APPENDIX G-3

RESPONSE TO GEOTECHNICAL PEER REVIEW

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

May 28, 2013
Project Number 2368-01-08

Berg Holdings
Attention: Mr. Skip Berg
2330 Marinship Way, Suite 301
Sausalito, California 94965

RE: Response to Geotechnical Peer Review
Upper Road Land Division - Vesting Tentative Map
Assessor's Parcel 073-011-26
Ross, California

Dear Mr. Berg:

This presents our responses to the geotechnical peer review in connection with the proposed Upper Road Land Division at in Ross, California. The project is shown on the *Vesting Tentative Map* submittal by CSW/Stuber-Stroeh Engineering Group dated May 7, 2012. Herzog Associates previously performed a geotechnical investigation at the site and presented results in their reports dated October 12, 1989, August 9, 1990, and July 12, 1993. Herzog Geotechnical has been retained as the geotechnical engineer or record for the project.

The scope of our current work was to review the previous geologic and geotechnical work at the site, conduct a site reconnaissance, drill seven additional test borings, perform laboratory testing, conduct engineering analyses, and develop responses to geotechnical comments outlined in the March 29, 2013 *Third Party Geotechnical/Geological Review* letter by Gilpin Geosciences, Inc. Our work was performed in accordance with the terms and conditions outlined in our proposal dated April 22, 2013.

WORK PERFORMED

As requested in the peer review letter, we performed supplemental subsurface exploration to evaluate expansion potential of on-site materials and to develop subsurface profiles and strength parameters to evaluate stability of proposed terraced walls for the project. The supplemental exploration consisted of seven test borings extending between approximately 2 and 7-1/2 feet deep, and extending into bedrock or drilling refusal. Due to difficult access, the test borings were drilled with portable gas-powered drilling equipment. The approximate locations of the test borings are depicted on the attached *Site Plan*, Plate 1.

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Our personnel observed the drilling, logged the subsurface conditions encountered, and collected soil samples for visual examination and laboratory testing. Samples were retrieved using Sprague and Henwood and Standard Penetration Test samplers driven with a 70-pound hammer. Penetration resistance blow counts were obtained by dropping the hammer through a 30-inch free fall. The samplers were driven 18 inches, and the number of blows was recorded for each 6 inches of penetration. These blow counts were then correlated to equivalent standard penetration resistance blow counts. The blows per foot recorded on the boring logs represent the accumulated number of correlated standard penetration blows that were required to drive the sampler the last 12 inches or fraction thereof.

Logs of the test borings are presented on Plates 2 through 8. The soils encountered are described in accordance with the criteria presented on Plate 9. Bedrock is described in accordance with the *Engineering Geology Rock Terms* presented on Plate 10. The logs depict our interpretation of subsurface conditions on the date and at the depths indicated. The stratification lines on the logs represent the approximate boundaries between soil types; the actual transitions may be gradational.

Selected samples were laboratory tested to determine their moisture content, dry density shear strength, plasticity and expansion potential. Laboratory test results are posted on the boring logs in the manner described on the *Key to Test Data*, Plate 9. The results of back-saturated unconsolidated, undrained triaxial (Tx-UU) testing are presented on Plate 11, and the results of multi-staged, consolidated, undrained triaxial (Tx-CU) testing are presented on Plate 12. The results of Atterberg Limits plasticity testing are presented on Plate 13, and results of Expansion Index (EI) testing are presented on Plate 14.

SUBSURFACE CONDITIONS

Our test borings in the vicinity of the proposed surplus fill pad retaining walls (B-1 through B3) encountered approximately 1 to 1-1/2 feet of topsoil overlying colluvium. The topsoil encountered consists of soft and organic sandy silt. The upper colluvium encountered consists of soft to stiff sandy and gravelly clay. The colluvium becomes very stiff to hard below depths of approximately 4 to 5 feet. The stiffness of these deeper colluvial soils precluded the retrieval of undisturbed drive samples for strength testing. As such, shear strength testing was limited to the weaker shallow materials. Firm to moderately hard sandstone bedrock was encountered in Boring 1 at a depth of approximately 3-1/2 feet, whereas colluvium extended to the total depths explored in Borings 2 and 3 (approximately 7-1/2 and 7 feet, respectively).

Our test borings in the area of the proposed driveway (B-4 through B-7) encountered topsoil and colluvium overlying bedrock. The topsoil encountered generally consists of soft and organic sandy silt, and the colluvium encountered generally consists of medium stiff to stiff gravelly and sandy clay. The soils encountered in this area are relatively weak and compressible, are of low to moderate expansion potential, and are subject to downslope creep. Bedrock encountered in the borings generally consists of hard chert and of firm to moderately hard sandstone.

The approximate test boring locations are shown on the *Site Plan* (Plate 1). The test borings encountered the following profiles:

	Depth (feet)		
Boring	**Topsoil**	**Colluvium**	**Bedrock**
B-1	0-1.0	1.0-3.5	3.5-5.5+
B-2	0-1.2	1.2-7.5+	---
B-3	0-1.5	1.5-7.0+	---
B-4	0-0.5	0.5-3.6	3.6-4.0+
B-5	0-1.5	1.5-5.2	5.2-5.5+
B-6	0-0.9	0.9-5.6	5.6-6.0+
B-7	0-0.5	0.5-1.3	1.3-2.0+

Descriptions of the subsurface conditions encountered are presented on the boring logs.

Free groundwater did not develop in the borings prior to backfilling. Groundwater levels at the site are expected to fluctuate over time due to variations in rainfall and other factors. Rainwater percolates through the relatively porous surface soils. On hillsides, the water typically migrates downslope in the form of seepage within the porous soils, at the interface of the soil/bedrock contact, and within the upper portions of the weathered and fractured bedrock.

RESPONSE TO PEER REVIEW COMMENTS

Seismic Design

Based on the results of our investigation, the following seismic design criteria were developed in accordance with the *California Building Code* (2010) and *International Building Code* (2009):

Site Class	C
Site Coefficient F_a	1.0
Site Coefficient F_v	1.3
0.2 sec Spectral Acceleration S_S	1.50
1.0 sec Spectral Acceleration S_1	0.72
0.2 sec Max Spectral Response S_{MS}	1.50
1.0 sec Max Spectral Response S_{M1}	0.93
0.2 sec Design Spectral Response S_{DS}	1.00
1.0 sec Design Spectral Response S_{D1}	0.62

Surplus Fill Terraced Wall Stability

We performed slope stability analyses to evaluate the global stability of the proposed terraced surplus fill retaining walls. The analyses were performed using the GSTABL7 computer program (Gregory, 2008) utilizing the Simplified Janbu Method. GSTABL7 is used for analyses of circular and non-circular slip surfaces using several available two-dimensional limit equilibrium methods. The program utilizes random techniques for the generation of potential failure surfaces for subsequent determination of the most critical surface having the lowest factor of safety under static and seismic loading conditions. For method of slices slope stability analysis, the factor of safety is defined as the factor by which the shear strength of the soil would have to be divided to bring the slope into a state of barely stable equilibrium, and provides a numerical representation of the stability of the slope with a factor of safety of less than 1.0 indicating failure. Minimum static and seismic factors of safety of 1.5 and 1.1 were considered acceptable for design, as is standard practice in the Bay Area.

Shear strength parameters for the on-site colluvial materials were evaluated based on consolidated undrained triaxial (Tx-CU) testing. Testing could only be performed on the relatively weak upper colluvial materials since undisturbed samples of the harder and substantially stronger underlying colluvium could not be retrieved with the drive sampler. Conservative strength estimates of these deeper materials were therefore utilized in the analyses. Conservative strength parameters were utilized to model the strength of the fill material which will be generated from site excavations elsewhere on the site. During construction, we should be retained perform appropriate laboratory testing on the fill to confirm the validity of these parameters, and to modify our recommendations, if necessary. The analyses were performed assuming that groundwater levels rising to near the ground surface in areas where subdrains will not be present. The seismic factors of safety were evaluated using pseudo-static analyses based on a seismic coefficient of (k_h) of 0.15.

Our analyses indicate that the proposed terraced wall layout is feasible from a geotechnical standpoint. It will be necessary to extend support for the lowest wall and for the fills into the bedrock or competent colluvium located at least 4 feet below existing grade. It will also be necessary to utilize geogrid reinforcement to generate factors of safety of at least 1.5 and 1.1 under static and seismic loading conditions. Our analyses indicate that acceptable global stability levels can be achieved by utilizing modular retaining walls reinforced with 35 foot long Tensar® UX1600MSE geogrids (or equivalent) provided every two vertical feet. Wall facing should extend at least 12 inches into bedrock or approved competent soils located at least 4 feet below existing grade, or at least 12 inches into compacted fill founded on bedrock or approved competent soils. Wall facing should also be deepened as necessary to obtain at least 7 feet of horizontal confinement between the toe of the wall and the face of slope. It will be necessary to design walls to resist surcharge pressures imposed by upslope retaining walls. Upon completion of the final wall layout, the modular retaining wall design should be finalized based on at least the following minimum factors of safety:

Failure Mode	Static	Seismic[1]
a) Base Sliding	1.5	1.1
b) Overturning	1.5	1.1
c) Bearing Capacity	2.0	1.5
d) Tensile Overstress	1.0	1.0
e) Pullout	1.5	1.1
f) Internal Sliding	1.5	1.1
g) Shear (bulging)	1.5	1.1
h) Connection	1.5	1.1
i) Global Instability	1.5	1.1

Wall facing should be provided with backdrains. The backdrains should consist of a 4-inch diameter, rigid perforated pipe which is located at the base of the wall and which is surrounded by a drainage blanket. The pipe should be PVC Schedule 40 or ABS with an SDR of 35 or better, and the pipe should be sloped to drain at least 1 percent by gravity to an approved outlet. Accessible subdrain cleanouts should be provided, and should be maintained on a routine basis. The drainage blanket should consist Caltrans Class 2 "Permeable Material". The drainage blanket should be at least 1 foot in width and should extend to within 1 foot of the surface. The uppermost 1 foot should be backfilled with compacted soil to exclude surface water.

Compacted fill behind the modular walls should be founded on level benches excavated into bedrock or approved competent soils. The depth of required benches should be as recommended by the project Engineering Geologist during excavation. It will be necessary to provide subdrains on the benches at least every 15 vertical feet and where evidence of seepage is observed, as recommended by our representative in the field during construction. Site excavation, fill compaction and subdrainage installation should be performed in accordance with the previous grading recommendations for the project.

Driveway Terraced Wall Stability

Our supplemental test borings indicate that bedrock depths in the vicinity of the proposed driveway retaining walls are relatively shallow, and that it will be feasible to derive support for these walls in competent bedrock utilizing drilled piers or spread footings. It will be necessary to design retaining walls to resist surcharge pressures imposed by adjacent upslope retaining walls. Where an imaginary 1-1/2:1 (horizontal:vertical) plane projected downward from the base of an upslope retaining wall intersects the downslope wall, that portion of the downslope wall below the intersection should be designed for an additional horizontal uniform pressure equivalent to

[1] A seismic coefficient (k_h) of at least 0.15 should be used in the design of the modular walls.

the maximum calculated lateral earth pressure at the base of the upslope wall. Wall backfill should be founded on level benches excavated into competent bedrock.

Fill Hydrocompression

Hydro-compression refers to settlement of fills under their self-weight as they become wetted from rainfall, irrigation, or other sources. Our previous experience and testing on other projects indicates that hydrocompression settlement typically is on the order of 1 percent of the total fill thickness. Our recent test borings indicate that relatively minor overexcavation will be necessary within the proposed driveway area to reach supporting bedrock, and that corresponding fill thicknesses beneath the driveway will be relatively minor with the exception of the outboard portion of the driveway at Parcel 1. We judge that the following measures may be implemented to address hydro-compression settlement of proposed pavements:

- In areas where fills will exceed 5 feet in total thickness, compaction of the fill should be increased to 95 percent relative compaction[2].

- Exaggerate finished grades to ensure that proper surface drainage is maintained after settlement occurs.

- Settlement sensitive driveways in areas of deep fills may consist of structural slabs which span between pier supported retaining walls.

Several inches of hydrocompression settlement will occur within the deep retained surplus fills. In addition, modular walls are more flexible than conventional wall systems, and yielding and additional settlement behind the walls may occur. Provided that improvements are not proposed in this area, we judge that it will be sufficient to exaggerate finished grades to ensure that proper surface drainage is maintained after settlement occurs.

Expansive Soils

Our laboratory testing indicates that portions of the on-site soils are moderately expansive. Expansive soils swell and shrink as they gain and lose moisture. The resulting volumetric changes can heave and crack lightly loaded foundations, slabs and pavements. We recommend that the following measures be implemented to mitigate the impact of expansive soils:

- Expansive soils beneath and within 3 horizontal feet of pavements or slabs-on-grade should be removed to a depth of at least 24 inches below planned subgrade, or 24 inches below existing grade, whichever is deeper. The exposed soils should be scarified at least 8 inches deep, thoroughly moisture condition to cause expansion to occur, and

[2] Relative compaction refers to the in-place dry density of a soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 test procedure.

recompacted. The excavated material should then be replaced with non-expansive fill. The non-expansive fill should consist of approved clean well-graded material with little or no potential for expansion. The non-expansive material should have a plasticity index of 15 percent or less, and a maximum liquid limit of 40 percent. Expansive on-site soils should be segregated during excavation and not used in non-expansive fill zones. Herzog Geotechnical should approve all imported fill prior to it being brought to the site, and all segregated non-expansive fill.

- The outer 2 feet of fill slopes should consist of non-expansive fill to reduce sloughing due to strength loss associated with the seasonal wetting and drying of expansive soils.

- Cut slopes in expansive soil should be inclined no steeper than 3:1 or should be fully retained.

- Grade beams in expansive soil areas should be designed to resist expansive soil uplift pressures of 2000 pounds per square foot. Alternatively, a compressible void form product (Econo-Void or equivalent) should be provided beneath the grade beams. Expansive soils exert uplift forces on concrete overpours. Grade beams should be formed above the trench to prevent overpours, and care should be taken to prevent overpours (mushrooming) at the tops of piers.

- Structural slabs should be underlain by an approved void forming product for protection from expansive soil heave. The void forms should consist of at least a 2-inch thick degradable and compressible paper product (SureVoid®, or equivalent).

- In order to reduce expansive soil heave against retaining walls, the zone located above a 1:1 plane projected up from the base of the wall should consist of approved non-expansive backfill.

Geotechnical Drainage

All site drainage should be designed by the project civil engineer. Surface runoff should be directed away from the tops and toes of slopes using swales or berms. Surface drainage benches and ditches should be provided as required by the *International Building Code*. Outlet pipes for surface drains should extend down to approved erosion resistant outlets well away from unstable slopes. Drain pipes should consist of rigid PVC or ABS pipe which is Schedule 40, SDR 35 or equivalent.

Positive drainage should be provided within 5 feet of buildings to direct surface runoff towards suitable discharge facilities and away from foundations and slabs. Ponding of surface water should not be allowed. All roofs should be provided with gutters and downspouts. All downspouts and drains should be connected into closed conduits which discharge at approved erosion resistant outlets reviewed by our Engineering Geologist. All conduit should consist of rigid PVC or ABS pipe which is Schedule 40, SDR 35 or equivalent. Downspouts, surface drains and subsurface drains should be checked for blockage and cleared and maintained on a regular basis. Surface drains and downspouts should be maintained entirely separate from foundation drains and slab underdrains. Provisions should be made for conducting water out of crawl spaces.

Foundation drains should be installed adjacent to all perimeter foundations. Perimeter retaining wall backdrains may be substituted for foundation drains. The foundation drains should consist of trenches which extend 18 inches deep, or 12 inches below lowest adjacent interior or crawl space grade, whichever is deeper, and which are sloped to drain at least 1 percent by gravity. The trenches should be lined completely with a filter fabric such as Mirafi 140N, or equivalent. A 4-inch diameter rigid perforated PVC or ABS pipe (Schedule 40, SDR 35 or equivalent) should be placed on a 1-inch thick layer of drain rock at the bottom of the trenches with perforations down. Accessible subdrain cleanouts should be provided, and should be maintained on a routine basis. The pipes should be sloped to drain at least 1 percent by gravity to a non-perforated pipe (Schedule 40, SDR 35 or equivalent) which discharges at an approved outlet. The trench for the perforated pipe should be backfilled to within 6 inches of the ground surface with drain rock. The filter fabric should be wrapped over the top of the drain rock. The upper 6 inches of the trenches should be backfilled with compacted clayey soil to exclude surface water. The trench for the non-perforated outlet pipe should be completely backfilled with compacted soil.

Water will accumulate in crawl spaces. Where this will not be acceptable, crawl spaces should be graded to create a smooth surface, and covered with an approved pre-fabricated drainage material such as Mirafi Miradrain 6000. A 4-inch diameter, perforated Schedule 40 or SDR 35 pipe should be provided in a trench excavated extending across the lowest portion of the crawl space. The trench should extend 12 inches deep, and should be sloped to drain at least 1 percent by gravity. The trench should be completely lined with Mirafi 140N filter fabric, or equivalent. The perforated pipe should slope to drain at least 1 percent to a non-perforated Schedule 40 or SDR 35 pipe which discharges at an approved outlet. The surface and trench should then be covered with reinforced gunite.

Maintenance

Routine maintenance of drains and slopes should be anticipated. Erosion that occurs must be repaired promptly before it can enlarge. Surface drains, wall backdrains, and subdrains should be periodically checked for blockage and cleared as necessary. A homeowner's association maintenance and monitoring program should be established to ensure maintenance of the drains and to perform maintenance and repairs of slopes, as necessary.

LIMITATIONS

This report has been prepared for the exclusive use of Berg Holdings and their consultants for the proposed project described in this report. Our services consist of professional opinions and conclusions developed in accordance with generally-accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided us regarding the proposed construction, the results of our field exploration and laboratory testing programs, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

The test boring logs represent subsurface conditions at the locations and on the dates indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration and may not necessarily be the same or comparable at other times. The locations of the test borings were established in the field by reference to existing features, and should be considered approximate only.

Our investigation did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic or corrosive materials in the soil, surface water, ground water or air, on or below, or around the site, nor did it include an evaluation or investigation of the presence or absence of wetlands. Our work also did not address the evaluation or mitigation of mold hazard at the site.

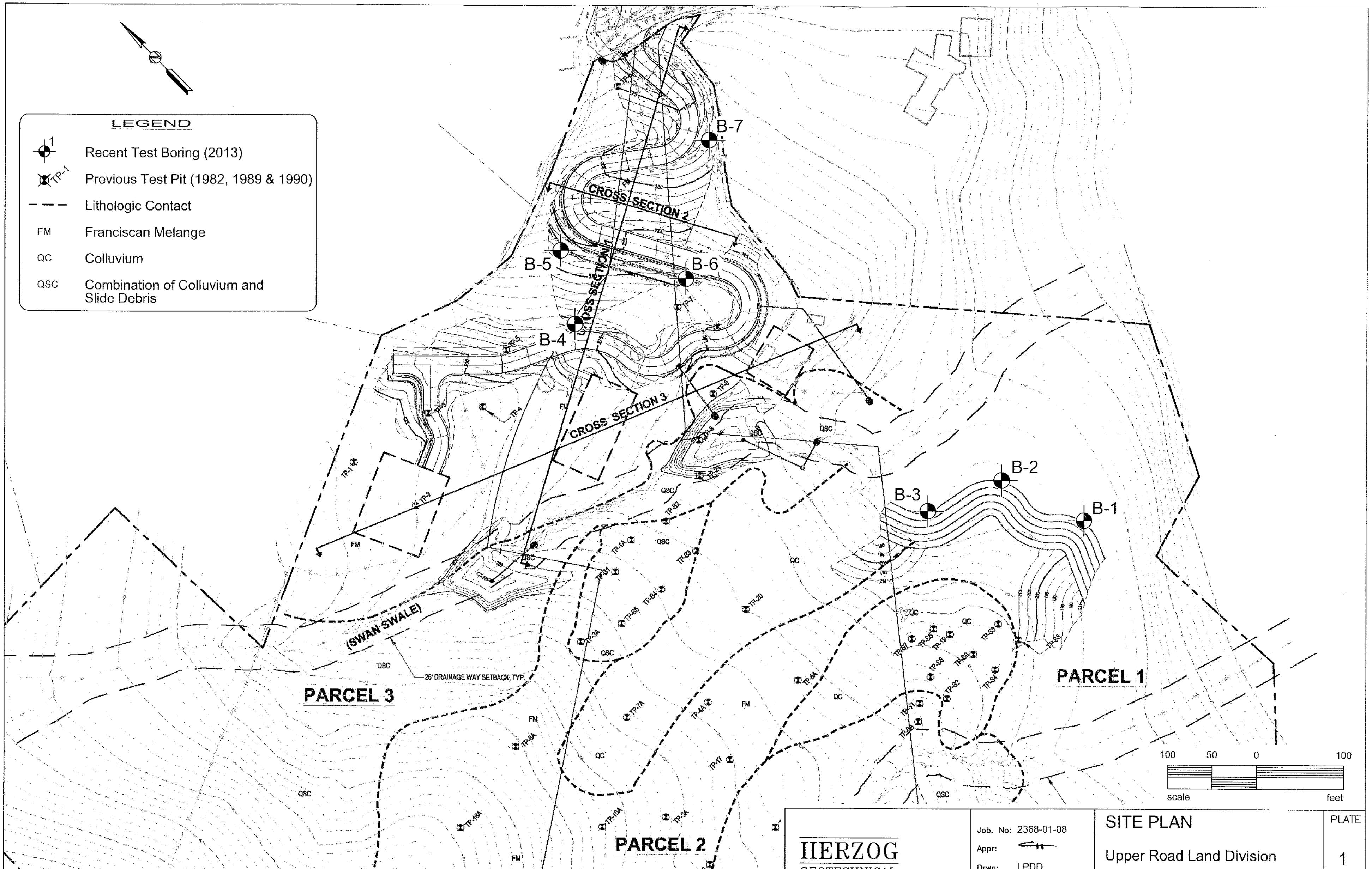
We appreciate the opportunity to be of service to you. If you have any questions, please call us at (415) 388-8355.

Sincerely,
HERZOG GEOTECHNICAL

REGISTERED PROFESSIONAL ENGINEER
CRAIG W. HERZOG
No. 002383
Exp. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

Craig Herzog, G.E.
Principal Engineer

Attachments: Plates 1 through 11
Slope Stability Analyses



Reference: Geotechnical Constraints-Grading Overlay by CSW Stuber/Stroeh Engineering Group, Inc., dated 5/7/12.

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job. No: 2368-01-08
Appr:
Drwn: LPDD
Date: MAY 2013

SITE PLAN
Upper Road Land Division
Ross, California

PLATE
1

EQUIPMENT: **4" Flight Auger**
LOGGED BY: **G.M.**
ELEVATION: **
START DATE: **4-30-13**
FINISH DATE: **4-30-13**

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	Description
							0	ORANGE-BROWN SANDY SILT (ML), soft, moist, with organics
							1	YELLOW-BROWN GRAVELLY CLAY (CL), medium stiff, moist
Tx-UU, see Plate 11		18.3	105		9	■		
							2	
							3	ORANGE-BROWN SANDSTONE, firm to moderately hard, weak to moderately strong, highly weathered
					44	■	4	
							5	

BOTTOM OF BORING 1 @ 5.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

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Drwn: LPDD
Date: MAY 2013

LOG OF BORING 1

Upper Road Land Division

Ross, California

PLATE **2**

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	DEPTH (FEET)	Description
						0	BROWN SANDY SILT (ML), soft, moist, with organics
						1	BROWN GRAVELLY CLAY (CL), stiff to very stiff, moist, with roots
					27		
						2	
						3	
						4	
		15.1	103		30		
					29	5	drilling refusal at 5'
						6	becomes hard at 6'
					45		
						7	
							BOTTOM OF BORING 2 @ 7.5 FEET No Free Water Encountered

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 4-30-13
FINISH DATE: 4-30-13

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

HERZOG GEOTECHNICAL CONSULTING ENGINEERS

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Drwn: LPDD
Date: MAY 2013

LOG OF BORING 2

Upper Road Land Division

Ross, California

PLATE 3

EQUIPMENT: **4" Flight Auger**

LOGGED BY: **G.M.**

ELEVATION: **

START DATE: **4-30-13**

FINISH DATE: **4-30-13**

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	Description
							0	BROWN SANDY SILT (ML), soft to medium stiff, moist, with organics
							1	
		23.4	89		8			DARK BROWN GRAVELLY CLAY (CL), soft, moist
							2	
Tx-CU, see Plate 12		17.4	100		28		3	ORANGE-BROWN SANDY CLAY (CL), stiff, moist, with roots
							4	drilling refusal at 4'
					25			
								BROWN GRAVELLY CLAY (CH), very stiff, moist
							5	
					50			
							6	
							7	BOTTOM OF BORING 3 @ 7.0 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.

** Existing ground surface at time of investigation.

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Job No: 2368-01-08

Appr: [signature]

Drwn: LPDD

Date: MAY 2013

LOG OF BORING 3

Upper Road Land Division

Ross, California

PLATE 4

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	EQUIPMENT: 4" Flight Auger / LOGGED BY: G.M. / ELEVATION: ** / START DATE: 4-30-13 / FINISH DATE: 4-30-13
							0	BROWN SANDY SILT (ML), soft, moist, with organics
LL=47, PI=26, see Plate 13		13.4	97		27			BROWN GRAVELLY CLAY (CL), stiff, moist
							1	
					27			
							2	
					49		3	
								RED-BROWN CHERT, hard, strong, moderately weathered
							4	BOTTOM OF BORING 4 @ 4.0 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

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LOG OF BORING 4

Upper Road Land Division

Ross, California

PLATE 5

EQUIPMENT: 4" Flight Auger
LOGGED BY: G.M.
ELEVATION: **
START DATE: 4-30-13
FINISH DATE: 4-30-13

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	Description
							0	BROWN GRAVELLY SILT (ML), soft, moist, with organics
LL=39, PI=18, see Plate 13		16.2	104		9		1.5	BROWN SANDY CLAY (CL), medium stiff, moist
					17		2.5	
					70		4	becomes stiff at 4'
							5.2	YELLOW-BROWN SANDSTONE, firm to moderately hard, friable to weak, highly weathered

BOTTOM OF BORING 5 @ 5.5 FEET
No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

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Job No: 2368-01-08
Appr: [signature]
Drwn: LPDD
Date: MAY 2013

LOG OF BORING 5

Upper Road Land Division

Ross, California

PLATE 6

EQUIPMENT: **4" Flight Auger**
LOGGED BY: **G.M.**
ELEVATION: **
START DATE: **4-30-13**
FINISH DATE: **4-30-13**

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	Description
							0	BROWN SANDY SILT (ML), soft, moist
							1	BROWN GRAVELLY CLAY (CL), stiff, moist
LL=44, PI=24, ~~see~~ Plate 13		20.0	89		17			
							2	
							3	becomes very stiff at 3'
El=46, see Plate 14					42		4	becomes hard at 4'
					45			
							5	
								BROWN SANDSTONE, firm to moderately hard, weak, highly weathered
							6	BOTTOM OF BORING 6 @ 6.0 FEET No Free Water Encountered

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

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Job No: 2368-01-08
Appr: [signature]
Drwn: LPDD
Date: MAY 2013

LOG OF BORING 6

Upper Road Land Division

Ross, California

PLATE **7**

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot *	Sample	DEPTH (FEET)	EQUIPMENT: 4" Flight Auger LOGGED BY: G.M.	ELEVATION: ** START DATE: 4-30-13 FINISH DATE: 4-30-13
							0	YELLOW-BROWN SANDY SILT (ML), medium stiff, moist	
					29			BROWN SANDY CLAY (CL), medium stiff, moist	
							1		
								MOTTLED YELLOW-GRAY SANDSTONE, firm to moderately hard, friable to weak, highly weathered	
							2	BOTTOM OF BORING 7 @ 2.0 FEET No Free Water Encountered	

* Converted to equivalent standard penetration blow counts.
** Existing ground surface at time of investigation.

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Drwn: LPDD
Date: MAY 2013

LOG OF BORING 7

Upper Road Land Division

Ross, California

PLATE 8

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Shear Strength, psf
Confining Pressure, psf

Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◩	Standard Penetration Test	Perm	Permeability	
⊠	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 2368-01-08
Appr:
Drwn: LPDD
Date: MAY 2013

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
Upper Road Land Division
Ross, California

PLATE
9

ROCK SYMBOLS

SHALE OR CLAYSTONE	CHERT	SERPENTINITE
SILTSTONE	PYROCLASTIC	METAMORPHIC ROCKS
SANDSTONE	VOLCANIC	DIATOMITE
CONGLOMERATE	PLUTONIC	SHEARED ROCKS

LAYERING

MASSIVE	Greater than 6 feet
THICKLY BEDDED	2 to 6 feet
MEDIUM BEDDED	8 to 24 inches
THINNLY BEDDED	2-1/2 to 8 inches
VERY THINNLY BEDDED	3/4 to 2-1/2 inches
CLOSELY LAMINATED	1/4 to 3/4 inches
VERY CLOSELY LAMINATED	Less than 1/4 inch

JOINT, FRACTURE, OR SHEAR SPACING

VERY WIDELY SPACED	Greater than 6 feet
WIDELY SPACED	2 to 6 feet
MODERATELY SPACED	8 to 24 inches
CLOSELY SPACED	2-1/2 to 8 inches
VERY CLOSELY SPACED	3/4 to 2-1/2 inches
EXTREMELY CLOSELY SPACED	Less than 3/4 inch

HARDNESS

SOFT - Pliable; can be dug by hand

FIRM - Can be gouged deeply or carved with a pocket knife

MODERATELY HARD - Can be readily scrached by a knife blade; scratch leaves heavy trace of dust and is readily visable after the powder has been blown away

HARD - Can be scratched with difficulty; scratch produces little powder and is often faintly visable

VERY HARD - Cannot be scratched with pocket knife; leaves a metallic streak

STRENGTH

PLASTIC - Capable of being molded by hand

FRIABLE - Crumbles by rubbing with fingers

WEAK - An unfractured specimen of such material will crumble under light hammer blows

MODERATELY STRONG - Specimen will withstand a few heavy hammer blows before breaking

STRONG - Specimem will withstand a few heavy ringing hammer blows and usually yields large fragments

VERY STRONG - Rock will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

DEGREE OF WEATHERING

HIGHLY WEATHERED - Abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thourough discoloration, rock disintegration, mineral decomposition

MODERATELY WEATHERED - Some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition

SLIGHTLY WEATHERED - A few stained fractures, slight discoloration, little or no effect on cementation, no mineral decomposition

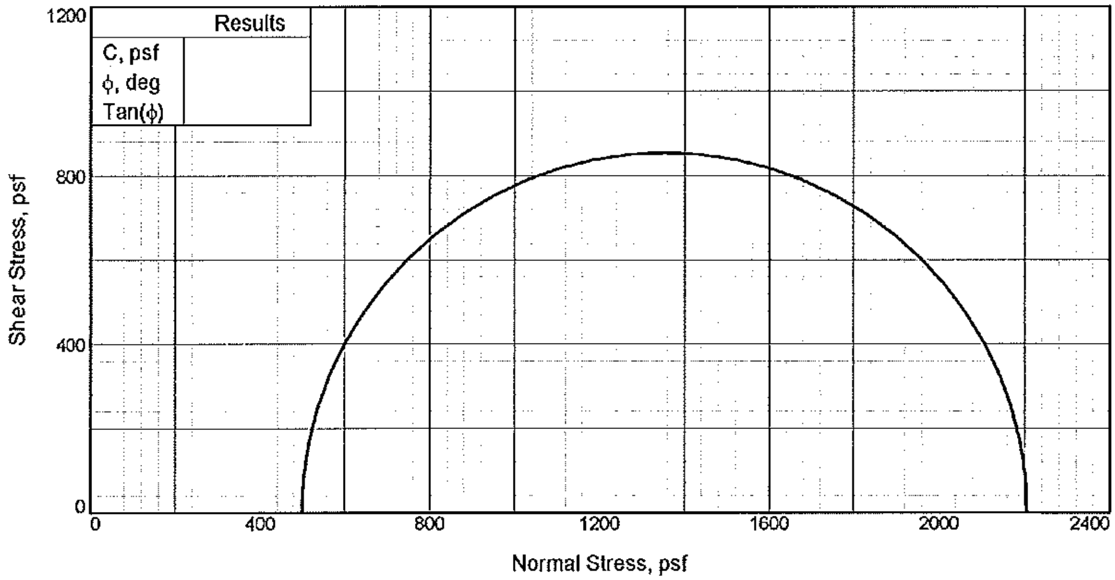
FRESH - Unaffected by weathering agents, no appreciable change with depth

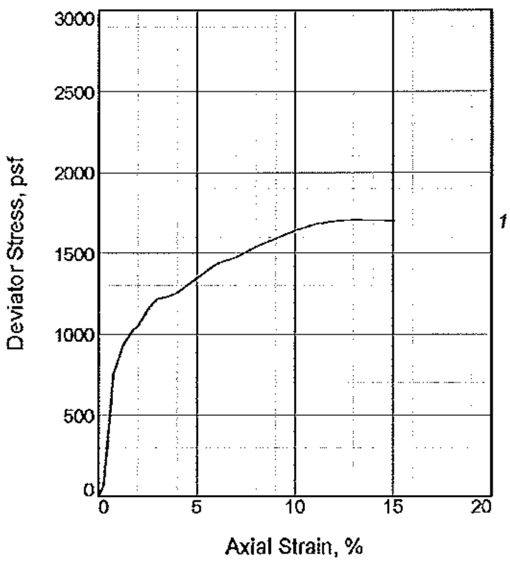
HERZOG
GEOTECHNICAL
CONSULTING ENGINEERS

Job No: 2368-01-08
Appr:
Drwn: LPDD
Date: MAY 2013

ENGINEERING GEOLOGY
ROCK TERMS
Upper Road Land Division
Ross, California

PLATE
10





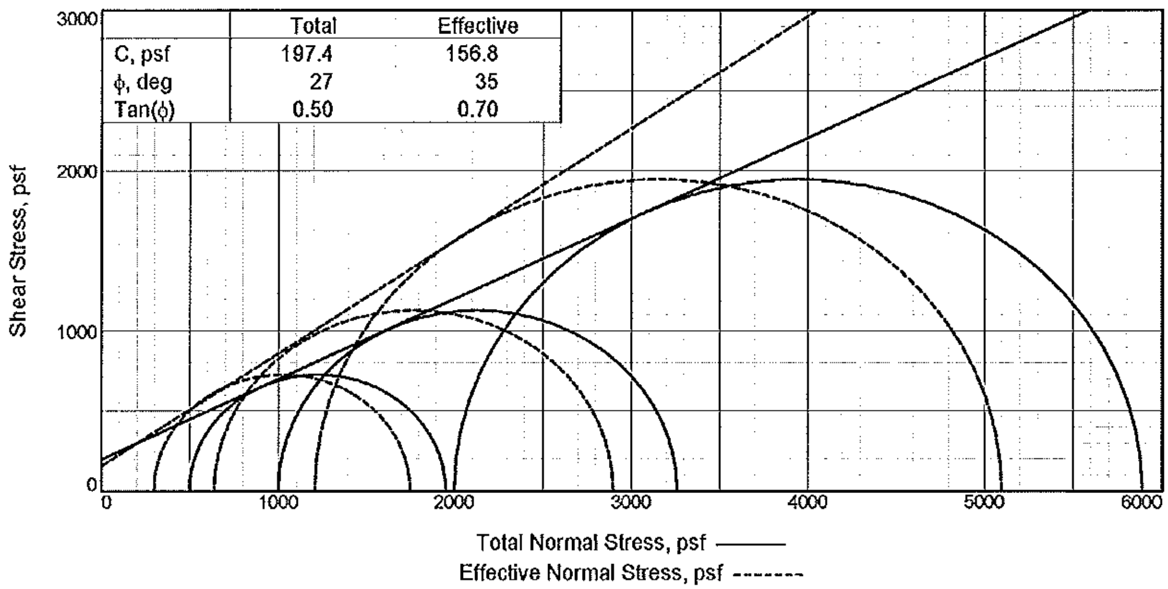
Sample No.		1
Initial	Water Content, %	18.3
	Dry Density, pcf	104.6
	Saturation, %	80.8
	Void Ratio	0.6108
	Diameter, in.	2.430
	Height, in.	5.700
At Test	Water Content, %	22.6
	Dry Density, pcf	104.6
	Saturation, %	100.0
	Void Ratio	0.6108
	Diameter, in.	2.430
	Height, in.	5.700
Strain rate, in./min.		0.060
Back Pressure, psf		7488.0
Cell Pressure, psf		7987.7
Fail. Stress, psf		1707.0
Strain, %		13.0
Ult. Stress, psf		1707.0
Strain, %		
σ_1 Failure, psf		2206.6
σ_3 Failure, psf		499.7

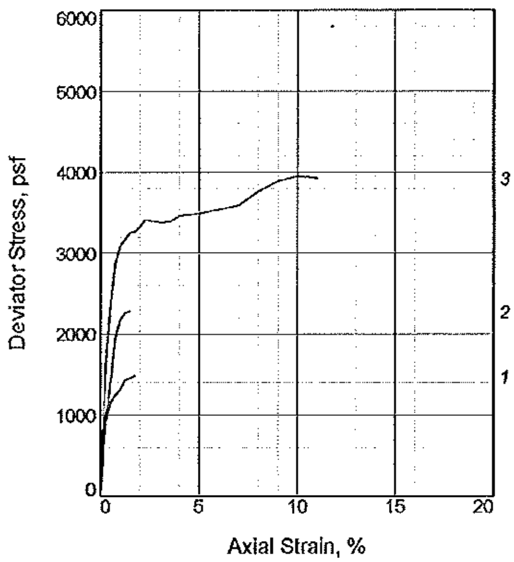
Boring No. B-1

Depth: 1.5'

Description: Yellow-Brown Gravelly Clay (CL)

HERZOG GEOTECHNICAL CONSULTING ENGINEERS	Job. No: 2368-01-08 Appr: [signature] Drwn: LPDD Date: MAY 2013	STRENGTH TEST DATA Upper Road Land Division Ross, California	PLATE 11





Sample No.		1	2	3
Initial	Water Content, %	17.4	17.4	17.4
	Dry Density, pcf	100.3	100.6	101.8
	Saturation, %	69.0	69.4	71.6
	Void Ratio	0.6805	0.6763	0.6558
	Diameter, in.	2.430	2.430	2.430
	Height, in.	5.650	5.636	5.567
At Test	Water Content, %	20.5	20.5	20.5
	Dry Density, pcf	108.5	108.5	108.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5530	0.5530	0.5530
	Diameter, in.	2.339	2.353	2.365
	Height, in.	5.636	5.568	5.511
Strain rate, in./min.		0.004	0.004	0.004
Eff. Cell Pressure, psf		499.7	999.4	2000.2
Fail. Stress, psf		1453.7	2259.0	3889.7
Total Pore Pr., psf		7689.6	7848.0	8280.0
Strain, %		1.5	1.2	9.0
Ult. Stress, psf				3889.7
Total Pore Pr., psf				8280.0
Strain, %				9.0
$\bar{\sigma}_1$ Failure, psf		1751.8	2898.4	5097.8
$\bar{\sigma}_3$ Failure, psf		298.1	639.4	1208.2

Boring No. B-3

Depth: 3.0'

Description: Orange-Brown Sandy Clay (CL)

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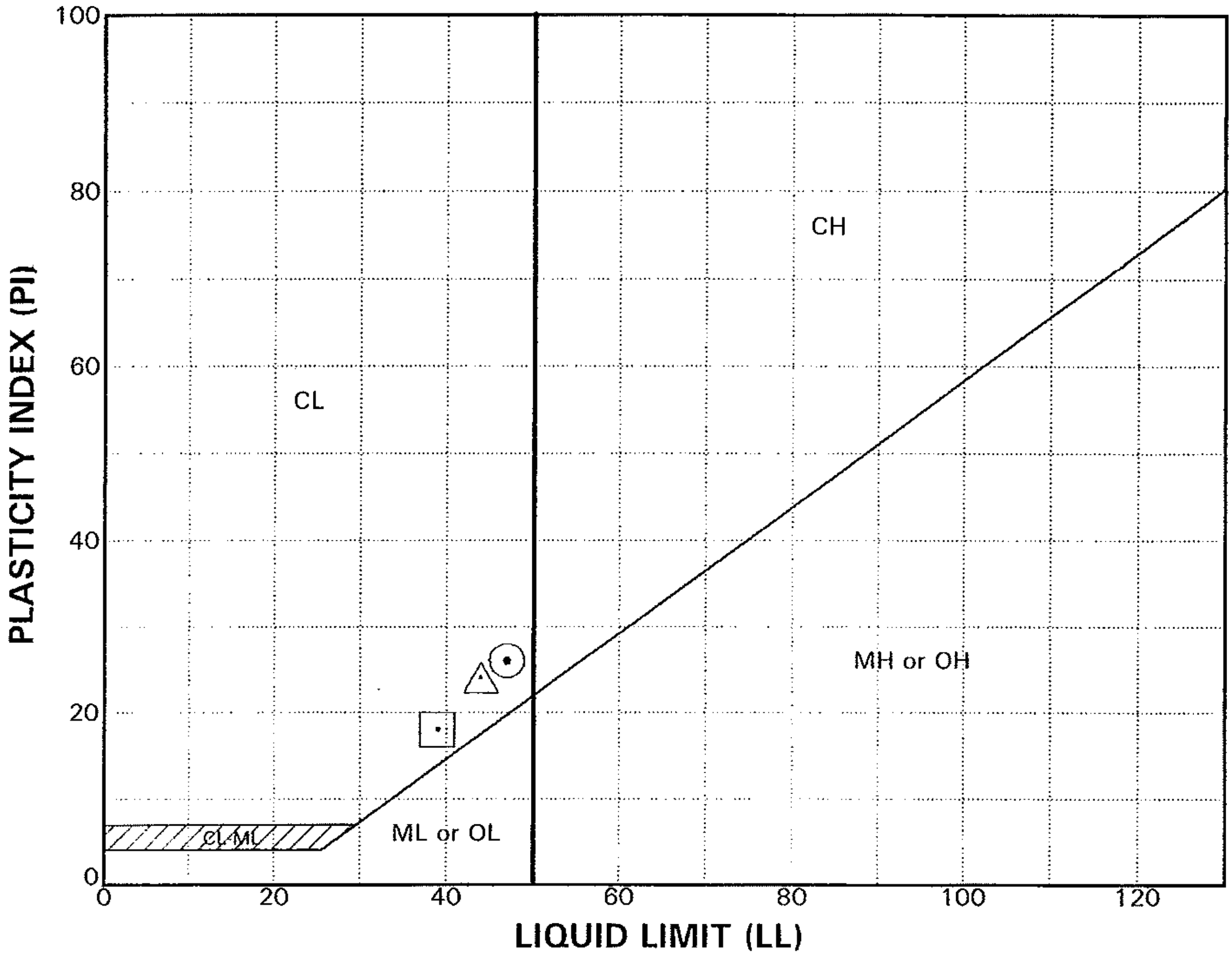
Job. No: 2368-01-08
Appr: [signature]
Drwn: LPDD
Date: MAY 2013

STRENGTH TEST DATA

Upper Road Land Division

Ross, California

PLATE 12



SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% PASSING #200 SIEVE
⊙ Bor. 4 @ 0.5'	Brown Gravelly Clay (CL)	47	21	26	
⊡ Bor. 5 @ 1.5'	Brown Sandy Clay (CL)	39	21	18	
△ Bor. 6 @ 1.5'	Brown Gravelly Clay (CL)	44	20	24	

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Job No: 2368-01-08
Appr: [signature]
Drwn: LPDD
Date: MAY 2013

PLASTICITY CHART

Upper Road Land Division

Ross, California

PLATE

13

EXPANSION INDEX

Subject: Upper Road Land Division
Sample: B-6 @ 4.0'
Sample Description : Brown Gravelly Clay (CL)

Initial

Sample Height (in):	1.0000
Moisture Content (%):	15.2
Dry Density (pcf):	97.7
Void Ratio:	0.7245
Saturation (%):	56.5

Final

Sample Height (in):	1.0416
Moisture Content (%):	28.5
Void Ratio:	0.7962
Saturation (%):	96.6

EXPANSION INDEX LEVELS:

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

Expansion Index : **46**
Expansion Index Level: **Low**

Very Low>< Low >< Medium >< High >< Very High

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Job. No: 2368-01-08
Appr:
Drwn: LPDD
Date: MAY 2013

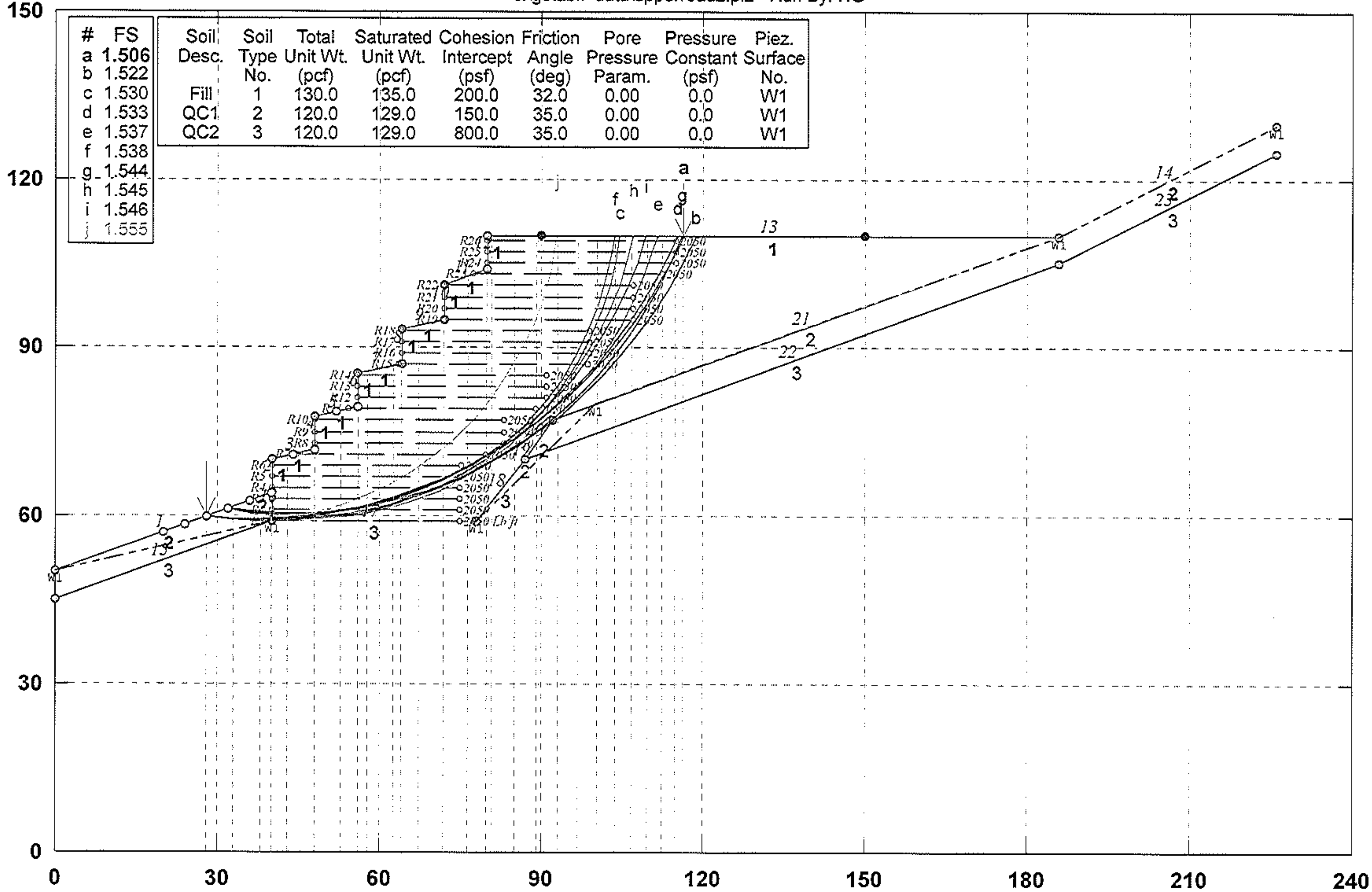
EXPANSION INDEX
Upper Road Land Division
Ross, California

PLATE
14

SLOPE STABILITY ANALYSES

Upper Road Land Division - Static 35' long UX1600 geogrid @ 2' vert o.c.

c:\gstabl7 data\upperroad2.pl2   Run By: HG



GSTABL7 v.2 FSmin=1.506

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

```
                              ***  GSTABL7  ***
          ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **
   ** Original Version 1.0, January 1996; Current Ver. 2.005.2, Jan. 2011 **
             (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
Analysis Run Date:
Time of Run:
Run By:                    HG
Input Data Filename:       C:\GSTABL7 DATA\upperroad2.
Output Filename:           C:\GSTABL7 DATA\upperroad2.OUT
Unit System:               English
Plotted Output Filename:   C:\GSTABL7 DATA\upperroad2.PLT
PROBLEM DESCRIPTION:  Upper Road Land Division - Static
                      35' long UX1600 geogrid @ 2' vert o.c.
BOUNDARY COORDINATES
   14 Top   Boundaries
   23 Total Boundaries
Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
   No.        (ft)       (ft)        (ft)        (ft)      Below Bnd
```

1	0.00	50.00	40.00	64.00	2
2	40.00	64.00	40.01	70.00	1
3	40.01	70.00	48.00	71.70	1
4	48.00	71.70	48.01	77.70	1
5	48.01	77.70	56.00	79.40	1
6	56.00	79.40	56.01	85.40	1
7	56.01	85.40	64.00	87.10	1
8	64.00	87.10	64.01	93.10	1
9	64.01	93.10	72.00	95.00	1
10	72.00	95.00	72.01	101.00	1
11	72.01	101.00	80.00	104.00	1
12	80.00	104.00	80.01	110.00	1
13	80.01	110.00	186.00	110.00	1
14	186.00	110.00	226.00	130.00	2
15	0.00	45.00	40.00	59.00	3
16	40.00	64.00	40.10	59.00	2
17	40.10	59.00	78.00	59.00	3
18	78.00	59.00	87.00	70.00	3
19	87.00	70.00	87.00	70.00	2
20	87.00	70.00	92.10	77.00	2
21	92.10	77.00	186.00	110.00	2
22	87.00	70.00	186.00	105.00	3
23	186.00	105.00	226.00	125.00	3

Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	200.0	32.0	0.00	0.0	1
2	120.0	129.0	150.0	35.0	0.00	0.0	1
3	120.0	129.0	800.0	35.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 6 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	50.00
2	40.00	59.00
3	78.00	59.00
4	100.00	80.00
5	186.00	110.00
6	226.00	130.00

REINFORCING LAYER(S)

26 REINFORCING LAYER(S) SPECIFIED

REINFORCING LAYER NO. 1

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	59.00	2050.00	0.000
2	75.00	59.00	2050.00	0.000

REINFORCING LAYER NO. 2

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	61.00	2050.00	0.000
2	75.00	61.00	2050.00	0.000

REINFORCING LAYER NO. 3

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	63.00	2050.00	0.000
2	75.00	63.00	2050.00	0.000

REINFORCING LAYER NO. 4

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	65.00	2050.00	0.000
2	75.00	65.00	2050.00	0.000

REINFORCING LAYER NO. 5
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	67.00	2050.00	0.000
2	75.00	67.00	2050.00	0.000

REINFORCING LAYER NO. 6
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.01	69.00	2050.00	0.000
2	75.01	69.00	2050.00	0.000

REINFORCING LAYER NO. 7
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	44.71	71.00	2050.00	0.000
2	79.71	71.00	2050.00	0.000

REINFORCING LAYER NO. 8
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	48.00	73.00	2050.00	0.000
2	83.00	73.00	2050.00	0.000

REINFORCING LAYER NO. 9
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	48.01	75.00	2050.00	0.000
2	83.01	75.00	2050.00	0.000

REINFORCING LAYER NO. 10
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	48.01	77.00	2050.00	0.000
2	83.01	77.00	2050.00	0.000

REINFORCING LAYER NO. 11
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	54.12	79.00	2050.00	0.000
2	89.12	79.00	2050.00	0.000

REINFORCING LAYER NO. 12
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	56.00	81.00	2050.00	0.000
2	91.00	81.00	2050.00	0.000

REINFORCING LAYER NO. 13
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	56.01	83.00	2050.00	0.000
2	91.01	83.00	2050.00	0.000

REINFORCING LAYER NO. 14
2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	56.01	85.00	2050.00	0.000
2	91.01	85.00	2050.00	0.000

REINFORCING LAYER NO. 15
2 POINTS DEFINE THIS LAYER

```
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         63.53     87.00   2050.00     0.000
       2         98.53     87.00   2050.00     0.000
REINFORCING LAYER NO.  16
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         64.00     89.00   2050.00     0.000
       2         99.00     89.00   2050.00     0.000
REINFORCING LAYER NO.  17
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         64.01     91.00   2050.00     0.000
       2         99.01     91.00   2050.00     0.000
REINFORCING LAYER NO.  18
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         64.01     93.00   2050.00     0.000
       2         99.01     93.00   2050.00     0.000
REINFORCING LAYER NO.  19
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         72.00     95.00   2050.00     0.000
       2        107.00     95.00   2050.00     0.000
REINFORCING LAYER NO.  20
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         72.00     97.00   2050.00     0.000
       2        107.00     97.00   2050.00     0.000
REINFORCING LAYER NO.  21
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         72.01     99.00   2050.00     0.000
       2        107.01     99.00   2050.00     0.000
REINFORCING LAYER NO.  22
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         72.01    101.00   2050.00     0.000
       2        107.01    101.00   2050.00     0.000
REINFORCING LAYER NO.  23
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         77.34    103.00   2050.00     0.000
       2        112.34    103.00   2050.00     0.000
REINFORCING LAYER NO.  24
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         80.00    105.00   2050.00     0.000
       2        115.00    105.00   2050.00     0.000
REINFORCING LAYER NO.  25
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                     FACTOR
       1         80.00    107.00   2050.00     0.000
       2        115.00    107.00   2050.00     0.000
REINFORCING LAYER NO.  26
  2 POINTS DEFINE THIS LAYER
     POINT      X-COORD   Y-COORD   FORCE   INCLINATION
```

NO.				FACTOR
1	80.01	109.00	2050.00	0.000
2	115.01	109.00	2050.00	0.000

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
Janbus Empirical Coef. is being used for the case of c & phi both > 0
5000 Trial Surfaces Have Been Generated.
500 Surface(s) Initiate(s) From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 20.00(ft)
and X = 56.00(ft)
Each Surface Terminates Between X = 90.00(ft)
and X = 150.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
5.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 5.105 FS Min = 1.506 FS Ave = 2.681
Standard Deviation = 0.781 Coefficient of Variation = 29.15 %
Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.987	59.446
3	37.987	59.376
4	42.982	59.589
5	47.958	60.084
6	52.897	60.862
7	57.784	61.917
8	62.604	63.249
9	67.340	64.851
10	71.978	66.719
11	76.503	68.847
12	80.899	71.228
13	85.154	73.854
14	89.253	76.718
15	93.183	79.809
16	96.931	83.118
17	100.486	86.634
18	103.836	90.346
19	106.970	94.242
20	109.878	98.310
21	112.551	102.535
22	114.980	106.905
23	116.477	110.000

Factor of Safety
*** 1.506 ***
Individual data on the 35 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	628.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.0	1805.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	2.0	1021.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.0	9.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	109.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.9	4059.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	7325.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.0	63.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.0	19.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	4.9	11272.2	0.0	0.0	0.	0.	0.0	0.0	0.0

11	3.1	7209.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	0.0	27.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.8	5504.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.8	14853.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.4	4259.3	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.0	34.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	3.3	12645.0	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.6	17279.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	0.0	80.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	0.0	40.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.5	19888.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.5	15253.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	0.0	47.1	0.0	0.0	0.	0.	0.0	0.0	0.0
24	0.9	4510.0	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.3	20718.3	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.1	18497.3	0.0	0.0	0.	0.	0.0	0.0	0.0
27	3.9	16214.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	3.7	13905.6	0.0	0.0	0.	0.	0.0	0.0	0.0
29	3.6	11610.3	0.0	0.0	0.	0.	0.0	0.0	0.0
30	3.3	9366.9	0.0	0.0	0.	0.	0.0	0.0	0.0
31	3.1	7213.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	2.9	5188.4	0.0	0.0	0.	0.	0.0	0.0	0.0
33	2.7	3327.9	0.0	0.0	0.	0.	0.0	0.0	0.0
34	2.4	1667.2	0.0	0.0	0.	0.	0.0	0.0	0.0
35	1.5	301.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.974	59.289
3	37.969	59.065
4	42.968	59.127
5	47.956	59.476
6	52.916	60.111
7	57.831	61.029
8	62.685	62.227
9	67.463	63.702
10	72.148	65.448
11	76.725	67.460
12	81.180	69.731
13	85.496	72.254
14	89.661	75.020
15	93.661	78.021
16	97.482	81.246
17	101.111	84.685
18	104.538	88.327
19	107.750	92.158
20	110.736	96.168
21	113.488	100.343
22	115.996	104.668
23	118.252	109.130
24	118.631	110.000

Factor of Safety
*** 1.522 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.884	60.129
3	41.842	59.480
4	46.837	59.259
5	51.832	59.468
6	56.792	60.104
7	61.678	61.164
8	66.456	62.639
9	71.089	64.518
10	75.544	66.788

11	79.788	69.432
12	83.789	72.430
13	87.519	75.760
14	90.949	79.398
15	94.054	83.317
16	96.812	87.488
17	99.201	91.880
18	101.205	96.461
19	102.809	101.197
20	104.000	106.053
21	104.615	110.000

Factor of Safety
*** 1.530 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.983	59.394
3	37.982	59.281
4	42.979	59.461
5	47.957	59.934
6	52.898	60.697
7	57.786	61.749
8	62.604	63.086
9	67.335	64.703
10	71.964	66.594
11	76.474	68.753
12	80.849	71.173
13	85.075	73.845
14	89.137	76.761
15	93.021	79.909
16	96.714	83.280
17	100.204	86.861
18	103.477	90.641
19	106.523	94.606
20	109.331	98.743
21	111.892	103.037
22	114.197	107.474
23	115.326	110.000

Factor of Safety
*** 1.533 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.936	60.406
3	41.918	59.972
4	46.917	59.903
5	51.909	60.197
6	56.865	60.853
7	61.761	61.869
8	66.570	63.238
9	71.267	64.953
10	75.826	67.005
11	80.224	69.384
12	84.437	72.076
13	88.444	75.067
14	92.222	78.342
15	95.752	81.884
16	99.014	85.672
17	101.993	89.688
18	104.671	93.910
19	107.036	98.316
20	109.073	102.882
21	110.773	107.584
22	111.452	110.000

Factor of Safety

*** 1.537 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.898	60.197
3	41.865	59.619
4	46.863	59.471
5	51.855	59.753
6	56.804	60.464
7	61.674	61.599
8	66.427	63.148
9	71.031	65.100
10	75.448	67.442
11	79.648	70.154
12	83.599	73.219
13	87.272	76.612
14	90.639	80.308
15	93.675	84.280
16	96.359	88.499
17	98.669	92.934
18	100.589	97.550
19	102.105	102.315
20	103.205	107.193
21	103.588	110.000

Factor of Safety

*** 1.538 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.964	60.600
3	41.956	60.322
4	46.956	60.366
5	51.942	60.733
6	56.895	61.421
7	61.793	62.426
8	66.615	63.746
9	71.343	65.375
10	75.955	67.305
11	80.434	69.528
12	84.759	72.036
13	88.914	74.818
14	92.880	77.862
15	96.642	81.156
16	100.184	84.685
17	103.490	88.436
18	106.548	92.392
19	109.343	96.538
20	111.866	100.855
21	114.104	105.326
22	116.050	109.932
23	116.074	110.000

Factor of Safety

*** 1.544 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.925	60.336
3	41.902	59.864
4	46.902	59.789
5	51.892	60.111
6	56.840	60.827
7	61.716	61.933
8	66.489	63.423
9	71.129	65.286

10	75.606	67.512
11	79.893	70.085
12	83.962	72.991
13	87.788	76.209
14	91.347	79.722
15	94.616	83.505
16	97.575	87.535
17	100.205	91.788
18	102.490	96.236
19	104.414	100.850
20	105.967	105.603
21	107.026	110.000

Factor of Safety
*** 1.545 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.958	60.553
3	41.950	60.267
4	46.949	60.346
5	51.930	60.788
6	56.865	61.591
7	61.728	62.750
8	66.495	64.260
9	71.139	66.113
10	75.636	68.299
11	79.962	70.806
12	84.094	73.621
13	88.011	76.729
14	91.691	80.113
15	95.116	83.756
16	98.266	87.639
17	101.126	91.740
18	103.680	96.039
19	105.915	100.512
20	107.818	105.135
21	109.381	109.885
22	109.409	110.000

Factor of Safety
*** 1.546 ***

Failure Surface Specified By 20 Coordinate Points

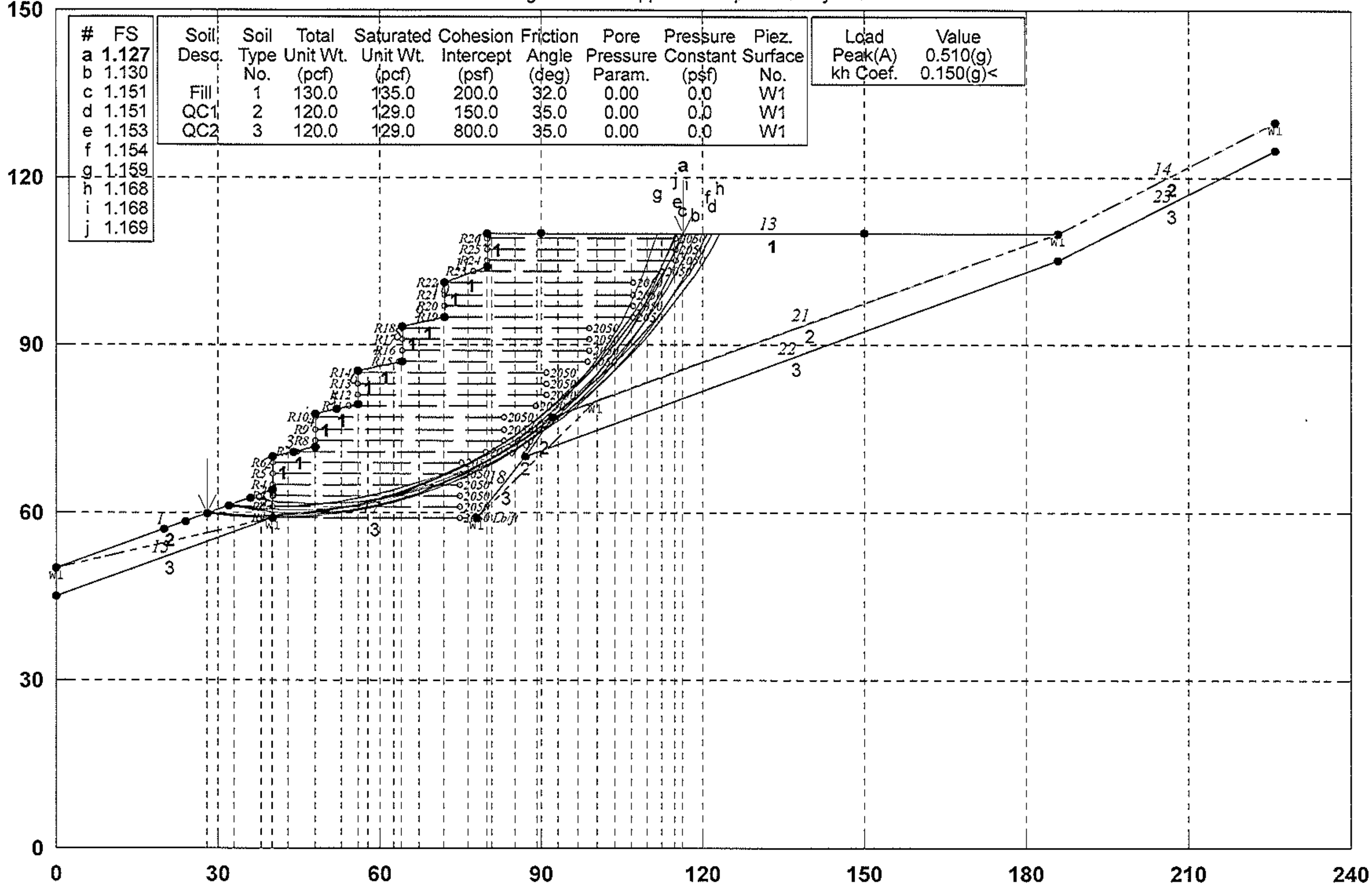
Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.980	59.350
3	37.980	59.333
4	42.962	59.750
5	47.890	60.596
6	52.726	61.866
7	57.434	63.550
8	61.978	65.636
9	66.325	68.108
10	70.441	70.946
11	74.295	74.131
12	77.860	77.637
13	81.107	81.440
14	84.012	85.509
15	86.555	89.814
16	88.714	94.324
17	90.475	99.003
18	91.824	103.818
19	92.751	108.731
20	92.878	110.000

Factor of Safety
*** 1.555 ***

**** END OF GSTABL7 OUTPUT ****

Upper Road Land Division - Seismic 35' long UX1600 geogrid @ 2' vert o.c.

c:\gstabl7 data\upperroad2s.pl2 Run By: HG



GSTABL7 v.2 FSmin=1.127

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

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                          ***  GSTABL7  ***
          ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **
   ** Original Version 1.0, January 1996; Current Ver. 2.005.2, Jan. 2011 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
Analysis Run Date:
Time of Run:
Run By:                    HG
Input Data Filename:       C:\GSTABL7 DATA\upperroad2s.
Output Filename:           C:\GSTABL7 DATA\upperroad2s.OUT
Unit System:               English
Plotted Output Filename:   C:\GSTABL7 DATA\upperroad2s.PLT
PROBLEM DESCRIPTION:  Upper Road Land Division - Seismic
                      35' long UX1600 geogrid @ 2' vert o.c.
BOUNDARY COORDINATES
   14 Top   Boundaries
   23 Total Boundaries
Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
   No.        (ft)       (ft)        (ft)        (ft)      Below Bnd
```

1	0.00	50.00	40.00	64.00	2
2	40.00	64.00	40.01	70.00	1
3	40.01	70.00	48.00	71.70	1
4	48.00	71.70	48.01	77.70	1
5	48.01	77.70	56.00	79.40	1
6	56.00	79.40	56.01	85.40	1
7	56.01	85.40	64.00	87.10	1
8	64.00	87.10	64.01	93.10	1
9	64.01	93.10	72.00	95.00	1
10	72.00	95.00	72.01	101.00	1
11	72.01	101.00	80.00	104.00	1
12	80.00	104.00	80.01	110.00	1
13	80.01	110.00	186.00	110.00	1
14	186.00	110.00	226.00	130.00	2
15	0.00	45.00	40.00	59.00	3
16	40.00	64.00	40.10	59.00	2
17	40.10	59.00	78.00	59.00	3
18	78.00	59.00	87.00	70.00	3
19	87.00	70.00	87.00	70.00	2
20	87.00	70.00	92.10	77.00	2
21	92.10	77.00	186.00	110.00	2
22	87.00	70.00	186.00	105.00	3
23	186.00	105.00	226.00	125.00	3

Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	130.0	135.0	200.0	32.0	0.00	0.0	1
2	120.0	129.0	150.0	35.0	0.00	0.0	1
3	120.0	129.0	800.0	35.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 6 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	50.00
2	40.00	59.00
3	78.00	59.00
4	100.00	80.00
5	186.00	110.00
6	226.00	130.00

Specified Peak Ground Acceleration Coefficient (A) = 0.510(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000

REINFORCING LAYER(S)

26 REINFORCING LAYER(S) SPECIFIED

REINFORCING LAYER NO. 1

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	59.00	2050.00	0.000
2	75.00	59.00	2050.00	0.000

REINFORCING LAYER NO. 2

2 POINTS DEFINE THIS LAYER

POINT NO.	X-COORD	Y-COORD	FORCE	INCLINATION FACTOR
1	40.00	61.00	2050.00	0.000
2	75.00	61.00	2050.00	0.000

REINFORCING LAYER NO. 3

2 POINTS DEFINE THIS LAYER

POINT	X-COORD	Y-COORD	FORCE	INCLINATION

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     NO.                                          FACTOR
      1        40.00      63.00   2050.00        0.000
      2        75.00      63.00   2050.00        0.000
REINFORCING LAYER NO.   4
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        40.00      65.00   2050.00        0.000
      2        75.00      65.00   2050.00        0.000
REINFORCING LAYER NO.   5
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        40.00      67.00   2050.00        0.000
      2        75.00      67.00   2050.00        0.000
REINFORCING LAYER NO.   6
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        40.01      69.00   2050.00        0.000
      2        75.01      69.00   2050.00        0.000
REINFORCING LAYER NO.   7
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        44.71      71.00   2050.00        0.000
      2        79.71      71.00   2050.00        0.000
REINFORCING LAYER NO.   8
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        48.00      73.00   2050.00        0.000
      2        83.00      73.00   2050.00        0.000
REINFORCING LAYER NO.   9
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        48.01      75.00   2050.00        0.000
      2        83.01      75.00   2050.00        0.000
REINFORCING LAYER NO.  10
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        48.01      77.00   2050.00        0.000
      2        83.01      77.00   2050.00        0.000
REINFORCING LAYER NO.  11
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        54.12      79.00   2050.00        0.000
      2        89.12      79.00   2050.00        0.000
REINFORCING LAYER NO.  12
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        56.00      81.00   2050.00        0.000
      2        91.00      81.00   2050.00        0.000
REINFORCING LAYER NO.  13
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
      1        56.01      83.00   2050.00        0.000
      2        91.01      83.00   2050.00        0.000
REINFORCING LAYER NO.  14
  2 POINTS DEFINE THIS LAYER
    POINT      X-COORD    Y-COORD    FORCE    INCLINATION
     NO.                                          FACTOR
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       1        56.01     85.00   2050.00     0.000
       2        91.01     85.00   2050.00     0.000
REINFORCING LAYER NO.  15
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        63.53     87.00   2050.00     0.000
       2        98.53     87.00   2050.00     0.000
REINFORCING LAYER NO.  16
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        64.00     89.00   2050.00     0.000
       2        99.00     89.00   2050.00     0.000
REINFORCING LAYER NO.  17
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        64.01     91.00   2050.00     0.000
       2        99.01     91.00   2050.00     0.000
REINFORCING LAYER NO.  18
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        64.01     93.00   2050.00     0.000
       2        99.01     93.00   2050.00     0.000
REINFORCING LAYER NO.  19
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        72.00     95.00   2050.00     0.000
       2       107.00     95.00   2050.00     0.000
REINFORCING LAYER NO.  20
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        72.00     97.00   2050.00     0.000
       2       107.00     97.00   2050.00     0.000
REINFORCING LAYER NO.  21
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        72.01     99.00   2050.00     0.000
       2       107.01     99.00   2050.00     0.000
REINFORCING LAYER NO.  22
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        72.01    101.00   2050.00     0.000
       2       107.01    101.00   2050.00     0.000
REINFORCING LAYER NO.  23
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        77.34    103.00   2050.00     0.000
       2       112.34    103.00   2050.00     0.000
REINFORCING LAYER NO.  24
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        80.00    105.00   2050.00     0.000
       2       115.00    105.00   2050.00     0.000
REINFORCING LAYER NO.  25
  2 POINTS DEFINE THIS LAYER
     POINT     X-COORD   Y-COORD   FORCE   INCLINATION
      NO.                                    FACTOR
       1        80.00    107.00   2050.00     0.000
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        2        115.00    107.00   2050.00     0.000
 REINFORCING LAYER NO.  26
   2 POINTS DEFINE THIS LAYER
      POINT      X-COORD   Y-COORD   FORCE   INCLINATION
       NO.                                     FACTOR
        1         80.01    109.00   2050.00     0.000
        2        115.01    109.00   2050.00     0.000
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 Janbus Empirical Coef. is being used for the case of  c & phi both > 0
 5000 Trial Surfaces Have Been Generated.
  500 Surface(s) Initiate(s) From Each Of    10 Points Equally Spaced
 Along The Ground Surface Between  X =  20.00(ft)
                              and  X =  56.00(ft)
 Each Surface Terminates Between   X =  90.00(ft)
                              and  X = 150.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  5.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Simplified Janbu Method * *
       Total Number of Trial Surfaces Attempted =  5000
       Number of Trial Surfaces With Valid FS = 5000
       Statistical Data On All Valid FS Values:
          FS Max =   2.943   FS Min =   1.127   FS Ave =   1.828
          Standard Deviation =    0.403   Coefficient of Variation =   22.07 %
       Failure Surface Specified By 23 Coordinate Points
         Point       X-Surf       Y-Surf
          No.         (ft)         (ft)
           1         28.000       59.800
           2         32.987       59.446
           3         37.987       59.376
           4         42.982       59.589
           5         47.958       60.084
           6         52.897       60.862
           7         57.784       61.917
           8         62.604       63.249
           9         67.340       64.851
          10         71.978       66.719
          11         76.503       68.847
          12         80.899       71.228
          13         85.154       73.854
          14         89.253       76.718
          15         93.183       79.809
          16         96.931       83.118
          17        100.486       86.634
          18        103.836       90.346
          19        106.970       94.242
          20        109.878       98.310
          21        112.551      102.535
          22        114.980      106.905
          23        116.477      110.000
              Factor of Safety
             ***    1.127   ***
            Individual data on the    35  slices
```

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	628.2	0.0	0.0	0.	0.	94.2	0.0	0.0
2	5.0	1805.6	0.0	0.0	0.	0.	270.8	0.0	0.0
3	2.0	1021.6	0.0	0.0	0.	0.	153.2	0.0	0.0
4	0.0	9.4	0.0	0.0	0.	0.	1.4	0.0	0.0
5	0.1	109.0	0.0	0.0	0.	0.	16.3	0.0	0.0
6	2.9	4059.2	0.0	0.0	0.	0.	608.9	0.0	0.0

7	5.0	7325.1	0.0	0.0	0.	0.	1098.8	0.0	0.0
8	0.0	63.7	0.0	0.0	0.	0.	9.6	0.0	0.0
9	0.0	19.0	0.0	0.0	0.	0.	2.8	0.0	0.0
10	4.9	11272.2	0.0	0.0	0.	0.	1690.8	0.0	0.0
11	3.1	7209.8	0.0	0.0	0.	0.	1081.5	0.0	0.0
12	0.0	27.1	0.0	0.0	0.	0.	4.1	0.0	0.0
13	1.8	5504.2	0.0	0.0	0.	0.	825.6	0.0	0.0
14	4.8	14853.6	0.0	0.0	0.	0.	2228.0	0.0	0.0
15	1.4	4259.3	0.0	0.0	0.	0.	638.9	0.0	0.0
16	0.0	34.3	0.0	0.0	0.	0.	5.1	0.0	0.0
17	3.3	12645.0	0.0	0.0	0.	0.	1896.7	0.0	0.0
18	4.6	17279.0	0.0	0.0	0.	0.	2591.9	0.0	0.0
19	0.0	80.6	0.0	0.0	0.	0.	12.1	0.0	0.0
20	0.0	40.7	0.0	0.0	0.	0.	6.1	0.0	0.0
21	4.5	19888.3	0.0	0.0	0.	0.	2983.3	0.0	0.0
22	3.5	15253.6	0.0	0.0	0.	0.	2288.0	0.0	0.0
23	0.0	47.1	0.0	0.0	0.	0.	7.1	0.0	0.0
24	0.9	4510.0	0.0	0.0	0.	0.	676.5	0.0	0.0
25	4.3	20718.3	0.0	0.0	0.	0.	3107.8	0.0	0.0
26	4.1	18497.3	0.0	0.0	0.	0.	2774.6	0.0	0.0
27	3.9	16214.0	0.0	0.0	0.	0.	2432.1	0.0	0.0
28	3.7	13905.6	0.0	0.0	0.	0.	2085.8	0.0	0.0
29	3.6	11610.3	0.0	0.0	0.	0.	1741.6	0.0	0.0
30	3.3	9366.9	0.0	0.0	0.	0.	1405.0	0.0	0.0
31	3.1	7213.6	0.0	0.0	0.	0.	1082.0	0.0	0.0
32	2.9	5188.4	0.0	0.0	0.	0.	778.3	0.0	0.0
33	2.7	3327.9	0.0	0.0	0.	0.	499.2	0.0	0.0
34	2.4	1667.2	0.0	0.0	0.	0.	250.1	0.0	0.0
35	1.5	301.1	0.0	0.0	0.	0.	45.2	0.0	0.0

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.974	59.289
3	37.969	59.065
4	42.968	59.127
5	47.956	59.476
6	52.916	60.111
7	57.831	61.029
8	62.685	62.227
9	67.463	63.702
10	72.148	65.448
11	76.725	67.460
12	81.180	69.731
13	85.496	72.254
14	89.661	75.020
15	93.661	78.021
16	97.482	81.246
17	101.111	84.685
18	104.538	88.327
19	107.750	92.158
20	110.736	96.168
21	113.488	100.343
22	115.996	104.668
23	118.252	109.130
24	118.631	110.000

Factor of Safety
*** 1.130 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.964	60.600
3	41.956	60.322
4	46.956	60.366
5	51.942	60.733
6	56.895	61.421

7	61.793	62.426
8	66.615	63.746
9	71.343	65.375
10	75.955	67.305
11	80.434	69.528
12	84.759	72.036
13	88.914	74.818
14	92.880	77.862
15	96.642	81.156
16	100.184	84.685
17	103.490	88.436
18	106.548	92.392
19	109.343	96.538
20	111.866	100.855
21	114.104	105.326
22	116.050	109.932
23	116.074	110.000

Factor of Safety
*** 1.151 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.995	60.986
3	41.995	61.034
4	46.986	61.345
5	51.953	61.918
6	56.883	62.750
7	61.763	63.840
8	66.578	65.185
9	71.317	66.780
10	75.965	68.622
11	80.510	70.706
12	84.940	73.025
13	89.242	75.574
14	93.404	78.345
15	97.414	81.330
16	101.263	84.522
17	104.939	87.912
18	108.431	91.490
19	111.731	95.246
20	114.830	99.170
21	117.718	103.252
22	120.388	107.479
23	121.800	110.000

Factor of Safety
*** 1.151 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.983	59.394
3	37.982	59.281
4	42.979	59.461
5	47.957	59.934
6	52.898	60.697
7	57.786	61.749
8	62.604	63.086
9	67.335	64.703
10	71.964	66.594
11	76.474	68.753
12	80.849	71.173
13	85.075	73.845
14	89.137	76.761
15	93.021	79.909
16	96.714	83.280
17	100.204	86.861

18	103.477	90.641
19	106.523	94.606
20	109.331	98.743
21	111.892	103.037
22	114.197	107.474
23	115.326	110.000

Factor of Safety
*** 1.153 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.000	59.800
2	32.971	59.263
3	37.964	59.005
4	42.964	59.026
5	47.955	59.327
6	52.922	59.905
7	57.848	60.761
8	62.719	61.890
9	67.519	63.289
10	72.234	64.955
11	76.848	66.881
12	81.347	69.062
13	85.717	71.491
14	89.945	74.160
15	94.018	77.061
16	97.921	80.185
17	101.645	83.523
18	105.176	87.063
19	108.503	90.794
20	111.617	94.706
21	114.508	98.786
22	117.166	103.021
23	119.584	107.398
24	120.837	110.000

Factor of Safety
*** 1.154 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.936	60.406
3	41.918	59.972
4	46.917	59.903
5	51.909	60.197
6	56.865	60.853
7	61.761	61.869
8	66.570	63.238
9	71.267	64.953
10	75.826	67.005
11	80.224	69.384
12	84.437	72.076
13	88.444	75.067
14	92.222	78.342
15	95.752	81.884
16	99.014	85.672
17	101.993	89.688
18	104.671	93.910
19	107.036	98.316
20	109.073	102.882
21	110.773	107.584
22	111.452	110.000

Factor of Safety
*** 1.159 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	28.000	59.800
2	32.991	59.496
3	37.990	59.443
4	42.987	59.641
5	47.966	60.090
6	52.917	60.788
7	57.827	61.734
8	62.683	62.925
9	67.473	64.358
10	72.186	66.030
11	76.808	67.936
12	81.329	70.072
13	85.737	72.432
14	90.021	75.010
15	94.170	77.800
16	98.174	80.795
17	102.022	83.987
18	105.706	87.368
19	109.215	90.930
20	112.541	94.664
21	115.675	98.559
22	118.610	102.608
23	121.337	106.798
24	123.200	110.000

Factor of Safety
*** 1.168 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	36.000	62.600
2	40.953	61.917
3	45.941	61.575
4	50.941	61.576
5	55.930	61.920
6	60.882	62.605
7	65.777	63.627
8	70.589	64.983
9	75.298	66.666
10	79.880	68.668
11	84.314	70.979
12	88.579	73.588
13	92.655	76.484
14	96.523	79.652
15	100.164	83.078
16	103.563	86.746
17	106.701	90.638
18	109.566	94.736
19	112.143	99.021
20	114.420	103.472
21	116.386	108.069
22	117.060	110.000

Factor of Safety
*** 1.168 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	32.000	61.200
2	36.940	60.429
3	41.922	59.998
4	46.921	59.911
5	51.914	60.167
6	56.878	60.765
7	61.790	61.703
8	66.625	62.976
9	71.361	64.577
10	75.977	66.501
11	80.449	68.736

12	84.757	71.273
13	88.881	74.101
14	92.802	77.204
15	96.499	80.570
16	99.957	84.181
17	103.159	88.022
18	106.090	92.073
19	108.735	96.316
20	111.083	100.730
21	113.122	105.295
22	114.843	109.990
23	114.846	110.000

Factor of Safety
*** 1.169 ***
**** END OF GSTABL7 OUTPUT ****