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JULIE DOLE
RECORDER, SALT LAKE COUNTY, UTAH
COTTONWOOD HGHTS CITY RECORDER
2277 EAST BENGAL BLVD
COTTONWOOD HGHTS UT 84121
BY: EEP, DEPUTY - WI 160 P.

When recorded, mail to:

Cottonwood Heights City Recorder
2277 East Bengal Boulevard
Cottonwood Heights, UT 84121

Affects Lots / Parcel No(s): Giverny Planned Unit Development, lots 101-102, 201-209, 211-213, 314-320, 326-328, 411-416 (*See Attached Exhibit B for Parcel Numbers*)

NOTICE OF DEFORMATION AND STRUCTURAL ENGINEERING REQUIREMENTS

NOTICE IS HEREBY GIVEN that a slope stability assessment, and subsequent updates, performed by the developer of the Giverny Planned Unit Development (the "*Project*") in 2014 determined that settlement from seismic deformation of up to four inches (4.0") may occur on lots 101, 102, 201-209 (inclusive), 211-213 (inclusive), 314-320 (inclusive), 326-328 (inclusive) and 411-416 (inclusive) (singly, a "*Lot,*" and collectively, the "*Lots*") of the Project.

Experts have determined that an earthquake or other seismic event could trigger slope movement and/or potential landslide resulting in up to four inches (4.0") of deformation below proposed structures on the Lots. After such an occurrence, the owner of an affected Lot may not occupy any structure on that Lot until such owner, at its sole cost, performs mitigation to restore the slope and structure to bring it into compliance with the requirements of the code of ordinances ("*Code*") of the city of Cottonwood Heights ("*City*"). If the structure and slope on a Lot cannot be restored to meet Code requirements following such an event, City may require the structure to be abandoned.

City requires all structures to be designed and built to protect life and safety during a seismic event. Code Chapter 19.72, Appendix C, Section 12.3 provides that "calculated seismic displacements shall be 15 centimeters [approximately 5.9 inches] or less." City requires that a structure engineer who is experienced in the design of structures to withstand the anticipated seismic deformation anticipated in the case of a seismic event affecting the Lots shall be used to perform structural calculations and develop a design to mitigate the anticipated deformation on a Lot before construction may commence on that Lot.

All structural designs shall specifically account for the anticipated deformation and be stamped by a licensed structural engineer in the State of Utah and who has specific expertise in seismic deformation values that are expected for the slope(s) on or abutting the Lots (the "*Slope*"), as represented in the slope stability geotechnical reports by Applied Geotechnical Engineering Consultants ("AGEC"). See the AGEC report attached hereto as Exhibit A for specific recommendations for the foundation wall depths and setback requirements.

An individual stamped site plan (that meets City requirements) shall be submitted for each Lot, which shall address the geotechnical recommendations, utility mitigation and storm water drainage issues affect that Lot. No storm water shall be discharged onto the Slope. All roof surface

drainage shall be directed toward the street and away from the Slope. The site plan shall include a plan to prevent utility breaks, hoses or landscape irrigation from impacting the Slope. The Slope shall be maintained to prevent erosion, including stabilization and revegetation after brush fires or other events affecting the Slope.

Attachments:

Exhibit A: Applied Geotechnical Engineering Consultants Slope Stability Geotechnical Report and Updates

Exhibit B: Parcel Numbers for Lots

EXHIBIT "A" TO NOTICE OF DEFORMATION AND STRUCTURAL ENGINEERING REQUIREMENTS

(See Attached Applied Geotechnical Engineering Consultants
Slope Stability Geotechnical Report and All Updates)

EXHIBIT "B" TO NOTICE OF DEFORMATION AND STRUCTURAL ENGINEERING REQUIREMENTS

The following lots of the Giverny Planned Unit Development, according to the official plat thereof on file and of record in the office of the Recorder of Salt Lake County, Utah:

LOT	PARCEL #
101	28-02-426-014
102	28-02-426-015
201	28-02-426-016
202	28-02-426-017
203	28-02-426-018
204	28-02-426-019
205	28-02-426-020
206	28-02-426-021
207	28-02-426-022
208	28-02-426-023
209	28-02-426-024
211	28-02-431-002
212	28-02-431-003
213	28-02-431-004
314	28-02-477-011
315	28-02-477-010
316	28-02-477-009
317	28-02-477-008
318	28-02-477-007
319	28-02-477-006
320	28-02-479-015
326	28-02-480-002
327	28-02-480-003
328	28-02-480-004
411	28-02-479-001
412	28-02-477-005
413	28-02-477-004
414	28-02-477-003
415	28-02-477-002
416	28-02-430-008

AGEC

Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED GIVERNY RESIDENTIAL DEVELOPMENT

9180 SOUTH WASATCH BOULEVARD

COTTONWOOD HEIGHTS, UTAH

PREPARED FOR:

GIVERNY, LLC
111 EAST BROADWAY, SUITE 900
SALT LAKE CITY, UTAH 84111

ATTENTION: DADE ROSE

PROJECT NO. 1140572 **REVISED JULY 30, 2014**

600 West Sandy Parkway • Sandy, Utah 84070 • (801) 566-6399 • FAX (801) 566-6493

EXECUTIVE SUMMARY

1. Approximately ½ foot of topsoil was encountered in Test Pits TP-1, TP-2, TP-3 and TP-5 and approximately 1 foot of fill was encountered in TP-4. The topsoil and fill are underlain by sand. Silt was encountered below the sand in TP-1 at a depth of approximately 10 feet and extended the full depth of the test pit, approximately 14 feet. Gravel was encountered below the sand in TP-2 and the full depth of TP-6, approximately 4 feet where practical excavation refusal was encountered due to the large particle sizes. Silt layers, approximately 2 and 5 feet thick, were encountered in TP-4 and TP-5 at depths of approximately 8 and 6 feet, respectively.

2. No subsurface water was encountered in the test pits at the time of excavation.

3. Gravel with cobbles and boulders was encountered in Test Pit TP-6. Heavy-duty excavation equipment will likely be needed for excavations in the southeast portion of the site, particularly for confined excavations such as for utility trenches.

4. Potentially moisture-sensitive soil was encountered in the northern approximately one-third of the site. The moisture-sensitive soil should be removed from below proposed building areas. A representative of AGEC should observe foundation excavations in the area of potentially moisture-sensitive soil.

5. The proposed residences may be supported on spread footings bearing on the undisturbed natural, non-moisture-sensitive soil or on compacted structural fill extending down to the undisturbed natural, non-moisture-sensitive soil. Spread footings may be designed using an allowable net bearing pressure of 2,000 pounds per square foot (psf). Footings bearing on at least 2 feet of compacted structural fill or at least 2 feet of the natural undisturbed gravel may be designed for a net allowable bearing pressure of 3,500 psf.

6. There are moderate to steep slopes, typically ranging from 1 ½ to 2 horizontal to 1 vertical, along the west edge of the property. Houses should be set back from the slope as indicated in the text of this report unless the stability of the slope is evaluated through additional field and laboratory testing and engineering analysis and it is determined that a lesser setback would be suitable.

7. Geotechnical information related to foundations, subgrade preparation, pavement design and materials is included in the report.

Vegetation at the site consists of weeds, grass and some trees.

The northern and central portions of the site are relatively flat and slope gently down to the north. The ground surface slopes up to a hill located in the southeast corner of the site. The site slopes moderately down from the hill located in the southeast corner to Wasatch Boulevard. The western edge of the site slopes moderately to steeply down to the west with a typical slope ranging from 1½ to 2 horizontal to 1 vertical. Profiles of the slope can be provided by the engineer prior to recording of the final plat.

The site is bordered on the north by single-family, residential properties. Wasatch Boulevard, a two-lane, asphalt-paved road and residential properties are to the east. There is undeveloped property to the south and a water treatment plant to the northwest. Cottonwood Creek is to the southwest and there is residential property beyond the creek.

FIELD STUDY

The field study was conducted on July 10, 2014. Six test pits were excavated at the approximate locations indicated on Figure 1 using a rubber-tired backhoe. The test pits were logged and soil samples obtained by an engineer from AGEC. Logs of the subsurface conditions encountered in the test pits are graphically shown on Figure 2.

The test pits were backfilled without significant compaction. The backfill in the test pits should be properly compacted where it will support proposed buildings, floor slabs or pavement.

SUBSURFACE CONDITIONS

Approximately ½ foot of topsoil was encountered in Test Pits TP-1, TP-2, TP-3 and TP-5 and approximately 1 foot of fill was encountered in TP-4. The topsoil and fill are underlain

Poorly-Graded Gravel with Sand - The gravel contains cobbles and boulders up to approximately 2 feet in size. It is medium dense to dense, dry and brown to gray.

Results of the laboratory tests are summarized on Table I and are included on the logs of the test pits.

SUBSURFACE WATER

No subsurface water was encountered in the test pits at the time of excavation. Fluctuations in subsurface water level at the site will occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand that the site encompasses approximately 40 acres and will be subdivided for residential building lots. We anticipate that the residences will be one to three-story, wood-frame structures with basements.

We have assumed building loads consisting of wall loads up to 3 kips per lineal foot and column loads up to 50 kips.

Roads are planned to extend through the proposed subdivision. We have assumed traffic for roads consisting of 1,000 cars, two delivery trucks and two school buses per day and two garbage trucks per week.

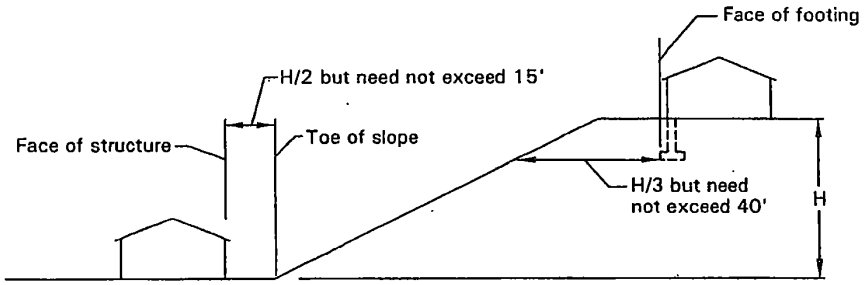
If the proposed construction, building loads or anticipated traffic is significantly different from what is described above, we should be notified so that we can reevaluate the recommendations given.

Good surface drainage should be provided up slope of cut and fill slopes to direct surface runoff away from the face of the slopes. The slopes should be protected from erosion by revegetation or other methods.

The grade should not be raised at the top, or within 30 feet, of the crest of existing slopes without a slope stability analysis.

4. Building Setback From Slopes

Foundations should be setback from slopes steeper than 3 horizontal to 1 vertical. The minimum setback distance is indicated below. Lesser setbacks may be considered on an individual basis but would require slope stability analysis.



5. Materials

Listed below are materials recommended for imported structural fill.

Fill to Support	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

Fill and pavement materials placed for the project should be frequently tested for compaction.

7. Drainage

The ground surface surrounding the proposed buildings should be sloped away from the buildings in all directions. Roof downspouts and drains should discharge beyond the limits of backfill.

The collection and diversion of drainage away from the pavement surface is important to the satisfactory performance of the pavement section. Proper drainage should be provided.

B. Foundations

1. Bearing Material

With the proposed construction and the subsurface conditions encountered, the proposed buildings may be supported on spread footings bearing on the undisturbed natural, non-moisture-sensitive soil or on compacted structural fill extending down to the undisturbed natural, non-moisture-sensitive soil. Structural fill placed below footings should extend out away from the edge of the footings at least a distance equal to the depth of fill beneath footings.

Topsoil, organics, debris, unsuitable fill, moisture-sensitive soil and other deleterious material should be removed from below proposed foundations.

2. Bearing Pressure

Spread footings bearing on the natural undisturbed soil or on compacted structural fill may be designed for an allowable net bearing pressure of 2,000 psf. Footings bearing on at least 2 feet of compacted structural fill or at least 2 feet of the natural undisturbed soil may be designed for a net allowable bearing pressure of 3,500 psf.

2. Underslab Sand and/or Gravel

Free-draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) may be considered for use below slabs for ease of construction and to promote even curing of the slab concrete. The natural sand and gravel may meet this criteria.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings placed on the natural soil or on compacted structural fill is controlled by sliding resistance between the footing and the foundation soils. A friction value of 0.4 may be used in design for ultimate lateral resistance.

2. Subgrade Walls and Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. The values listed below assume a horizontal surface adjacent the wall.

Soil Type	Active	At-Rest	Passive
Clay & Silt	50 pcf	65 pcf	250 pcf
Sand & Gravel	40 pcf	55 pcf	300 pcf

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weight should be increased by 36 pcf for active condition and 21 pcf for the at-rest condition and decreased by 36 pcf for the passive condition. This assumes a peak ground acceleration

liquefaction potential decreases with an increase in fines content and density. Based on our understanding of the geologic conditions at the site and the subsurface soils encountered to the depth investigated, liquefaction is not considered a potential hazard at the site.

F. Water Soluble Sulfates

One sample of the natural soil was tested in the laboratory and found to have less than 0.1 percent water soluble sulfates. Previous testing of the soil in the area has found the soil to contain negligible amounts of water soluble sulfate. Based on the results of the test, our experience in the area and published literature, the natural soil possesses negligible sulfate attack potential on concrete. No special cement type is required for concrete placed in contact with the natural soil. Other conditions may dictate the type of cement to be used in concrete for the project.

G. Subsurface Drains

In areas where silt or clay is encountered in basement excavations, consideration should be given to providing a perimeter drain around the subgrade floor portion of the residence to protect against perched groundwater. A perimeter drain system should consist of at least the following items:

1. The underdrain system should consist of perforated pipe installed in a free-draining gravel filled trench around the perimeter of the below grade floor portion of the building.

2. The flow line of the pipe should be placed at least 14 inches below the finished floor level and should slope to a sump or outlet where water can be removed by pumping or by gravity flow.

section consisting of 3 inches of asphaltic concrete overlying 6 inches of high quality base course is calculated. The base course thickness should be increased to 9 inches in areas of clay or silt subgrade except in areas where no significant truck traffic is expected. A rigid pavement section consisting of 5 inches of Portland cement concrete may be used regardless of subgrade soil type.

A pavement section consisting of 6½ inches over 4 inches of base course is recommended for dumpster approach slabs.

3. Pavement Materials and Construction

a. Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet the specifications for the applicable jurisdiction. Other materials may be considered for use in the pavement section. The use of other materials may result in the need for different pavement material thicknesses.

b. Rigid Pavement (Portland Cement Concrete)

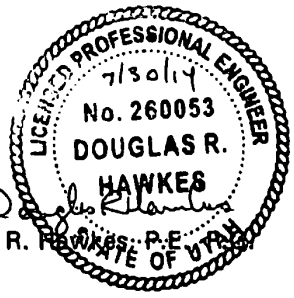
The rigid pavement thickness given above assumes that the pavement will have aggregate interlock joints and that a concrete shoulder or curb will be provided.

The pavement materials should meet the specifications for the applicable jurisdiction. The pavement thickness indicated above assumes that the concrete will have a 28-day compressive strength of 4,000 pounds per square inch. Concrete should be air entrained with approximately 6 percent air. Maximum allowable slump will depend on the method of placement but should not exceed 4 inches.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the test pits excavated at the approximate locations indicated on the site plan and the data obtained from laboratory testing. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the proposed construction, subsurface conditions or groundwater level is found to be significantly different from what is described above, we should be notified to reevaluate our recommendations.

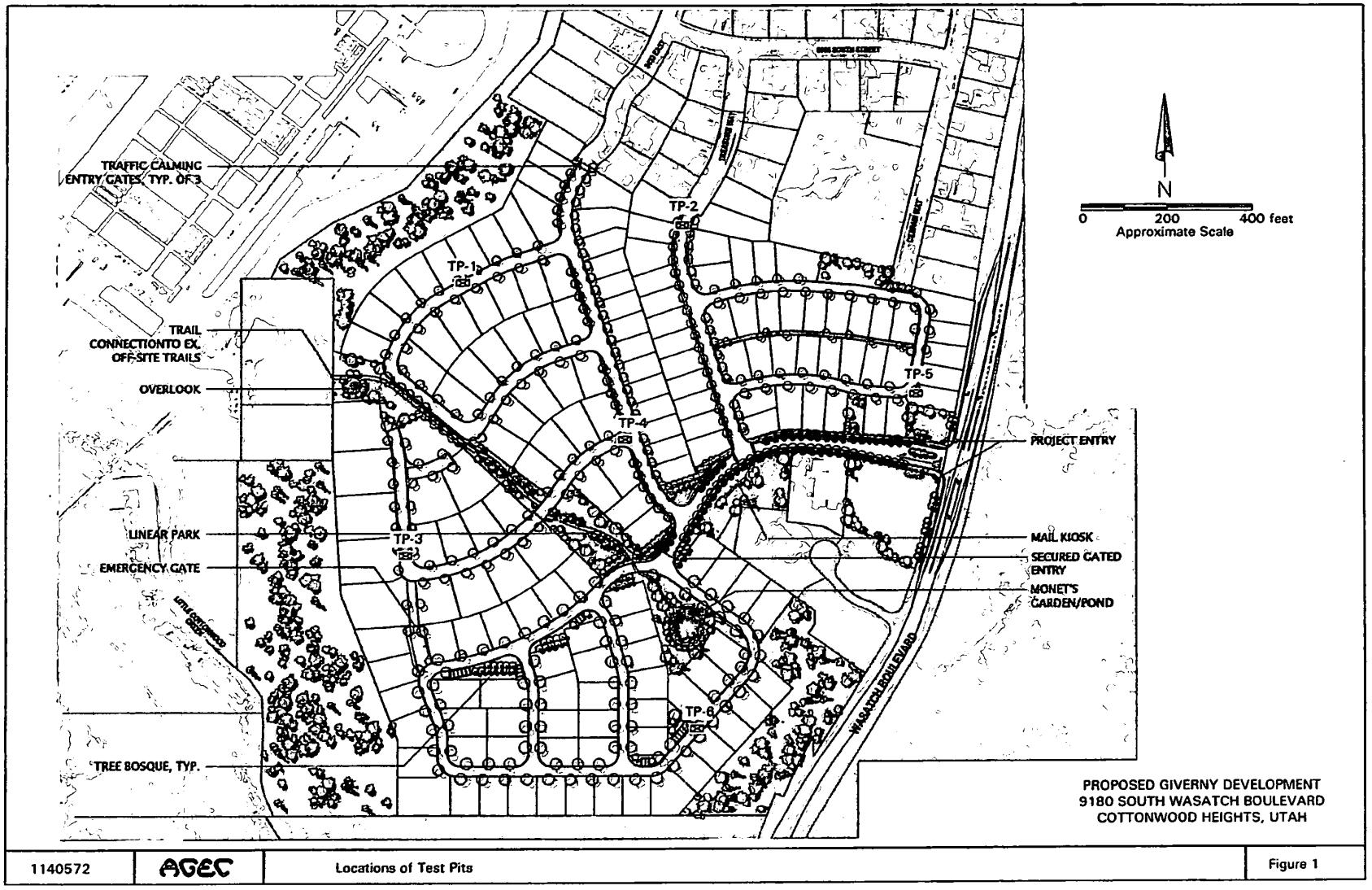
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Douglas R. Hawkes, P.E.

Reviewed by Jay R. McQuivey, P.E.

DRH/rs



1140572	AGEC	Locations of Test Pits	Figure 1

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1140572

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
TP-1	11	3	91			62					Sandy Silt
TP-4	9	13	87			78				<0.001	Silt with Sand
TP-5	7½	6	86			86					Silt

BK 10585 PG 3625

AGEC

Applied GeoTech

August 29, 2014

Giverny, LLC
111 East Broadway, Suite 900
Salt Lake City, Utah 84111

Attention: Dade Rose
EMAIL: drose@djplaw.com

Subject: Slope Stability Evaluation
Proposed Giverny Development
9180 South Wasatch Boulevard
Cottonwood Heights, Utah
Project No. 1140572

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to evaluate the stability of the slope along the west edge of the proposed Giverny residential development located at 9180 South Wasatch Boulevard in Cottonwood Heights, Utah. We previously performed a geotechnical investigation for the project and submitted our findings and recommendations in a report dated July 30, 2014 under Project No. 1140572.

SCOPE

The slope stability evaluation consisted of review of aerial photographs and geologic literature to identify potential landslides along the slope, the drilling of one boring at the crest of the slope to a depth of approximately 110 feet, development of a slope and subsurface profile and performing engineering analysis.

SITE CONDITIONS

The slope evaluated for stability is a moderately to heavily vegetated slope with grass, brush and numerous areas of trees. The slope ranges from approximately 1½ horizontal to 1 vertical to 2 horizontal to 1 vertical.

There are some erosional features that have developed in the slope near the north end of the property. Based on a review of 1952 aerial photographs (USDA Photos AAL-6K-114 and 115), these areas have experienced slope failure. These failures appear as shallow depth failures and based on the subsurface conditions encountered, we anticipate that a perched

water table on the upper silt developed when the property was heavily irrigated resulting in the erosional features. Vegetation has filled in much of the previously eroded areas since 1952 and there are no signs of the erosion problems even in the residential development to the north of the property where more numerous erosional features are apparent on the 1952 aerial photos.

FIELD STUDY

The field study for the slope stability evaluation consisted of drilling one boring to a depth of approximately 110 feet at the approximate location indicated on Figure 1. This boring was drilled using 8-inch diameter, hollow-stem auger powered by a truck-mounted drill rig. The boring was logged and soil samples obtained by an engineer from AGEC. A log of the subsurface conditions encountered in the boring is presented on Figure 2 with legend and notes on Figure 3.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in the boring consist predominantly of sand with some silt, clay and gravel layers. The silt and clay layers are horizontally bedded and the silt was found in test pits in the area indicating that these deposits are likely continuous horizontally.

A description of the various soils encountered in the boring follows:

Topsoil - The topsoil consists of silty to clayey sand with some gravel. It is dry, dark brown and contains roots and organics.

Lean Clay - The clay is stiff, moist to very moist and brown.

Silt - The silt contains a small to large amount of sand. It is stiff to very stiff, moist to very moist and brown.

Sand - The sand contains a small to moderate amount of silt and occasional silty layers. The sand contains some gravelly layers. The sand is medium dense to very dense, slightly moist to moist and brown to gray.

Gravel - The gravel contains a small amount of silt and a moderate to large amount of sand. It is very dense, slightly moist and brown to gray.

No subsurface water was encountered to the depth of the boring, approximately 110 feet.

SLOPE STABILITY EVALUATION

A profile for the slope was developed from contours shown on the site plan provided and soil layers were assigned based on the subsurface conditions encountered in the boring. Strength

parameters used in the slope stability analysis for the sand and gravel are based on the corrected N-values. Strength parameters for the silt and clay were assumed based on conservative values from experience in the area and geotechnical literature. We have assumed a friction angle of 25 degrees and a cohesion of 250 pounds per square foot for the clay and a friction angle of 30 degrees and a cohesion of 150 pounds per square foot for the silt.

The computer program Slide Version 6.0 was used to evaluate the stability of the slope using the Morgenstern-Price method. Pseudostatic analysis for the stability of the slope under seismic conditions was evaluated using a peak horizontal ground acceleration of 0.62g as obtained from the 2012 IBC data and representing a 2 percent in 50-year probability of exceedance. This peak ground acceleration was adjusted based on Blake and others (2002) for both 2-inch and 6-inch ground deformations.

Based on the results of the slope stability analysis, the slope setback recommended in the above-referenced geotechnical report results in approximately 4 inches of ground deformation for the 2012 IBC design seismic event. The safety factor for the static slope stability analysis for this same setback is greater than 1.5. Based on the results of the analyses, it is our professional opinion that the slope setback recommendations provided in the above-referenced geotechnical report are suitable for the proposed construction. Results of the slope stability analysis are included in the Appendix.

It will be important to minimize the potential for a perched water condition to develop where seeps would form in the slope as a result of the development. Methods to reduce water infiltration should be considered in planning the development.

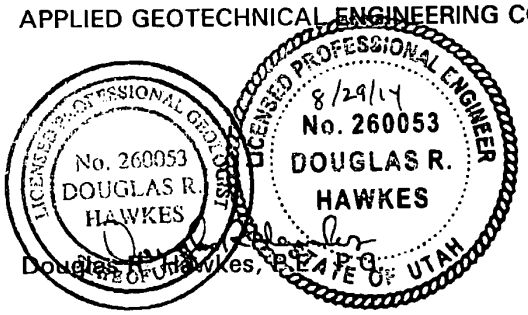
LIMITATIONS

This letter has been prepared in accordance with generally accepted geotechnical engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on subsurface conditions encountered, laboratory testing and engineering analysis as described in this letter and in the above-referenced report. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions or proposed construction is significantly different from what is described in this letter and in the above referenced report, we should be notified to reevaluate the recommendations given.

If you have questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Douglas R. Hawkes, P.E., P.G.

Reviewed by JRM, P.E.
DRH/rs

Enclosures

References

International Building Code, 2012; International Code Council, Falls Church, Virginia.

Blake, T.F, Hollingsworth, R.A. and Stewart, J.P., 2002; Recommended procedures for implementation of DMG Special Publication 117 Guidelines for analyzing and mitigating landslide hazards in California, Southern California Earthquake Center, Los Angeles, CA.

APPENDIX

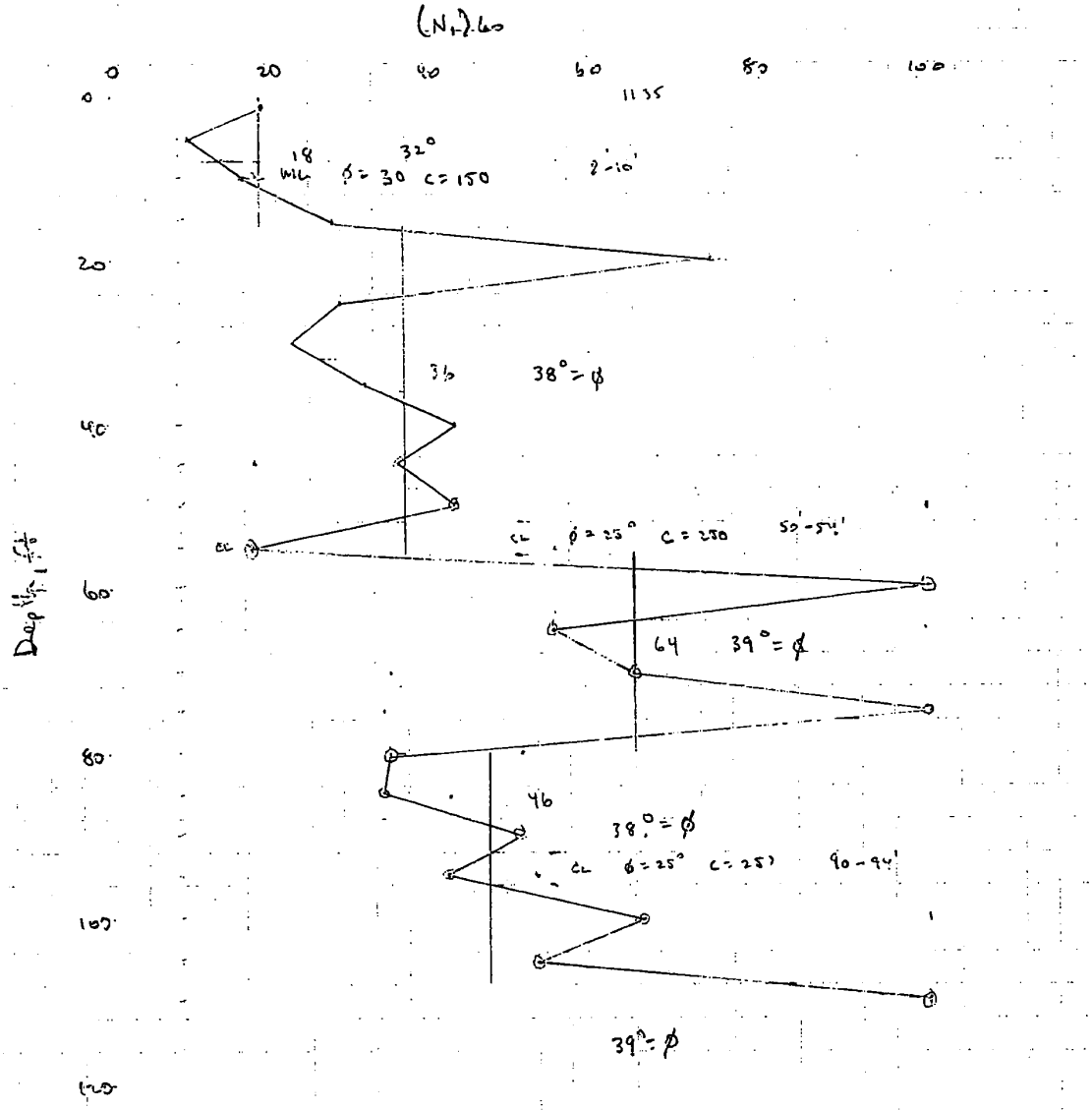
SLOPE STABILITY CALCULATIONS

Project No. 1140572

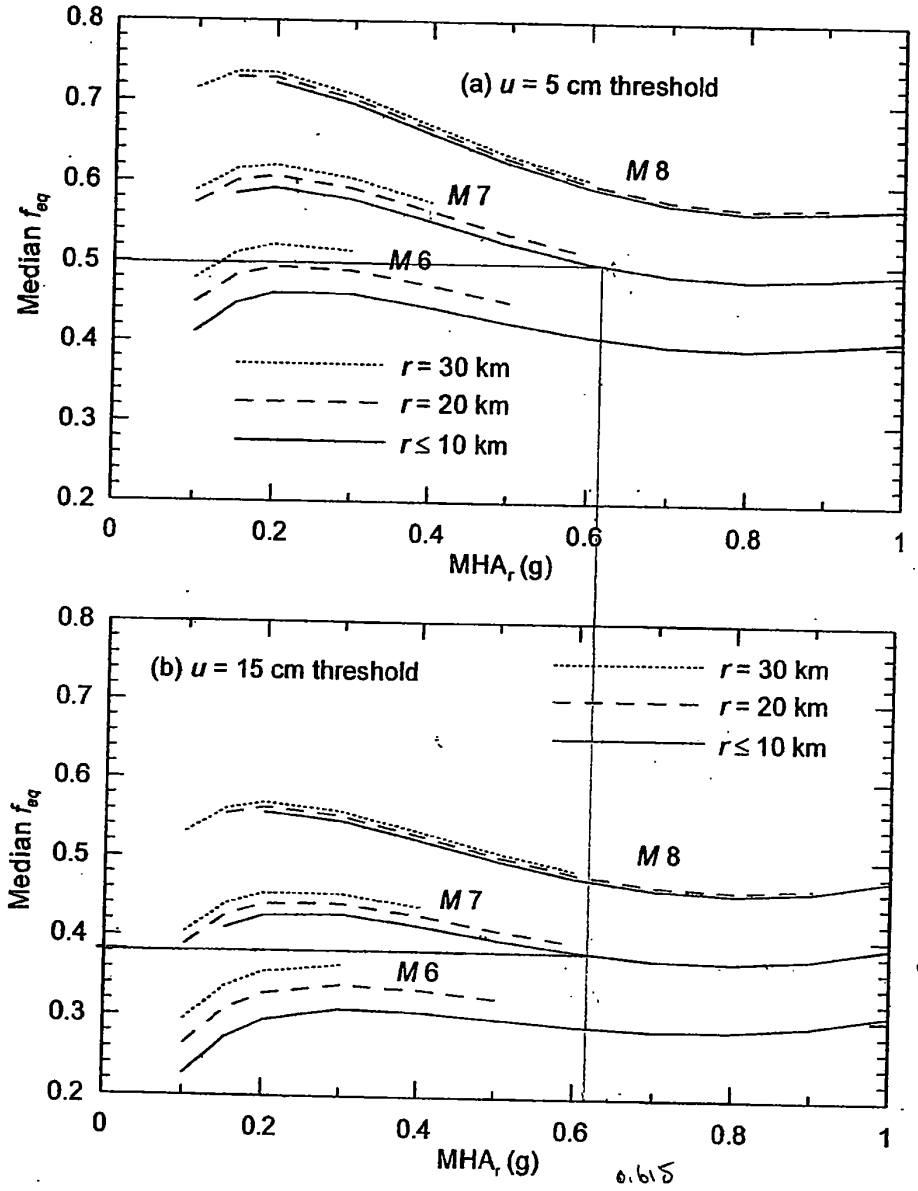
AGEC
Applied GeoTech

PROJECT NO. 114057 TITLE Gilroy DATE 8/27/14 BY DRH

SUBJECT (N1)60 vs. depth SHEET ____ OF ____



N. 40.5855 W 111.7986 PGA = 0.615 7 mag.

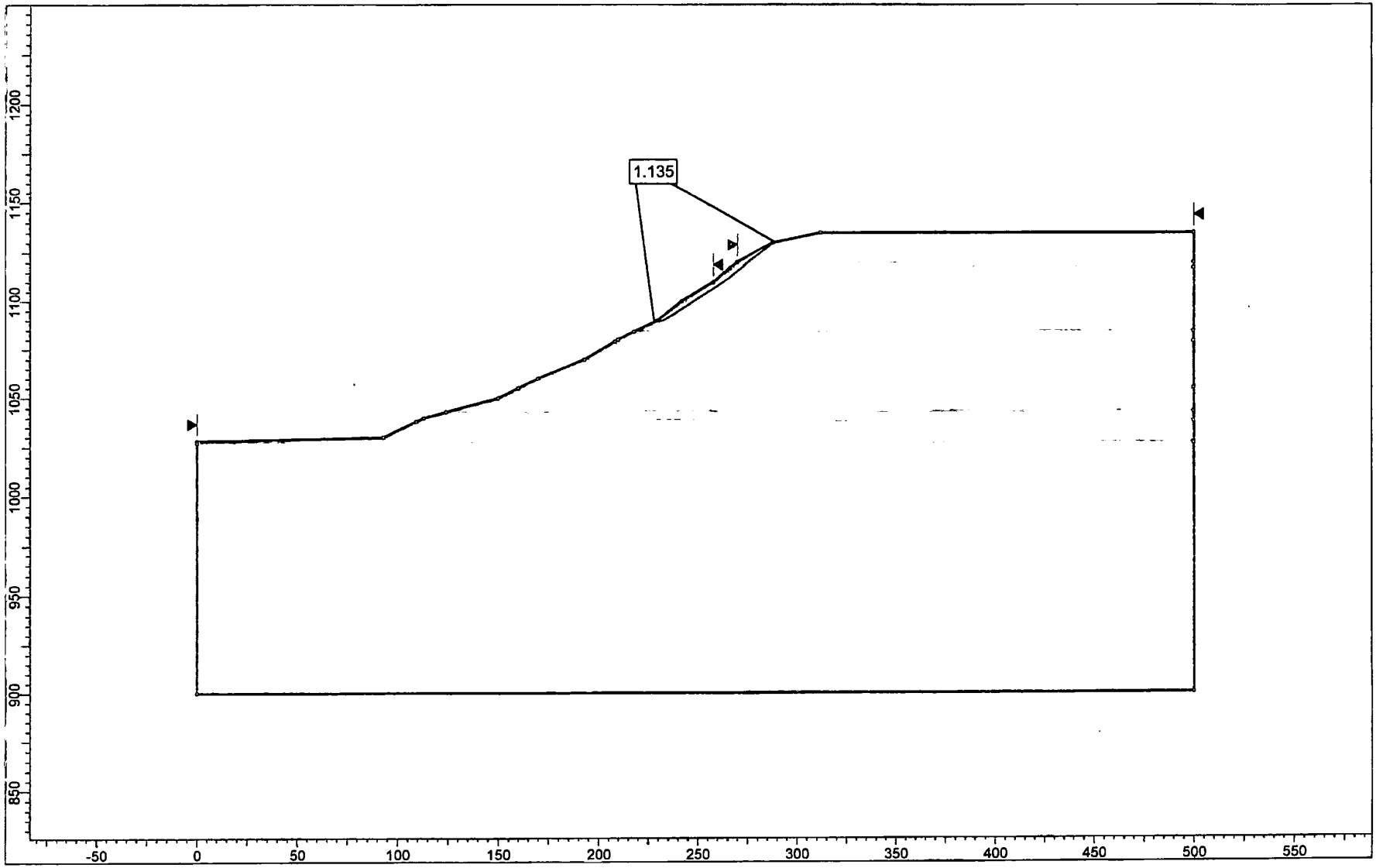


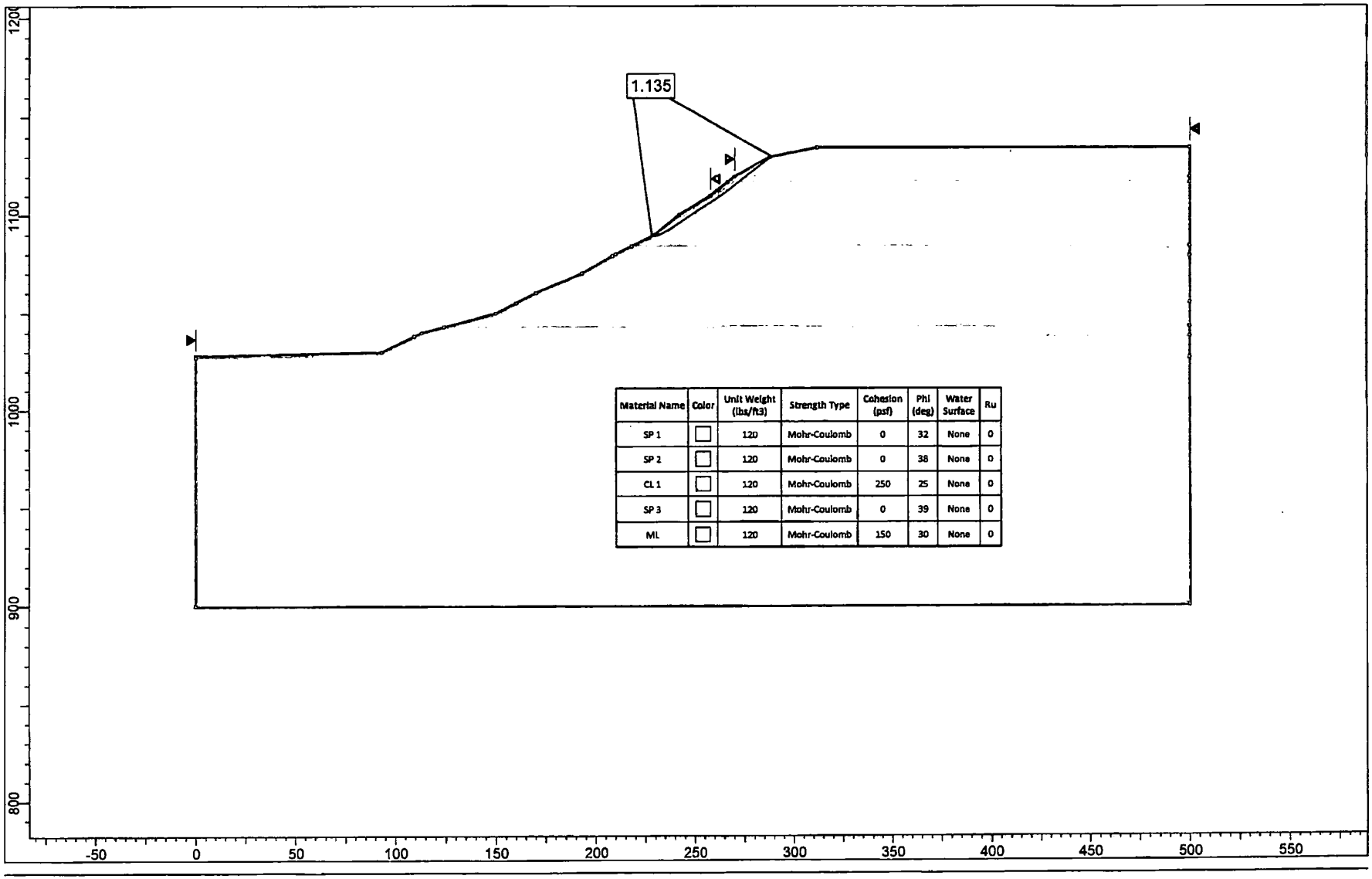
0.5 0.31g
2" deformation

0.38 0.23g
6" deformation

0.615

Figure 11.1. Required Values of f_{eq} as Function of MHA$_r$ and Seismological Condition for Threshold Displacements of (a) 5 cm and (b) 15 cm





Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP 1		120	Mohr-Coulomb	0	32	None	0
SP 2		120	Mohr-Coulomb	0	38	None	0
CL 1		120	Mohr-Coulomb	250	25	None	0
SP 3		120	Mohr-Coulomb	0	39	None	0
ML		120	Mohr-Coulomb	150	30	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140572 a
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/27/2014, 7:12:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	SP 1	SP 2	CL 1	SP 3	ML
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120
Cohesion [psf]	0	0	250	0	150
Friction Angle [deg]	32	38	25	39	30
Water Surface	None	None	None	None	None

Ru Value	0	0	0	0	0

Global Minimums

Method: gle/morgenstern-price

FS: 1.135330
Axis Location: 217.401, 1170.254
Left Slip Surface Endpoint: 228.168, 1089.084
Right Slip Surface Endpoint: 288.797, 1130.166
Resisting Moment=1.15765e+006 lb-ft
Driving Moment=1.01966e+006 lb-ft
Resisting Horizontal Force=12465 lb
Driving Horizontal Force=10979.2 lb
Total Slice Area=195.825 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
228.168	1089.08
230.688	1089.3
233.231	1090.24
237.322	1092.5
246.734	1098.93
252.062	1102.45
260.234	1107.84
263.637	1110.23
267.049	1112.8
272.324	1117.19
276.374	1120.74
288.797	1130.17

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 2029
Number of Invalid Surfaces: 2472

Error Codes:

Error Code -105 reported for 261 surfaces
Error Code -111 reported for 2 surfaces
Error Code -113 reported for 2209 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.13533

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	2.51946	167.852	SP 2	0	38	46.43	52.7134	67.4703	0	67.4703
2	2.54363	569.204	SP 2	0	38	133.027	151.03	193.309	0	193.309
3	2.0455	672.384	SP 2	0	38	175.071	198.763	254.405	0	254.405
4	2.0455	813.143	SP 2	0	38	213.66	242.575	310.482	0	310.482
5	2.35287	1066.38	SP 2	0	38	220.393	250.219	320.266	0	320.266
6	2.35287	1166.57	SP 2	0	38	239.904	272.37	348.618	0	348.618
7	2.35287	1195.91	SP 2	0	38	245.17	278.349	356.27	0	356.27

8	2.35287	1157.7	SP 2	0	38	236.836	268.887	344.159	0	344.159
9	2.66379	1273.26	SP 2	0	38	234.196	265.89	340.326	0	340.326
10	2.66379	1241.66	SP 2	0	38	227.729	258.547	330.926	0	330.926
11	2.04318	931.593	SP 2	0	38	222.534	252.65	323.377	0	323.377
12	2.04318	914.26	SP 2	0	38	217.488	246.921	316.044	0	316.044
13	2.04318	897.384	SP 2	0	38	212.395	241.138	308.642	0	308.642
14	2.04318	941.538	SP 2	0	38	221.552	251.535	321.95	0	321.95
15	3.40307	1733.45	SP 2	0	38	232.886	264.402	338.42	0	338.42
16	3.41139	1885.44	SP 2	0	38	237.901	270.096	345.708	0	345.708
17	2.63778	1501.07	SP 2	0	38	228.895	259.871	332.621	0	332.621
18	2.63778	1412.73	SP 2	0	38	216.979	246.343	315.304	0	315.304
19	3.20502	1380.04	ML	150	30	249.562	283.335	230.943	0	230.943
20	0.844713	297.58	SP 1	0	32	112.414	127.627	204.246	0	204.246
21	2.48465	759.505	SP 1	0	32	107.065	121.554	194.527	0	194.527
22	2.48465	609.067	SP 1	0	32	87.4397	99.2729	158.87	0	158.87
23	2.48465	458.629	SP 1	0	32	67.2349	76.3338	122.16	0	122.16
24	2.48465	308.19	SP 1	0	32	46.2408	52.4986	84.0154	0	84.0154
25	2.48465	144.511	SP 1	0	32	22.2071	25.2124	40.3484	0	40.3484

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.13533

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	228.168	1089.08	0	0	0
2	230.688	1089.3	102.678	11.9774	6.65349
3	233.231	1090.24	258.53	60.0822	13.0833
4	235.277	1091.37	328.871	106.11	17.8823
5	237.322	1092.5	414.718	169.735	22.2582
6	239.675	1094.11	418.969	210.819	26.7109
7	242.028	1095.71	423.596	249.762	30.5246

8	244.381	1097.32	428.326	285.824	33.7154
9	246.734	1098.93	432.894	318.213	36.319
10	249.398	1100.69	456.507	364.566	38.6108
11	252.062	1102.45	479.468	406.073	40.2621
12	254.105	1103.8	498.337	435.103	41.1245
13	256.148	1105.15	516.778	459.684	41.6537
14	258.191	1106.5	534.787	479.152	41.8593
15	260.234	1107.84	553.572	493.998	41.7452
16	263.637	1110.23	540.138	466.84	40.8368
17	267.049	1112.8	461.416	373.397	38.9812
18	269.686	1114.99	335.825	251.621	36.8428
19	272.324	1117.19	216.771	146.387	34.0314
20	275.529	1120	366.892	208.634	29.6248
21	276.374	1120.74	310.403	166.937	28.2717
22	278.859	1122.63	209.753	92.5712	23.8135
23	281.343	1124.51	127.553	43.0562	18.6524
24	283.828	1126.4	64.3465	14.6833	12.8543
25	286.313	1128.28	20.8764	2.40178	6.56289
26	288.797	1130.17	0	0	0

List Of Coordinates

External Boundary

X	Y
0	900
500	900
500	1027.02
500	1038.16
500	1043.01
500	1055.02
500	1079.03

500	1084.06
500	1117.17
500	1120
500	1135
312	1135
288	1130
270	1120
266.6	1117.17
258	1110
242	1100
230	1090
218.117	1084.06
210	1080
208.359	1079.03
193	1070
170	1060
160.044	1055.02
150	1050
124.137	1043.01
113	1040
109.322	1038.16
93	1030
0	1028
0	1027.02

Material Boundary

X	Y
266.6	1117.17
500	1117.17

Material Boundary

X	Y
208.359	1079.03
500	1079.03

Material Boundary

X	Y
218.117	1084.06
500	1084.06

Material Boundary

X	Y
160.044	1055.02
500	1055.02

Material Boundary

X	Y
124.137	1043.01
500	1043.01

Material Boundary

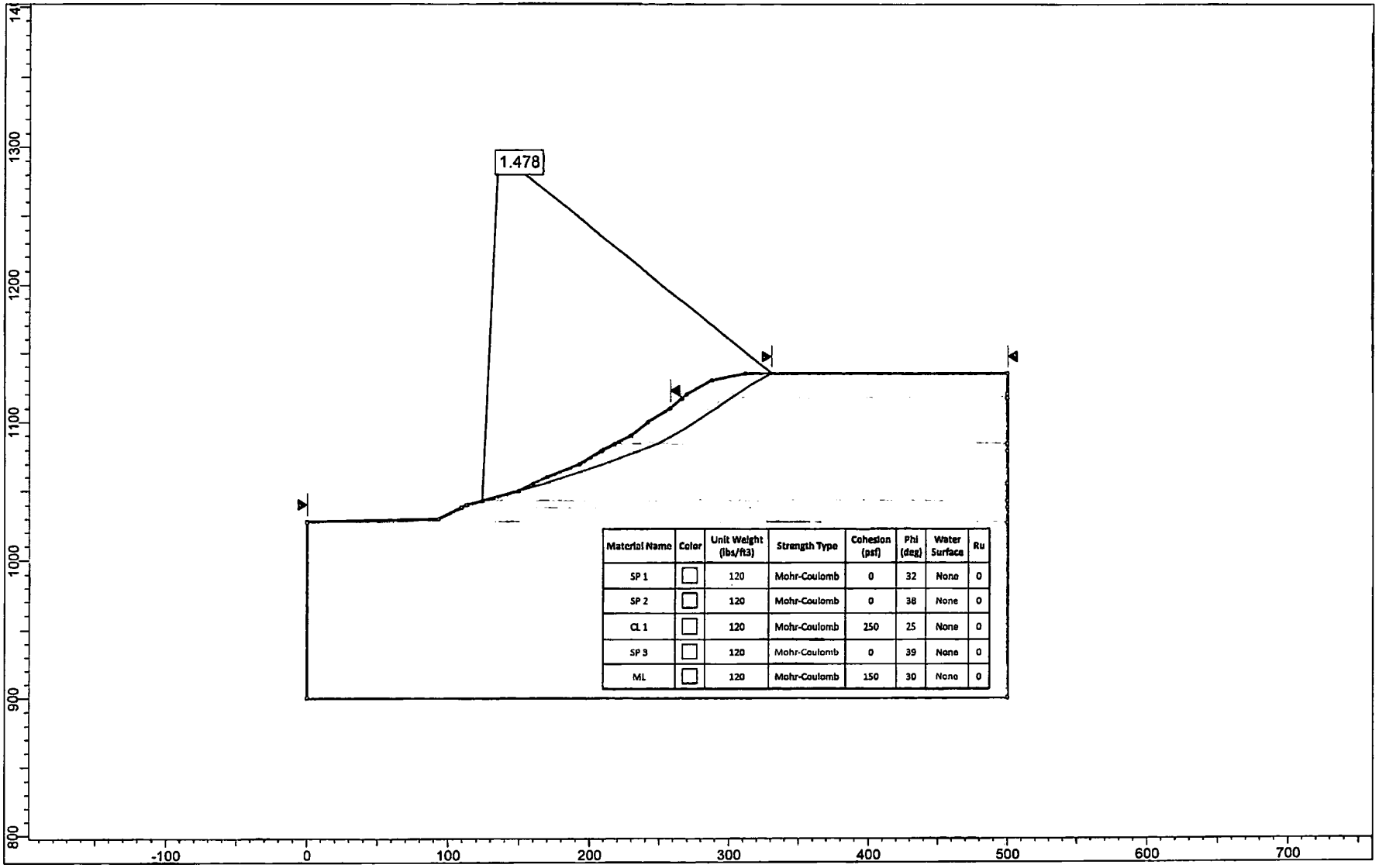
X	Y
109.322	1038.16
500	1038.16

Material Boundary

X	Y
0	1027.02
500	1027.02

Material Boundary

X	Y
270	1120
500	1120



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP 1		120	Mohr-Coulomb	0	32	None	0
SP 2		120	Mohr-Coulomb	0	38	None	0
CL 1		120	Mohr-Coulomb	250	25	None	0
SP 3		120	Mohr-Coulomb	0	39	None	0
ML		120	Mohr-Coulomb	150	30	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140572 b
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/27/2014, 7:12:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	SP 1	SP 2	CL 1	SP 3	ML
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120
Cohesion [psf]	0	0	250	0	150
Friction Angle [deg]	32	38	25	39	30
Water Surface	None	None	None	None	None

Ru Value	0	0	0	0	0

Global Minimums

Method: gle/morgenstern-price

FS: 1.477530
Axis Location: 135.294, 1295.497
Left Slip Surface Endpoint: 124.054, 1042.988
Right Slip Surface Endpoint: 330.558, 1135.000
Resisting Moment=4.31362e+007 lb-ft
Driving Moment=2.91948e+007 lb-ft
Resisting Horizontal Force=159574 lb
Driving Horizontal Force=108001 lb
Total Slice Area=2229.77 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
124.054	1042.99
166.265	1054.4
169.251	1055.45
201.202	1066.75
209.028	1069.59
238.069	1080.1
249.638	1084.09
261.417	1090.55
269.292	1095.42
291.552	1110.39
316.194	1126.76
330.558	1135

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1449
Number of Invalid Surfaces: 3052

Error Codes:

Error Code -105 reported for 278 surfaces
Error Code -113 reported for 2774 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.47753

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	8.4422	0.000854858	SP 2	0	38	4.7646e-005	7.03984e-005	9.01057e-005	0	9.01057e-005
2	8.4422	0.00258992	SP 2	0	38	0.000147619	0.000218111	0.000279169	0	0.000279169
3	8.4422	0.00431653	SP 2	0	38	0.00025204	0.000372396	0.000476645	0	0.000476645
4	8.4422	843.626	SP 2	0	38	49.4048	72.9971	93.4321	0	93.4321
5	8.4422	2803.11	SP 2	0	38	167.41	247.354	316.599	0	316.599
6	1.77019	821.258	SP 2	0	38	221.126	326.72	418.182	0	418.182
7	1.21554	595.791	SP 3	0	39	242.712	358.615	442.853	0	442.853
8	10.6504	5945.83	SP 3	0	39	279.279	412.643	509.572	0	509.572

9	10.6504	7051.54	SP 3	0	39	335.983	496.425	613.033	0	613.033
10	10.6504	8774.5	SP 3	0	39	421.129	622.23	768.391	0	768.391
11	7.82585	8409.96	SP 3	0	39	545.013	805.273	994.429	0	994.429
12	8.69614	10978.1	SP 3	0	39	639.514	944.901	1166.86	0	1166.86
13	8.69614	12234.8	SP 3	0	39	709.691	1048.59	1294.9	0	1294.9
14	8.69614	14010	SP 3	0	39	806.319	1191.36	1471.21	0	1471.21
15	2.95252	5642.19	CL 1	250	25	703.218	1039.03	1692.07	0	1692.07
16	11.5689	26271.5	CL 1	250	25	808.114	1194.01	2024.44	0	2024.44
17	11.7793	30019.1	SP 2	0	38	1014.79	1499.39	1919.13	0	1919.13
18	7.87522	21869	SP 2	0	38	1047.42	1547.6	1980.84	0	1980.84
19	11.1297	31425	SP 2	0	38	1029.45	1521.05	1946.85	0	1946.85
20	11.1297	29433.8	SP 2	0	38	973.158	1437.87	1840.39	0	1840.39
21	10.2016	22066.4	SP 2	0	38	807.117	1192.54	1526.38	0	1526.38
22	4.26451	7536.04	ML	150	30	601.551	888.81	1279.66	0	1279.66
23	10.1763	13741.5	SP 1	0	32	426.519	630.194	1008.52	0	1008.52
24	7.18177	5324.97	SP 1	0	32	247.965	366.376	586.324	0	586.324
25	7.18177	1774.99	SP 1	0	32	83.4819	123.347	197.398	0	197.398

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.47753

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	124.054	1042.99	0	0	0
2	132.497	1045.27	0.000196645	1.45459e-005	4.23048
3	140.939	1047.55	0.000805899	0.000118243	8.34699
4	149.381	1049.83	0.00184612	0.000400713	12.2465
5	157.823	1052.11	203.906	57.8719	15.8448
6	166.265	1054.4	894.845	309.527	19.0805
7	168.036	1055.02	1024.44	366.984	19.709
8	169.251	1055.45	1129.06	413.851	20.1301

9	179.902	1059.22	2183.85	947.224	23.4483
10	190.552	1062.99	3452.81	1690.4	26.0851
11	201.202	1066.75	5043.34	2686	28.039
12	209.028	1069.59	6488.96	3603.6	29.0453
13	217.724	1072.74	8376.32	4786.25	29.7438
14	226.42	1075.89	10470.8	6046.61	30.0053
15	235.117	1079.03	12850.4	7369.13	29.8323
16	238.069	1080.1	13117.8	7474.57	29.6746
17	249.638	1084.09	14402.9	7842.61	28.569
18	261.417	1090.55	13944.2	6992.92	26.6334
19	269.292	1095.42	12553.4	5820.56	24.8755
20	280.422	1102.9	9441.59	3767.3	21.7526
21	291.552	1110.39	6499.9	2099.13	17.8978
22	301.753	1117.17	4387.38	1075.15	13.7693
23	306.018	1120	3326.75	700.732	11.8947
24	316.194	1126.76	847.93	106.159	7.13618
25	323.376	1130.88	213.57	13.4494	3.6034
26	330.558	1135	0	0	0

List Of Coordinates

External Boundary

X	Y
0	900
500	900
500	1027.02
500	1038.16
500	1043.01
500	1055.02
500	1079.03
500	1084.06

500	1117.17
500	1120
500	1135
312	1135
288	1130
270	1120
266.6	1117.17
258	1110
242	1100
230	1090
218.117	1084.06
210	1080
208.359	1079.03
193	1070
170	1060
160.044	1055.02
150	1050
124.137	1043.01
113	1040
109.322	1038.16
93	1030
0	1028
0	1027.02

Material Boundary

X	Y
266.6	1117.17
500	1117.17

Material Boundary

X	Y

208.359	1079.03
500	1079.03

Material Boundary

X	Y
218.117	1084.06
500	1084.06

Material Boundary

X	Y
160.044	1055.02
500	1055.02

Material Boundary

X	Y
124.137	1043.01
500	1043.01

Material Boundary

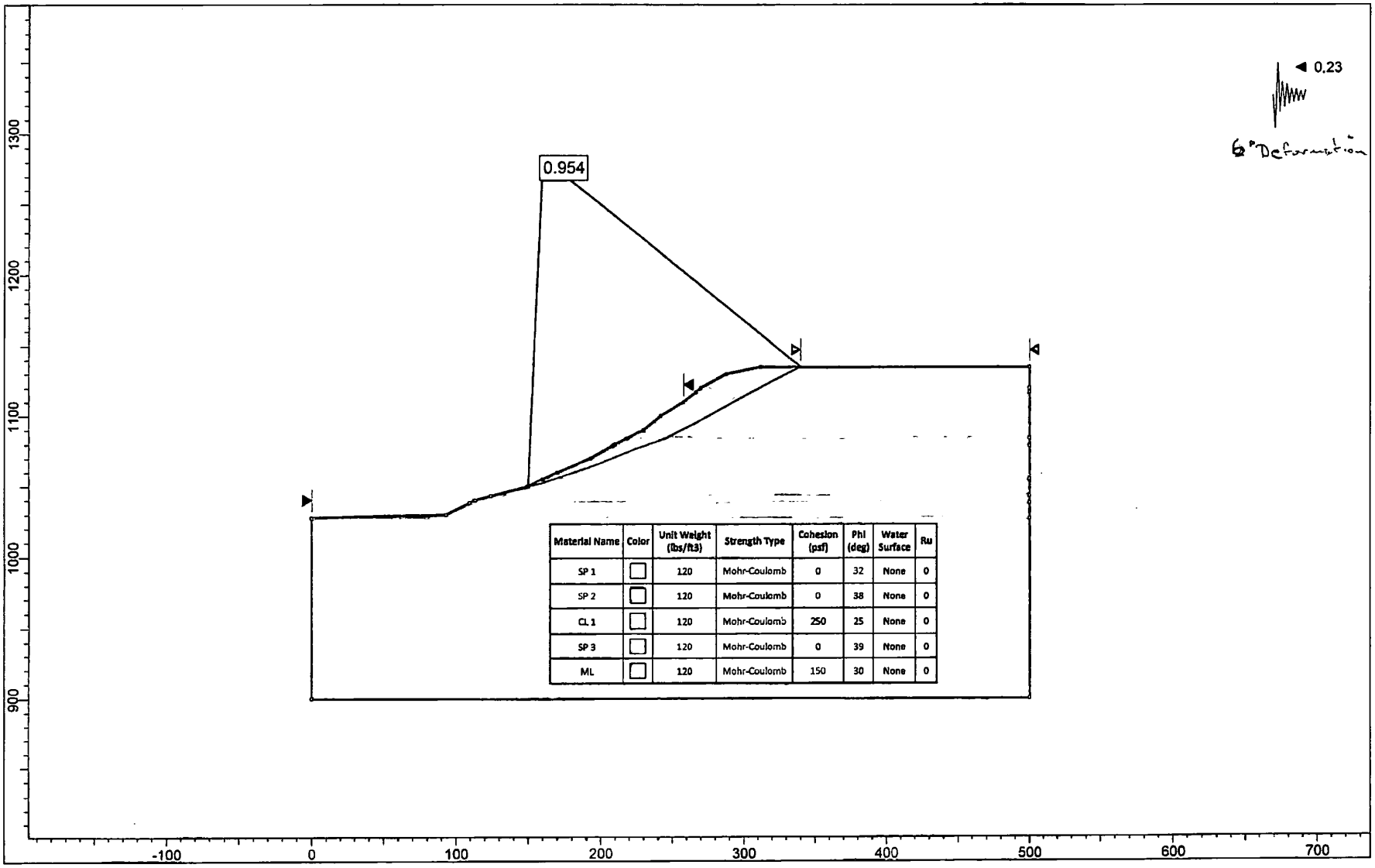
X	Y
109.322	1038.16
500	1038.16

Material Boundary

X	Y
0	1027.02
500	1027.02

Material Boundary

X	Y
270	1120
500	1120



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP 1		120	Mohr-Coulomb	0	32	None	0
SP 2		120	Mohr-Coulomb	0	38	None	0
CL 1		120	Mohr-Coulomb	250	25	None	0
SP 3		120	Mohr-Coulomb	0	39	None	0
ML		120	Mohr-Coulomb	150	30	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140572 c
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/27/2014, 7:12:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.23

Material Properties

Property	SP 1	SP 2	CL 1	SP 3	ML
Color	☐	☐	☐	☐	☐

Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120
Cohesion [psf]	0	0	250	0	150
Friction Angle [deg]	32	38	25	39	30
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Global Minimums

Method: gle/morgenstern-price

FS: 0.954022
Axis Location: 159.898, 1282.296
Left Slip Surface Endpoint: 150.000, 1050.000
Right Slip Surface Endpoint: 339.796, 1135.000
Resisting Moment=3.60578e+007 lb-ft
Driving Moment=3.77955e+007 lb-ft
Resisting Horizontal Force=150734 lb
Driving Horizontal Force=157998 lb
Total Slice Area=2289.81 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
150	1050
157.373	1051.43
178.024	1058.83
199.365	1066.45
223.174	1076.27
245.409	1084.09
247.921	1085.3

264.985	1093.9
291.035	1108.76
307.867	1118.12
317.094	1123
339.796	1135

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1579
Number of Invalid Surfaces: 2922

Error Codes:

Error Code -105 reported for 151 surfaces
Error Code -111 reported for 1 surface
Error Code -113 reported for 2770 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.954022

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	7.3733	998.745	SP 2	0	38	99.8604	95.269	121.939	0	121.939
2	10.0222	3567.8	SP 2	0	38	239.035	228.045	291.884	0	291.884

3	10.6287	5395.04	SP 3	0	39	369.41	352.425	435.209	0	435.209
4	10.6705	6493.95	SP 3	0	39	469.633	448.04	553.283	0	553.283
5	10.6705	7931.15	SP 3	0	39	602.471	574.771	709.783	0	709.783
6	7.93627	7610.96	SP 3	0	39	720.83	687.688	849.223	0	849.223
7	7.93627	8792.93	SP 3	0	39	837.334	798.835	986.479	0	986.479
8	7.93627	9491.81	SP 3	0	39	906.937	865.238	1068.48	0	1068.48
9	7.85902	10298.7	SP 3	0	39	1133.93	1081.79	1335.91	0	1335.91
10	7.18783	11694.7	CL 1	250	25	953.786	909.933	1415.23	0	1415.23
11	7.18783	14537.9	CL 1	250	25	1084.64	1034.77	1682.94	0	1682.94
12	2.5126	5495.11	SP 2	0	38	1300.64	1240.84	1588.2	0	1588.2
13	8.53161	19371.6	SP 2	0	38	1282.76	1223.78	1566.36	0	1566.36
14	8.53161	21038.6	SP 2	0	38	1372.93	1309.81	1676.48	0	1676.48
15	8.68338	23810.3	SP 2	0	38	1368.25	1305.34	1670.76	0	1670.76
16	8.68338	24092.3	SP 2	0	38	1389.46	1325.58	1696.66	0	1696.66
17	8.68338	23763.3	SP 2	0	38	1382.64	1319.07	1688.34	0	1688.34
18	7.55958	18647.6	SP 2	0	38	1279.18	1220.37	1562.01	0	1562.01
19	7.55958	16264.4	SP 2	0	38	1122.51	1070.9	1370.69	0	1370.69
20	1.71295	3354.22	ML	150	30	916.348	874.216	1254.38	0	1254.38
21	3.55836	6597.32	ML	150	30	900.192	858.803	1227.68	0	1227.68
22	5.66828	9179.52	SP 1	0	32	714.835	681.968	1091.38	0	1091.38
23	7.56735	9083.14	SP 1	0	32	543.127	518.155	829.221	0	829.221
24	7.56735	5449.88	SP 1	0	32	335.301	319.885	511.924	0	511.924
25	7.56735	1816.63	SP 1	0	32	114.649	109.378	175.042	0	175.042

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.954022

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	150	1050	0	0	0
2	157.373	1051.43	332.33	43.0542	7.3817

3	167.396	1055.02	858.625	259.469	16.8144
4	178.024	1058.83	1885.73	897.817	25.4596
5	188.695	1062.64	3296.28	2096.18	32.4532
6	199.365	1066.45	5197.74	4033.17	37.8096
7	207.302	1069.72	6386.91	5522.42	40.8482
8	215.238	1073	7779.34	7300.52	43.1813
9	223.174	1076.27	9294.9	9258.46	44.8875
10	231.033	1079.03	12149.2	12589.5	46.0196
11	238.221	1081.56	12741.3	13475.8	46.6048
12	245.409	1084.09	12943.9	13773.6	46.7787
13	247.921	1085.3	13025.4	13843.5	46.744
14	256.453	1089.6	12779.2	13350.8	46.2532
15	264.985	1093.9	12445.4	12518.4	45.1675
16	273.668	1098.85	10570.2	9996.58	43.4024
17	282.351	1103.81	8685.85	7522.89	40.8961
18	291.035	1108.76	6859.28	5272.18	37.5466
19	298.594	1112.96	5676.83	3807.8	33.8522
20	306.154	1117.17	4662.02	2622	29.3541
21	307.867	1118.12	4265.85	2288.97	28.2171
22	311.425	1120	3641.94	1753.79	25.7133
23	317.094	1123	2311.74	902.81	21.3323
24	324.661	1127	1014.92	267.741	14.7782
25	332.228	1131	250.576	33.3127	7.57275
26	339.796	1135	0	0	0

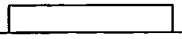
List Of Coordinates

External Boundary

X	Y
0	900
500	900

500	1027.02
500	1038.16
500	1043.01
500	1055.02
500	1079.03
500	1084.06
500	1117.17
500	1120
500	1135
312	1135
288	1130
270	1120
266.6	1117.17
258	1110
242	1100
230	1090
218.117	1084.06
210	1080
208.359	1079.03
193	1070
170	1060
160.044	1055.02
150	1050
124.137	1043.01
113	1040
109.322	1038.16
93	1030
0	1028
0	1027.02

Material Boundary



X	Y
266.6	1117.17
500	1117.17

Material Boundary

X	Y
208.359	1079.03
500	1079.03

Material Boundary

X	Y
218.117	1084.06
500	1084.06

Material Boundary

X	Y
160.044	1055.02
500	1055.02

Material Boundary

X	Y
124.137	1043.01
500	1043.01

Material Boundary

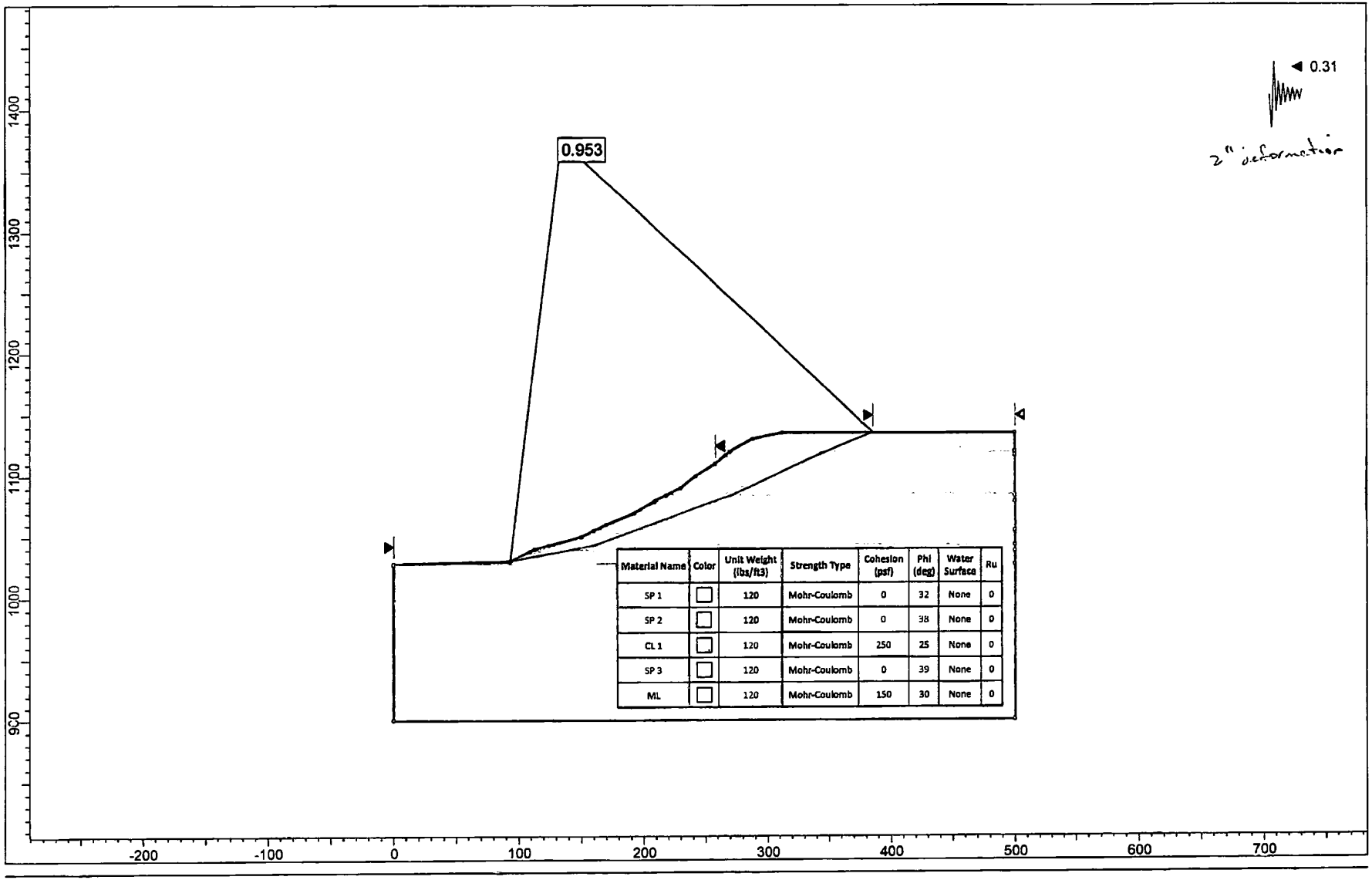
X	Y
109.322	1038.16
500	1038.16

Material Boundary

X	Y
0	1027.02
500	1027.02

Material Boundary

X	Y
270	1120
500	1120



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP 1		120	Mohr-Coulomb	0	32	None	0
SP 2		120	Mohr-Coulomb	0	38	None	0
CL 1		120	Mohr-Coulomb	250	25	None	0
SP 3		120	Mohr-Coulomb	0	39	None	0
ML		120	Mohr-Coulomb	150	30	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140572 d
Slide Modeler Version: 6.029
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 8/27/2014, 7:12:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.31

Material Properties

Property	SP 1	SP 2	CL 1	SP 3	ML
Color					

Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120
Cohesion [psf]	0	0	250	0	150
Friction Angle [deg]	32	38	25	39	30
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Global Minimums

Method: gle/morgenstern-price

FS: 0.952744
Axis Location: 134.091, 1374.682
Left Slip Surface Endpoint: 93.000, 1030.000
Right Slip Surface Endpoint: 385.182, 1135.000
Resisting Moment=1.27867e+008 lb-ft
Driving Moment=1.34209e+008 lb-ft
Resisting Horizontal Force=369922 lb
Driving Horizontal Force=388270 lb
Total Slice Area=5343.9 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
93	1030
111.723	1033.62
136.112	1038.32
160.501	1043.03
183.9	1051.69
204.793	1059.63
224.936	1067.28

245.553	1075.11
271.501	1084.1
279.343	1087.77
296.287	1095.84
313.222	1103.9
333.481	1113.54
362.211	1125.64
385.182	1135

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1709
Number of Invalid Surfaces: 2792

Error Codes:

Error Code -105 reported for 108 surfaces
Error Code -111 reported for 3 surfaces
Error Code -113 reported for 2681 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.952744

	Base	Base	Shear	Shear	Base	Pore	Effective

Number	[ft]	[lbs]	Material	Cohesion [psf]	Friction Angle [degrees]	Stress [psf]	Strength [psf]	Normal Stress [psf]	Pressure [psf]	Normal Stress [psf]
1	9.36174	1613.98	SP 2	0	38	125.444	119.516	152.973	0	152.973
2	9.36174	4841.95	SP 2	0	38	391.619	373.113	477.563	0	477.563
3	23.5461	19611.6	SP 2	0	38	700.035	666.954	853.662	0	853.662
4	0.842512	797.707	CL 1	250	25	764.158	728.047	1025.18	0	1025.18
5	12.1942	12282.1	CL 1	250	25	808.503	770.296	1115.78	0	1115.78
6	12.1942	15179.4	CL 1	250	25	943.229	898.656	1391.05	0	1391.05
7	11.6996	18200.1	SP 2	0	38	1135.75	1082.08	1385	0	1385
8	11.6996	19614	SP 2	0	38	1221.63	1163.9	1489.72	0	1489.72
9	8.75953	15335.1	SP 2	0	38	1246.2	1187.31	1519.69	0	1519.69
10	12.1343	23359.6	SP 3	0	39	1433.91	1366.15	1687.06	0	1687.06
11	10.0714	22058.4	SP 3	0	39	1607.03	1531.09	1890.73	0	1890.73
12	10.0714	23664.5	SP 3	0	39	1699.24	1618.94	1999.23	0	1999.23
13	10.3085	26286.2	SP 3	0	39	1810.11	1724.57	2129.67	0	2129.67
14	10.3085	31398.3	SP 3	0	39	2117.02	2016.98	2490.77	0	2490.77
15	11.3231	38976.3	SP 3	0	39	2549.69	2429.2	2999.81	0	2999.81
16	14.6247	58927.8	CL 1	250	25	1599.02	1523.46	2730.94	0	2730.94
17	7.84258	34893.9	SP 2	0	38	2333.62	2223.34	2845.74	0	2845.74
18	16.9436	76022.2	SP 2	0	38	2337.51	2227.05	2850.49	0	2850.49
19	16.935	68308.9	SP 2	0	38	2134.13	2033.28	2602.49	0	2602.49
20	20.2593	63886.1	SP 2	0	38	1704.15	1623.62	2078.15	0	2078.15
21	8.60157	20277.2	SP 2	0	38	1379.42	1314.23	1682.14	0	1682.14
22	6.72793	13254.1	ML	150	30	1006.74	959.17	1401.52	0	1401.52
23	13.3998	19582.3	SP 1	0	32	697.117	664.174	1062.9	0	1062.9
24	11.4858	9672.09	SP 1	0	32	419.016	399.215	638.877	0	638.877
25	11.4858	3224.03	SP 1	0	32	142.936	136.181	217.935	0	217.935

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.952744

X	Y	Interslice	Interslice	Interslice

Number	coordinate [ft]	coordinate - Bottom [ft]	Normal Force [lbs]	Shear Force [lbs]	Force Angle [degrees]
1	93	1030	0	0	0
2	102.362	1031.81	397.538	44.8536	6.43737
3	111.723	1033.62	1699.58	381.58	12.6539
4	135.27	1038.16	8222.17	4052.79	26.2391
5	136.112	1038.32	8451.93	4243.11	26.658
6	148.306	1040.68	11876.6	7470.62	32.1707
7	160.501	1043.03	15397.9	11474.7	36.6939
8	172.2	1047.36	17044.9	14397.8	40.1877
9	183.9	1051.69	18804.9	17504.1	42.9482
10	192.659	1055.02	19910.8	19627	44.5887
11	204.793	1059.63	22293	23347.7	46.3238
12	214.865	1063.46	24406.8	26479.3	47.3323
13	224.936	1067.28	26536.3	29450.3	47.9795
14	235.245	1071.2	28708	32205.5	48.2862
15	245.553	1075.11	31044.8	34772.7	48.2418
16	256.876	1079.03	36070.1	39761	47.7865
17	271.501	1084.1	27357.3	28870.4	46.5415
18	279.343	1087.77	24392.9	24862.9	45.5467
19	296.287	1095.84	17439.2	15993.1	42.5232
20	313.222	1103.9	11423.5	8963.03	38.1182
21	333.481	1113.54	6100.76	3614.72	30.6469
22	342.083	1117.17	5586.2	2803.66	26.6516
23	348.811	1120	4279.47	1831.55	23.1702
24	362.211	1125.64	1551.74	425.972	15.3503
25	373.697	1130.32	377.281	52.1816	7.8746
26	385.182	1135	0	0	0

List Of Coordinates

External Boundary

X	Y
0	900
500	900
500	1027.02
500	1038.16
500	1043.01
500	1055.02
500	1079.03
500	1084.06
500	1117.17
500	1120
500	1135
312	1135
288	1130
270	1120
266.6	1117.17
258	1110
242	1100
230	1090
218.117	1084.06
210	1080
208.359	1079.03
193	1070
170	1060
160.044	1055.02
150	1050
124.137	1043.01
113	1040
109.322	1038.16
93	1030
0	1028
0	1027.02

Material Boundary

X	Y
266.6	1117.17
500	1117.17

Material Boundary

X	Y
208.359	1079.03
500	1079.03

Material Boundary

X	Y
218.117	1084.06
500	1084.06

Material Boundary

X	Y
160.044	1055.02
500	1055.02

Material Boundary

X	Y
124.137	1043.01
500	1043.01

Material Boundary

X	Y
109.322	1038.16
500	1038.16

Material Boundary

X	Y
0	1027.02
500	1027.02

Material Boundary

X	Y
270	1120
500	1120

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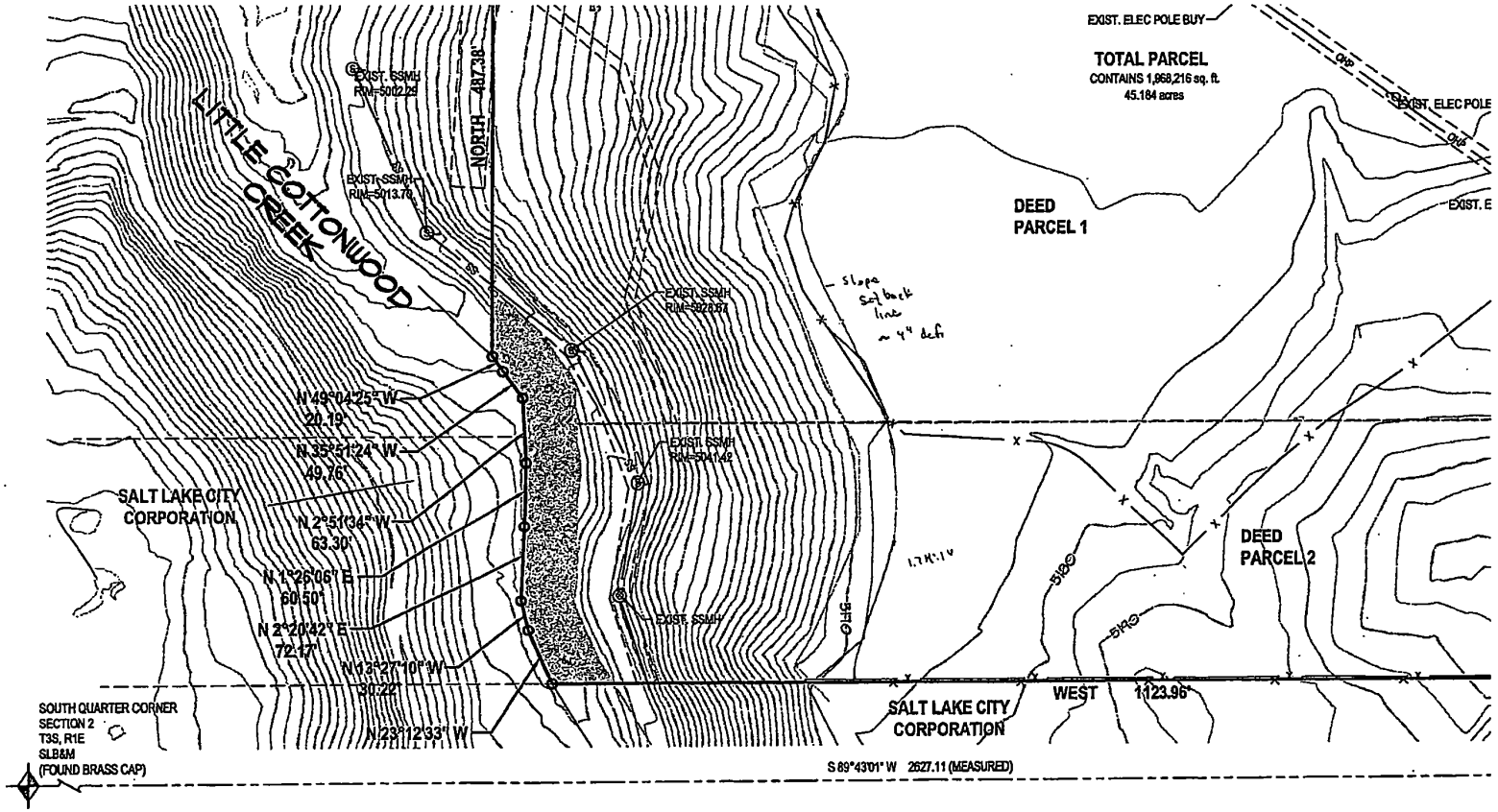
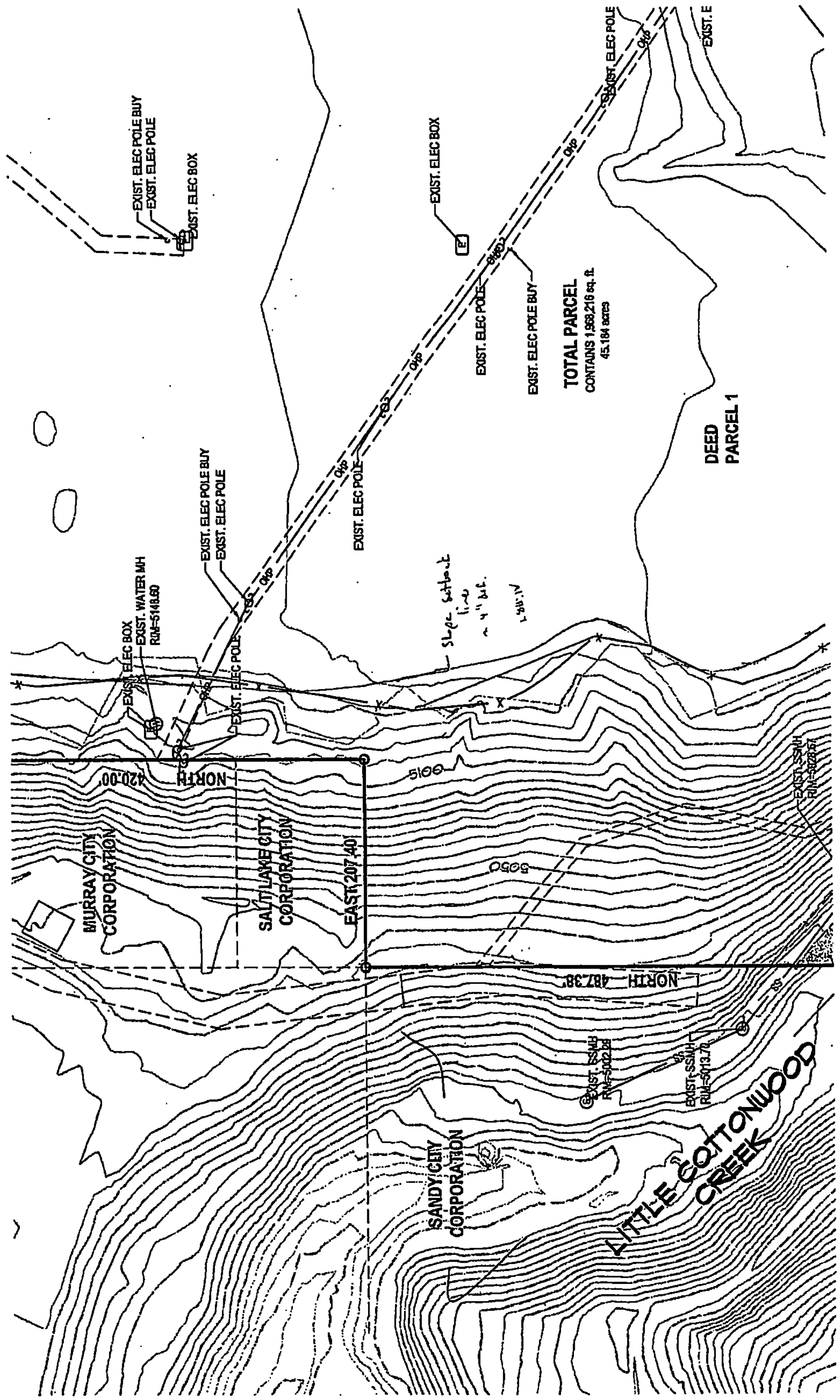
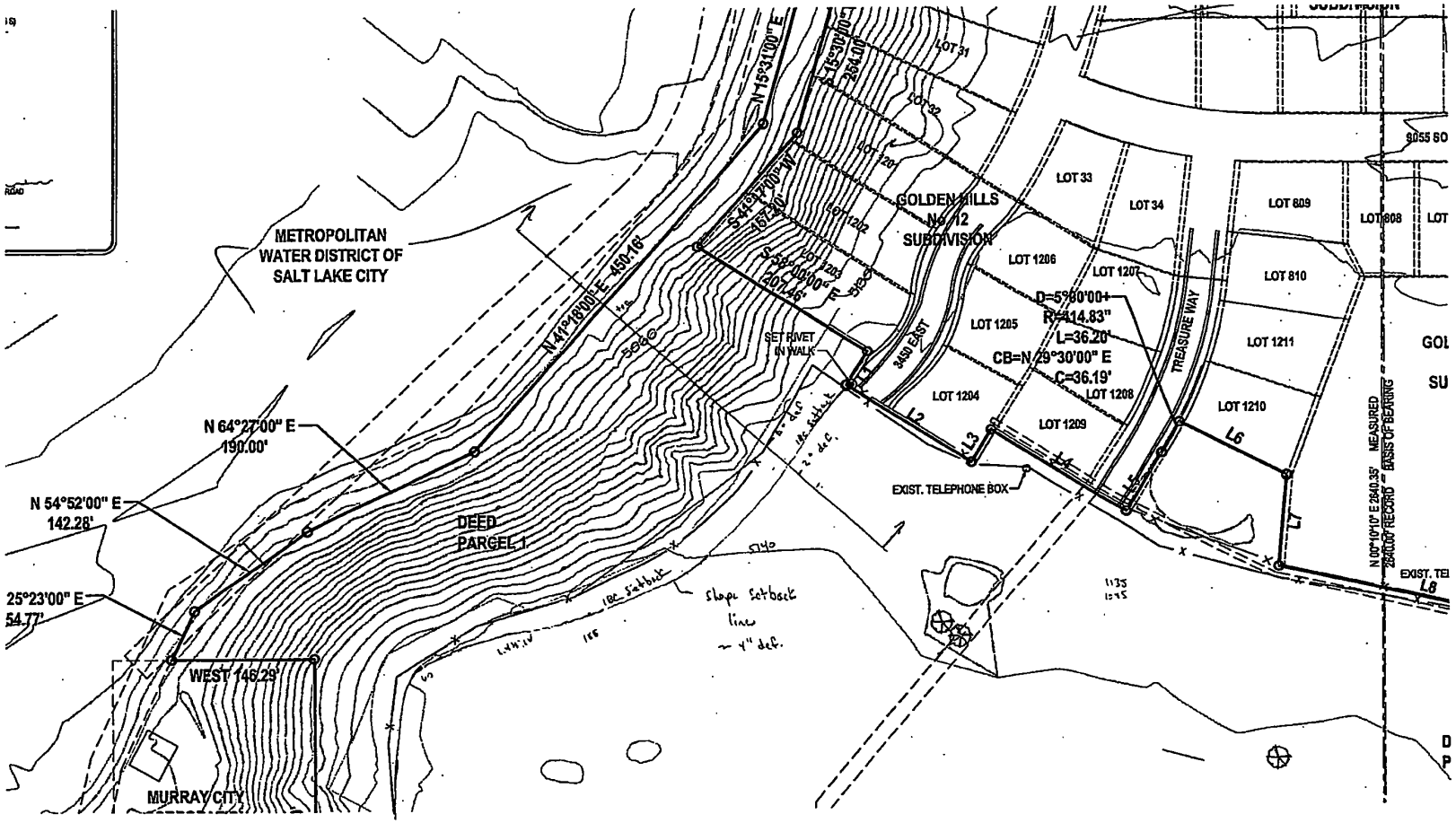
8/27/14




EXIST. ELEC POLE BUY
EXIST. ELEC POLE
EXIST. ELEC BOX
EXIST. ELEC BOX
EXIST. ELEC POLE
EXIST. ELEC POLE BUY
TOTAL PARCEL
CONTAINS 1,968,216 sq. ft.
45.184 acres
DEED
PARCEL 1
EXIST. ELEC POLE
EXIST. ELEC POLE BUY
EXIST. ELEC POLE
EXIST. WATER MH
RIM=5148.60
EXIST. ELEC BOX
EXIST. ELEC POLE
NORTH
420.00'
MURRAY CITY
CORPORATION
SALT LAKE CITY
CORPORATION
EAST 207.40'
5100
5050
NORTH 487.38'
EXIST. SSMH
SANDY CITY
CORPORATION
EXIST. SSMH
RIM=5002.08
EXIST. SSMH
RIM=5013.72
LITTLE COTTONWOOD
CREEK

114052
8/27/19



AGEC
Applied GeoTech

October 16, 2014
Revised October 20, 2014

Giverny, LLC
111 East Broadway, Suite 900
Salt Lake City, Utah 84111

Attention: Dade Rose
EMAIL: drose@djplaw.com

Subject: Slope Stability Evaluation Update
Proposed Giverny Development
9180 South Wasatch Boulevard
Cottonwood Heights, Utah
Project No. 1140572

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to provide additional evaluation of the stability of the slope along the south and west edges of the proposed Giverny residential development located at 9180 South Wasatch Boulevard in Cottonwood Heights, Utah. Our original study was reported in a letter dated August 29, 2014. Geostrata reviewed the letter for Cottonwood Heights and provided comments concerning the study in a memorandum dated September 3, 2014.

We previously performed a geotechnical investigation for the project and submitted our findings and recommendations in a report dated July 30, 2014 under Project No. 1140572.

SCOPE

The slope stability evaluation consisted of review of aerial photographs and geologic literature to identify potential landslides along the slope, the drilling of one boring at the crest of the slope to a depth of approximately 110 feet, performing laboratory testing on the soil from the boring, development of slope and subsurface profiles and performing engineering analysis.

SITE CONDITIONS

The slope evaluated for stability is a moderately to heavily vegetated slope with grass, brush and numerous areas of trees. The slope ranges from approximately 1½ horizontal to 1 vertical to 2 horizontal to 1 vertical.

There are some erosional features that have developed in the slope near the north end of the property. The locations of these washouts are presented on Figure 1 along with the geology as mapped by Personious and Scott, 1992. Based on a review of 1952 aerial photographs (USDA Photos AAL-6K-114 and 115), these areas experienced significant erosion prior to the photograph date. These features appear as shallow depth washout areas and based on review of climate data for Salt Lake City and the ground slope being down toward these features, we anticipate that these washouts are a result of heavy rainfall in the 1950s (Evans, 1953). These features are no longer considered a result of a perched water table on the upper silt that may have developed when the property was heavily irrigated as previously hypothesized since the sand would not be pervious enough to convey the amount of water needed to result in the erosional features. There is currently a berm above the washout on the property that would divert water away from the slope. Vegetation has filled in much of the previously eroded areas since 1952 and there are no signs of the erosion problems even in the residential development to the north of the property where more numerous erosional features are apparent on the 1952 aerial photos. Similar erosion features are not expected to develop on the property in the future since grading will be designed to eliminate this problem.

FIELD STUDY

The field study for the slope stability evaluation consisted of drilling one boring to a depth of approximately 110 feet at the approximate location indicated on Figure 2. This boring was drilled using 8-inch diameter, hollow-stem auger powered by a truck-mounted drill rig. A test pit was excavated on October 3, 2014 to a depth of approximately 8 feet next to the boring to obtain additional samples of the silt for direct shear testing. The boring and test pits were logged and soil samples obtained by an engineer from AGEC. A log of the subsurface conditions encountered in the boring is presented on Figure 7. Logs of test pits are presented on Figure 8. Legend and notes of the boring and test pit logs are presented on Figure 9. The boring log was adjusted to account for the soil profile found in the test pit.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in the boring consist predominantly of sand with some silt, clay and gravel layers. The silt and clay layers are horizontally bedded and the silt was found in test pits in the area indicating that these deposits are likely continuous horizontally.

A description of the various soils encountered in the boring follows:

Topsoil - The topsoil consists of silty to clayey sand with some gravel. It is dry, dark brown and contains roots and organics.

Lean Clay - The clay is stiff, very moist and brown.

A moisture contents of 32 percent and a dry density of 102 pounds per cubic foot (pcf) were measured for the clay sample. A direct shear test was performed on the clay and results are presented on Figure 11.

Silt - The silt contains a small to large amount of sand. It is stiff to very stiff, moist to very moist and brown.

Moisture contents of 2 to 13 percent and dry densities of 85 to 109 pcf were measured for the silt. A direct shear test was performed on the silt and results are presented on Figure 10.

Sand - The sand contains a small to moderate amount of silt and occasional silty layers. The sand contains some gravelly layers. The sand is medium dense to very dense, slightly moist to moist and brown to gray.

Moisture contents of 0 to 4 percent and dry densities of 96 to 113 pcf were measured for the sand.

Gravel - The gravel contains a small amount of silt and a moderate to large amount of sand. It is very dense, slightly moist and brown to gray.

A summary of the laboratory test results is included on Table I and results are presented on the log of the boring.

No subsurface water was encountered to the depth of the boring, approximately 110 feet.

SLOPE STABILITY EVALUATION

Profiles for the slope were developed from contours shown on the site plan provided and soil layers were assigned based on the subsurface conditions encountered in the boring. Strength parameters used in the slope stability analyses for the sand and gravel are based on the corrected N-values (Lambe and Whitman, 1969, pg 209). Strength parameters used in the analyses for the silt and clay are less than indicated by the direct shear tests. A friction angle of 30 degrees and a cohesion of 250 pounds per square foot for the clay and a friction angle of 32 degrees and a cohesion of 150 pounds per square foot for the silt are used in the stability analyses.

The computer program Slide Version 6.0 was used to evaluate the stability of the slope using the Morgenstern-Price method. Pseudostatic analysis for the stability of the slope under seismic conditions was evaluated using a peak horizontal ground acceleration of 0.615g as obtained from the 2012 IBC data and representing a 2 percent in 50-year probability of exceedance. This peak ground acceleration was adjusted based on Blake and others (2002) for 4 inches of ground deformation resulting in a horizontal seismic load coefficient of 0.27g.

Based on the results of the slope stability analyses, building setback lines for a 10-deep and 20-deep footing are presented on Figures 3 through 6. The safety factor for the static slope stability analysis for this same setback is greater than 1.5. Results of the slope stability analyses are included in the Appendix. The actual setback distance from the slope depends on the foundation depth closest to the slope and thus deeper foundations may extend closer to the slope. The setback limit line would be approximately 23 feet (west slope) to 28 feet (north slope) closer to the slope for each 10 feet of drop in foundation depth for foundations placed closest to the slope.

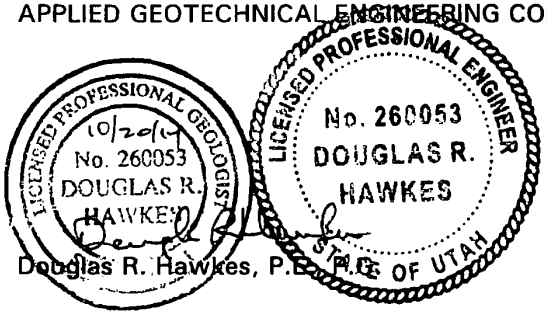
LIMITATIONS

This letter has been prepared in accordance with generally accepted geotechnical engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on subsurface conditions encountered, laboratory testing and engineering analysis as described in this letter and in the above-referenced report. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions or proposed construction is significantly different from what is described in this letter and in the above referenced report, we should be notified to reevaluate the recommendations given.

If you have questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Douglas R. Hawkes, P.E.

Reviewed by JEN, P.E.
DRH/rs

Enclosures

References

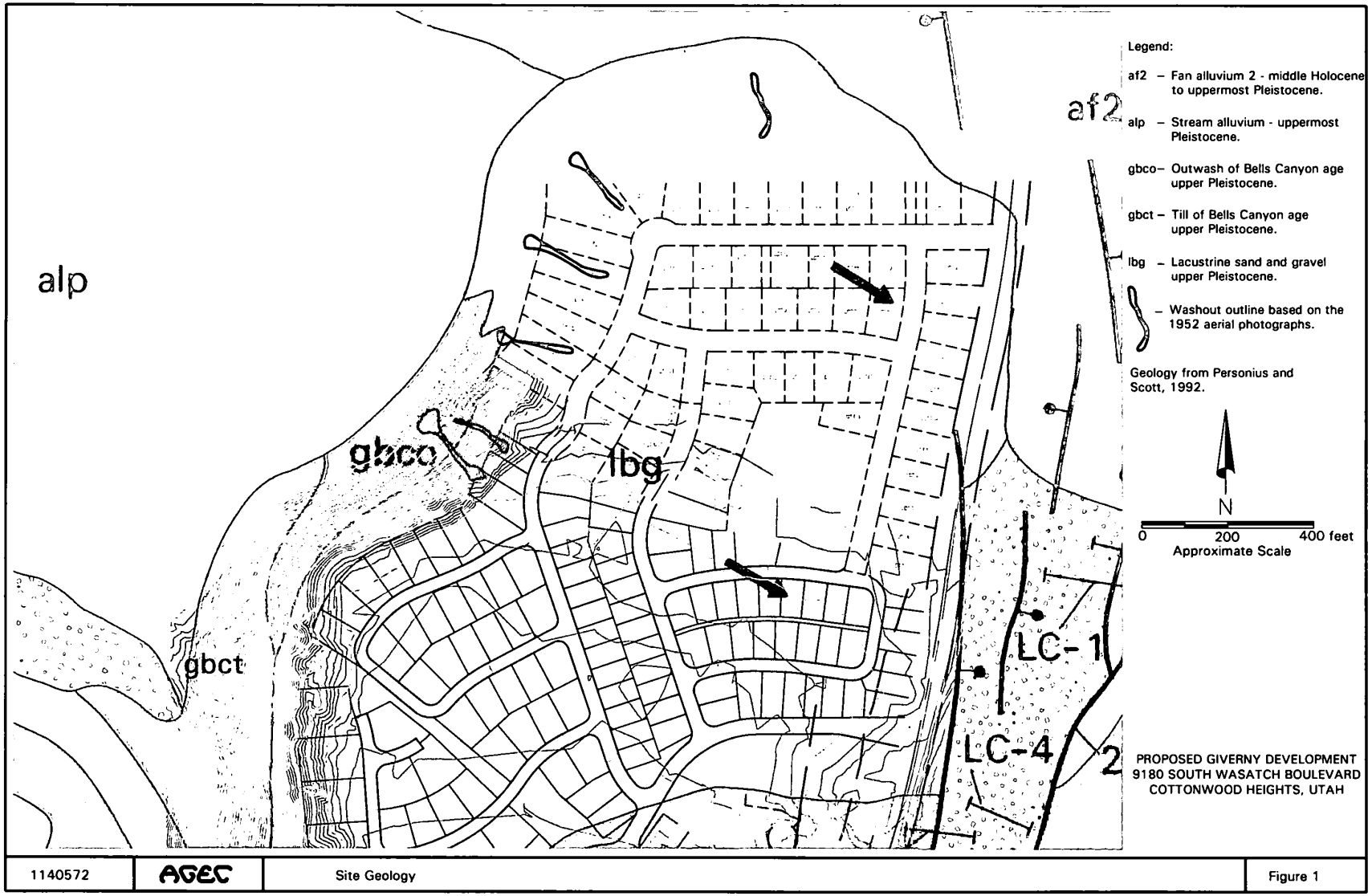
International Building Code, 2012; International Code Council, Falls Church, Virginia.

Blake, T.F, Hollingsworth, R.A. and Stewart, J.P., 2002; Recommended procedures for implementation of DMG Special Publication 117 Guidelines for analyzing and mitigating landslide hazards in California, Southern California Earthquake Center, Los Angeles, CA.

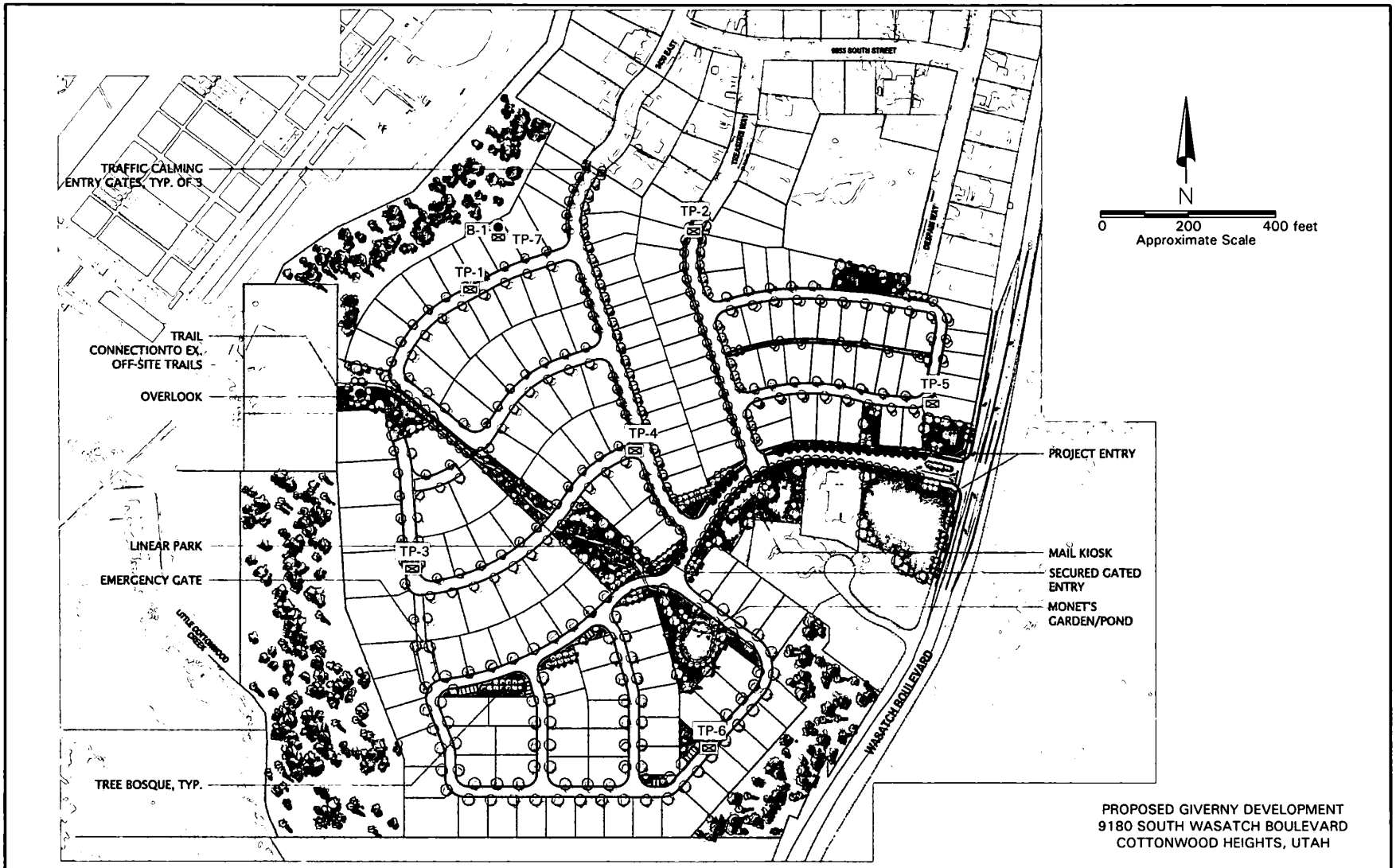
Evans, R.W.,Jr., 1953; An analysis of the Salt Lake City 1952 flood, University of Utah Thesis.

Lambe, T.W. and Whitman, R.V., 1969; Soil Mechanics, John Wiley and Sons, New York, NY.

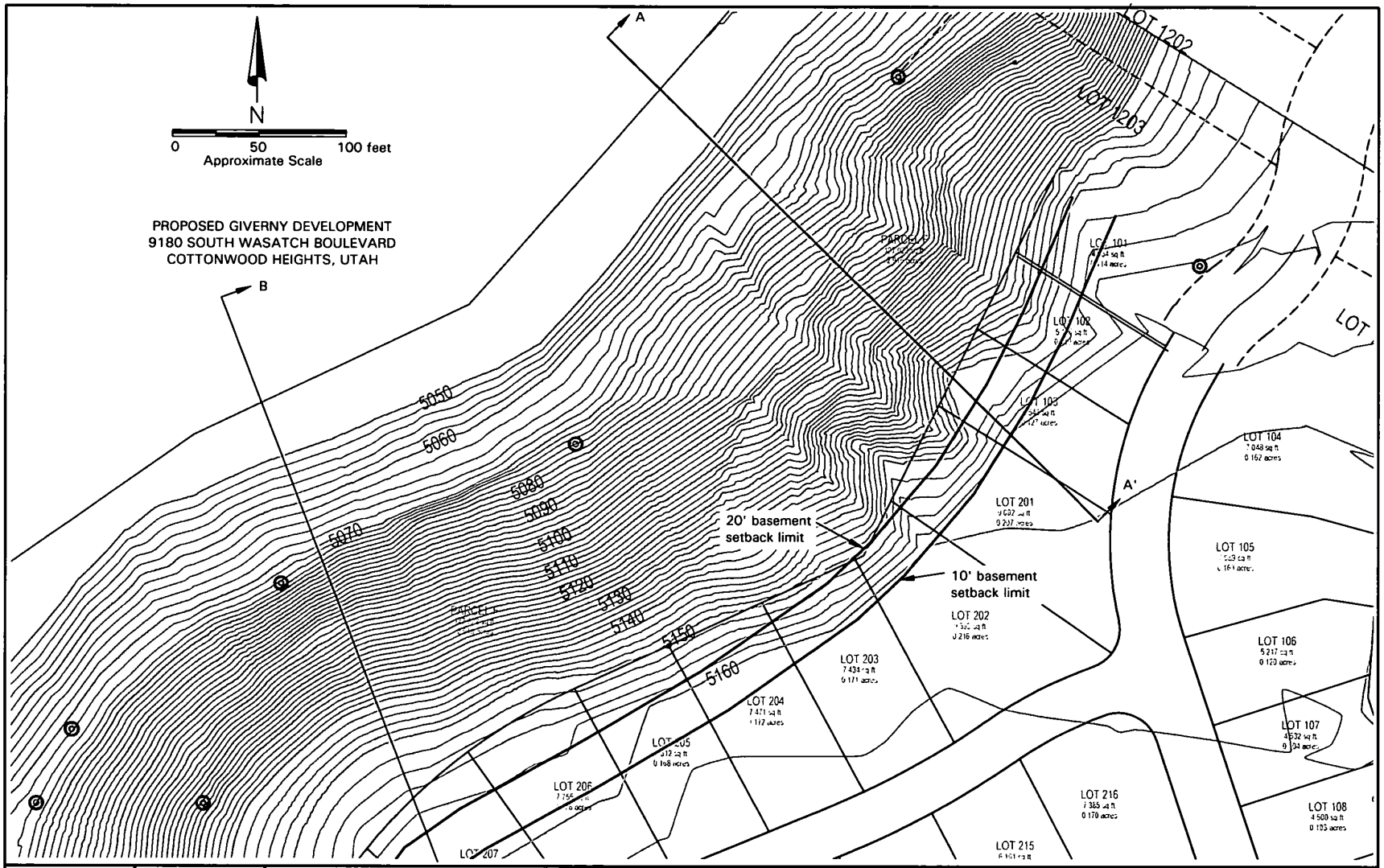
Personius, S.F. and Scott, W.E. 1992; Surficial Geologic Map of the Salt Lake City Segment and parts of adjacent segments of the Wasatch fault zone, Davis, Salt Lake and Utah Counties, Utah; U.S. Geological Survey Map I-2106.



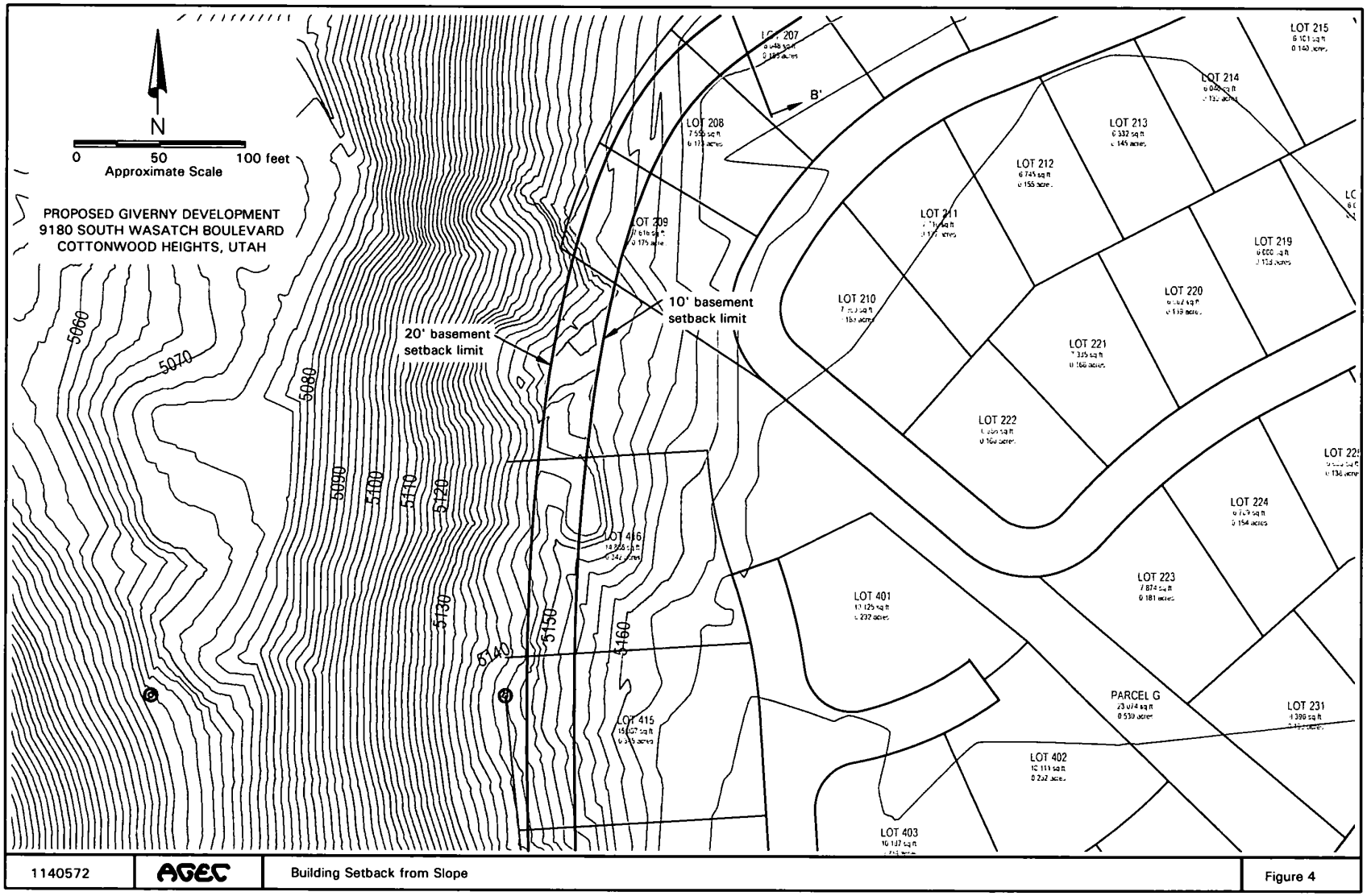
1140572	AGEC	Site Geology	Figure 1



1140572	AGEC	Locations of Exploratory Boring and Test Pits	Figure 2

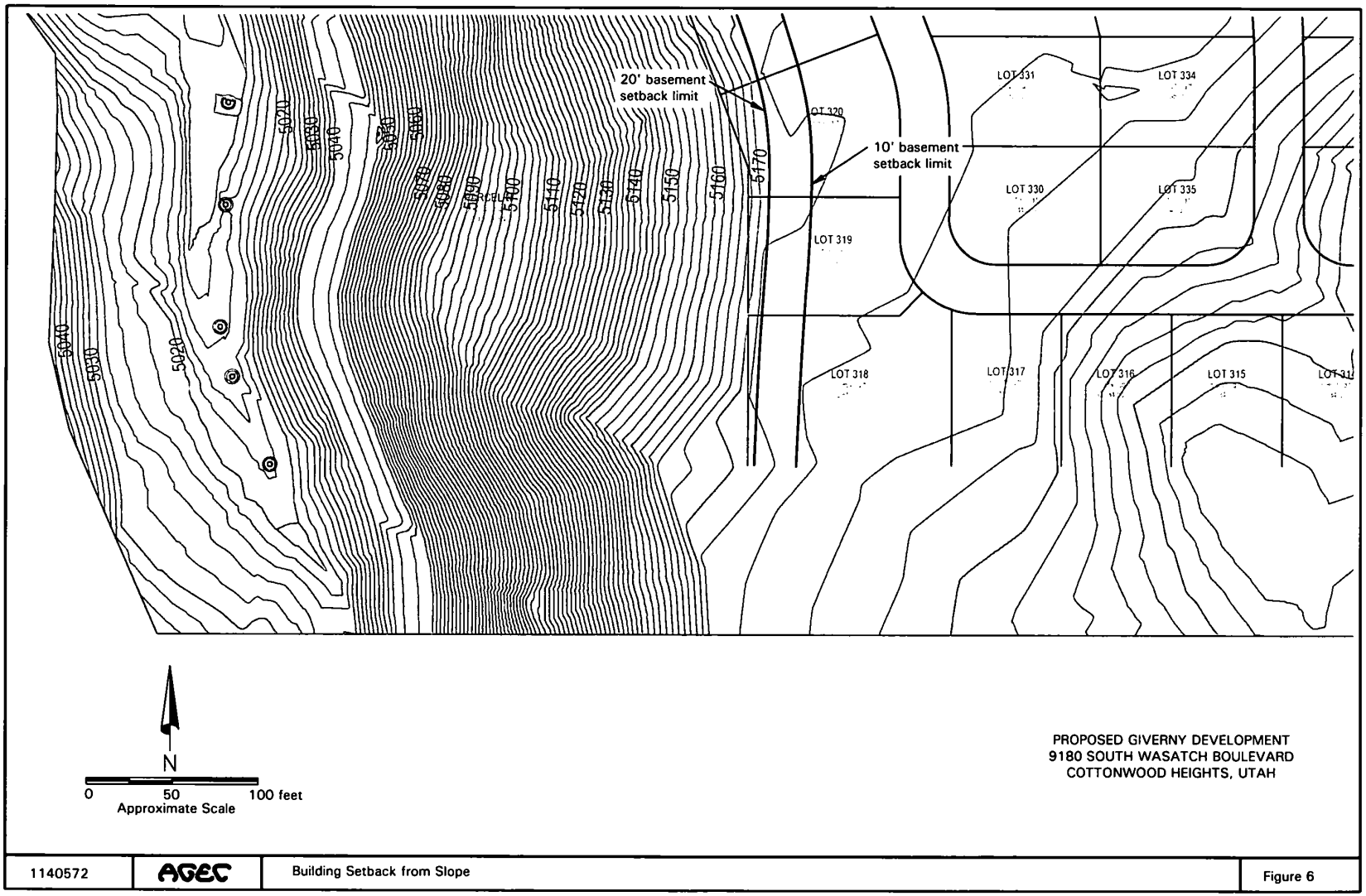


1140572	AGEC	Building Setback from Slope	Figure 3

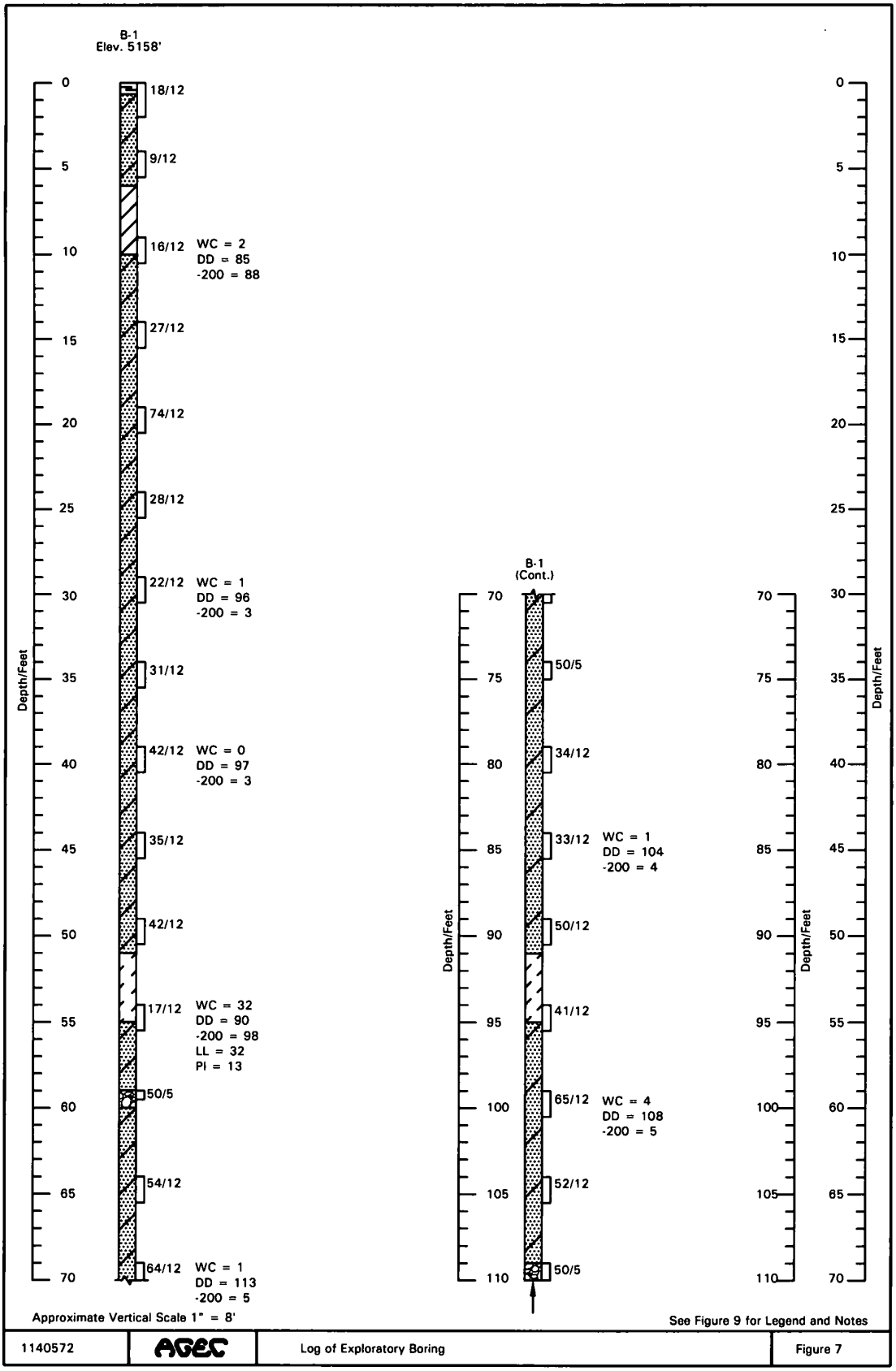


1140572	AGEC	Building Setback from Slope	Figure 4

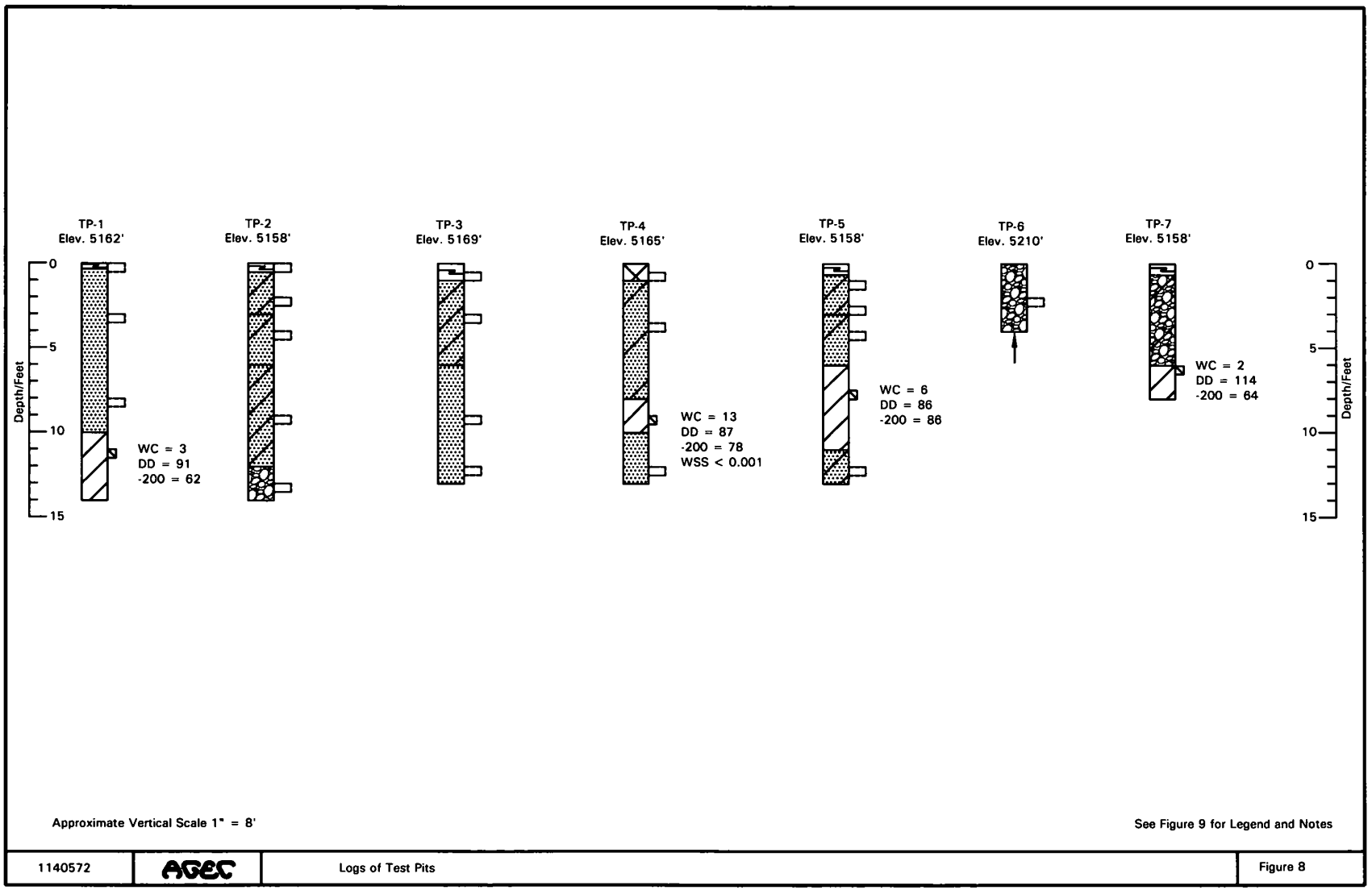
1140572	AGEC	Building Setback from Slope	Figure 5



1140572	AGEC	Building Setback from Slope	Figure 6



1140572	AGEC	Log of Exploratory Boring	Figure 7



Approximate Vertical Scale 1" = 8'

See Figure 9 for Legend and Notes

1140572	AGEC	Logs of Test Pits	Figure 8

LEGEND:


Fill; silty sand with gravel, dry, brown, plastic, rope, other debris.


Topsoil; silty to clayey sand, some gravel, dry, dark brown, roots, organics.


Lean Clay (CL); stiff, moist to very moist, brown.


Silt (ML); small to large amount of sand, stiff to very stiff, moist to very moist, brown.


Silty Sand (SM); occasional silt and clay layers, medium dense, dry to moist, brown to gray.


Poorly-graded Sand with Silt (SP-SM); contains a small to moderate amount of silt and occasional silty layers, some gravelly layers, medium dense to very dense, slightly moist to moist, brown to gray.


Poorly-graded Sand (SP); some silty and gravelly zones, medium dense, dry to moist, brown to gray.


Poorly-graded Gravel with Sand (GP); very dense, slightly moist, brown to gray.

California Drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound automatic hammer falling 30 inches were required to drive the sampler 12 inches.


Indicates disturbed sample taken.


Indicates relatively undisturbed block sample taken.

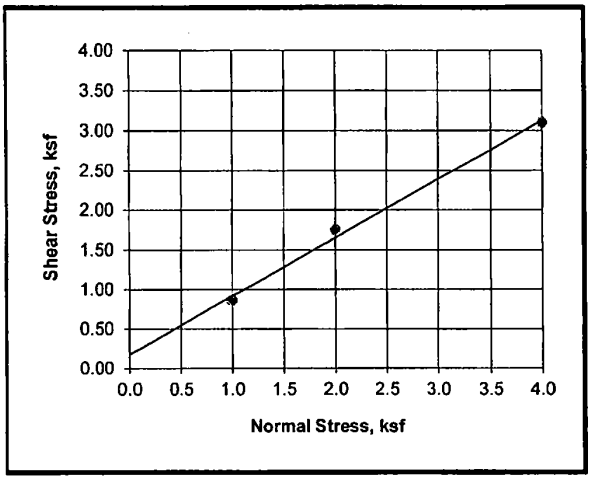
Indicates practical auger refusal.

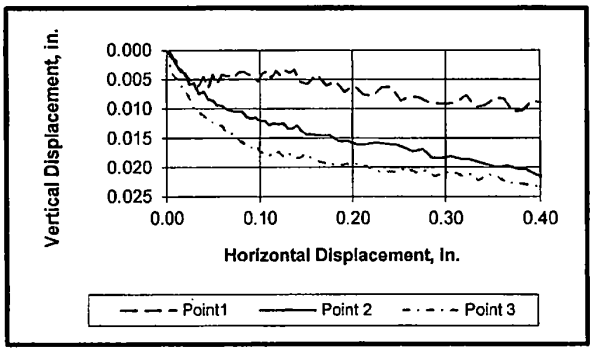
NOTES:

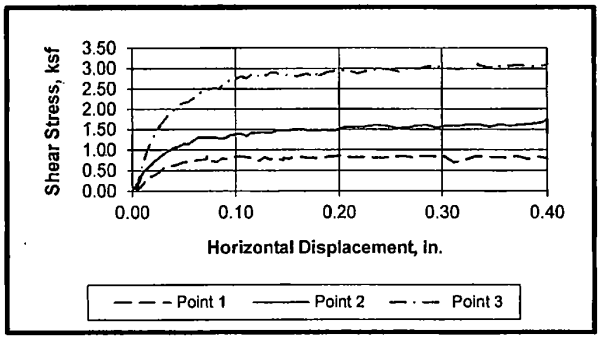
1. The boring was drilled on August 25, 2014 with 8-inch hollowstem auger. The test pits were excavated on July 10, 2014 with a rubber-tired backhoe except TP-7, which was excavated on October 3, 2014.
2. Locations of the boring and test pits were measured approximately by pacing from features shown on the site plan provided.
3. Elevations of the boring and test pits were determined by interpolating between contours shown on the site plan provided.
4. The boring and test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the boring and test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
6. No free water was encountered in the boring or test pits at the time of drilling/excavation.

1140572	AGEC	Legend and Notes of Exploratory Boring and Test Pits	Figure 9

Applied Geotechnical Engineering Consultants, Inc.







c = 180 psf	ϕ = 36 °
Strength Parameters were determined from linear regression of the PEAK shear stress values	

Project and Sample Information	
Project Number	1140572
Project Name	Giverney
Sample Identification	TP-7 at 6'
Sample Description	Sandy Silt (ML)

Test No. (Symbol)	1 (▲)	2 (■)	3 (●)
Test Type	Consolidated Drained Wetted		
Sample Type	Remolded	Undistrubed	Undisturbed
Strain Rate, in/min	0.001	0.001	0.001
Length, in.	0.98	0.98	0.98
Diameter, in.	1.93	1.93	1.93
Dry Density, pcf	99.0	115.1	114.3
Moisture Content, %	1.7	1.7	1.7
Consol. Load, ksf	1.0	2.0	4.0
Normal Load, ksf	1.0	2.0	4.0
Shear Stress, ksf	0.86	1.75	3.10

Each sample point was wetted when not loaded and allowed to soak at least 8 hours.
After the soak period, the normal load was applied and the sample point was allowed to consolidate.
After consolidation, each sample point was sheared.

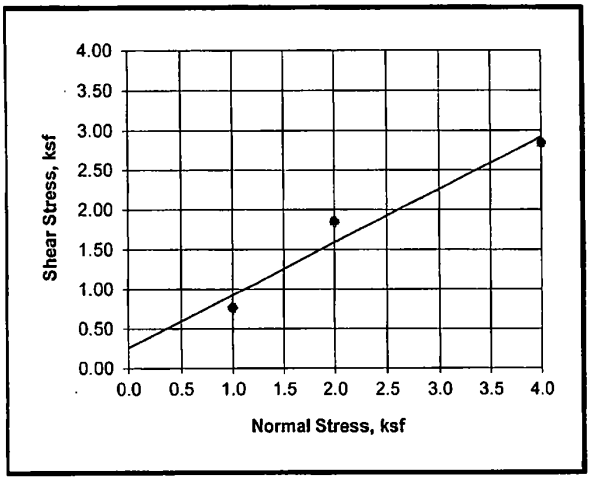
Sample Properties	
Dry Density, pcf	See Above
Moisture Content, %	1.7
Liquid Limit, %	Non-Plastic
Plasticity Index, %	
Percent Gravel	0
Percent Sand	36
Percent passing No. 200 Sieve	64

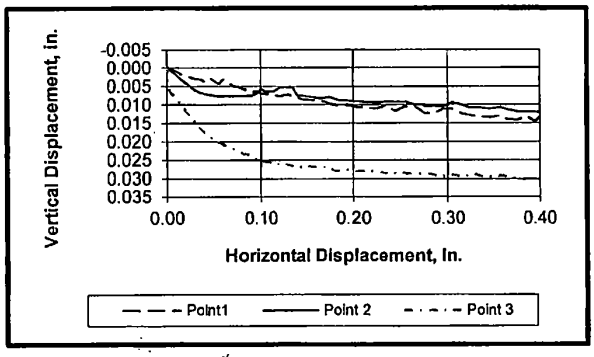
Project No. 1140572

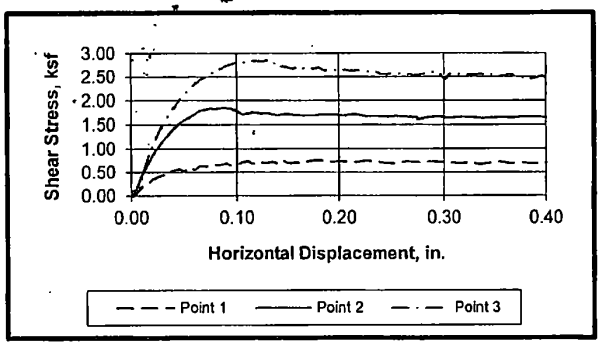
Direct Shear Results

Figure 10

Applied Geotechnical Engineering Consultants, Inc.







c = 265 psf ϕ = 34 °	
Strength Parameters were determined from linear regression of the PEAK shear stress values	
Project and Sample Information	
Project Number	1140572
Project Name	Giverney
Sample Identification	B-1 @ 54'
Sample Description	Lean Clay (CL)

Test No. (Symbol)	1 (▲)	2 (■)	3 (●)
Test Type	Consolidated Drained Wetted		
Sample Type	Undisturbed		
Strain Rate, in/min	0.002	0.002	0.001
Length, in.	0.98	0.98	0.98
Diameter, in.	1.93	1.93	1.93
Dry Density, pcf	88.0	91.7	89.5
Moisture Content, %	32.4	32.4	32.4
Consol. Load, ksf	1.0	2.0	4.0
Normal Load, ksf	1.0	2.0	4.0
Shear Stress, ksf	0.76	1.85	2.84

Each sample point was wetted when not loaded and allowed to soak for two hours.
After the two hours, the normal load was applied and the sample point was allowed to consolidate.
After consolidation, each sample point was sheared.

Sample Properties	
Dry Density, pcf	See Above
Moisture Content, %	32.4
Liquid Limit, %	32
Plasticity Index, %	13
Percent Gravel	0
Percent Sand	2
Percent passing No. 200 Sieve	98

Project No. 1140572

Direct Shear Results

Figure 11

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1140572

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
BORING/ TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1	9	2	85			88					Silt
	29	1	96			3					Poorly-graded Sand
	39	0	97			3					Poorly-graded Sand
	54	32	90			98	32	13			Lean Clay
	69	1	113			5					Poorly-graded Sand with Silt and Gravel
	84	1	104			4					Poorly-graded Sand with Gravel
	99	4	108			5					Poorly-graded Sand with silt and Gravel
TP-1	11	3	91			62					Sandy Silt
TP-4	9	13	87			78				<0.001	Silt with Sand
TP-5	7½	6	86			86					Silt
TP-7	6	2	114			64					Sandy Silt

BK 10585 PG 3693

APPENDIX

SLOPE STABILITY CALCULATIONS

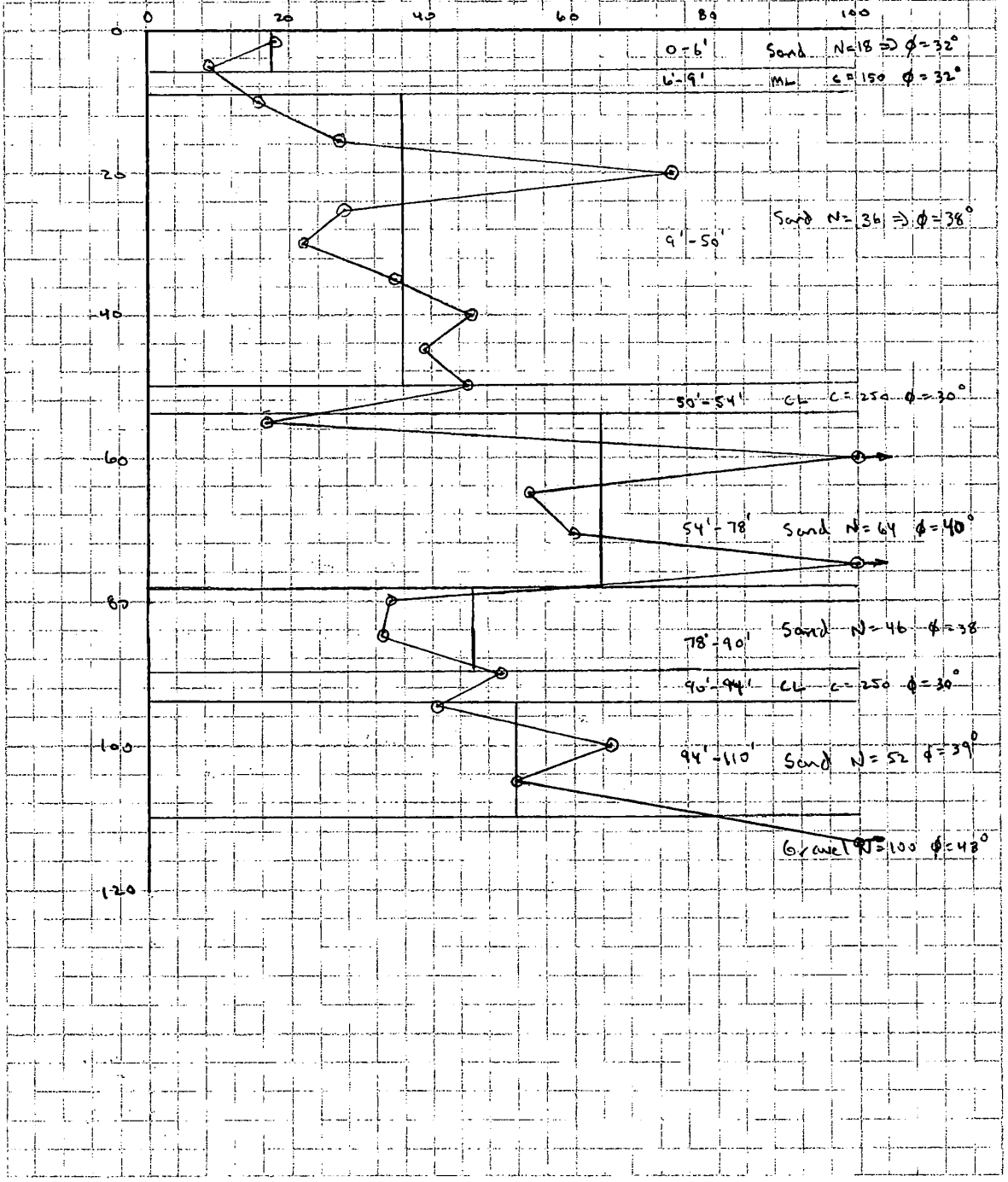
Project No. 1140572

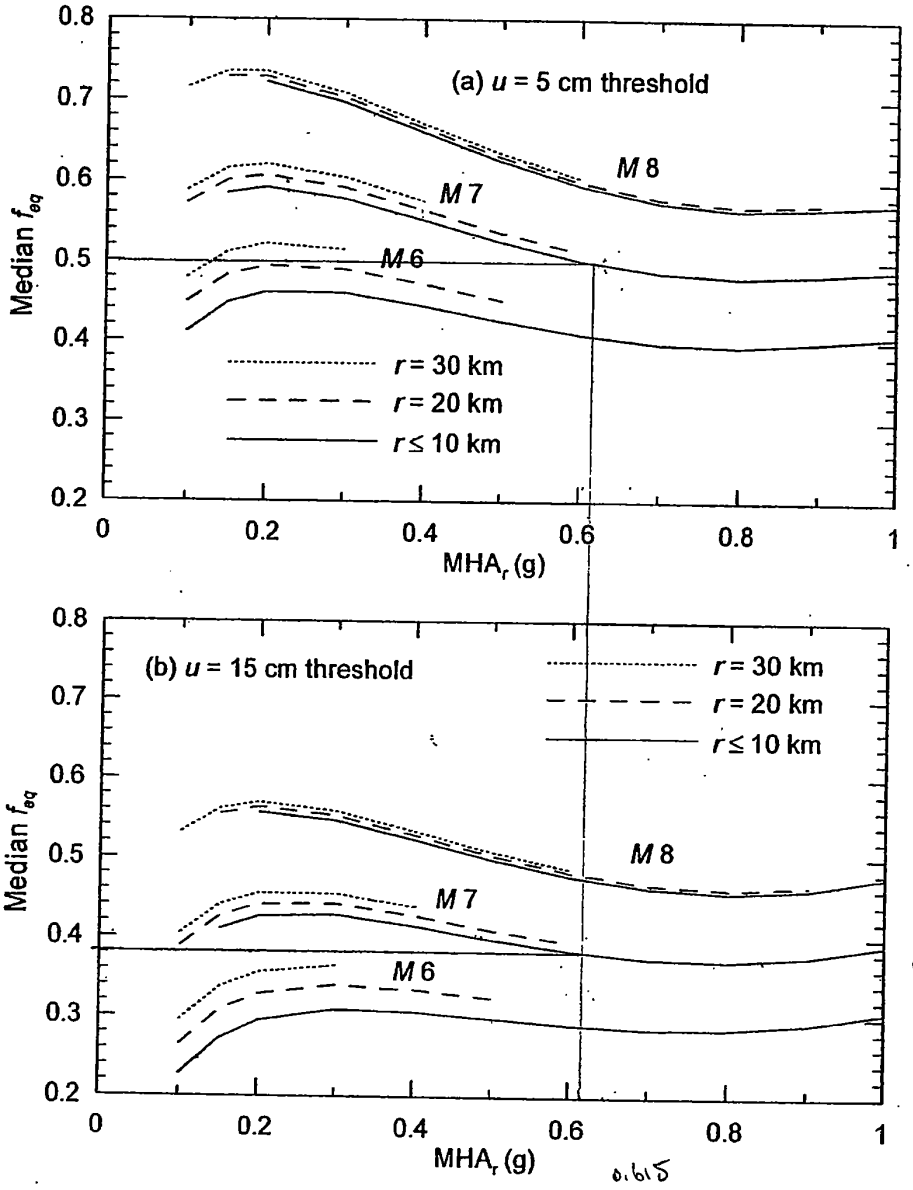
AGEC

Applied GeoTech

PROJECT NO. 1140572 TITLE Giverny DATE 10/3/14 BY DRH

SUBJECT $(N_1)_{60}$ vs. depth - Sand/Gravel ϕ determination SHEET _____ OF _____





0.5 6.31g
2" deformation

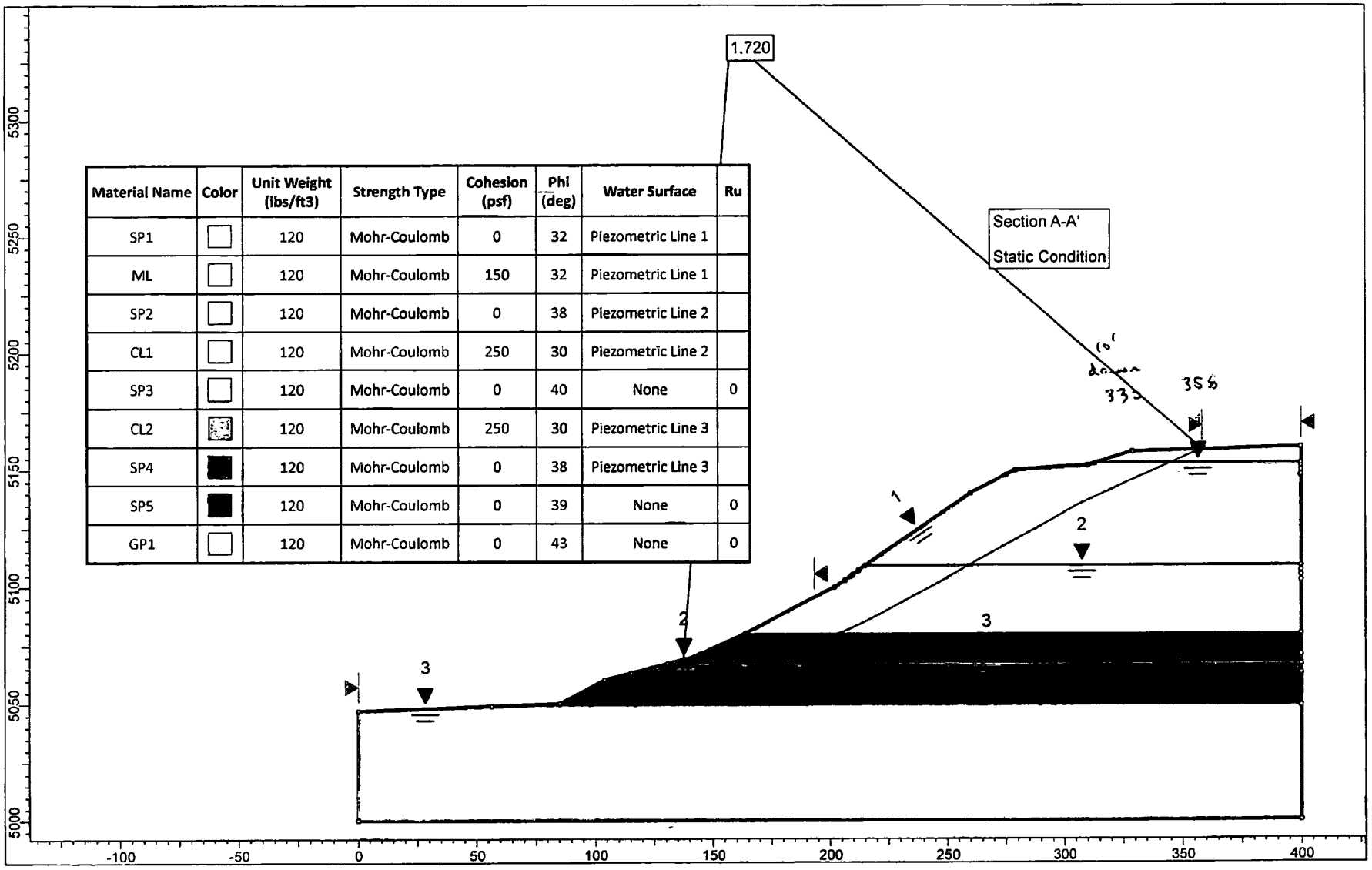
4" deformation
≈ 0.37g
Horizontal Seismic coefficient used for seismic condition

0.38 0.23g
6" deformation

Figure 11.1. Required Values of f_{eq} as Function of MHA_r and Seismological Condition for Threshold Displacements of (a) 5 cm and (b) 15 cm

From Blake et al, 2002

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	32	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0



BK 10585 PG 3697

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r1
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 7:59:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	32	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None

Hu Value	1	1	1	1	1	1	
Ru Value				0			0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 1.720330
Axis Location: 157.737, 5334.615
Left Slip Surface Endpoint: 137.371, 5068.782
Right Slip Surface Endpoint: 358.184, 5158.822
Resisting Moment=8.68225e+007 lb-ft
Driving Moment=5.04685e+007 lb-ft
Resisting Horizontal Force=314139 lb
Driving Horizontal Force=182604 lb
Total Slice Area=4032.79 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
137.371	5068.78
147.704	5066.99

170.168	5069.65
204.302	5080.03
213.598	5084.24
223.853	5089.37
258.25	5108.27
284.713	5123.03
307.177	5135.57
327.418	5145.02
349.274	5154.82
358.184	5158.82

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1648
Number of Invalid Surfaces: 2853

Error Codes:

Error Code -105 reported for 151 surfaces
Error Code -111 reported for 2 surfaces
Error Code -113 reported for 2700 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.72033

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	10.3333	3168.73	SP4	0	38	159.735	274.797	351.724	0	351.724
2	7.48806	6162.5	SP4	0	38	370.266	636.979	832.94	17.6431	815.297
3	7.48806	8423.66	SP4	0	38	530.47	912.584	1168.05	0	1168.05
4	7.48806	10848.7	SP4	0	38	700.383	1204.89	1542.19	0	1542.19
5	11.3778	20285.2	SP4	0	38	772.875	1329.6	1701.81	0	1701.81
6	11.3778	23740.8	SP4	0	38	911.343	1567.81	2006.71	0	2006.71
7	11.3778	27248.3	SP4	0	38	1051.04	1808.14	2314.31	0	2314.31
8	9.29608	25276.6	SP3	0	40	1135.72	1953.81	2328.45	0	2328.45
9	10.2547	30428.7	SP3	0	40	1183.96	2036.81	2427.37	0	2427.37
10	8.25303	26023.6	SP3	0	40	1200.29	2064.89	2460.84	0	2460.84
11	8.25303	27170.8	SP3	0	40	1244.05	2140.17	2550.55	0	2550.55
12	8.25303	28318	SP3	0	40	1288.9	2217.33	2642.51	0	2642.51
13	7.30937	26038	CL1	250	30	979.632	1685.29	2735.44	249.438	2486
14	2.32898	8485.51	SP2	0	38	1229.6	2115.32	2791.74	84.2542	2707.49
15	8.82086	32436.1	SP2	0	38	1269.97	2184.77	2796.38	0	2796.38
16	8.82086	32170.7	SP2	0	38	1259.69	2167.09	2773.75	0	2773.75
17	8.82086	30971	SP2	0	38	1214.95	2090.12	2675.23	0	2675.23
18	11.2321	33109.4	SP2	0	38	1023.41	1760.61	2253.47	0	2253.47
19	11.2321	25639.1	SP2	0	38	797.213	1371.47	1755.4	0	1755.4
20	10.1205	18065.7	SP2	0	38	663.989	1142.28	1462.05	0	1462.05
21	10.1205	16087	SP2	0	38	591.584	1017.72	1302.63	0	1302.63
22	6.71145	9238.82	SP2	0	38	517.509	890.287	1139.52	0	1139.52
23	8.84835	8764.05	ML	150	32	321.202	552.574	833.689	189.436	644.253
24	6.29664	3830.86	SP1	0	32	188.078	323.557	517.798	0	517.798
25	8.90977	2002.68	SP1	0	32	69.854	120.172	192.316	0	192.316

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.72033

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	137.371	5068.78	0	0	0
2	147.704	5066.99	2279.81	179.982	4.51391
3	155.192	5067.88	4313.34	583.108	7.69898
4	162.68	5068.77	7249.16	1376.58	10.7522
5	170.168	5069.65	11125.3	2697.33	13.6284
6	181.546	5073.11	14035.1	4447.08	17.581
7	192.924	5076.57	17466.2	6689.1	20.9555
8	204.302	5080.03	21423.3	9406.51	23.7052
9	213.598	5084.24	22167.6	10561.9	25.4758
10	223.853	5089.37	21852.1	11101.1	26.9311
11	232.106	5093.91	20602.2	10828.3	27.7259
12	240.359	5098.44	19306.7	10347.1	28.1883
13	248.612	5102.97	17964.5	9680.93	28.3199
14	255.921	5106.99	14142.1	7570.52	28.1609
15	258.25	5108.27	13434.3	7159.96	28.0559
16	267.071	5113.19	10873.7	5640.75	27.4181
17	275.892	5118.11	8333.69	4136.75	26.3993
18	284.713	5123.03	5883.94	2743.19	24.9957
19	295.945	5129.3	3256.33	1358.73	22.6487
20	307.177	5135.57	1209.48	432.591	19.6805
21	317.297	5140.29	1019.36	301.85	16.4949
22	327.418	5145.02	849.962	194.166	12.8679
23	334.129	5148.03	892.149	161.356	10.2518
24	342.978	5152	424.8	49.1445	6.59913
25	349.274	5154.82	146.342	9.9708	3.89774
26	358.184	5158.82	0	0	0

List Of Coordinates

Piezoline

X	Y
215.018	5108.98
260	5140
275.258	5148.03
279	5150
310	5152
313.328	5153.05
400	5153.05

Piezoline

X	Y
133.333	5067.72
142	5070
144.134	5070.97
164	5080
202	5100
206.311	5102.97
209.475	5105.16
212.133	5106.99
215.018	5108.98
400	5108.98

Piezoline

X	Y
0	5047
56.3227	5048.99
85	5050
104	5060

115.313	5062.98
130.613	5067
133.333	5067.72
400	5067.72

External Boundary

X	Y
0	5000
400	5000
400	5048.99
400	5062.98
400	5067
400	5070.97
400	5080
400	5102.97
400	5105.16
400	5106.99
400	5108.98
400	5148.03
400	5150
400	5152
400	5153.05
400	5160
329	5158
313.328	5153.05
310	5152
279	5150
275.258	5148.03
260	5140
215.018	5108.98
212.133	5106.99

209.475	5105.16
206.311	5102.97
202	5100
164	5080
144.134	5070.97
142	5070
130.613	5067
115.313	5062.98
104	5060
85	5050
56.3227	5048.99
0	5047

Material Boundary

X	Y
310	5152
400	5152

Material Boundary

X	Y
275.258	5148.03
400	5148.03

Material Boundary

X	Y
212.133	5106.99
400	5106.99

Material Boundary

X	Y
206.311	5102.97
400	5102.97

Material Boundary

X	Y
130.613	5067
400	5067

Material Boundary

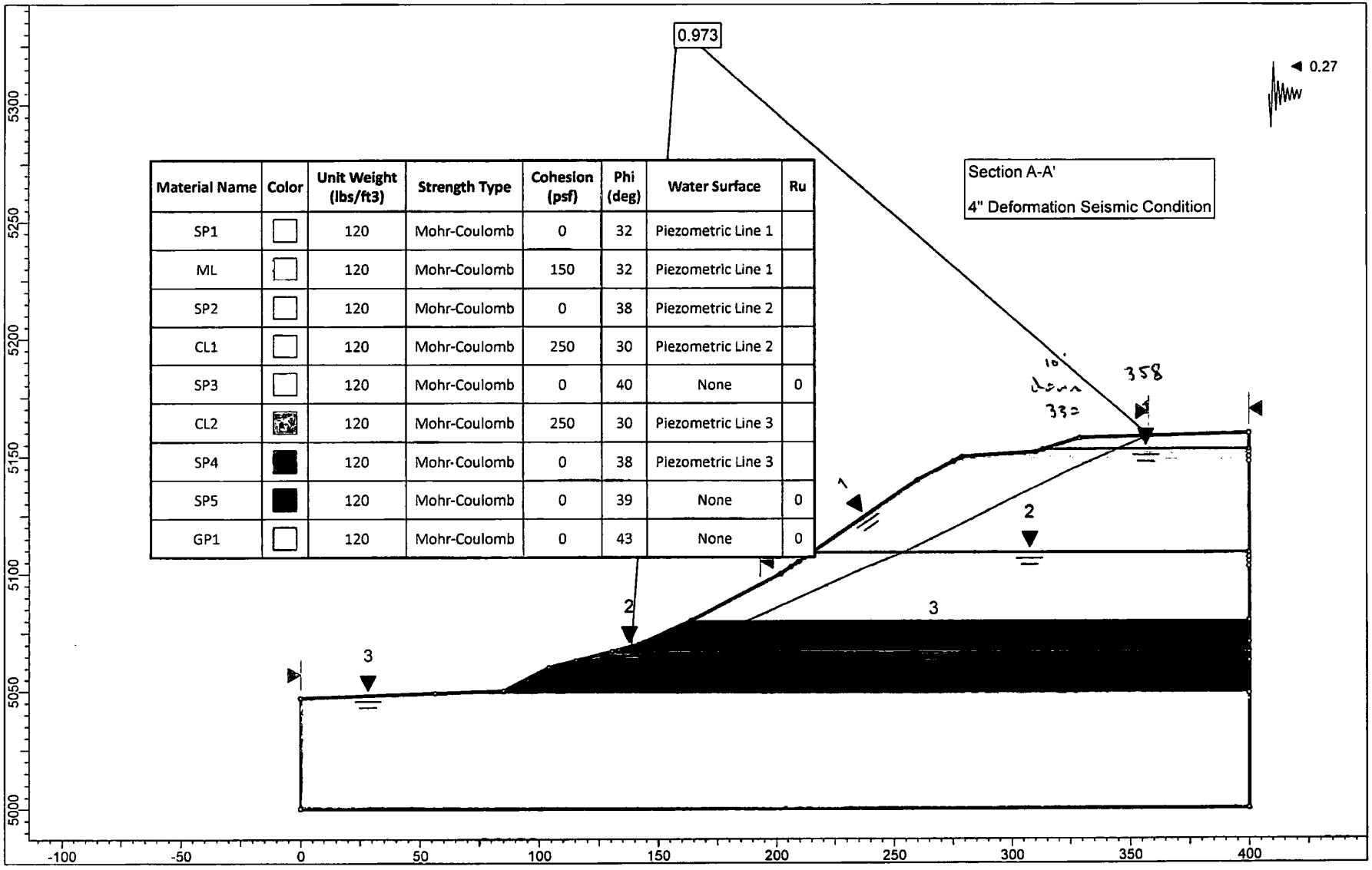
X	Y
115.313	5062.98
400	5062.98

Material Boundary

X	Y
164	5080
400	5080

Material Boundary

X	Y
56.3227	5048.99
400	5048.99



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	32	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0

BK 10585 PG 3708

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r1seis
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 7:59:11 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.27

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								

Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	32	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None
Hu Value	1	1	1	1		1	1	
Ru Value					0			0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 0.972505
Axis Location: 158.409, 5333.241
Left Slip Surface Endpoint: 138.494, 5069.077
Right Slip Surface Endpoint: 357.791, 5158.811
Resisting Moment=6.32185e+007 lb-ft
Driving Moment=6.50058e+007 lb-ft
Resisting Horizontal Force=236201 lb
Driving Horizontal Force=242879 lb
Total Slice Area=3406.53 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
138.494	5069.08
147.134	5068.64
165.927	5072.55
187.915	5079.96
204.473	5087.4
226.482	5097.35
235.966	5101.63
254.257	5109
271.563	5117.51
290.425	5126.95
298.144	5130.81
310.714	5137.1
324.74	5144.11
338.304	5150.14
357.791	5158.81

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1618
Number of Invalid Surfaces: 2883

Error Codes:

Error Code -105 reported for 114 surfaces
Error Code -113 reported for 2769 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.

-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.972505

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	8.63945	1708.58	SP4	0	38	184.324	179.256	229.437	0	229.437
2	9.39661	5470.66	SP4	0	38	456.02	443.482	567.63	0	567.63
3	9.39661	8095.56	SP4	0	38	730.646	710.557	909.472	0	909.472
4	21.9883	27819.8	SP4	0	38	973.276	946.516	1211.49	0	1211.49
5	0.0877207	132.947	SP4	0	38	997.194	969.776	1241.25	0	1241.25
6	8.23487	12798.4	SP3	0	40	1122.7	1091.83	1301.19	0	1301.19
7	8.23487	13487.4	SP3	0	40	1181.87	1149.37	1369.77	0	1369.77
8	11.0045	20623.3	SP3	0	40	1325.69	1289.24	1536.45	0	1536.45
9	11.0045	24075.3	SP3	0	40	1516.6	1474.9	1757.72	0	1757.72
10	9.48388	23517.9	SP3	0	40	1683.38	1637.1	1951.02	0	1951.02
11	3.32732	8891.38	SP3	0	40	2032.09	1976.22	2355.16	0	2355.16
12	9.97043	28926.1	CL1	250	30	1312.22	1276.14	2026.77	249.438	1777.33
13	4.99338	15773.2	SP2	0	38	1940.67	1887.31	2477.07	61.4314	2415.64
14	8.65332	28884.3	SP2	0	38	1734.81	1687.11	2159.4	0	2159.4
15	8.65332	29517.6	SP2	0	38	1762.01	1713.56	2193.25	0	2193.25
16	9.43075	32367.3	SP2	0	38	1746.17	1698.16	2173.55	0	2173.55
17	9.43075	29249.1	SP2	0	38	1586.46	1542.84	1974.74	0	1974.74
18	7.71885	20478.8	SP2	0	38	1367.09	1329.5	1701.68	0	1701.68
19	12.5702	26689.5	SP2	0	38	1106.7	1076.27	1377.56	0	1377.56
20	14.0261	23287.5	SP2	0	38	884.842	860.513	1101.41	0	1101.41
21	8.81002	12302.2	SP2	0	38	805.393	783.249	1002.51	0	1002.51
22	4.75352	5195.27	ML	150	32	504.287	490.422	792.12	247.331	544.789
23	4.17248	3629.38	ML	150	32	480.569	467.356	631.355	123.478	507.877

24	7.65752	4396.68	SP1	0	32	275.702	268.122	429.084	0	429.084
25	7.65752	1465.56	SP1	0	32	94.068	91.4816	146.402	0	146.402

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.972505

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	138.494	5069.08	0	0	0
2	147.134	5068.64	1231.79	192.76	8.89395
3	156.53	5070.6	2928.62	948.559	17.9468
4	165.927	5072.55	5828.13	2829.2	25.8937
5	187.915	5079.96	10744.1	8856.81	39.5002
6	188.003	5080	10746.8	8872.02	39.5414
7	196.238	5083.7	11725.3	10940	43.0156
8	204.473	5087.4	12751.4	13102.5	45.778
9	215.477	5092.37	14127.4	15982.8	48.5261
10	226.482	5097.35	15571.5	18795.8	50.3597
11	235.966	5101.63	16821.1	20999	51.3038
12	239.293	5102.97	18026.2	22666.8	51.5059
13	249.263	5106.99	15162	19217.1	51.7271
14	254.257	5109	15612.8	19715.1	51.6236
15	262.91	5113.25	13636	16899.8	51.1009
16	271.563	5117.51	11579.5	13859.8	50.1221
17	280.994	5122.23	9053.61	10228.8	48.4876
18	290.425	5126.95	6801.36	7087.62	46.1807
19	298.144	5130.81	5253.46	5022.72	43.7137
20	310.714	5137.1	3295.88	2608.84	38.3632
21	324.74	5144.11	1691.59	977.761	30.0285
22	333.55	5148.03	1537.58	663.326	23.3358
23	338.304	5150.14	857.421	299.501	19.2545

24	342.476	5152	711.104	196.184	15.4235
25	350.134	5155.41	173.944	24.1396	7.90093
26	357.791	5158.81	0	0	0

List Of Coordinates

Piezoline

X	Y
215.018	5108.98
260	5140
275.258	5148.03
279	5150
310	5152
313.328	5153.05
400	5153.05

Piezoline

X	Y
133.333	5067.72
142	5070
144.134	5070.97
164	5080
202	5100
206.311	5102.97
209.475	5105.16
212.133	5106.99
215.018	5108.98
400	5108.98

Piezoline

X	Y
0	5047
56.3227	5048.99
85	5050
104	5060
115.313	5062.98
130.613	5067
133.333	5067.72
400	5067.72

External Boundary

X	Y
0	5000
400	5000
400	5048.99
400	5062.98
400	5067
400	5070.97
400	5080
400	5102.97
400	5105.16
400	5106.99
400	5108.98
400	5148.03
400	5150
400	5152
400	5153.05
400	5160
329	5158
313.328	5153.05
310	5152

279	5150
275.258	5148.03
260	5140
215.018	5108.98
212.133	5106.99
209.475	5105.16
206.311	5102.97
202	5100
164	5080
144.134	5070.97
142	5070
130.613	5067
115.313	5062.98
104	5060
85	5050
56.3227	5048.99
0	5047

Material Boundary

X	Y
310	5152
400	5152

Material Boundary

X	Y
275.258	5148.03
400	5148.03

Material Boundary

X	Y

212.133	5106.99
400	5106.99

Material Boundary

X	Y
206.311	5102.97
400	5102.97

Material Boundary

X	Y
130.613	5067
400	5067

Material Boundary

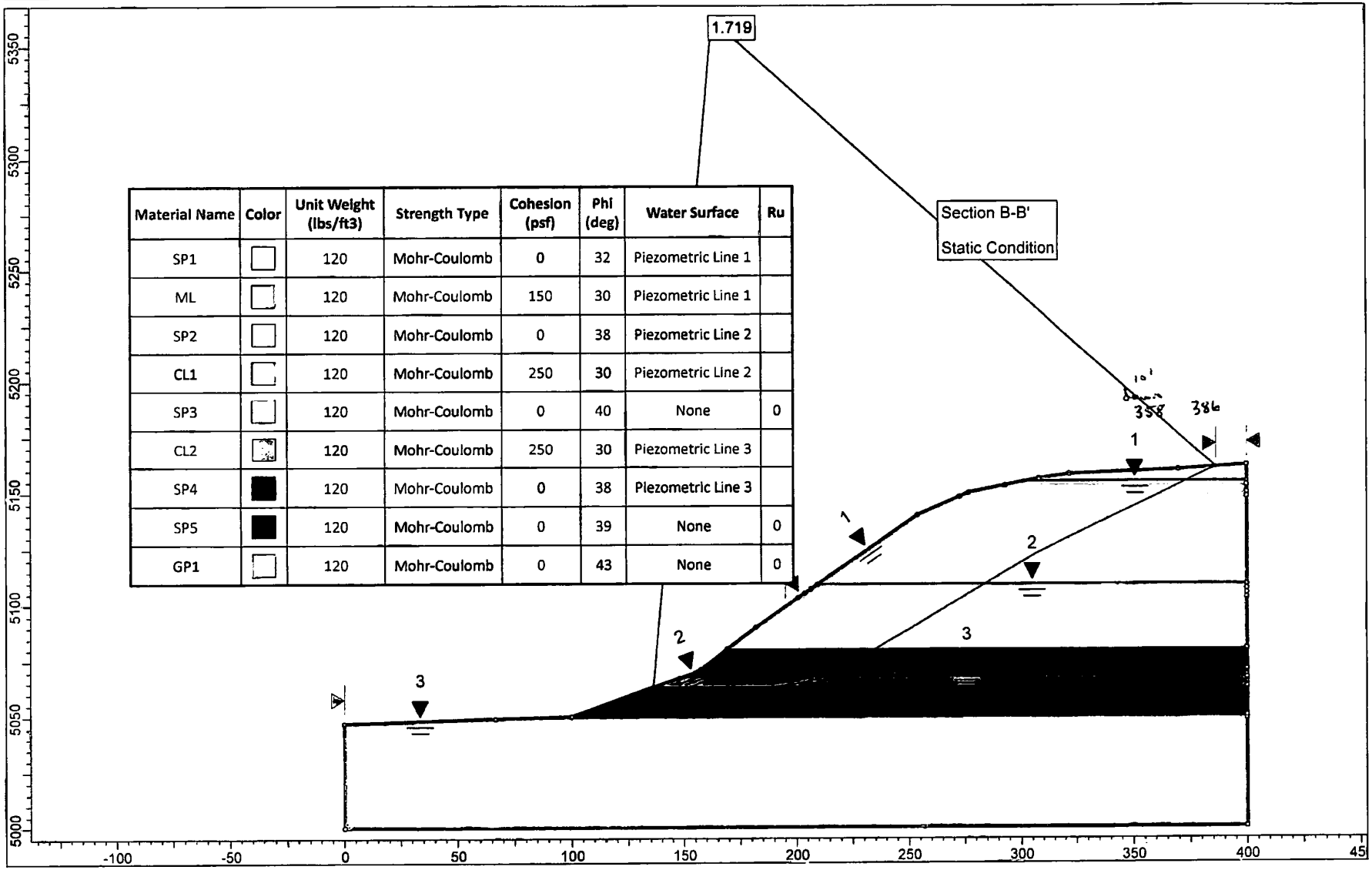
X	Y
115.313	5062.98
400	5062.98

Material Boundary

X	Y
164	5080
400	5080

Material Boundary

X	Y
56.3227	5048.99
400	5048.99



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	30	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r2
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 8:17:47 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	30	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None

Hu Value	1	1	1	1	1	1	
Ru Value				0			0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 1.718740
Axis Location: 163.054, 5362.103
Left Slip Surface Endpoint: 136.170, 5062.918
Right Slip Surface Endpoint: 386.271, 5161.085
Resisting Moment=1.669e+008 lb-ft
Driving Moment=9.71057e+007 lb-ft
Resisting Horizontal Force=527892 lb
Driving Horizontal Force=307139 lb
Total Slice Area=7153.55 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
136.17	5062.92
140.222	5062.91

190.088	5062.98
200.411	5064.31
211.926	5067.1
235.368	5080.04
248.561	5087.92
261.341	5095.54
285.166	5109.77
306.687	5122.56
344.758	5140.99
386.271	5161.08

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1420
Number of Invalid Surfaces: 3081

Error Codes:

Error Code -105 reported for 346 surfaces
Error Code -113 reported for 2735 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.71874

	Base	Base	Shear	Shear	Base	Pore	Effective

Number	[ft]	[lbs]	Material	Cohesion [psf]	Friction Angle [degrees]	Stress [psf]	Strength [psf]	Normal Stress [psf]	Pressure [psf]	Normal Stress [psf]
1	4.05216	353.744	SP5	0	39	41.6783	71.6342	88.4609	0	88.4609
2	5.49965	1605.85	SP5	0	39	142.052	244.151	301.502	0	301.502
3	11.0917	7183.26	CL2	250	30	263.526	452.932	687.472	335.984	351.488
4	11.0917	15907.1	CL2	250	30	559.203	961.125	1566.74	335.031	1231.71
5	11.0917	27243	CL2	250	30	960.896	1651.53	2761.6	334.079	2427.52
6	11.0917	38285.4	CL2	250	30	1375.54	2364.2	3995.02	333.126	3661.89
7	10.3221	44041.2	CL2	250	30	1591.73	2735.77	4596.52	291.042	4305.47
8	11.5157	56761.6	CL2	250	30	1744.46	2998.27	4922.47	162.331	4760.14
9	11.7207	62607.7	SP4	0	38	1936.11	3327.67	4259.23	0	4259.23
10	11.7207	64957.7	SP4	0	38	1982.53	3407.45	4361.33	0	4361.33
11	0.244179	1378.1	SP4	0	38	1943.88	3341.02	4276.33	0	4276.33
12	12.9493	74083.6	SP3	0	40	2098.48	3606.74	4298.35	0	4298.35
13	12.7797	74197.9	SP3	0	40	2111.38	3628.92	4324.78	0	4324.78
14	12.6242	70631.1	SP3	0	40	2023.61	3478.06	4144.99	0	4144.99
15	6.69063	35983	CL1	250	30	1412.18	2427.17	4016.83	245.854	3770.98
16	4.51022	23123.8	SP2	0	38	1711.67	2941.91	3802.73	37.2584	3765.48
17	10.7603	51209.4	SP2	0	38	1608.69	2764.92	3538.94	0	3538.94
18	10.7603	45641.3	SP2	0	38	1438.85	2473.01	3165.31	0	3165.31
19	9.5179	36124.6	SP2	0	38	1393.01	2394.22	3064.47	0	3064.47
20	9.5179	32335.7	SP2	0	38	1247.51	2144.14	2744.38	0	2744.38
21	9.5179	27729.6	SP2	0	38	1070.39	1839.73	2354.75	0	2354.75
22	9.5179	22919.6	SP2	0	38	885.212	1521.45	1947.36	0	1947.36
23	14.5881	25793	SP2	0	38	650.174	1117.48	1430.3	0	1430.3
24	10.4158	11502	ML	150	30	311.396	535.208	926.137	258.94	667.197
25	16.5093	6827.11	SP1	0	32	126.484	217.393	347.901	0	347.901

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.71874

X	Y	Interslice	Interslice	Interslice

Number	coordinate [ft]	coordinate - Bottom [ft]	Normal Force [lbs]	Shear Force [lbs]	Force Angle [degrees]
1	136.17	5062.92	0	0	0
2	140.222	5062.91	169.574	4.39023	1.48304
3	145.722	5062.92	948.531	57.7731	3.48546
4	156.813	5062.93	3860.98	503.772	7.43383
5	167.905	5062.95	10039.6	1983.01	11.1732
6	178.997	5062.96	20655.4	5385.52	14.6135
7	190.088	5062.98	35851.5	11432.7	17.687
8	200.411	5064.31	46151.7	16960.1	20.1777
9	211.926	5067.1	52497.9	21754.4	22.5084
10	223.647	5073.57	47639.7	21591.6	24.3813
11	235.368	5080.04	42665.1	20575.7	25.7462
12	235.612	5080.19	42516.5	20525.1	25.7692
13	248.561	5087.92	36466.7	18322.3	26.6767
14	261.341	5095.54	30459.5	15499.6	26.9697
15	273.965	5103.08	24772.1	12444.3	26.6727
16	280.656	5107.07	18178.8	8976.17	26.2788
17	285.166	5109.77	15661.4	7611.64	25.9203
18	295.926	5116.16	10340.5	4769.72	24.7623
19	306.687	5122.56	5581.41	2389.42	23.1759
20	316.205	5127.16	4719.07	1851	21.417
21	325.722	5131.77	3946.79	1384.43	19.3295
22	335.24	5136.38	3284.16	999.378	16.9251
23	344.758	5140.99	2736.17	693.579	14.224
24	359.346	5148.05	2119.28	357.82	9.58346
25	369.762	5153.09	692.517	72.5558	5.98112
26	386.271	5161.08	0	0	0

List Of Coordinates

Piezoline

X	Y
209.384	5109.02
254	5140
272.514	5148.05
277	5150
292.976	5153.09
301.389	5154.72
400	5154.72

Piezoline

X	Y
151.267	5068.31
156	5070
157.288	5070.99
169.243	5080.19
182	5090
200.835	5103.08
203.764	5105.11
206.585	5107.07
209.384	5109.02
400	5109.02

Piezoline

X	Y
0	5047
66.6301	5049
100	5050
136.169	5062.92
147.823	5067.08
151.267	5068.31

400	5068.31

External Boundary

X	Y
0	5000
400	5000
400	5049
400	5050
400	5062.92
400	5067.08
400	5070.99
400	5080.19
400	5103.08
400	5105.11
400	5107.07
400	5109.02
400	5148.05
400	5150
400	5153.09
400	5162
370	5160
322	5158
308	5156
292.976	5153.09
277	5150
272.514	5148.05
254	5140
209.384	5109.02
206.585	5107.07
203.764	5105.11
200.835	5103.08

182	5090
169.243	5080.19
157.288	5070.99
156	5070
147.823	5067.08
136.169	5062.92
100	5050
66.6301	5049
0	5047

Material Boundary

X	Y
292.976	5153.09
400	5153.09

Material Boundary

X	Y
147.823	5067.08
400	5067.08

Material Boundary

X	Y
169.243	5080.19
400	5080.19

Material Boundary

X	Y
272.514	5148.05
400	5148.05

Material Boundary

X	Y
206.585	5107.07
400	5107.07

Material Boundary

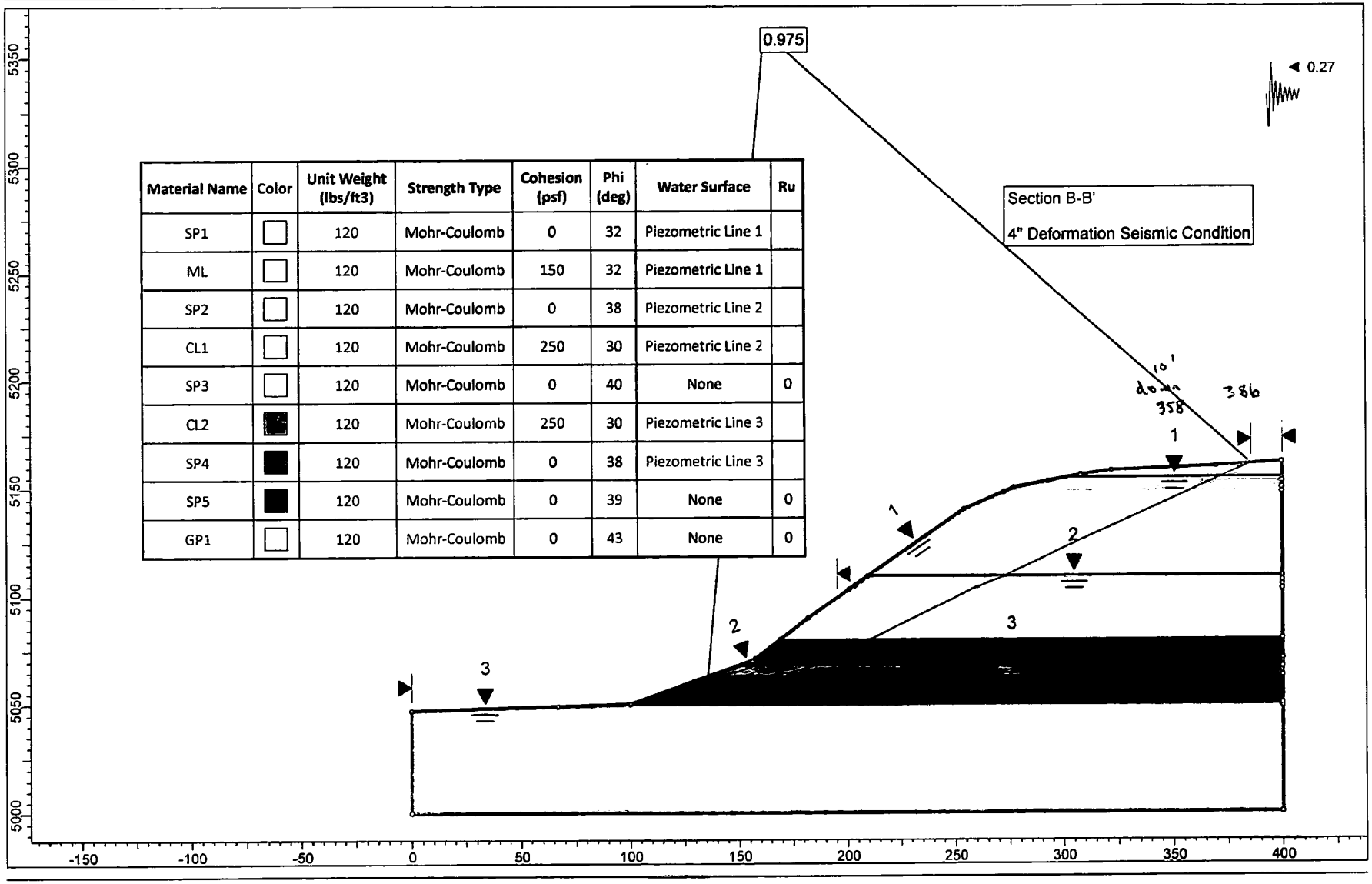
X	Y
200.835	5103.08
400	5103.08

Material Boundary

X	Y
136.169	5062.92
400	5062.92

Material Boundary

X	Y
66.6301	5049
400	5049



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	32	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r2seis
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 8:17:47 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: **Park and Miller v.3**

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.27

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								

Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	32	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None
Hu Value	1	1	1	1		1	1	
Ru Value					0			0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 0.974980
Axis Location: 162.360, 5361.854
Left Slip Surface Endpoint: 135.679, 5062.743
Right Slip Surface Endpoint: 385.641, 5161.043
Resisting Moment=1.23354e+008 lb-ft
Driving Moment=1.2652e+008 lb-ft
Resisting Horizontal Force=406344 lb
Driving Horizontal Force=416771 lb
Total Slice Area=5941.97 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
135.679	5062.74
164.676	5063.2
172.931	5064.3
183.801	5067.03
192.606	5071.04
216.139	5082.47
225.492	5087.05
241.796	5095.05
258.099	5103.04
272.209	5108.7
289.187	5116.72
306.166	5124.74
338.188	5139.36
361.914	5150.2
385.641	5161.04

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1347
Number of Invalid Surfaces: 3154

Error Codes:

Error Code -105 reported for 200 surfaces
Error Code -111 reported for 8 surfaces
Error Code -113 reported for 2946 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.97498

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	10.9896	2472.58	SP5	0	39	213.981	208.627	257.633	0	257.633
2	9.0035	5711.09	CL2	250	30	546.076	532.413	818.999	329.846	489.153
3	9.0035	10891.5	CL2	250	30	1112.75	1084.91	1769.15	323.044	1446.11
4	8.25523	15947.8	CL2	250	30	1591.68	1551.86	2539.4	284.506	2254.89
5	10.87	28083	CL2	250	30	1873.02	1826.16	2895.07	165.079	2729.99
6	0.104715	304.487	CL2	250	30	1593.39	1553.52	2335.99	78.23	2257.76
7	8.70021	26395.3	SP4	0	38	2058.23	2006.73	2568.5	0	2568.5
8	9.41786	30858.8	SP4	0	38	2041.72	1990.64	2547.91	0	2547.91
9	9.41786	33084.3	SP4	0	38	2109.7	2056.92	2632.74	0	2632.74
10	4.69706	17332.2	SP3	0	40	2473.12	2411.24	2873.6	0	2873.6
11	9.35289	36134.8	SP3	0	40	2515.37	2452.44	2922.71	0	2922.71
12	16.3037	68113.1	SP3	0	40	2631.02	2565.19	3057.07	0	3057.07
13	16.3037	74363.1	SP3	0	40	2748.38	2679.62	3193.44	0	3193.44
14	10.0589	46970	CL1	250	30	1814.17	1768.78	2877.7	247.105	2630.59
15	4.05041	19029.3	SP2	0	38	2988.62	2913.84	3800.11	70.5762	3729.54
16	8.4894	39593.5	SP2	0	38	2399.52	2339.48	2994.4	0	2994.4
17	8.4894	37514.8	SP2	0	38	2263.57	2206.94	2824.75	0	2824.75
18	16.9788	67796.8	SP2	0	38	2052.86	2001.5	2561.8	0	2561.8
19	10.6739	37552.3	SP2	0	38	1901.56	1853.98	2372.99	0	2372.99
20	10.6739	33085.4	SP2	0	38	1685.39	1643.22	2103.23	0	2103.23
21	10.6739	27571	SP2	0	38	1412.45	1377.11	1762.63	0	1762.63

22	19.0105	35047.9	SP2	0	38	1013.13	987.777	1264.3	0	1264.3
23	4.71597	5907.18	ML	150	32	473.292	461.45	847.477	349.053	498.424
24	6.3224	6180.95	ML	150	32	471.261	459.47	686.978	191.723	495.255
25	17.404	7095.49	SP1	0	32	191.726	186.929	299.15	0	299.15

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.97498

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	135.679	5062.74	0	0	0
2	146.669	5062.92	1638.88	396.129	13.5882
3	155.672	5063.06	4896.09	2137.17	23.5815
4	164.676	5063.2	11720.5	7333.73	32.035
5	172.931	5064.3	17781.6	14087.2	38.3875
6	183.801	5067.03	22638.2	22597.8	44.9488
7	183.906	5067.08	22611.4	22614	45.0033
8	192.606	5071.04	23207.8	26726	49.0302
9	202.024	5075.62	22458.1	29195.8	52.4317
10	211.442	5080.19	21359.9	30549.8	55.0394
11	216.139	5082.47	21745.5	32353.2	56.0938
12	225.492	5087.05	22112.5	35088.8	57.7814
13	241.796	5095.05	22180.2	37849.1	59.629
14	258.099	5103.04	21383.7	37520.8	60.3205
15	268.158	5107.07	15342.5	26815	60.2235
16	272.209	5108.7	16137.3	28032	60.0721
17	280.698	5112.71	13810.7	23480.6	59.537
18	289.187	5116.72	11571.5	19022.6	58.6877
19	306.166	5124.74	7577.09	11185	55.885
20	316.84	5129.61	6164.01	8233.94	53.1811
21	327.514	5134.49	4965.01	5816.26	49.5145

22	338.188	5139.36	4002.42	3946.55	44.5973
23	357.198	5148.05	2819.64	1732.06	31.5617
24	361.914	5150.2	1630.94	841.209	27.2839
25	368.237	5153.09	957.41	364.728	20.8545
26	385.641	5161.04	0	0	0

List Of Coordinates

Piezoline

X	Y
209.384	5109.02
254	5140
272.514	5148.05
277	5150
292.976	5153.09
301.389	5154.72
400	5154.72

Piezoline

X	Y
151.267	5068.31
156	5070
157.288	5070.99
169.243	5080.19
182	5090
200.835	5103.08
203.764	5105.11
206.585	5107.07
209.384	5109.02
400	5109.02

Piezoline

X	Y
0	5047
66.6301	5049
100	5050
136.169	5062.92
147.823	5067.08
151.267	5068.31
400	5068.31

External Boundary

X	Y
0	5000
400	5000
400	5049
400	5050
400	5062.92
400	5067.08
400	5070.99
400	5080.19
400	5103.08
400	5105.11
400	5107.07
400	5109.02
400	5148.05
400	5150
400	5153.09
400	5162
370	5160
322	5158

308	5156
292.976	5153.09
277	5150
272.514	5148.05
254	5140
209.384	5109.02
206.585	5107.07
203.764	5105.11
200.835	5103.08
182	5090
169.243	5080.19
157.288	5070.99
156	5070
147.823	5067.08
136.169	5062.92
100	5050
66.6301	5049
0	5047

Material Boundary

X	Y
292.976	5153.09
400	5153.09

Material Boundary

X	Y
147.823	5067.08
400	5067.08

Material Boundary

X	Y
169.243	5080.19
400	5080.19

Material Boundary

X	Y
272.514	5148.05
400	5148.05

Material Boundary

X	Y
206.585	5107.07
400	5107.07

Material Boundary

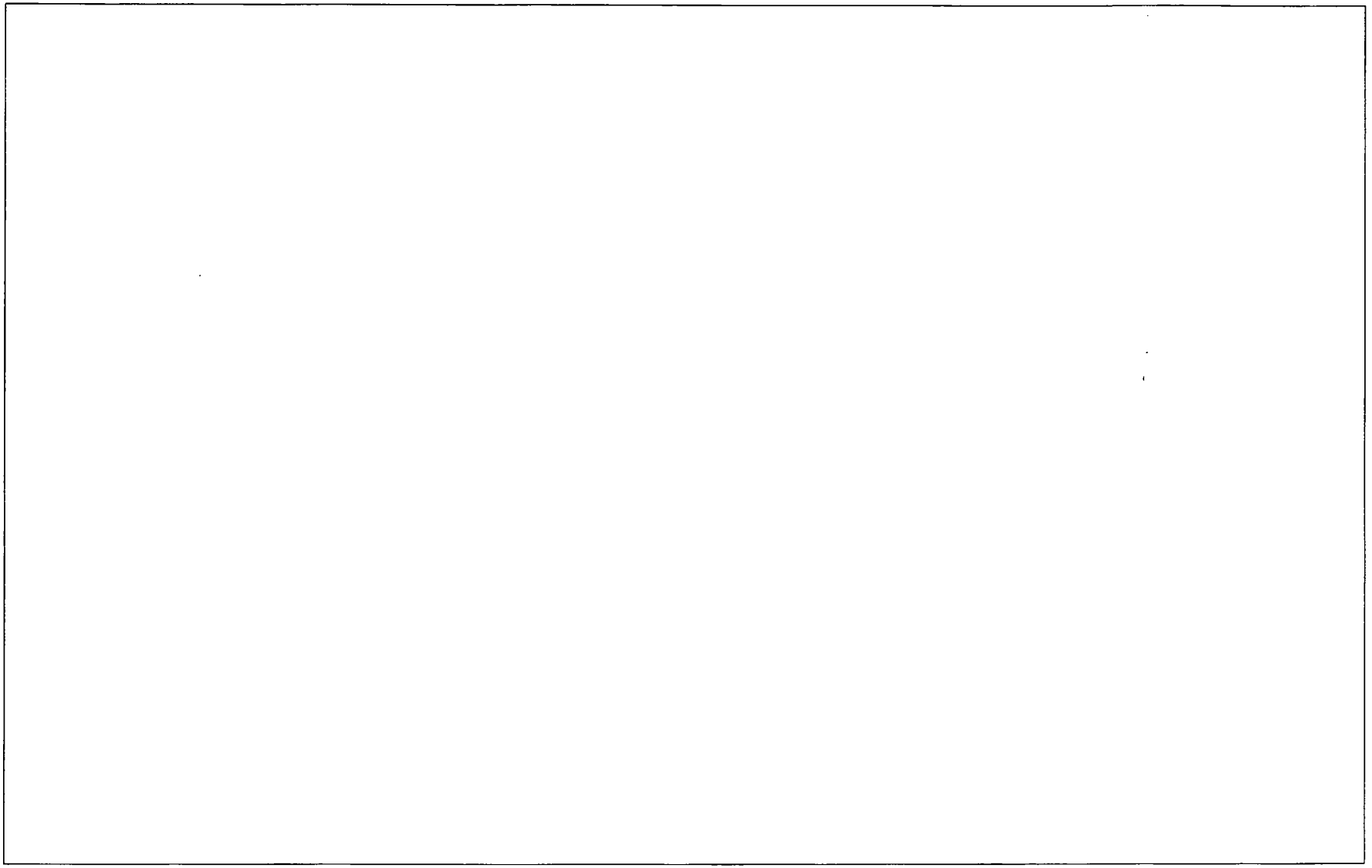
X	Y
200.835	5103.08
400	5103.08

Material Boundary

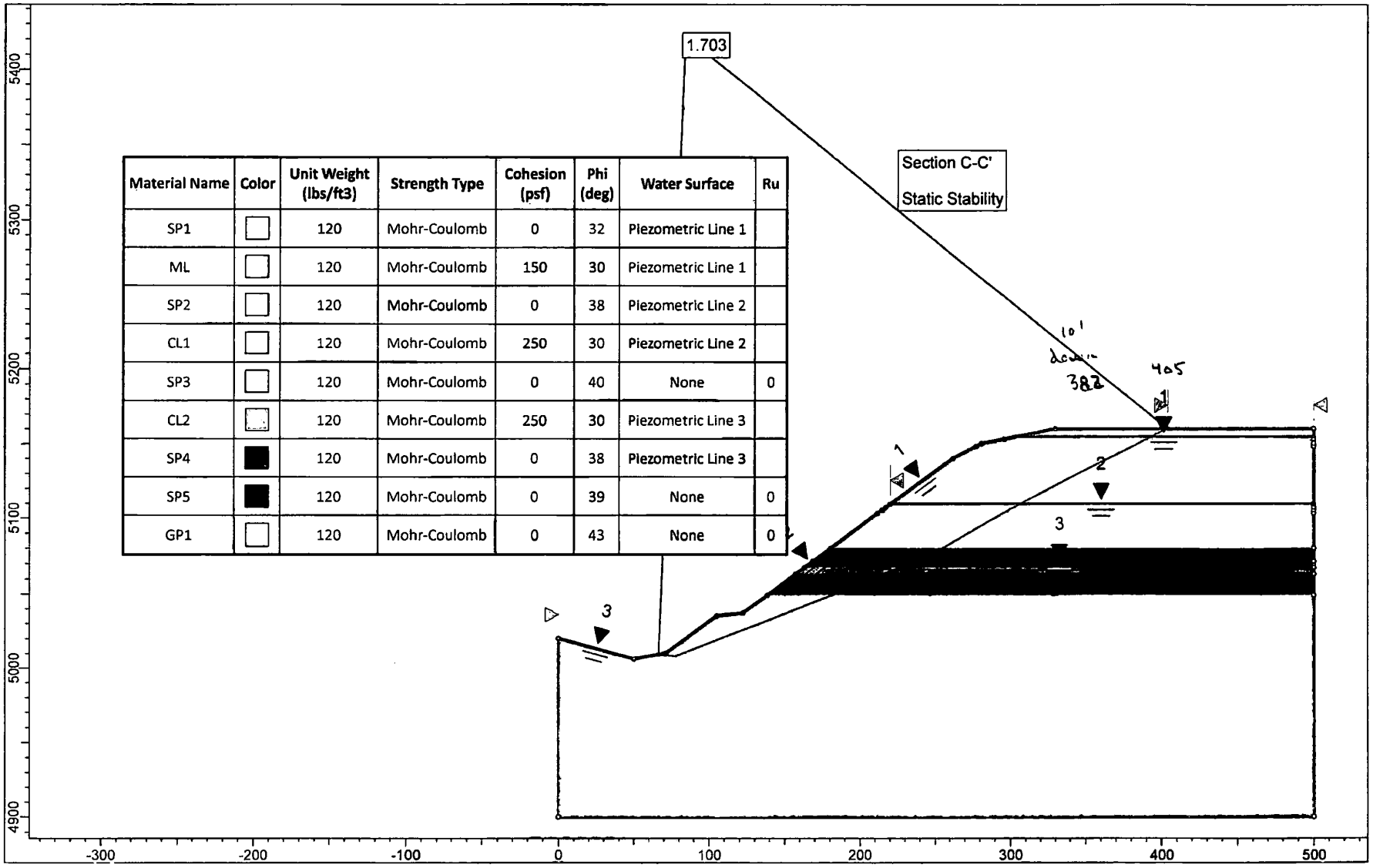
X	Y
136.169	5062.92
400	5062.92

Material Boundary

X	Y
66.6301	5049
400	5049



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	30	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0



BK 10585 PG 3742

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r3
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 10:58:46 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	30	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None

Hu Value	1	1	1	1		1	1
Ru Value					0		0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 1.702510
Axis Location: 84.171, 5422.119
Left Slip Surface Endpoint: 66.285, 5009.102
Right Slip Surface Endpoint: 403.853, 5160.000
Resisting Moment=3.43278e+008 lb-ft
Driving Moment=2.01631e+008 lb-ft
Resisting Horizontal Force=810532 lb
Driving Horizontal Force=476080 lb
Total Slice Area=10241.6 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
66.2846	5009.1
77.3545	5007.98

111.099	5021.09
144.845	5034.2
152.28	5037.23
213.446	5062.12
231.151	5068.46
255.32	5080.02
283.928	5096.53
306.943	5109.67
363.402	5138.99
370.378	5142.61
403.853	5160

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1747
Number of Invalid Surfaces: 2754

Error Codes:

Error Code -105 reported for 270 surfaces
Error Code -113 reported for 2484 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.70251

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	11.0699	3467.99	GP1	0	43	188.91	321.621	344.897	0	344.897
2	16.8725	19479.9	GP1	0	43	536.672	913.69	979.813	0	979.813
3	16.8725	29945.8	GP1	0	43	836.389	1423.96	1527.01	0	1527.01
4	33.745	60080.9	GP1	0	43	862.203	1467.91	1574.14	0	1574.14
5	7.43543	18583.8	GP1	0	43	1201.44	2045.47	2193.5	0	2193.5
6	14.4281	42282.2	GP1	0	43	1411.9	2403.77	2577.73	0	2577.73
7	14.4281	50493.2	GP1	0	43	1689.71	2876.74	3084.93	0	3084.93
8	16.1549	66280.2	SP5	0	39	1710.68	2912.45	3596.57	0	3596.57
9	16.1549	76574.3	SP5	0	39	1967.9	3350.37	4137.36	0	4137.36
10	2.16676	11067.2	SP5	0	39	2209.2	3761.19	4644.69	0	4644.69
11	11.9668	64956.8	CL2	250	30	1705.35	2903.38	4830.64	234.847	4595.8
12	3.57186	20646.3	SP4	0	38	2364.13	4024.96	5213.02	61.3055	5151.72
13	24.169	150688	SP4	0	38	2320.89	3951.33	5057.48	0	5057.48
14	14.3037	95740.3	SP3	0	40	2466.17	4198.68	5003.79	0	5003.79
15	14.3037	94888.6	SP3	0	40	2443.03	4159.29	4956.85	0	4956.85
16	11.4963	71685.2	SP3	0	40	2307.42	3928.41	4681.69	0	4681.69
17	6.8539	39968.2	CL1	250	30	1564.63	2663.79	4444.94	264.142	4180.8
18	4.66481	26019.4	SP2	0	38	1910.59	3252.8	4222.3	58.9067	4163.39
19	18.8196	96339.5	SP2	0	38	1845.5	3141.98	4021.55	0	4021.55
20	18.8196	80335.9	SP2	0	38	1544.88	2630.17	3366.46	0	3366.46
21	18.8196	58482.2	SP2	0	38	1129.49	1922.96	2461.27	0	2461.27
22	6.97631	16071.1	SP2	0	38	840.042	1430.18	1830.54	0	1830.54
23	10.5436	18532.7	SP2	0	38	642.128	1093.23	1399.26	0	1399.26
24	9.59146	10841	ML	150	30	324.627	552.68	939.563	242.103	697.46
25	13.34	5545.39	SP1	0	32	127.061	216.322	346.187	0	346.187

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.70251

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	66.2846	5009.1	0	0	0
2	77.3545	5007.98	2479.39	137.361	3.17101
3	94.227	5014.53	5110.57	707.899	7.88624
4	111.099	5021.09	9211.18	2010.1	12.3103
5	144.845	5034.2	17665.6	6354.31	19.7836
6	152.28	5037.23	19960.5	7716.1	21.1349
7	166.708	5043.1	25193.9	10916.9	23.4278
8	181.136	5048.97	31456.9	14856	25.2797
9	197.291	5055.55	35444.2	17926.2	26.8284
10	213.446	5062.12	40030.9	21129.9	27.8269
11	215.613	5062.9	41215.2	21840.1	27.9193
12	227.579	5067.18	40930.1	21996	28.2538
13	231.151	5068.46	42709.2	22992.7	28.296
14	255.32	5080.02	40360.8	21357.8	27.8865
15	269.624	5088.27	34332.3	17547	27.0713
16	283.928	5096.53	28360.4	13725.7	25.8258
17	295.424	5103.09	24150.7	11011.3	24.5102
18	302.278	5107	17476.5	7632.38	23.592
19	306.943	5109.67	15141	6398.92	22.91
20	325.762	5119.44	10565.2	3781.75	19.6945
21	344.582	5129.22	6734.73	1901.32	15.7652
22	363.402	5138.99	3934.23	779.166	11.2023
23	370.378	5142.61	3162.16	522.158	9.37647
24	380.922	5148.09	2270.21	259.024	6.50912
25	390.513	5153.07	703.488	46.929	3.81649
26	403.853	5160	0	0	0

List Of Coordinates

Piezoline

X	Y
220.246	5109.28
262	5140
277.372	5148.09
281	5150
296.052	5153.07
302.858	5154.46
500	5154.46

Piezoline

X	Y
165.229	5068.8
168.54	5071.24
180.381	5079.95
211.832	5103.09
214.65	5105.16
217.152	5107
220.246	5109.28
500	5109.28

Piezoline

X	Y
0	5020
50	5006
71	5010
105	5035
122	5037
138.273	5048.97
157.202	5062.9

163.024	5067.18
165.229	5068.8
500	5068.8

External Boundary

X	Y
0	4900
500	4900
500	5048.97
500	5062.9
500	5067.18
500	5071.24
500	5079.95
500	5103.09
500	5105.16
500	5107
500	5109.28
500	5148.09
500	5150
500	5153.07
500	5160
330	5160
296.052	5153.07
281	5150
277.372	5148.09
262	5140
220.246	5109.28
217.152	5107
214.65	5105.16
211.832	5103.09
180.381	5079.95

168.54	5071.24
163.024	5067.18
157.202	5062.9
138.273	5048.97
122	5037
105	5035
71	5010
50	5006
0	5020

Material Boundary

X	Y
296.052	5153.07
500	5153.07

Material Boundary

X	Y
277.372	5148.09
500	5148.09

Material Boundary

X	Y
217.152	5107
500	5107

Material Boundary

X	Y
211.832	5103.09
500	5103.09

Material Boundary

X	Y
180.381	5079.95
500	5079.95

Material Boundary

X	Y
163.024	5067.18
500	5067.18

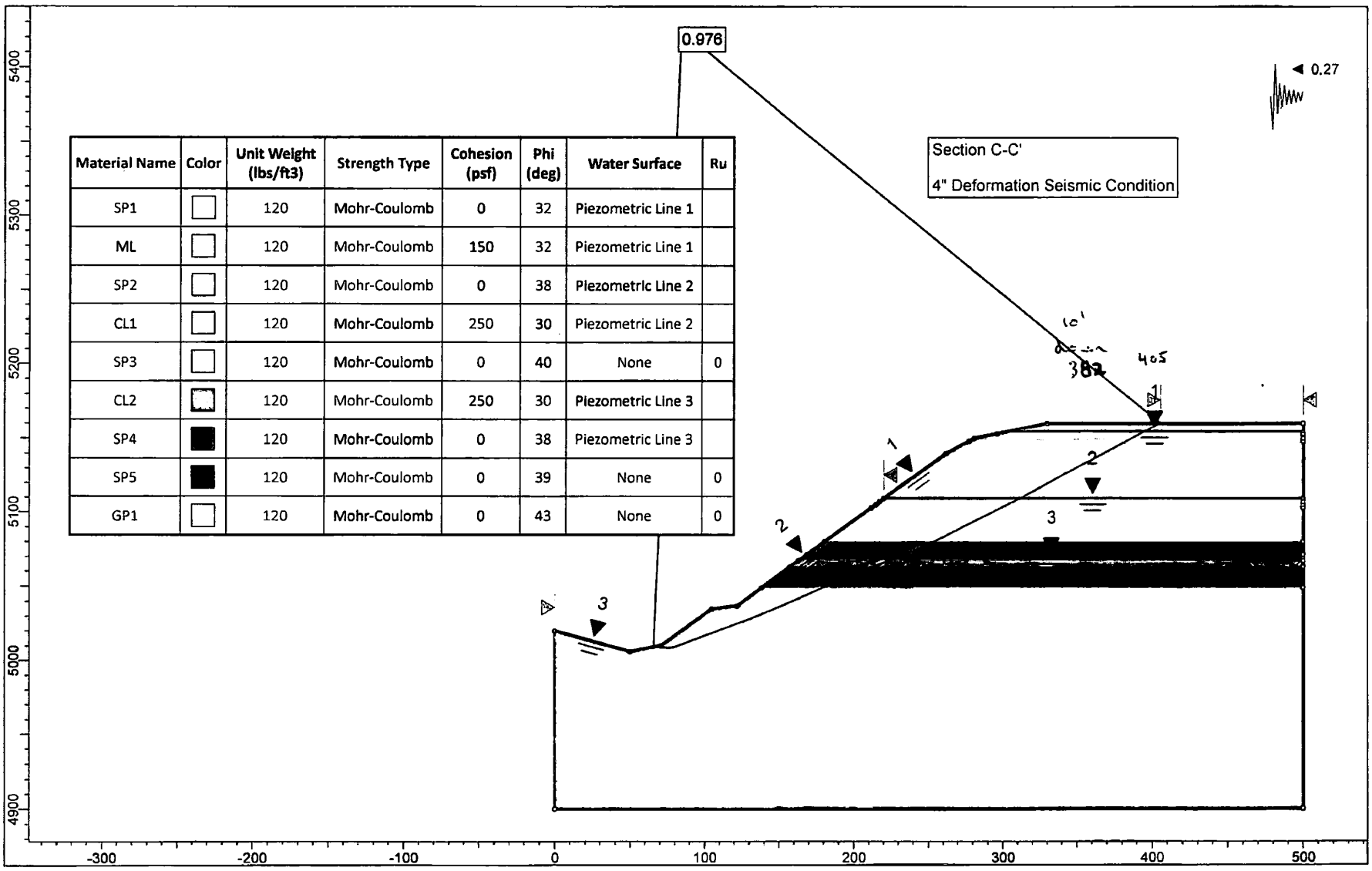
Material Boundary

X	Y
157.202	5062.9
500	5062.9

Material Boundary

X	Y
138.273	5048.97
500	5048.97

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
SP1		120	Mohr-Coulomb	0	32	Piezometric Line 1	
ML		120	Mohr-Coulomb	150	32	Piezometric Line 1	
SP2		120	Mohr-Coulomb	0	38	Piezometric Line 2	
CL1		120	Mohr-Coulomb	250	30	Piezometric Line 2	
SP3		120	Mohr-Coulomb	0	40	None	0
CL2		120	Mohr-Coulomb	250	30	Piezometric Line 3	
SP4		120	Mohr-Coulomb	0	38	Piezometric Line 3	
SP5		120	Mohr-Coulomb	0	39	None	0
GP1		120	Mohr-Coulomb	0	43	None	0



Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: 1140112r3seis
Slide Modeler Version: 6.03
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 10/3/2014, 10:58:46 AM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

GLE/Morgenstern-Price with interslice force function: Half Sine

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Search Method: Auto Refine Search
Divisions along slope: 10
Circles per division: 10
Number of iterations: 10
Divisions to use in next iteration: 50%
Number of vertices per surface: 12
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.27

Material Properties

Property	SP1	ML	SP2	CL1	SP3	CL2	SP4	SP5
Color								

Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	120	120	120	120	120	120	120	120
Cohesion [psf]	0	150	0	250	0	250	0	0
Friction Angle [deg]	32	32	38	30	40	30	38	39
Water Surface	Piezometric Line 1	Piezometric Line 1	Piezometric Line 2	Piezometric Line 2	None	Piezometric Line 3	Piezometric Line 3	None
Hu Value	1	1	1	1		1	1	
Ru Value					0			0

Property	GP1
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	120
Cohesion [psf]	0
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: gle/morgenstern-price

FS: 0.975974
Axis Location: 84.550, 5423.979
Left Slip Surface Endpoint: 65.803, 5009.010
Right Slip Surface Endpoint: 405.277, 5160.000
Resisting Moment=3.10222e+008 lb-ft
Driving Moment=3.17859e+008 lb-ft
Resisting Horizontal Force=733311 lb
Driving Horizontal Force=751363 lb
Total Slice Area=10385.8 ft2

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
65.8026	5009.01
78.5467	5008.64
130.645	5027.96
146.53	5034.66
209.226	5061.84
225.422	5067.4
253.774	5079.88
293.294	5100.07
311.722	5109.48
333.877	5121.52
377.584	5145.26
405.277	5160

Valid / Invalid Surfaces

Method: gle/morgenstern-price

Number of Valid Surfaces: 1849
Number of Invalid Surfaces: 2652

Error Codes:

Error Code -105 reported for 201 surfaces
Error Code -111 reported for 12 surfaces
Error Code -113 reported for 2439 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge

-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.975974

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	12.7441	3999.47	GP1	0	43	348.806	340.426	365.062	0	365.062
2	26.0491	36431.1	GP1	0	43	1110.16	1083.49	1161.9	0	1161.9
3	26.0491	44509.8	GP1	0	43	1530.1	1493.34	1601.41	0	1601.41
4	15.8852	34109.1	GP1	0	43	1892.18	1846.72	1980.37	0	1980.37
5	16.5073	45324.5	GP1	0	43	2413.28	2355.3	2525.74	0	2525.74
6	16.5073	55206.5	GP1	0	43	2985.86	2914.12	3125.01	0	3125.01
7	14.8407	58068.8	SP5	0	39	2731.72	2666.09	3292.35	0	3292.35
8	14.8407	66056.2	SP5	0	39	3023.5	2950.86	3644.01	0	3644.01
9	3.08712	14796.1	SP5	0	39	4084.43	3986.3	4922.66	0	4922.66
10	12.4841	64412.9	CL2	250	30	2528.13	2467.39	4075.49	234.847	3840.64
11	0.624184	3413.28	SP4	0	38	4066.52	3968.82	5174.38	94.515	5079.86
12	14.1764	81293.7	SP4	0	38	3389.1	3307.67	4233.62	0	4233.62
13	14.1764	88420.6	SP4	0	38	3602	3515.46	4499.58	0	4499.58
14	0.146341	949.832	SP4	0	38	3195.2	3118.43	3991.4	0	3991.4
15	19.6868	131352	SP3	0	40	3648.77	3561.1	4243.95	0	4243.95
16	19.6868	129969	SP3	0	40	3563.19	3477.58	4144.42	0	4144.42
17	5.92018	36611.4	SP3	0	40	3314.47	3234.84	3855.13	0	3855.13
18	7.66177	45466.2	CL1	250	30	2069.07	2019.36	3328.76	264.142	3064.62
19	4.84578	27640.1	SP2	0	38	2733.72	2668.04	3479.73	64.7861	3414.94
20	22.1548	114211	SP2	0	38	2459.66	2400.56	3072.58	0	3072.58
21	21.8537	85342.2	SP2	0	38	1937.86	1891.3	2420.76	0	2420.76
22	21.8537	54220.3	SP2	0	38	1279.13	1248.4	1597.88	0	1597.88
23	5.32012	8507.32	SP2	0	38	851.017	830.57	1063.08	0	1063.08
24	9.35774	10576.8	ML	150	32	505.331	493.19	791.321	242.103	549.218

25	13.015	5410.26	SP1	0	32	192.669	188.04	300.926	0	300.926

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 0.975974

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	65.8026	5009.01	0	0	0
2	78.5467	5008.64	3499.81	524.48	8.5229
3	104.596	5018.3	11359.3	5083	24.1073
4	130.645	5027.96	23731.3	17067.8	35.7241
5	146.53	5034.66	31310	27096.2	40.8735
6	163.037	5041.82	40835	40734.2	44.9292
7	179.545	5048.97	52855.3	58479.6	47.8919
8	194.385	5055.41	56536.3	66846.2	49.7766
9	209.226	5061.84	60128.4	74321.2	51.026
10	212.313	5062.9	63528.1	79048.6	51.2126
11	224.797	5067.18	60240.1	76343.9	51.7244
12	225.422	5067.4	60748.5	77031.4	51.74
13	239.598	5073.64	60425.1	76904.1	51.8426
14	253.774	5079.88	59535.9	74749	51.4635
15	253.921	5079.95	59448.7	74622.1	51.4569
16	273.607	5090.01	53133.7	63515.9	50.0861
17	293.294	5100.07	46508.5	50973	47.6222
18	299.214	5103.09	44586.3	47209	46.6366
19	306.876	5107	35134.1	35345.5	45.1719
20	311.722	5109.48	32304.1	31334.8	44.1274
21	333.877	5121.52	18957.1	14817.6	38.0126
22	355.73	5133.39	9535.76	5375.57	29.4112
23	377.584	5145.26	3887.16	1254.92	17.892
24	382.904	5148.09	3106.98	813.451	14.6715

25	392.262	5153.07	1038.09	158.858	8.70043
26	405.277	5160	0	0	0

List Of Coordinates

Piezoline

X	Y
220.246	5109.28
262	5140
277.372	5148.09
281	5150
296.052	5153.07
302.858	5154.46
500	5154.46

Piezoline

X	Y
165.229	5068.8
168.54	5071.24
180.381	5079.95
211.832	5103.09
214.65	5105.16
217.152	5107
220.246	5109.28
500	5109.28

Piezoline

X	Y
0	5020

50	5006
71	5010
105	5035
122	5037
138.273	5048.97
157.202	5062.9
163.024	5067.18
165.229	5068.8
500	5068.8

External Boundary

X	Y
0	4900
500	4900
500	5048.97
500	5062.9
500	5067.18
500	5071.24
500	5079.95
500	5103.09
500	5105.16
500	5107
500	5109.28
500	5148.09
500	5150
500	5153.07
500	5160
330	5160
296.052	5153.07
281	5150
277.372	5148.09

262	5140
220.246	5109.28
217.152	5107
214.65	5105.16
211.832	5103.09
180.381	5079.95
168.54	5071.24
163.024	5067.18
157.202	5062.9
138.273	5048.97
122	5037
105	5035
71	5010
50	5006
0	5020

Material Boundary

X	Y
296.052	5153.07
500	5153.07

Material Boundary

X	Y
277.372	5148.09
500	5148.09

Material Boundary

X	Y
217.152	5107
500	5107

Material Boundary

X	Y
211.832	5103.09
500	5103.09

Material Boundary

X	Y
180.381	5079.95
500	5079.95

Material Boundary

X	Y
163.024	5067.18
500	5067.18

Material Boundary

X	Y
157.202	5062.9
500	5062.9

Material Boundary

X	Y
138.273	5048.97
500	5048.97

AGEC
Applied GeoTech

November 5, 2014

Giverny, LLC
111 East Broadway, Suite 900
Salt Lake City, Utah 84111

Attention: Dade Rose
EMAIL: drose@djplaw.com

Subject: Deformation Analysis Update
Proposed Giverny Development
9180 South Wasatch Boulevard
Cottonwood Heights, Utah
Project No. 1140572

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to provide additional deformation analysis for the slope stability study performed for the proposed Giverny residential development located at 9180 South Wasatch Boulevard in Cottonwood Heights, Utah using methods presented by Bray and Travasarou (2009) instead of the method presented by Blake and others (2002). Our original study was reported in a letter dated August 29, 2014 with an update in a letter dated October 20, 2014, both reported under Project No. 1140572. Geostrata reviewed our most recent letter for Cottonwood Heights and provided comments concerning the study in a memorandum dated October 27, 2014. This letter provides responses to the comments presented in that memorandum.

Geostrata Review Comment 1

"We have reviewed the work presented and concur with the results. However, we consider this deformation methodology as being somewhat dated. We recommend that the seismic analysis be completed using the Bray and Travasarou (2007) or the Bray and Travasarou (2009) method and that the results of this method be compared to the Blake (2002) method. Adjustments to the recommendations should be provided if the updated method provides differing results."

AGEC Response

The deformation analysis was performed following the method presented by Bray and Travasarou (2009) as requested. Results of this deformation analysis are attached. Results of the analysis indicate that the predicted median deformation is 4 inches for the yield

acceleration previously evaluated and the setback lines previously selected are reasonable using either deformation evaluation method. Results are attached.

Geostrata Review Comment 2

"The methodology presented assumes that up to 4 inches of deformation may occur during a seismic event. It is not clear if AGEC is recommending that the structural design of the residences be designed for this magnitude of movement."

AGEC Response

The 4-inch deformation value was selected based Youd (1980) and the Utah State Surface-fault-rupture hazard guidelines, Christenson and others (2003). Residences for this development are expected to be constructed in accordance with the 2012 International Building Code standards and such buildings would be able to accommodate 4 inches of deformation without undue negative risk to human health and safety based on the above references.

Geostrata Review Comment 3

"The slope stability cross section validating the lateral extent of the 1.5 factor of safety is not presented. This cross section should be provided to substantiate the recommended setback zones."

AGEC Response

The printouts provided in the most recent above-referenced letter for the static condition are for the same setback limits used for the pseudostatic analysis and are greater than 1.5. The static slope stability safety factor for the setback limits shown is 1.7. Thus, there is no need to present the slip surface representing a static safety factor of 1.5 since seismic conditions control the setback limit.

Geostrata Review Comment 4

"We further understand that City Code limits the location of residences in relation to steep slopes, particularly in sensitive land areas. The setback zones should be in compliance with existing City Code requirements."

AGEC Response

Our report presents the stability-based setbacks. House placement should also incorporate other City Code requirements.

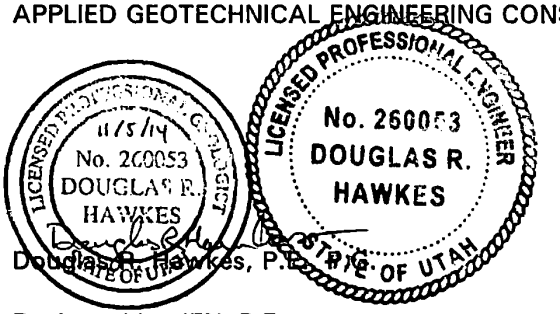
LIMITATIONS

This letter has been prepared in accordance with generally accepted geotechnical engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on the subsurface conditions encountered, laboratory testing and engineering analysis as described in this letter and in the above-referenced report and letters. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions or proposed construction is significantly different from what is described in this letter and in the above referenced report and letters, we should be notified to reevaluate the recommendations given.

If you have questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Douglas R. Hawkes, P.E.

Reviewed by JEN, P.E.
DRH/rs

Enclosures

References

Bray, J.D. and Travasarou, T, 2009; Pseudostatic coefficient for use in simplified seismic slope stability evaluation, Journal of Geotechnical and Environmental Engineering, Vol. 135, No. 9.

Bray, J.D. and Travasarou, T, 2007; Simplified procedure for estimating earthquake-induced deviatoric slope displacements, Journal of Geotechnical and Environmental Engineering, Vol. 133, No. 4.

Christenson, G.E., Batatian, L.D. and Nelson, C.V., 2003; Guidelines for evaluation surface-fault-rupture hazards in Utah, Utah Geological Survey Miscellaneous Publication 03-6.

Collins, N., Graves, R., Ichinose, G. and Somerville, P., 2006; Ground motion attenuation for the Intermountain west, US Geological Survey Research Contract 05HQGR0031.

Wair, B.R., DeJong, J.T. and Shantz, T., 2012; Guidelines for estimation of shear wave velocities, PEER Report 2012/08.

Youd, T.L., 1980; Ground failure displacement and earthquake damage to buildings, ASCE Conference on Civil Engineering and Nuclear Power, Knoxville, TN Vol. 2 pp. 7-6-2 to 7-6-26.

AGEC
Applied GeoTech

PROJECT NO. 140572 TITLE Giveny DATE 10/31/14 BY DRH

SUBJECT _____ SHEET _____ OF _____

V_s based on N-value average of 47

Wair et al (2012) gives $V_s = 35 N_{60}^{0.23} \sigma_v^{0.25} = 335$ m/s

$T_s = 2.6 H / V_s = 2.6 (30) / 335 = 0.23$ s

$M_w = 6.99$ $R = 0.5$ Km from USGS website

$S_a = 1.0$ g from Collins et al (2006) at $1.5 T_s$

$D_{median} = 4$ in. for $K_y = 0.27$ g

1140572 Giverny 10/31/14

Bray and Travasarou, 2009

K_y	0.27 g	H	30 m	
T_s	0.23 s	N_{60}	47 bpf	
$S_a(1.5T_s)$	1.00 g	V_s	335 m/s	$35.0\ N_{60}^{0.23}\ \sigma'^{0.25}_{v}$ (4.79)
M_w	6.99			
Zero Prob	0.00			
ln(D)	2.38			
D 50	10.8 cm		4.3 in	
D 16	5.6 cm		2.2 in	
D 84	20.9 cm		8.2 in	

$$\ln(D) = -1.10 - 2.83\ln(k_y) - 0.333(\ln(k_y))^2 + 0.566\ln(k_y)\ln(S_a(1.5T_s)) + 3.04\ln(S_a(1.5T_s)) - 0.244(\ln(S_a(1.5T_s)))^2 + 1.50T_s + 0.278(M-7) \pm \varepsilon$$

Table 7. Form of the Ground Motion Attenuation Relations

Collins et al, 2006

$Ln(y) = lnSa(g) = c_1 + c_2Mw + c_3\ln(rc) + c_4Mw\ln(rc) + c_5r + c_6(8.5 - Mw)^2 + c_7HW(8.5 - M)$

where

Sa(g) = spectral acceleration in g

r = closest distance to the fault plane

rc = sqrt($r^2 + H^2$)

H = 6.5 (pseudo depth term)

HW = r/5, r < 5

= 1, 5<=r < 15

= 1 – (r-15)/(20-15), 15<= r <20

= 0, r >=20

M	6.99						
r	0.5 km						
rc	6.52 km						
H	6.5 km						
HW	0.1						
$1.5T_s$	c1	c2	c3	c4	c5	c6	c7
0.349	7.17	-0.758	-1.475	0.1109	-0.0104	-0.257	0.212

Table 8. Coefficients of the Intermountain West Ground Motion Model

S_a 1.000

Period	C_1	C_2	C_3	C_4	C_5	C_6	C_7
0.01	6.764	-0.758	-1.800	0.1375	-0.0104	-0.236	0.212
0.02	6.761	-0.758	-1.776	0.1357	-0.0104	-0.236	0.212
0.029	6.801	-0.758	-1.780	0.1352	-0.0104	-0.236	0.212
0.04	6.823	-0.758	-1.777	0.1346	-0.0104	-0.236	0.212
0.05	6.887	-0.758	-1.772	0.1314	-0.0104	-0.236	0.212
0.075	7.110	-0.758	-1.743	0.1268	-0.0104	-0.236	0.212
0.10	7.272	-0.758	-1.693	0.1216	-0.0104	-0.236	0.212
0.16	7.376	-0.758	-1.637	0.1203	-0.0104	-0.236	0.212
0.20	7.305	-0.758	-1.597	0.1202	-0.0104	-0.236	0.212
0.24	7.230	-0.758	-1.566	0.1207	-0.0104	-0.242	0.212
0.30	7.183	-0.758	-1.515	0.1156	-0.0104	-0.249	0.212
0.40	7.157	-0.758	-1.435	0.1062	-0.0104	-0.279	0.212
0.50	7.184	-0.758	-1.374	0.0937	-0.0092	-0.311	0.212
0.75	6.919	-0.758	-1.390	0.0926	-0.0070	-0.351	0.212
1.00	6.594	-0.758	-1.480	0.0954	-0.0055	-0.351	0.212