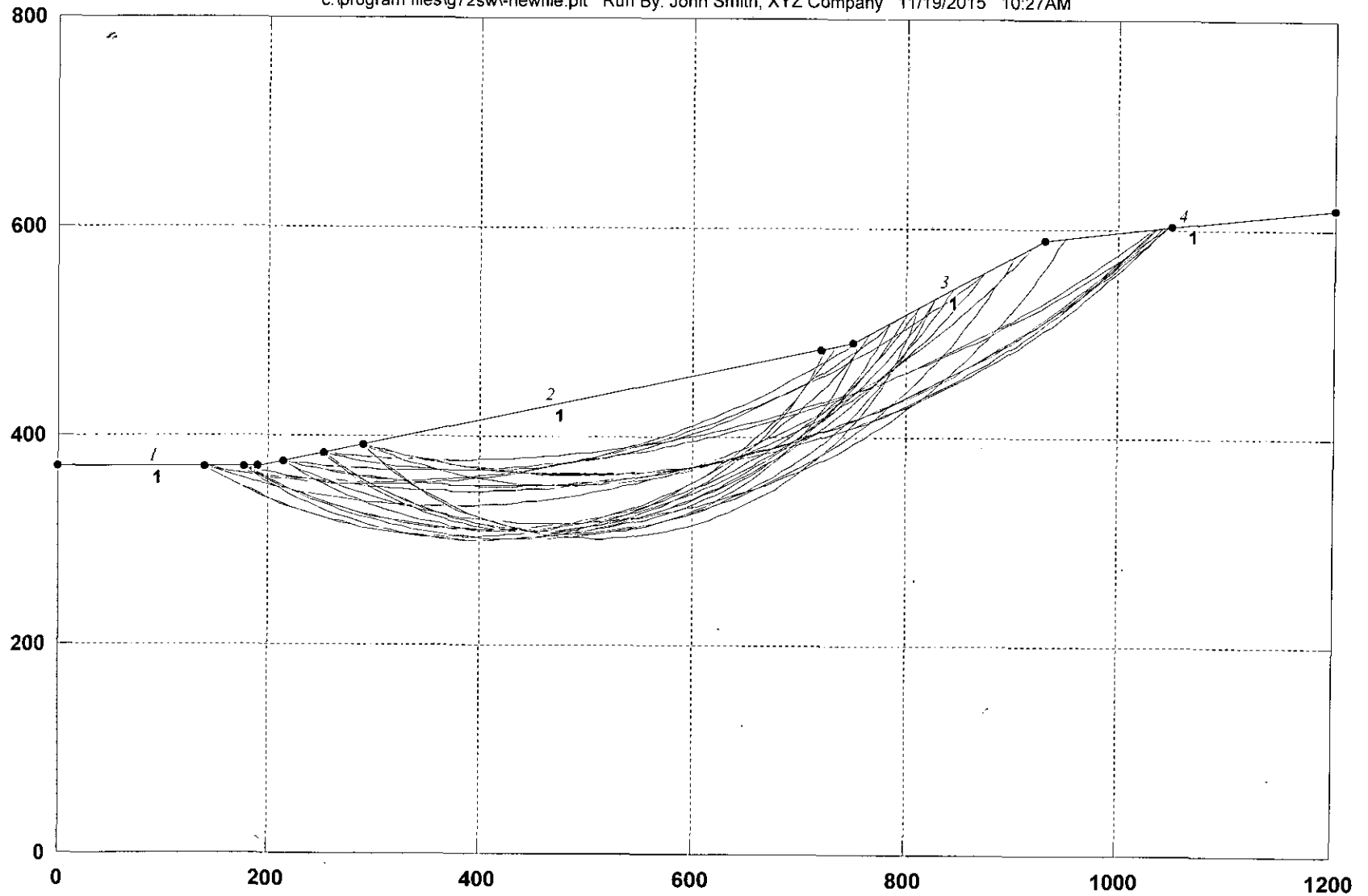
Safety Factors Are Calculated By The Modified Bishop Method



$\phi = 12^\circ$
 $c = 375 \text{ psf}$
 Back Calc ϕ/c

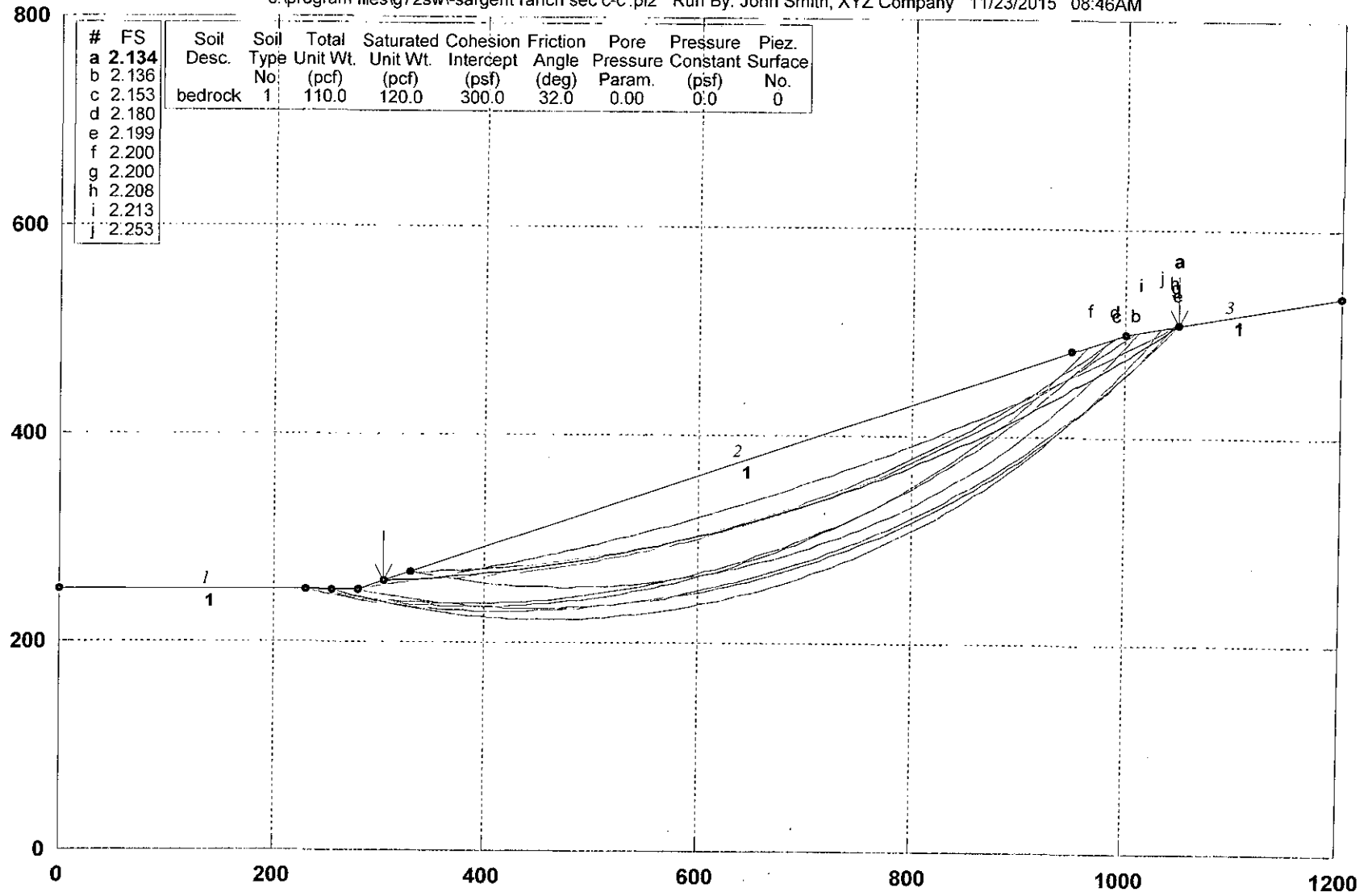
Sargent Ranch Quarry Site Section L-L' Back Calc

c:\program files\lg72sw\newfile.plt Run By: John Smith, XYZ Company 11/19/2015 10:27AM



Sargent Ranch Quarry Site Section Q-Q' Cross Bedded

c:\program files\g72swl-sargent ranch sec c-c'.pl2 Run By: John Smith, XYZ Company 11/23/2015 08:46AM



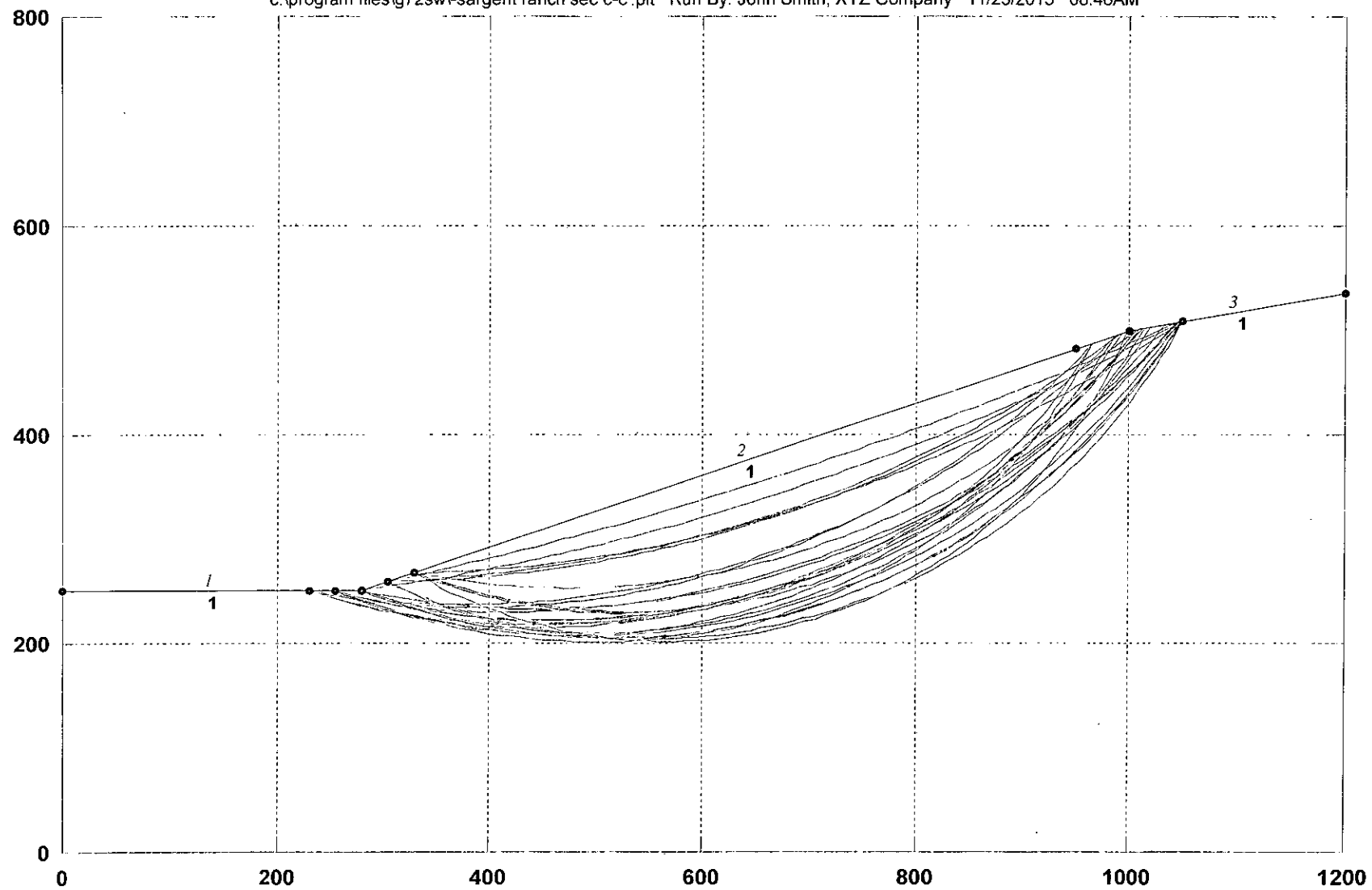
GSTABL7 v.2 FSmin=2.134

Safety Factors Are Calculated By The Modified Bishop Method



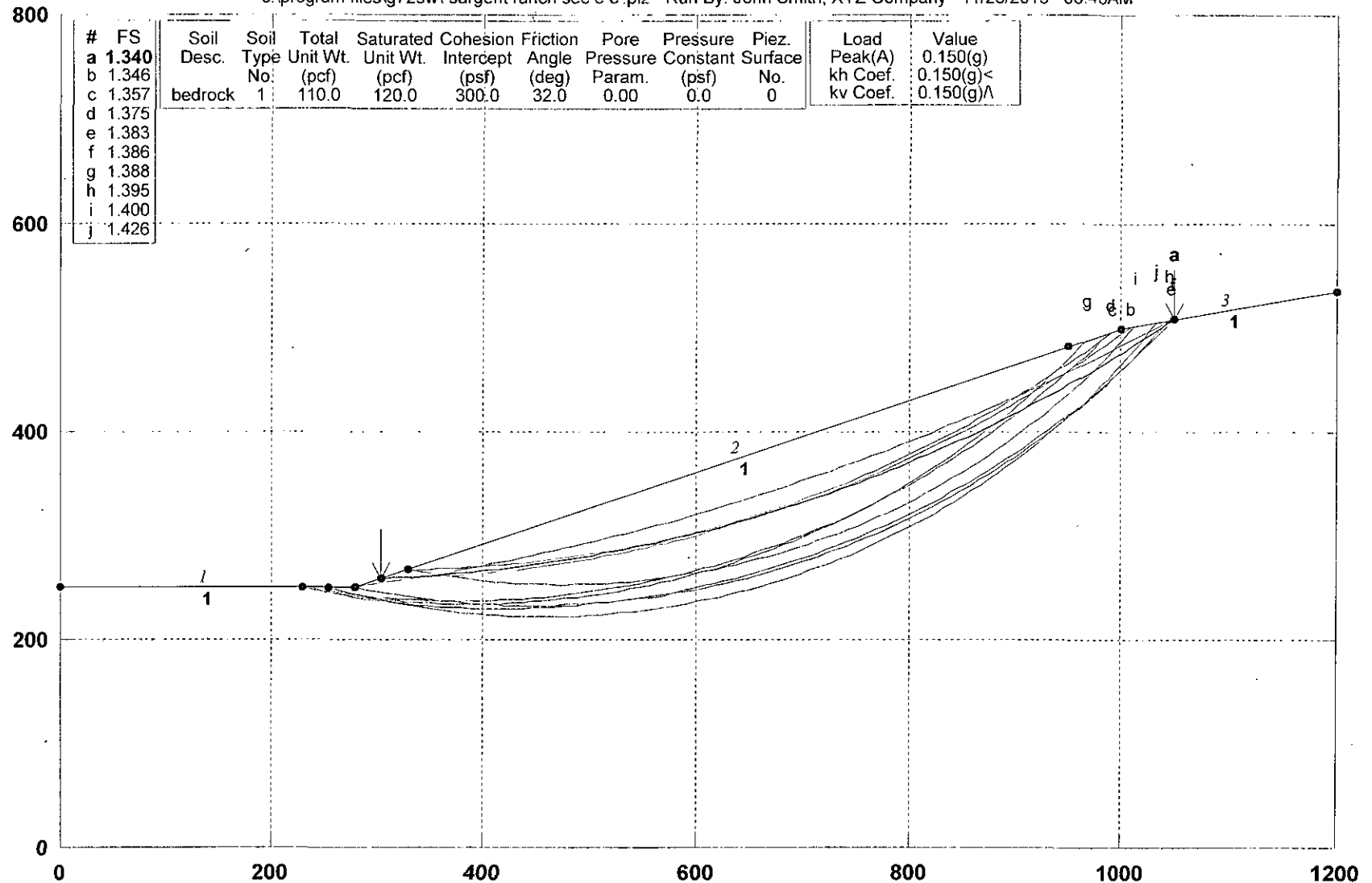
Sargent Ranch Quarry Site Section Q-Q' Cross Bedded

c:\program files\g72sw\l-sargent ranch sec c-c'.plt Run By: John Smith, XYZ Company 11/23/2015 08:46AM



Sargent Ranch Quarry Site Section Q-Q' Cross Bedded

c:\program files\g72sw\l-sargent ranch sec c-c'.pl2 Run By: John Smith, XYZ Company 11/23/2015 08:43AM



GSTABL7 v.2 FSmin=1.340

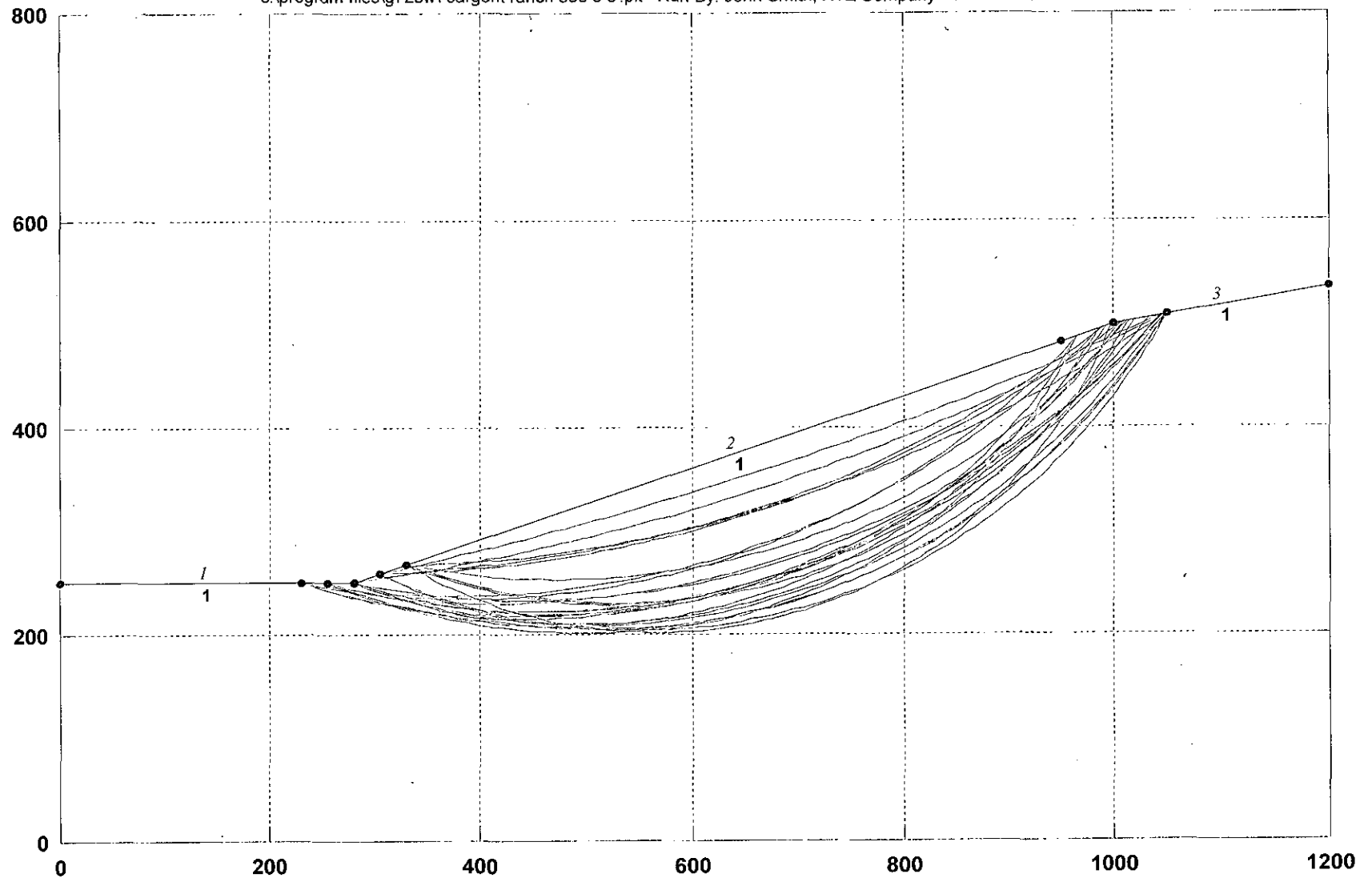
Safety Factors Are Calculated By The Modified Bishop Method



SEISMIC

Sargent Ranch Quarry Site Section Q-Q' Cross Bedded

c:\program files\g72swl-sargent ranch sec c-c'.plt Run By: John Smith, XYZ Company 11/23/2015 08:43AM



Sargent Ranch Sec A-A' Civil Overburden

c:\program files\g72sw\sargent ranch sec a-a' civil overburden.pl2 Run By: John Smith, XYZ Company 12/8/2015 10:12AM

700

#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param. (psf)	Pressure Constant (psf)	Piez. Surface No.	Load Peak(A) kh Coef.	Value 0.150(g) kv Coef. 0.150(g)/\
a	0.946											
b	0.958											
c	0.962	Ph2 Top	1	100.0	120.0	375.0	12.0	0.00	0.0	0		
d	0.966	Ph1 OB	2	100.0	12.0	675.0	12.0	0.00	0.0	0		
e	0.977											
f	0.977											
g	0.994											
h	1.012											
i	1.040											
j	1.078											

600

500

400

300

200

100

0

0

100

200

300

400

500

600

700

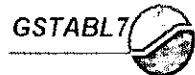
800

900

1000

GSTABL7 v.2 FSmin=0.946

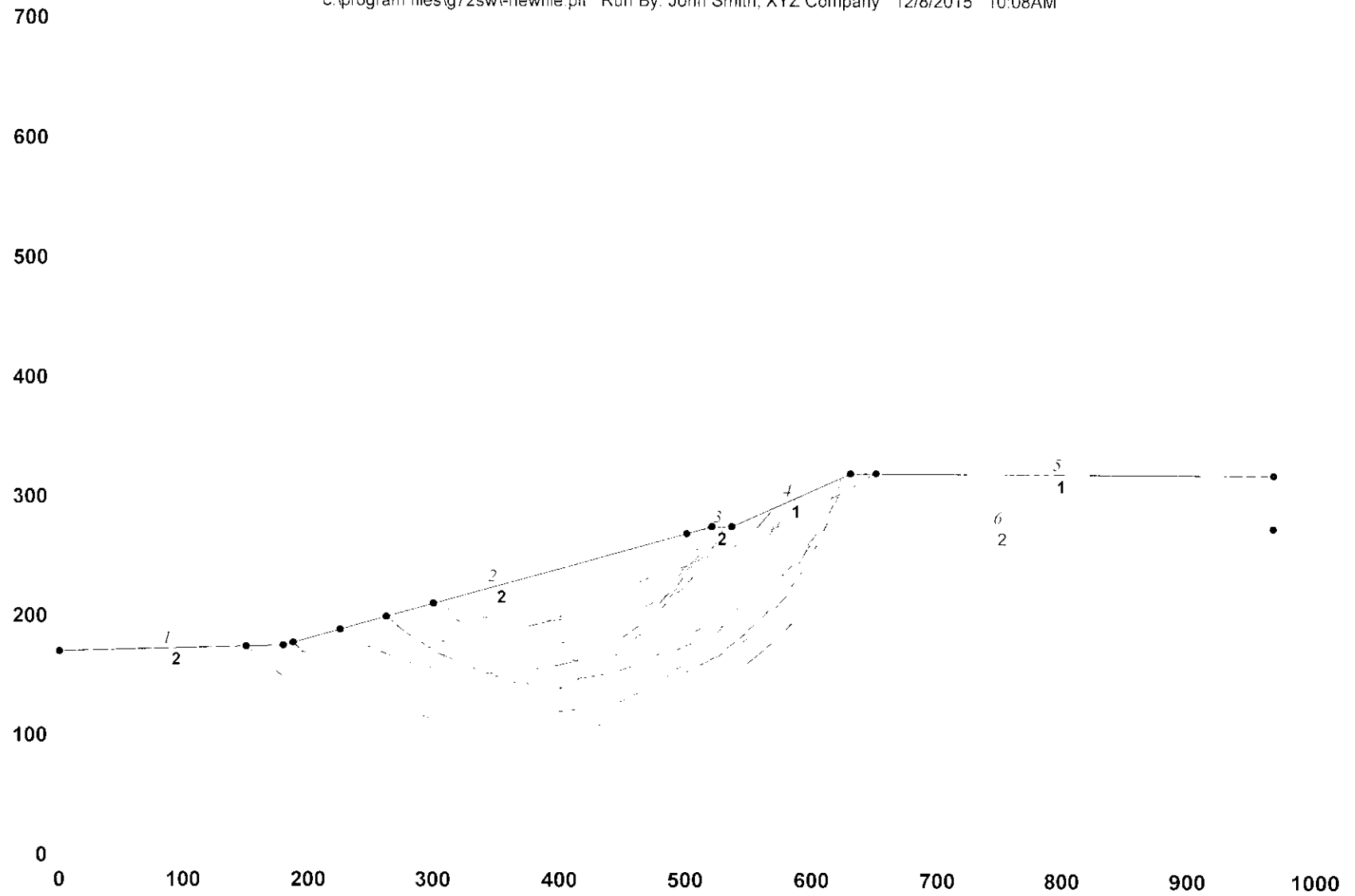
Safety Factors Are Calculated By The Modified Bishop Method



Seismic

Sargent Ranch Sec A-A' Civil Overburden

c:\program files\g72sw\newfile.plt Run By: John Smith, XYZ Company 12/8/2015 10:08AM



Sargent Ranch Sec A-A' Civil Overburden

c:\program files\g72swl-newfile.pl2 Run By: John Smith, XYZ Company 12/8/2015 10:08AM

700

600

500

400

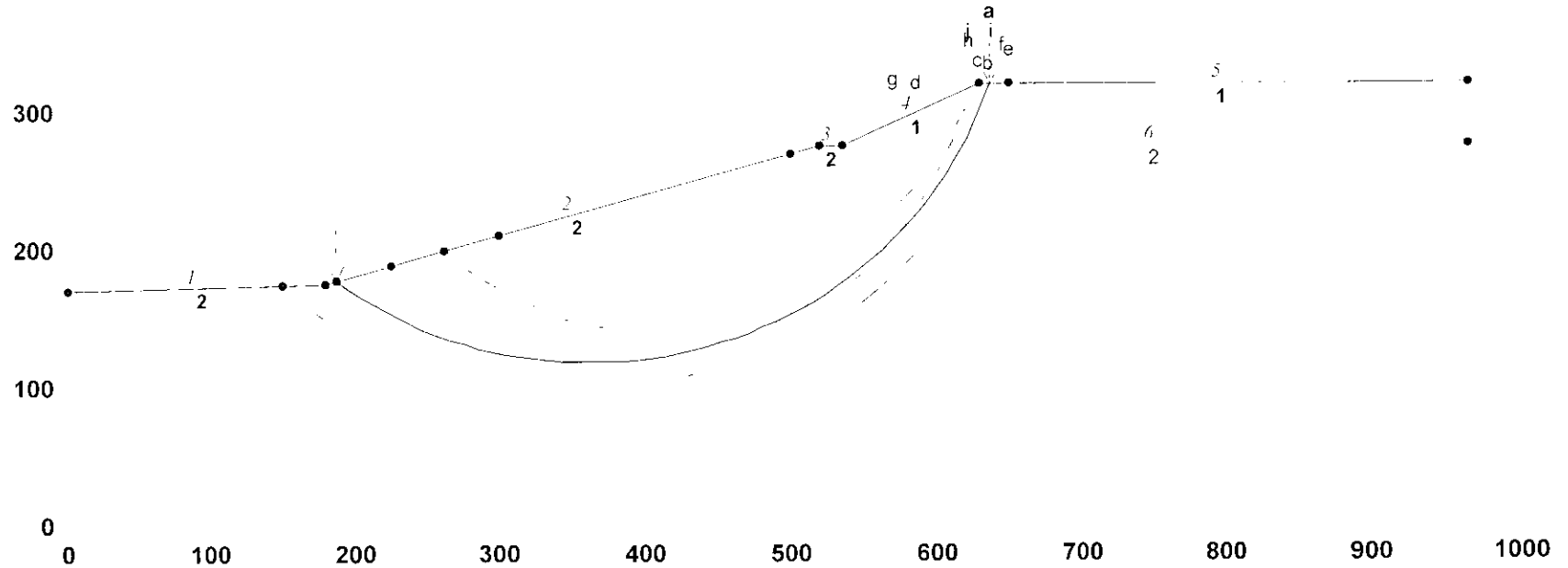
300

200

100

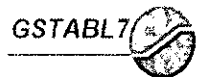
0

#	FS	Soil Desc.	Soil Type	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param. (psf)	Pressure Constant (psf)	Piez. Surface No.
a	1.452									
b	1.456									
c	1.460	Ph2 Top	1	100.0	120.0	375.0	12.0	0.00	0.0	0
d	1.476	Ph1 OB	2	100.0	12.0	675.0	12.0	0.00	0.0	0
e	1.502									
f	1.510									
g	1.541									
h	1.542									
i	1.579									
j	1.645									

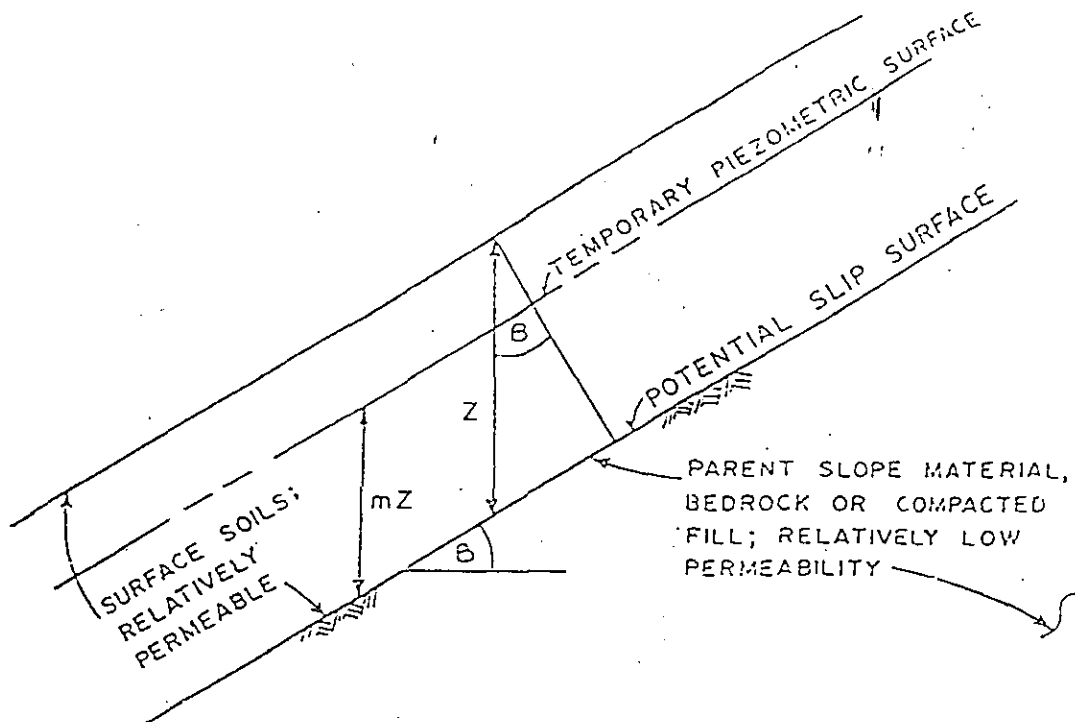


GSTABL7 v.2 FSmin=1.452

Safety Factors Are Calculated By The Modified Bishop Method



STATIC



$$F = \frac{C + (\gamma - m\gamma_w) Z \cos^2 B \tan \phi}{\gamma Z \sin B \cos B}$$

WHERE: F = FACTOR OF SAFETY
 γ = UNIT WEIGHT OF THE SOIL (sat)
 γ_w = UNIT WEIGHT OF THE WATER
 C = COHESION
 ϕ = ANGLE OF SHEARING RESISTANCE
 Z = VERTICAL DEPTH OF THE SLIP SURFACE
 m = FRACTION OF Z SUCH THAT mZ IS THE VERTICAL HEIGHT OF THE TEMPORARY WATER SURFACE ABOVE THE SLIP SURFACE.
 θ = SLOPE ANGLE

$$\cos B = .95$$

$$\cos^2 B = .90$$

$$\tan \phi = .21$$

$$\sin B = .29$$

120 pcf
62.4 pcf
375
12°
3'
1
17°

$$F = \frac{375 + (120 - 62.4) 3' (.9) .21}{120 (3) .29 (.95)}$$

$$= \frac{375 + 33}{99.2} = 4.11 \text{ OK @ } 3:1$$

@ $\phi = 12^\circ$
 $C = 150$

$$F = \frac{150 + (57.6) 3' (.9) .21}{120 (3) .29 (.95)} = \frac{183}{99.1} = 1.84 \text{ OK}$$

Sargent Ranch - Quarry

REFERENCE:

U.S. GEOLOGICAL SURVEY
 PROFESSIONAL PAPER 851

SURFICIAL SLOPE STABILITY ANALYSIS

SCALE	CHECKED BY	DRAWN BY <u>RDA</u>
DATE		
SIZE		DRAWING NO. <u>FIG.</u>

P2/2 Surface
Sargent Ranch
RD Hinkle
R654402

Failure on Sec G-G'

$$B = 27^\circ$$

$$\sin B = .45$$

$$\cos B = .89$$

$$\cos^2 B = .79$$

$$P = \frac{375 + (.576) 3' (.79) .21}{1.20 (3) .45 (.9)}$$

$$= \frac{375 + 28.6}{1.45} = 2.78 \text{ OK}$$

Real $\phi = 12^\circ$ $C = 150$ in Surface Failures

APPENDIX E

STANDARD OF CARE IN QUARRY SLOPE DEVELOPMENT

General: Slope design for open pit mines and quarries includes consideration of both mining economics (the steepness and overall stability of the slopes) and operating safety (particularly mitigation of wedge failures, rockfall and slide hazards). Design factors related to safety must be of paramount importance, whether for permanent or temporary slopes, and slope designs must be implemented to meet the current standard of care in the mining industry for operating safely below slopes. This standard includes incorporating effective catch benches into pit slopes.

The minimum standard of care for safety in development of mine slopes is defined by Federal regulations that are enforced by Mine Safety and Health Administration (MSHA), or by equivalent State agencies using State regulations that can be no less stringent than Federal regulations. In addition, operating practices and slope designs to enhance operator safety are often developed at the corporate level, and these may be supplemented at the Operating level based on site conditions at individual pits.

Mine slope stability requirements are regulated by Title 30 of the Code of Federal Regulations, Section 56.3130. This Section requires that mining methods shall maintain slope stability in places where persons work or travel in performing their assigned tasks, and that bench configurations be based on the type of equipment used for scaling.

MSHA provides interpretation guidelines for ground control. These indicate that MSHA requires that a bench adequate to retain rockfall must be maintained above work or travel areas. Where there is not an effective catch bench above a work or travel area, other measures must be taken to protect the miners, such as berming off or ceasing mining in the affected area.

Benching Practices

Operating safety is generally enhanced by implementing the following practices: Thorough bench face scaling to reduce risks of raveling using equipment that can safely reach the top of the bench to scale loose rock/soil; Inspection and monitoring program to ensure that conditions are safe below existing slopes; Geological documentation and geotechnical evaluation program to ensure that the conditions assumed for the slope and bench design are met in the field; Operator awareness training to train operators in safe practices, and to educate operators regarding potential hazards.

Mining a single bench configuration provides flexibility in enabling operations to be restricted in the area of bench toes, but it does not eliminate all need for operations, access, and mapping in areas that can be subject to significant slope hazards. Developing stable bench faces and controlling hazards with effective catch benches is therefore important even for single bench operations.

Testing and Observation

The recommendations provided in this report are based on the assumption that SGS will be retained as the Geotechnical Engineer of Record for the project. It is important to maintain continuity of geotechnical interpretation and confirm field conditions encountered are similar to those anticipated during design. In accordance with the CBC testing and observation services by the Geotechnical Engineer of Record are required to verify construction has been performed in accordance with this report, approved plans and specifications. If we are not retained for these services, we cannot assume any responsibility for other's interpretations of our recommendations or the future performance of the project.

Erosion Control

We expect the majority of surface runoff to readily infiltrate the exposed final cut faces and the intervening benches. Locally, cemented zones may limit infiltration, but we do not expect high volumes of concentrated runoff. We recommend the intervening benches be out-sloped 2% to avoid concentrated flow and consequent erosion of the benches. Disturbed slopes adjacent to the excavation should be protected from erosion by planting native vegetation, or other appropriate means.