APPENDIX 5-1

Geotechnical Analysis- Sediment Impoundments
and Excess Spoil Structure

By: Taylor Geo-Engineering, LLC

TAYLOR GEO-ENGINEERING, LLC

Alton Coal Development Coal Hollow Project

Slope Stability Analyses
For
PROPOSED EXCESS SPOIL STRUCTURE AND SEDIMENT IMPOUNDMENTS

Alton, Utah

Prepared for

Mr. Chris McCourt
Alton Coal Development
P.O. Box 1230
Huntington, Utah 84528

April 23, 2007

TGE Project No. 307001

2650 NORTH 180 EAST LEHI, UTAH 84043
TELEPHONE NUMBER 801-400-9784 FAX NUMBER 801-766-3246

TAYLOR GEO-ENGINEERING, LLC

2650 NORTH 180 EAST
LEHI, UTAH 84043
TELEPHONE NUMBER 801-400-9784
FAX NUMBER 801-766-3246

April 23, 2007

Mr. Chris McCourt
Alton Coal Development
P.O. Box 1230
Huntington, Utah 84528

Subject: **Slope Stability Analyses**
Proposed Excess Spoil Structure and Sediment Impoundments
Alton Coal Development Coal Hollow Project
Alton, Utah
TGE Project No. 307001

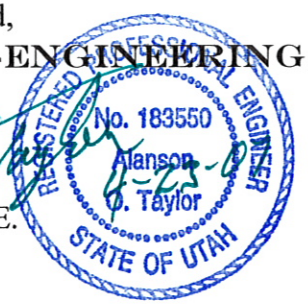
Dear Mr. McCourt,

Enclosed are the findings of the slope stability study performed for the proposed Alton Coal Mine Excess Spoil Structure and mining related sediment impoundments. The purpose of the study was to verify the stability of the proposed spoil structure and impoundment slopes as designed by Alton Coal Development. The accompanying report describes the methods used in the study and our conclusions and recommendations.

Based on the results of our analyses, the proposed spoil structure may be constructed with 3:1 slopes up to a height of 110 feet above adjacent grade on the eastern 2/3 of the spoil pile and 120 feet above adjacent grade on the western 1/3 portion of the spoil pile. The proposed sediment embankments may be constructed with 2:1 slopes to a height of 14 feet. The owner should review the report in its entirety and specific recommendations.

If you have any questions, please feel free to contact the undersigned. The opportunity to be of service on this project is appreciated.

Respectfully submitted,
TAYLOR GEO-ENGINEERING, LLC



Alanson O. Taylor, P.E.
Manager

Table of Contents

1.0 INTRODUCTION 1
2.0 PREVIOUS STUDIES 1
3.0 SCOPE OF WORK 2
3.2 Subsurface Exploration 2
3.3 Laboratory Testing 2
3.4 Engineering Analyses and Report 3
4.0 SITE CONDITIONS 3
4.1 General 3
4.2 Subsurface Conditions 3
4.3 Subsurface Water 3
4.4 Subsurface Variations 4
5.0 SLOPE STABILITY ANALYSIS 4
6.0 SETTLEMENT 7
7.0 BULKING 7
8.0 RECOMMENDATIONS 8
9.0 CLOSURE 8

Appendix A Vicinity Map and Site Plan
Figure 1 Vicinity Map
Figure 2 Site Plan

Appendix B Field Exploration
Figures 3 through 10 – Logs of Borings

Appendix C Laboratory Testing Data
Table 1 – Summary of Laboratory Test Results
Appendix C-1 and C-2, Laboratory Data

Appendix D Design and Detail Sheets
Figure 11 - Post Mining Topography with Lines A-A and B-B
Figure 12 - Pond #1 Design and Details with Line C-C
Figure 13 - Pond #2 Design and Details with Line D-D
Figure 14 - Pone #3 Design and Details with Line E-E
Figure 15 - Pond #4 Design and Details with Line F-F

Appendix E Output Files of Static and Pseudo-static Slope Stability Analyses
Figures 16 through 35 – Slope Stability Profiles
Appendix E-1 through E-10, Output Files

Appendix F Recommended Earthwork Specifications

1.0 INTRODUCTION

This report presents the results of the geotechnical engineering study performed at the subject property. The proposed Alton Coal Mine is located within Township 40 South, Range 5 West Salt Lake Base and Meridian. As shown on Figure 1, Vicinity Map and Figure 2, Site Plan (Appendix A), the area investigated is located on the west side of State Highway 10, approximately 3 miles south of Alton, Utah.

The proposed Coal Hollow Mine will be an open pit coal mine approximately 440 acres in size with the portion addressed in this report comprising 80 acres. It is anticipated that during operation of the mine, approximately 2,000,000 cubic yards of coal will be mined per year with approximately 14,000,000 cubic yards of overburden moved per year. For the initial 80 acres of the project, an excess spoil pile and 4 sedimentation ponds will be constructed. The purpose of the study was to verify the stability of the proposed spoil structure and impoundment slopes as designed by Alton Coal Development.

2.0 PREVIOUS STUDIES

Previous investigations have been conducted prior to this study. Several borings were drilled in 2005 by Petersen Hydraulic for a hydraulic study of the proposed mine. Prior to 2005, several test pits and borings were completed as part of an economical geologic study of the area to study overburden thickness and coal stratum thickness.

Test Pits SP-13, SP-15, SP-16 and CH-32, and borings CH-1-05, CH-3-05, CH-5-05 are relevant to this study. The location of the test pits and borings are shown on Figure 2. Borings logs were provided to TGE by Peterson Hydraulic for borings CH-1-05, CH-3-05 and CH-5-05. Logs of the Test Pits were not provided to TGE.

The following samples from the previous subsurface investigations by others were provided by Alton Coal Development to TGE:

ALTON COAL DEVELOPMENT TEST PIT AND BORING NUMBER	DESCRIPTION	SAMPLE DEPTH
SP-13	Sandy Clay (CL)	24"-48"
SP-13	Silty Sand (SM)	72" - 84"
SP-15	Silty Clay (CL-ML)	20" - 37"
SP-15	Silty Sand (SM)	57" - 73"
SP-16	Clay (CL)	36" - 56"
SP-16	Sandy Silt (ML)	56" - 68"
SP-16	Silt (ML)	68" - 90"
CH-32 (Coal Hollow)	Clay (CL)	31" - 54"

CH-32	Clay (CL)	54" - 72"
CH-1-05 (Rock Core)	Weathered Shale Fat Clay (CH)	40' - 55'
CH-3-05 (Rock Core)	Shale	41' - 44.5'
CH-5-05 (Rock Core)	Shale	48' - 55'
CH-5-05 (Rock Core)	Shale	98' - 108'

Samples SP-13, SP-15, SP-16 and CH 32, were combined to make a sample representative of the upper soil profile which TGE labelled SP-16-13. Samples CH-1-05 and CH-3-05 were hand crushed and combined to create sample CH-1-3. The remaining core samples were hand crushed and labelled CH-5-48 for the 48-55 ft. core and CH-5-98 for the 98-108 ft. core.

3.0 SCOPE OF WORK

This study included the following scope of work.

3.1 Site reconnaissance

A site reconnaissance was conducted by TGE on February 22, 2007. The purpose of the visit was to observe existing site conditions, determine boring locations, and pick up subsurface samples from the previous investigations that have been in storage.

3.2 Subsurface Exploration

Five (5) exploratory borings were drilled on February 28, 2007 and March 1, 2007, at the site to evaluate subsurface conditions. The borings were drilled with a hollow stem auger drill rig, to depths of 5 to 41 feet below the surface. As shown on Figure 2, 3 borings were located within the proposed mining area, one boring was located on the western point of the proposed excess spoil structure, and one boring was located near the proposed Sedimentation Pond #3 embankment.

Subsurface conditions observed in the exploratory boring were carefully documented at the time of drilling by TGE field personnel. Samples of representative soils were obtained from the borings for laboratory testing and visual classification. A description of the field exploration program and the logs of exploratory borings are presented on Figures 3 through 7 in Appendix B, Field Exploration.

3.3 Laboratory Testing

The representative samples obtained from the TGE field investigation and previous investigations were tested in the laboratory to aid in classification and to determine pertinent engineering properties. These tests included natural dry density and moisture content; Atterberg

Limits, grain size analysis and unconfined compression shear tests, hydrometer analysis, and consolidated undrained triaxial shear tests with pore pressure measurement. A description of the laboratory test methods and test results are presented in Appendix C, Laboratory Testing Data Sheets. Results of the laboratory testing are presented on the boring logs, Table 1 and attached data sheets in Appendix C.

3.4 Engineering Analyses and Report

Data obtained from the exploratory borings and the laboratory testing program was evaluated. Geotechnical engineering analyses were performed which included preparation of this report presenting the findings and recommendations developed during the study.

4.0 SITE CONDITIONS

4.1 General

The area investigated consist of open range land vegetated with field grass, sage brush, pinions, and cedar trees. The surface of the area is fairly level with a gentle slope to the west. Relatively large drainage ravines, 1 to15 feet deep, traverse the northern portion of the property. Two small knolls are located on the west side of the property. The knolls appear to be comprised of weathered sandstone and alluvial deposits. A shallow ravine is also located between the knolls and south of Borings GT-4 and GT- 5. Topographic conditions are shown on Figure 2.

Snowmelt was observed seeping into the deep ravine from various locations. Snowmelt was also observed draining into a shallow ravine between the two knolls.

4.2 Subsurface Conditions

Alluvial/colluvial sediments were documented in the exploratory boring to depths of about 5 to 30 feet below existing ground surface. The alluvial/colluvial sediments consist of silty sand (SM), sandy silt (ML) and lean clay (CL). The sediments are underlain by highly weathered shale (fat clay, CH) and slightly to moderately weathered shale, which was documented by others to a maximum depth 41 feet. The shale is underlain by a coal deposits.

Detailed descriptions of subsurface conditions documented at the site are presented on the TGE Boring Logs Figures 3 through 7, and Boring Logs 8 through 10, Peterson Hydraulic logs redrawn with permission by Taylor Geo-Engineering (Appendix B).

4.3 Subsurface Water

Subsurface water was documented in the borings at a depth of 10± feet (recorded at the time of drilling) in borings GT-1, GT-2 and GT-3. Subsurface water was also observed at a depth of

about 15 feet in GT-5. Boring GT-4 terminated at 5 feet below the surface on sandstone bedrock and was free of water.

Flowing sands were documented in the exploratory borings at a depth of 15 to 25 feet±. The flowing sands likely denote a zone of very loose sands that act as a liquid during drilling activities.

The subsurface investigation was performed during a period of high snowmelt which could add to the groundwater table at the time of the investigation. Seasonal fluctuations in groundwater conditions do occur, and groundwater fluctuations of several feet are not unusual. Numerous factors contribute to groundwater fluctuations such as seasonal recharge, regional and local irrigation, and periods of heavy precipitation. The detailed evaluation of these and other factors which may be responsible for groundwater fluctuations is beyond the scope of this study.

4.4 Subsurface Variations

Based on the results of the subsurface exploration and our experience, variations in the continuity and nature of subsurface conditions should be anticipated. Due to the nature and depositional characteristics of soils documented at the site, care should be taken in interpolating or extrapolating subsurface conditions between or beyond the exploratory borings.

5.0 SLOPE STABILITY ANALYSIS

Slope stability analyses were performed for the proposed excess spoil structure, for the interior slopes of the proposed sedimentation Ponds #1 through #4. Stability analyses were performed using GSTABL7 software and safety factors were calculated by the Modified Bishop Method.

Site ground acceleration for the pseudo-static stability analysis was based on the peak ground acceleration with a 2 percent probability of being exceeded in a 50-year period. [1] The peak bedrock ground acceleration (PGA) for the site with a 2 percent probability of being exceeded in 50 years is 0.29g. In accordance with industry standards, the pga was reduced by 50 percent and a value of 0.145g was used in the analyses.

Based on the information provided, TGE understands that the spoil pile will be constructed in thick lifts using large mining equipment; therefore, laboratory testing of the proposed fill materials was completed at 90 percent of the standard Proctor. The engineering characteristics obtained from laboratory testing were utilized in the stability analyses. Since the excess spoil pile will consist of soils from above the coal layer, the strength characteristics of the sandy clay, clay and shale were analyzed separately to verify the stability of the slopes under static and seismic conditions for each type of material.

---

[1] USGS, 2002, U.S. Geological Survey seismic hazard maps: http://eqhazmap.usgs.gov.

Slope stability analyses for proposed Sedimentation Ponds #1, #2, and #4 used strength parameters obtained from sample SP-16-13, since the pond embankments in those areas will be constructed of soils representative of SP-16-13. The analyses considered a maximum slope height of 14 feet, even though not all the ponds will have slopes extending to 14 in height.

The slope stability analysis for the sedimentation Pond #3 embankment was completed using the soil unconfined compression strengths from samples obtained from boring GT-5. Laboratory testing indicated unconfined compressive strength of 9429 psf or a cohesive strength of 4700 psf. For stability purposes a cohesion of 700 psf and a friction angle (ø) of 10 degrees was utilized.

Locations from which the cross-sections for the each of the slope analyses was taken from are shown on Figures 11 through 15, Appendix D. Lines A-A and B-B for the excess spoil pile are shown on Figure 11, Line C-C for the sedimentation ponds is shown on Figure 12, and Line E-E for Pond #3 is shown Figure 14. Profile views with the accompanying output files for each of the static and seismic slope stability analyses are shown on, Figures 16 through 35, in Appendix E, Profile Views and Output Files of Static and Pseudo-static Slope Stability Analyses.

5.1 Excess Spoil Structure

Based on the information provided, TGE understands the excess spoil structure will be a permanent structure after mining operations are complete. The proposed structure has been designed with 3:1 (horizontal: vertical) slopes. As shown on Figure 11, Proposed Embankment Design, embankment height will vary from 60 feet at the east end to 110 feet at the west end.. The top of the embankment will descend to the northwest at a 2.2 percent grade.

The embankment will be comprised of soil deposits that overlie the coal bed to be removed during mining operations. Although the soils will likely consist of a mixture of silt, clay, sand, and shale, the stability analyses considered the materials separately. The analyses assume the materials will be compacted to at least 90 percent of the standard Proctor.

The subsurface information indicates that the subsurface profile varies between the area of GT-2/GT-3 and GT-5. Therefore, two sets of stability analyses were performed, Line A-A and Line B-B, Figure 11. Additionally, TGE analyzed the spoil pile having a finished height of 120 feet in the area of the west end of the structure and 110 feet for the central portion of the structure. The heights analyzed are 10 feet greater than the design heights but allows for future changes in the structures height without reanalysis in the event changes are required in the future.

Generally, the subgrade in the area of Line A-A contains a layer of bedrock underlain by very stiff clay. The subgrade in the area of Line B-B contains loose sand to 20 feet underlain by stiff clay then shale. It is anticipated that the groundwater elevation could be different after mining operations. TGE attempted to predict long term groundwater elevations after mining is complete with the depth of water shown on the attached stability profiles Figures 16 through 32.

Representative Factors of Safety of the stability analyses with the respective soil parameters used are tabulated below.

LINE A-A Maximum Height - 120 feet

SAMPLE SET	PHI,	COHESION	STATIC	PSEUDO-STATIC
SP-16-13	29.6	94	1.8	1.2
CH-1-3	21.6	319	1.7	1.2
CH-5-48	20.1	321	1.7	1.1
CH-5-98	25.4	216	1.8	1.1

LINE B-B Maximum Height – 110 feet

SAMPLE SET	PHI,	COHESION	STATIC	PSEUDO-STATIC
SP-16-13	29.6	94	1.8	1.1
CH-1-3	21.6	319	1.7	1.1
CH-5-48	20.1	321	1.7	1.1
CH-5-98	25.4	216	1.7	1.1

5.2 Sediment Impoundments #1, #2 and #4

Sediment Impoundments 1, 2 and 4 vary in size from 1.7 to 6.28 acre/feet. The proposed basin areas will be derived from digging into the original grades and constructing a portion of the embankments with the spoils. The depth of each sedimentation pond varies but the maximum depth shown on the attached plan sheets is 14 feet, Figures 12, 13 and 15. The profile obtained for this analysis is based upon Line C-C of Pond #1, Figure 12. The soils associated with the side slopes and dikes for the detention ponds will be similar to sample SP-16-13. No groundwater or phreatic surface was utilized in the analysis since groundwater will not be present and the short water retention time will not allow for saturation of the slopes. The results of the stability analyses are tabulated below.

LINE C-C

SEDIMENT IMPOUNDMENT	MAXIMUM HEIGHT	HEIGHT OF FREE BOARD	STATIC	PSEUDO-STATIC
Pond #1, 2 & 4	14 feet	6 feet	2.1	1.5

5.3 Sediment Impoundment #3, Valley Pond

Based on the information provided, TGE understands that Valley View Pond will be a sedimentation pond located at the western most point of the mining area and at the base of the tailings embankment between the two knolls spoken of earlier in this report. The base of the

pond will be cut 10 feet into the native stiff clay soils and the remainder of the embankment will constructed from soils derived from the excavation of the interior of the pond. The height of the fill for the pond embankment will be approximately 14-feet. The soils associated with the slopes and embankment for the pond will be similar to soils analyzed for samples from GT-5. No groundwater or phreatic surface was utilized in the analysis since groundwater will not be present and the short water retention time will not allow for saturation of the slopes. The results are tabulated below.

SEDIMENT IMPOUNDMENT	MAXIMUM HEIGHT	HEIGHT OF FREE BOARD	STATIC	PSEUDO-STATIC
Pond #3	14 feet	5 feet	3.8	2.8

For temporary structures, such as Sedimentation Ponds 1, 2 , and 4, a static Factor of Safety of 1.3 is considered adequate. For permanent structures such as the excess spoil structure and the sediment impoundment Pond #3, a static Factor of Safety of 1.5 and a Factor of Safety for seismic conditions of at least 1.0 is considered adequate.

6.0 SETTLEMENT

The existing subgrade that will not be mined but will be supporting the 100 to 120 feet of spoils will potentially consolidate under the 13,000 psf to 14,000 psf loads associated with the spoil pile. Additionally, as the spoil pile is constructed, the spoil materials placed near the base of the spoil pile will consolidate to densities greater than densities at the time of initial placement.

Consolidation of the native materials in the area of GT-3 under the 110 foot embankment could be on the order of 4 to 5 feet. Consolidation of the native materials in the area of GT-4 and GT-5 will be negligible based on the stiffness of the clay soils and the presence of sandstone bedrock.

Consolidation of the spoil materials after placement will be on the order of 0 to 15 percent, depending the depth below finish grade the spoil is located. In all cases, since the spoil pile will be constructed over a period of several years, the effects of the differential settlement across the structure is anticipated to be minimal and should not affect the short term or long term performance of the spoil pile.

7.0 BULKING

During mass excavation operations of dense materials, the placement of spoils generally requires more volume of space during placement than that originally occupied by the same soil mass in its native state. Based on dry densities of the shale materials in their intact state and the standard Proctors conducted for this project, the shale spoils will have a a volume approximately 30 percent higher after mining than prior to mining. The silty sand and clay soils will have minimal

bulking with an average of approximately 10 percent. However, as indicated in section **5.0 SETTLEMENT**, the overall apparent bulking may be lower after the fill pile is complete due to post placement consolidation.

8.0 RECOMMENDATIONS

The proposed excess spoil structure and sediment ponds may be constructed as designed by Alton Coal Development. The laboratory shear tests were conducted on materials compacted to at least 90 percent of the standard Proctor. Therefore, fill materials should be placed and compacted to at least 90 percent of the standard Proctor (ASTM test method 698). An engineer from TGE or his representative should be present periodically to verify that the placement of fill materials are being completed properly and that testing inspection is taking place in accordance with Appendix E of this document and the State of Utah R645 – Coal Mining Rules.

Based on the presence of groundwater (see Section 4.3), a dewatering plan will likely need to be implemented during excavation operations. The satiability of the cut walls of the strip mining area will be dependent on temporarily diverting groundwater seepage from the excavation. The design of a dewatering plan was beyond the scope of this study.

If a dewatering plan is properly implemented and the temporary cut slopes are kept dry, TGE recommends that temporary cuts in the stiff clay and shale may be no greater than 1H:1V (horizontal:vertical), and temporary cuts in the lean clay and sand layers my no greater than 2H:1V. If after inspection of the shale formation and additional groundwater observations are made, the cut slopes may be steepened as directed by TGE.

Based on the information provided, TGE's understands that the spoil pile is not intended to be constructed for the future support of structures. The recommendations for fill placement as provided in Appendix F, Recommended Earthwork Specifications, are based on this understanding. Therefore, TGE does not recommend that the excess spoil pile be used in the future for the support of structures since the material is being placed with a moderate level of compaction (at best) and long term differential settlement of the pile will occur.

9.0 CLOSURE

The findings and recommendations of this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area of Utah at this time. There is no other warranty, either express or implied.

The conclusions and recommendations presented herein are based on the results of limited subsurface exploration and laboratory testing, combined with interpolation and extrapolation of subsurface conditions between and beyond exploration locations. As the project evolves, TGE's continued consultation and construction monitoring should be considered an extension of the

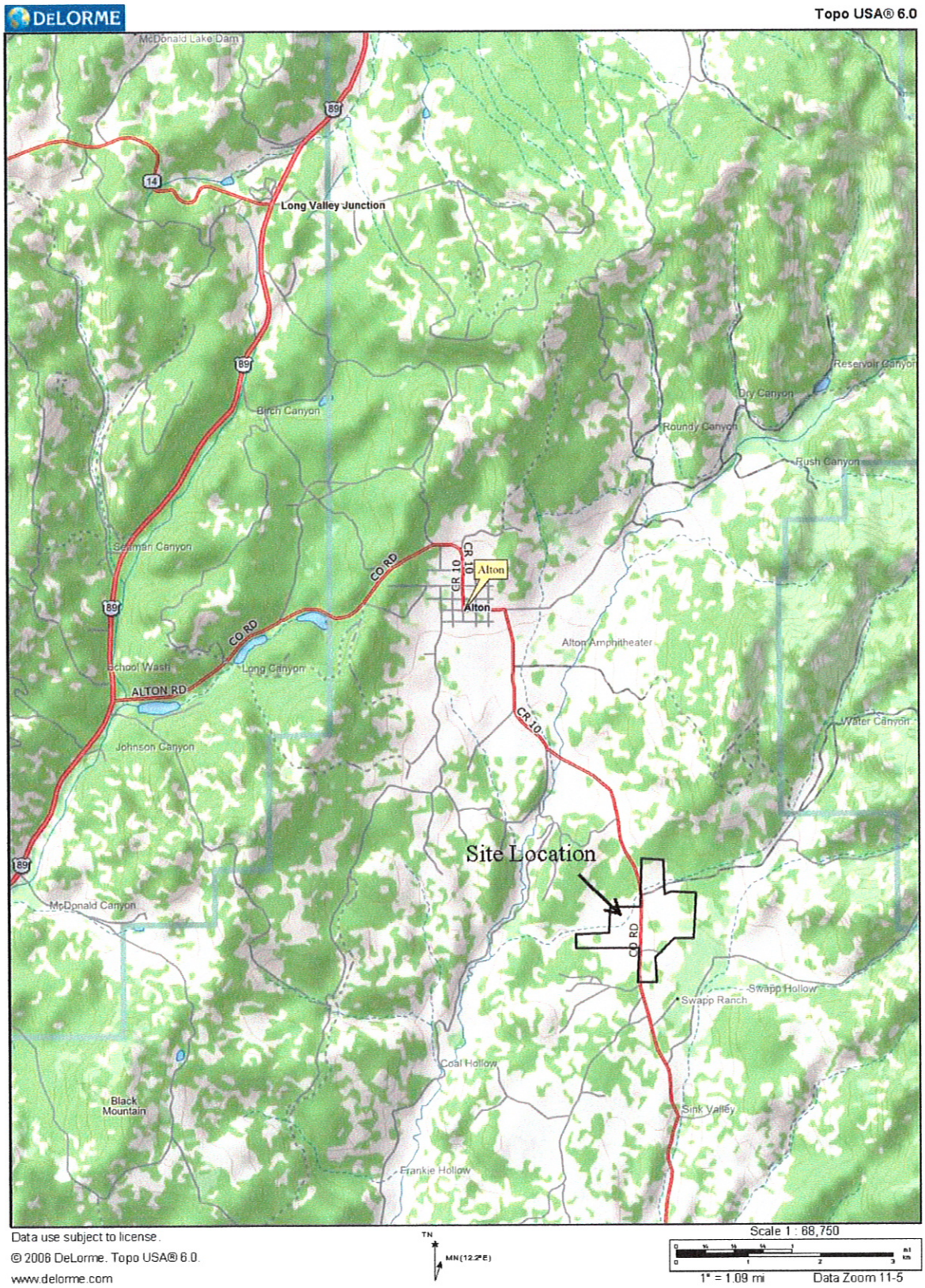
services performed to date. Subsurface conditions may differ in some locations from the conditions observed in the explorations, and may require additional analyses and possibly modified recommendations.

This report was written for the exclusive use of Alton Coal Development and only for the proposed project described herein. TGE is not responsible for technical interpretations by others or exploratory information which has not been described or documented in this report. Specific questions or interpretations concerning the findings and conclusions presented herein may require written clarification to avoid possible misunderstandings. The opportunity to be of service is appreciated.

APPENDIX A

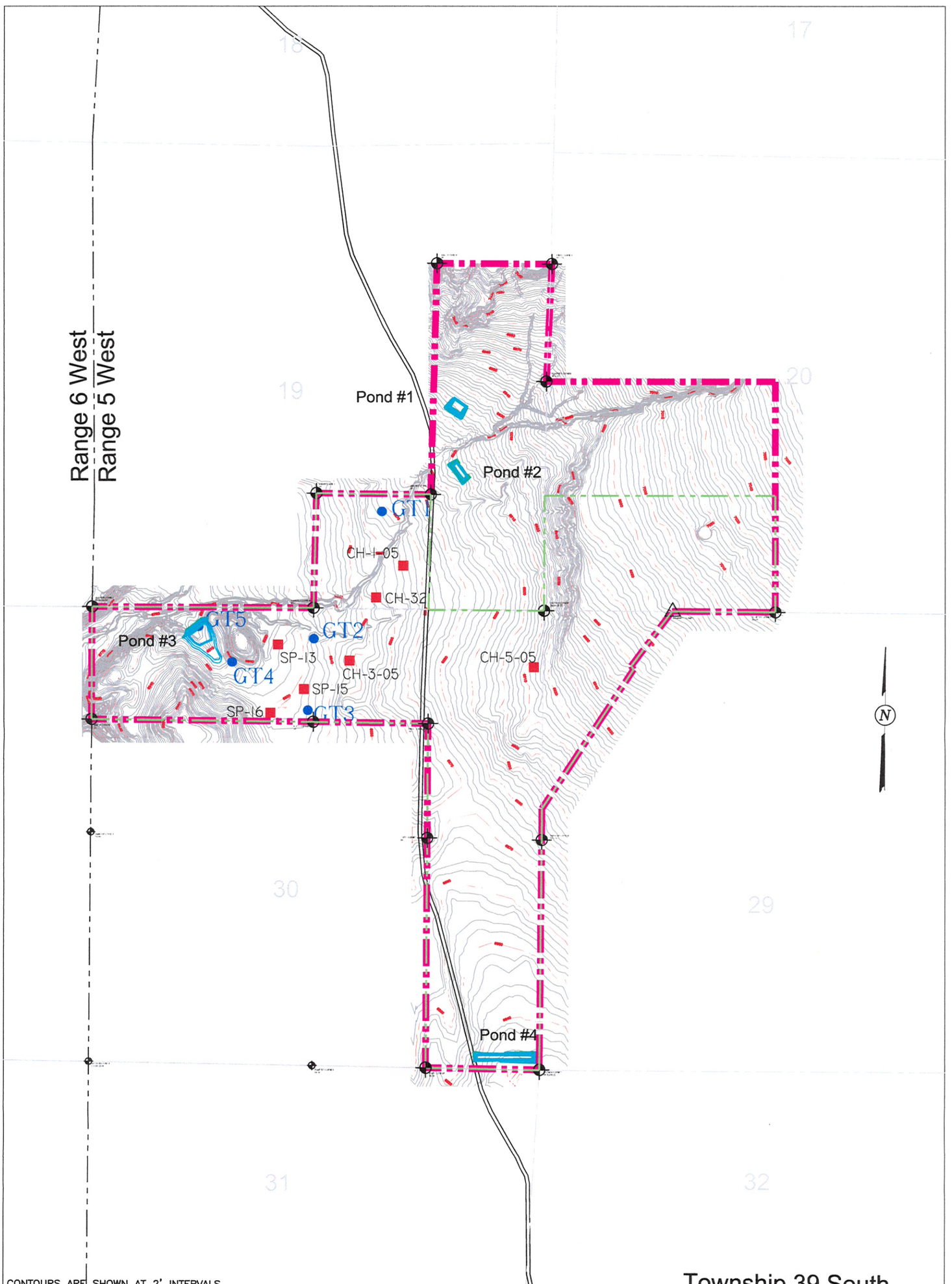
VICINITY MAP AND SITE PLAN

VICINITY MAP



Alton Coal Hollow Mine

Figure No. 1



CONTOURS ARE SHOWN AT 2' INTERVALS.

LEGEND:
- PROJECT AREA
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: C. McCOURT J. STANSFIELD	CHECKED BY: CRM/APC
DRAWING: 5-39	DATE: 4/20/07
	SCALE: 1" = 1000'
JOB NUMBER: 1400	SHEET

REVISIONS	
DATE:	BY:

GEOTECH SAMPLES/ DRILLING LOCATIONS

COAL HOLLOW PROJECT ALTON, UTAH

DRAWING: 5-39

Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

Figure No. 2

APPENDIX B

FIELD EXPLORATION

APPENDIX B
FIELD EXPLORATION

The program of subsurface exploration consisted of drilling five (5) borings to explore subsurface conditions in the vicinity of the proposed structures and to obtain samples for laboratory testing. Subsurface conditions observed in the borings were carefully documented by experienced TGE field personnel. Subsurface materials were classified in accordance with Unified Soil Classification System (ASTM Method D 2488).

Boring locations are shown on Figure 2, Site Plan (Appendix A). Borings were located by TGE field personnel using surveyed property corners, and information shown on a Figure 2.

Exploratory borings were drilled to depths of about 5 to 41 feet below existing ground surface. The borings were advanced with a truck mounted drill rig using 8-inch outside diameter hollow-stem augers.

Relatively undisturbed and bulk samples of representative soils were obtained from the borings at frequent intervals for laboratory testing and visual classification. Relatively undisturbed samples were obtained using either a 1.4-inch inside diameter (ID) split-spoon sampler (Standard Penetration Test Sampler), a 2-inch ID "Modified California" sampler (lined with 4-inch brass sleeves), or a Shelby Tube sampler.

A sampler was advanced a maximum of 18 inches by successive drops ("blows") from a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler three successive 6-inch increments was recorded. The total number of blows required to advance a sampler the second and third 6-inch increment represents the penetration resistance value (N-value). For the 1.4-inch sampler, this test constitutes the Standard Penetration Test (SPT) as described by ASTM Method D 1586.

A description of soils observed in the borings, the sample types, depths at which the samples were taken, and N-values are shown on the Logs of Exploratory Borings included in this appendix. A legend of boring symbols and the Unified Soil Classification System is also included herein.

DRILL LOG

TAYLOR GEO-ENGINEERING

Figure No. 3

Boring No. GT-1

Date of Drilling: February 28, 2007

Project : Alton Hollow Project
Project No.: 307001
Location: Alton, Utah
Elevation: 6900 feet

Drilling Company: GTS
Equipment: Mobile B-80
Logged By: A.T.

GWT: 10 feet

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
1				TOPSOIL: Light brown, moist, loose, 6" thick.		
2				LEAN CLAY: Very stiff, moist to wet, greenish brown.		
3						
4						
5						
6			X			2" ID Sampler
7			X			29, 53, 50/5"
8						
9		CL				
10						2" ID Sampler
11			X		WC = 12.6%	21, 56, 50/3"
12			X		DD = 111.6 pcf	
13					LL = 47 PI = 31	
14						
15						
16			X			2" ID Sampler
17			X			20, 37, 50/5"
18						
19						
20						
21			X		WC = 14.4	2" ID Sampler
22			X			12, 26, 40
23				FAT CLAY: Stiff, moist to wet, probable perched water		
24				between 22 and 25 feet, some pebbles and gravel, gray with		
25				tan specs.		
26			X		WC = 28.6%	2" ID Sampler
27			X		DD = 95.0 pcf	8, 16, 25
28		CH			LL = 69 PI = 52	
29					UC = 4777 psf	
30			X			2" ID Sampler
31			X			7, 24, 26
32						
33						
34						
35		SHALE		SHALE: Weathered, hard, moist, brownish gray to gray.		
36			X			2" ID Sampler
37				Boring Terminated at 36 Feet.		17, 50/5"
38						
39						
40						
41						
42						
43						
44						
45						

Notes: 140 lb sampler using drive cable. Low Efficiency.

DRILL LOG

TAYLOR GEO-ENGINEERING

Figure No. 4

Boring No.: GT-2

Date of Drilling: March 1, 2007

Project : Alton Hollow Project

Project No.: 307001

Location: Alton, Utah

Elevation: 6900 feet

Drilling Company: GTS

Equipment: Mobile B-80

Logged By: A.T.

GWT: 10 feet

Depth (ft.) 0	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
1				TOPSOIL: Light brown, moist, loose, 6" thick.		
2				SILTY SAND: Medium dense to loose, moist to wet, gray to tan.		
3						
4						
5						
6			X			Standard Spoon
7			X			11, 10, 13
8						
9		SM				
10						2" ID Sampler
11			X		WC = 10.6%	5, 8, 7
12			X		-200 = 33.3%	
13						
14						
15						
16			X	No Recovery Due to GWT and Loose Sand.		2" ID Sampler
17			X			3, 5, 8
18						
19				CLAYEY SAND: Very loose, wet, tan.		
20		SC				
21			X			2" ID Sampler
22			X	LEAN CLAY: Some sand, very soft, wet, tannish gray.		2, 3, 5
23						
24		CL				
25						
26			X	Liquified with vibration.	WC = 27.8%	2" ID Sampler
27			X		LL = 37 PI = 19	2, 6, 9
28						
29						
30			X			2" ID Sampler
31			X	FAT CLAY: With sand, medium stiff, moist, bluish gray with dark gray seams.	WC = 18.5%	3, 6, 8
32		CH				
33						
34						
35		SHALE		SHALE: Weathered, hard, moist, light gray to dark gray.		
36			X			2" ID Sampler
37				Boring Terminated at 35.5 Feet.		50/5"
38						
39						
40						
41						
42						
43						
44						
45						

Notes: 140 lb sampler using drive cable. Low Efficiency.

DRILL LOG

TAYLOR GEO-ENGINEERING

Figure No. 5

Boring No.: GT-3

Date of Drilling: February 28, 2007

Project : Alton Hollow Project

Project No.: 307001

Location: Alton, Utah

Elevation: 6900 feet

Drilling Company: GTS

Equipment: Mobile B-80

Logged By: A.T.

GWT: 15 feet

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
1				TOPSOIL: Light brown, moist, loose, 6" thick.		
2				SILTY SAND: Medium dense to loose, moist to wet, gray to tan.		
3						
4						
5						
6			X			2" ID Sampler
7			X			12, 20, 16
8						
9						
10						2" ID Sampler
11			X		WC = 11.0%	5, 6, 11
12			X		-200 = 37.5%	
13						
14		SM				
15						
16			X	No Recovery Due to GWT and Loose Sand.		2" ID Sampler
17			X			3, 3, 3
18						
19				CLAYEY SAND: Very loose, wet, tan.		
20						
21			X			2" ID Sampler
22			X	LEAN CLAY: Some sand, very soft, wet, tannish gray.		5, 5, 8
23						
24						
25						
26			X	Liquified with vibration.		2" ID Sampler
27			X			6, 26, 75/5.5"
28						
29				HIGH PLASTICITY SILT: Very Stiff, wet, dark gray to black.	WC = 37.3%	
30		MH	X		DD = 76.6 pcf	2" ID Sampler
31			X		LL = 74 PI = 38	6, 18, 30
32					UC = 1956 psf	
33				FAT CLAY: Very Stiff, moist, gray. Sampling terminated due to water intrusion into hole from above layers.		
34						
35						
36		CH	X			2" ID Sampler
37						8, 25, -
38						
39						
40		SHALE		SHALE: Weathered, hard, moist, light gray to dark gray.		2" ID Sampler
41			X			13,50/5"
42				Boring Terminated at 41 Feet.		
43						
44						
45						

Notes: 140 lb sampler using drive cable. Low Efficiency.

DRILL LOG

TAYLOR GEO-ENGINEERING

Figure No. 6

Boring No.: GT-4

Date of Drilling: March 1, 2007

Project : Alton Hollow Project

Project No.: 307001

Location: Alton, Utah

Elevation: 6900 feet

Drilling Company: GTS

Equipment: Mobile B-80

Logged By: A.T.

GWT: NA

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
1				TOPSOIL: Light brown, moist, loose, 6" thick.		
2				SILTY SAND: Medium dense, moist, tan.		
3		SM				
4						Standard Spoon 50/0"
5			X			
6				Boring Terminated at 5 Feet on sandstone bedrock.		
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						

Notes: 140 lb sampler using drive cable. Low Efficiency.

DRILL LOG

TAYLOR GEO-ENGINEERING

Figure No. 7

Boring No.: GT-5

Date of Drilling: March 1, 2007

Project : Alton Hollow Project

Project No.: 307001

Location: Alton, Utah

Elevation: 6900 feet

Drilling Company: GTS

Equipment: Mobile B-80

Logged By: A.T.

GWT: 15 feet

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
1				TOPSOIL: Light brown, moist, loose, 6" thick.		
2				FAT CLAY: Very Stiff, moist, dark brown with tan specs. Some pebbles at 15 feet and saturated sand layers at 15 feet. Potential perched water.		
3						
4						
5						
6			X		WC = 18.7%	Standard Sampler
7			X		DD = 108.3 pcf	12, 26, 32
8		CH			LL = 63 PI = 44	
9						
10						2½" ID Sampler
11			X		WC = 17.1%	14, 50, 50/5"
12			X		DD = 102.0 pcf	
13					LL = 63 PI = 45	
14					UC = 9429 psf	
15						
16			X		WC = 17.2%	2" ID Sampler
17			X		DD = 120.0 pcf	20, 40, 50/5"
18				Boring Terminated at 16.5 feet.		
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						

Notes: 140 lb sampler using drive cable. Low Efficiency.

DRILL LOG

PETERSON HYDRAULIC

Figure No. 8

Boring No.: CH-01-05

Date of Drilling: Nov. 9-10, 2005

Project : Alton Hollow Project

Project No.: 307001

Location: Alton, Utah

Elevation: 6900 feet

Drilling Company: DA Smith Drillers

Equipment:

Logged By: Eric Peterson

GWT: Not Indicated

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
2				TOPSOIL: Light brown, moist, loose, 6" thick.		
4				0-8 Soil		
6						
8				8-40 Clay, gray (auger drilled)		
10						
12						
14						
16		CL				
18						
20						
22						
24						
26						
28						
30						
32						
34						
36						
38						
40				40-55 Silty clay, gray, dense, and 0.5' bentonite layer, white to orange	ø = 21.6 cohesion = 319 psf OM = 20.5 MDD = 101.9 LL = 53 PI = 32	
42						
44						
46		CH				
48						
50						
52						
54						
56		SHALE		55-56 Silty shale, gray.		
58				56-58 Carbonaceous shale, dark gray.		
60				58-59.2 Low-grade Coal and organic shale, dark gray to black, some fossiliferous intervals		
62						
64		COAL				
66				59.2-73 Coal, black with some brown mottled zones.		
68						
70						
72						
74				73-75.8 Siltstone, gray, clayey.		
76		SHALE		75.8-76.0 Shale, gray; 76-76.3 Siltstone, gray, clayey, laminated; 76.3-76.6 Shale, gray		
78						
80				76.6-80 Organic siltstone/shale, highly laminated, dark gray		
82						
84						
86						
88						
90						

Notes: Auger (0-40 feet), Continous NQ core (40-80 feet)
This boring is close to GT-1

DRILL LOG

PETERSON HYDRAULIC

Figure No. 9

Boring No.: CH-03-05

Date of Drilling: Nov. 12, 2005

Project : Alton Hollow Project
Project No.: 307001
Location: Alton, Utah
Elevation: 6900 feet

Drilling Company: DA Smith Drillers
Equipment:
Logged By: Eric Peterson

GWT: Not Indicated

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
2				TOPSOIL: Light brown, moist, loose, 6" thick.		
4						
6						
8						
10						
12						
14						
16						
18				No Core (Auger hole)		
20						
22						
24						
26						
28						
30						
32						
34						
36						
38						
40						
42		SHALE		41-44.5 Carbonaceous shale, waxy, soft, dark gray to black		
44						
46				44.5-46 Low-grade coal, cabonaceous silty shale		
48				46-61 Coal, black, monor brownish coal, minor pyrite		
50						
52						
54		COAL		46-61 Coal, black, monor brownish coal, minor pyrite		
56						
58						
60				61-61.5 Low-grade coal, carbonaceous shale, some fairly		
62				dissembinted pyrite		
64		SHALE		61.5-63.5 Silty shale, waxy, gray		
66						
68						
70						
72						
74						
76						
78						
80						
82						
84						
86						
88						
90						

Notes: Auger (0-41 feet), Continous NQ core (41-63.5 feet)
This boring is close to GT-2

DRILL LOG

PETERSON HYDRAULIC

Figure No. 10-A

Boring No.: CH-01-05

Date of Drilling: Nov. 8, 2005

Project : Alton Hollow Project
Project No.: 307001
Location: Alton, Utah
Elevation: 6900 feet

Drilling Company: DA Smith Drillers
Equipment:
Logged By: Eric Peterson

GWT: 15 feet

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
0						
2				TOPSOIL: Light brown, moist, loose, 6" thick.		
4		CL		0-5 Soil, Clayey		
6		GM		5-14 Gravel with sand and silt, reddish		
8						
10						
12						
14						
16		CL		14-16.6 Clayey silt, wet 16.5-20 Clay, moist, wet		
18						
20						
22				20-34 Silty clay, dark gray, less dense than above		
24						
26						
28						
30						
32						
34		CH		34-48 Clay, stiff, medium gray		
36						
38						
40						
42						
44						
46						
48						
50		SHALE		48-55 Dark gray silty carbonaceous shale, soft, waxy texture, some minor interbedded shaley siltstone, iron-stained fracture zone at 50-51 feet	ø = 20.1 cohesion = 321 psf OM = 20 MDD = 99.5 LL = 61 PI = 38	
52						
54						
56				55-68 Carbonaceous shale with minor silt, dark gray to black, more competent than above		
58						
60						
62						
64						
66						
68				68-69.5 Fractured/broken carbonaceous shale, dark gray to black		
70						
72				69.5-88.5 Carbonaceous shale, dark gray to black, soft, waxy texture		
74						
76						
78						
80						
82						
84						
86						
88						
90				88.5-89.5 Medium gray siltstone		

Notes: Auger (0-40 feet), Continous NQ core (40-175 feet)

DRILL LOG

PETERSON HYDRAULIC

Figure No. 10-B

Boring No.: CH-01-05

Date of Drilling: Nov. 8, 2005

Depth (ft.)	Graphic	USCS	Sample	Description	Laboratory Test Results	Other Data
92		CH		89.5-92 Bentonite, medium to dark gray, pure		
94				92-92.5 Siltstone, medium gray		
96				92.5-107 Cabonaceous shale, dark gray to black, soft, waxy texture		
98					ø = 25.4	
100					cohesion = 216 psf	
102				107-109.5 Siltstone and cabonaceous shale, interbedded,	OM = 17.0	
104				thinly laminated, dark gray	MDD = 108.4	
106				109.5-110 Carbonaceous shale, dark gray to black, soft,	LL = 53 PI = 31	
108				waxy texture		
110		SHALE		110-115 Siltstone and cabonaceous shale, interbedded,		
112				thinly laminated, dark gray		
114				115-121.5 Carbonaceous shale, dark gray to black, soft,		
116				waxy texture, (poor core recovery)		
118				121.5-122 Limey claystone, dark gray, fossiliferous, (small,		
120				open fracture in this interval)		
122				122-125 Little or no recovery in this zone		
124				125-127.5 Carbonaceous shale, dark gray to black, soft,		
126				waxy texture		
128		CH		127.5-128 Bentonite, medium to light gray		
130				128-135 Carbonaceous shale, dark gray to black, soft, waxy		
132		SHALE		texture		
134				135-137 Carbonaceousw shale, harder than above		
136				137-138 Bentonite and interbedded carbonaceous shale,		
138		CH		dark and medium gray, thinly laminated		
140				138-143.5 Carbonaceous shale, dark gray to black, soft		
142				143.5-144 Bentonite and interbedded carbonaceous shale,		
144				dark and medium gray, thinly laminated		
146		SHALE		144-146 Carbonaceous shale and thin interbeds of siltstone,		
148				146-152.5 Siltstone with minor thin interbeds of		
150				cabonaceous shale, mottled gray to black		
152						
154				152.5-154.7 Coal, low grade or highly carbonaceous shale,		
156				black, abundant white fossils/fossil hash		
158						
160		COAL				
162						
164				154.7-171.5 Coal, black with some brown mottled zones.		
166						
168						
170						
172				171.5-171-7 Coal, low grade, brown and black		
174				171.7-173.5 Carbonaceous shale, dark gray to black		
176				173.5-175 Siltstone, gray, interbedded with minor		
178				carbonaceous shale		
180						
182						
184						
186						
188						
190						
192						

Notes: Auger (0-40 feet), Continous NQ core (40-175 feet)

APPENDIX C

LABORATORY TESTING DATA

TAYLOR GEO-ENGINEERING, LLC

TABLE 1

Alton Coal Hollow Project

TGE Project No. 307001

Summary of Laboratory Test Results

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation				Atterberg Limits		Unconfined Compressive Strength (psf)	Standard Proctor		CU Triaxial Test		USCS
Boring No.	Depth (ft.)			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plasticity Index (%)		Optimum Moisture (%)	Maximum Dry Density (pcf)	Effective (ø)	Effective Cohesion (psf)	
GT-1	10-11.5	12.6	111.6					47.0	31.0						CL
GT-1	20-21.5	14.4													CL
GT-1	25-26.5	28.6	95.0					69.0	52.0	4777.0					CH
GT-2	10-11.5	10.6				33.3									SM
GT-2	25-26.5	27.8						37.0	19.0						CL
GT-2	30-31.5	18.5													CL
GT-3	10-11.5	11.0				37.5									SM
GT-3	30-31.5	37.3	76.6					74.0	38.0	1956.0					MH
GT-5	5-6.5	18.7	108.3					63.0	44.0						CH
GT-5	10-11.5	17.1	102.0					63.0	45.0	9429.0					CH
GT-5	15-16.5	17.2	120.0												CH
SP-16-13	39120.0			0.0	20.5	51.1	28.4	31.0	15.0		17.0	110.4	29.6	94.0	CL
CH-1-3	40 - 44.5			1.1	4.4	57.8	37.8	53.0	32.0		20.5	101.9	21.6	319.0	CH
CH-5-48	48 - 55	5.7	132.9	13.2	40.7	46.1		61.0	38.0		20.0	99.5	20.1	321.0	SC
CH-5-98	98 - 108			7.4	29.7	62.9		53.0	36.0		17.0	108.4	25.4	216.0	CH

APPENDIX C
LABORATORY TESTING PROGRAM

Laboratory tests were conducted on representative soil samples obtained from the exploratory borings for the purpose of evaluating specific engineering properties and to aid in classification. Laboratory testing was performed at IGES Geotechnical Laboratory (Murray, Utah). A summary of the various laboratory tests, conducted in accordance with ASTM or other approved procedures follows:

Tests Conducted:	To Determine:
Natural Moisture Content ASTM D 2216	Moisture content representative of field conditions at the time samples were taken.
Natural Dry Density ASTM D 2922	Dry unit weight of samples, representative of in-place conditions at the time samples were taken.
Grain Size Analysis ASTM D 422	Size and distribution of soil particles (i.e. gravel, sand, and the combined percentage of clay and silt) within a soil sample.
Hydrometer ASTM D 422	Size and distribution of soil particles (i.e. gravel, sand, clay, and silt) within a soil sample.
Atterberg Limits ASTM D 423 and D 424	Effect of varying water content on the consistency of fine-grained soils.
Standard Proctor ASTM D 698	Determine the maximum density and optimum moisture for fill compaction effort.
Unconfined Compressive Strength ASTM D 2166	Compressive strength of sample, determined without a confining pressure.
Triaxial Shear Test	Angle of friction and cohesion under a confining pressure.

Results of the laboratory tests are summarized on Table-1, Summary of Laboratory Test Results. Laboratory data sheets are provided in Appendix C-1 and C-2.

APPENDIX C-1

LABORATORY TESTING DATA for BORINGS GT-1 through GT-5

Moisture Content and Unit Weight of Soil

(In General Accordance with ASTM D2937 and D2216)

IGES
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location: _
Date: 3/9/2007
By: NB

Sample Info.	Boring No.	GT-1	GT-1	GT-2	GT-2	GT-2	GT-3	GT-5	GT-5
	Sample:								
	Depth:	10-11.5'	20.21.5'	10-11.5'	25-26.5'	30-31.5'	10-11.5'	5-6.5'	15-16.5
Unit Weight Info.	Sample height, H (in)	1.110						4.449	2.430
	Sample diameter, D (in)	1.890						1.373	1.824
	Sample volume, V (ft^3)	0.0018						0.0038	0.0037
	Wt. rings + wet soil (g)	102.87						222.43	234.72
	Wt. rings/tare (g)	0.00						0.00	0.00
	Moist soil, Ws (g)	102.87						222.43	234.72
	Moist unit wt., γ_m (pcf)	125.73						128.53	140.70
Moisture	Wet soil + tare (g)	292.45	670.40	438.87	295.22	380.60	492.21	283.41	385.29
	Dry soil + tare (g)	276.79	603.47	410.17	264.26	345.01	457.38	262.52	350.82
	Tare (g)	152.92	140.21	140.53	152.70	152.72	139.84	150.75	150.62
Moisture Content, w (%)		**12.6**	**14.4**	**10.6**	**27.8**	**18.5**	**11.0**	**18.7**	**17.2**
Dry Unit Wt., γ_d (pcf)		**111.6**						**108.3**	**120.0**

Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: BRR

Boring No.: GT-1
Sample:
Depth: 10-11.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

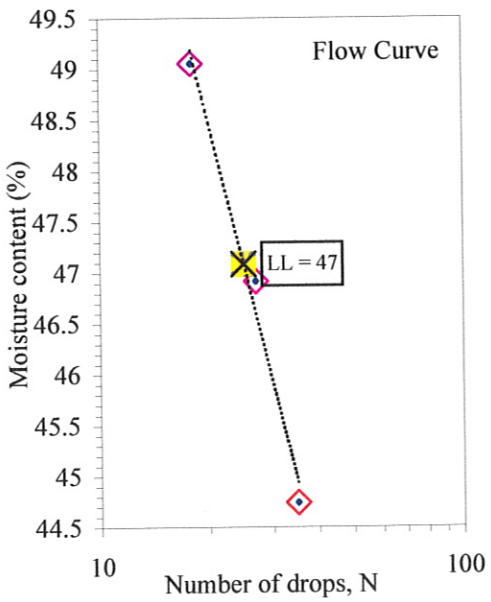
Plastic Limit

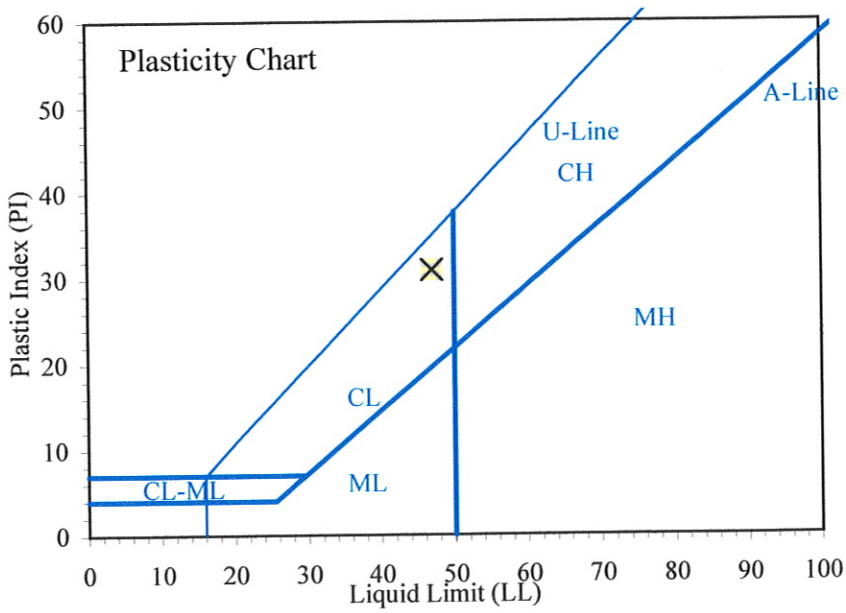
Determination No	1	2				
Wet Soil + Tare (g)	9.48	10.49				
Dry Soil + Tare (g)	8.37	9.24				
Moisture Loss (g)	1.11	1.25				
Tare (g)	1.39	1.39				
Dry Soil (g)	6.98	7.85				
Moisture Content, w (%)	15.90	15.92				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	35	27	18			
Wet Soil + Tare (g)	10.04	11.88	10.87			
Dry Soil + Tare (g)	7.36	8.53	7.75			
Moisture Loss (g)	2.68	3.35	3.12			
Tare (g)	1.37	1.39	1.39			
Dry Soil (g)	5.99	7.14	6.36			
Moisture Content, w (%)	44.74	46.92	49.06			
One-Point LL (%)		47				

Liquid Limit, LL (%)	**47**
Plastic Limit, PL (%)	**16**
Plasticity Index, PI (%)	**31**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/15/2007
By: NB

Boring No.: GT-1
Sample:
Depth: 25-26.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

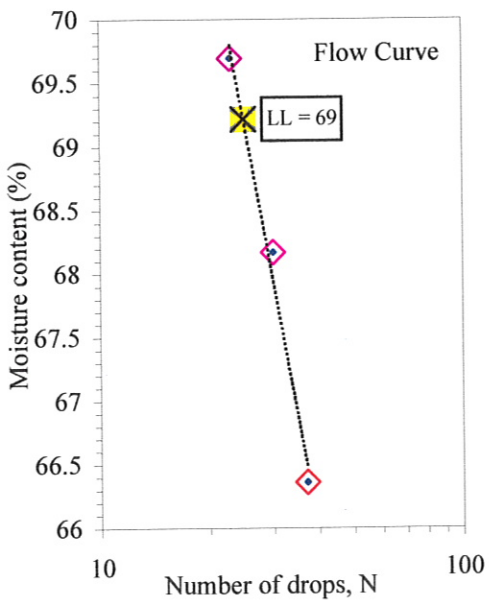
Plastic Limit

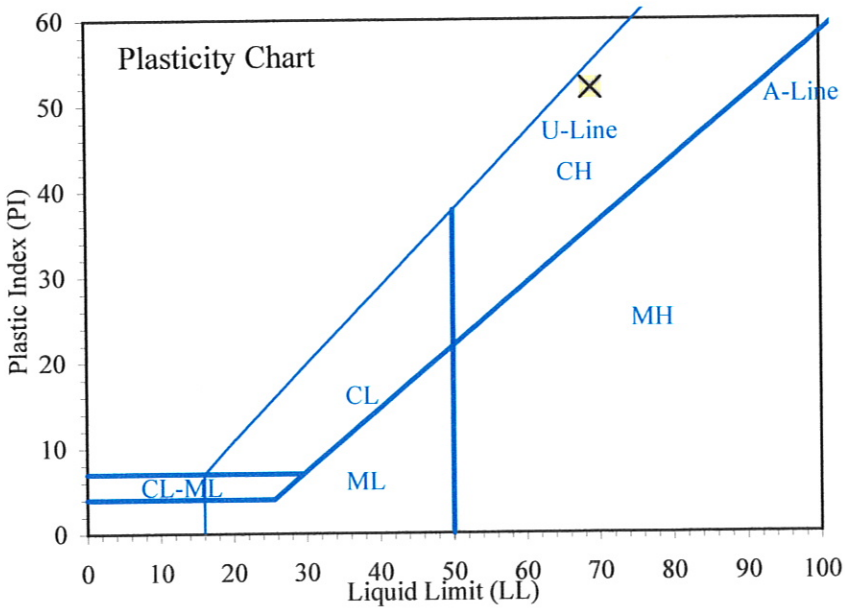
Determination No	1	2				
Wet Soil + Tare (g)	4.1	4.23				
Dry Soil + Tare (g)	3.7	3.81				
Moisture Loss (g)	0.4	0.42				
Tare (g)	1.38	1.38				
Dry Soil (g)	2.32	2.43				
Moisture Content, w (%)	17.24	17.28				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	37	30	23			
Wet Soil + Tare (g)	8.66	7.73	7			
Dry Soil + Tare (g)	5.76	5.16	4.7			
Moisture Loss (g)	2.9	2.57	2.3			
Tare (g)	1.39	1.39	1.4			
Dry Soil (g)	4.37	3.77	3.30			
Moisture Content, w (%)	66.36	68.17	69.70			
One-Point LL (%)		70	69			

Liquid Limit, LL (%)	**69**
Plastic Limit, PL (%)	**17**
Plasticity Index, PI (%)	**52**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: BRR

Boring No.: GT-2
Sample:
Depth: 25-26.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

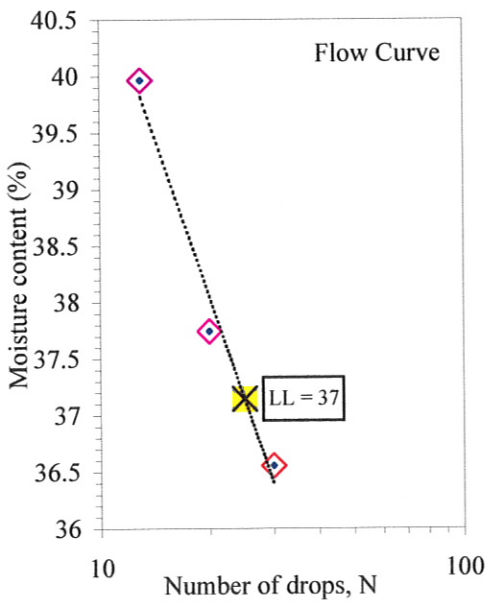
Plastic Limit

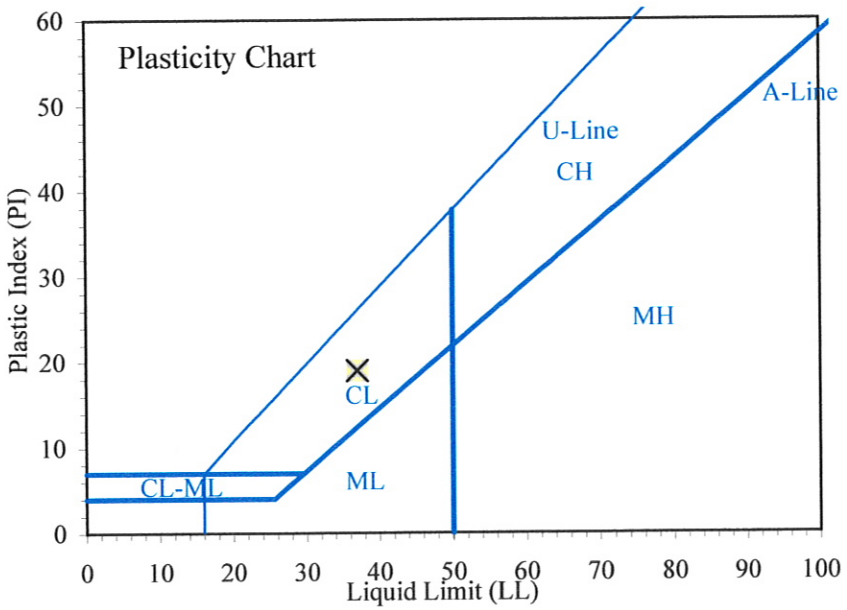
Determination No	1	2				
Wet Soil + Tare (g)	9.63	9.76				
Dry Soil + Tare (g)	8.35	8.47				
Moisture Loss (g)	1.28	1.29				
Tare (g)	1.39	1.4				
Dry Soil (g)	6.96	7.07				
Moisture Content, w (%)	18.39	18.25				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	30	20	13			
Wet Soil + Tare (g)	11	11.9	10.25			
Dry Soil + Tare (g)	8.43	9.02	7.72			
Moisture Loss (g)	2.57	2.88	2.53			
Tare (g)	1.4	1.39	1.39			
Dry Soil (g)	7.03	7.63	6.33			
Moisture Content, w (%)	36.56	37.75	39.97			
One-Point LL (%)	37	37				

Liquid Limit, LL (%)	**37**
Plastic Limit, PL (%)	**18**
Plasticity Index, PI (%)	**19**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

IGES
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/15/2007
By: NB

Boring No.: GT-3
Sample:
Depth: 30-31.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

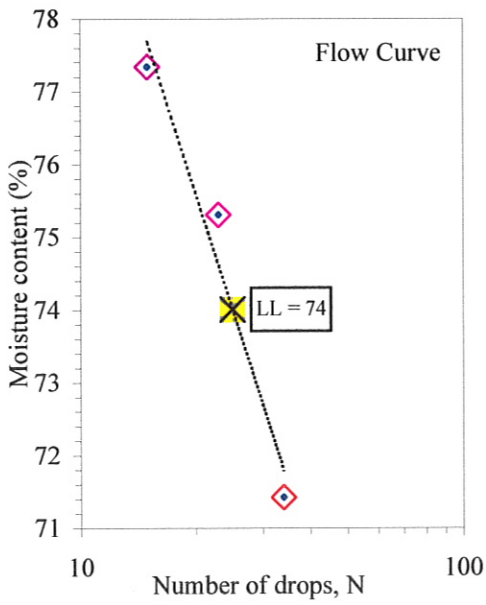
Plastic Limit

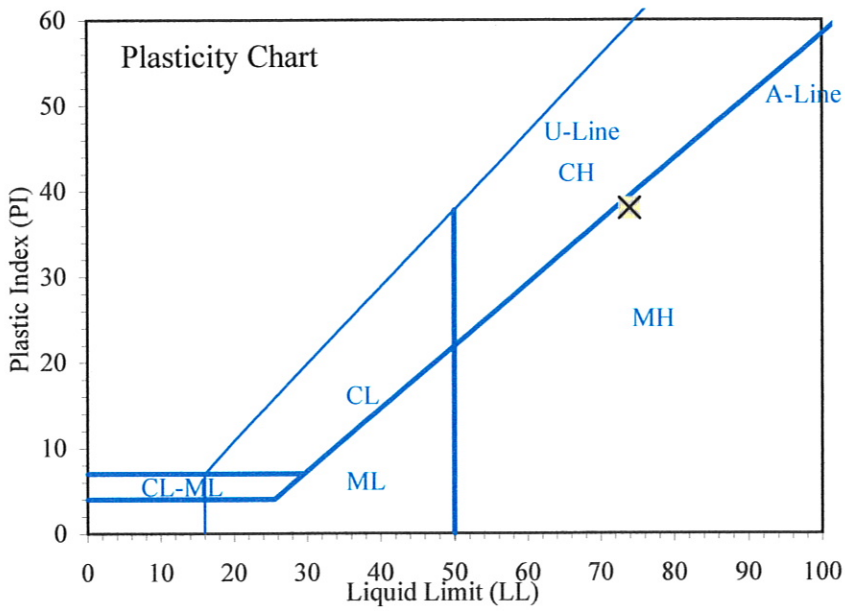
Determination No	1	2				
Wet Soil + Tare (g)	4.54	4.32				
Dry Soil + Tare (g)	3.7	3.55				
Moisture Loss (g)	0.84	0.77				
Tare (g)	1.39	1.39				
Dry Soil (g)	2.31	2.16				
Moisture Content, w (%)	36.36	35.65				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	34	23	15			
Wet Soil + Tare (g)	7.02	8.35	8.2			
Dry Soil + Tare (g)	4.67	5.36	5.23			
Moisture Loss (g)	2.35	2.99	2.97			
Tare (g)	1.38	1.39	1.39			
Dry Soil (g)	3.29	3.97	3.84			
Moisture Content, w (%)	71.43	75.31	77.34			
One-Point LL (%)		75				

Liquid Limit, LL (%)	**74**
Plastic Limit, PL (%)	**36**
Plasticity Index, PI (%)	**38**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: BRR

Boring No.: GT-5
Sample:
Depth: 5-6.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

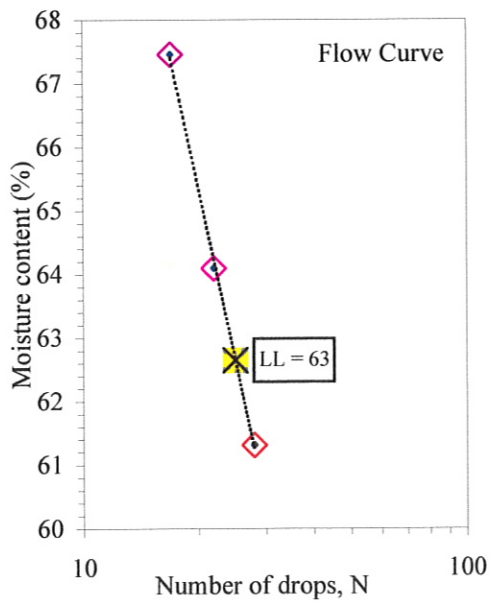
Plastic Limit

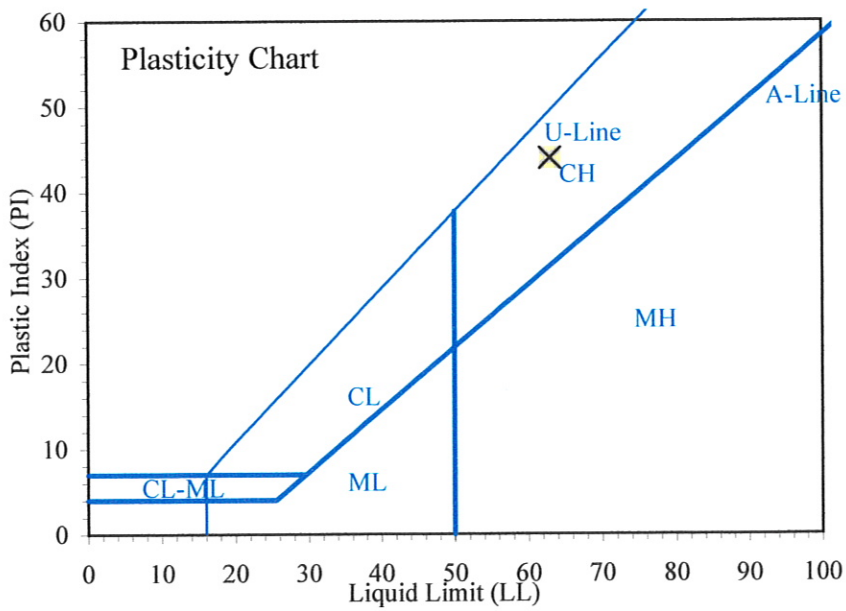
Determination No	1	2				
Wet Soil + Tare (g)	8.32	8.38				
Dry Soil + Tare (g)	7.22	7.28				
Moisture Loss (g)	1.1	1.1				
Tare (g)	1.39	1.38				
Dry Soil (g)	5.83	5.90				
Moisture Content, w (%)	18.87	18.64				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	28	22	17			
Wet Soil + Tare (g)	9.23	8.43	10.49			
Dry Soil + Tare (g)	6.25	5.68	6.82			
Moisture Loss (g)	2.98	2.75	3.67			
Tare (g)	1.39	1.39	1.38			
Dry Soil (g)	4.86	4.29	5.44			
Moisture Content, w (%)	61.32	64.10	67.46			
One-Point LL (%)	62	63				

Liquid Limit, LL (%)	**63**
Plastic Limit, PL (%)	**19**
Plasticity Index, PI (%)	**44**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: .
No: M00991-002
Location:
Date: 3/15/2007
By: NB

Boring No.: GT-5
Sample:
Depth: 10-11.5
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

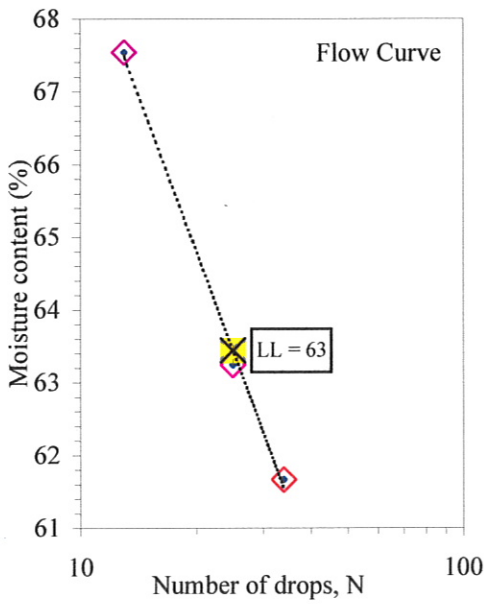
Plastic Limit

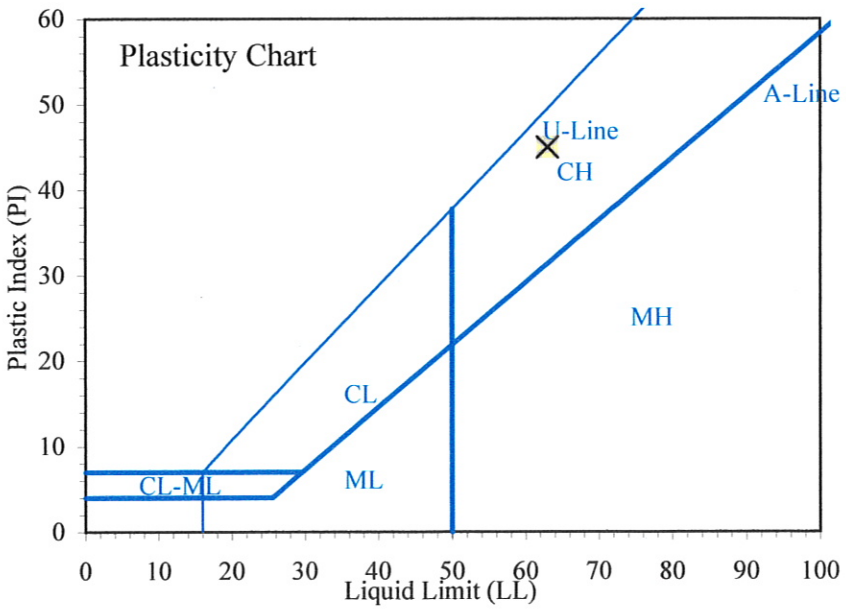
Determination No	1	2				
Wet Soil + Tare (g)	5.3	5.18				
Dry Soil + Tare (g)	4.7	4.61				
Moisture Loss (g)	0.6	0.57				
Tare (g)	1.35	1.35				
Dry Soil (g)	3.35	3.26				
Moisture Content, w (%)	17.91	17.48				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	34	25	13			
Wet Soil + Tare (g)	8.93	8.19	10.32			
Dry Soil + Tare (g)	6.05	5.54	6.72			
Moisture Loss (g)	2.88	2.65	3.6			
Tare (g)	1.38	1.35	1.39			
Dry Soil (g)	4.67	4.19	5.33			
Moisture Content, w (%)	61.67	63.25	67.54			
One-Point LL (%)		63				

Liquid Limit, LL (%)	**63**
Plastic Limit, PL (%)	**18**
Plasticity Index, PI (%)	**45**





Entered by:_____
Reviewed:

Amount of Material in Soil Finer than the No. 200 (75µm) Sieve

(ASTM D1140)

IGES
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/12/2007
By: NB

Sample Info.	Boring No.	GT-2	GT-3						
	Sample								
	Depth	10-11.5	10-11.5						
	Split	No	No						
	Split Sieve*								
Moist total sample wt. (g)		298.34	352.37						
Moist coarse fraction (g)									
Dry split fraction (g)									
No. 200 Dry wt. retained (g)		179.78	198.58						
Split sieve* Dry wt. retained (g)									
Dry total sample wt. (g)		269.64	317.54						
Coarse Fraction	Moist soil + tare (g)								
	Dry soil + tare (g)								
	Tare (g)								
	Moisture content (%)								
Split Fraction	Moist soil + tare (g)	438.87	492.21						
	Dry soil + tare (g)	410.17	457.38						
	Tare (g)	140.53	139.84						
	Moisture content (%)	10.64	10.97						
Percent passing split sieve* (%)									
Percent passing No. 200 sieve (%)		**33.3**	**37.5**						

Entered by:_____

Unconfined Compressive Strength of Cohesive Soils

(ASTM D2166)

© IGES 2005

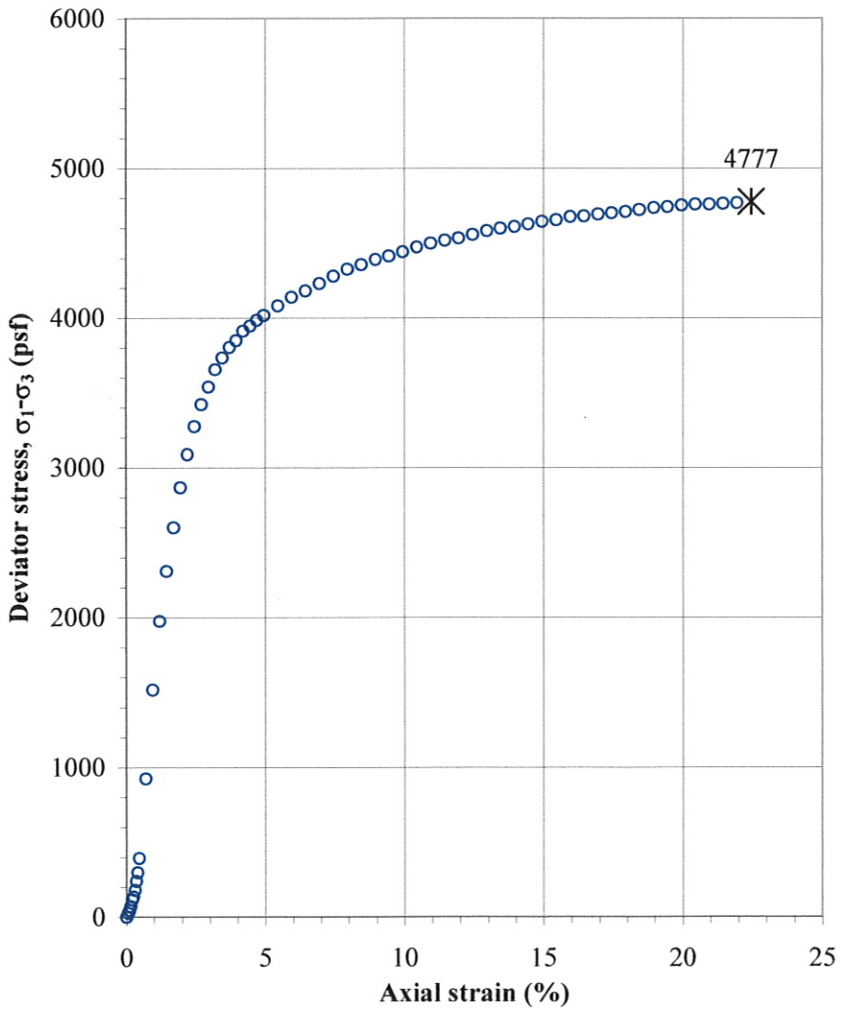
Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: DS

Boring No.: GT-1
Sample:
Depth: 25-26.5 feet
Sample Description: Brown clay
Sample type: Undisturbed

Sample height, H (in.)	4.250
Sample diameter, D (in.)	1.930
Sample volume, V (ft^3)	0.0072
Wt. rings + wet soil (g)	398.84
Wt. rings/tare (g)	0.00
Moist soil, Ws (g)	398.84
Moist unit wt., γ_m (pcf)	122.2
Dry unit wt., γ_d (pcf)	**95.0**

Wet soil + tare (g)	58.32
Dry soil + tare (g)	52.02
Tare (g)	30.00
Moisture content, w (%)	**28.6**
Strain rate (%/min)	2.0
Strain at failure, ε_f (%)	22.45
Deviator stress at failure, $(\sigma1-\sigma3)_f$ (psf)	4777
Shear stress at failure, $q_f = (\sigma1_f-\sigma3_f)/2$ (psf)	2389

Axial Strain (%)	σd σ1-σ3 (psf)	Q 1/2 σd (psf)
0.00	0.0	0.0
0.05	25.8	12.9
0.10	45.1	22.6
0.15	70.9	35.5
0.20	116.0	58.0
0.26	135.3	67.6
0.31	180.3	90.1
0.35	238.2	119.1
0.40	296.0	148.0
0.46	392.4	196.2
0.70	924.5	462.3
0.95	1517.9	759.0
1.20	1974.2	987.1
1.46	2306.7	1153.4
1.70	2599.6	1299.8
1.95	2865.6	1432.8
2.20	3085.8	1542.9
2.45	3273.3	1636.7
2.70	3422.1	1711.1
2.95	3538.6	1769.3
3.20	3654.4	1827.2
3.45	3732.2	1866.1
3.71	3802.9	1901.5
3.95	3849.0	1924.5
4.20	3913.2	1956.6
4.45	3945.9	1973.0
4.70	3984.5	1992.3
4.95	4017.0	2008.5
5.46	4080.6	2040.3
5.95	4137.8	2068.9
6.45	4181.8	2090.9
6.95	4231.2	2115.6
7.46	4279.4	2139.7
7.96	4326.8	2163.4
8.45	4356.5	2178.3
8.96	4390.9	2195.5
9.45	4413.3	2206.7
9.95	4440.9	2220.5
10.45	4473.4	2236.7
10.96	4499.5	2249.8
11.46	4519.5	2259.8
11.95	4533.5	2266.8
12.45	4558.1	2279.1
12.95	4582.0	2291.0
13.45	4600.0	2300.0
13.95	4611.5	2305.8
14.45	4628.5	2314.3
14.95	4644.9	2322.5
15.46	4654.9	2327.5
15.96	4675.7	2337.9
16.45	4680.0	2340.0
16.96	4693.8	2346.9
17.45	4702.7	2351.4
17.95	4710.8	2355.4
18.45	4723.6	2361.8
18.96	4735.4	2367.7
19.45	4742.6	2371.3
19.96	4753.5	2376.8
20.46	4759.2	2379.6
20.96	4759.2	2379.6
21.45	4764.2	2382.1
21.95	4768.7	2384.4
22.45	4777.3	2388.7



Entered by:_____

Reviewed:_____

Unconfined Compressive Strength of Cohesive Soils

(ASTM D2166)

© IGES 2005

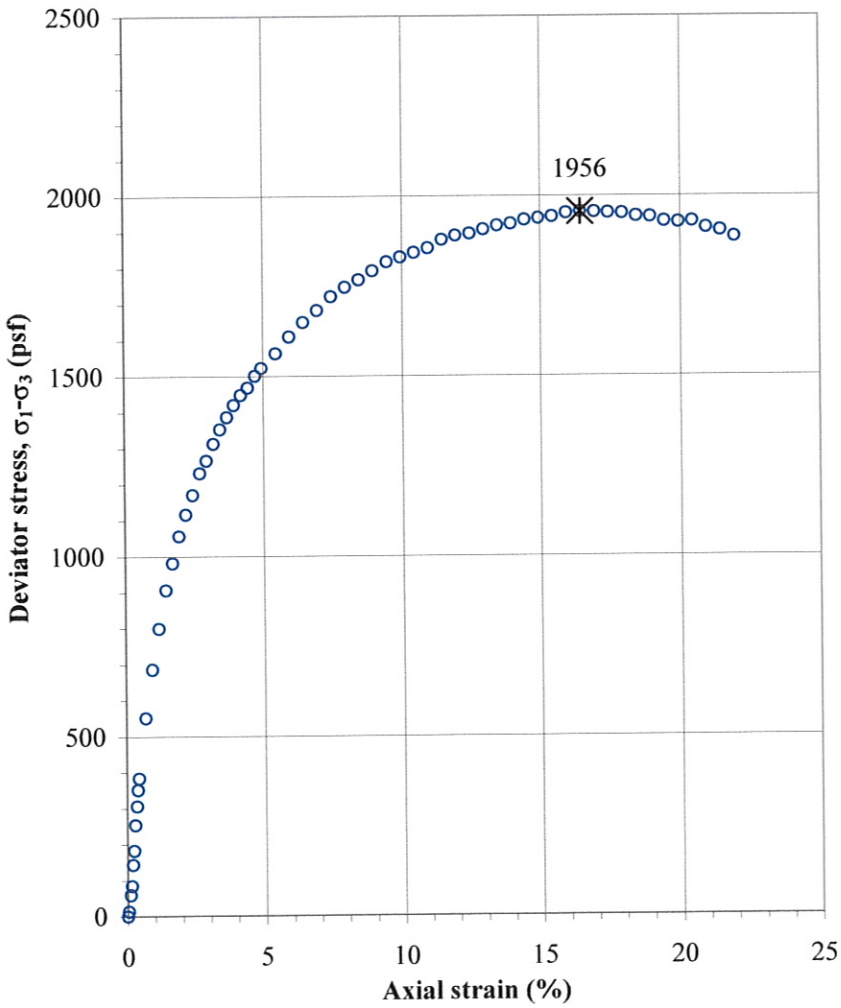
Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: DS

Boring No.: GT-3
Sample:
Depth: 30-31.5 feet
Sample Description: Dark grey clay with organics
Sample type: Undisturbed

Sample height, H (in.)	4.200
Sample diameter, D (in.)	1.920
Sample volume, V (ft^3)	0.0070
Wt. rings + wet soil (g)	335.60
Wt. rings/tare (g)	0.00
Moist soil, Ws (g)	335.60
Moist unit wt., γ_m (pcf)	105.1
Dry unit wt., γ_d (pcf)	**76.6**

Wet soil + tare (g)	70.62
Dry soil + tare (g)	59.53
Tare (g)	29.82
Moisture content, w (%)	**37.3**
Strain rate (%/min)	2.0
Strain at failure, ε_f (%)	16.45
Deviator stress at failure, $(\sigma1-\sigma3)_f$ (psf)	1956
Shear stress at failure, $q_f = (\sigma1_f-\sigma3_f)/2$ (psf)	978

Axial Strain (%)	σd σ1-σ3 (psf)	Q 1/2 σd (psf)
0.00	0.0	0.0
0.04	13.0	6.5
0.10	58.7	29.3
0.14	84.7	42.3
0.20	143.3	71.7
0.25	182.3	91.2
0.29	253.9	126.9
0.35	305.8	152.9
0.39	351.2	175.6
0.44	383.5	191.7
0.69	551.0	275.5
0.94	685.3	342.7
1.19	799.6	399.8
1.45	906.6	453.3
1.69	981.2	490.6
1.94	1055.3	527.7
2.19	1116.3	558.2
2.44	1170.4	585.2
2.70	1230.6	615.3
2.95	1265.3	632.7
3.20	1312.3	656.2
3.44	1352.8	676.4
3.69	1386.8	693.4
3.94	1420.5	710.3
4.19	1447.8	723.9
4.44	1468.7	734.4
4.71	1501.5	750.8
4.94	1522.4	761.2
5.45	1563.1	781.6
5.94	1609.7	804.9
6.44	1649.4	824.7
6.94	1682.4	841.2
7.45	1721.0	860.5
7.95	1747.0	873.5
8.44	1767.0	883.5
8.94	1792.3	896.2
9.45	1817.0	908.5
9.94	1830.0	915.0
10.44	1842.6	921.3
10.94	1854.9	927.5
11.45	1878.3	939.2
11.94	1890.0	945.0
12.45	1895.6	947.8
12.94	1907.0	953.5
13.45	1917.7	958.9
13.94	1923.0	961.5
14.44	1933.5	966.8
14.94	1938.0	969.0
15.44	1942.6	971.3
15.94	1952.2	976.1
16.45	1956.0	978.0
16.95	1954.5	977.3
17.44	1952.8	976.4
17.94	1950.9	975.5
18.45	1943.5	971.8
18.94	1941.4	970.7
19.44	1928.7	964.4
19.95	1926.2	963.1
20.44	1929.2	964.6
20.94	1911.1	955.6
21.44	1903.2	951.6
21.94	1885.3	942.7
22.44	1862.2	931.1



Entered by:_____

Reviewed:_____

Unconfined Compressive Strength of Cohesive Soils

(ASTM D2166)

IGES
© IGES 2005

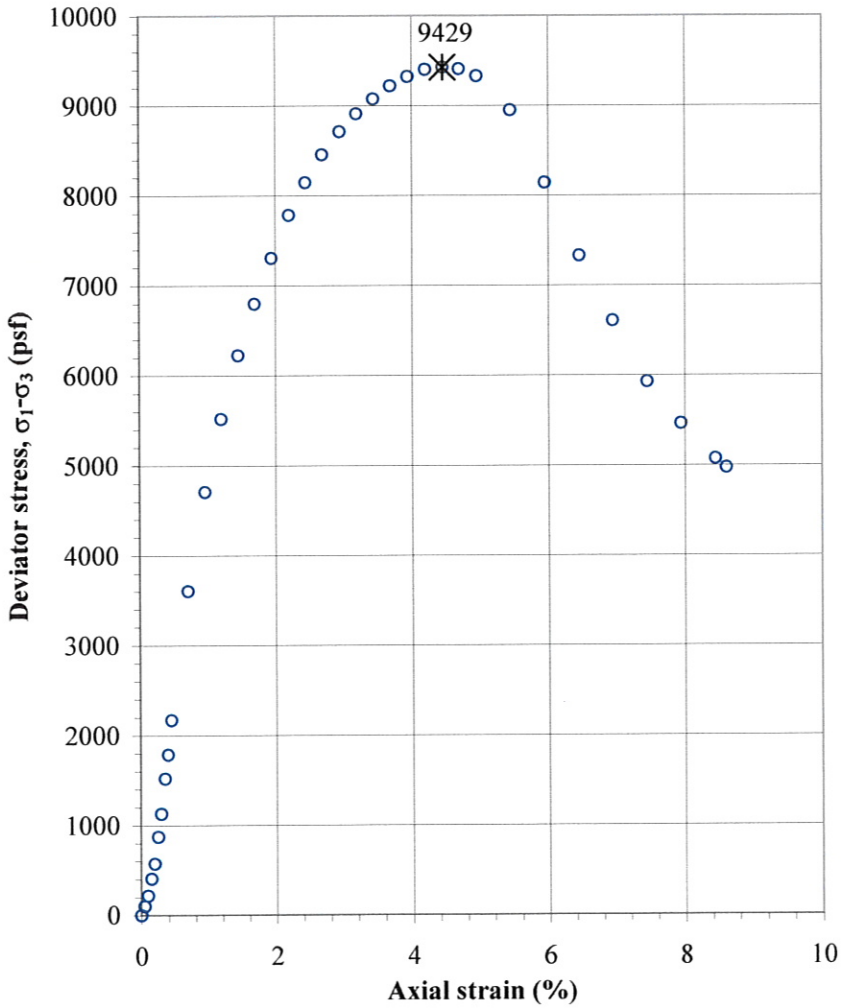
Project: Taylor Geo-Engineering
No: M00991-002
Location:
Date: 3/13/2007
By: DS

Boring No.: GT-5
Sample:
Depth: 10-11.5 feet
Sample Description: Brown clay
Sample type: Undisturbed

Sample height, H (in.)	5.990
Sample diameter, D (in.)	2.416
Sample volume, V (ft^3)	0.0159
Wt. rings + wet soil (g)	860.41
Wt. rings/tare (g)	0.00
Moist soil, Ws (g)	860.41
Moist unit wt., γ_m (pcf)	119.4
Dry unit wt., γ_d (pcf)	**102.0**

Wet soil + tare (g)	339.46
Dry soil + tare (g)	315.83
Tare (g)	177.29
Moisture content, w (%)	**17.1**
Strain rate (%/min)	2.0
Strain at failure, ε_f (%)	4.45
Deviator stress at failure, $(\sigma1-\sigma3)_f$ (psf)	9429
Shear stress at failure, $q_f = (\sigma1_f-\sigma3_f)/2$ (psf)	4714

Axial Strain (%)	σd σ1-σ3 (psf)	Q 1/2 σd (psf)
0.00	0.0	0.0
0.05	99.0	49.5
0.10	218.5	109.3
0.15	403.9	202.0
0.20	572.6	286.3
0.25	873.0	436.5
0.29	1127.8	563.9
0.35	1517.9	759.0
0.40	1784.5	892.3
0.45	2170.0	1085.0
0.70	3603.3	1801.7
0.95	4706.5	2353.3
1.20	5518.7	2759.4
1.45	6224.8	3112.4
1.69	6797.6	3398.8
1.95	7306.2	3653.1
2.20	7783.5	3891.8
2.45	8146.6	4073.3
2.69	8455.0	4227.5
2.95	8713.1	4356.6
3.20	8910.5	4455.3
3.44	9074.9	4537.5
3.69	9222.1	4611.1
3.95	9324.7	4662.4
4.20	9402.2	4701.1
4.45	9428.7	4714.4
4.70	9408.4	4704.2
4.95	9331.8	4665.9
5.44	8951.0	4475.5
5.95	8141.6	4070.8
6.45	7332.5	3666.3
6.94	6609.4	3304.7
7.45	5931.0	2965.5
7.94	5465.3	2732.7
8.45	5072.0	2536.0
8.61	4972.3	2486.2



Entered by:_____

Reviewed:_____

APPENDIX C-2

LABORATORY TESTING DATA for SAMPLES SETS
SP-16-13
CH-1-3
CH-5-48
CH-5-98

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

IGES © IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location: _
Date: 3/8/2007
By: DKS

Boring No.: _
Sample: CH-5-98
Depth: _
Description: Gray Weathered Claystone

Preparation method: Air Dry
Liquid limit test method: Multipoint

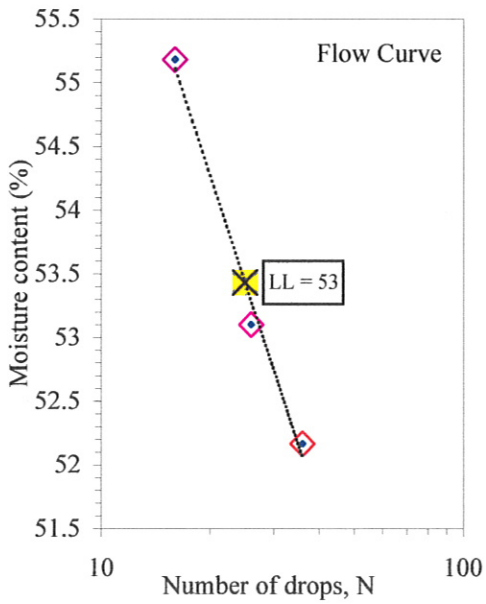
Plastic Limit

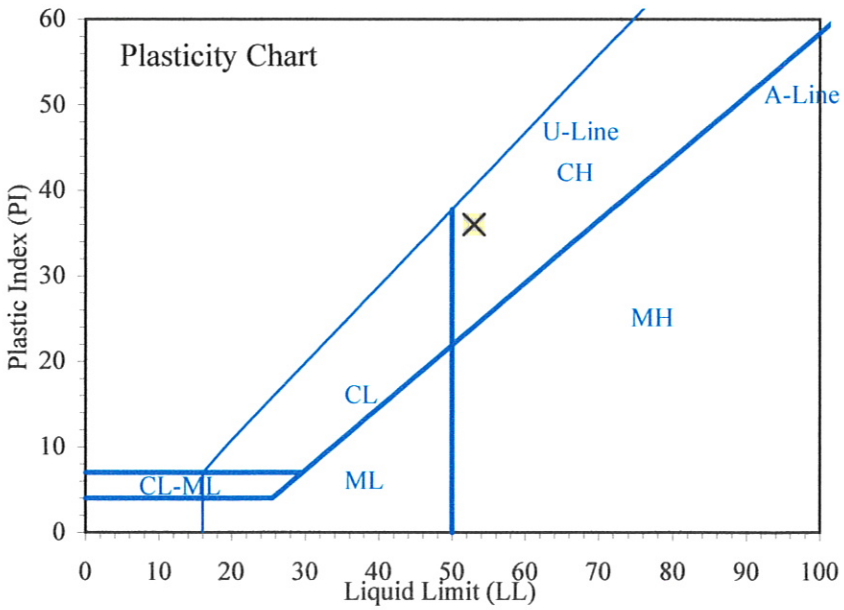
Determination No	1	2				
Wet Soil + Tare (g)	8.38	12.66				
Dry Soil + Tare (g)	7.37	10.99				
Moisture Loss (g)	1.01	1.67				
Tare (g)	1.39	1.38				
Dry Soil (g)	5.98	9.61				
Moisture Content, w (%)	16.89	17.38				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	36	26	16			
Wet Soil + Tare (g)	11.22	12.94	11.57			
Dry Soil + Tare (g)	7.85	8.92	7.95			
Moisture Loss (g)	3.37	4.02	3.62			
Tare (g)	1.39	1.35	1.39			
Dry Soil (g)	6.46	7.57	6.56			
Moisture Content, w (%)	52.17	53.10	55.18			
One-Point LL (%)		53				

Liquid Limit, LL (%)	**53**
Plastic Limit, PL (%)	**17**
Plasticity Index, PI (%)	**36**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location: _
Date: 3/8/2007
By: BRR

Boring No.: _
Sample: SP-16-13
Depth: _
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

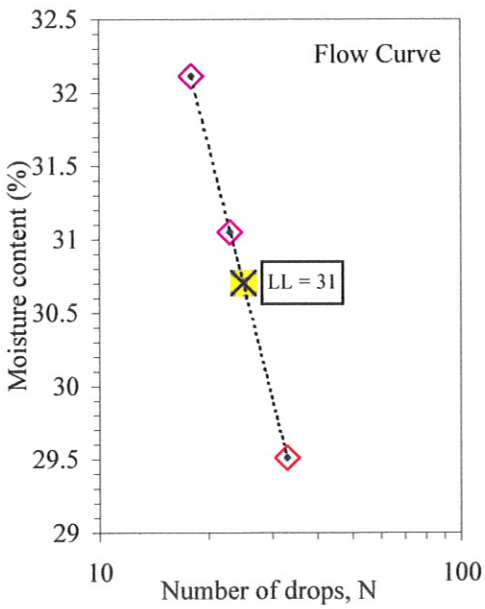
Plastic Limit

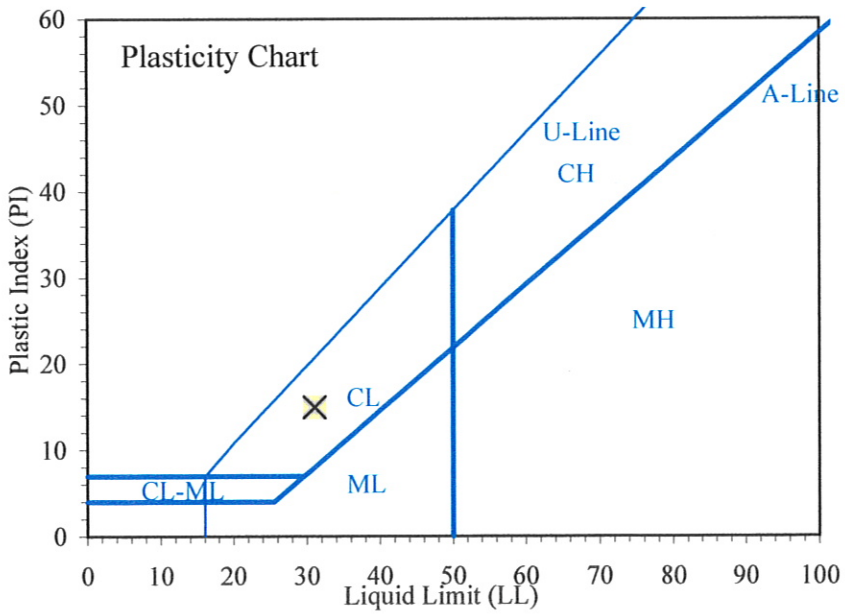
Determination No	1	2				
Wet Soil + Tare (g)	12	12.16				
Dry Soil + Tare (g)	10.53	10.66				
Moisture Loss (g)	1.47	1.5				
Tare (g)	1.4	1.39				
Dry Soil (g)	9.13	9.27				
Moisture Content, w (%)	16.10	16.18				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	33	23	18			
Wet Soil + Tare (g)	9.64	10.95	10.77			
Dry Soil + Tare (g)	7.76	8.68	8.48			
Moisture Loss (g)	1.88	2.27	2.29			
Tare (g)	1.39	1.37	1.35			
Dry Soil (g)	6.37	7.31	7.13			
Moisture Content, w (%)	29.51	31.05	32.12			
One-Point LL (%)		31				

Liquid Limit, LL (%)	**31**
Plastic Limit, PL (%)	**16**
Plasticity Index, PI (%)	**15**





Entered by:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/12/2007
By: NB

Boring No.:
Sample: CH-1-3
Depth:
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

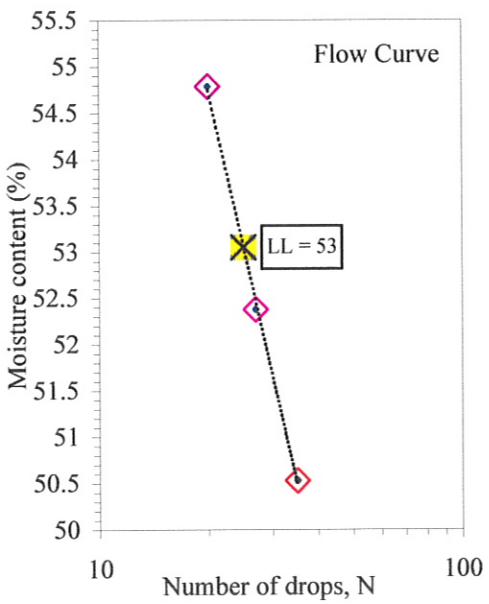
Plastic Limit

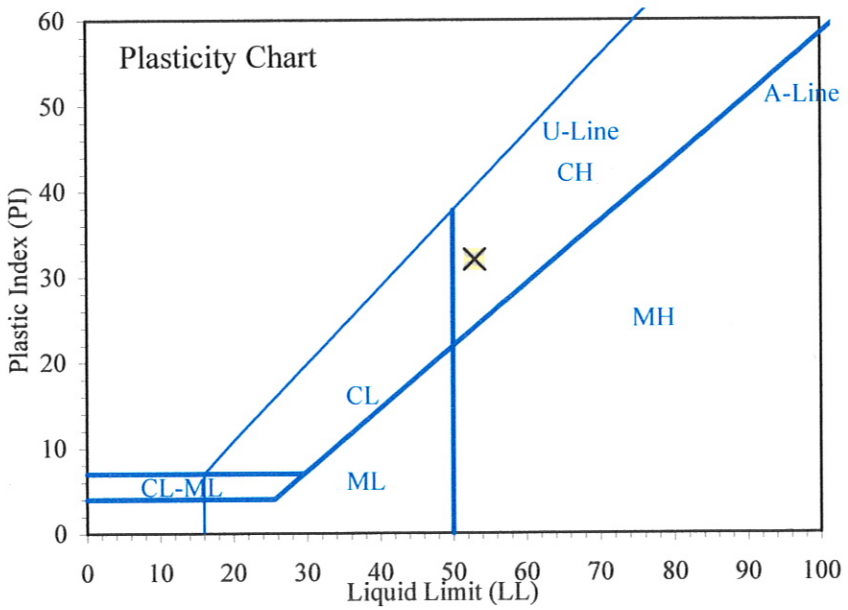
Determination No	1	2				
Wet Soil + Tare (g)	6.44	6.43				
Dry Soil + Tare (g)	5.57	5.57				
Moisture Loss (g)	0.87	0.86				
Tare (g)	1.38	1.39				
Dry Soil (g)	4.19	4.18				
Moisture Content, w (%)	20.76	20.57				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	35	27	20			
Wet Soil + Tare (g)	8.47	8.11	10.61			
Dry Soil + Tare (g)	6.09	5.8	7.35			
Moisture Loss (g)	2.38	2.31	3.26			
Tare (g)	1.38	1.39	1.4			
Dry Soil (g)	4.71	4.41	5.95			
Moisture Content, w (%)	50.53	52.38	54.79			
One-Point LL (%)		53	53			

Liquid Limit, LL (%)	**53**
Plastic Limit, PL (%)	**21**
Plasticity Index, PI (%)	**32**





Entered by:_____
Reviewed:

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

IGES
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/12/2007
By: NB

Boring No.:
Sample: CH-5-48
Depth:
Description: Not Requested

Preparation method: Air Dry
Liquid limit test method: Multipoint

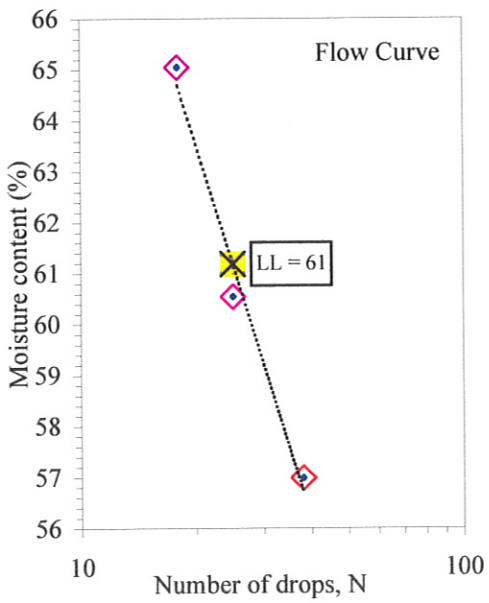
Plastic Limit

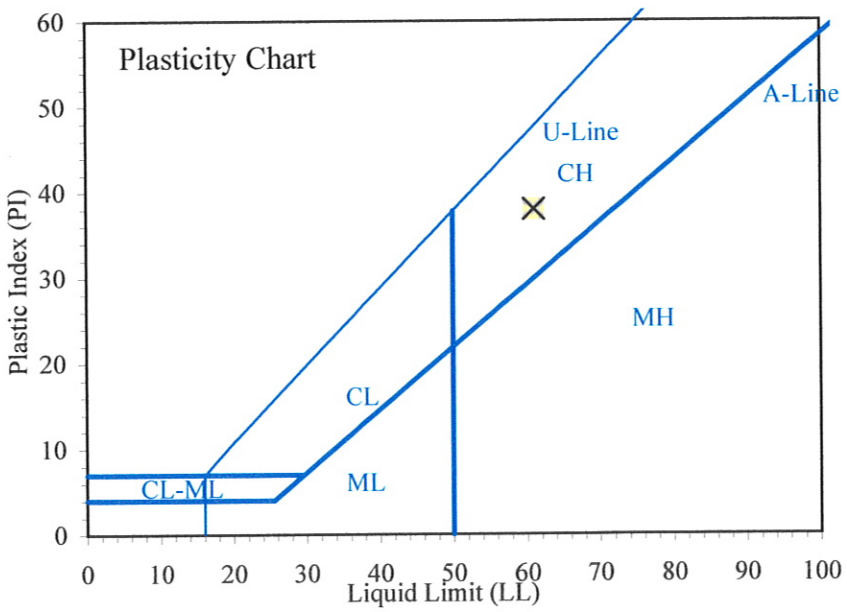
Determination No	1	2				
Wet Soil + Tare (g)	8.58	10.39				
Dry Soil + Tare (g)	7.22	8.71				
Moisture Loss (g)	1.36	1.68				
Tare (g)	1.4	1.39				
Dry Soil (g)	5.82	7.32				
Moisture Content, w (%)	23.37	22.95				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	38	25	18			
Wet Soil + Tare (g)	8.69	9	9.55			
Dry Soil + Tare (g)	6.04	6.13	6.33			
Moisture Loss (g)	2.65	2.87	3.22			
Tare (g)	1.39	1.39	1.38			
Dry Soil (g)	4.65	4.74	4.95			
Moisture Content, w (%)	56.99	60.55	65.05			
One-Point LL (%)		61				

Liquid Limit, LL (%)	**61**
Plastic Limit, PL (%)	**23**
Plasticity Index, PI (%)	**38**





Entered by: _____
Reviewed:

Particle-Size Analysis of Soils

(ASTM D422)

© IGES 2004

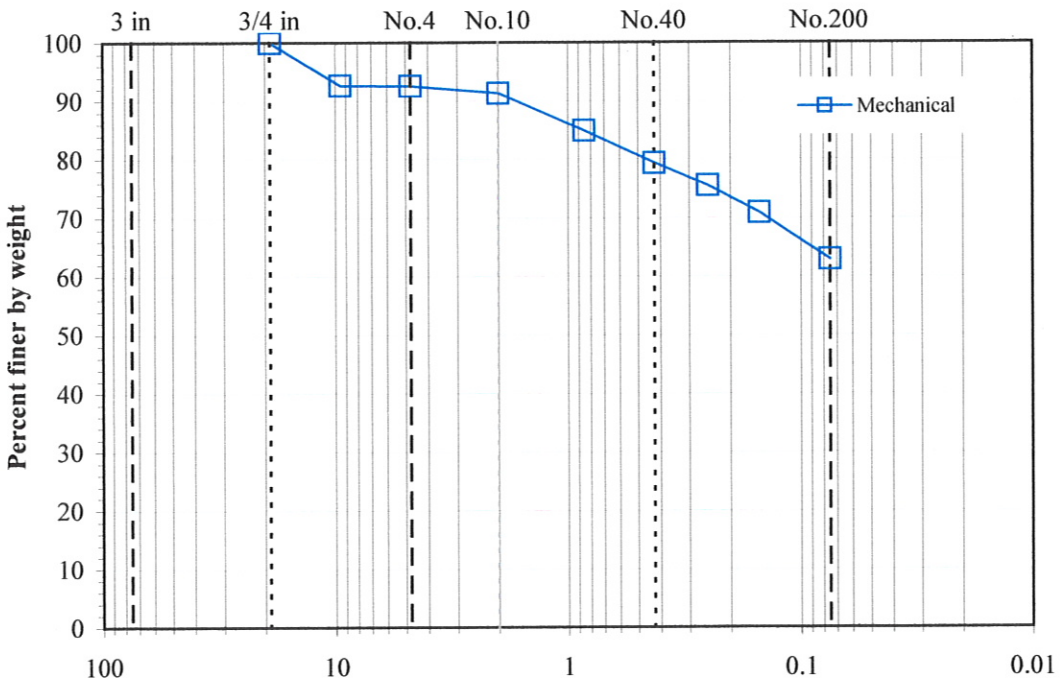
Project: Taylor Geo-Engineering
No: M00991-001
Location: __
Date: 3/6/2007
By: DKS

Boring No.: __
Sample: CH-5-98
Depth: __
Description: Gray Weathered Claystone

	Moist	Dry
Split:	Yes	
Split sieve:	3/8"	
Total sample wt. (g):	7142.6	6906.5
+3/8" Coarse fraction (g):	523.1	505.9
-3/8" Split fraction (g):	1270.1	1228.10
Split fraction:	0.927	

Moisture data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	629.80	1661.40
Dry soil + tare (g):	616.32	1619.40
Tare (g):	220.90	391.30
Moisture content (%):	3.4	3.4

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
12"	-	300	-	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	-	
1.5"	-	37.5	-	
3/4"	-	19	100.0	
3/8"	505.90	9.5	92.7	←Split
No.4	1.40	4.75	92.6	
No.10	18.10	2	91.3	
No.20	102.50	0.85	84.9	
No.40	176.30	0.425	79.4	
No.60	227.20	0.25	75.5	
No.100	289.00	0.15	70.9	
No.200	394.40	0.075	62.9	



Entered by:_____

Reviewed:

Particle-Size Analysis of Soils

(ASTM D422)

© IGES 2004

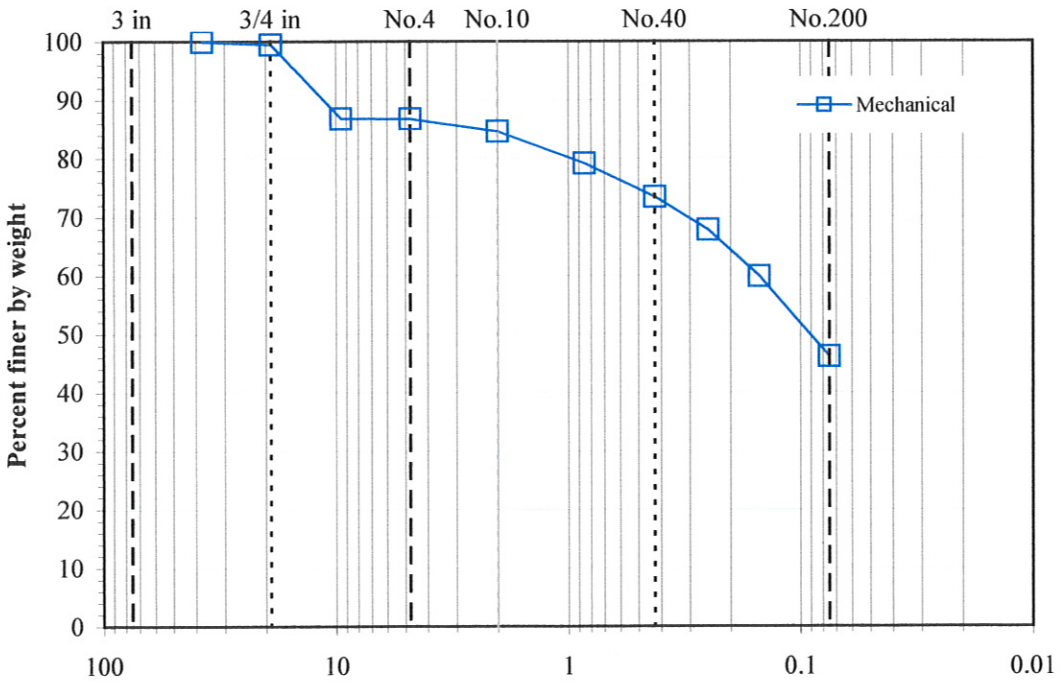
Project: Taylor Geo-Engineering
No: M00991-001
Location: __
Date: 3/6/2007
By: DKS

Boring No.: __
Sample: CH-5-48
Depth: __
Description: Gray Weathered Claystone

	Moist	Dry
Split:	Yes	
Split sieve:	3/8"	
Total sample wt. (g):	5766.1	5455.0
+3/8" Coarse fraction (g):	760.6	719.0
-3/8" Split fraction (g):	464.4	439.40
Split fraction:	0.868	

Moisture data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	440.80	646.60
Dry soil + tare (g):	426.29	621.60
Tare (g):	175.80	182.20
Moisture content (%):	5.8	5.7

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
12"	-	300	-	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	-	
1.5"	-	37.5	100.0	
3/4"	27.60	19	99.5	
3/8"	719.00	9.5	86.8	←Split
No.4	0.20	4.75	86.8	
No.10	11.10	2	84.6	
No.20	38.60	0.85	79.2	
No.40	67.70	0.425	73.4	
No.60	96.10	0.25	67.8	
No.100	136.70	0.15	59.8	
No.200	205.90	0.075	46.1	



Entered by:_____

Reviewed:

Particle-Size Analysis of Soils *with hydrometer*

(ASTM D422)

IGES
© IGES 2004

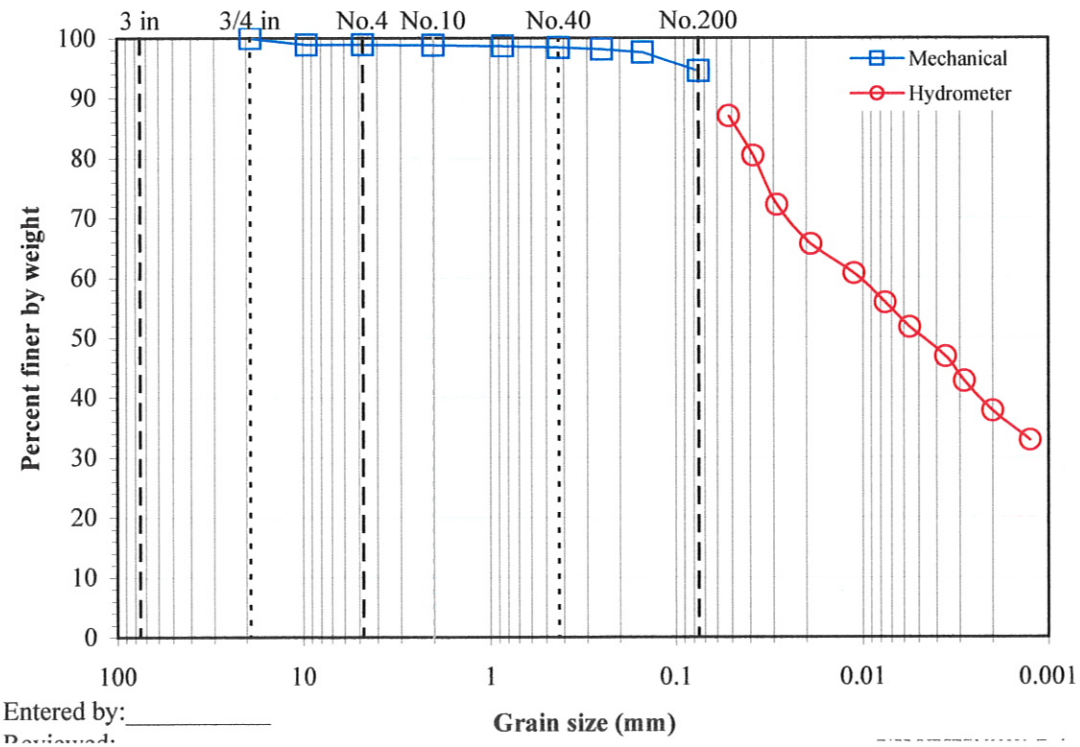
Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/12/2007
By: BRR

Boring No.:
Sample: CH-1-3
Depth:
Description: Description

Split sieve:	Yes	
Split sieve:	3/8"	
	Moist	Dry
Total sample wt. (g):	7774	7397.19
+3/8" Coarse fraction (g):	83.4	79.60
-3/8" Split fraction (g):	356.60	339.30
Hydrometer fraction (g):	62.26	60.20
Split fraction:	0.989	

Moisture data	C.F.(+3/8")	S.F.(-3/8")	Hyd.(-No.10)	
Moist soil + tare (g):	224.40	92.06	61.75	
Dry soil + tare (g):	220.60	89.05	60.70	
Tare (g):	141.00	30.00	30.04	
Moisture content (%):	4.77	5.10	3.42	
Hydrometer data			Slope:	-0.164
Hyd. split:	No.10		Intercept:	16.3
Gs:	2.65	Assumed	α:	1.00
Composite corr.:	6		Hyd. fraction:	98.81
Dispersion period (min):	15		Dispersion device:	Air-jet

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer		Elapsed time (min)	Temp. (°C)	Hydrometer Reading	Grain Size (mm)	% Soil in Suspension
12"	-	300	-		0.5	16.5	59	0.05190	86.99
8"	-	200	-		1	16.5	55	0.03847	80.43
6"	-	150	-		2	16.5	50	0.02870	72.22
4"	-	100	-		5	16.5	46	0.01887	65.65
3"	-	75	-		15	17	43	0.01112	60.73
1.5"	-	37.5	-		34	17.5	40	0.00754	55.81
3/4"	-	19	100.0		64	18	37.5	0.00557	51.70
3/8"	79.60	9.5	98.9	<=Split	160	19	34.5	0.00357	46.78
No.4	-	4.75	98.9		258	20	32	0.00282	42.68
No.10	0.40	2	98.8	<=Split hyd.	521	21.5	29	0.00199	37.75
No.20	0.10	0.85	98.6		1396	21	26	0.00125	32.83
No.40	0.25	0.425	98.4						
No.60	0.40	0.25	98.2						
No.100	0.75	0.15	97.6						
No.200	2.63	0.075	94.5						



Entered by:_____

Reviewed:

Particle-Size Analysis of Soils *with hydrometer*

(ASTM D422)

IGES
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/12/2007
By: BRR

Boring No.:
Sample: SP-16-13
Depth:
Description: Description

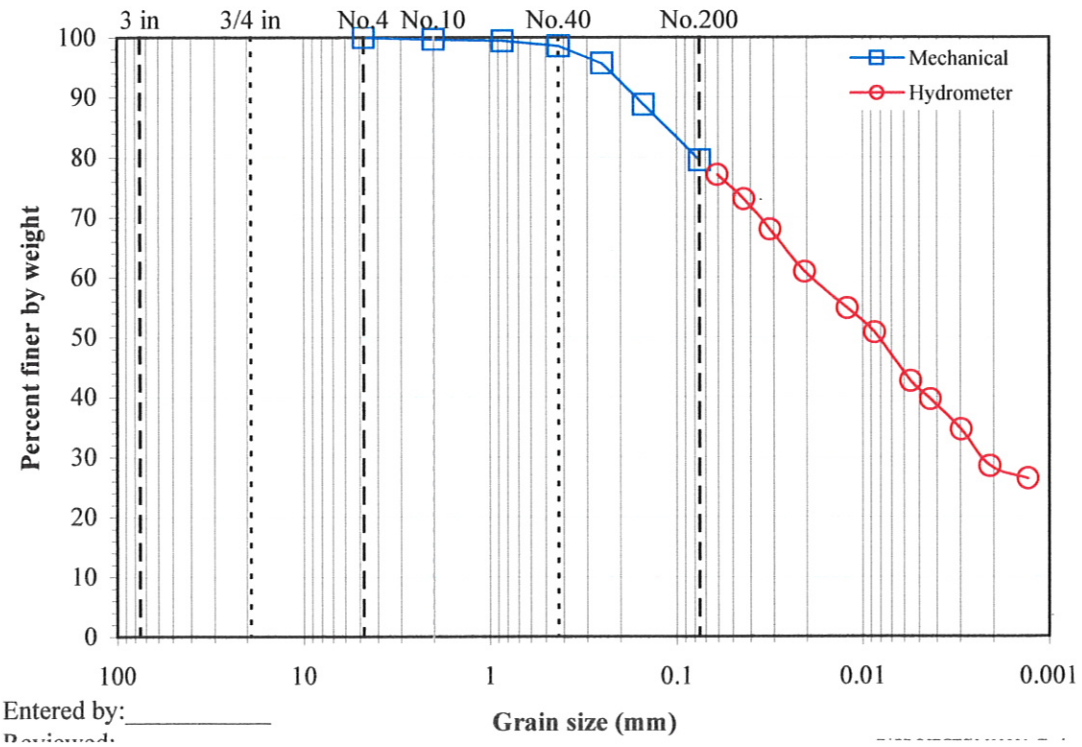
Split sieve:	Yes	
Split sieve:	3/8"	
	Moist	Dry
Total sample wt. (g):	10597.4	10387.95
+3/8" Coarse fraction (g):		0.00
-3/8" Split fraction (g):	511.30	501.19
Hydrometer fraction (g):	49.63	49.11
Split fraction:	1.000	

Moisture data	C.F.(+3/8")	S.F.(-3/8")	Hyd.(-No.10)
Moist soil + tare (g):	-	680.10	95.73
Dry soil + tare (g):	-	669.71	95.04
Tare (g):	-	154.40	30.00
Moisture content (%):	0.00	2.02	1.06

Hydrometer data				
Hyd. split:	No.10		Slope:	-0.164
Gs:	2.65	Assumed	Intercept:	16.3
Composite corr.:	6		α:	1.00
Dispersion period (min):	15		Hyd. fraction:	99.67
			Dispersion device:	Air-jet

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer
12"	-	300	-
8"	-	200	-
6"	-	150	-
4"	-	100	-
3"	-	75	-
1.5"	-	37.5	-
3/4"	-	19	-
3/8"	-	9.5	-
No.4	-	4.75	100.0
No.10	1.63	2	99.7
No.20	0.14	0.85	99.4
No.40	0.55	0.425	98.6
No.60	1.98	0.25	95.7
No.100	5.36	0.15	88.8
No.200	9.94	0.075	79.5

	Elapsed time (min)	Temp. (°C)	Hydrometer Reading	Grain Size (mm)	% Soil in Suspension
	0.5	17	44	0.06039	77.13
	1	17	42	0.04347	73.07
	2	17	39.5	0.03140	67.99
	5	17	36	0.02043	60.89
	15	17	33	0.01207	54.80
	30	17.5	31	0.00861	50.74
	76	18	27	0.00553	42.62
<=Split	123	19	25.5	0.00434	39.58
	266	20	23	0.00296	34.50
<=Split hyd.	538	21.5	20	0.00208	28.42
	1413	21	19	0.00130	26.39



Entered by:_____

Reviewed:

Laboratory Compaction Characteristics of Soil

(ASTM D698 / D1557)

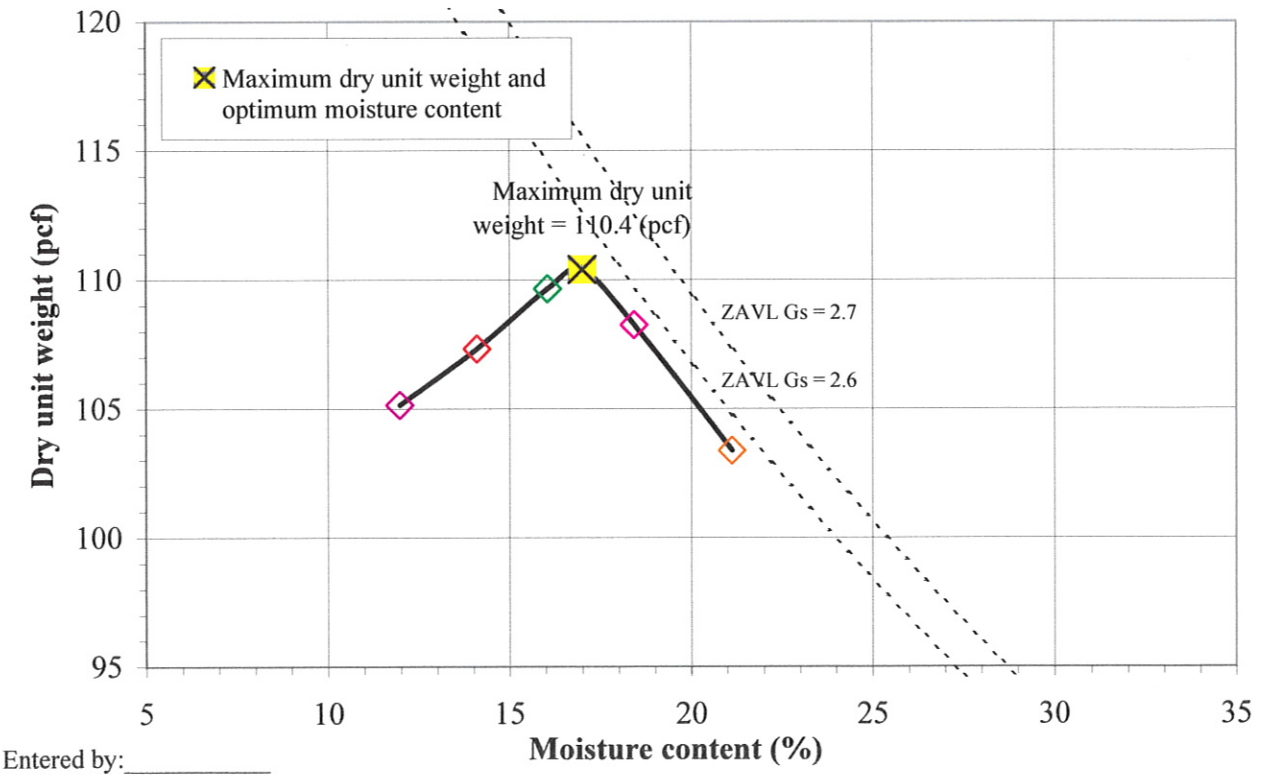
© IGES 2004

Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/1/2007
By: NB

Boring No.:
Sample: SP-16-13
Depth:
Sample Description:
Engineering Classification: Not requested
As-received moisture content (%): 2.02
Method: ASTM D698 B
Preparation method: Moist
Mold volume (ft^3): 0.0333
Rammer: Mechanical-circular face
Rock Correction: No

Optimum moisture content (%): 17
Maximum dry unit weight (pcf): 110.4

Point Number	+10	+12	+14	+16	+18			
Wt. Sample + Mold (g)	5962.0	6033.3	6106.0	6120.3	6075.2			
Wt. of Mold (g)	4181.8	4181.8	4181.8	4181.8	4181.8			
Wet Unit Wt., γ_m (pcf)	117.7	122.5	127.3	128.2	125.2			
Wet Soil + Tare (g)	738.9	593.5	820.4	685.7	719			
Dry Soil + Tare (g)	674.85	538.79	728.12	602.71	620.21			
Tare (g)	140	150.7	153.3	152.4	152.7			
Moisture Content, w (%)	**12.0**	**14.1**	**16.1**	**18.4**	**21.1**			
Dry Unit Wt., γ_d (pcf)	**105.1**	**107.3**	**109.7**	**108.3**	**103.4**			



Entered by:_____
Reviewed:

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[PROCTORv1.xls]1

Laboratory Compaction Characteristics of Soil

(ASTM D698 / D1557)

© IGES 2004

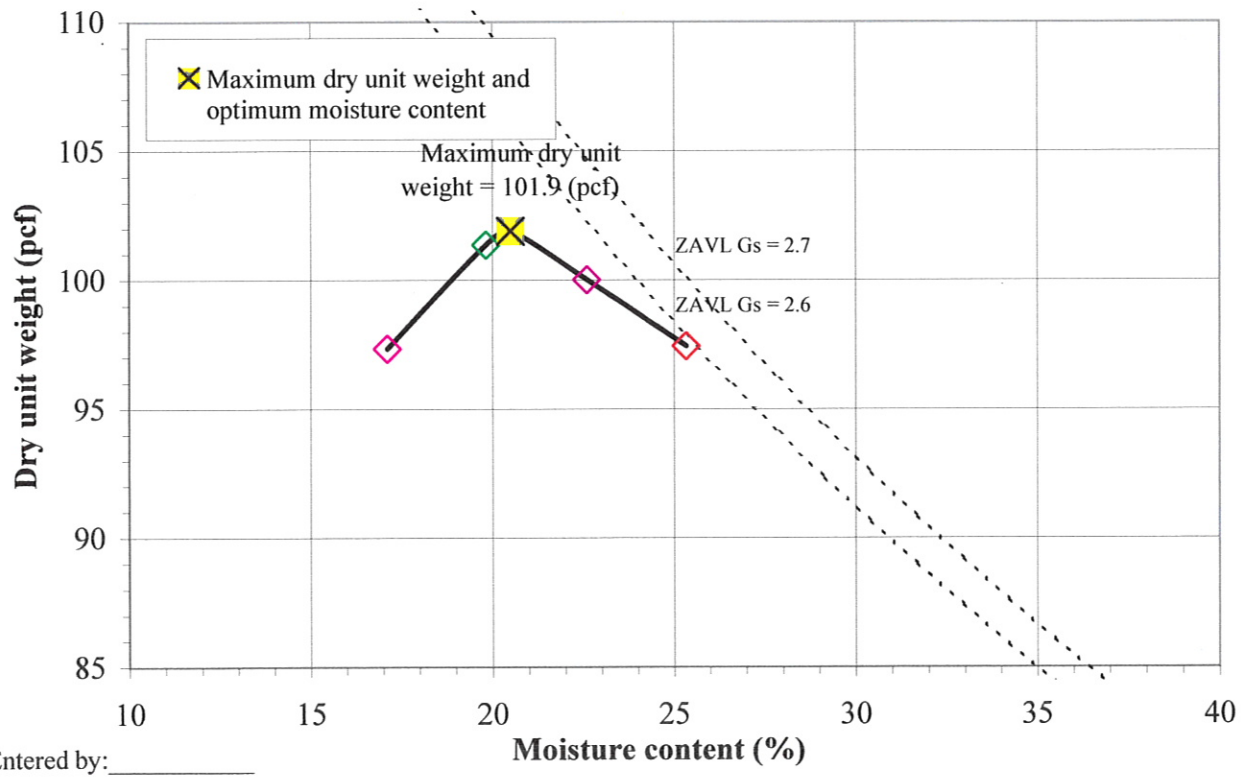
Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/7/2007
By: DKS

Method: ASTM D698 B
Mold volume (ft^3): 0.0333

Boring No.:
Sample: CH-1-3
Depth:
Sample Description:
Engineering Classification: Not requested
As-received moisture content (%): 5.1
Preparation method: Moist
Rammer: Mechanical-circular face
Rock Correction: No

Optimum moisture content (%): 20.5
Maximum dry unit weight (pcf): 101.9

Point Number	+18	+20	+15	+12				
Wt. Sample + Mold (g)	6110.0	6102.8	6092.8	5905.3				
Wt. of Mold (g)	4256.2	4256.2	4256.2	4181.7				
Wet Unit Wt., γ_m (pcf)	122.6	122.1	121.5	114.0				
Wet Soil + Tare (g)	518.1	584.4	626.4	659.3				
Dry Soil + Tare (g)	455.42	511.67	559.49	586.02				
Tare (g)	177.9	224.6	222	150.7				
Moisture Content, w (%)	**22.6**	**25.3**	**19.8**	**17.1**				
Dry Unit Wt., γ_d (pcf)	**100.0**	**97.4**	**101.4**	**97.3**				



Entered by:_____

Reviewed:

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[PROCTORv1.xls]2

Laboratory Compaction Characteristics of Soil

(ASTM D698 / D1557)

© IGES 2004

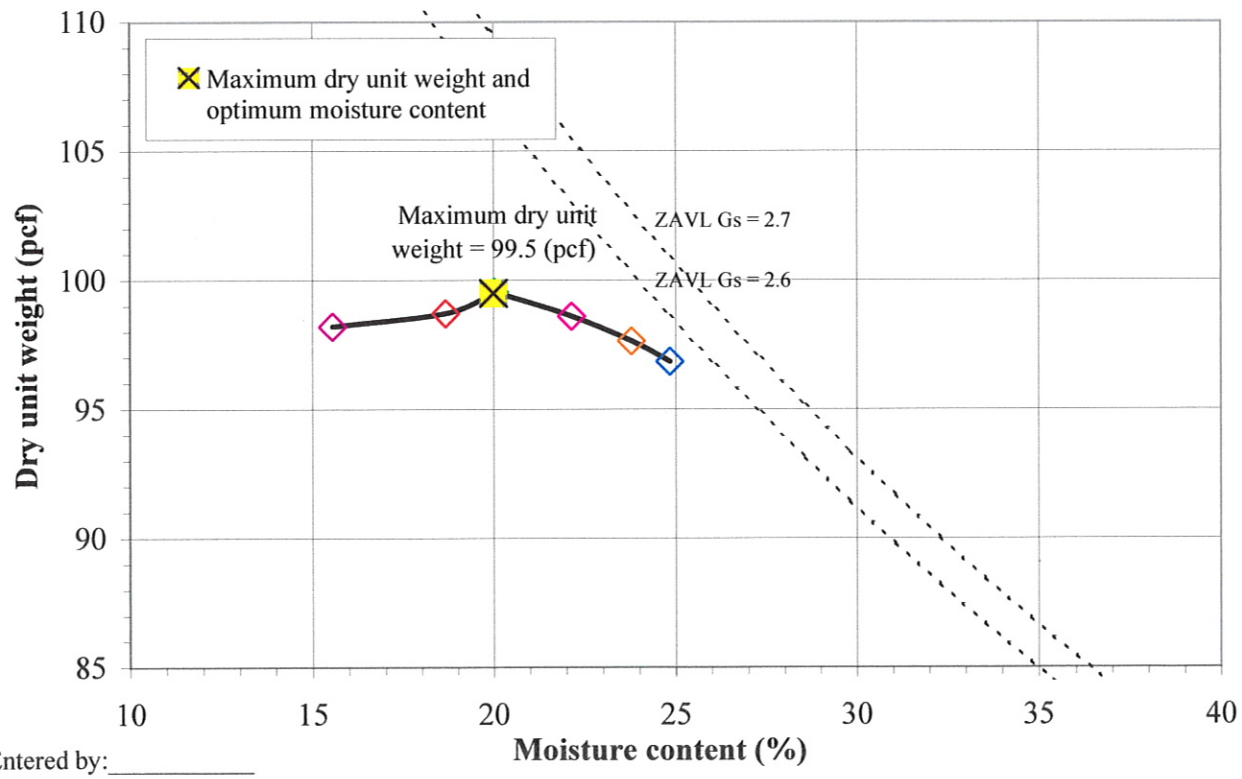
Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/7/2007
By: DKS

Method: ASTM D698 B
Mold volume (ft^3): 0.0333

Boring No.:
Sample: CH-5-48
Depth:
Sample Description:
Engineering Classification: Not requested
As-received moisture content (%): 5.7
Preparation method: Moist
Rammer: Mechanical-circular face
Rock Correction: No

Optimum moisture content (%): 20
Maximum dry unit weight (pcf): 99.5

Point Number	+10	+12	+14	+16	+18	+20		
Wt. Sample + Mold (g)	5890.6	5946.0	5981.3	5995.8	6002.4	6002.8		
Wt. of Mold (g)	4174.8	4174.8	4174.8	4174.8	4174.8	4174.8		
Wet Unit Wt., γ_m (pcf)	113.5	117.1	119.5	120.4	120.9	120.9		
Wet Soil + Tare (g)	360.7	316.6	348.1	376.2	414.5	450.5		
Dry Soil + Tare (g)	331.24	288.78	313.48	335.73	364.49	391.25		
Tare (g)	141.8	139.8	140.6	153	154.3	152.8		
Moisture Content, w (%)	**15.6**	**18.7**	**20.0**	**22.1**	**23.8**	**24.8**		
Dry Unit Wt., γ_d (pcf)	**98.2**	**98.7**	**99.5**	**98.6**	**97.6**	**96.8**		



Entered by:_____

Reviewed:

Laboratory Compaction Characteristics of Soil

(ASTM D698 / D1557)

© IGES 2004

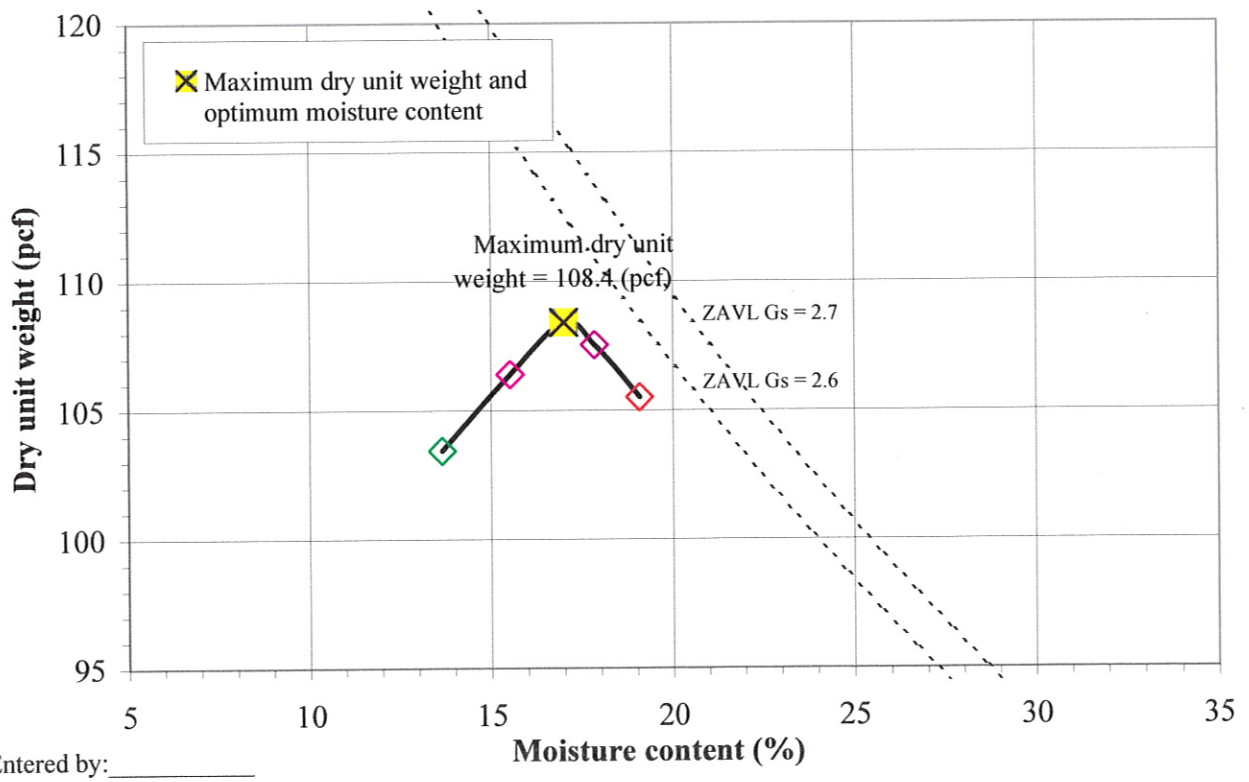
Project: Taylor Geo-Engineering
No: M00991-001
Location:
Date: 3/7/2007
By: DKS

Method: ASTM D698 B
Mold volume (ft^3): 0.0333

Boring No.:
Sample: CH-5-98
Depth:
Sample Description:
Engineering Classification: Not requested
As-received moisture content (%): 3.42
Preparation method: Moist
Rammer: Mechanical-circular face
Rock Correction: No

Optimum moisture content (%): 17
Maximum dry unit weight (pcf): 108.4

Point Number	+14	+16	+10	+12				
Wt. Sample + Mold (g)	6091.4	6075.0	5952.8	6033.8				
Wt. of Mold (g)	4175.3	4175.3	4175.3	4175.3				
Wet Unit Wt., γ_m (pcf)	126.7	125.6	117.6	122.9				
Wet Soil + Tare (g)	452.1	583.3	536.3	481.8				
Dry Soil + Tare (g)	415.64	525.49	490.64	437.31				
Tare (g)	211.3	222.5	156.2	150.7				
Moisture Content, w (%)	**17.8**	**19.1**	**13.7**	**15.5**				
Dry Unit Wt., γ_d (pcf)	**107.5**	**105.5**	**103.4**	**106.4**				



Entered by:_____
Reviewed:

Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

IGES

Project Name: Taylor Geo-Engineering

Project Number: M00991-001

Sample: CH-1-3

Comments: Samples were compacted to 90% of ASTM D698 at OMC.

	Test Number	S1	S2	S3	
Initial	Height, H (in)	5.44	5.85	5.19	
	Diameter, D (in)	2.42	2.42	2.42	
	Moisture Content, w (%)	21.0	21.0	20.2	
	Dry Unit Weight, γd (pcf)	91.0	90.9	91.4	
	Saturation (%)	66.6	66.3	64.7	
	Void Ratio, e	0.85	0.85	0.84	
Before Shear	Moisture Content, w (%)	26.5	25.1	21.2	
	Dry Unit Weight, γd (pcf)	96.4	99.3	105.8	
	Saturation (%)	100.0	100.0	100.0	
	Void Ratio, e	0.72	0.68	0.57	
	B	0.95	0.95	0.95	
	Back pressure (psf)	6193	5161	5474	
	Strain rate (%/min)	0.033	0.033	0.033	
	Time to Failure (min)	606.1	606.1	460.6	
Total Stress	Strain at Failure, εf (%)	20.00	20.00	15.20	
	σ3 (psf)	2878	5760	11518	
	σ1-σ3 (psf)	2393	3460	7111	
	σ1 (psf)	5271	9220	18629	
	q = (σ1-σ3)/2 (psf)	1197	1730	3556	
	p = (σ1+σ3)/2 (psf)	4075	7490	15073	
Effective Stress	u (psf)	1473	3782	6184	
	σ'3 (psf)	1405	1978	5334	
	σ'1-σ'3 (psf)	2393	3460	7111	
	σ'1 (psf)	3798	5438	12445	
	q = (σ'1-σ'3)/2 (psf)	1197	1730	3556	
	p' = (σ'1+σ'3)/2 (psf)	2602	3708	8889	
	σ'1/σ'3	2.70	2.75	2.33	
	A = u/(σ1−σ3)	0.616	1.093	0.870	

Estimated Specific Gravity	2.70
Plastic Limit (%)	21
Liquid Limit (%)	53
Plasticity Index (%)	32

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	223	319
ϕ (deg)	12.6	21.6
tan ϕ	0.224	0.396

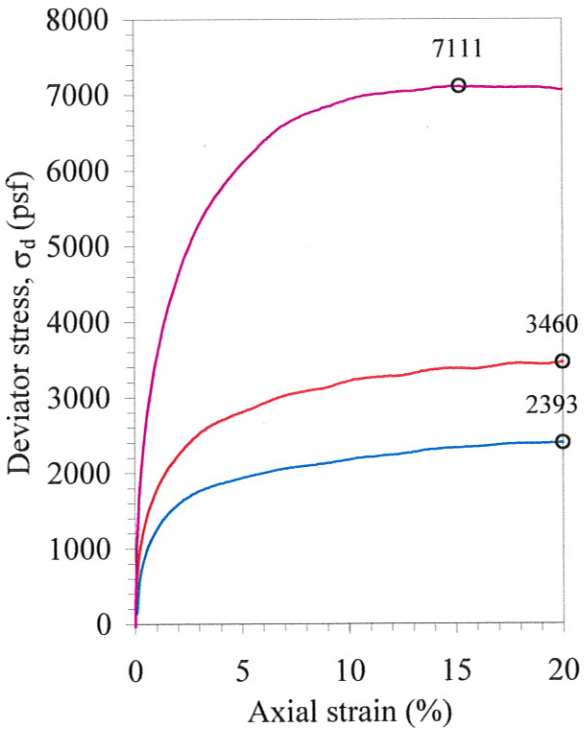
[a] Saturation set to 100% for phase calculations

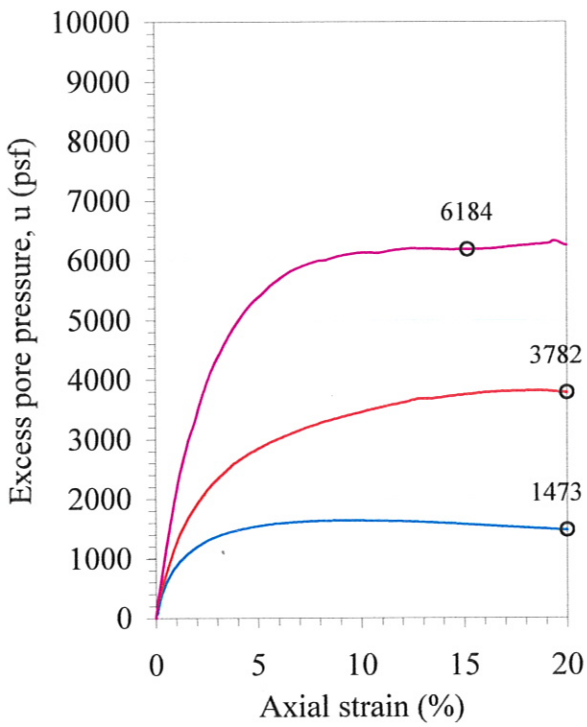
Tested by:_____

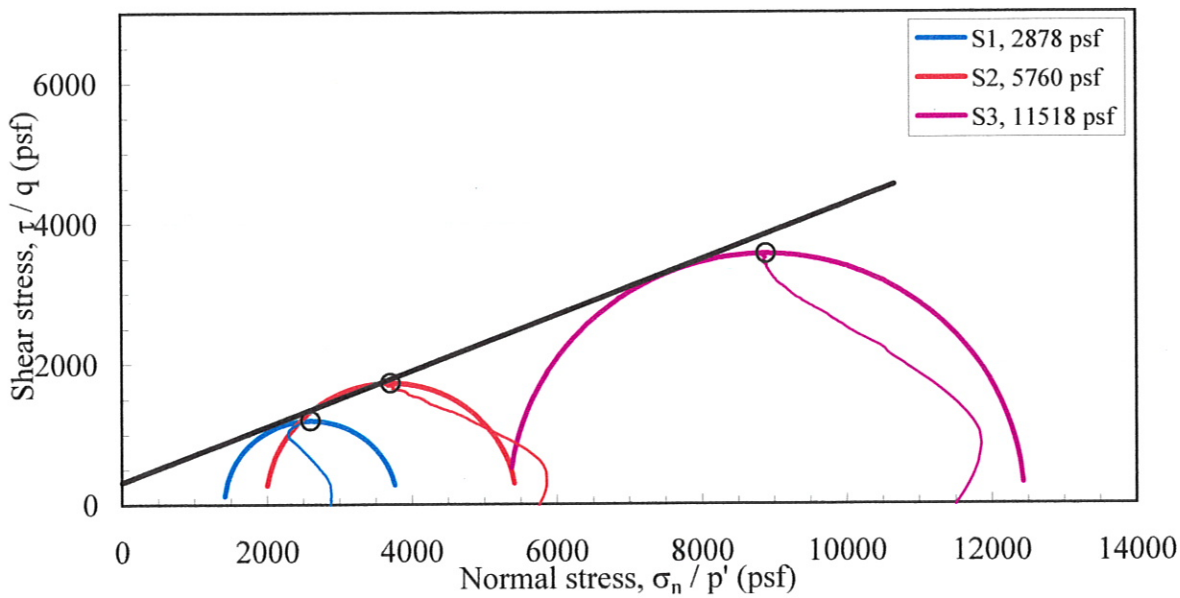
Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-1-3
Comments:

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	223	319
ϕ (deg)	12.6	21.6
tan ϕ	0.224	0.396







Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-1-3
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S1

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-1-3.xls]s1

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-10	0	2878	2868	-5	2873	2873	1.004
0.02	125	56	2822	2947	62	2941	2885	1.044
0.04	133	67	2812	2945	67	2945	2878	1.047
0.06	138	73	2807	2945	69	2948	2876	1.049
0.08	151	78	2800	2950	75	2954	2875	1.054
0.10	259	122	2757	3016	130	3008	2886	1.094
0.20	572	294	2584	3156	286	3164	2870	1.221
0.30	731	409	2470	3201	366	3244	2835	1.296
0.40	843	498	2381	3223	421	3300	2802	1.354
0.50	937	584	2295	3232	468	3348	2764	1.408
0.60	1018	658	2220	3238	509	3387	2729	1.458
0.70	1086	718	2160	3246	543	3421	2703	1.502
0.80	1149	775	2103	3252	574	3453	2678	1.546
0.90	1203	829	2050	3254	602	3481	2652	1.587
1.00	1253	876	2002	3256	627	3505	2629	1.626
1.10	1299	919	1960	3259	650	3529	2610	1.663
1.20	1345	960	1918	3263	672	3551	2590	1.701
1.30	1382	994	1884	3266	691	3569	2575	1.733
1.40	1418	1031	1849	3267	709	3589	2558	1.767
1.50	1451	1062	1816	3267	725	3604	2542	1.799
1.60	1483	1093	1786	3269	742	3620	2527	1.831
1.70	1511	1122	1756	3268	756	3634	2512	1.860
1.80	1539	1148	1731	3270	770	3648	2500	1.889
1.90	1563	1172	1706	3269	782	3660	2488	1.916
2.00	1587	1197	1681	3268	793	3672	2475	1.944
2.10	1610	1218	1660	3271	805	3683	2465	1.970
2.20	1629	1239	1639	3269	815	3693	2454	1.994
2.30	1653	1259	1619	3272	826	3705	2446	2.021
2.40	1672	1279	1601	3273	836	3716	2437	2.045
2.50	1687	1297	1582	3269	843	3722	2425	2.066
2.60	1706	1313	1566	3271	853	3731	2418	2.090
2.70	1725	1329	1549	3274	862	3741	2412	2.113
2.80	1735	1345	1534	3269	868	3746	2402	2.131
2.90	1750	1359	1521	3271	875	3755	2396	2.151
3.00	1765	1373	1506	3271	882	3761	2388	2.172
3.10	1775	1386	1493	3268	888	3766	2380	2.189
3.20	1786	1397	1481	3267	893	3771	2374	2.206
3.30	1800	1409	1469	3270	900	3778	2370	2.225
3.40	1806	1421	1458	3264	903	3782	2361	2.239
3.50	1821	1431	1447	3268	910	3789	2358	2.258
3.60	1831	1442	1437	3268	916	3794	2352	2.275
3.70	1837	1451	1427	3264	919	3797	2346	2.287
3.80	1847	1461	1419	3267	924	3803	2343	2.302
3.90	1858	1469	1410	3267	929	3807	2339	2.318
4.00	1864	1478	1400	3264	932	3810	2332	2.331
4.10	1865	1485	1393	3259	933	3811	2326	2.339
4.20	1880	1494	1384	3264	940	3818	2324	2.358
4.30	1886	1502	1377	3263	943	3821	2320	2.370
4.40	1892	1507	1371	3263	946	3824	2317	2.380
4.50	1898	1514	1365	3263	949	3828	2314	2.390
4.60	1908	1521	1357	3265	954	3832	2311	2.406
4.70	1918	1527	1351	3269	959	3837	2310	2.419
4.80	1919	1533	1345	3265	960	3838	2305	2.427
4.90	1929	1539	1339	3269	965	3843	2304	2.441
5.00	1939	1545	1334	3273	970	3848	2303	2.454
5.10	1945	1550	1329	3274	973	3851	2302	2.464
5.20	1951	1555	1323	3274	976	3854	2299	2.475

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	1957	1559	1320	3276	978	3857	2298	2.483
5.40	1967	1565	1314	3280	983	3862	2297	2.497
5.50	1972	1569	1309	3281	986	3865	2295	2.507
5.60	1978	1573	1306	3284	989	3867	2295	2.515
5.70	1984	1576	1303	3287	992	3871	2295	2.522
5.80	1990	1580	1298	3288	995	3873	2293	2.532
5.90	1995	1583	1295	3290	998	3876	2293	2.541
6.00	2001	1587	1291	3292	1001	3879	2292	2.549
6.10	2011	1591	1288	3299	1005	3884	2293	2.561
6.20	2012	1593	1286	3298	1006	3884	2292	2.565
6.30	2022	1596	1282	3304	1011	3889	2293	2.577
6.40	2027	1599	1280	3307	1014	3892	2293	2.584
6.50	2037	1602	1276	3313	1019	3897	2295	2.596
6.60	2039	1605	1275	3314	1019	3899	2294	2.599
6.70	2048	1607	1272	3320	1024	3903	2296	2.611
6.80	2050	1609	1269	3319	1025	3903	2294	2.615
6.90	2055	1612	1267	3322	1028	3906	2294	2.622
7.00	2061	1614	1265	3325	1030	3909	2295	2.630
7.10	2062	1616	1262	3324	1031	3909	2293	2.634
7.20	2068	1617	1261	3329	1034	3912	2295	2.640
7.30	2073	1620	1259	3332	1037	3915	2295	2.647
7.40	2074	1621	1257	3332	1037	3916	2295	2.650
7.50	2080	1622	1256	3336	1040	3918	2296	2.656
7.60	2081	1623	1256	3337	1041	3920	2297	2.657
7.70	2087	1624	1254	3341	1043	3922	2297	2.664
7.80	2088	1626	1253	3341	1044	3922	2297	2.667
7.90	2093	1628	1250	3344	1047	3925	2297	2.674
8.00	2095	1628	1252	3346	1047	3927	2299	2.674
8.10	2100	1630	1248	3348	1050	3928	2298	2.683
8.20	2101	1630	1248	3349	1051	3929	2299	2.684
8.30	2107	1630	1248	3355	1053	3932	2301	2.688
8.40	2104	1632	1247	3351	1052	3930	2299	2.687
8.50	2117	1633	1247	3364	1059	3938	2305	2.698
8.60	2118	1634	1245	3363	1059	3938	2304	2.702
8.70	2120	1634	1245	3364	1060	3938	2304	2.703
8.80	2121	1634	1245	3366	1060	3939	2305	2.704
8.90	2130	1634	1245	3375	1065	3943	2310	2.711
9.00	2131	1635	1243	3375	1066	3944	2309	2.714
9.10	2133	1634	1245	3377	1066	3945	2311	2.713
9.20	2138	1634	1245	3382	1069	3947	2313	2.718
9.30	2143	1635	1243	3386	1071	3950	2315	2.723
9.40	2148	1636	1243	3391	1074	3954	2317	2.727
9.50	2157	1635	1243	3400	1079	3957	2322	2.735
9.60	2154	1635	1243	3398	1077	3956	2321	2.733
9.70	2163	1635	1243	3407	1082	3960	2325	2.740
9.80	2164	1634	1245	3409	1082	3961	2327	2.739
9.90	2169	1634	1245	3414	1085	3963	2329	2.743
10.00	2174	1634	1246	3420	1087	3967	2333	2.746
10.10	2179	1634	1246	3425	1090	3969	2336	2.750
10.20	2185	1634	1245	3429	1092	3971	2337	2.755
10.30	2190	1633	1246	3435	1095	3973	2341	2.758
10.40	2195	1633	1246	3440	1097	3976	2343	2.762
10.50	2196	1633	1246	3441	1098	3976	2344	2.762
10.60	2201	1633	1246	3446	1100	3979	2346	2.766
10.70	2205	1632	1248	3454	1103	3982	2351	2.767
10.80	2206	1632	1247	3453	1103	3982	2350	2.770
10.90	2208	1632	1247	3454	1104	3982	2351	2.770
11.00	2209	1630	1248	3457	1104	3983	2352	2.770
11.10	2209	1630	1249	3459	1105	3984	2354	2.769
11.20	2214	1629	1249	3464	1107	3986	2356	2.773
11.30	2215	1628	1250	3466	1108	3986	2358	2.772
11.40	2220	1627	1253	3473	1110	3990	2363	2.772
11.50	2221	1628	1252	3473	1111	3990	2362	2.775
11.60	2230	1627	1253	3483	1115	3995	2368	2.780

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	2231	1624	1254	3485	1115	3994	2369	2.779
11.80	2228	1623	1256	3484	1114	3994	2370	2.773
11.90	2233	1623	1255	3488	1116	3995	2371	2.779
12.00	2234	1622	1256	3490	1117	3995	2373	2.778
12.10	2238	1621	1257	3496	1119	3998	2377	2.780
12.20	2239	1620	1259	3498	1120	3998	2378	2.779
12.30	2244	1619	1260	3504	1122	4000	2382	2.781
12.40	2245	1617	1261	3506	1122	4001	2383	2.780
12.50	2249	1616	1262	3512	1125	4003	2387	2.782
12.60	2254	1615	1263	3517	1127	4006	2390	2.784
12.70	2259	1614	1266	3524	1129	4009	2395	2.785
12.80	2260	1613	1266	3525	1130	4008	2395	2.785
12.90	2264	1610	1268	3532	1132	4011	2400	2.786
13.00	2273	1609	1269	3542	1136	4015	2405	2.791
13.10	2273	1607	1272	3545	1137	4015	2408	2.788
13.20	2278	1606	1274	3552	1139	4019	2413	2.788
13.30	2282	1605	1274	3556	1141	4020	2415	2.792
13.40	2291	1603	1275	3566	1145	4024	2420	2.797
13.50	2295	1601	1277	3573	1148	4026	2425	2.797
13.60	2296	1600	1279	3575	1148	4026	2427	2.796
13.70	2301	1598	1281	3581	1150	4029	2431	2.796
13.80	2305	1595	1283	3588	1153	4031	2436	2.796
13.90	2306	1594	1284	3590	1153	4031	2437	2.795
14.00	2306	1592	1287	3593	1153	4032	2440	2.792
14.10	2311	1591	1288	3599	1155	4034	2443	2.794
14.20	2315	1588	1290	3606	1158	4036	2448	2.794
14.30	2316	1587	1293	3609	1158	4037	2451	2.792
14.40	2320	1585	1294	3614	1160	4039	2454	2.793
14.50	2321	1582	1296	3617	1161	4039	2457	2.791
14.60	2322	1581	1297	3619	1161	4039	2458	2.790
14.70	2322	1579	1300	3622	1161	4040	2461	2.787
14.80	2323	1576	1302	3625	1161	4040	2463	2.784
14.90	2331	1575	1303	3634	1165	4044	2469	2.789
15.00	2328	1573	1306	3633	1164	4042	2469	2.783
15.10	2328	1572	1307	3635	1164	4043	2471	2.782
15.20	2329	1569	1309	3638	1164	4043	2473	2.779
15.30	2329	1567	1311	3641	1165	4043	2476	2.776
15.40	2334	1566	1313	3646	1167	4045	2479	2.778
15.50	2334	1564	1315	3649	1167	4046	2482	2.775
15.60	2335	1561	1317	3652	1167	4046	2485	2.773
15.70	2335	1559	1320	3655	1168	4046	2487	2.770
15.80	2340	1558	1321	3660	1170	4048	2491	2.771
15.90	2340	1555	1323	3663	1170	4048	2493	2.769
16.00	2341	1553	1327	3667	1170	4050	2497	2.764
16.10	2345	1552	1327	3671	1172	4051	2499	2.768
16.20	2345	1550	1329	3674	1173	4051	2502	2.765
16.30	2349	1548	1330	3679	1175	4053	2505	2.766
16.40	2350	1546	1334	3683	1175	4055	2509	2.762
16.50	2354	1544	1334	3688	1177	4054	2511	2.765
16.60	2358	1542	1337	3695	1179	4059	2516	2.764
16.70	2358	1541	1338	3697	1179	4059	2518	2.762
16.80	2363	1538	1341	3703	1181	4060	2522	2.762
16.90	2367	1535	1343	3710	1183	4062	2526	2.762
17.00	2367	1534	1344	3711	1184	4062	2528	2.761
17.10	2371	1532	1347	3717	1186	4064	2532	2.761
17.20	2371	1530	1349	3720	1186	4064	2535	2.758
17.30	2375	1527	1351	3727	1188	4066	2539	2.758
17.40	2376	1526	1352	3728	1188	4066	2540	2.757
17.50	2376	1524	1355	3731	1188	4066	2543	2.754
17.60	2376	1521	1357	3733	1188	4067	2545	2.751
17.70	2377	1520	1358	3735	1188	4067	2547	2.750
17.80	2381	1518	1361	3741	1190	4069	2551	2.750
17.90	2381	1516	1363	3744	1191	4069	2553	2.747
18.00	2381	1514	1365	3747	1191	4070	2556	2.744

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	2382	1512	1366	3748	1191	4069	2557	2.743
18.20	2382	1510	1369	3751	1191	4069	2560	2.740
18.30	2382	1507	1371	3753	1191	4070	2562	2.738
18.40	2383	1506	1372	3755	1191	4070	2564	2.736
18.50	2383	1504	1375	3757	1191	4070	2566	2.733
18.60	2387	1502	1377	3764	1193	4072	2570	2.733
18.70	2383	1499	1379	3763	1192	4070	2571	2.728
18.80	2383	1498	1382	3765	1192	4071	2573	2.725
18.90	2384	1496	1383	3767	1192	4070	2575	2.724
19.00	2384	1493	1385	3769	1192	4070	2577	2.721
19.10	2384	1491	1387	3772	1192	4071	2580	2.718
19.20	2384	1490	1389	3773	1192	4071	2581	2.717
19.30	2385	1487	1391	3776	1192	4071	2583	2.714
19.40	2388	1486	1392	3781	1194	4073	2586	2.716
19.50	2389	1484	1395	3783	1194	4073	2589	2.713
19.60	2392	1482	1397	3789	1196	4075	2593	2.713
19.70	2389	1480	1398	3787	1195	4073	2593	2.709
19.80	2393	1478	1400	3793	1196	4075	2597	2.709
19.90	2393	1477	1402	3794	1196	4075	2598	2.707
20.00	2393	1473	1405	3798	1197	4075	2602	2.703

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-1-3
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S2

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-1-3.xls]s2

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-14	0	5760	5746	-7	5753	5753	1.002
0.02	225	59	5701	5927	113	5872	5814	1.040
0.04	391	112	5647	6038	195	5955	5842	1.069
0.06	508	158	5602	6109	254	6014	5855	1.091
0.08	599	200	5559	6158	300	6059	5859	1.108
0.10	677	240	5520	6197	339	6098	5858	1.123
0.20	937	379	5380	6317	468	6228	5848	1.174
0.30	1113	500	5260	6373	557	6316	5816	1.212
0.40	1254	625	5134	6389	627	6387	5761	1.244
0.50	1370	743	5017	6387	685	6444	5702	1.273
0.60	1467	856	4903	6371	734	6493	5637	1.299
0.70	1556	957	4803	6359	778	6538	5581	1.324
0.80	1636	1060	4699	6335	818	6577	5517	1.348
0.90	1707	1158	4602	6310	854	6615	5456	1.371
1.00	1779	1252	4508	6286	889	6649	5397	1.395
1.10	1841	1336	4423	6264	920	6680	5344	1.416
1.20	1895	1417	4342	6237	947	6707	5290	1.436
1.30	1944	1492	4268	6211	972	6731	5239	1.455
1.40	1993	1562	4198	6191	996	6757	5195	1.475
1.50	2042	1630	4129	6171	1021	6781	5150	1.494
1.60	2086	1696	4064	6150	1043	6803	5107	1.513
1.70	2122	1754	4006	6129	1061	6822	5068	1.530
1.80	2158	1808	3951	6110	1079	6839	5030	1.546
1.90	2198	1860	3901	6099	1099	6860	5000	1.564
2.00	2234	1910	3849	6083	1117	6877	4966	1.580
2.10	2270	1959	3800	6070	1135	6894	4935	1.597
2.20	2297	2007	3752	6049	1148	6908	4901	1.612
2.30	2328	2054	3705	6033	1164	6924	4869	1.628
2.40	2363	2100	3661	6024	1182	6942	4843	1.646
2.50	2390	2142	3619	6009	1195	6956	4814	1.661
2.60	2421	2183	3577	5998	1211	6970	4787	1.677
2.70	2448	2221	3539	5987	1224	6984	4763	1.692
2.80	2475	2256	3504	5979	1237	6997	4741	1.706
2.90	2493	2289	3471	5964	1246	7006	4718	1.718
3.00	2519	2325	3435	5954	1260	7019	4695	1.733
3.10	2546	2359	3401	5947	1273	7033	4674	1.749
3.20	2564	2389	3370	5934	1282	7042	4652	1.761
3.30	2582	2423	3338	5919	1291	7052	4629	1.774
3.40	2604	2456	3304	5908	1302	7062	4606	1.788
3.50	2622	2489	3271	5893	1311	7071	4582	1.802
3.60	2640	2522	3239	5879	1320	7081	4559	1.815
3.70	2653	2551	3209	5862	1327	7086	4535	1.827
3.80	2667	2588	3171	5838	1333	7093	4505	1.841
3.90	2685	2612	3149	5834	1342	7103	4491	1.853
4.00	2694	2633	3127	5821	1347	7107	4474	1.862
4.10	2707	2657	3102	5810	1354	7113	4456	1.873
4.20	2717	2680	3080	5797	1358	7118	4438	1.882
4.30	2730	2702	3058	5788	1365	7125	4423	1.893
4.40	2739	2725	3034	5774	1370	7129	4404	1.903
4.50	2757	2745	3014	5771	1378	7138	4393	1.915
4.60	2770	2768	2992	5762	1385	7145	4377	1.926
4.70	2779	2786	2973	5753	1390	7149	4363	1.935
4.80	2788	2799	2960	5749	1394	7154	4355	1.942
4.90	2802	2819	2941	5742	1401	7160	4341	1.953
5.00	2806	2840	2920	5726	1403	7163	4323	1.961
5.10	2820	2858	2902	5722	1410	7169	4312	1.972
5.20	2829	2876	2884	5713	1414	7175	4299	1.981

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	2842	2894	2866	5707	1421	7180	4286	1.992
5.40	2846	2912	2849	5696	1423	7184	4272	1.999
5.50	2860	2930	2831	5690	1430	7191	4260	2.010
5.60	2873	2947	2813	5686	1436	7196	4249	2.021
5.70	2886	2963	2797	5682	1443	7202	4239	2.032
5.80	2898	2978	2781	5680	1449	7209	4231	2.042
5.90	2911	2995	2765	5676	1456	7215	4221	2.053
6.00	2924	3011	2749	5673	1462	7222	4211	2.064
6.10	2933	3026	2732	5665	1467	7225	4199	2.074
6.20	2946	3043	2718	5664	1473	7234	4191	2.084
6.30	2959	3054	2705	5664	1479	7239	4184	2.094
6.40	2971	3069	2691	5662	1486	7245	4177	2.104
6.50	2980	3080	2679	5659	1490	7250	4169	2.112
6.60	2988	3094	2667	5655	1494	7255	4161	2.121
6.70	3001	3108	2651	5652	1501	7260	4152	2.132
6.80	3010	3122	2638	5648	1505	7266	4143	2.141
6.90	3018	3135	2624	5643	1509	7269	4133	2.150
7.00	3027	3148	2611	5638	1513	7273	4125	2.159
7.10	3035	3162	2597	5633	1518	7277	4115	2.169
7.20	3044	3175	2585	5628	1522	7281	4106	2.178
7.30	3048	3188	2572	5620	1524	7284	4096	2.185
7.40	3052	3201	2560	5612	1526	7287	4086	2.192
7.50	3061	3213	2547	5608	1530	7290	4077	2.202
7.60	3065	3223	2537	5602	1533	7292	4069	2.208
7.70	3069	3235	2525	5594	1535	7294	4060	2.216
7.80	3074	3247	2513	5587	1537	7296	4050	2.223
7.90	3074	3257	2503	5577	1537	7297	4040	2.228
8.00	3082	3270	2490	5572	1541	7301	4031	2.238
8.10	3091	3281	2479	5570	1545	7305	4024	2.247
8.20	3091	3290	2471	5562	1545	7306	4016	2.251
8.30	3099	3300	2459	5558	1550	7309	4009	2.260
8.40	3103	3311	2450	5553	1552	7312	4001	2.267
8.50	3107	3320	2439	5547	1554	7313	3993	2.274
8.60	3111	3330	2431	5543	1556	7317	3987	2.280
8.70	3112	3339	2422	5533	1556	7317	3978	2.285
8.80	3120	3348	2411	5531	1560	7319	3971	2.294
8.90	3128	3358	2403	5531	1564	7325	3967	2.302
9.00	3132	3366	2394	5526	1566	7326	3960	2.308
9.10	3140	3377	2383	5523	1570	7330	3953	2.318
9.20	3148	3386	2374	5522	1574	7334	3948	2.326
9.30	3156	3394	2366	5522	1578	7338	3944	2.334
9.40	3168	3402	2357	5525	1584	7344	3941	2.344
9.50	3176	3412	2348	5524	1588	7347	3936	2.353
9.60	3188	3421	2339	5526	1594	7353	3932	2.363
9.70	3196	3429	2330	5526	1598	7357	3928	2.371
9.80	3199	3437	2323	5523	1600	7360	3923	2.377
9.90	3207	3446	2314	5521	1604	7363	3918	2.386
10.00	3215	3453	2308	5523	1608	7368	3916	2.393
10.10	3219	3463	2296	5515	1610	7369	3906	2.402
10.20	3231	3473	2287	5518	1615	7375	3902	2.413
10.30	3234	3483	2277	5511	1617	7377	3894	2.421
10.40	3238	3490	2270	5508	1619	7379	3889	2.427
10.50	3242	3500	2260	5502	1621	7381	3881	2.434
10.60	3246	3507	2253	5499	1623	7382	3876	2.441
10.70	3250	3516	2244	5493	1625	7384	3868	2.448
10.80	3253	3524	2237	5490	1627	7387	3863	2.454
10.90	3253	3532	2227	5480	1627	7386	3854	2.461
11.00	3257	3539	2220	5477	1628	7388	3849	2.467
11.10	3260	3548	2212	5473	1630	7390	3842	2.474
11.20	3260	3556	2205	5465	1630	7391	3835	2.479
11.30	3264	3564	2196	5460	1632	7392	3828	2.487
11.40	3268	3571	2189	5456	1634	7393	3822	2.493
11.50	3267	3579	2180	5448	1634	7393	3814	2.499
11.60	3271	3586	2175	5446	1636	7396	3810	2.504

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	3275	3593	2166	5441	1637	7397	3804	2.512
11.80	3274	3600	2159	5434	1637	7397	3797	2.516
11.90	3278	3607	2152	5430	1639	7399	3791	2.523
12.00	3278	3614	2145	5423	1639	7399	3784	2.528
12.10	3274	3621	2138	5412	1637	7396	3775	2.531
12.20	3277	3627	2132	5410	1639	7398	3771	2.537
12.30	3277	3634	2127	5403	1638	7399	3765	2.541
12.40	3284	3647	2114	5398	1642	7403	3756	2.554
12.50	3284	3659	2101	5385	1642	7402	3743	2.563
12.60	3291	3665	2095	5386	1646	7405	3741	2.571
12.70	3295	3671	2089	5384	1647	7407	3736	2.577
12.80	3302	3676	2083	5385	1651	7410	3734	2.585
12.90	3305	3679	2081	5386	1653	7412	3734	2.588
13.00	3312	3679	2082	5394	1656	7417	3738	2.591
13.10	3320	3676	2083	5403	1660	7419	3743	2.593
13.20	3323	3676	2084	5407	1661	7422	3746	2.594
13.30	3330	3676	2084	5414	1665	7426	3749	2.598
13.40	3341	3680	2080	5421	1670	7430	3750	2.606
13.50	3344	3686	2074	5418	1672	7432	3746	2.613
13.60	3347	3688	2072	5419	1674	7433	3745	2.616
13.70	3351	3693	2067	5418	1675	7435	3742	2.621
13.80	3358	3696	2065	5422	1679	7440	3743	2.626
13.90	3361	3701	2059	5420	1681	7440	3739	2.633
14.00	3364	3704	2055	5419	1682	7442	3737	2.637
14.10	3364	3709	2052	5415	1682	7443	3733	2.639
14.20	3367	3714	2047	5414	1683	7444	3730	2.645
14.30	3374	3719	2041	5415	1687	7446	3728	2.653
14.40	3373	3723	2036	5410	1687	7446	3723	2.656
14.50	3376	3728	2032	5408	1688	7448	3720	2.662
14.60	3376	3731	2029	5405	1688	7449	3717	2.663
14.70	3379	3735	2025	5403	1689	7449	3714	2.669
14.80	3378	3738	2021	5399	1689	7449	3710	2.671
14.90	3377	3743	2018	5395	1689	7450	3706	2.674
15.00	3377	3747	2013	5390	1688	7448	3701	2.678
15.10	3380	3749	2011	5391	1690	7450	3701	2.681
15.20	3376	3753	2007	5383	1688	7447	3695	2.682
15.30	3379	3755	2005	5383	1689	7449	3694	2.685
15.40	3374	3760	2000	5374	1687	7447	3687	2.687
15.50	3374	3764	1997	5370	1687	7448	3683	2.690
15.60	3373	3768	1993	5366	1686	7447	3680	2.692
15.70	3372	3772	1988	5361	1686	7447	3674	2.696
15.80	3368	3776	1984	5352	1684	7444	3668	2.698
15.90	3367	3779	1981	5348	1684	7444	3665	2.699
16.00	3374	3783	1978	5352	1687	7448	3665	2.706
16.10	3377	3785	1974	5351	1688	7448	3663	2.710
16.20	3380	3786	1974	5354	1690	7451	3664	2.712
16.30	3382	3790	1971	5353	1691	7452	3662	2.716
16.40	3385	3791	1969	5354	1693	7452	3661	2.720
16.50	3392	3794	1966	5358	1696	7456	3662	2.725
16.60	3395	3796	1964	5358	1697	7457	3661	2.729
16.70	3397	3797	1963	5360	1699	7458	3661	2.731
16.80	3404	3799	1960	5364	1702	7462	3662	2.736
16.90	3407	3801	1959	5366	1703	7463	3662	2.739
17.00	3413	3802	1958	5371	1707	7466	3664	2.743
17.10	3419	3802	1959	5378	1710	7471	3669	2.745
17.20	3426	3804	1956	5381	1713	7472	3668	2.752
17.30	3428	3806	1954	5383	1714	7475	3669	2.754
17.40	3435	3806	1953	5388	1717	7477	3671	2.758
17.50	3437	3806	1953	5391	1719	7478	3672	2.760
17.60	3436	3806	1953	5390	1718	7478	3672	2.759
17.70	3439	3808	1952	5391	1720	7479	3672	2.762
17.80	3442	3808	1952	5394	1721	7480	3673	2.763
17.90	3444	3809	1951	5395	1722	7482	3673	2.765
18.00	3443	3810	1950	5393	1722	7481	3671	2.766

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	3446	3812	1949	5394	1723	7484	3672	2.768
18.20	3441	3810	1950	5391	1721	7480	3670	2.765
18.30	3440	3811	1949	5389	1720	7480	3669	2.766
18.40	3439	3812	1947	5387	1720	7479	3667	2.766
18.50	3438	3812	1947	5386	1719	7479	3667	2.766
18.60	3441	3813	1946	5387	1720	7480	3667	2.768
18.70	3436	3811	1950	5386	1718	7479	3668	2.762
18.80	3435	3810	1950	5385	1718	7477	3667	2.762
18.90	3431	3808	1952	5383	1715	7475	3667	2.757
19.00	3433	3808	1952	5385	1717	7476	3669	2.759
19.10	3432	3805	1954	5386	1716	7476	3670	2.756
19.20	3434	3804	1956	5390	1717	7477	3673	2.756
19.30	3430	3799	1961	5391	1715	7476	3676	2.749
19.40	3436	3797	1963	5398	1718	7478	3681	2.751
19.50	3442	3795	1966	5408	1721	7482	3687	2.750
19.60	3444	3791	1969	5413	1722	7482	3691	2.750
19.70	3446	3788	1972	5418	1723	7483	3695	2.748
19.80	3449	3785	1974	5423	1724	7484	3699	2.747
19.90	3455	3785	1974	5429	1727	7487	3702	2.750
20.00	3460	3782	1978	5438	1730	7490	3708	2.750

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-1-3
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S3

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-1-3.xls]s3

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-29	0	11518	11488	-15	11503	11503	1.003
0.02	344	61	11457	11801	172	11690	11629	1.030
0.04	614	124	11393	12008	307	11825	11701	1.054
0.06	824	180	11337	12161	412	11929	11749	1.073
0.08	1011	238	11280	12290	505	12023	11785	1.090
0.10	1155	286	11232	12387	577	12095	11809	1.103
0.20	1689	511	11008	12697	845	12364	11853	1.153
0.30	2055	718	10801	12855	1027	12546	11828	1.190
0.40	2350	946	10572	12922	1175	12693	11747	1.222
0.50	2593	1160	10358	12951	1297	12815	11655	1.250
0.60	2808	1369	10149	12957	1404	12922	11553	1.277
0.70	2995	1564	9954	12949	1498	13016	11452	1.301
0.80	3182	1757	9761	12942	1591	13109	11352	1.326
0.90	3344	1940	9578	12923	1672	13190	11250	1.349
1.00	3493	2114	9404	12897	1747	13264	11150	1.371
1.10	3632	2283	9235	12867	1816	13334	11051	1.393
1.20	3762	2441	9078	12840	1881	13400	10959	1.414
1.30	3882	2586	8932	12814	1941	13459	10873	1.435
1.40	4002	2727	8791	12793	2001	13519	10792	1.455
1.50	4108	2860	8658	12766	2054	13572	10712	1.474
1.60	4209	2984	8532	12741	2105	13621	10637	1.493
1.70	4305	3103	8415	12720	2153	13671	10568	1.512
1.80	4401	3184	8333	12734	2201	13718	10534	1.528
1.90	4492	3292	8227	12719	2246	13765	10473	1.546
2.00	4574	3406	8113	12687	2287	13806	10400	1.564
2.10	4661	3536	7982	12643	2330	13848	10312	1.584
2.20	4738	3653	7865	12602	2369	13887	10234	1.602
2.30	4815	3760	7758	12573	2407	13925	10165	1.621
2.40	4891	3858	7660	12551	2446	13963	10105	1.639
2.50	4959	3952	7566	12525	2479	13997	10045	1.655
2.60	5026	4039	7478	12504	2513	14031	9991	1.672
2.70	5097	4123	7396	12494	2549	14068	9945	1.689
2.80	5160	4205	7313	12473	2580	14098	9893	1.706
2.90	5222	4280	7238	12460	2611	14129	9849	1.721
3.00	5275	4350	7168	12443	2638	14155	9806	1.736
3.10	5328	4413	7105	12433	2664	14182	9769	1.750
3.20	5386	4473	7044	12429	2693	14209	9737	1.765
3.30	5438	4545	6972	12410	2719	14237	9691	1.780
3.40	5486	4612	6906	12392	2743	14261	9649	1.794
3.50	5530	4675	6843	12373	2765	14284	9608	1.808
3.60	5578	4739	6779	12357	2789	14306	9568	1.823
3.70	5616	4798	6721	12337	2808	14327	9529	1.836
3.80	5659	4857	6661	12320	2830	14347	9490	1.850
3.90	5698	4912	6606	12304	2849	14367	9455	1.863
4.00	5736	4964	6554	12291	2868	14386	9422	1.875
4.10	5775	5015	6503	12277	2887	14405	9390	1.888
4.20	5818	5065	6452	12270	2909	14426	9361	1.902
4.30	5851	5112	6405	12257	2926	14443	9331	1.913
4.40	5885	5156	6362	12247	2943	14460	9305	1.925
4.50	5918	5198	6320	12238	2959	14477	9279	1.936
4.60	5956	5238	6280	12236	2978	14496	9258	1.948
4.70	5985	5275	6243	12228	2993	14510	9235	1.959
4.80	6023	5308	6210	12233	3012	14529	9221	1.970
4.90	6052	5341	6177	12229	3026	14544	9203	1.980
5.00	6085	5371	6147	12232	3043	14560	9189	1.990
5.10	6109	5400	6117	12226	3055	14572	9172	1.999
5.20	6138	5426	6092	12229	3069	14587	9160	2.008

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	6166	5464	6054	12220	3083	14601	9137	2.019
5.40	6199	5498	6021	12220	3100	14618	9121	2.030
5.50	6227	5533	5984	12211	3114	14630	9097	2.041
5.60	6256	5569	5949	12204	3128	14645	9076	2.052
5.70	6284	5598	5919	12203	3142	14659	9061	2.062
5.80	6312	5626	5891	12203	3156	14674	9047	2.071
5.90	6340	5653	5864	12204	3170	14688	9034	2.081
6.00	6372	5680	5837	12210	3186	14704	9024	2.092
6.10	6400	5706	5812	12212	3200	14718	9012	2.101
6.20	6419	5732	5786	12205	3210	14727	8995	2.109
6.30	6447	5752	5766	12213	3223	14741	8989	2.118
6.40	6474	5774	5744	12218	3237	14755	8981	2.127
6.50	6498	5795	5723	12220	3249	14767	8972	2.135
6.60	6521	5816	5702	12222	3260	14778	8962	2.144
6.70	6544	5835	5683	12227	3272	14790	8955	2.152
6.80	6567	5850	5668	12235	3284	14801	8951	2.159
6.90	6586	5866	5651	12237	3293	14810	8944	2.165
7.00	6600	5881	5637	12237	3300	14818	8937	2.171
7.10	6614	5895	5624	12238	3307	14826	8931	2.176
7.20	6632	5907	5610	12243	3316	14834	8926	2.182
7.30	6651	5920	5597	12248	3325	14843	8923	2.188
7.40	6665	5932	5586	12250	3332	14850	8918	2.193
7.50	6679	5944	5575	12254	3339	14858	8914	2.198
7.60	6693	5959	5560	12253	3346	14865	8906	2.204
7.70	6707	5968	5549	12256	3353	14871	8903	2.209
7.80	6721	5978	5540	12260	3360	14878	8900	2.213
7.90	6734	5987	5531	12265	3367	14885	8898	2.218
8.00	6748	5998	5520	12268	3374	14892	8894	2.222
8.10	6757	5996	5521	12279	3379	14896	8900	2.224
8.20	6763	5999	5519	12281	3381	14899	8900	2.225
8.30	6772	6002	5515	12287	3386	14904	8901	2.228
8.40	6785	6016	5502	12288	3393	14912	8895	2.233
8.50	6795	6027	5491	12285	3397	14915	8888	2.238
8.60	6804	6039	5479	12283	3402	14920	8881	2.242
8.70	6813	6049	5470	12283	3407	14925	8876	2.246
8.80	6827	6059	5459	12286	3413	14931	8872	2.250
8.90	6831	6068	5450	12281	3416	14933	8865	2.254
9.00	6845	6077	5440	12285	3422	14940	8863	2.258
9.10	6850	6083	5435	12284	3425	14942	8859	2.260
9.20	6854	6090	5428	12282	3427	14945	8855	2.263
9.30	6872	6096	5423	12295	3436	14955	8859	2.267
9.40	6881	6101	5417	12298	3440	14958	8857	2.270
9.50	6890	6108	5411	12301	3445	14964	8856	2.273
9.60	6899	6114	5404	12303	3449	14967	8853	2.277
9.70	6907	6118	5401	12308	3454	14972	8854	2.279
9.80	6912	6122	5396	12308	3456	14974	8852	2.281
9.90	6925	6122	5397	12322	3462	14981	8860	2.283
10.00	6934	6126	5392	12326	3467	14986	8859	2.286
10.10	6947	6129	5389	12335	3473	14991	8862	2.289
10.20	6951	6129	5389	12340	3476	14993	8864	2.290
10.30	6955	6129	5389	12344	3478	14995	8867	2.291
10.40	6968	6131	5387	12355	3484	15002	8871	2.294
10.50	6973	6132	5385	12358	3486	15004	8872	2.295
10.60	6977	6126	5391	12368	3488	15006	8880	2.294
10.70	6985	6125	5392	12378	3493	15010	8885	2.295
10.80	6985	6122	5396	12381	3493	15010	8889	2.295
10.90	6994	6130	5389	12383	3497	15016	8886	2.298
11.00	6998	6136	5383	12381	3499	15018	8882	2.300
11.10	7002	6142	5377	12379	3501	15020	8878	2.302
11.20	7006	6146	5371	12378	3503	15021	8874	2.304
11.30	7011	6155	5363	12374	3505	15023	8868	2.307
11.40	7015	6160	5357	12372	3507	15025	8865	2.309
11.50	7010	6164	5354	12364	3505	15023	8859	2.309
11.60	7015	6171	5347	12361	3507	15025	8854	2.312

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	7019	6176	5342	12361	3509	15027	8851	2.314
11.80	7023	6178	5341	12363	3511	15030	8852	2.315
11.90	7027	6183	5335	12362	3513	15031	8848	2.317
12.00	7031	6186	5331	12362	3515	15033	8847	2.319
12.10	7030	6189	5330	12361	3515	15034	8845	2.319
12.20	7030	6191	5327	12357	3515	15033	8842	2.320
12.30	7038	6193	5324	12363	3519	15037	8844	2.322
12.40	7034	6197	5321	12355	3517	15035	8838	2.322
12.50	7038	6197	5322	12360	3519	15038	8841	2.322
12.60	7046	6197	5321	12366	3523	15040	8844	2.324
12.70	7045	6197	5321	12366	3523	15040	8844	2.324
12.80	7045	6196	5322	12367	3522	15040	8845	2.324
12.90	7045	6196	5322	12367	3522	15040	8844	2.324
13.00	7048	6196	5322	12370	3524	15042	8846	2.324
13.10	7048	6194	5323	12371	3524	15042	8847	2.324
13.20	7056	6196	5323	12379	3528	15047	8851	2.325
13.30	7059	6193	5324	12384	3530	15047	8854	2.326
13.40	7059	6193	5324	12383	3529	15047	8854	2.326
13.50	7062	6191	5327	12389	3531	15049	8858	2.326
13.60	7070	6190	5328	12398	3535	15053	8863	2.327
13.70	7073	6189	5330	12404	3537	15055	8867	2.327
13.80	7073	6189	5329	12402	3537	15054	8866	2.327
13.90	7080	6187	5330	12411	3540	15058	8871	2.328
14.00	7088	6184	5334	12422	3544	15062	8878	2.329
14.10	7091	6184	5334	12425	3546	15063	8879	2.330
14.20	7091	6183	5336	12427	3545	15064	8881	2.329
14.30	7094	6184	5334	12428	3547	15065	8881	2.330
14.40	7093	6178	5340	12433	3547	15064	8886	2.328
14.50	7101	6179	5339	12439	3550	15068	8889	2.330
14.60	7100	6180	5337	12437	3550	15068	8887	2.330
14.70	7107	6180	5337	12444	3554	15071	8891	2.332
14.80	7106	6183	5335	12441	3553	15071	8888	2.332
14.90	7106	6182	5336	12442	3553	15070	8889	2.332
15.00	7105	6182	5336	12441	3552	15070	8889	2.331
15.10	7104	6182	5336	12440	3552	15070	8888	2.331
15.20	7111	6184	5334	12445	3556	15073	8889	2.333
15.30	7102	6185	5333	12435	3551	15069	8884	2.332
15.40	7094	6183	5335	12429	3547	15064	8882	2.330
15.50	7101	6185	5333	12433	3550	15068	8883	2.332
15.60	7100	6187	5331	12431	3550	15069	8881	2.332
15.70	7103	6189	5329	12432	3551	15069	8880	2.333
15.80	7106	6189	5329	12435	3553	15070	8882	2.333
15.90	7101	6190	5328	12429	3550	15068	8878	2.333
16.00	7100	6192	5326	12425	3550	15068	8876	2.333
16.10	7103	6191	5327	12429	3551	15069	8878	2.333
16.20	7098	6193	5324	12422	3549	15067	8873	2.333
16.30	7097	6196	5322	12419	3548	15066	8871	2.333
16.40	7100	6198	5320	12419	3550	15067	8870	2.335
16.50	7095	6200	5317	12412	3547	15065	8865	2.334
16.60	7094	6204	5314	12407	3547	15064	8861	2.335
16.70	7092	6208	5310	12403	3546	15065	8857	2.336
16.80	7091	6211	5307	12398	3546	15063	8853	2.336
16.90	7086	6216	5302	12389	3543	15061	8845	2.337
17.00	7089	6219	5300	12389	3545	15063	8844	2.338
17.10	7092	6224	5294	12386	3546	15064	8840	2.340
17.20	7091	6230	5288	12379	3545	15063	8833	2.341
17.30	7086	6231	5287	12372	3543	15060	8830	2.340
17.40	7088	6234	5283	12372	3544	15062	8828	2.342
17.50	7087	6238	5281	12368	3543	15062	8825	2.342
17.60	7089	6241	5276	12366	3545	15062	8821	2.344
17.70	7092	6246	5272	12364	3546	15064	8818	2.345
17.80	7087	6247	5271	12357	3543	15061	8814	2.345
17.90	7093	6251	5267	12360	3547	15064	8814	2.347
18.00	7096	6252	5267	12363	3548	15067	8815	2.347

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	7094	6252	5266	12360	3547	15065	8813	2.347
18.20	7097	6258	5260	12357	3548	15066	8808	2.349
18.30	7095	6261	5257	12352	3548	15065	8804	2.350
18.40	7094	6264	5254	12348	3547	15065	8801	2.350
18.50	7096	6268	5250	12346	3548	15066	8798	2.352
18.60	7091	6266	5252	12343	3546	15063	8797	2.350
18.70	7090	6271	5247	12337	3545	15062	8792	2.351
18.80	7092	6273	5245	12337	3546	15064	8791	2.352
18.90	7094	6276	5242	12336	3547	15066	8789	2.353
19.00	7089	6280	5238	12326	3544	15062	8782	2.353
19.10	7087	6285	5233	12320	3544	15061	8777	2.354
19.20	7082	6287	5232	12314	3541	15060	8773	2.354
19.30	7080	6317	5201	12282	3540	15059	8742	2.361
19.40	7082	6327	5191	12273	3541	15059	8732	2.364
19.50	7081	6322	5197	12277	3540	15059	8737	2.363
19.60	7075	6309	5210	12285	3538	15056	8747	2.358
19.70	7074	6289	5228	12302	3537	15054	8765	2.353
19.80	7064	6272	5247	12312	3532	15051	8779	2.346
19.90	7063	6258	5261	12324	3531	15050	8793	2.342
20.00	7065	6249	5269	12334	3532	15051	8802	2.341

Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering

Project Number: M00991-001

Sample: CH-5-48

Comments: Samples were compacted to 90% of ASTM D698 at OMC.

Test Number		S1	S2	S3	
Initial	Height, H (in)	4.21	4.10	4.08	
	Diameter, D (in)	1.93	1.93	1.93	
	Moisture Content, w (%)	19.8	19.8	19.8	
	Dry Unit Weight, γd (pcf)	90.1	89.9	90.1	
	Saturation (%)	66.1	67.1	69.2	
	Void Ratio, e	0.81	0.84	0.81	
Before Shear	Moisture Content, w (%)	27.0	26.5	23.8	
	Dry Unit Weight, γd (pcf)	96.4	97.1	101.4	
	Saturation (%)	100.0	100.0	100.0	
	Void Ratio, e	0.73	0.72	0.64	
	B	0.95	0.95	0.95	
	Back pressure (psf)	17430	4434.1	4751.5	
	Strain rate (%/min)	0.033	0.033	0.033	
	Time to Failure (min)	590.9	509.1	584.8	
Total Stress	Strain at Failure, εf (%)	19.50	16.80	19.30	
	σ3 (psf)	2879	5763	11524	
	σ1-σ3 (psf)	2392	4023	7276	
	σ1 (psf)	5271	9786	18799	
	q = (σ1-σ3)/2 (psf)	1196	2012	3638	
	p = (σ1+σ3)/2 (psf)	4075	7775	15161	
Effective Stress	u (psf)	1332	3013	5413	
	σ'3 (psf)	1547	2750	6110	
	σ'1-σ'3 (psf)	2392	4023	7276	
	σ'1 (psf)	3939	6773	13386	
	q = (σ'1-σ'3)/2 (psf)	1196	2012	3638	
	p' = (σ'1+σ'3)/2 (psf)	2743	4761	9748	
	σ'1/σ'3	2.55	2.46	2.19	
	A = u/(σ1−σ3)	0.557	0.749	0.744	

Estimated Specific Gravity	2.70
Plastic Limit (%)	23
Liquid Limit (%)	61
Plasticity Index (%)	38

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	306	321
ϕ (deg)	12.7	20.1
tan ϕ	0.226	0.367

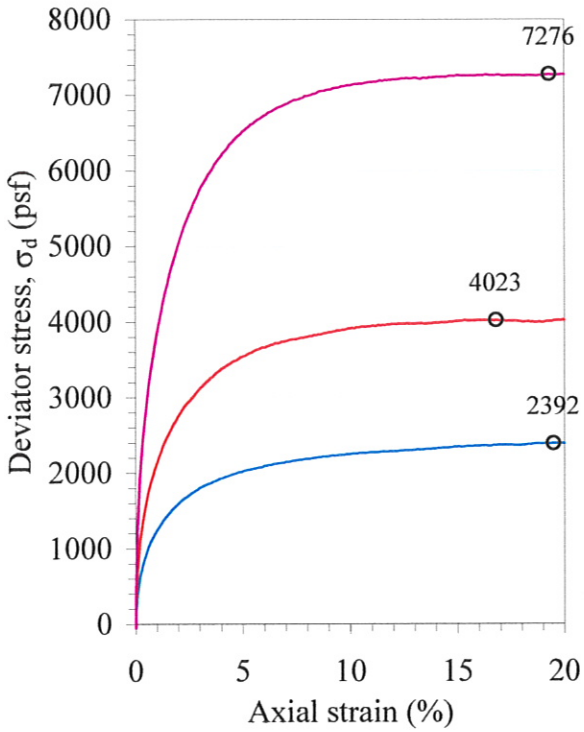
[a] Saturation set to 100% for phase calculations

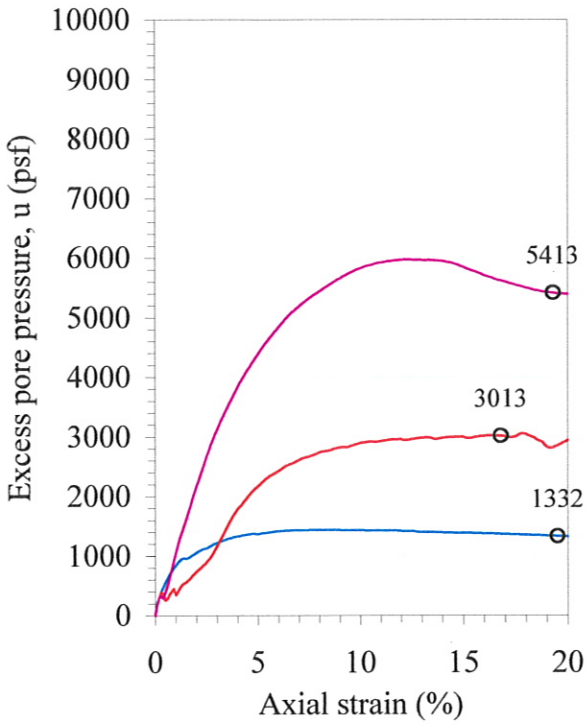
Tested by:_____

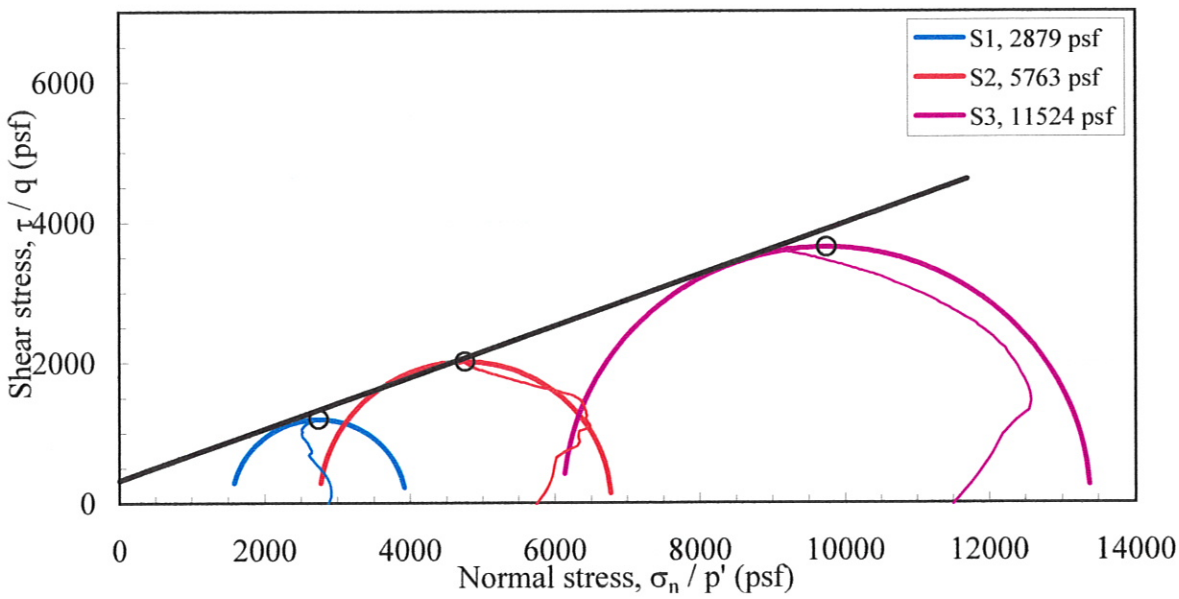
Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-48
Comments:

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	306	321
ϕ (deg)	12.7	20.1
tan ϕ	0.226	0.367







Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-48
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S1

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-48.xls]s1

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-4	0	2879	2875	-2	2877	2877	1.001
0.02	190	56	2823	3013	95	2974	2918	1.067
0.04	267	98	2782	3049	134	3014	2916	1.096
0.06	339	134	2746	3084	169	3048	2915	1.123
0.08	397	165	2714	3111	198	3077	2912	1.146
0.10	448	193	2686	3134	224	3103	2910	1.167
0.20	628	307	2572	3200	314	3193	2886	1.244
0.30	749	399	2480	3229	375	3254	2854	1.302
0.40	851	483	2397	3248	426	3305	2822	1.355
0.50	933	560	2319	3253	467	3346	2786	1.403
0.60	1016	629	2250	3266	508	3387	2758	1.451
0.70	1085	698	2181	3266	542	3421	2723	1.497
0.80	1141	751	2130	3270	570	3451	2700	1.536
0.90	1197	799	2081	3278	598	3479	2680	1.575
1.00	1246	843	2037	3283	623	3503	2660	1.612
1.10	1289	885	1995	3284	645	3525	2639	1.646
1.20	1332	922	1959	3291	666	3546	2625	1.680
1.30	1375	957	1922	3298	688	3567	2610	1.716
1.40	1412	963	1916	3328	706	3585	2622	1.737
1.50	1448	956	1923	3371	724	3603	2647	1.753
1.60	1478	969	1910	3388	739	3618	2649	1.774
1.70	1514	990	1889	3403	757	3636	2646	1.801
1.80	1544	1013	1866	3410	772	3651	2638	1.827
1.90	1573	1035	1844	3417	787	3666	2630	1.853
2.00	1597	1055	1824	3420	798	3677	2622	1.875
2.10	1626	1078	1803	3429	813	3693	2616	1.902
2.20	1649	1097	1783	3432	825	3705	2607	1.925
2.30	1672	1114	1766	3439	836	3716	2603	1.947
2.40	1689	1124	1755	3444	845	3724	2599	1.963
2.50	1712	1133	1745	3458	856	3734	2602	1.981
2.60	1735	1154	1725	3461	868	3747	2593	2.006
2.70	1752	1170	1709	3461	876	3755	2585	2.025
2.80	1768	1191	1689	3457	884	3764	2573	2.047
2.90	1785	1204	1676	3461	892	3773	2569	2.065
3.00	1807	1218	1662	3470	904	3784	2566	2.087
3.10	1818	1232	1647	3465	909	3788	2556	2.104
3.20	1834	1247	1632	3466	917	3796	2549	2.124
3.30	1851	1259	1620	3471	925	3804	2545	2.142
3.40	1861	1272	1607	3468	930	3809	2538	2.158
3.50	1871	1285	1594	3465	935	3814	2530	2.173
3.60	1887	1295	1584	3471	944	3823	2527	2.192
3.70	1897	1305	1574	3471	949	3828	2523	2.205
3.80	1907	1313	1566	3473	954	3833	2520	2.218
3.90	1923	1322	1556	3479	962	3840	2517	2.236
4.00	1933	1329	1550	3483	967	3846	2516	2.247
4.10	1943	1336	1544	3487	971	3852	2515	2.259
4.20	1953	1343	1536	3489	977	3856	2512	2.272
4.30	1963	1350	1530	3493	981	3862	2511	2.283
4.40	1973	1356	1523	3496	986	3865	2509	2.295
4.50	1983	1361	1518	3501	991	3870	2509	2.306
4.60	1992	1366	1513	3506	996	3875	2510	2.316
4.70	2002	1370	1510	3512	1001	3881	2511	2.326
4.80	2012	1372	1508	3519	1006	3885	2514	2.334
4.90	2015	1370	1509	3524	1008	3887	2516	2.336
5.00	2025	1369	1510	3535	1013	3892	2522	2.341
5.10	2035	1375	1505	3540	1017	3898	2523	2.352
5.20	2044	1381	1499	3544	1022	3902	2522	2.363

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	2048	1386	1495	3542	1024	3904	2519	2.370
5.40	2051	1391	1489	3540	1026	3906	2514	2.378
5.50	2061	1395	1484	3545	1031	3910	2515	2.389
5.60	2064	1401	1478	3543	1032	3911	2511	2.396
5.70	2074	1405	1474	3548	1037	3916	2511	2.407
5.80	2077	1409	1470	3547	1039	3918	2509	2.413
5.90	2081	1414	1467	3547	1040	3921	2507	2.419
6.00	2096	1416	1463	3559	1048	3927	2511	2.433
6.10	2100	1420	1460	3559	1050	3929	2509	2.439
6.20	2109	1423	1456	3565	1055	3934	2511	2.449
6.30	2106	1424	1456	3562	1053	3933	2509	2.447
6.40	2122	1427	1454	3575	1061	3941	2515	2.460
6.50	2125	1429	1450	3575	1063	3942	2513	2.465
6.60	2128	1430	1450	3578	1064	3944	2514	2.468
6.70	2132	1431	1449	3581	1066	3946	2515	2.471
6.80	2135	1431	1449	3584	1067	3948	2516	2.473
6.90	2138	1432	1447	3585	1069	3948	2516	2.478
7.00	2147	1434	1447	3594	1074	3954	2520	2.484
7.10	2151	1434	1446	3596	1075	3954	2521	2.488
7.20	2154	1434	1447	3601	1077	3957	2524	2.489
7.30	2163	1434	1446	3609	1082	3961	2527	2.497
7.40	2166	1434	1446	3612	1083	3962	2529	2.499
7.50	2170	1435	1444	3614	1085	3964	2529	2.502
7.60	2173	1435	1444	3617	1086	3965	2531	2.504
7.70	2176	1435	1444	3620	1088	3967	2532	2.507
7.80	2185	1436	1443	3628	1093	3972	2536	2.514
7.90	2188	1436	1443	3631	1094	3973	2537	2.516
8.00	2185	1437	1442	3627	1093	3972	2535	2.515
8.10	2188	1437	1442	3630	1094	3973	2536	2.518
8.20	2197	1437	1443	3640	1099	3979	2542	2.523
8.30	2200	1437	1442	3642	1100	3979	2542	2.526
8.40	2204	1437	1442	3646	1102	3981	2544	2.528
8.50	2206	1437	1443	3650	1103	3983	2546	2.529
8.60	2210	1436	1443	3653	1105	3984	2548	2.531
8.70	2219	1436	1443	3662	1109	3988	2552	2.537
8.80	2216	1436	1443	3659	1108	3987	2551	2.535
8.90	2219	1436	1444	3663	1109	3990	2554	2.536
9.00	2222	1435	1444	3666	1111	3990	2555	2.538
9.10	2231	1434	1446	3676	1115	3994	2561	2.543
9.20	2228	1434	1446	3673	1114	3993	2559	2.541
9.30	2231	1434	1446	3676	1115	3994	2561	2.543
9.40	2233	1434	1447	3680	1117	3997	2563	2.544
9.50	2236	1432	1447	3683	1118	3997	2565	2.546
9.60	2239	1432	1447	3686	1120	3999	2566	2.548
9.70	2236	1432	1447	3683	1118	3997	2565	2.546
9.80	2245	1432	1448	3693	1123	4003	2570	2.551
9.90	2248	1432	1448	3696	1124	4004	2572	2.553
10.00	2251	1431	1449	3700	1125	4006	2574	2.553
10.10	2254	1430	1450	3704	1127	4007	2577	2.554
10.20	2257	1430	1450	3707	1128	4008	2578	2.556
10.30	2254	1429	1450	3704	1127	4006	2577	2.554
10.40	2262	1430	1450	3712	1131	4011	2581	2.560
10.50	2265	1429	1450	3715	1133	4012	2583	2.562
10.60	2262	1429	1451	3713	1131	4011	2582	2.559
10.70	2265	1429	1451	3716	1132	4013	2584	2.560
10.80	2268	1429	1451	3719	1134	4014	2585	2.562
10.90	2270	1429	1451	3722	1135	4015	2587	2.564
11.00	2273	1428	1451	3725	1137	4016	2588	2.566
11.10	2270	1428	1451	3722	1135	4014	2587	2.564
11.20	2273	1428	1451	3724	1137	4016	2588	2.566
11.30	2276	1428	1451	3727	1138	4017	2589	2.568
11.40	2278	1427	1453	3731	1139	4018	2592	2.569
11.50	2281	1425	1454	3735	1141	4020	2594	2.569
11.60	2284	1425	1454	3738	1142	4021	2596	2.571

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	2281	1424	1455	3736	1140	4020	2595	2.568
11.80	2284	1424	1455	3738	1142	4021	2597	2.570
11.90	2286	1422	1457	3743	1143	4022	2600	2.569
12.00	2289	1420	1460	3748	1144	4024	2604	2.568
12.10	2286	1417	1462	3748	1143	4022	2605	2.564
12.20	2288	1415	1465	3754	1144	4024	2610	2.562
12.30	2291	1414	1465	3757	1146	4025	2611	2.563
12.40	2294	1415	1464	3758	1147	4026	2611	2.567
12.50	2296	1414	1465	3762	1148	4027	2614	2.567
12.60	2299	1414	1465	3764	1149	4028	2615	2.569
12.70	2296	1411	1468	3764	1148	4027	2616	2.564
12.80	2298	1407	1474	3772	1149	4029	2623	2.560
12.90	2301	1402	1477	3778	1151	4030	2628	2.558
13.00	2303	1402	1477	3781	1152	4031	2629	2.559
13.10	2312	1401	1478	3790	1156	4035	2634	2.564
13.20	2309	1400	1479	3788	1154	4033	2634	2.560
13.30	2305	1400	1481	3786	1153	4033	2633	2.557
13.40	2308	1398	1481	3789	1154	4033	2635	2.559
13.50	2316	1397	1482	3798	1158	4037	2640	2.563
13.60	2319	1397	1482	3800	1159	4038	2641	2.565
13.70	2315	1396	1484	3799	1158	4038	2642	2.560
13.80	2318	1395	1484	3802	1159	4038	2643	2.562
13.90	2320	1395	1484	3805	1160	4039	2644	2.563
14.00	2323	1393	1487	3809	1161	4040	2648	2.563
14.10	2325	1390	1490	3815	1163	4043	2653	2.560
14.20	2328	1390	1489	3816	1164	4043	2653	2.563
14.30	2330	1389	1490	3820	1165	4044	2655	2.564
14.40	2332	1388	1491	3824	1166	4045	2657	2.564
14.50	2329	1387	1494	3823	1165	4045	2658	2.559
14.60	2337	1386	1494	3831	1169	4048	2662	2.565
14.70	2334	1384	1495	3829	1167	4046	2662	2.562
14.80	2342	1383	1496	3838	1171	4050	2667	2.566
14.90	2344	1383	1496	3840	1172	4051	2668	2.567
15.00	2346	1382	1497	3844	1173	4052	2670	2.567
15.10	2349	1382	1498	3847	1174	4055	2673	2.568
15.20	2345	1382	1498	3844	1173	4053	2671	2.566
15.30	2348	1381	1499	3847	1174	4054	2673	2.566
15.40	2350	1381	1498	3848	1175	4054	2673	2.569
15.50	2352	1380	1499	3852	1176	4055	2676	2.569
15.60	2355	1380	1499	3854	1177	4056	2677	2.570
15.70	2351	1379	1501	3852	1176	4055	2676	2.567
15.80	2359	1379	1502	3861	1180	4060	2681	2.571
15.90	2356	1376	1503	3859	1178	4057	2681	2.568
16.00	2358	1375	1504	3862	1179	4058	2683	2.568
16.10	2360	1375	1505	3865	1180	4060	2685	2.568
16.20	2362	1374	1505	3868	1181	4060	2687	2.570
16.30	2365	1374	1506	3871	1182	4063	2689	2.570
16.40	2361	1372	1508	3869	1181	4060	2688	2.566
16.50	2358	1370	1509	3867	1179	4058	2688	2.563
16.60	2360	1369	1510	3870	1180	4059	2690	2.563
16.70	2368	1368	1511	3879	1184	4063	2695	2.567
16.80	2365	1367	1512	3877	1182	4061	2695	2.564
16.90	2372	1364	1515	3887	1186	4065	2701	2.566
17.00	2369	1363	1517	3886	1184	4065	2701	2.561
17.10	2371	1362	1518	3889	1185	4066	2704	2.562
17.20	2367	1361	1519	3887	1184	4064	2703	2.558
17.30	2370	1359	1520	3890	1185	4064	2705	2.559
17.40	2372	1357	1522	3893	1186	4065	2708	2.559
17.50	2368	1356	1524	3892	1184	4064	2708	2.554
17.60	2371	1355	1524	3895	1185	4064	2709	2.556
17.70	2367	1354	1526	3893	1184	4064	2710	2.551
17.80	2369	1352	1528	3897	1185	4064	2712	2.551
17.90	2366	1352	1529	3895	1183	4063	2712	2.548
18.00	2368	1350	1529	3897	1184	4063	2713	2.549

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	2370	1349	1530	3900	1185	4064	2715	2.549
18.20	2372	1349	1530	3902	1186	4065	2716	2.550
18.30	2379	1348	1531	3910	1190	4069	2721	2.554
18.40	2376	1347	1533	3909	1188	4068	2721	2.549
18.50	2383	1346	1535	3918	1192	4072	2726	2.553
18.60	2385	1345	1536	3921	1192	4073	2728	2.553
18.70	2387	1343	1536	3923	1194	4073	2729	2.554
18.80	2389	1341	1538	3927	1194	4074	2733	2.553
18.90	2385	1340	1540	3926	1193	4073	2733	2.549
19.00	2387	1339	1542	3929	1194	4074	2735	2.549
19.10	2389	1338	1542	3931	1195	4074	2736	2.550
19.20	2391	1336	1543	3934	1196	4075	2738	2.550
19.30	2388	1334	1545	3933	1194	4073	2739	2.545
19.40	2389	1333	1547	3937	1195	4075	2742	2.544
19.50	2392	1332	1547	3939	1196	4075	2743	2.546
19.60	2388	1331	1549	3937	1194	4073	2743	2.542
19.70	2390	1328	1551	3941	1195	4074	2746	2.541
19.80	2392	1326	1554	3946	1196	4076	2750	2.539
19.90	2388	1325	1554	3943	1194	4073	2749	2.537
20.00	2390	1323	1556	3946	1195	4074	2751	2.537

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-48
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S2

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-48.xls]s2

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-26	0	5761	5735	-13	5748	5748	1.005
0.02	270	45	5717	5987	135	5897	5852	1.047
0.04	450	85	5676	6127	225	5987	5902	1.079
0.06	587	123	5639	6226	294	6055	5933	1.104
0.08	695	155	5607	6303	348	6110	5955	1.124
0.10	782	184	5578	6360	391	6153	5969	1.140
0.20	1090	306	5456	6547	545	6307	6001	1.200
0.30	1298	391	5371	6668	649	6411	6020	1.242
0.40	1476	354	5408	6884	738	6500	6146	1.273
0.50	1618	258	5504	7122	809	6571	6313	1.294
0.60	1745	289	5473	7217	872	6634	6345	1.319
0.70	1857	362	5399	7256	929	6689	6328	1.344
0.80	1955	409	5353	7308	978	6739	6331	1.365
0.90	2053	449	5313	7366	1026	6788	6340	1.386
1.00	2136	341	5421	7557	1068	6830	6489	1.394
1.10	2219	390	5372	7591	1110	6871	6481	1.413
1.20	2295	453	5309	7603	1147	6909	6456	1.432
1.30	2370	512	5251	7621	1185	6948	6436	1.451
1.40	2431	543	5220	7651	1216	6979	6435	1.466
1.50	2493	565	5197	7690	1246	7008	6444	1.480
1.60	2539	597	5165	7704	1270	7032	6434	1.492
1.70	2600	627	5134	7734	1300	7061	6434	1.506
1.80	2660	672	5091	7751	1330	7093	6421	1.523
1.90	2707	703	5059	7766	1354	7115	6413	1.535
2.00	2760	734	5028	7788	1380	7142	6408	1.549
2.10	2799	766	4996	7795	1400	7162	6396	1.560
2.20	2845	801	4961	7806	1423	7185	6384	1.574
2.30	2884	834	4929	7813	1442	7205	6371	1.585
2.40	2923	863	4899	7822	1462	7223	6360	1.597
2.50	2955	898	4864	7819	1477	7239	6341	1.608
2.60	2986	940	4821	7808	1493	7255	6315	1.619
2.70	3018	984	4779	7797	1509	7272	6288	1.631
2.80	3056	1034	4728	7784	1528	7290	6256	1.647
2.90	3088	1092	4670	7758	1544	7306	6214	1.661
3.00	3119	1163	4600	7719	1560	7323	6160	1.678
3.10	3143	1225	4537	7680	1572	7334	6109	1.693
3.20	3175	1287	4475	7649	1587	7349	6062	1.709
3.30	3206	1353	4409	7615	1603	7365	6012	1.727
3.40	3230	1421	4340	7570	1615	7376	5955	1.744
3.50	3261	1494	4268	7528	1630	7392	5898	1.764
3.60	3278	1564	4198	7476	1639	7401	5837	1.781
3.70	3309	1630	4132	7440	1654	7416	5786	1.801
3.80	3332	1691	4071	7403	1666	7428	5737	1.819
3.90	3356	1743	4020	7376	1678	7441	5698	1.835
4.00	3380	1788	3974	7353	1690	7452	5664	1.851
4.10	3397	1826	3936	7333	1698	7460	5634	1.863
4.20	3413	1862	3900	7313	1707	7469	5606	1.875
4.30	3437	1909	3854	7291	1718	7481	5572	1.892
4.40	3446	1952	3811	7257	1723	7486	5534	1.904
4.50	3470	1996	3766	7236	1735	7497	5501	1.921
4.60	3487	2038	3724	7211	1743	7505	5467	1.936
4.70	3496	2074	3688	7184	1748	7510	5436	1.948
4.80	3513	2106	3656	7169	1756	7518	5412	1.961
4.90	3536	2137	3625	7160	1768	7530	5392	1.976
5.00	3545	2169	3593	7138	1773	7535	5366	1.987
5.10	3555	2197	3565	7120	1777	7539	5342	1.997
5.20	3571	2235	3529	7099	1785	7548	5314	2.012

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	3587	2265	3498	7085	1794	7557	5292	2.025
5.40	3597	2296	3466	7063	1798	7560	5265	2.038
5.50	3613	2323	3439	7052	1806	7568	5246	2.050
5.60	3629	2348	3414	7042	1814	7576	5228	2.063
5.70	3638	2365	3397	7035	1819	7581	5216	2.071
5.80	3647	2386	3376	7023	1824	7586	5200	2.080
5.90	3663	2406	3356	7020	1832	7594	5188	2.091
6.00	3665	2427	3336	7002	1833	7596	5169	2.099
6.10	3675	2451	3312	6986	1837	7600	5149	2.110
6.20	3684	2476	3287	6971	1842	7605	5129	2.121
6.30	3700	2499	3264	6963	1850	7613	5114	2.134
6.40	3702	2520	3243	6945	1851	7614	5094	2.142
6.50	3718	2532	3230	6948	1859	7621	5089	2.151
6.60	3720	2545	3217	6937	1860	7622	5077	2.156
6.70	3722	2557	3205	6928	1861	7623	5066	2.161
6.80	3738	2572	3190	6928	1869	7631	5059	2.172
6.90	3740	2594	3169	6909	1870	7633	5039	2.180
7.00	3749	2613	3150	6899	1874	7638	5025	2.190
7.10	3758	2629	3134	6892	1879	7642	5013	2.199
7.20	3767	2643	3120	6886	1883	7646	5003	2.207
7.30	3769	2655	3107	6876	1884	7646	4991	2.213
7.40	3771	2661	3102	6873	1885	7648	4988	2.216
7.50	3773	2669	3093	6866	1887	7648	4979	2.220
7.60	3782	2680	3082	6864	1891	7653	4973	2.227
7.70	3790	2690	3073	6863	1895	7658	4968	2.233
7.80	3792	2705	3058	6850	1896	7659	4954	2.240
7.90	3801	2722	3041	6842	1901	7664	4942	2.250
8.00	3803	2738	3024	6827	1902	7664	4925	2.258
8.10	3812	2752	3011	6823	1906	7669	4917	2.266
8.20	3814	2756	3006	6820	1907	7669	4913	2.269
8.30	3822	2761	3001	6824	1911	7673	4913	2.274
8.40	3824	2766	2996	6820	1912	7674	4908	2.277
8.50	3833	2773	2989	6821	1916	7678	4905	2.283
8.60	3835	2785	2978	6813	1917	7680	4895	2.288
8.70	3843	2799	2963	6806	1922	7684	4884	2.297
8.80	3851	2806	2957	6808	1926	7689	4883	2.303
8.90	3853	2814	2949	6802	1927	7690	4875	2.307
9.00	3862	2821	2942	6804	1931	7694	4873	2.313
9.10	3864	2828	2934	6797	1932	7694	4865	2.317
9.20	3872	2831	2932	6804	1936	7699	4868	2.320
9.30	3874	2828	2934	6807	1937	7699	4870	2.321
9.40	3889	2833	2929	6818	1944	7706	4873	2.328
9.50	3884	2840	2923	6807	1942	7705	4865	2.329
9.60	3892	2852	2910	6802	1946	7708	4856	2.338
9.70	3894	2866	2896	6790	1947	7709	4843	2.345
9.80	3902	2875	2888	6790	1951	7714	4839	2.351
9.90	3910	2886	2876	6786	1955	7717	4831	2.360
10.00	3912	2894	2869	6781	1956	7719	4825	2.363
10.10	3920	2902	2860	6780	1960	7722	4820	2.371
10.20	3915	2908	2854	6769	1958	7720	4812	2.372
10.30	3930	2914	2849	6779	1965	7728	4814	2.379
10.40	3925	2916	2845	6770	1963	7723	4807	2.380
10.50	3933	2921	2841	6774	1967	7728	4808	2.384
10.60	3935	2915	2847	6781	1967	7729	4814	2.382
10.70	3936	2913	2849	6785	1968	7730	4817	2.381
10.80	3938	2913	2849	6787	1969	7731	4818	2.382
10.90	3939	2921	2842	6781	1970	7733	4812	2.386
11.00	3947	2929	2833	6780	1974	7735	4806	2.393
11.10	3949	2935	2827	6776	1974	7736	4801	2.397
11.20	3943	2940	2823	6767	1972	7735	4795	2.397
11.30	3958	2946	2818	6775	1979	7742	4796	2.405
11.40	3953	2948	2815	6768	1976	7740	4792	2.404
11.50	3961	2953	2809	6770	1980	7742	4790	2.410
11.60	3956	2955	2807	6763	1978	7740	4785	2.409

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	3964	2954	2808	6772	1982	7744	4790	2.411
11.80	3965	2955	2807	6772	1982	7744	4790	2.413
11.90	3966	2957	2805	6771	1983	7745	4788	2.414
12.00	3968	2962	2800	6768	1984	7746	4784	2.417
12.10	3969	2951	2811	6780	1985	7746	4795	2.412
12.20	3970	2944	2818	6788	1985	7747	4803	2.409
12.30	3971	2942	2821	6793	1986	7749	4807	2.408
12.40	3973	2953	2809	6782	1987	7748	4796	2.414
12.50	3974	2962	2800	6774	1987	7749	4787	2.419
12.60	3976	2965	2797	6772	1988	7750	4784	2.422
12.70	3977	2970	2792	6769	1988	7750	4780	2.424
12.80	3972	2976	2786	6758	1986	7748	4772	2.426
12.90	3973	2980	2784	6756	1986	7750	4770	2.427
13.00	3974	2982	2781	6755	1987	7750	4768	2.429
13.10	3975	2985	2777	6752	1988	7750	4764	2.432
13.20	3977	2985	2777	6753	1988	7750	4765	2.432
13.30	3978	2987	2777	6754	1989	7752	4765	2.433
13.40	3979	2985	2778	6757	1989	7752	4767	2.432
13.50	3974	2978	2784	6758	1987	7749	4771	2.428
13.60	3975	2968	2793	6768	1988	7748	4781	2.423
13.70	3976	2961	2800	6776	1988	7749	4788	2.420
13.80	3977	2970	2792	6769	1989	7751	4781	2.425
13.90	3985	2976	2786	6771	1992	7754	4778	2.430
14.00	3986	2983	2780	6766	1993	7756	4773	2.434
14.10	3987	2985	2778	6765	1993	7756	4771	2.435
14.20	3988	2989	2773	6761	1994	7756	4767	2.438
14.30	3995	2991	2772	6767	1998	7761	4769	2.441
14.40	3990	2994	2768	6758	1995	7757	4763	2.441
14.50	3991	2994	2768	6760	1996	7757	4764	2.442
14.60	3998	2997	2765	6763	1999	7761	4764	2.446
14.70	3999	2998	2764	6763	2000	7762	4763	2.447
14.80	4000	2997	2765	6765	2000	7762	4765	2.447
14.90	4007	2997	2766	6773	2004	7767	4770	2.449
15.00	4008	2996	2766	6774	2004	7766	4770	2.449
15.10	4009	2987	2775	6785	2005	7767	4780	2.445
15.20	4010	2976	2786	6796	2005	7767	4791	2.439
15.30	4017	2974	2788	6806	2009	7771	4797	2.441
15.40	4018	2983	2779	6797	2009	7771	4788	2.446
15.50	4013	2991	2771	6784	2006	7768	4777	2.448
15.60	4020	2997	2765	6785	2010	7772	4775	2.454
15.70	4014	3001	2763	6777	2007	7770	4770	2.453
15.80	4015	3006	2757	6772	2008	7771	4764	2.457
15.90	4022	3010	2752	6774	2011	7773	4763	2.462
16.00	4017	3015	2747	6764	2009	7770	4756	2.462
16.10	4018	3017	2745	6763	2009	7771	4754	2.464
16.20	4019	3018	2744	6763	2009	7771	4753	2.465
16.30	4019	3017	2745	6764	2010	7772	4755	2.464
16.40	4020	3018	2744	6764	2010	7772	4754	2.465
16.50	4021	3019	2743	6764	2011	7772	4753	2.466
16.60	4022	3015	2747	6769	2011	7773	4758	2.464
16.70	4016	3013	2748	6765	2008	7770	4757	2.461
16.80	4023	3013	2750	6773	2012	7775	4761	2.463
16.90	4018	3012	2750	6768	2009	7771	4759	2.461
17.00	4013	3010	2752	6765	2006	7768	4758	2.458
17.10	4019	2999	2763	6782	2010	7772	4772	2.455
17.20	4014	2994	2768	6782	2007	7769	4775	2.450
17.30	4009	2989	2773	6782	2004	7766	4777	2.446
17.40	4009	2996	2766	6775	2005	7767	4771	2.449
17.50	4010	3004	2758	6768	2005	7767	4763	2.454
17.60	4011	3022	2740	6751	2005	7767	4746	2.464
17.70	4011	3045	2718	6729	2006	7769	4724	2.476
17.80	4012	3058	2704	6716	2006	7768	4710	2.484
17.90	4006	3052	2711	6717	2003	7766	4714	2.478
18.00	4001	3046	2716	6717	2001	7762	4716	2.473

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	3996	3025	2737	6732	1998	7760	4735	2.460
18.20	4002	3012	2750	6752	2001	7763	4751	2.456
18.30	4003	2997	2765	6768	2001	7763	4766	2.448
18.40	4003	2985	2777	6780	2002	7764	4778	2.442
18.50	3998	2956	2806	6804	1999	7761	4805	2.425
18.60	3998	2939	2823	6822	1999	7761	4823	2.416
18.70	3993	2923	2839	6832	1997	7758	4835	2.407
18.80	3999	2912	2850	6850	2000	7762	4850	2.403
18.90	4000	2866	2895	6895	2000	7761	4895	2.382
19.00	3995	2833	2929	6923	1997	7759	4926	2.364
19.10	4001	2817	2944	6945	2001	7761	4945	2.359
19.20	4007	2810	2951	6958	2004	7764	4955	2.358
19.30	4007	2821	2941	6948	2004	7766	4944	2.363
19.40	4008	2834	2929	6937	2004	7767	4933	2.368
19.50	4014	2854	2908	6922	2007	7769	4915	2.381
19.60	4020	2871	2893	6913	2010	7773	4903	2.390
19.70	4021	2889	2873	6893	2010	7772	4883	2.400
19.80	4021	2907	2855	6876	2011	7772	4866	2.408
19.90	4021	2924	2838	6859	2011	7773	4848	2.417
20.00	4022	2943	2819	6840	2011	7773	4830	2.427

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-48
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S3

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-48.xls]s3

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-47	0	11524	11477	-23	11500	11500	1.004
0.02	511	43	11480	11992	256	11779	11736	1.045
0.04	829	82	11442	12271	415	11938	11856	1.072
0.06	1054	116	11408	12461	527	12050	11934	1.092
0.08	1247	150	11374	12621	624	12147	11997	1.110
0.10	1394	179	11344	12738	697	12220	12041	1.123
0.20	1949	307	11217	13166	975	12498	12191	1.174
0.30	2333	328	11196	13529	1167	12690	12362	1.208
0.40	2632	288	11235	13867	1316	12839	12551	1.234
0.50	2891	391	11132	14023	1446	12969	12578	1.260
0.60	3119	519	11005	14124	1559	13083	12564	1.283
0.70	3323	650	10875	14198	1662	13186	12536	1.306
0.80	3512	789	10734	14246	1756	13279	12490	1.327
0.90	3684	922	10602	14286	1842	13366	12444	1.348
1.00	3857	1048	10475	14332	1928	13452	12404	1.368
1.10	3998	1168	10356	14354	1999	13523	12355	1.386
1.20	4139	1287	10236	14375	2069	13593	12306	1.404
1.30	4272	1402	10123	14395	2136	13661	12259	1.422
1.40	4405	1505	10019	14423	2202	13726	12221	1.440
1.50	4514	1627	9897	14411	2257	13781	12154	1.456
1.60	4631	1733	9790	14421	2316	13839	12106	1.473
1.70	4733	1846	9678	14410	2366	13890	12044	1.489
1.80	4834	1956	9568	14402	2417	13941	11985	1.505
1.90	4935	2071	9453	14388	2468	13991	11920	1.522
2.00	5021	2169	9355	14375	2510	14034	11865	1.537
2.10	5114	2259	9264	14378	2557	14080	11821	1.552
2.20	5199	2373	9151	14350	2599	14123	11750	1.568
2.30	5276	2478	9045	14322	2638	14161	11683	1.583
2.40	5354	2583	8941	14295	2677	14201	11618	1.599
2.50	5431	2679	8846	14277	2715	14240	11561	1.614
2.60	5493	2771	8753	14245	2746	14270	11499	1.628
2.70	5562	2861	8664	14225	2781	14305	11444	1.642
2.80	5623	2951	8572	14196	2812	14335	11384	1.656
2.90	5677	3035	8490	14167	2839	14364	11329	1.669
3.00	5746	3113	8411	14157	2873	14397	11284	1.683
3.10	5800	3190	8333	14133	2900	14423	11233	1.696
3.20	5846	3269	8255	14101	2923	14447	11178	1.708
3.30	5899	3343	8181	14080	2950	14474	11131	1.721
3.40	5952	3416	8108	14061	2976	14500	11084	1.734
3.50	5991	3493	8031	14022	2995	14519	11026	1.746
3.60	6036	3566	7957	13994	3018	14541	10975	1.759
3.70	6082	3637	7887	13969	3041	14565	10928	1.771
3.80	6127	3706	7818	13945	3064	14587	10881	1.784
3.90	6165	3775	7749	13914	3082	14606	10831	1.796
4.00	6203	3839	7684	13887	3101	14625	10786	1.807
4.10	6240	3902	7621	13861	3120	14643	10741	1.819
4.20	6270	3961	7563	13833	3135	14659	10698	1.829
4.30	6308	4018	7505	13813	3154	14677	10659	1.840
4.40	6345	4078	7447	13791	3172	14697	10619	1.852
4.50	6375	4130	7395	13770	3187	14712	10582	1.862
4.60	6405	4179	7345	13749	3202	14726	10547	1.872
4.70	6442	4233	7291	13733	3221	14745	10512	1.884
4.80	6464	4283	7241	13704	3232	14755	10472	1.893
4.90	6486	4335	7189	13675	3243	14767	10432	1.902
5.00	6523	4384	7140	13663	3261	14785	10401	1.914
5.10	6538	4434	7089	13627	3269	14792	10358	1.922
5.20	6560	4483	7040	13600	3280	14803	10320	1.932

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	6589	4534	6990	13579	3294	14818	10284	1.943
5.40	6611	4582	6942	13552	3305	14829	10247	1.952
5.50	6625	4627	6897	13522	3313	14837	10210	1.960
5.60	6654	4672	6852	13506	3327	14851	10179	1.971
5.70	6676	4715	6808	13484	3338	14861	10146	1.981
5.80	6690	4755	6769	13459	3345	14869	10114	1.988
5.90	6711	4798	6726	13438	3356	14880	10082	1.998
6.00	6733	4841	6684	13417	3366	14892	10051	2.007
6.10	6747	4882	6643	13390	3374	14899	10017	2.016
6.20	6769	4919	6605	13373	3384	14908	9989	2.025
6.30	6782	4960	6565	13347	3391	14916	9956	2.033
6.40	6797	4997	6526	13323	3398	14922	9924	2.041
6.50	6810	5033	6491	13301	3405	14929	9896	2.049
6.60	6832	5067	6457	13289	3416	14939	9873	2.058
6.70	6845	5098	6427	13272	3423	14947	9849	2.065
6.80	6852	5129	6395	13247	3426	14950	9821	2.071
6.90	6866	5157	6368	13234	3433	14958	9801	2.078
7.00	6879	5187	6338	13217	3440	14964	9777	2.085
7.10	6893	5219	6305	13198	3447	14970	9751	2.093
7.20	6907	5246	6279	13186	3453	14978	9732	2.100
7.30	6920	5273	6251	13171	3460	14984	9711	2.107
7.40	6934	5297	6227	13161	3467	14992	9694	2.113
7.50	6940	5322	6203	13143	3470	14995	9673	2.119
7.60	6947	5345	6178	13125	3473	14997	9652	2.124
7.70	6960	5371	6154	13113	3480	15005	9634	2.131
7.80	6966	5393	6130	13096	3483	15007	9613	2.136
7.90	6987	5421	6103	13090	3493	15018	9597	2.145
8.00	6986	5444	6080	13066	3493	15016	9573	2.149
8.10	6999	5466	6058	13057	3500	15023	9557	2.155
8.20	7005	5491	6033	13038	3503	15026	9536	2.161
8.30	7018	5512	6013	13031	3509	15034	9522	2.167
8.40	7024	5533	5991	13015	3512	15036	9503	2.172
8.50	7037	5554	5970	13007	3519	15042	9488	2.179
8.60	7050	5575	5949	12999	3525	15049	9474	2.185
8.70	7056	5597	5928	12984	3528	15053	9456	2.190
8.80	7055	5618	5905	12960	3528	15051	9433	2.195
8.90	7068	5638	5886	12953	3534	15058	9419	2.201
9.00	7074	5659	5864	12938	3537	15060	9401	2.206
9.10	7073	5680	5843	12916	3536	15060	9380	2.210
9.20	7085	5699	5826	12911	3543	15067	9368	2.216
9.30	7091	5718	5806	12897	3546	15069	9351	2.221
9.40	7097	5736	5787	12884	3548	15072	9336	2.226
9.50	7102	5755	5770	12872	3551	15076	9321	2.231
9.60	7115	5770	5754	12869	3558	15082	9312	2.236
9.70	7114	5787	5737	12850	3557	15080	9294	2.240
9.80	7126	5803	5722	12848	3563	15088	9285	2.245
9.90	7132	5817	5707	12839	3566	15091	9273	2.250
10.00	7130	5829	5696	12826	3565	15090	9261	2.252
10.10	7136	5841	5683	12819	3568	15092	9251	2.256
10.20	7141	5855	5669	12810	3571	15094	9239	2.260
10.30	7140	5865	5659	12799	3570	15095	9229	2.262
10.40	7145	5876	5648	12793	3573	15096	9220	2.265
10.50	7151	5884	5640	12790	3575	15099	9215	2.268
10.60	7156	5895	5629	12785	3578	15102	9207	2.271
10.70	7161	5903	5622	12783	3581	15105	9203	2.274
10.80	7166	5913	5611	12778	3583	15108	9195	2.277
10.90	7172	5920	5604	12776	3586	15111	9190	2.280
11.00	7170	5926	5597	12768	3585	15109	9183	2.281
11.10	7175	5932	5593	12768	3588	15112	9180	2.283
11.20	7174	5938	5586	12759	3587	15110	9173	2.284
11.30	7186	5944	5580	12765	3593	15116	9173	2.288
11.40	7191	5948	5576	12767	3595	15120	9172	2.290
11.50	7189	5954	5569	12758	3595	15118	9164	2.291
11.60	7194	5957	5568	12762	3597	15122	9165	2.292

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	7192	5961	5562	12755	3596	15120	9158	2.293
11.80	7197	5964	5560	12757	3599	15122	9159	2.295
11.90	7202	5967	5556	12759	3601	15125	9158	2.296
12.00	7207	5968	5555	12763	3604	15127	9159	2.297
12.10	7205	5972	5552	12757	3603	15126	9154	2.298
12.20	7210	5971	5554	12764	3605	15130	9159	2.298
12.30	7215	5971	5553	12768	3608	15131	9160	2.299
12.40	7220	5971	5553	12773	3610	15134	9163	2.300
12.50	7218	5971	5554	12772	3609	15134	9163	2.300
12.60	7223	5970	5555	12778	3611	15136	9167	2.300
12.70	7221	5967	5556	12777	3610	15134	9167	2.300
12.80	7219	5968	5555	12774	3609	15133	9165	2.299
12.90	7224	5967	5556	12780	3612	15135	9168	2.300
13.00	7228	5966	5558	12786	3614	15138	9172	2.301
13.10	7226	5964	5561	12787	3613	15138	9174	2.299
13.20	7217	5963	5561	12778	3609	15132	9170	2.298
13.30	7215	5967	5556	12772	3608	15131	9164	2.299
13.40	7227	5966	5558	12784	3613	15137	9171	2.300
13.50	7224	5963	5561	12785	3612	15136	9173	2.299
13.60	7222	5961	5562	12784	3611	15135	9173	2.298
13.70	7233	5959	5566	12799	3617	15141	9182	2.300
13.80	7231	5957	5567	12798	3616	15139	9183	2.299
13.90	7235	5953	5572	12807	3618	15142	9189	2.299
14.00	7240	5950	5574	12814	3620	15144	9194	2.299
14.10	7238	5945	5580	12817	3619	15144	9199	2.297
14.20	7242	5938	5587	12829	3621	15146	9208	2.296
14.30	7240	5932	5590	12830	3620	15142	9210	2.295
14.40	7237	5924	5601	12838	3619	15143	9220	2.292
14.50	7242	5915	5609	12851	3621	15145	9230	2.291
14.60	7246	5903	5621	12867	3623	15147	9244	2.289
14.70	7250	5891	5634	12884	3625	15150	9259	2.287
14.80	7248	5878	5645	12893	3624	15148	9269	2.284
14.90	7252	5863	5661	12913	3626	15150	9287	2.281
15.00	7263	5849	5675	12938	3632	15155	9306	2.280
15.10	7260	5835	5690	12950	3630	15155	9320	2.276
15.20	7252	5820	5704	12955	3626	15149	9330	2.271
15.30	7255	5807	5718	12973	3628	15152	9346	2.269
15.40	7259	5793	5732	12991	3630	15154	9362	2.266
15.50	7257	5780	5744	13001	3629	15152	9372	2.263
15.60	7255	5767	5757	13011	3627	15151	9384	2.260
15.70	7259	5753	5771	13029	3629	15153	9400	2.258
15.80	7256	5740	5785	13041	3628	15153	9413	2.254
15.90	7260	5727	5798	13057	3630	15155	9428	2.252
16.00	7264	5713	5811	13074	3632	15155	9442	2.250
16.10	7261	5700	5823	13084	3631	15154	9454	2.247
16.20	7259	5687	5836	13095	3629	15153	9466	2.244
16.30	7269	5677	5847	13116	3634	15158	9481	2.243
16.40	7266	5666	5857	13123	3633	15157	9490	2.241
16.50	7263	5653	5870	13134	3632	15155	9502	2.237
16.60	7261	5642	5882	13143	3630	15154	9512	2.234
16.70	7258	5631	5893	13150	3629	15153	9522	2.232
16.80	7262	5623	5901	13162	3631	15154	9532	2.231
16.90	7265	5612	5912	13178	3633	15157	9545	2.229
17.00	7262	5602	5923	13185	3631	15156	9554	2.226
17.10	7253	5590	5934	13187	3627	15150	9560	2.222
17.20	7257	5578	5946	13203	3628	15153	9575	2.220
17.30	7261	5569	5955	13215	3630	15154	9585	2.219
17.40	7264	5558	5965	13229	3632	15156	9597	2.218
17.50	7261	5549	5975	13236	3631	15154	9605	2.215
17.60	7258	5540	5984	13242	3629	15153	9613	2.213
17.70	7262	5535	5989	13250	3631	15154	9619	2.213
17.80	7259	5525	5999	13258	3629	15153	9628	2.210
17.90	7262	5513	6011	13273	3631	15155	9642	2.208
18.00	7259	5503	6021	13280	3630	15154	9651	2.206

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	7256	5494	6031	13287	3628	15153	9659	2.203
18.20	7260	5485	6040	13300	3630	15154	9670	2.202
18.30	7263	5474	6051	13313	3631	15156	9682	2.200
18.40	7260	5465	6059	13319	3630	15153	9689	2.198
18.50	7263	5458	6066	13329	3632	15155	9697	2.197
18.60	7260	5451	6073	13333	3630	15154	9703	2.196
18.70	7257	5444	6081	13338	3628	15153	9710	2.193
18.80	7260	5439	6086	13346	3630	15155	9716	2.193
18.90	7263	5432	6093	13356	3632	15156	9724	2.192
19.00	7260	5428	6096	13356	3630	15155	9726	2.191
19.10	7270	5425	6099	13368	3635	15158	9733	2.192
19.20	7266	5417	6107	13373	3633	15157	9740	2.190
19.30	7276	5413	6110	13386	3638	15161	9748	2.191
19.40	7266	5409	6115	13381	3633	15157	9748	2.188
19.50	7269	5405	6119	13388	3635	15158	9753	2.188
19.60	7266	5403	6121	13387	3633	15157	9754	2.187
19.70	7269	5402	6122	13391	3634	15158	9757	2.187
19.80	7272	5399	6124	13396	3636	15159	9760	2.187
19.90	7275	5396	6128	13403	3637	15161	9765	2.187
20.00	7271	5393	6130	13402	3636	15159	9766	2.186

Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering

Project Number: M00991-001

Sample: CH-5-98

Comments: Samples were compacted to 90% of ASTM D698 at OMC.

Test Number		S1	S2	S3	
Initial	Height, H (in)	4.22	4.22	4.05	
	Diameter, D (in)	1.88	1.88	1.88	
	Moisture Content, w (%)	17.3	17.3	17.3	
	Dry Unit Weight, γd (pcf)	97.9	98.0	97.7	
	Saturation (%)	78.6	77.0	74.0	
	Void Ratio, e	0.59	0.60	0.62	
Before Shear	Moisture Content, w (%)	22.4	20.6	19.8	
	Dry Unit Weight, γd (pcf)	103.8	107.1	114.4	
	Saturation (%)	100.0	100.0	100.0	
	Void Ratio, e	0.61	0.56	0.53	
	B	0.95	0.95	0.97	
	Back pressure (psf)	5431.9	15270	6916	
	Strain rate (%/min)	0.033	0.033	0.033	
	Time to Failure (min)	603.0	606.1	603.0	
Total Stress	Strain at Failure, εf (%)	19.90	20.00	19.90	
	σ3 (psf)	2878	5754	11523	
	σ1-σ3 (psf)	2994	5436	8088	
	σ1 (psf)	5873	11190	19612	
	q = (σ1-σ3)/2 (psf)	1497	2718	4044	
	p = (σ1+σ3)/2 (psf)	4375	8472	15568	
Effective Stress	u (psf)	1353	2564	6606	
	σ'3 (psf)	1526	3190	4918	
	σ'1-σ'3 (psf)	2994	5436	8088	
	σ'1 (psf)	4520	8626	13006	
	q = (σ'1-σ'3)/2 (psf)	1497	2718	4044	
	p' = (σ'1+σ'3)/2 (psf)	3023	5908	8962	
	σ'1/σ'3	2.96	2.70	2.64	
	A = u/(σ1−σ3)	0.452	0.472	0.817	

Estimated Specific Gravity	2.70
Plastic Limit (%)	17
Liquid Limit (%)	53
Plasticity Index (%)	36

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	657	216
ϕ (deg)	12.9	25.4
tan ϕ	0.229	0.475

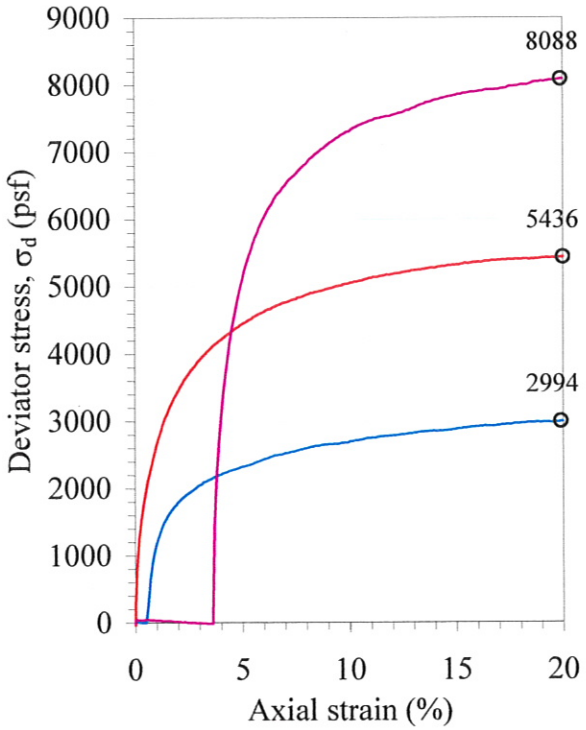
[a] Saturation set to 100% for phase calculations

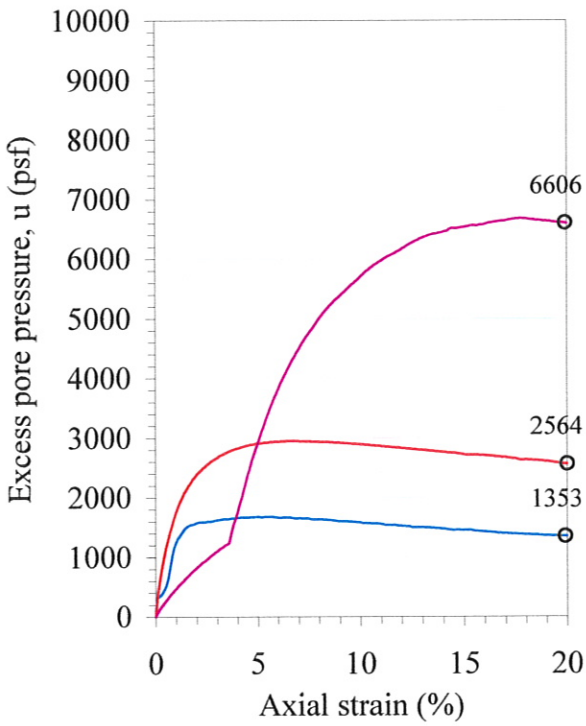
Tested by:_____

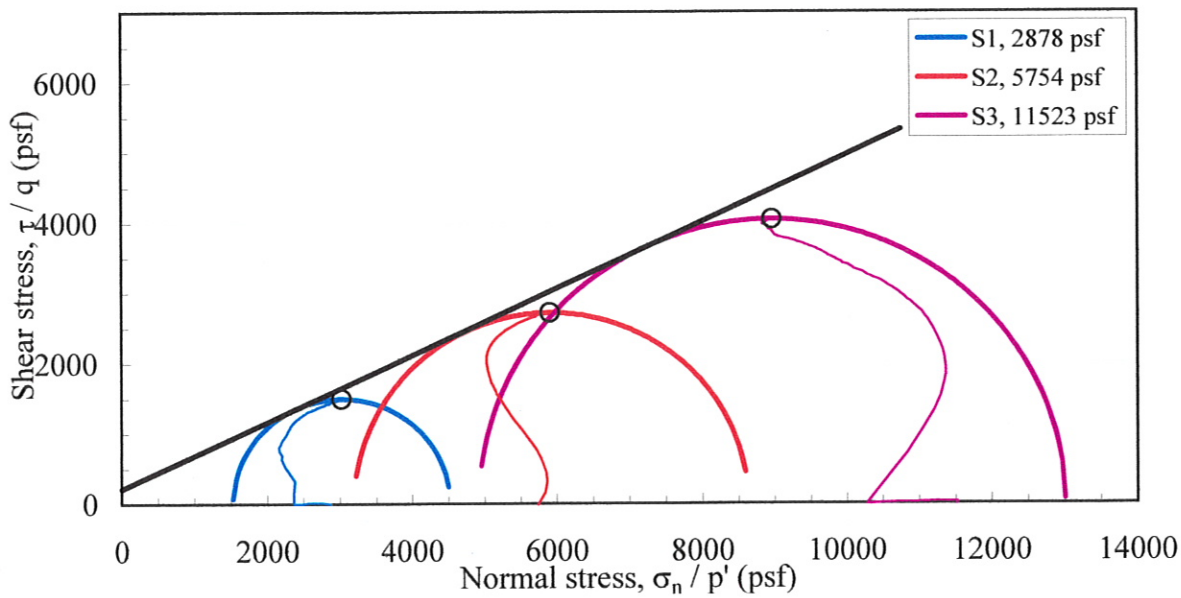
Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-98
Comments:

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	657	216
ϕ (deg)	12.9	25.4
tan ϕ	0.229	0.475







Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-98
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S1

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-98.xls]s1

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-2	0	2878	2876	-1	2877	2877	1.001
0.02	19	107	2772	2791	10	2888	2781	1.007
0.04	19	186	2692	2711	10	2888	2702	1.007
0.06	19	248	2630	2649	10	2888	2640	1.007
0.08	19	301	2577	2596	10	2888	2587	1.007
0.10	19	335	2543	2562	9	2888	2553	1.007
0.20	11	344	2534	2545	6	2884	2540	1.004
0.30	11	382	2497	2507	5	2884	2502	1.004
0.40	3	443	2436	2439	2	2880	2437	1.001
0.50	3	513	2365	2368	1	2880	2367	1.001
0.60	256	644	2233	2489	128	3005	2361	1.115
0.70	657	827	2051	2709	329	3207	2380	1.320
0.80	889	1017	1861	2749	444	3321	2305	1.478
0.90	1049	1152	1726	2775	524	3403	2250	1.608
1.00	1181	1250	1629	2810	590	3469	2219	1.725
1.10	1285	1322	1556	2841	642	3521	2198	1.826
1.20	1381	1361	1517	2898	691	3569	2208	1.910
1.30	1456	1418	1460	2916	728	3606	2188	1.997
1.40	1524	1471	1407	2931	762	3640	2169	2.083
1.50	1585	1506	1372	2957	793	3671	2165	2.155
1.60	1632	1530	1349	2981	816	3694	2165	2.210
1.70	1678	1542	1336	3014	839	3718	2175	2.257
1.80	1725	1550	1329	3054	863	3741	2191	2.298
1.90	1758	1562	1316	3074	879	3757	2195	2.336
2.00	1797	1574	1304	3101	899	3777	2203	2.378
2.10	1829	1583	1296	3125	915	3794	2211	2.411
2.20	1862	1585	1294	3155	931	3809	2225	2.439
2.30	1887	1588	1291	3178	943	3823	2235	2.461
2.40	1912	1594	1286	3198	956	3836	2242	2.488
2.50	1938	1596	1282	3220	969	3847	2251	2.511
2.60	1963	1599	1280	3242	981	3860	2261	2.534
2.70	1981	1603	1275	3256	990	3869	2265	2.554
2.80	2006	1610	1268	3274	1003	3881	2271	2.582
2.90	2031	1617	1261	3292	1015	3894	2276	2.611
3.00	2049	1622	1256	3305	1025	3903	2281	2.631
3.10	2067	1628	1250	3317	1034	3912	2284	2.653
3.20	2099	1634	1245	3343	1049	3928	2294	2.686
3.30	2110	1639	1240	3350	1055	3933	2295	2.702
3.40	2128	1641	1238	3365	1064	3942	2301	2.719
3.50	2139	1641	1238	3376	1069	3948	2307	2.728
3.60	2156	1644	1234	3390	1078	3956	2312	2.747
3.70	2174	1649	1229	3403	1087	3965	2316	2.769
3.80	2185	1654	1225	3410	1093	3971	2317	2.784
3.90	2203	1660	1219	3421	1101	3980	2320	2.807
4.00	2213	1663	1216	3430	1107	3986	2323	2.820
4.10	2231	1665	1214	3445	1116	3995	2330	2.838
4.20	2242	1669	1209	3451	1121	3999	2330	2.854
4.30	2253	1670	1208	3461	1126	4005	2334	2.864
4.40	2263	1668	1211	3474	1132	4010	2342	2.870
4.50	2274	1669	1209	3483	1137	4015	2346	2.880
4.60	2285	1672	1206	3490	1142	4021	2348	2.895
4.70	2295	1674	1205	3500	1148	4026	2352	2.905
4.80	2306	1675	1204	3509	1153	4031	2356	2.916
4.90	2316	1677	1201	3518	1158	4036	2359	2.928
5.00	2327	1678	1201	3528	1163	4043	2365	2.937
5.10	2331	1676	1202	3533	1165	4044	2368	2.938
5.20	2341	1674	1205	3546	1171	4049	2375	2.943

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	2352	1677	1201	3553	1176	4054	2377	2.958
5.40	2362	1680	1200	3562	1181	4061	2381	2.968
5.50	2372	1678	1200	3572	1186	4065	2386	2.977
5.60	2389	1678	1200	3590	1195	4073	2395	2.991
5.70	2400	1677	1201	3601	1200	4078	2401	2.998
5.80	2410	1677	1201	3611	1205	4083	2406	3.007
5.90	2420	1674	1205	3625	1210	4089	2415	3.009
6.00	2437	1669	1209	3647	1219	4097	2428	3.015
6.10	2448	1664	1214	3662	1224	4102	2438	3.016
6.20	2458	1669	1209	3667	1229	4107	2438	3.032
6.30	2468	1669	1209	3677	1234	4112	2443	3.041
6.40	2478	1669	1209	3688	1239	4117	2448	3.049
6.50	2495	1668	1212	3707	1247	4127	2459	3.059
6.60	2492	1668	1212	3703	1246	4125	2458	3.056
6.70	2502	1661	1218	3719	1251	4129	2468	3.055
6.80	2505	1656	1221	3726	1253	4130	2474	3.052
6.90	2515	1654	1225	3740	1258	4136	2482	3.054
7.00	2525	1656	1222	3748	1263	4141	2485	3.066
7.10	2529	1655	1223	3752	1264	4143	2488	3.067
7.20	2538	1654	1226	3764	1269	4149	2495	3.071
7.30	2548	1654	1225	3773	1274	4153	2499	3.081
7.40	2552	1650	1228	3780	1276	4154	2504	3.078
7.50	2562	1649	1230	3792	1281	4160	2511	3.082
7.60	2572	1642	1236	3808	1286	4164	2522	3.080
7.70	2581	1637	1241	3822	1291	4169	2532	3.080
7.80	2585	1634	1245	3829	1292	4171	2537	3.077
7.90	2594	1636	1243	3838	1297	4177	2541	3.087
8.00	2598	1637	1241	3839	1299	4177	2540	3.093
8.10	2607	1635	1245	3852	1304	4183	2548	3.095
8.20	2617	1634	1246	3863	1309	4188	2554	3.101
8.30	2620	1630	1248	3868	1310	4188	2558	3.100
8.40	2630	1628	1250	3880	1315	4193	2565	3.103
8.50	2633	1626	1253	3886	1317	4195	2569	3.102
8.60	2636	1623	1256	3892	1318	4198	2574	3.098
8.70	2646	1621	1259	3904	1323	4202	2581	3.102
8.80	2649	1613	1266	3914	1324	4203	2590	3.093
8.90	2652	1608	1270	3922	1326	4204	2596	3.088
9.00	2655	1605	1274	3929	1327	4206	2601	3.084
9.10	2658	1606	1274	3932	1329	4208	2603	3.087
9.20	2654	1605	1274	3928	1327	4206	2601	3.084
9.30	2664	1603	1275	3939	1332	4210	2607	3.089
9.40	2661	1602	1276	3937	1330	4209	2606	3.085
9.50	2663	1600	1279	3942	1332	4210	2610	3.083
9.60	2673	1598	1282	3955	1336	4216	2618	3.085
9.70	2676	1595	1283	3959	1338	4216	2621	3.085
9.80	2685	1592	1287	3972	1343	4221	2629	3.087
9.90	2682	1588	1290	3972	1341	4219	2631	3.079
10.00	2697	1583	1295	3992	1349	4227	2644	3.083
10.10	2700	1578	1301	4001	1350	4229	2651	3.076
10.20	2710	1571	1308	4017	1355	4233	2663	3.072
10.30	2719	1572	1307	4025	1359	4238	2666	3.081
10.40	2715	1571	1309	4024	1358	4237	2667	3.074
10.50	2725	1569	1309	4033	1362	4241	2671	3.082
10.60	2727	1567	1311	4039	1364	4242	2675	3.080
10.70	2736	1565	1314	4050	1368	4247	2682	3.083
10.80	2746	1571	1309	4054	1373	4252	2682	3.098
10.90	2748	1562	1316	4064	1374	4253	2690	3.089
11.00	2751	1558	1321	4072	1376	4254	2696	3.083
11.10	2754	1553	1325	4079	1377	4255	2702	3.078
11.20	2750	1545	1334	4084	1375	4253	2709	3.062
11.30	2766	1538	1341	4106	1383	4261	2723	3.063
11.40	2768	1541	1337	4105	1384	4262	2721	3.070
11.50	2771	1540	1339	4110	1385	4265	2725	3.069
11.60	2774	1538	1341	4114	1387	4265	2727	3.069

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	2776	1537	1342	4118	1388	4266	2730	3.069
11.80	2779	1533	1346	4125	1389	4269	2736	3.064
11.90	2782	1531	1348	4129	1391	4269	2738	3.064
12.00	2784	1528	1350	4134	1392	4270	2742	3.062
12.10	2787	1525	1353	4140	1393	4272	2747	3.059
12.20	2789	1523	1356	4145	1395	4273	2750	3.057
12.30	2792	1519	1359	4151	1396	4274	2755	3.054
12.40	2801	1517	1362	4162	1400	4279	2762	3.057
12.50	2797	1509	1370	4167	1399	4277	2768	3.042
12.60	2806	1504	1375	4180	1403	4281	2777	3.041
12.70	2808	1500	1378	4186	1404	4282	2782	3.038
12.80	2817	1502	1377	4194	1409	4287	2785	3.046
12.90	2813	1502	1377	4190	1407	4285	2783	3.043
13.00	2822	1500	1378	4200	1411	4289	2789	3.048
13.10	2824	1499	1380	4205	1412	4292	2793	3.046
13.20	2833	1498	1380	4213	1416	4295	2797	3.052
13.30	2835	1496	1384	4219	1418	4297	2802	3.049
13.40	2838	1493	1385	4223	1419	4297	2804	3.049
13.50	2840	1491	1387	4228	1420	4298	2807	3.047
13.60	2843	1489	1390	4232	1421	4300	2811	3.045
13.70	2845	1485	1394	4239	1422	4302	2817	3.040
13.80	2847	1483	1396	4243	1424	4302	2819	3.040
13.90	2850	1479	1399	4249	1425	4303	2824	3.037
14.00	2852	1477	1400	4252	1426	4303	2826	3.037
14.10	2848	1473	1405	4253	1424	4302	2829	3.027
14.20	2856	1470	1409	4265	1428	4307	2837	3.028
14.30	2853	1462	1417	4269	1426	4305	2843	3.014
14.40	2855	1457	1420	4275	1428	4305	2848	3.010
14.50	2857	1455	1424	4281	1429	4307	2852	3.007
14.60	2859	1456	1423	4282	1430	4308	2852	3.010
14.70	2862	1457	1421	4283	1431	4309	2852	3.013
14.80	2870	1456	1424	4294	1435	4315	2859	3.016
14.90	2872	1455	1424	4296	1436	4314	2860	3.017
15.00	2880	1452	1426	4306	1440	4319	2866	3.020
15.10	2883	1451	1427	4310	1441	4320	2869	3.020
15.20	2885	1449	1431	4315	1442	4322	2873	3.016
15.30	2893	1446	1432	4325	1447	4325	2878	3.020
15.40	2895	1449	1430	4325	1448	4326	2877	3.025
15.50	2897	1444	1434	4331	1449	4327	2883	3.020
15.60	2905	1439	1439	4344	1453	4331	2892	3.019
15.70	2907	1437	1442	4350	1454	4333	2896	3.016
15.80	2909	1434	1445	4354	1455	4333	2900	3.014
15.90	2912	1430	1448	4360	1456	4334	2904	3.010
16.00	2914	1428	1451	4364	1457	4335	2907	3.008
16.10	2922	1425	1453	4375	1461	4339	2914	3.011
16.20	2918	1422	1457	4374	1459	4337	2915	3.003
16.30	2926	1420	1459	4384	1463	4341	2922	3.005
16.40	2927	1417	1461	4389	1464	4342	2925	3.004
16.50	2924	1414	1465	4388	1462	4340	2927	2.996
16.60	2926	1410	1468	4394	1463	4341	2931	2.993
16.70	2922	1407	1472	4393	1461	4339	2933	2.985
16.80	2924	1405	1473	4396	1462	4340	2935	2.985
16.90	2931	1402	1476	4408	1466	4344	2942	2.985
17.00	2933	1401	1478	4411	1467	4345	2944	2.985
17.10	2941	1398	1480	4421	1471	4349	2950	2.987
17.20	2943	1395	1483	4426	1472	4350	2955	2.984
17.30	2945	1393	1486	4431	1472	4351	2958	2.982
17.40	2947	1390	1488	4435	1473	4352	2961	2.980
17.50	2948	1388	1490	4439	1474	4353	2965	2.978
17.60	2950	1387	1493	4443	1475	4355	2968	2.976
17.70	2958	1384	1494	4452	1479	4357	2973	2.980
17.80	2966	1382	1496	4462	1483	4361	2979	2.982
17.90	2962	1381	1498	4459	1481	4359	2978	2.978
18.00	2963	1380	1500	4463	1482	4361	2981	2.976

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	2965	1379	1500	4465	1483	4361	2982	2.977
18.20	2967	1376	1502	4469	1483	4362	2986	2.975
18.30	2974	1375	1503	4478	1487	4366	2991	2.978
18.40	2976	1373	1506	4482	1488	4366	2994	2.977
18.50	2978	1372	1507	4485	1489	4367	2996	2.976
18.60	2974	1370	1508	4482	1487	4365	2995	2.972
18.70	2975	1368	1512	4487	1488	4367	2999	2.968
18.80	2983	1367	1512	4494	1491	4370	3003	2.973
18.90	2979	1364	1514	4493	1489	4368	3003	2.968
19.00	2975	1363	1515	4490	1487	4366	3002	2.963
19.10	2982	1362	1516	4498	1491	4369	3007	2.967
19.20	2978	1361	1517	4495	1489	4367	3006	2.962
19.30	2979	1359	1520	4499	1490	4368	3009	2.960
19.40	2981	1357	1521	4502	1491	4369	3011	2.960
19.50	2977	1354	1524	4501	1488	4367	3013	2.953
19.60	2984	1354	1526	4510	1492	4372	3018	2.956
19.70	2986	1352	1527	4512	1493	4371	3020	2.956
19.80	2981	1350	1529	4511	1491	4370	3020	2.950
19.90	2994	1353	1526	4520	1497	4375	3023	2.963
20.00	2990	1349	1529	4519	1495	4373	3024	2.956

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-98
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S2

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-98.xls]s2

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-29	0	5754	5725	-14	5740	5740	1.005
0.02	325	76	5678	6002	162	5916	5840	1.057
0.04	533	160	5593	6127	267	6021	5860	1.095
0.06	677	227	5527	6204	339	6093	5865	1.123
0.08	785	288	5466	6251	393	6146	5858	1.144
0.10	893	348	5406	6299	446	6200	5852	1.165
0.20	1265	600	5155	6421	633	6388	5788	1.245
0.30	1537	805	4949	6486	768	6522	5718	1.311
0.40	1757	990	4764	6522	879	6633	5643	1.369
0.50	1949	1156	4598	6547	974	6728	5572	1.424
0.60	2118	1301	4453	6571	1059	6813	5512	1.476
0.70	2259	1428	4327	6586	1129	6884	5457	1.522
0.80	2399	1546	4208	6607	1200	6954	5408	1.570
0.90	2525	1653	4101	6626	1262	7016	5364	1.616
1.00	2650	1757	3997	6647	1325	7079	5322	1.663
1.10	2761	1846	3908	6669	1381	7135	5289	1.707
1.20	2858	1927	3827	6685	1429	7183	5256	1.747
1.30	2954	2003	3752	6706	1477	7232	5229	1.787
1.40	3050	2079	3675	6725	1525	7279	5200	1.830
1.50	3117	2140	3614	6731	1559	7312	5173	1.862
1.60	3199	2196	3558	6757	1599	7353	5157	1.899
1.70	3266	2248	3508	6773	1633	7388	5140	1.931
1.80	3340	2298	3456	6796	1670	7424	5126	1.966
1.90	3399	2344	3412	6811	1700	7455	5111	1.996
2.00	3452	2386	3369	6821	1726	7481	5095	2.024
2.10	3512	2423	3331	6842	1756	7510	5087	2.054
2.20	3564	2457	3297	6861	1782	7536	5079	2.081
2.30	3616	2491	3263	6879	1808	7562	5071	2.108
2.40	3661	2523	3231	6892	1831	7584	5062	2.133
2.50	3713	2553	3201	6914	1857	7610	5057	2.160
2.60	3758	2581	3174	6931	1879	7634	5053	2.184
2.70	3796	2606	3148	6944	1898	7652	5046	2.206
2.80	3833	2629	3125	6958	1917	7671	5041	2.227
2.90	3878	2650	3105	6982	1939	7694	5044	2.249
3.00	3908	2673	3081	6990	1954	7708	5035	2.268
3.10	3953	2695	3059	7012	1976	7730	5035	2.292
3.20	3983	2714	3040	7023	1991	7745	5032	2.310
3.30	4020	2731	3023	7043	2010	7764	5033	2.330
3.40	4050	2748	3008	7058	2025	7780	5033	2.347
3.50	4080	2763	2992	7072	2040	7795	5032	2.364
3.60	4110	2779	2975	7085	2055	7809	5030	2.382
3.70	4140	2793	2962	7102	2070	7825	5032	2.398
3.80	4163	2806	2949	7112	2082	7837	5030	2.412
3.90	4193	2818	2936	7129	2097	7850	5033	2.428
4.00	4216	2828	2926	7141	2108	7862	5033	2.441
4.10	4239	2839	2915	7154	2119	7873	5034	2.454
4.20	4268	2850	2906	7174	2134	7889	5040	2.469
4.30	4291	2858	2896	7187	2145	7899	5042	2.482
4.40	4313	2867	2888	7201	2157	7912	5045	2.494
4.50	4336	2875	2879	7215	2168	7922	5047	2.506
4.60	4365	2882	2872	7237	2183	7937	5054	2.520
4.70	4388	2889	2865	7252	2194	7948	5058	2.532
4.80	4403	2898	2858	7261	2202	7957	5059	2.541
4.90	4432	2905	2849	7282	2216	7970	5066	2.556
5.00	4448	2908	2846	7294	2224	7978	5070	2.563
5.10	4463	2913	2841	7304	2232	7985	5073	2.571
5.20	4485	2916	2838	7323	2243	7997	5080	2.581

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	4507	2921	2833	7340	2254	8008	5087	2.591
5.40	4522	2924	2831	7353	2261	8016	5092	2.598
5.50	4545	2928	2826	7370	2272	8026	5098	2.608
5.60	4566	2932	2824	7390	2283	8038	5107	2.617
5.70	4581	2934	2820	7402	2291	8045	5111	2.625
5.80	4597	2936	2818	7414	2298	8052	5116	2.631
5.90	4611	2939	2815	7427	2306	8060	5121	2.638
6.00	4626	2941	2814	7440	2313	8068	5127	2.644
6.10	4648	2942	2812	7460	2324	8078	5136	2.653
6.20	4663	2944	2810	7473	2332	8085	5141	2.660
6.30	4671	2946	2810	7480	2335	8090	5145	2.662
6.40	4692	2947	2808	7501	2346	8101	5155	2.671
6.50	4700	2947	2807	7508	2350	8104	5157	2.674
6.60	4722	2947	2808	7530	2361	8116	5169	2.681
6.70	4730	2948	2807	7537	2365	8120	5172	2.685
6.80	4744	2948	2806	7550	2372	8126	5178	2.691
6.90	4759	2949	2806	7565	2379	8134	5185	2.696
7.00	4767	2947	2807	7574	2383	8137	5191	2.698
7.10	4774	2946	2810	7584	2387	8142	5197	2.699
7.20	4789	2947	2807	7596	2395	8148	5202	2.706
7.30	4803	2946	2810	7613	2402	8157	5211	2.710
7.40	4811	2944	2810	7621	2406	8159	5215	2.712
7.50	4819	2943	2811	7629	2409	8163	5220	2.714
7.60	4840	2942	2812	7652	2420	8174	5232	2.721
7.70	4847	2940	2814	7662	2424	8178	5238	2.722
7.80	4855	2940	2814	7669	2427	8181	5242	2.725
7.90	4869	2937	2817	7686	2435	8188	5251	2.729
8.00	4883	2936	2818	7701	2442	8195	5259	2.733
8.10	4891	2935	2819	7710	2445	8199	5264	2.735
8.20	4905	2934	2820	7725	2452	8206	5272	2.739
8.30	4905	2932	2822	7728	2453	8207	5275	2.738
8.40	4919	2930	2824	7743	2460	8214	5283	2.742
8.50	4927	2930	2825	7751	2463	8218	5288	2.744
8.60	4934	2928	2827	7761	2467	8222	5294	2.745
8.70	4941	2926	2828	7770	2471	8225	5299	2.747
8.80	4949	2923	2831	7779	2474	8228	5305	2.748
8.90	4962	2923	2831	7793	2481	8235	5312	2.753
9.00	4969	2920	2835	7805	2485	8240	5320	2.753
9.10	4977	2917	2837	7813	2488	8242	5325	2.755
9.20	4984	2915	2839	7823	2492	8246	5331	2.756
9.30	4998	2913	2841	7839	2499	8253	5340	2.759
9.40	5005	2909	2845	7849	2502	8256	5347	2.759
9.50	5012	2907	2847	7859	2506	8260	5353	2.760
9.60	5018	2905	2851	7869	2509	8264	5360	2.761
9.70	5032	2901	2853	7885	2516	8270	5369	2.764
9.80	5039	2899	2855	7894	2520	8274	5375	2.765
9.90	5040	2895	2859	7898	2520	8274	5379	2.763
10.00	5053	2894	2860	7913	2527	8280	5386	2.767
10.10	5060	2892	2862	7922	2530	8284	5392	2.768
10.20	5067	2888	2866	7932	2533	8287	5399	2.768
10.30	5073	2886	2868	7942	2537	8291	5405	2.769
10.40	5080	2882	2872	7952	2540	8294	5412	2.769
10.50	5087	2879	2875	7962	2544	8297	5419	2.769
10.60	5094	2876	2878	7971	2547	8301	5424	2.770
10.70	5107	2874	2881	7988	2553	8309	5434	2.773
10.80	5113	2871	2885	7998	2557	8312	5441	2.773
10.90	5127	2867	2887	8014	2563	8317	5450	2.776
11.00	5127	2864	2892	8018	2563	8318	5455	2.773
11.10	5140	2860	2894	8034	2570	8324	5464	2.776
11.20	5140	2858	2896	8036	2570	8324	5466	2.775
11.30	5147	2854	2900	8046	2573	8327	5473	2.775
11.40	5153	2851	2903	8056	2577	8331	5480	2.775
11.50	5160	2847	2907	8066	2580	8334	5487	2.775
11.60	5166	2844	2911	8077	2583	8338	5494	2.774

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	5172	2840	2914	8086	2586	8340	5500	2.775
11.80	5172	2838	2916	8089	2586	8340	5502	2.774
11.90	5179	2834	2920	8098	2589	8343	5509	2.774
12.00	5185	2832	2922	8107	2593	8346	5515	2.775
12.10	5191	2828	2927	8118	2596	8351	5522	2.774
12.20	5191	2825	2929	8120	2596	8350	5525	2.772
12.30	5198	2821	2934	8131	2599	8354	5533	2.772
12.40	5204	2818	2937	8141	2602	8357	5539	2.772
12.50	5210	2816	2940	8150	2605	8360	5545	2.772
12.60	5216	2812	2942	8158	2608	8362	5550	2.773
12.70	5223	2809	2945	8168	2611	8365	5557	2.773
12.80	5222	2805	2949	8171	2611	8365	5560	2.771
12.90	5235	2802	2952	8187	2617	8371	5570	2.773
13.00	5241	2798	2957	8198	2620	8375	5577	2.772
13.10	5241	2794	2959	8200	2620	8374	5580	2.771
13.20	5246	2791	2964	8211	2623	8378	5587	2.770
13.30	5246	2787	2967	8213	2623	8377	5590	2.769
13.40	5252	2784	2970	8222	2626	8380	5596	2.768
13.50	5258	2782	2972	8231	2629	8383	5602	2.769
13.60	5264	2776	2978	8242	2632	8386	5610	2.768
13.70	5270	2773	2981	8251	2635	8389	5616	2.768
13.80	5276	2771	2983	8259	2638	8392	5621	2.769
13.90	5276	2768	2986	8262	2638	8392	5624	2.767
14.00	5275	2764	2990	8265	2638	8392	5628	2.764
14.10	5287	2759	2995	8282	2644	8398	5638	2.766
14.20	5293	2757	2998	8291	2646	8402	5645	2.765
14.30	5299	2752	3002	8300	2649	8403	5651	2.765
14.40	5298	2750	3005	8303	2649	8404	5654	2.763
14.50	5304	2746	3009	8313	2652	8407	5661	2.763
14.60	5310	2743	3011	8321	2655	8409	5666	2.763
14.70	5309	2739	3015	8324	2655	8409	5669	2.761
14.80	5315	2736	3019	8334	2657	8412	5677	2.760
14.90	5314	2731	3023	8337	2657	8411	5680	2.758
15.00	5320	2723	3030	8350	2660	8413	5690	2.756
15.10	5319	2715	3038	8357	2660	8412	5698	2.751
15.20	5331	2714	3040	8371	2665	8419	5706	2.753
15.30	5336	2715	3039	8375	2668	8422	5707	2.756
15.40	5348	2715	3039	8387	2674	8428	5713	2.760
15.50	5341	2715	3040	8381	2670	8426	5711	2.757
15.60	5346	2713	3041	8388	2673	8427	5715	2.758
15.70	5352	2711	3044	8396	2676	8431	5720	2.758
15.80	5357	2710	3044	8401	2679	8433	5722	2.760
15.90	5356	2708	3046	8403	2678	8432	5724	2.758
16.00	5362	2707	3047	8409	2681	8435	5728	2.760
16.10	5361	2704	3050	8411	2681	8434	5730	2.758
16.20	5366	2702	3053	8419	2683	8438	5736	2.758
16.30	5371	2698	3056	8427	2686	8440	5741	2.758
16.40	5377	2696	3058	8435	2688	8442	5746	2.758
16.50	5376	2694	3061	8437	2688	8443	5749	2.756
16.60	5381	2689	3065	8446	2690	8444	5755	2.756
16.70	5386	2686	3068	8454	2693	8447	5761	2.755
16.80	5385	2682	3072	8457	2693	8447	5765	2.753
16.90	5390	2677	3078	8468	2695	8450	5773	2.751
17.00	5389	2674	3080	8469	2695	8449	5775	2.750
17.10	5394	2669	3085	8479	2697	8451	5782	2.749
17.20	5393	2664	3089	8483	2697	8451	5786	2.746
17.30	5392	2660	3094	8487	2696	8450	5790	2.743
17.40	5397	2656	3099	8496	2699	8454	5797	2.742
17.50	5402	2653	3101	8503	2701	8455	5802	2.742
17.60	5395	2643	3111	8506	2698	8452	5808	2.735
17.70	5400	2632	3122	8522	2700	8454	5822	2.730
17.80	5405	2627	3127	8532	2703	8456	5829	2.729
17.90	5404	2632	3123	8527	2702	8457	5825	2.730
18.00	5403	2632	3122	8525	2701	8455	5824	2.730

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	5408	2632	3122	8530	2704	8458	5826	2.732
18.20	5406	2629	3125	8531	2703	8457	5828	2.730
18.30	5411	2628	3126	8537	2706	8459	5831	2.731
18.40	5404	2625	3129	8533	2702	8456	5831	2.727
18.50	5409	2622	3133	8542	2704	8459	5837	2.726
18.60	5408	2620	3134	8542	2704	8458	5838	2.726
18.70	5412	2618	3136	8549	2706	8460	5842	2.726
18.80	5411	2615	3139	8550	2706	8459	5844	2.724
18.90	5416	2611	3145	8560	2708	8463	5852	2.722
19.00	5420	2607	3148	8568	2710	8465	5858	2.722
19.10	5419	2604	3152	8570	2709	8464	5861	2.719
19.20	5423	2599	3155	8579	2712	8466	5867	2.719
19.30	5428	2594	3160	8588	2714	8468	5874	2.718
19.40	5421	2591	3163	8584	2710	8464	5874	2.714
19.50	5431	2586	3168	8599	2716	8470	5884	2.714
19.60	5424	2580	3174	8598	2712	8466	5886	2.709
19.70	5423	2570	3184	8607	2711	8465	5896	2.703
19.80	5433	2561	3193	8625	2716	8470	5909	2.702
19.90	5431	2564	3190	8622	2716	8470	5906	2.703
20.00	5436	2564	3190	8626	2718	8472	5908	2.704

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: CH-5-98
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S3

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_CH-5-98.xls]s3

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-10	0	11522	11512	-5	11517	11517	1.001
0.02	46	18	11506	11552	23	11547	11529	1.004
0.04	46	30	11493	11539	23	11546	11516	1.004
0.06	54	43	11480	11534	27	11550	11507	1.005
0.08	54	55	11468	11522	27	11550	11495	1.005
0.10	46	67	11457	11502	23	11546	11479	1.004
0.20	45	126	11397	11442	23	11545	11419	1.004
0.30	44	178	11347	11391	22	11547	11369	1.004
0.40	44	224	11300	11343	22	11546	11322	1.004
0.50	51	269	11255	11306	26	11550	11281	1.005
0.60	51	315	11208	11259	25	11549	11234	1.005
0.70	42	357	11166	11208	21	11544	11187	1.004
0.80	41	396	11128	11169	21	11544	11148	1.004
0.90	41	432	11091	11132	20	11543	11111	1.004
1.00	40	470	11054	11094	20	11544	11074	1.004
1.10	39	507	11016	11056	20	11543	11036	1.004
1.20	39	547	10976	11015	19	11543	10996	1.004
1.30	30	587	10937	10967	15	11539	10952	1.003
1.40	29	623	10900	10930	15	11538	10915	1.003
1.50	29	657	10866	10895	14	11538	10881	1.003
1.60	28	691	10832	10861	14	11537	10846	1.003
1.70	27	727	10797	10825	14	11538	10811	1.003
1.80	19	760	10763	10782	10	11533	10773	1.002
1.90	18	792	10733	10751	9	11534	10742	1.002
2.00	18	822	10701	10719	9	11532	10710	1.002
2.10	17	853	10671	10688	9	11532	10679	1.002
2.20	9	883	10640	10649	4	11528	10645	1.001
2.30	16	911	10612	10628	8	11531	10620	1.002
2.40	7	936	10588	10595	4	11527	10591	1.001
2.50	7	967	10556	10563	3	11526	10559	1.001
2.60	6	998	10526	10532	3	11527	10529	1.001
2.70	6	1024	10500	10505	3	11527	10503	1.001
2.80	5	1052	10473	10478	3	11527	10475	1.000
2.90	-3	1078	10446	10443	-2	11522	10444	1.000
3.00	4	1104	10420	10424	2	11526	10422	1.000
3.10	-4	1129	10394	10390	-2	11521	10392	1.000
3.20	-5	1151	10372	10367	-3	11521	10370	1.000
3.30	-6	1176	10347	10342	-3	11521	10345	1.001
3.40	-14	1201	10323	10309	-7	11517	10316	1.001
3.50	-7	1218	10307	10300	-3	11521	10303	1.001
3.60	-7	1240	10283	10276	-4	11519	10279	1.001
3.70	1476	1410	10113	11589	738	12261	10851	1.146
3.80	2203	1545	9979	12182	1102	12625	11080	1.221
3.90	2681	1650	9873	12554	1340	12864	11214	1.272
4.00	3072	1759	9764	12837	1536	13059	11300	1.315
4.10	3401	1884	9639	13040	1701	13224	11340	1.353
4.20	3675	1993	9530	13205	1838	13361	11368	1.386
4.30	3918	2118	9406	13324	1959	13483	11365	1.417
4.40	4145	2245	9278	13423	2072	13596	11351	1.447
4.50	4355	2372	9152	13507	2178	13701	11329	1.476
4.60	4527	2489	9035	13562	2264	13787	11298	1.501
4.70	4691	2605	8919	13610	2346	13869	11264	1.526
4.80	4847	2717	8806	13653	2423	13947	11230	1.550
4.90	4987	2821	8702	13689	2494	14016	11195	1.573
5.00	5111	2921	8602	13714	2556	14079	11158	1.594
5.10	5236	3018	8505	13741	2618	14141	11123	1.616
5.20	5344	3114	8409	13753	2672	14195	11081	1.636

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	5453	3204	8320	13773	2726	14250	11046	1.655
5.40	5546	3306	8217	13763	2773	14296	10990	1.675
5.50	5638	3400	8123	13762	2819	14343	10943	1.694
5.60	5731	3489	8034	13765	2865	14389	10900	1.713
5.70	5800	3579	7944	13744	2900	14423	10844	1.730
5.80	5885	3664	7860	13744	2942	14466	10802	1.749
5.90	5954	3744	7779	13733	2977	14500	10756	1.765
6.00	6023	3818	7705	13728	3011	14535	10717	1.782
6.10	6084	3894	7629	13713	3042	14565	10671	1.797
6.20	6145	3968	7555	13700	3072	14596	10628	1.813
6.30	6198	4038	7485	13683	3099	14622	10584	1.828
6.40	6251	4105	7418	13670	3126	14649	10544	1.843
6.50	6304	4174	7349	13654	3152	14675	10501	1.858
6.60	6357	4242	7281	13639	3179	14702	10460	1.873
6.70	6395	4305	7218	13613	3198	14721	10416	1.886
6.80	6425	4365	7158	13584	3213	14736	10371	1.898
6.90	6470	4428	7095	13566	3235	14758	10330	1.912
7.00	6508	4490	7033	13541	3254	14777	10287	1.925
7.10	6553	4548	6976	13529	3276	14800	10252	1.939
7.20	6590	4603	6921	13511	3295	14819	10216	1.952
7.30	6620	4658	6867	13487	3310	14835	10177	1.964
7.40	6649	4709	6815	13465	3325	14849	10140	1.976
7.50	6679	4759	6765	13444	3340	14863	10104	1.987
7.60	6716	4801	6723	13439	3358	14882	10081	1.999
7.70	6753	4849	6675	13428	3377	14900	10051	2.012
7.80	6782	4897	6627	13409	3391	14915	10018	2.023
7.90	6811	4951	6573	13384	3406	14929	9979	2.036
8.00	6833	4997	6526	13359	3417	14940	9943	2.047
8.10	6877	5042	6483	13360	3439	14963	9921	2.061
8.20	6906	5086	6437	13343	3453	14976	9890	2.073
8.30	6928	5126	6397	13325	3464	14987	9861	2.083
8.40	6964	5167	6356	13320	3482	15005	9838	2.096
8.50	6993	5206	6319	13311	3496	15021	9815	2.107
8.60	7014	5242	6281	13295	3507	15030	9788	2.117
8.70	7042	5280	6244	13286	3521	15045	9765	2.128
8.80	7064	5317	6206	13270	3532	15055	9738	2.138
8.90	7092	5345	6178	13270	3546	15069	9724	2.148
9.00	7113	5377	6147	13260	3557	15080	9703	2.157
9.10	7141	5414	6109	13250	3571	15094	9680	2.169
9.20	7162	5444	6080	13242	3581	15105	9661	2.178
9.30	7183	5475	6048	13231	3592	15115	9640	2.188
9.40	7204	5508	6015	13219	3602	15125	9617	2.198
9.50	7225	5542	5981	13206	3612	15136	9594	2.208
9.60	7253	5575	5949	13201	3626	15150	9575	2.219
9.70	7266	5601	5923	13189	3633	15156	9556	2.227
9.80	7286	5636	5888	13174	3643	15167	9531	2.238
9.90	7307	5667	5856	13163	3653	15177	9509	2.248
10.00	7313	5698	5826	13138	3656	15180	9482	2.255
10.10	7340	5731	5794	13134	3670	15195	9464	2.267
10.20	7361	5763	5760	13120	3680	15204	9440	2.278
10.30	7373	5794	5730	13103	3687	15210	9416	2.287
10.40	7394	5820	5704	13097	3697	15220	9401	2.296
10.50	7407	5849	5675	13081	3703	15227	9378	2.305
10.60	7419	5876	5648	13067	3710	15233	9357	2.314
10.70	7432	5903	5621	13053	3716	15239	9337	2.322
10.80	7438	5926	5597	13035	3719	15242	9316	2.329
10.90	7457	5951	5573	13030	3729	15252	9301	2.338
11.00	7470	5974	5550	13020	3735	15260	9285	2.346
11.10	7475	5995	5528	13004	3738	15261	9266	2.352
11.20	7495	6016	5507	13002	3748	15271	9255	2.361
11.30	7501	6037	5486	12986	3750	15274	9236	2.367
11.40	7506	6053	5471	12977	3753	15276	9224	2.372
11.50	7518	6070	5453	12971	3759	15283	9212	2.379
11.60	7523	6086	5438	12961	3762	15285	9200	2.384

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	7536	6107	5417	12953	3768	15291	9185	2.391
11.80	7534	6126	5397	12931	3767	15290	9164	2.396
11.90	7539	6145	5378	12917	3770	15293	9148	2.402
12.00	7551	6164	5359	12911	3776	15299	9135	2.409
12.10	7556	6186	5337	12893	3778	15302	9115	2.416
12.20	7568	6207	5317	12886	3784	15309	9101	2.423
12.30	7580	6230	5294	12874	3790	15314	9084	2.432
12.40	7585	6251	5273	12858	3793	15316	9066	2.439
12.50	7590	6268	5255	12846	3795	15319	9050	2.444
12.60	7609	6287	5237	12846	3805	15328	9041	2.453
12.70	7621	6306	5218	12839	3811	15334	9028	2.461
12.80	7626	6323	5200	12826	3813	15336	9013	2.466
12.90	7645	6341	5183	12827	3822	15346	9005	2.475
13.00	7657	6355	5169	12825	3828	15352	8997	2.481
13.10	7668	6369	5155	12823	3834	15358	8989	2.488
13.20	7687	6382	5142	12829	3844	15367	8985	2.495
13.30	7699	6395	5129	12827	3849	15373	8978	2.501
13.40	7710	6405	5118	12828	3855	15378	8973	2.506
13.50	7722	6416	5108	12829	3861	15384	8968	2.512
13.60	7733	6423	5101	12834	3867	15390	8967	2.516
13.70	7744	6431	5092	12837	3872	15396	8965	2.521
13.80	7749	6438	5085	12834	3875	15398	8960	2.524
13.90	7760	6447	5076	12836	3880	15403	8956	2.529
14.00	7778	6456	5068	12846	3889	15413	8957	2.535
14.10	7783	6465	5058	12841	3891	15415	8950	2.539
14.20	7787	6473	5050	12837	3894	15417	8944	2.542
14.30	7798	6499	5025	12823	3899	15423	8924	2.552
14.40	7802	6514	5010	12813	3901	15426	8912	2.557
14.50	7813	6516	5007	12820	3907	15430	8914	2.561
14.60	7824	6516	5007	12831	3912	15436	8919	2.563
14.70	7829	6518	5006	12834	3914	15438	8920	2.564
14.80	7833	6525	4999	12831	3916	15440	8915	2.567
14.90	7843	6529	4995	12839	3922	15446	8917	2.570
15.00	7847	6536	4987	12834	3924	15447	8911	2.574
15.10	7858	6543	4980	12838	3929	15453	8909	2.578
15.20	7855	6549	4974	12829	3928	15451	8902	2.579
15.30	7873	6556	4967	12840	3936	15460	8904	2.585
15.40	7877	6563	4960	12837	3938	15462	8898	2.588
15.50	7880	6569	4954	12835	3940	15464	8894	2.591
15.60	7884	6560	4964	12848	3942	15466	8906	2.588
15.70	7895	6567	4957	12851	3947	15471	8904	2.593
15.80	7892	6573	4951	12842	3946	15469	8897	2.594
15.90	7895	6574	4950	12845	3948	15471	8897	2.595
16.00	7899	6586	4938	12837	3950	15473	8887	2.600
16.10	7909	6597	4926	12836	3955	15478	8881	2.606
16.20	7906	6606	4918	12824	3953	15477	8871	2.608
16.30	7917	6610	4913	12830	3958	15482	8872	2.611
16.40	7920	6616	4907	12828	3960	15484	8868	2.614
16.50	7924	6622	4902	12825	3962	15485	8863	2.617
16.60	7920	6627	4897	12817	3960	15484	8857	2.617
16.70	7924	6631	4892	12816	3962	15485	8854	2.620
16.80	7927	6638	4885	12812	3964	15487	8849	2.623
16.90	7931	6641	4883	12813	3965	15489	8848	2.624
17.00	7934	6645	4878	12812	3967	15490	8845	2.626
17.10	7944	6652	4871	12815	3972	15495	8843	2.631
17.20	7947	6661	4863	12810	3974	15497	8836	2.634
17.30	7950	6668	4856	12806	3975	15499	8831	2.637
17.40	7960	6670	4854	12814	3980	15504	8834	2.640
17.50	7977	6676	4848	12824	3988	15512	8836	2.645
17.60	7973	6677	4848	12821	3987	15511	8834	2.645
17.70	7976	6679	4844	12820	3988	15512	8832	2.647
17.80	7979	6680	4843	12822	3990	15513	8833	2.648
17.90	7989	6678	4845	12834	3995	15518	8840	2.649
18.00	7999	6677	4847	12845	3999	15523	8846	2.650

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	8002	6670	4854	12855	4001	15524	8854	2.649
18.20	8005	6665	4858	12863	4002	15526	8861	2.648
18.30	8001	6659	4864	12865	4001	15524	8865	2.645
18.40	8010	6657	4866	12877	4005	15529	8872	2.646
18.50	8020	6651	4872	12892	4010	15533	8882	2.646
18.60	8036	6650	4873	12909	4018	15541	8891	2.649
18.70	8039	6648	4876	12914	4019	15543	8895	2.649
18.80	8041	6644	4879	12921	4021	15544	8900	2.648
18.90	8050	6638	4886	12937	4025	15550	8912	2.648
19.00	8060	6637	4886	12946	4030	15553	8916	2.649
19.10	8049	6635	4889	12938	4025	15548	8913	2.647
19.20	8058	6631	4892	12950	4029	15553	8921	2.647
19.30	8061	6624	4899	12960	4030	15554	8930	2.645
19.40	8070	6621	4902	12971	4035	15557	8937	2.646
19.50	8066	6616	4907	12973	4033	15556	8940	2.644
19.60	8068	6616	4909	12977	4034	15559	8943	2.644
19.70	8077	6610	4913	12990	4039	15562	8952	2.644
19.80	8080	6610	4913	12993	4040	15563	8953	2.644
19.90	8088	6606	4918	13006	4044	15568	8962	2.645
20.00	8084	6594	4930	13014	4042	15566	8972	2.640

Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering

Project Number: M00991-001

Sample: SP-16-13

Comments: Samples were compacted to 90% of ASTM D698 at OMC.

Test Number		S1	S2	S3	
Initial	Height, H (in)	5.87	5.82	5.66	
	Diameter, D (in)	2.42	2.42	2.42	
	Moisture Content, w (%)	16.9	16.9	16.9	
	Dry Unit Weight, γd (pcf)	99.9	99.8	99.8	
	Saturation (%)	66.4	66.3	66.2	
	Void Ratio, e	0.69	0.69	0.69	
Before Shear	Moisture Content, w (%)	20.6	19.3	19.0	
	Dry Unit Weight, γd (pcf)	107.1	109.5	110.0	
	Saturation (%)	100.0	100.0	100.0	
	Void Ratio, e	0.56	0.52	0.51	
	B	0.96	0.95	0.96	
	Back pressure (psf)	7343.3	8207.6	4751.5	
	Strain rate (%/min)	0.033	0.033	0.033	
	Time to Failure (min)	606.1	606.1	606.1	
Total Stress	Strain at Failure, εf (%)	20.00	20.00	20.00	
	σ3 (psf)	2880	5759	11524	
	σ1-σ3 (psf)	2443	4466	8909	
	σ1 (psf)	5323	10225	20432	
	q = (σ1-σ3)/2 (psf)	1222	2233	4454	
	p = (σ1+σ3)/2 (psf)	4101	7992	15978	
Effective Stress	u (psf)	1783	3649	7116	
	σ'3 (psf)	1097	2109	4407	
	σ'1-σ'3 (psf)	2443	4466	8909	
	σ'1 (psf)	3541	6576	13316	
	q = (σ'1-σ'3)/2 (psf)	1222	2233	4454	
	p' = (σ'1+σ'3)/2 (psf)	2319	4343	8862	
	σ'1/σ'3	3.23	3.12	3.02	
	A = u/(σ1−σ3)	0.730	0.817	0.799	

Estimated Specific Gravity	2.70
Plastic Limit (%)	16
Liquid Limit (%)	31
Plasticity Index (%)	15

Summary of Strength Paramaters	**Total Stress**	**Effective Stress**
c (psf)	**84**	**94**
ϕ (deg)	**15.9**	**29.6**
tan ϕ	**0.284**	**0.568**

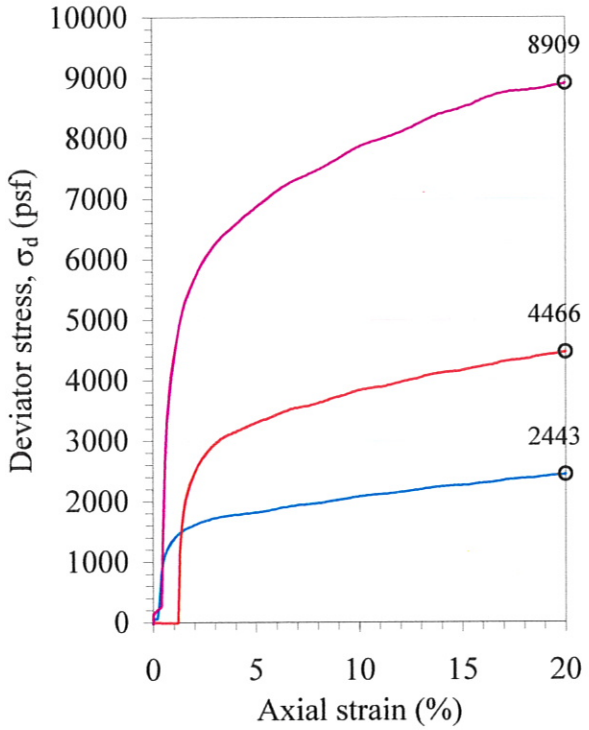
[a] Saturation set to 100% for phase calculations

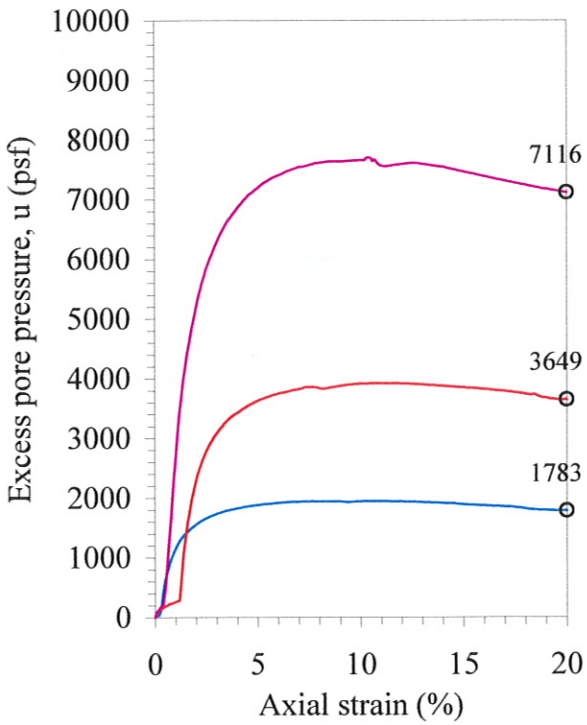
Tested by:_____

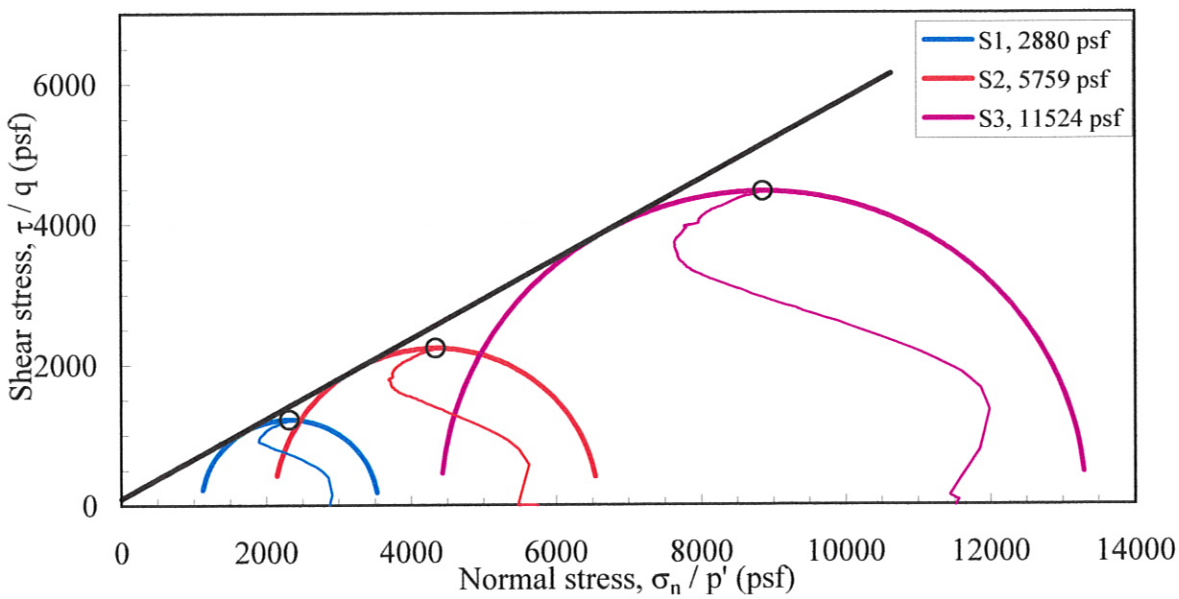
Isotropically Consolidated Undrained with Pore Pressure (CIU/PP)

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: SP-16-13
Comments:

Summary of Strength Paramaters	Total Stress	Effective Stress
c (psf)	84	94
ϕ (deg)	15.9	29.6
tan ϕ	0.284	0.568







Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: SP-16-13
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S1

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_SP-16-13.xls]s1

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-4	0	2879	2874	-2	2877	2877	1.001
0.02	55	21	2857	2912	27	2906	2885	1.019
0.04	55	23	2855	2910	27	2906	2883	1.019
0.06	59	25	2854	2913	29	2908	2883	1.021
0.08	63	27	2853	2916	32	2911	2884	1.022
0.10	63	28	2850	2913	31	2910	2882	1.022
0.20	71	35	2843	2914	35	2914	2879	1.025
0.30	302	116	2761	3064	151	3028	2913	1.109
0.40	811	424	2455	3265	405	3284	2860	1.330
0.50	1003	618	2260	3263	501	3380	2762	1.444
0.60	1123	768	2110	3233	562	3440	2672	1.532
0.70	1206	891	1987	3193	603	3481	2590	1.607
0.80	1279	994	1884	3164	640	3518	2524	1.679
0.90	1336	1079	1800	3136	668	3547	2468	1.742
1.00	1385	1154	1725	3110	692	3571	2417	1.803
1.10	1425	1217	1661	3085	712	3590	2373	1.858
1.20	1456	1273	1605	3062	728	3607	2334	1.907
1.30	1484	1321	1557	3041	742	3620	2299	1.953
1.40	1507	1366	1513	3020	753	3632	2266	1.996
1.50	1534	1405	1473	3007	767	3645	2240	2.041
1.60	1553	1441	1438	2991	776	3655	2214	2.080
1.70	1571	1473	1405	2977	786	3664	2191	2.118
1.80	1586	1505	1374	2960	793	3672	2167	2.155
1.90	1600	1533	1345	2946	800	3679	2146	2.190
2.00	1615	1559	1320	2935	808	3686	2127	2.224
2.10	1629	1581	1297	2927	815	3693	2112	2.256
2.20	1644	1605	1274	2918	822	3701	2096	2.290
2.30	1658	1624	1255	2914	829	3709	2084	2.321
2.40	1669	1643	1235	2904	834	3713	2070	2.351
2.50	1679	1661	1218	2897	839	3718	2057	2.379
2.60	1693	1677	1201	2895	847	3725	2048	2.409
2.70	1699	1694	1185	2884	850	3728	2035	2.434
2.80	1713	1709	1171	2884	857	3737	2028	2.463
2.90	1724	1722	1157	2881	862	3740	2019	2.490
3.00	1730	1735	1144	2874	865	3743	2009	2.512
3.10	1736	1746	1132	2868	868	3746	2000	2.533
3.20	1742	1758	1121	2862	871	3749	1991	2.554
3.30	1748	1767	1112	2860	874	3753	1986	2.571
3.40	1754	1778	1101	2854	877	3755	1977	2.593
3.50	1759	1787	1091	2851	880	3758	1971	2.612
3.60	1765	1797	1082	2847	883	3761	1965	2.632
3.70	1771	1805	1074	2845	886	3764	1959	2.650
3.80	1773	1813	1067	2840	887	3766	1953	2.662
3.90	1779	1820	1060	2839	889	3769	1949	2.679
4.00	1781	1827	1053	2833	890	3770	1943	2.692
4.10	1783	1834	1044	2827	891	3770	1936	2.707
4.20	1788	1839	1040	2828	894	3773	1934	2.720
4.30	1790	1846	1033	2823	895	3774	1928	2.733
4.40	1796	1852	1027	2823	898	3776	1925	2.749
4.50	1802	1858	1021	2823	901	3779	1922	2.765
4.60	1803	1863	1015	2819	902	3780	1917	2.776
4.70	1805	1868	1012	2817	903	3782	1914	2.784
4.80	1811	1874	1006	2817	905	3785	1911	2.800
4.90	1817	1879	1000	2817	908	3787	1908	2.817
5.00	1818	1882	996	2815	909	3788	1906	2.825
5.10	1824	1887	992	2816	912	3791	1904	2.839
5.20	1830	1893	986	2816	915	3793	1901	2.856

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	1835	1897	982	2818	918	3797	1900	2.868
5.40	1841	1897	981	2822	921	3799	1902	2.876
5.50	1847	1900	979	2826	923	3802	1902	2.887
5.60	1852	1903	975	2828	926	3805	1902	2.899
5.70	1862	1908	971	2833	931	3810	1902	2.918
5.80	1867	1911	968	2836	934	3813	1902	2.929
5.90	1873	1914	965	2838	937	3815	1901	2.941
6.00	1879	1917	962	2841	939	3819	1902	2.952
6.10	1888	1918	960	2848	944	3823	1904	2.967
6.20	1898	1922	958	2855	949	3828	1907	2.981
6.30	1903	1923	955	2859	952	3830	1907	2.992
6.40	1905	1927	952	2857	952	3831	1904	3.001
6.50	1910	1929	951	2861	955	3835	1906	3.009
6.60	1919	1931	947	2867	960	3838	1907	3.026
6.70	1925	1932	946	2871	962	3841	1909	3.035
6.80	1926	1934	945	2871	963	3842	1908	3.039
6.90	1932	1935	944	2876	966	3844	1910	3.047
7.00	1937	1936	943	2880	969	3847	1911	3.055
7.10	1942	1938	941	2884	971	3851	1913	3.063
7.20	1944	1938	940	2884	972	3851	1912	3.068
7.30	1945	1938	940	2886	973	3851	1913	3.069
7.40	1951	1940	939	2890	975	3854	1914	3.077
7.50	1952	1941	938	2890	976	3855	1914	3.081
7.60	1957	1943	937	2894	979	3858	1915	3.090
7.70	1959	1942	937	2896	979	3858	1916	3.091
7.80	1960	1941	938	2898	980	3859	1918	3.090
7.90	1965	1940	939	2905	983	3861	1922	3.093
8.00	1971	1940	939	2910	985	3864	1924	3.099
8.10	1972	1938	940	2912	986	3865	1926	3.097
8.20	1977	1938	940	2918	989	3867	1929	3.103
8.30	1982	1937	941	2924	991	3870	1933	3.106
8.40	1992	1938	940	2932	996	3874	1936	3.118
8.50	1997	1937	941	2938	998	3877	1940	3.121
8.60	2002	1938	940	2942	1001	3879	1941	3.129
8.70	2011	1937	941	2952	1005	3884	1947	3.136
8.80	2012	1937	941	2954	1006	3885	1947	3.137
8.90	2017	1938	940	2957	1009	3887	1949	3.146
9.00	2022	1938	940	2963	1011	3890	1951	3.151
9.10	2027	1940	940	2968	1014	3893	1954	3.156
9.20	2032	1935	944	2976	1016	3895	1960	3.154
9.30	2038	1932	945	2982	1019	3896	1964	3.156
9.40	2046	1930	947	2994	1023	3901	1970	3.160
9.50	2051	1934	945	2996	1026	3904	1971	3.171
9.60	2056	1936	943	2999	1028	3907	1971	3.182
9.70	2065	1937	941	3007	1033	3911	1974	3.194
9.80	2070	1938	940	3010	1035	3914	1975	3.202
9.90	2071	1940	939	3010	1036	3914	1975	3.206
10.00	2080	1941	938	3018	1040	3918	1978	3.218
10.10	2085	1942	937	3022	1042	3921	1979	3.226
10.20	2090	1943	937	3026	1045	3925	1982	3.231
10.30	2091	1943	936	3026	1045	3924	1981	3.235
10.40	2099	1944	934	3034	1050	3928	1984	3.247
10.50	2100	1944	934	3035	1050	3929	1985	3.248
10.60	2105	1944	936	3041	1053	3932	1988	3.250
10.70	2106	1944	936	3042	1053	3933	1989	3.251
10.80	2111	1944	932	3043	1056	3932	1988	3.265
10.90	2112	1943	936	3048	1056	3935	1992	3.258
11.00	2113	1943	936	3049	1057	3935	1992	3.259
11.10	2118	1943	936	3054	1059	3938	1995	3.264
11.20	2119	1942	937	3056	1060	3938	1996	3.262
11.30	2120	1943	937	3057	1060	3940	1997	3.263
11.40	2125	1942	937	3061	1062	3941	1999	3.268
11.50	2129	1941	938	3067	1065	3943	2003	3.270
11.60	2130	1941	938	3068	1065	3944	2003	3.271

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	2135	1940	940	3075	1068	3947	2008	3.271
11.80	2140	1938	940	3080	1070	3948	2010	3.276
11.90	2144	1938	940	3085	1072	3951	2012	3.281
12.00	2149	1937	941	3090	1074	3953	2016	3.283
12.10	2153	1937	943	3096	1077	3956	2019	3.285
12.20	2158	1936	943	3101	1079	3958	2022	3.290
12.30	2163	1935	944	3106	1081	3960	2025	3.292
12.40	2167	1934	945	3112	1084	3962	2029	3.294
12.50	2172	1932	946	3118	1086	3964	2032	3.296
12.60	2176	1932	946	3122	1088	3967	2034	3.300
12.70	2181	1932	947	3128	1090	3970	2038	3.302
12.80	2182	1929	950	3131	1091	3969	2040	3.297
12.90	2186	1929	950	3136	1093	3972	2043	3.302
13.00	2194	1928	951	3145	1097	3976	2048	3.308
13.10	2199	1925	953	3152	1099	3978	2053	3.307
13.20	2207	1925	954	3161	1103	3983	2058	3.313
13.30	2211	1923	955	3167	1106	3984	2061	3.314
13.40	2216	1922	957	3172	1108	3986	2064	3.316
13.50	2220	1920	959	3179	1110	3989	2069	3.315
13.60	2224	1918	960	3185	1112	3991	2072	3.317
13.70	2229	1917	961	3190	1114	3993	2076	3.318
13.80	2233	1915	964	3197	1117	3995	2080	3.317
13.90	2237	1914	965	3202	1119	3997	2084	3.319
14.00	2242	1911	967	3209	1121	3999	2088	3.318
14.10	2242	1910	968	3211	1121	4000	2090	3.316
14.20	2247	1909	969	3216	1123	4002	2093	3.317
14.30	2247	1907	973	3220	1124	4003	2097	3.310
14.40	2251	1911	968	3220	1126	4006	2094	3.325
14.50	2252	1909	969	3222	1126	4005	2096	3.323
14.60	2256	1907	973	3229	1128	4008	2101	3.319
14.70	2257	1896	982	3239	1129	4007	2111	3.297
14.80	2258	1894	985	3242	1129	4007	2114	3.293
14.90	2254	1892	987	3242	1127	4006	2114	3.284
15.00	2262	1889	989	3252	1131	4010	2121	3.286
15.10	2263	1886	993	3256	1131	4010	2124	3.279
15.20	2263	1884	995	3259	1132	4011	2127	3.274
15.30	2264	1882	996	3260	1132	4011	2128	3.272
15.40	2272	1881	999	3270	1136	4016	2135	3.274
15.50	2276	1879	1000	3276	1138	4016	2138	3.276
15.60	2283	1877	1002	3286	1142	4021	2144	3.278
15.70	2287	1875	1004	3291	1144	4022	2147	3.280
15.80	2291	1874	1005	3296	1146	4024	2150	3.281
15.90	2296	1870	1008	3304	1148	4026	2156	3.277
16.00	2300	1870	1008	3308	1150	4028	2158	3.281
16.10	2300	1868	1012	3312	1150	4030	2162	3.273
16.20	2304	1865	1014	3318	1152	4031	2166	3.272
16.30	2304	1863	1015	3320	1152	4031	2167	3.270
16.40	2308	1862	1016	3325	1154	4033	2171	3.271
16.50	2316	1861	1018	3333	1158	4036	2175	3.276
16.60	2320	1860	1019	3338	1160	4038	2179	3.277
16.70	2324	1859	1021	3345	1162	4042	2183	3.276
16.80	2328	1856	1022	3350	1164	4042	2186	3.277
16.90	2335	1854	1025	3359	1167	4046	2192	3.279
17.00	2342	1852	1028	3370	1171	4051	2199	3.278
17.10	2350	1851	1028	3378	1175	4053	2203	3.285
17.20	2353	1854	1026	3379	1177	4056	2202	3.294
17.30	2357	1851	1028	3385	1179	4057	2207	3.293
17.40	2357	1846	1034	3391	1179	4058	2213	3.280
17.50	2365	1841	1039	3403	1182	4062	2221	3.277
17.60	2365	1836	1042	3407	1183	4061	2225	3.269
17.70	2369	1834	1044	3413	1184	4063	2229	3.268
17.80	2372	1831	1049	3422	1186	4066	2235	3.261
17.90	2373	1826	1053	3425	1186	4065	2239	3.254
18.00	2373	1819	1060	3433	1187	4065	2246	3.239

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	2380	1814	1064	3444	1190	4069	2254	3.236
18.20	2377	1808	1070	3447	1188	4067	2259	3.221
18.30	2377	1804	1075	3452	1189	4067	2263	3.211
18.40	2381	1802	1076	3457	1190	4069	2266	3.212
18.50	2384	1800	1078	3463	1192	4071	2271	3.211
18.60	2388	1799	1080	3467	1194	4072	2274	3.212
18.70	2395	1797	1082	3477	1197	4076	2279	3.214
18.80	2398	1794	1084	3483	1199	4078	2284	3.212
18.90	2405	1793	1087	3492	1203	4082	2289	3.214
19.00	2406	1793	1085	3491	1203	4081	2288	3.216
19.10	2412	1792	1087	3499	1206	4085	2293	3.220
19.20	2416	1791	1088	3504	1208	4087	2296	3.221
19.30	2419	1788	1090	3510	1210	4088	2300	3.219
19.40	2423	1787	1091	3514	1212	4090	2303	3.220
19.50	2426	1786	1093	3519	1213	4092	2306	3.221
19.60	2426	1784	1095	3521	1213	4092	2308	3.216
19.70	2433	1783	1096	3529	1217	4095	2313	3.220
19.80	2433	1783	1096	3529	1217	4095	2313	3.220
19.90	2437	1786	1093	3529	1218	4097	2311	3.230
20.00	2443	1783	1097	3541	1222	4101	2319	3.227

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: SP-16-13
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S2

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_SP-16-13.xls]s2

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-5	0	5758	5753	-3	5755	5755	1.001
0.02	4	23	5736	5740	2	5762	5738	1.001
0.04	4	39	5720	5724	2	5760	5722	1.001
0.06	-1	52	5707	5706	0	5758	5707	1.000
0.08	3	63	5695	5699	2	5760	5697	1.001
0.10	3	74	5685	5688	2	5760	5687	1.001
0.20	-2	115	5644	5642	-1	5758	5643	1.000
0.30	-2	146	5613	5611	-1	5759	5612	1.000
0.40	-3	169	5591	5589	-1	5759	5590	1.000
0.50	-3	185	5574	5571	-1	5757	5572	1.001
0.60	-3	203	5556	5553	-2	5757	5554	1.001
0.70	-4	218	5541	5537	-2	5757	5539	1.001
0.80	-4	233	5526	5521	-2	5757	5524	1.001
0.90	-5	248	5512	5507	-2	5757	5509	1.001
1.00	-5	261	5499	5494	-3	5757	5496	1.001
1.10	-6	275	5485	5479	-3	5757	5482	1.001
1.20	-2	286	5474	5472	-1	5759	5473	1.000
1.30	1148	702	5057	6205	574	6333	5631	1.227
1.40	1593	1068	4691	6284	797	6555	5487	1.340
1.50	1847	1350	4408	6255	923	6682	5332	1.419
1.60	2030	1593	4166	6196	1015	6774	5181	1.487
1.70	2171	1801	3957	6128	1085	6844	5043	1.548
1.80	2293	1992	3767	6060	1147	6905	4913	1.609
1.90	2390	2154	3605	5995	1195	6954	4800	1.663
2.00	2473	2293	3466	5938	1237	6995	4702	1.714
2.10	2547	2414	3345	5892	1274	7032	4619	1.762
2.20	2613	2524	3236	5849	1307	7066	4543	1.808
2.30	2666	2614	3145	5811	1333	7092	4478	1.848
2.40	2718	2697	3081	5799	1359	7138	4440	1.882
2.50	2767	2776	2983	5750	1383	7142	4366	1.928
2.60	2811	2850	2909	5720	1405	7164	4315	1.966
2.70	2854	2914	2845	5699	1427	7186	4272	2.003
2.80	2890	2974	2785	5675	1445	7203	4230	2.038
2.90	2925	3030	2729	5653	1462	7221	4191	2.072
3.00	2955	3081	2679	5634	1478	7237	4156	2.103
3.10	2982	3125	2634	5616	1491	7250	4125	2.132
3.20	3008	3167	2592	5600	1504	7263	4096	2.161
3.30	3038	3206	2553	5592	1519	7278	4072	2.190
3.40	3056	3249	2510	5566	1528	7287	4038	2.218
3.50	3078	3285	2474	5551	1539	7298	4012	2.244
3.60	3100	3318	2442	5542	1550	7310	3992	2.269
3.70	3113	3351	2408	5521	1557	7315	3964	2.293
3.80	3122	3380	2380	5502	1561	7321	3941	2.312
3.90	3144	3407	2352	5495	1572	7331	3924	2.337
4.00	3153	3428	2331	5483	1576	7335	3907	2.353
4.10	3170	3452	2307	5477	1585	7344	3892	2.374
4.20	3183	3476	2283	5466	1592	7350	3874	2.395
4.30	3196	3500	2259	5456	1598	7357	3857	2.415
4.40	3214	3518	2240	5454	1607	7365	3847	2.434
4.50	3227	3541	2218	5445	1613	7372	3831	2.455
4.60	3244	3560	2199	5443	1622	7382	3821	2.475
4.70	3261	3579	2181	5442	1630	7390	3811	2.495
4.80	3278	3597	2163	5441	1639	7399	3802	2.515
4.90	3287	3615	2143	5430	1643	7402	3787	2.533
5.00	3304	3631	2128	5432	1652	7411	3780	2.552
5.10	3316	3646	2113	5429	1658	7417	3771	2.570
5.20	3329	3656	2102	5431	1665	7423	3767	2.584

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	3346	3668	2091	5437	1673	7432	3764	2.601
5.40	3355	3685	2074	5429	1677	7436	3751	2.617
5.50	3363	3696	2062	5426	1682	7440	3744	2.631
5.60	3376	3709	2050	5425	1688	7447	3737	2.647
5.70	3392	3721	2038	5430	1696	7455	3734	2.665
5.80	3405	3731	2027	5432	1703	7461	3730	2.680
5.90	3422	3741	2018	5440	1711	7470	3729	2.696
6.00	3434	3750	2009	5443	1717	7476	3726	2.710
6.10	3451	3761	1998	5449	1725	7484	3723	2.727
6.20	3463	3764	1995	5458	1732	7490	3726	2.736
6.30	3480	3771	1988	5467	1740	7499	3727	2.751
6.40	3492	3779	1979	5471	1746	7505	3725	2.764
6.50	3500	3789	1970	5470	1750	7509	3720	2.777
6.60	3512	3798	1962	5474	1756	7516	3718	2.790
6.70	3529	3806	1952	5481	1764	7523	3717	2.807
6.80	3537	3812	1948	5484	1768	7528	3716	2.816
6.90	3545	3819	1939	5484	1773	7531	3712	2.828
7.00	3549	3825	1934	5482	1774	7533	3708	2.835
7.10	3557	3831	1928	5485	1779	7537	3706	2.845
7.20	3565	3843	1916	5481	1783	7541	3699	2.861
7.30	3573	3854	1904	5477	1786	7545	3691	2.876
7.40	3573	3856	1903	5476	1786	7545	3690	2.877
7.50	3581	3858	1901	5481	1790	7549	3691	2.884
7.60	3584	3857	1902	5486	1792	7551	3694	2.885
7.70	3600	3854	1904	5505	1800	7559	3705	2.891
7.80	3604	3854	1904	5509	1802	7561	3706	2.893
7.90	3616	3851	1908	5524	1808	7567	3716	2.895
8.00	3624	3842	1917	5541	1812	7571	3729	2.890
8.10	3640	3834	1924	5564	1820	7579	3744	2.892
8.20	3644	3832	1927	5570	1822	7580	3748	2.891
8.30	3655	3837	1922	5577	1828	7586	3750	2.902
8.40	3667	3842	1917	5584	1834	7592	3751	2.913
8.50	3679	3850	1910	5589	1839	7599	3750	2.926
8.60	3694	3857	1902	5596	1847	7606	3749	2.942
8.70	3706	3863	1896	5602	1853	7612	3749	2.955
8.80	3713	3868	1890	5604	1857	7615	3747	2.965
8.90	3725	3874	1884	5609	1863	7621	3747	2.977
9.00	3729	3879	1880	5608	1864	7623	3744	2.984
9.10	3740	3885	1874	5614	1870	7629	3744	2.996
9.20	3748	3888	1870	5618	1874	7632	3744	3.004
9.30	3759	3893	1866	5625	1880	7638	3745	3.015
9.40	3774	3898	1862	5636	1887	7647	3749	3.027
9.50	3786	3901	1859	5644	1893	7653	3751	3.037
9.60	3797	3905	1854	5651	1899	7657	3752	3.048
9.70	3808	3908	1850	5659	1904	7663	3755	3.058
9.80	3816	3911	1848	5664	1908	7666	3756	3.065
9.90	3831	3913	1847	5678	1915	7675	3762	3.074
10.00	3838	3914	1845	5683	1919	7678	3764	3.081
10.10	3845	3916	1843	5689	1923	7682	3766	3.086
10.20	3852	3918	1841	5693	1926	7685	3767	3.092
10.30	3856	3918	1841	5697	1928	7686	3769	3.094
10.40	3863	3919	1841	5704	1931	7691	3772	3.098
10.50	3870	3921	1839	5708	1935	7695	3774	3.105
10.60	3877	3921	1838	5714	1938	7697	3776	3.110
10.70	3880	3922	1836	5716	1940	7699	3776	3.113
10.80	3883	3922	1836	5719	1942	7700	3778	3.114
10.90	3890	3922	1836	5726	1945	7704	3781	3.118
11.00	3893	3924	1835	5728	1947	7705	3782	3.121
11.10	3892	3922	1838	5730	1946	7706	3784	3.118
11.20	3899	3922	1838	5737	1950	7709	3787	3.122
11.30	3906	3922	1836	5743	1953	7712	3789	3.127
11.40	3921	3922	1836	5757	1960	7719	3797	3.135
11.50	3924	3921	1838	5761	1962	7721	3799	3.135
11.60	3934	3921	1838	5772	1967	7726	3805	3.141

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	3941	3920	1840	5781	1971	7730	3811	3.142
11.80	3952	3920	1840	5792	1976	7736	3816	3.148
11.90	3959	3919	1840	5799	1979	7738	3819	3.152
12.00	3969	3918	1841	5810	1985	7743	3826	3.156
12.10	3980	3916	1842	5822	1990	7749	3832	3.160
12.20	3990	3915	1843	5834	1995	7754	3839	3.165
12.30	3989	3913	1846	5835	1995	7753	3840	3.161
12.40	4000	3913	1846	5846	2000	7759	3846	3.167
12.50	4010	3911	1849	5859	2005	7765	3854	3.169
12.60	4017	3909	1849	5866	2008	7767	3858	3.172
12.70	4023	3907	1853	5876	2012	7772	3864	3.171
12.80	4030	3905	1855	5885	2015	7775	3870	3.172
12.90	4040	3904	1855	5895	2020	7779	3875	3.178
13.00	4047	3900	1859	5905	2023	7782	3882	3.177
13.10	4061	3899	1860	5920	2030	7789	3890	3.183
13.20	4075	3897	1862	5937	2037	7796	3900	3.188
13.30	4081	3894	1865	5946	2041	7799	3905	3.189
13.40	4084	3891	1868	5952	2042	7801	3910	3.186
13.50	4094	3890	1869	5963	2047	7806	3916	3.190
13.60	4104	3886	1873	5976	2052	7811	3925	3.191
13.70	4106	3885	1874	5980	2053	7812	3927	3.191
13.80	4112	3880	1879	5991	2056	7815	3935	3.189
13.90	4119	3879	1880	5998	2059	7818	3939	3.191
14.00	4121	3875	1883	6004	2061	7819	3944	3.188
14.10	4127	3873	1887	6014	2064	7823	3950	3.187
14.20	4133	3871	1888	6021	2067	7825	3955	3.189
14.30	4136	3868	1890	6026	2068	7827	3958	3.188
14.40	4138	3866	1893	6031	2069	7828	3962	3.186
14.50	4136	3863	1896	6033	2068	7827	3964	3.182
14.60	4143	3860	1898	6041	2071	7830	3970	3.182
14.70	4145	3859	1900	6044	2072	7831	3972	3.182
14.80	4147	3856	1904	6051	2074	7833	3978	3.178
14.90	4157	3852	1907	6063	2078	7837	3985	3.180
15.00	4163	3850	1909	6072	2081	7840	3990	3.181
15.10	4169	3849	1910	6079	2084	7843	3995	3.182
15.20	4178	3846	1914	6092	2089	7849	4003	3.183
15.30	4188	3843	1916	6104	2094	7853	4010	3.186
15.40	4194	3840	1918	6112	2097	7856	4015	3.186
15.50	4203	3838	1921	6124	2102	7860	4022	3.188
15.60	4209	3836	1923	6132	2105	7863	4028	3.189
15.70	4215	3833	1927	6141	2107	7867	4034	3.188
15.80	4217	3830	1929	6146	2108	7867	4037	3.186
15.90	4223	3826	1932	6155	2111	7870	4044	3.185
16.00	4232	3823	1936	6168	2116	7875	4052	3.186
16.10	4238	3820	1938	6176	2119	7877	4057	3.186
16.20	4243	3817	1942	6185	2122	7880	4063	3.185
16.30	4249	3813	1945	6194	2124	7883	4070	3.184
16.40	4251	3810	1949	6200	2125	7884	4074	3.181
16.50	4260	3808	1951	6211	2130	7889	4081	3.183
16.60	4269	3804	1955	6224	2135	7893	4089	3.184
16.70	4275	3799	1959	6234	2137	7896	4097	3.182
16.80	4291	3797	1963	6254	2146	7905	4108	3.186
16.90	4300	3795	1964	6264	2150	7909	4114	3.189
17.00	4306	3791	1968	6273	2153	7911	4120	3.188
17.10	4311	3788	1971	6282	2156	7914	4127	3.187
17.20	4316	3782	1977	6293	2158	7917	4135	3.183
17.30	4322	3778	1980	6302	2161	7920	4141	3.182
17.40	4327	3774	1985	6312	2164	7922	4149	3.180
17.50	4329	3768	1991	6320	2164	7923	4155	3.174
17.60	4334	3763	1996	6330	2167	7926	4163	3.172
17.70	4335	3758	2000	6336	2168	7926	4168	3.167
17.80	4337	3754	2006	6343	2169	7928	4175	3.162
17.90	4342	3750	2009	6351	2171	7930	4180	3.162
18.00	4344	3745	2013	6357	2172	7931	4185	3.158

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	4353	3740	2019	6372	2176	7935	4195	3.156
18.20	4358	3735	2024	6381	2179	7938	4203	3.153
18.30	4363	3729	2031	6394	2181	7941	4212	3.148
18.40	4375	3738	2021	6396	2188	7947	4209	3.164
18.50	4380	3735	2024	6404	2190	7949	4214	3.164
18.60	4392	3712	2047	6439	2196	7955	4243	3.145
18.70	4394	3699	2061	6455	2197	7957	4258	3.132
18.80	4402	3689	2069	6472	2201	7960	4271	3.127
18.90	4407	3682	2077	6484	2204	7962	4280	3.122
19.00	4412	3678	2081	6493	2206	7965	4287	3.120
19.10	4420	3672	2087	6507	2210	7969	4297	3.118
19.20	4422	3666	2093	6515	2211	7970	4304	3.113
19.30	4426	3660	2099	6525	2213	7972	4312	3.109
19.40	4431	3656	2102	6534	2216	7974	4318	3.108
19.50	4436	3653	2106	6542	2218	7977	4324	3.107
19.60	4441	3648	2110	6551	2220	7979	4331	3.104
19.70	4445	3647	2112	6557	2223	7981	4334	3.105
19.80	4454	3642	2116	6570	2227	7986	4343	3.104
19.90	4462	3654	2106	6568	2231	7991	4337	3.119
20.00	4466	3649	2109	6576	2233	7992	4343	3.118

Project Name: Taylor Geo-Engineering
Project Number: M00991-001
Sample: SP-16-13
Comments: Samples were compacted to 90% of ASTM D698 at
Test Number: S3

Z:\PROJECTS\M00991_Taylor_Geo-Engineering\001\[GTXCU3v1_SP-16-13.xls]s3

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
0.00	-14	0	11521	11507	-7	11514	11514	1.001
0.02	148	30	11492	11640	74	11596	11566	1.013
0.04	148	46	11477	11624	74	11596	11550	1.013
0.06	156	61	11461	11618	78	11601	11540	1.014
0.08	165	74	11450	11615	83	11606	11532	1.014
0.10	174	87	11436	11610	87	11610	11523	1.015
0.20	205	138	11385	11590	102	11626	11488	1.018
0.30	236	182	11341	11577	118	11641	11459	1.021
0.40	271	219	11303	11574	135	11658	11439	1.024
0.50	1560	450	11073	12632	780	12302	11852	1.141
0.60	2694	881	10642	13335	1347	12869	11988	1.253
0.70	3312	1313	10208	13520	1656	13177	11864	1.324
0.80	3750	1787	9735	13485	1875	13397	11610	1.385
0.90	4075	2255	9269	13344	2038	13562	11307	1.440
1.00	4347	2673	8850	13197	2174	13696	11023	1.491
1.10	4569	3058	8464	13034	2285	13807	10749	1.540
1.20	4764	3407	8115	12880	2382	13905	10498	1.587
1.30	4928	3710	7812	12740	2464	13986	10276	1.631
1.40	5069	3986	7537	12606	2534	14057	10071	1.673
1.50	5196	4226	7297	12493	2598	14120	9895	1.712
1.60	5310	4453	7068	12378	2655	14176	9723	1.751
1.70	5410	4655	6867	12277	2705	14228	9572	1.788
1.80	5502	4848	6675	12176	2751	14273	9426	1.824
1.90	5597	5021	6503	12100	2799	14322	9301	1.861
2.00	5675	5181	6341	12016	2837	14360	9178	1.895
2.10	5748	5331	6191	11939	2874	14396	9065	1.928
2.20	5821	5472	6051	11871	2910	14433	8961	1.962
2.30	5885	5599	5923	11807	2942	14465	8865	1.994
2.40	5940	5718	5805	11744	2970	14492	8774	2.023
2.50	6003	5831	5691	11694	3002	14524	8693	2.055
2.60	6058	5923	5600	11658	3029	14551	8629	2.082
2.70	6108	6014	5508	11617	3054	14577	8563	2.109
2.80	6154	6103	5419	11573	3077	14599	8496	2.136
2.90	6200	6187	5335	11535	3100	14622	8435	2.162
3.00	6245	6272	5251	11496	3123	14645	8373	2.189
3.10	6286	6348	5175	11461	3143	14666	8318	2.215
3.20	6323	6418	5104	11427	3162	14684	8266	2.239
3.30	6360	6484	5039	11398	3180	14702	8219	2.262
3.40	6396	6546	4977	11373	3198	14720	8175	2.285
3.50	6428	6609	4915	11343	3214	14738	8129	2.308
3.60	6460	6656	4867	11327	3230	14752	8097	2.327
3.70	6488	6706	4816	11304	3244	14766	8060	2.347
3.80	6519	6754	4768	11287	3260	14782	8028	2.367
3.90	6551	6802	4720	11271	3276	14798	7996	2.388
4.00	6578	6848	4675	11253	3289	14812	7964	2.407
4.10	6606	6895	4628	11233	3303	14825	7930	2.427
4.20	6633	6933	4589	11222	3316	14839	7905	2.445
4.30	6664	6974	4548	11212	3332	14854	7880	2.465
4.40	6695	7011	4513	11208	3348	14871	7861	2.484
4.50	6727	7047	4475	11202	3363	14886	7839	2.503
4.60	6749	7085	4438	11187	3375	14897	7813	2.521
4.70	6776	7107	4416	11192	3388	14910	7804	2.535
4.80	6807	7135	4388	11195	3404	14926	7791	2.551
4.90	6829	7165	4357	11187	3415	14937	7772	2.567
5.00	6860	7190	4333	11193	3430	14953	7763	2.583
5.10	6887	7220	4302	11189	3443	14966	7745	2.601
5.20	6913	7246	4276	11190	3457	14979	7733	2.617

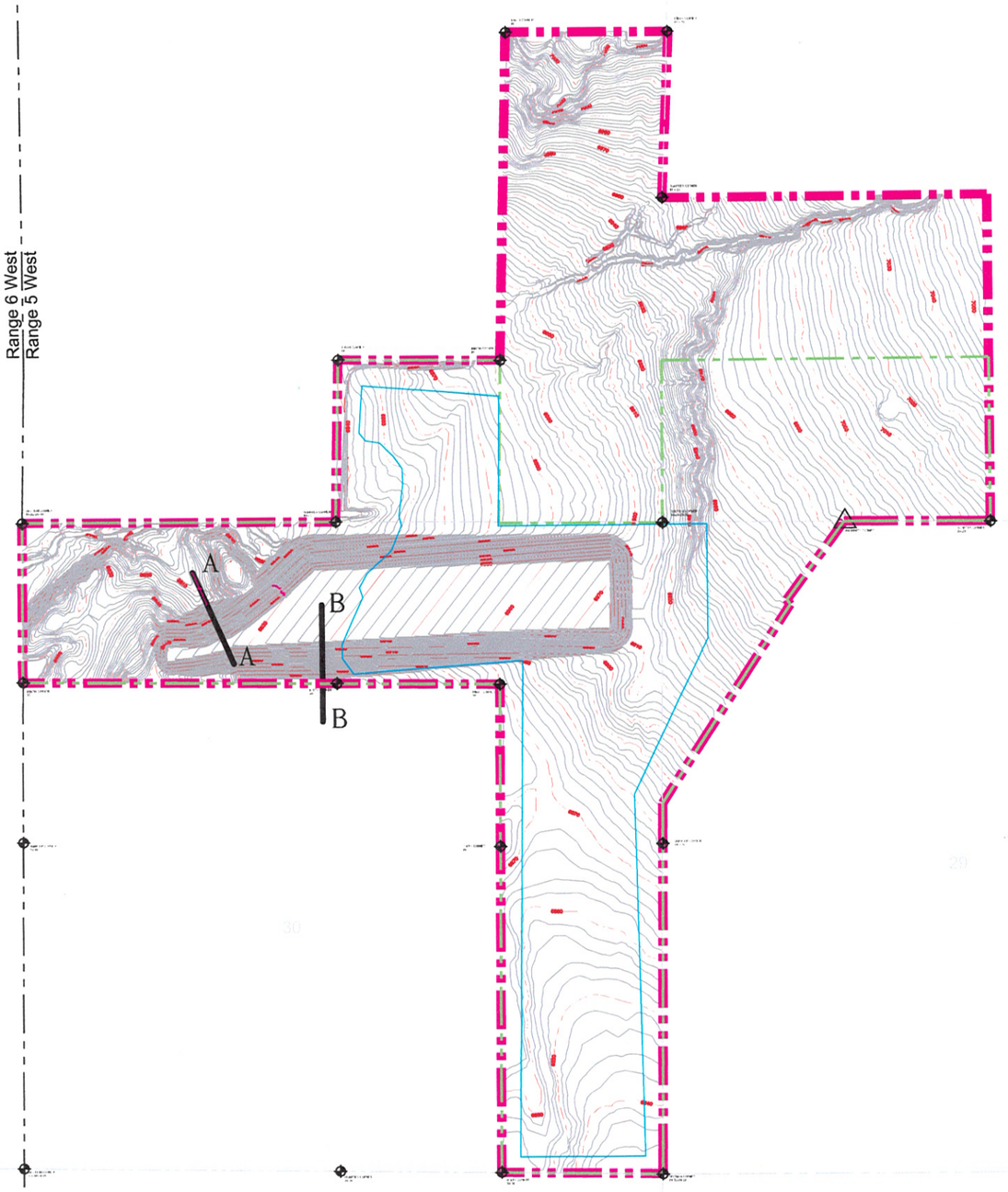
Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
5.30	6940	7272	4251	11190	3470	14992	7720	2.633
5.40	6966	7297	4226	11192	3483	15005	7709	2.648
5.50	6992	7319	4204	11196	3496	15018	7700	2.663
5.60	7018	7340	4184	11202	3509	15033	7693	2.678
5.70	7049	7360	4163	11211	3524	15047	7687	2.693
5.80	7079	7376	4146	11225	3540	15062	7686	2.707
5.90	7105	7390	4132	11237	3552	15075	7685	2.719
6.00	7126	7404	4118	11245	3563	15086	7681	2.731
6.10	7148	7418	4104	11252	3574	15096	7678	2.742
6.20	7174	7436	4087	11260	3587	15109	7673	2.755
6.30	7200	7451	4071	11271	3600	15122	7671	2.768
6.40	7217	7467	4056	11273	3608	15132	7664	2.779
6.50	7234	7482	4041	11275	3617	15139	7658	2.790
6.60	7255	7496	4027	11282	3628	15150	7654	2.802
6.70	7276	7508	4014	11290	3638	15160	7652	2.813
6.80	7293	7519	4003	11297	3647	15169	7650	2.822
6.90	7310	7532	3991	11300	3655	15177	7646	2.832
7.00	7327	7541	3981	11308	3663	15186	7645	2.840
7.10	7344	7547	3975	11319	3672	15194	7647	2.847
7.20	7352	7553	3969	11321	3676	15198	7645	2.852
7.30	7373	7559	3964	11336	3686	15209	7650	2.860
7.40	7381	7569	3954	11335	3691	15214	7645	2.867
7.50	7402	7580	3943	11344	3701	15223	7643	2.877
7.60	7419	7588	3934	11353	3709	15232	7644	2.886
7.70	7431	7596	3926	11357	3715	15238	7642	2.893
7.80	7447	7605	3918	11365	3724	15246	7642	2.901
7.90	7464	7614	3910	11373	3732	15255	7641	2.909
8.00	7480	7619	3904	11384	3740	15262	7644	2.916
8.10	7496	7622	3900	11396	3748	15270	7648	2.922
8.20	7517	7627	3897	11413	3758	15282	7655	2.929
8.30	7533	7633	3891	11424	3766	15290	7657	2.936
8.40	7553	7637	3885	11438	3777	15299	7662	2.944
8.50	7569	7640	3883	11452	3785	15307	7667	2.949
8.60	7589	7643	3879	11468	3795	15317	7674	2.956
8.70	7605	7638	3884	11489	3803	15325	7686	2.958
8.80	7625	7636	3886	11511	3813	15335	7699	2.962
8.90	7645	7637	3885	11530	3823	15345	7708	2.968
9.00	7665	7638	3884	11549	3832	15355	7716	2.973
9.10	7685	7640	3883	11567	3842	15365	7725	2.979
9.20	7708	7642	3880	11589	3854	15377	7735	2.986
9.30	7728	7646	3877	11605	3864	15386	7741	2.993
9.40	7752	7649	3873	11625	3876	15398	7749	3.001
9.50	7767	7649	3873	11641	3884	15406	7757	3.005
9.60	7791	7654	3869	11659	3895	15418	7764	3.014
9.70	7810	7654	3869	11679	3905	15428	7774	3.019
9.80	7825	7656	3866	11692	3913	15435	7779	3.024
9.90	7849	7658	3865	11714	3924	15448	7790	3.031
10.00	7860	7660	3863	11723	3930	15452	7793	3.035
10.10	7875	7660	3864	11739	3938	15461	7802	3.038
10.20	7890	7658	3864	11754	3945	15467	7809	3.042
10.30	7905	7695	3829	11734	3953	15476	7782	3.065
10.40	7916	7708	3815	11731	3958	15480	7773	3.075
10.50	7927	7698	3824	11751	3964	15486	7788	3.073
10.60	7942	7643	3878	11820	3971	15492	7849	3.048
10.70	7957	7669	3855	11811	3978	15502	7833	3.064
10.80	7960	7626	3897	11856	3980	15502	7877	3.043
10.90	7970	7592	3931	11901	3985	15508	7916	3.028
11.00	7981	7574	3947	11928	3991	15512	7938	3.022
11.10	7992	7565	3958	11949	3996	15518	7953	3.019
11.20	8002	7557	3966	11968	4001	15524	7967	3.018
11.30	8013	7562	3960	11973	4006	15529	7966	3.023
11.40	8027	7567	3955	11983	4014	15536	7969	3.029
11.50	8038	7569	3954	11992	4019	15542	7973	3.033
11.60	8044	7576	3946	11990	4022	15544	7968	3.039

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
11.70	8058	7582	3940	11998	4029	15552	7969	3.045
11.80	8073	7587	3935	12008	4036	15559	7972	3.051
11.90	8087	7590	3932	12019	4044	15566	7975	3.057
12.00	8097	7594	3928	12026	4049	15571	7977	3.061
12.10	8115	7597	3925	12040	4058	15580	7983	3.068
12.20	8129	7599	3924	12053	4065	15587	7988	3.072
12.30	8143	7601	3921	12065	4072	15594	7993	3.077
12.40	8161	7605	3919	12080	4081	15604	8000	3.082
12.50	8171	7605	3917	12088	4086	15607	8002	3.086
12.60	8185	7605	3918	12103	4093	15615	8010	3.089
12.70	8207	7605	3918	12125	4103	15626	8021	3.095
12.80	8228	7603	3918	12146	4114	15635	8032	3.100
12.90	8242	7600	3923	12165	4121	15643	8044	3.101
13.00	8256	7596	3926	12182	4128	15650	8054	3.103
13.10	8273	7594	3928	12202	4137	15659	8065	3.106
13.20	8294	7592	3931	12225	4147	15670	8078	3.110
13.30	8308	7586	3937	12245	4154	15676	8091	3.110
13.40	8325	7581	3941	12267	4163	15685	8104	3.112
13.50	8342	7575	3948	12291	4171	15695	8120	3.113
13.60	8360	7571	3952	12312	4180	15702	8132	3.115
13.70	8369	7565	3959	12328	4185	15708	8143	3.114
13.80	8390	7560	3962	12352	4195	15717	8157	3.117
13.90	8399	7554	3968	12368	4200	15722	8168	3.117
14.00	8408	7547	3975	12384	4204	15727	8180	3.115
14.10	8414	7540	3982	12396	4207	15729	8189	3.113
14.20	8431	7533	3989	12420	4215	15738	8205	3.113
14.30	8440	7525	3999	12438	4220	15743	8219	3.111
14.40	8449	7519	4003	12452	4224	15747	8228	3.110
14.50	8454	7512	4010	12464	4227	15749	8237	3.108
14.60	8463	7504	4019	12481	4231	15754	8250	3.106
14.70	8468	7494	4028	12496	4234	15756	8262	3.102
14.80	8477	7485	4037	12514	4238	15761	8276	3.100
14.90	8497	7476	4048	12545	4249	15772	8296	3.099
15.00	8510	7467	4055	12564	4255	15777	8310	3.099
15.10	8518	7462	4062	12580	4259	15783	8321	3.097
15.20	8531	7453	4069	12600	4265	15788	8334	3.097
15.30	8539	7445	4077	12616	4270	15792	8347	3.094
15.40	8548	7438	4084	12632	4274	15796	8358	3.093
15.50	8564	7432	4090	12654	4282	15804	8372	3.094
15.60	8584	7423	4099	12683	4292	15814	8391	3.094
15.70	8600	7414	4109	12709	4300	15822	8409	3.093
15.80	8612	7407	4116	12728	4306	15828	8422	3.092
15.90	8632	7400	4123	12755	4316	15838	8439	3.094
16.00	8648	7391	4131	12779	4324	15846	8455	3.093
16.10	8656	7386	4138	12794	4328	15851	8466	3.092
16.20	8668	7377	4146	12814	4334	15857	8480	3.090
16.30	8683	7369	4155	12838	4342	15865	8496	3.090
16.40	8691	7361	4163	12854	4346	15869	8508	3.088
16.50	8707	7354	4169	12875	4354	15876	8522	3.089
16.60	8715	7346	4177	12892	4358	15880	8534	3.087
16.70	8727	7337	4186	12913	4363	15887	8549	3.085
16.80	8734	7330	4192	12926	4367	15890	8559	3.084
16.90	8742	7325	4198	12940	4371	15894	8569	3.083
17.00	8754	7318	4205	12959	4377	15899	8582	3.082
17.10	8758	7309	4213	12971	4379	15901	8592	3.079
17.20	8758	7302	4220	12978	4379	15901	8599	3.075
17.30	8773	7297	4226	12999	4387	15909	8613	3.076
17.40	8773	7288	4234	13007	4387	15909	8621	3.072
17.50	8773	7280	4244	13017	4387	15910	8630	3.068
17.60	8785	7274	4249	13034	4392	15916	8642	3.067
17.70	8785	7267	4255	13040	4392	15915	8648	3.064
17.80	8781	7259	4263	13044	4391	15913	8654	3.060
17.90	8789	7253	4269	13058	4394	15917	8664	3.059
18.00	8789	7246	4276	13065	4394	15917	8671	3.055

Axial strain, ε (%)	σd (σ1−σ3) (psf)	Δ pore press., Δu (psf)	Effective σ'3 (psf)	Effective σ'1 (psf)	q (σ1−σ3)/2 (psf)	p (σ1+σ3)/2 (psf)	p' (σ'1+σ'3)/2 (psf)	σ'1/σ'3
18.10	8792	7238	4284	13077	4396	15919	8681	3.052
18.20	8792	7233	4289	13081	4396	15918	8685	3.050
18.30	8799	7226	4296	13096	4400	15922	8696	3.048
18.40	8799	7218	4304	13104	4400	15922	8704	3.044
18.50	8806	7210	4313	13119	4403	15926	8716	3.042
18.60	8810	7204	4318	13128	4405	15927	8723	3.040
18.70	8817	7198	4325	13142	4409	15932	8734	3.038
18.80	8820	7190	4333	13153	4410	15933	8743	3.036
18.90	8827	7185	4338	13166	4414	15937	8752	3.035
19.00	8834	7179	4343	13177	4417	15940	8760	3.034
19.10	8845	7175	4348	13193	4423	15945	8770	3.034
19.20	8852	7168	4356	13208	4426	15949	8782	3.032
19.30	8855	7162	4361	13216	4428	15950	8788	3.031
19.40	8866	7157	4365	13231	4433	15955	8798	3.031
19.50	8872	7150	4374	13246	4436	15960	8810	3.029
19.60	8879	7143	4379	13258	4440	15962	8819	3.027
19.70	8886	7137	4386	13272	4443	15966	8829	3.026
19.80	8889	7129	4393	13282	4444	15967	8838	3.023
19.90	8895	7123	4399	13294	4448	15970	8847	3.022
20.00	8909	7116	4407	13316	4454	15978	8862	3.021

APPENDIX D

DESIGN AND DETAIL SHEETS



Township 39 South

CONTOURS ARE SHOWN AT 2' INTERVALS.

LEGEND:
- PROJECT AREA
- PRIVATE COAL OWNERSHIP
- COAL LINE
- BOUNDARY
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: J. STANSFIELD	CHECKED BY: CRM/APC
DRAWING:	DATE: 4/20/07
	SCALE: 1" = 1000'
JOB NUMBER: 1400	SHEET

REVISIONS	
DATE:	BY:

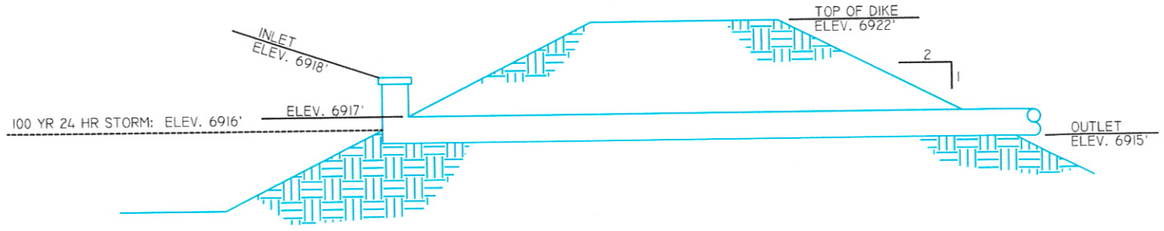
PREMINING TOPOGRAPHY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-11

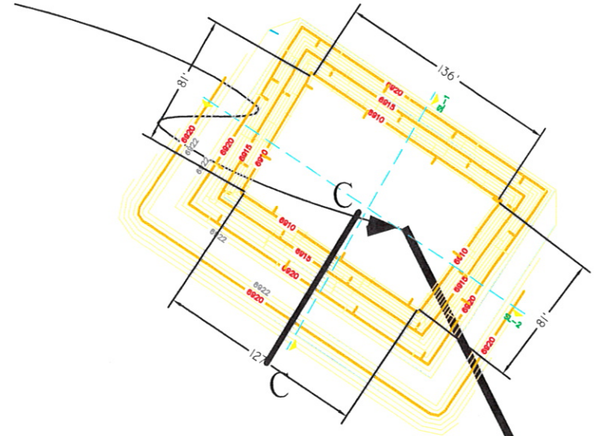
Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

Figure No. 11

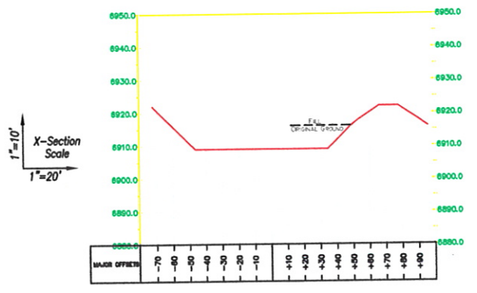


TYPICAL CROSS SECTION
Not to Scale

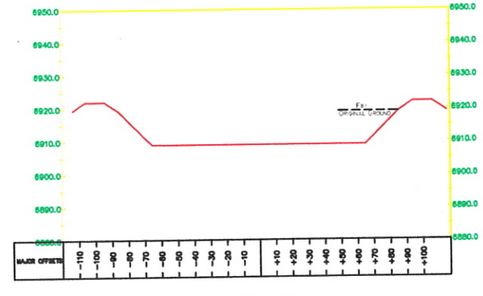
24 inch Drop Pipe Spillway
Top of riser 6918'
Bottom of riser 6915'



24 inch outlet 6915'

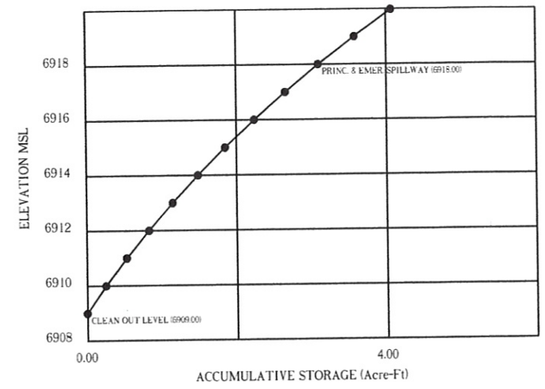


SL-1



SL-2

STAGE STORAGE CURVE
Sediment Control Structure No. 1



STORAGE VOLUME COMPUTATIONS
Sediment Control Structure No. 1

ELEV. (ft)	WIDTH (ft)	LENGTH (ft)	AREA (ac)	AVG. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)	STAGE INTERVAL (ft)
6909.00	NA	NA	0.2320					
				0.2485	1.00	0.2485	0.2485	1.00
6910.00	NA	NA	0.2650					
				0.2760	1.00	0.2760	0.5245	2.00
6911.00	NA	NA	0.2870					
				0.2980	1.00	0.2980	0.8225	3.00
6912.00	NA	NA	0.3090					
				0.3200	1.00	0.3200	1.1425	4.00
6913.00	NA	NA	0.3310					
				0.3425	1.00	0.3425	1.4850	5.00
6914.00	NA	NA	0.3540					
				0.3655	1.00	0.3655	1.8505	6.00
6915.00	NA	NA	0.3770					
				0.3895	1.00	0.3895	2.2400	7.00
6916.00	NA	NA	0.4020					
				0.4155	1.00	0.4155	2.6555	8.00
6917.00	NA	NA	0.4290					
				0.4440	1.00	0.4440	3.0995	9.00
6918.00	NA	NA	0.4590					
				0.4755	1.00	0.4755	3.5750	10.00
6919.00	NA	NA	0.4920					
				0.5055	0.98	0.4954	4.0704	10.98
6920.00	NA	NA	0.5190					
6922.00								

Pond #1

Required Storage for 100 year, 24 event = 2.57 acre/ft

Coal Hollow Project
615 North, 400 East
P.O. Box 1230
Huntington, Utah 84528
Phone (435)687-5310
Fax (435)687-5311

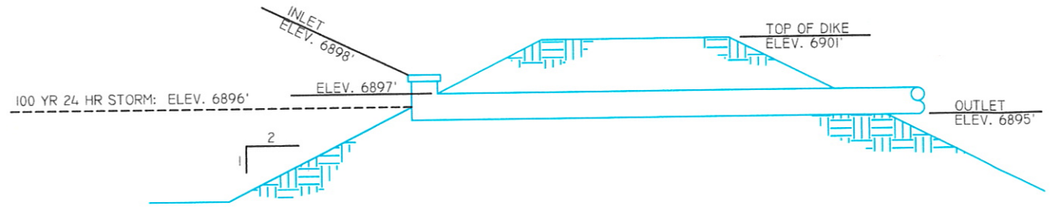
Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

SEDIMENT IMPOUNDMENT 1
DESIGN & DETAILS
COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-28

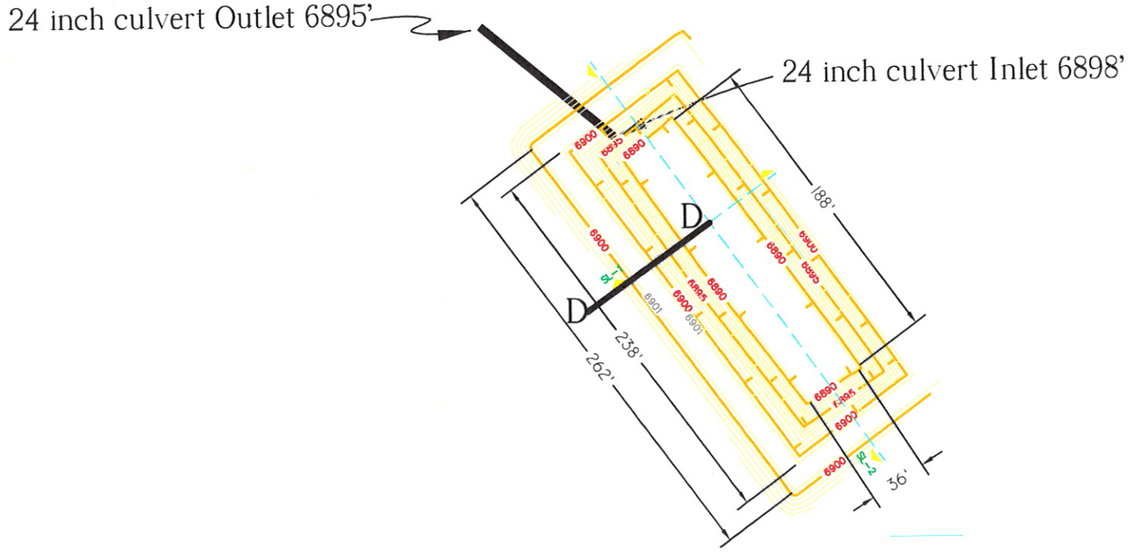
REVISIONS	BY:
DATE:	

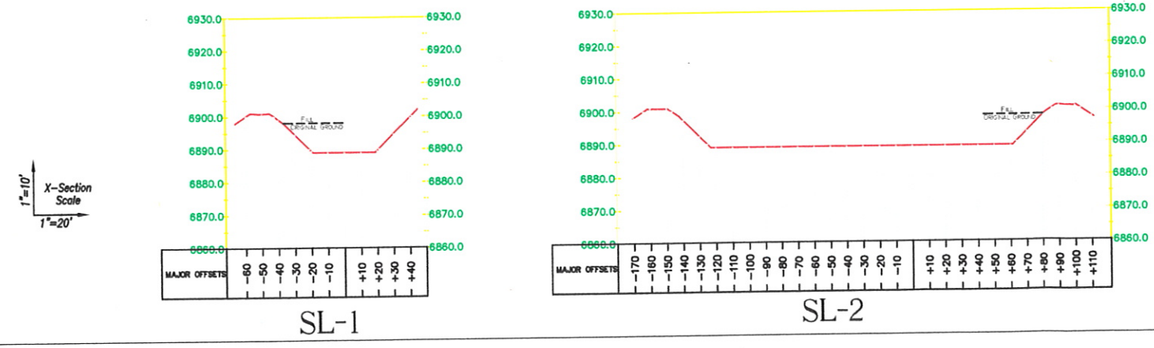
DRAWN BY:	CHECKED BY:		
C. MCCOURT	CM		
DRAWING:	DATE:	SCALE:	SHEET
5-28	04/20/07	1" = 80'	
		JOB NUMBER:	
		1400	

Figure No. 12

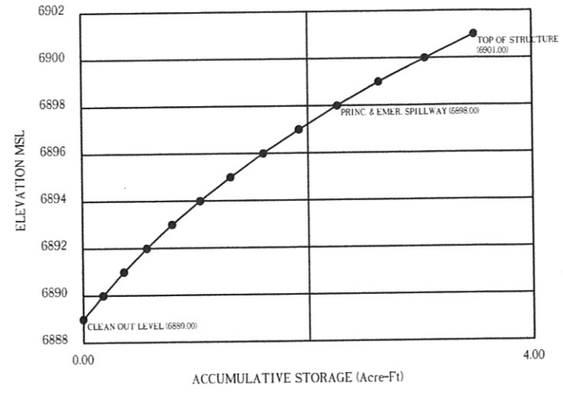


TYPICAL CROSS SECTION
Not to Scale





STAGE STORAGE CURVE
Sediment Control Structure No. 2



STORAGE VOLUME COMPUTATIONS
Sediment Control Structure No. 2

ELEV. (ft)	WIDTH (ft)	LENGTH (ft)	AREA (ac)	AVG. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)	STAGE INTERVAL (ft)
6889.00	NA	NA	0.0000					
				0.1770	1.00	0.1770	0.1770	1.00
6890.00	NA	NA	0.1770	0.1865	1.00	0.1865	0.3635	2.00
6891.00	NA	NA	0.1960	0.2060	1.00	0.2060	0.5695	3.00
6892.00	NA	NA	0.2160	0.2265	1.00	0.2265	0.7960	4.00
6893.00	NA	NA	0.2370	0.2475	1.00	0.2475	1.0435	5.00
6894.00	NA	NA	0.2580	0.2695	1.00	0.2695	1.3130	6.00
6895.00	NA	NA	0.2810	0.2925	1.00	0.2925	1.6055	7.00
6896.00	NA	NA	0.3040	0.3160	1.00	0.3160	1.9215	8.00
6897.00	NA	NA	0.3280	0.3425	1.00	0.3425	2.2640	9.00
6898.00	NA	NA	0.3570	0.3745	1.00	0.3745	2.6385	10.00
6899.00	NA	NA	0.3920	0.4085	1.00	0.4085	3.0470	11.00
6900.00	NA	NA	0.4250	0.4430	1.00	0.4430	3.4900	12.00
6901.00	NA	NA	0.4610					

Pond #2

Required Storage for 100 year, 24 event = 1.71 acre/ft

Coal Hollow Project
615 North, 400 East
P.O. Box 1230
Huntington, Utah 84528
Phone (435)687-5310
Fax (435)687-5311

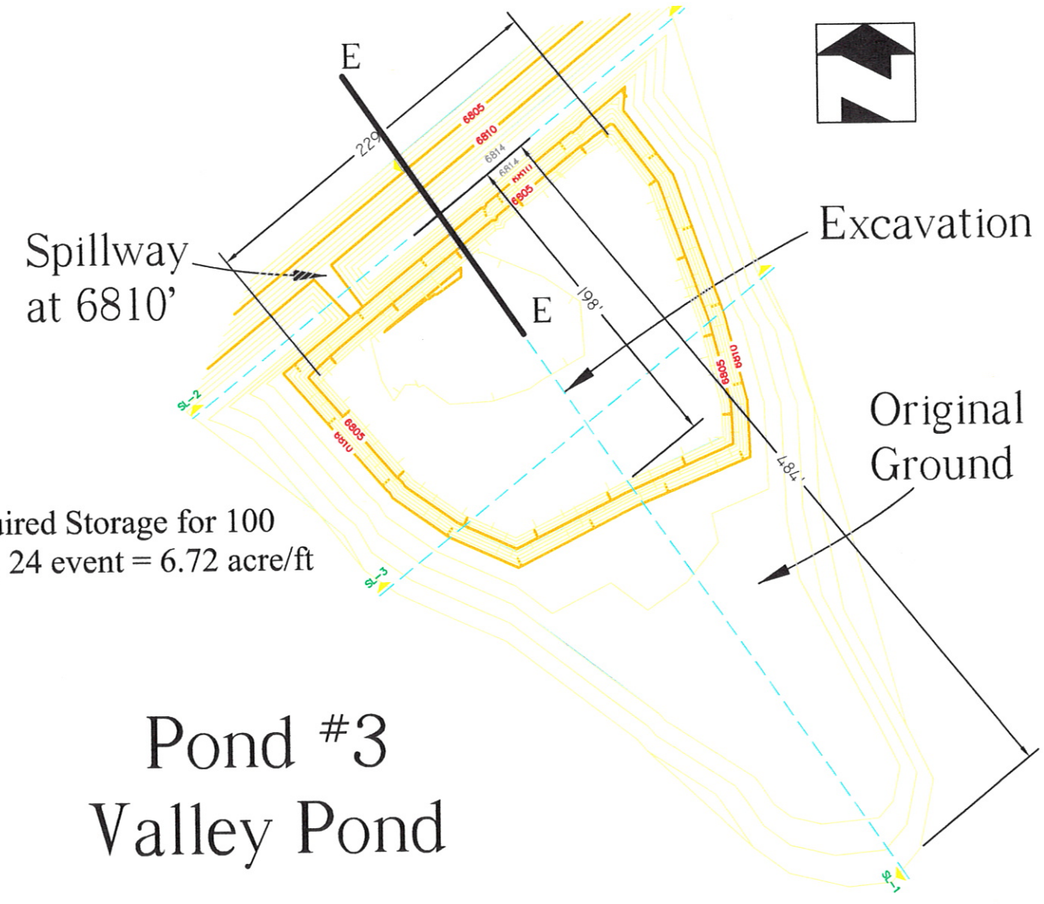
Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

SEDIMENT IMPOUNDMENT 2
DESIGN & DETAILS
COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-29

REVISIONS	BY:
DATE:	

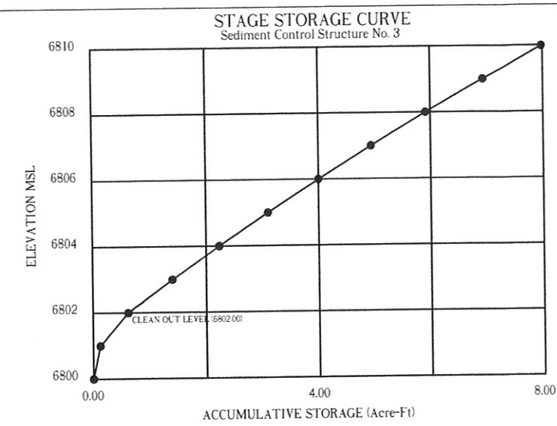
DRAWN BY:	CHECKED BY:		
C. MCCOURT	CM	DATE: 04/20/07	SCALE: 1" = 80'
DRAWING: 5-29			JOB NUMBER: 1400 SHEET

Figure No. 13



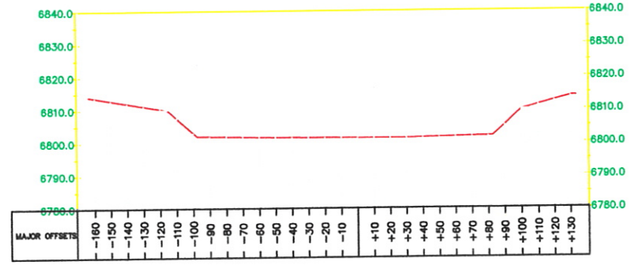
Required Storage for 100 year, 24 event = 6.72 acre/ft

Pond #3
Valley Pond

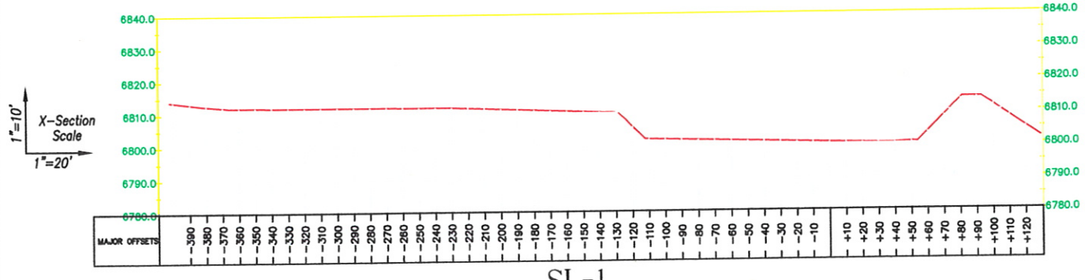


STORAGE VOLUME COMPUTATIONS
Sediment Control Structure No. 3

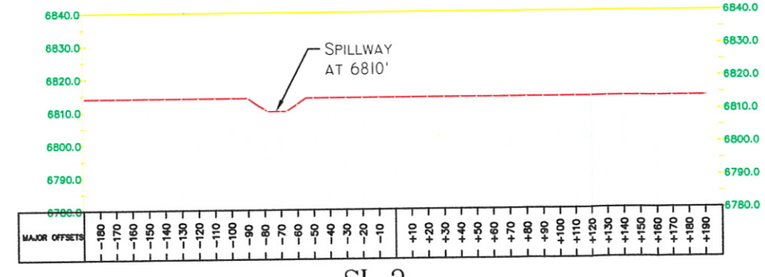
ELEV. (ft)	WIDTH (ft)	LENGTH (ft)	AREA (ac)	AVG. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)	STAGE INTERVAL (ft)
6800.00	NA	NA	0.0180					
6801.00	NA	NA	0.2320	0.1250	1.00	0.1250	0.1250	1.00
6802.00	NA	NA	0.7580	0.4950	1.00	0.4950	0.6200	2.00
6803.00	NA	NA	0.8110	0.7845	1.00	0.7845	1.4045	3.00
6804.00	NA	NA	0.8480	0.8295	1.00	0.8295	2.2340	4.00
6805.00	NA	NA	0.8840	0.8660	1.00	0.8660	3.1000	5.00
6806.00	NA	NA	0.9220	0.9030	1.00	0.9030	4.0030	6.00
6807.00	NA	NA	0.9580	0.9400	1.00	0.9400	4.9430	7.00
6808.00	NA	NA	0.9950	0.9765	1.00	0.9765	5.9195	8.00
6809.00	NA	NA	1.0400	1.0175	1.00	1.0175	6.9370	9.00
6810.00	NA	NA	1.0670	1.0535	1.00	1.0430	7.9800	10.00



SL-3



SL-1



SL-2

Coal Hollow Project
615 North, 400 East
P.O. Box 1238
Huntington, Utah 84528
Phone 435/687-5310
Fax 435/687-5311

Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

SEDIMENT IMPOUNDMENT 3
DESIGN & DETAILS
COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-30

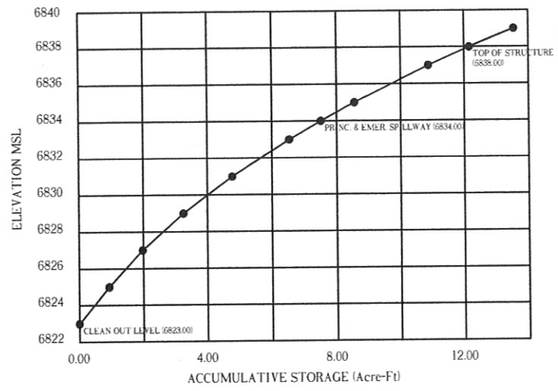
REVISIONS
DATE: BY:

DRAWN BY: C. MCCOURT
CHECKED BY: CM
DRAWING: 5-30
DATE: 12/18/06
SCALE: 1" = 80'
JOB NUMBER: 1400
SHEET

Figure No. 14

STAGE STORAGE CURVE

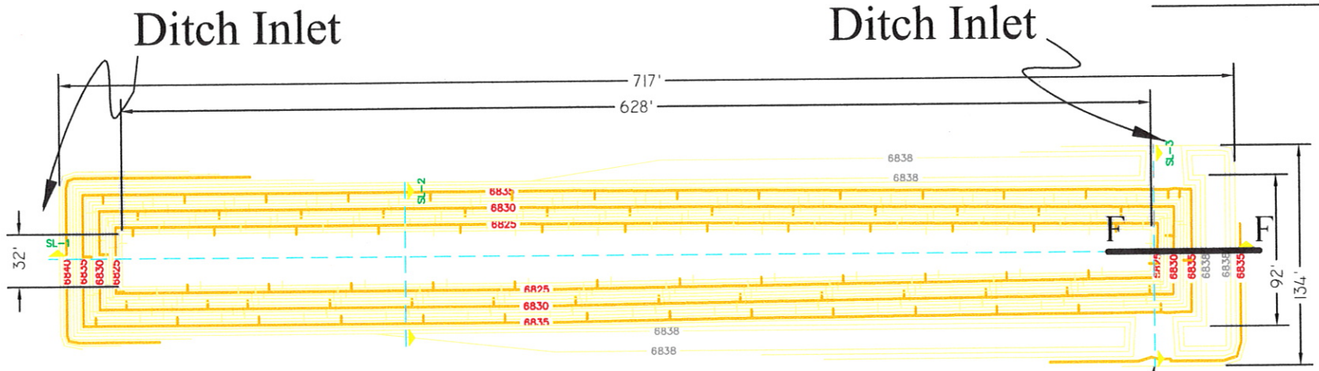
Sediment Control Structure No. 4



STORAGE VOLUME COMPUTATIONS

Sediment Control Structure No. 4

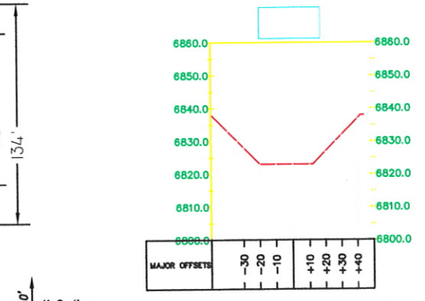
ELEV. (ft)	WIDTH (ft)	LENGTH (ft)	AREA (ac)	AVG. AREA (ac)	INTERVAL (ft)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)	STAGE INTERVAL (ft)
6823.00	NA	NA	0.0000					
				0.4660	2.00	0.9320	0.9320	2.00
6825.00	NA	NA	0.4660					
				0.5235	2.00	1.0470	1.9790	4.00
6827.00	NA	NA	0.5810					
				0.6400	2.00	1.2800	3.2590	6.00
6829.00	NA	NA	0.6990					
				0.7595	2.00	1.5190	4.7780	8.00
6831.00	NA	NA	0.8200					
				0.8815	2.00	1.7630	6.5410	10.00
6833.00	NA	NA	0.9430					
				0.9760	1.00	0.9760	7.5170	11.00
6834.00	NA	NA	1.0090					
				1.0420	1.00	1.0420	8.5590	12.00
6835.00	NA	NA	1.0750					
				1.1575	2.00	2.3150	10.8740	14.00
6837.00	NA	NA	1.2400					
				1.2885	1.00	1.2885	12.1625	15.00
6838.00	NA	NA	1.3370					



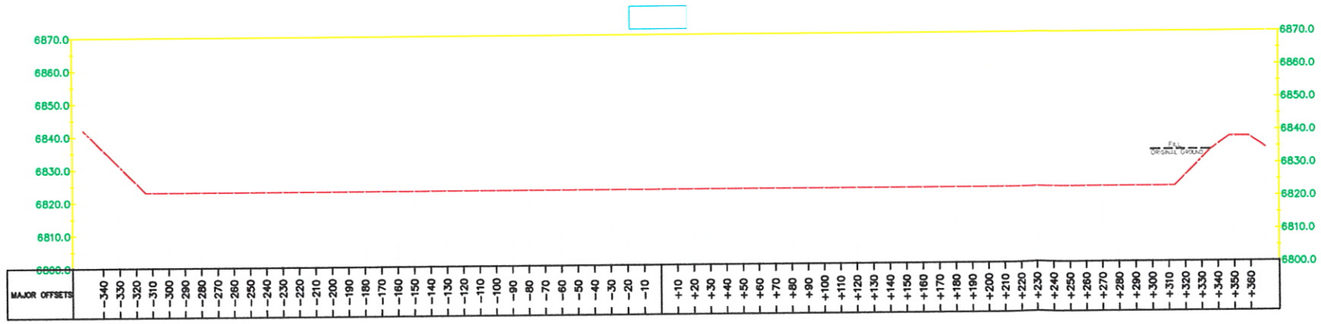
Required Storage for 100 year, 24 event = 6.28 acre/ft

Pond #4

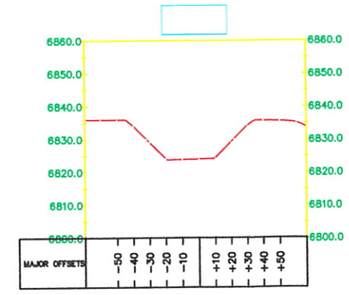
Spillway at 6836'



SL-2



SL-1



SL-3

X-Section Scale 1"=10' 1"=20'

Coal Hollow Project
615 North, 400 East
P.O. Box 1230
Huntington, Utah 84528
Phone (435)687-5310
Fax (435)687-5311

Registered Professional Engineer
275875-2202
CHRIS R. McCOURT
State of Utah

SEDIMENT IMPOUNDMENT 4
DESIGN & DETAILS
COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-31

REVISIONS	
DATE:	BY:

DRAWN BY: C. MCCOURT	CHECKED BY: CM		
DRAWING: 5-31	DATE: 04/20/07	SCALE: 1" = 80'	SHEET
			JOB NUMBER: 1400

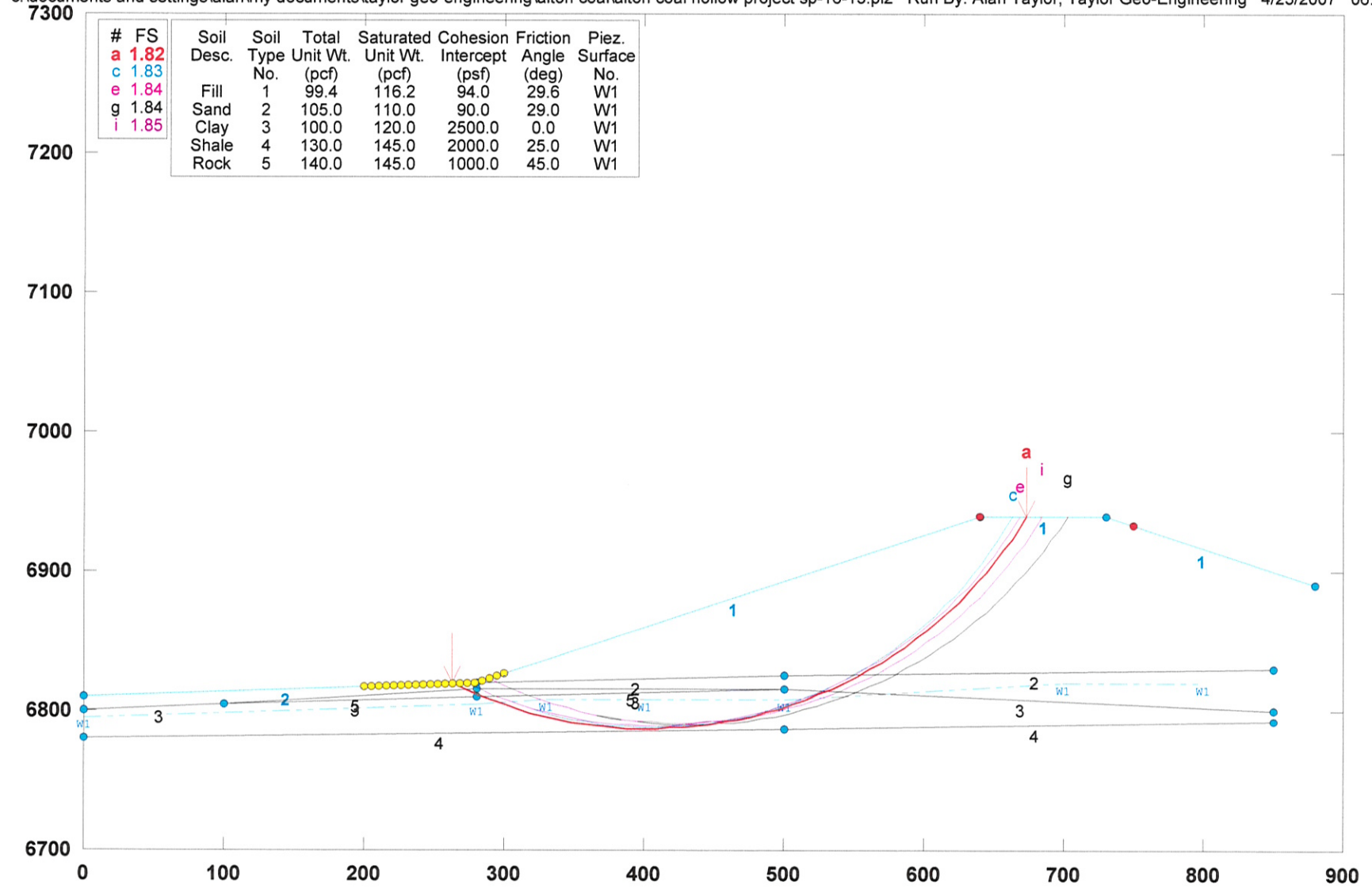
Figure No. 15

APPENDIX E

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

Alton Coal Hollow Stock Pile: Line A-A, Soil SP-16-13 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project sp-16-13.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/23/2007 06:35AM



GSTABL7 v.2 FSmin=1.82

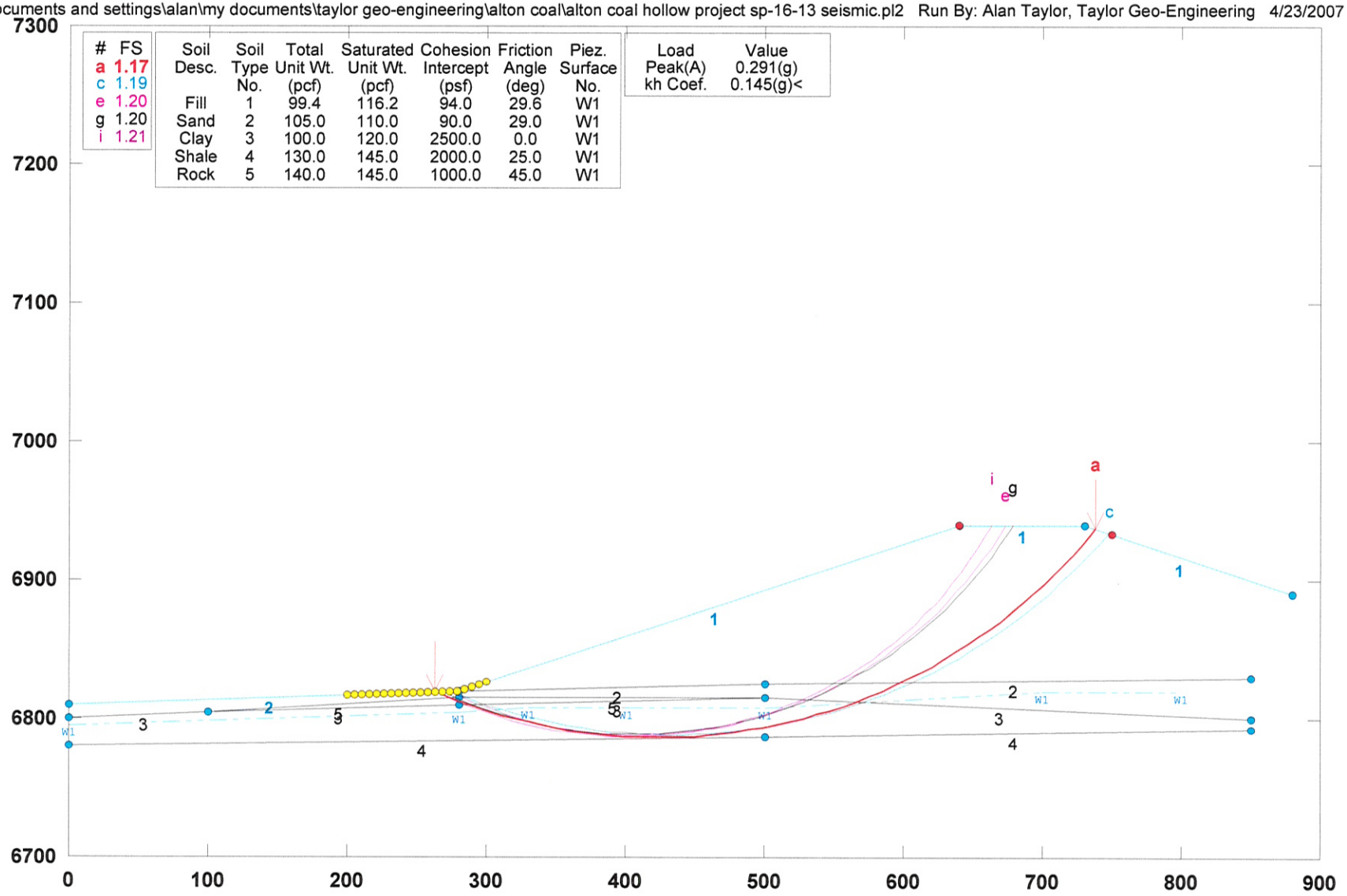
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 16

Alton Coal Hollow Stock Pile: Line A-A, Soil SP-16-13 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project sp-16-13 seismic.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/23/2007 06:38AM



GSTABL7 v.2 FSmin=1.17

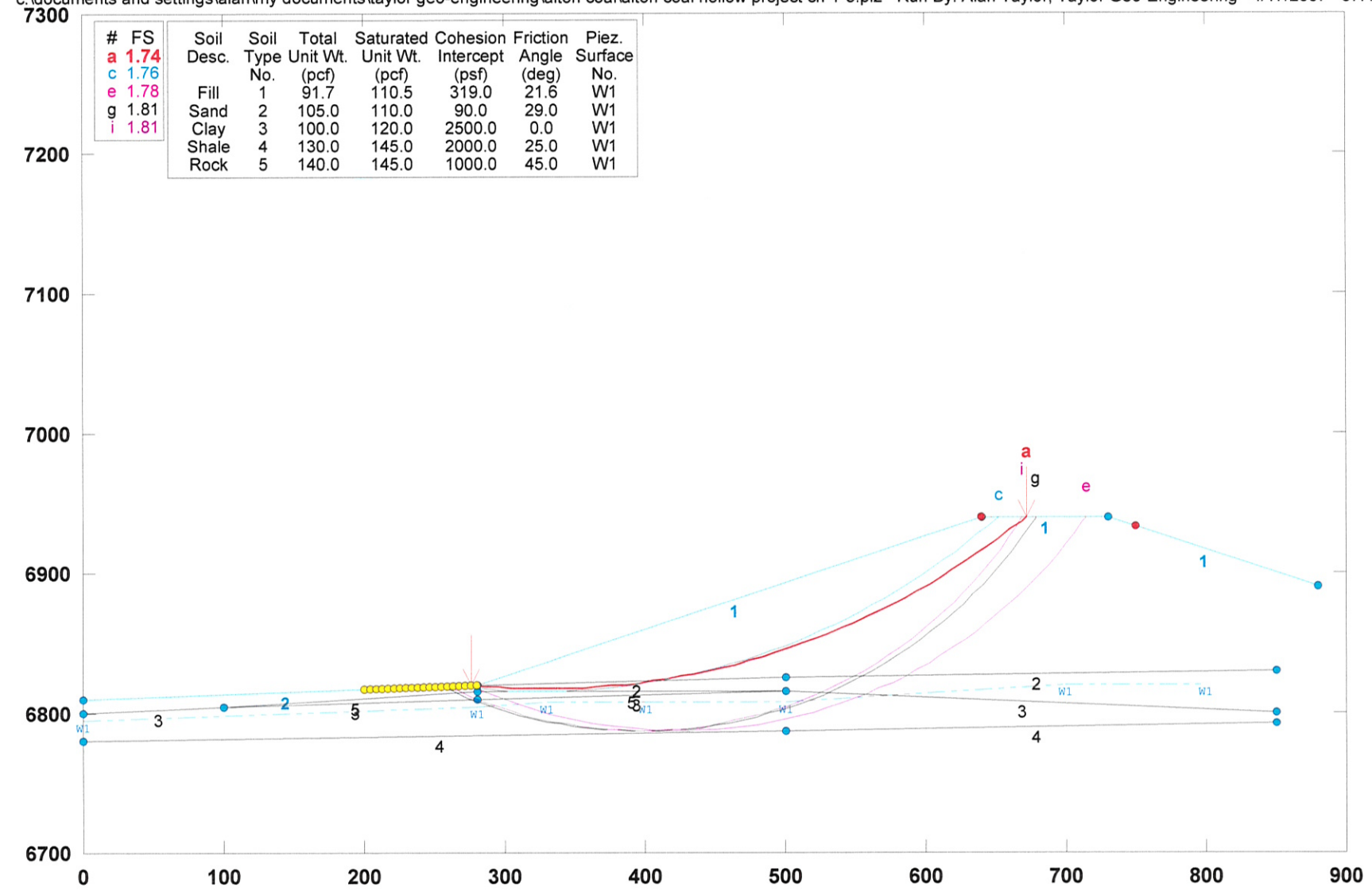
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 17

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-1-3 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-1-3.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 07:47PM



GSTABL7 v.2 FSmin=1.74

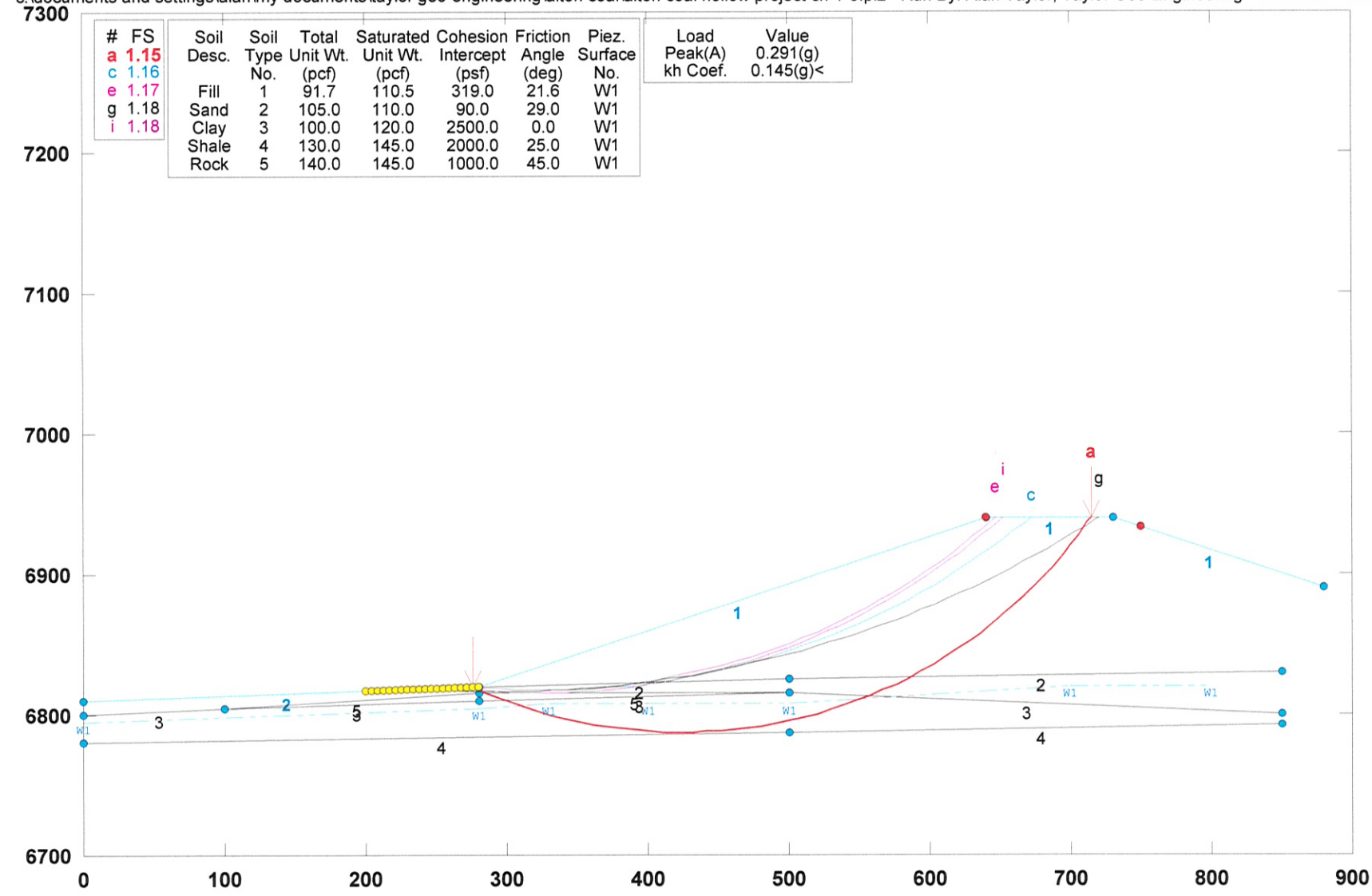
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 18

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-1-3 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-1-3.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 07:51PM



GSTABL7 v.2 FSmin=1.15

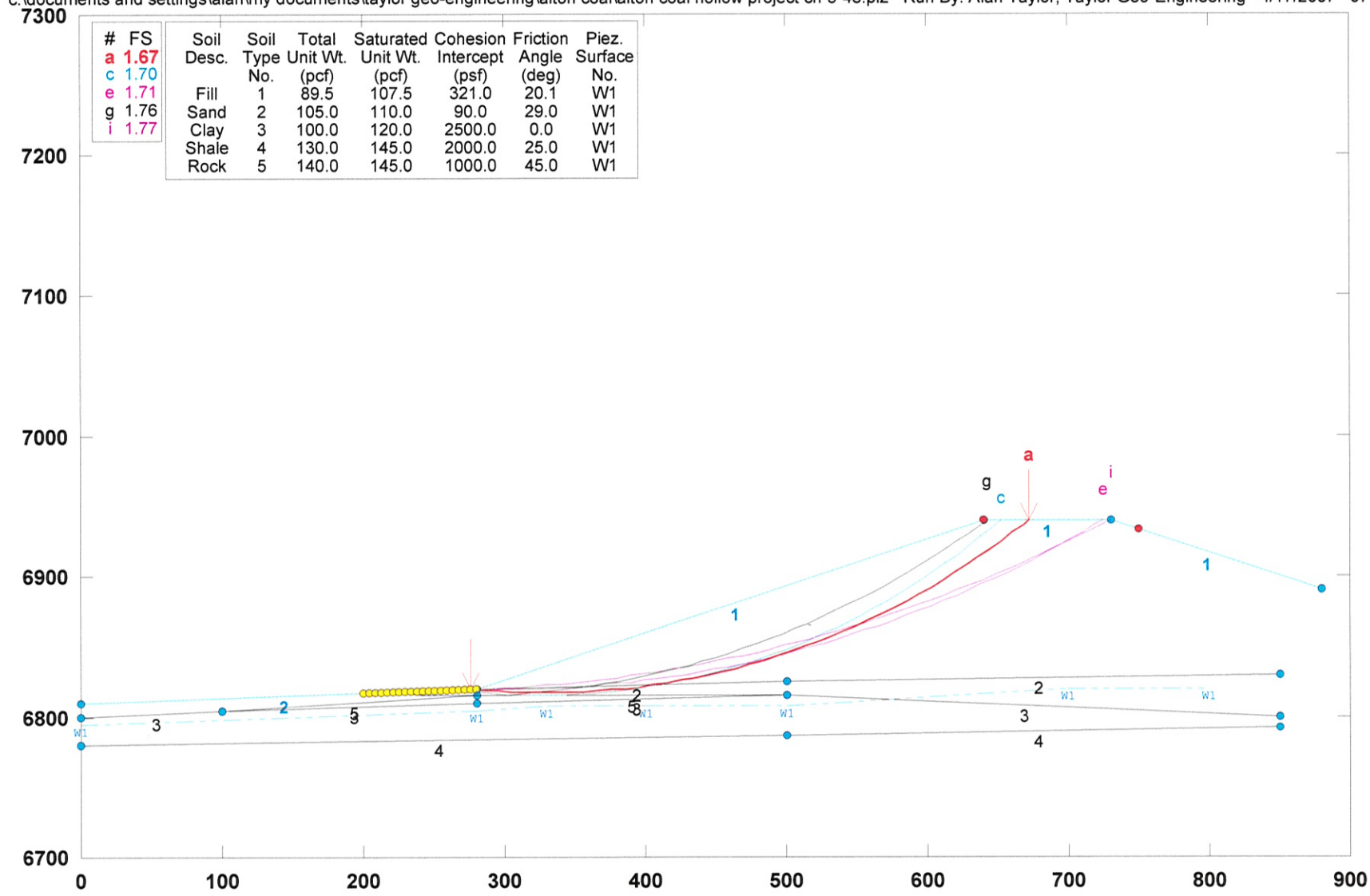
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 19

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-5-48 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-5-48.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 07:56PM



GSTABL7 v.2 FSmin=1.67

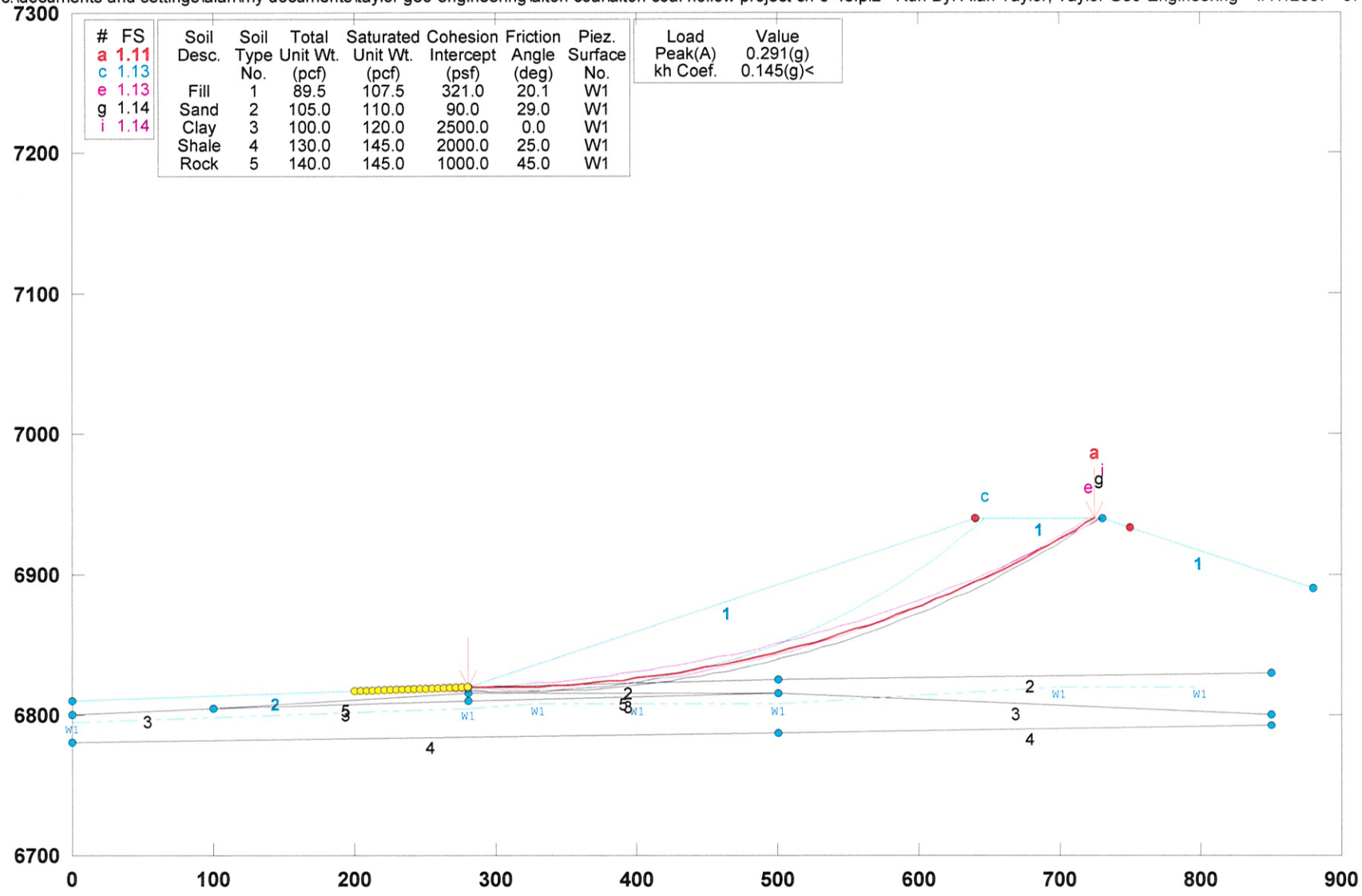
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 20

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-5-48 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-5-48.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 07:59PM



GSTABL7 v.2 FSmin=1.11

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

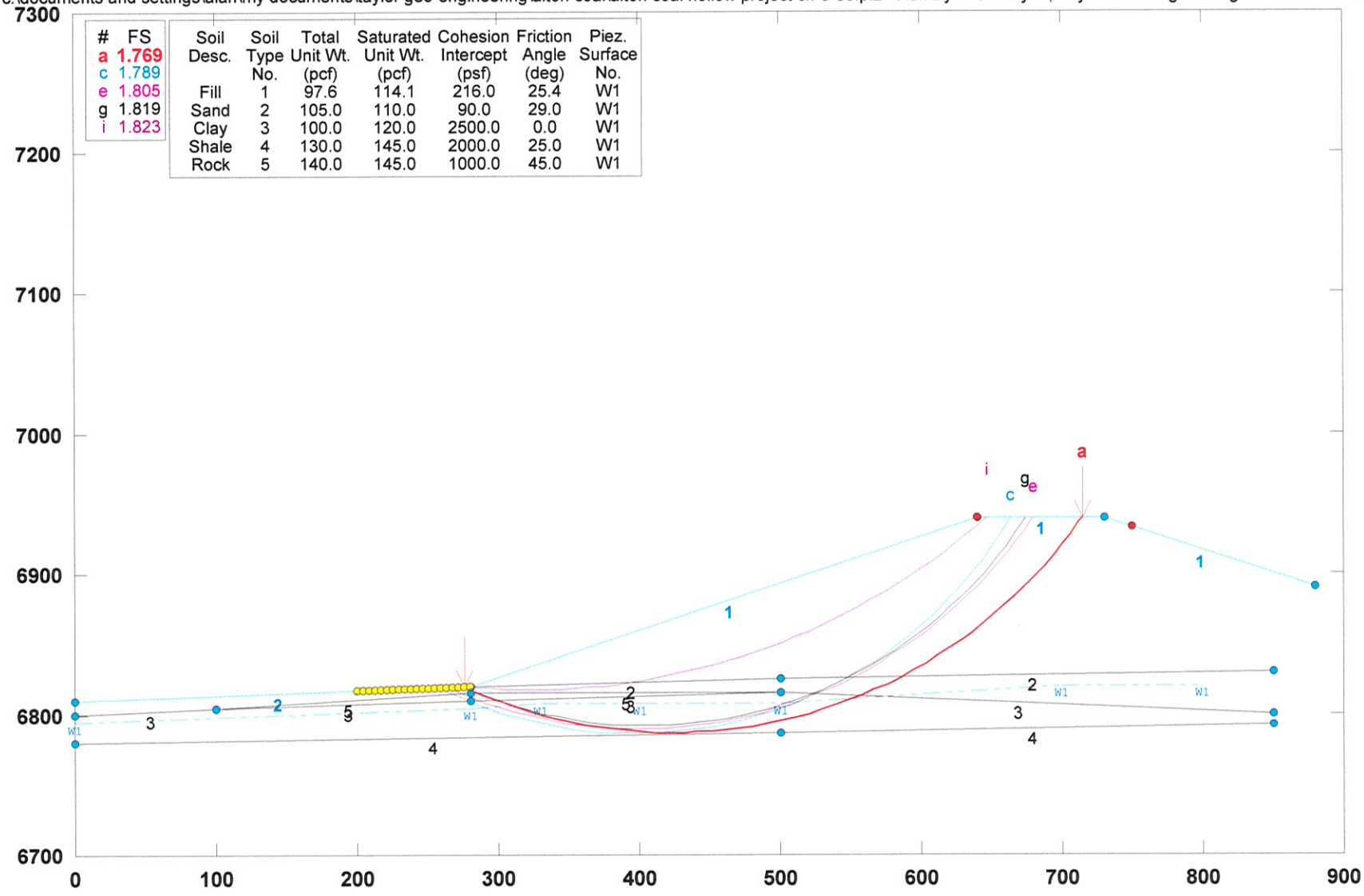
Figure 21

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-5-98 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-5-98.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/18/2007 08:46AM

#	FS
a	1.769
c	1.789
e	1.805
g	1.819
i	1.823

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	97.6	114.1	216.0	25.4	W1
Sand	2	105.0	110.0	90.0	29.0	W1
Clay	3	100.0	120.0	2500.0	0.0	W1
Shale	4	130.0	145.0	2000.0	25.0	W1
Rock	5	140.0	145.0	1000.0	45.0	W1



GSTABL7 v.2 FSmin=1.769

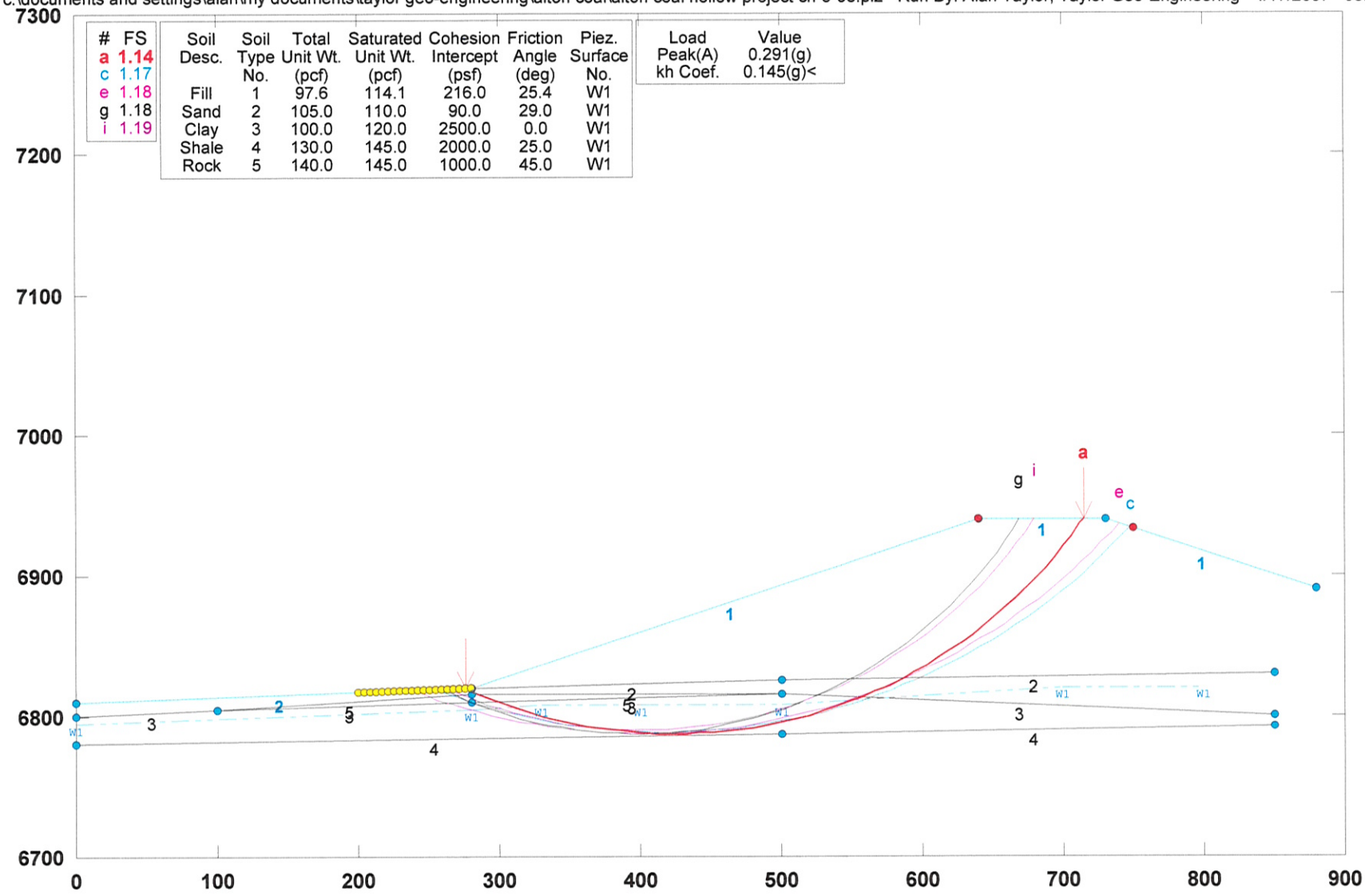
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 22

Alton Coal Hollow Stock Pile: Line A-A, Soil CH-5-98 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton coal hollow project ch-5-98.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 08:01PM



GSTABL7 v.2 FSmin=1.14

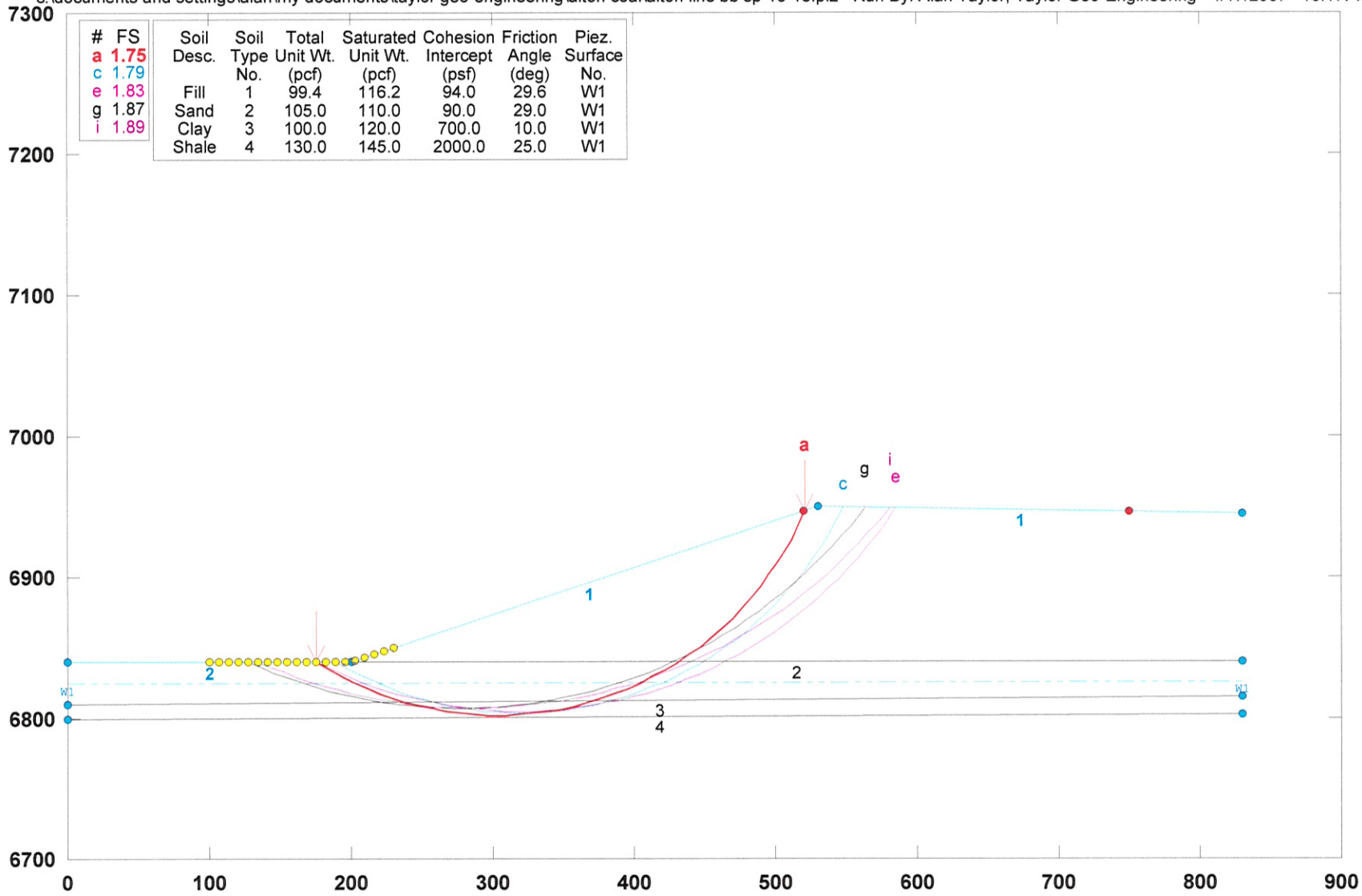
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 23

Alton Coal Hollow Stock Pile: Line B-B, Soil SP-16-13 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb sp-16-13.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 10:17PM



GSTABL7 v.2 FSmin=1.75

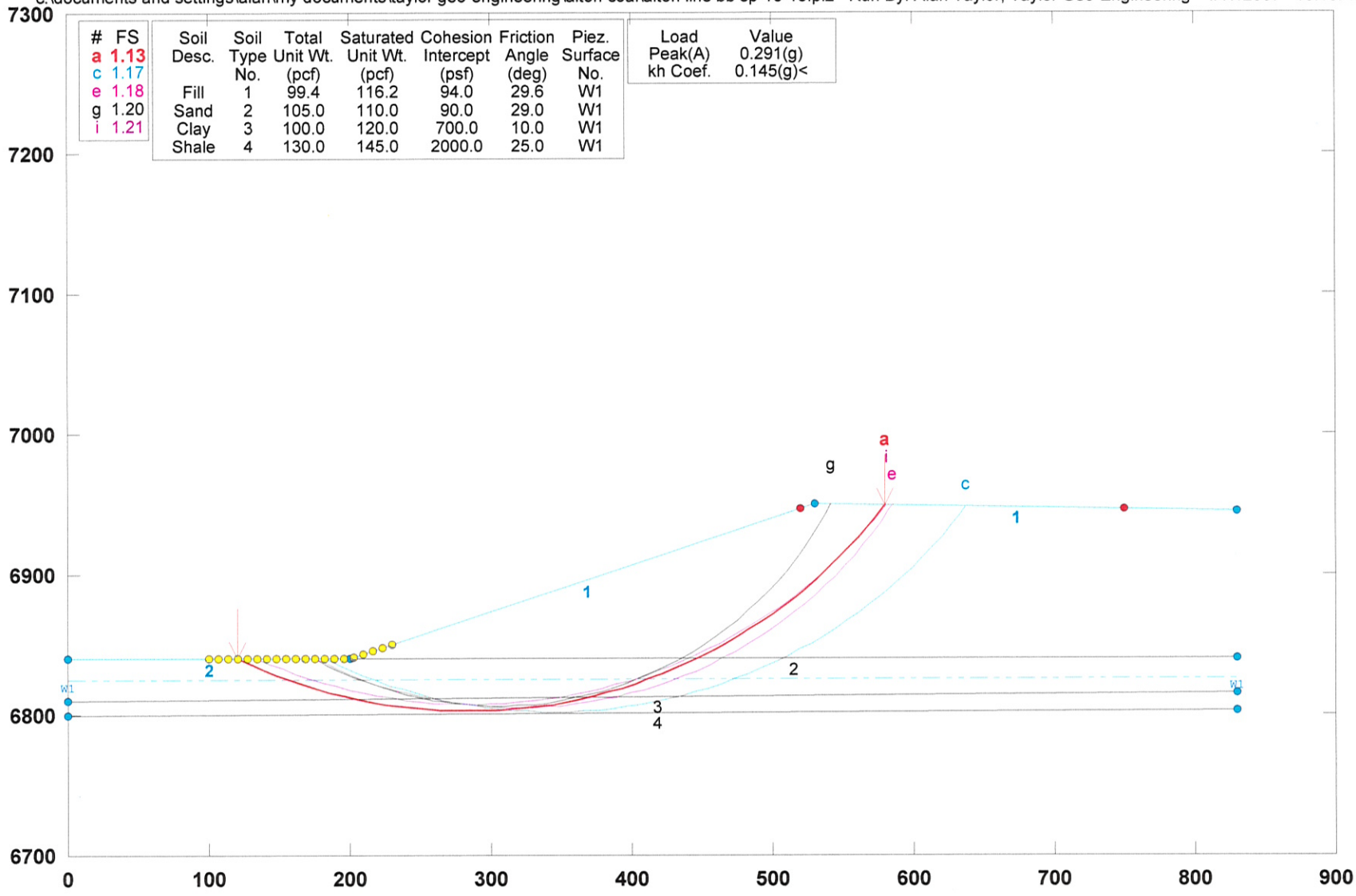
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 24

Alton Coal Hollow Stock Pile: Line B-B, Soil SP-16-13 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb sp-16-13.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 10:18PM



GSTABL7 v.2 FSmin=1.13

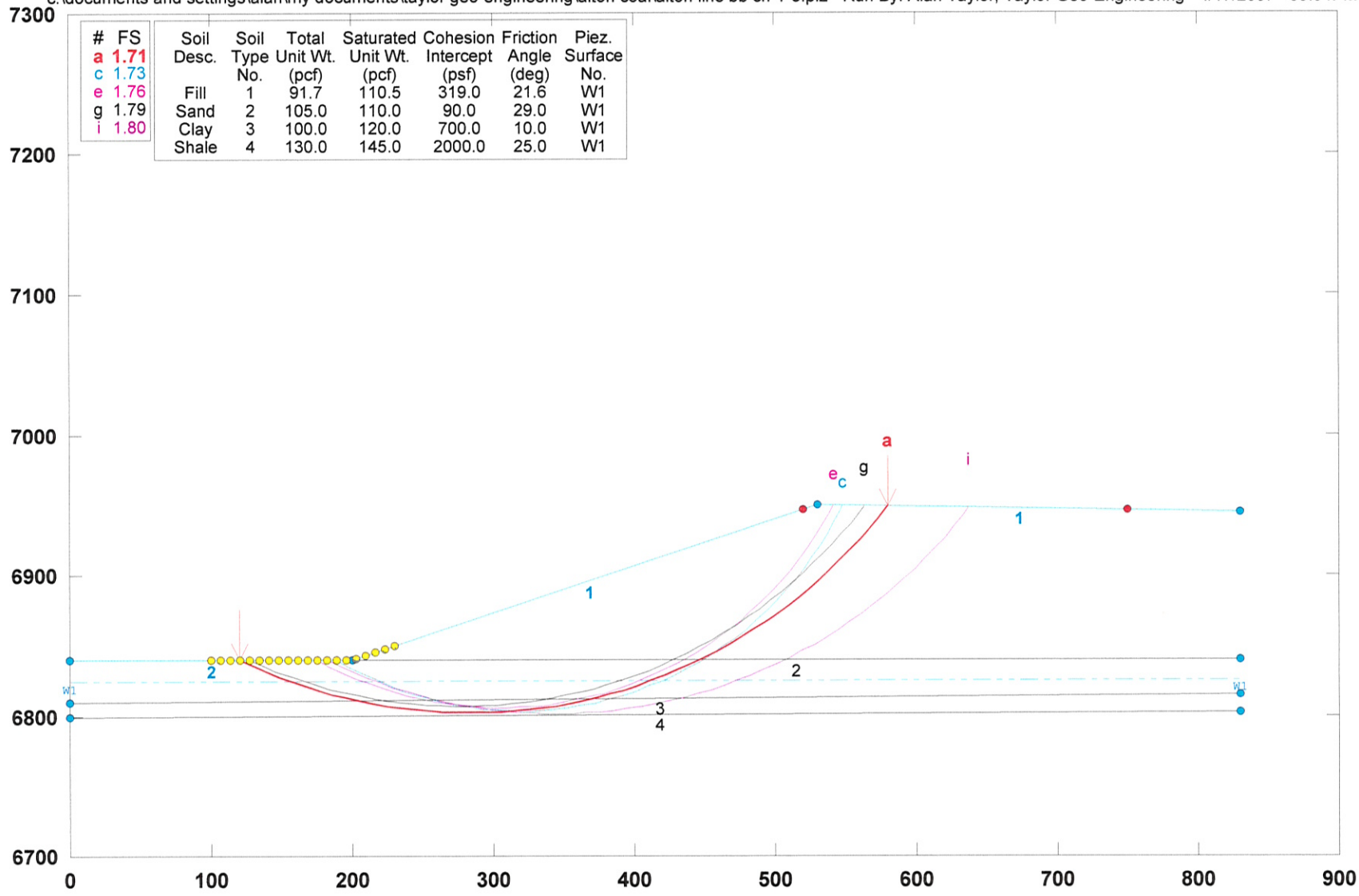
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 25

Alton Coal Hollow Stock Pile: Line B-B, Soil CH-1-3 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-1-3.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:34PM



GSTABL7 v.2 FSmin=1.71

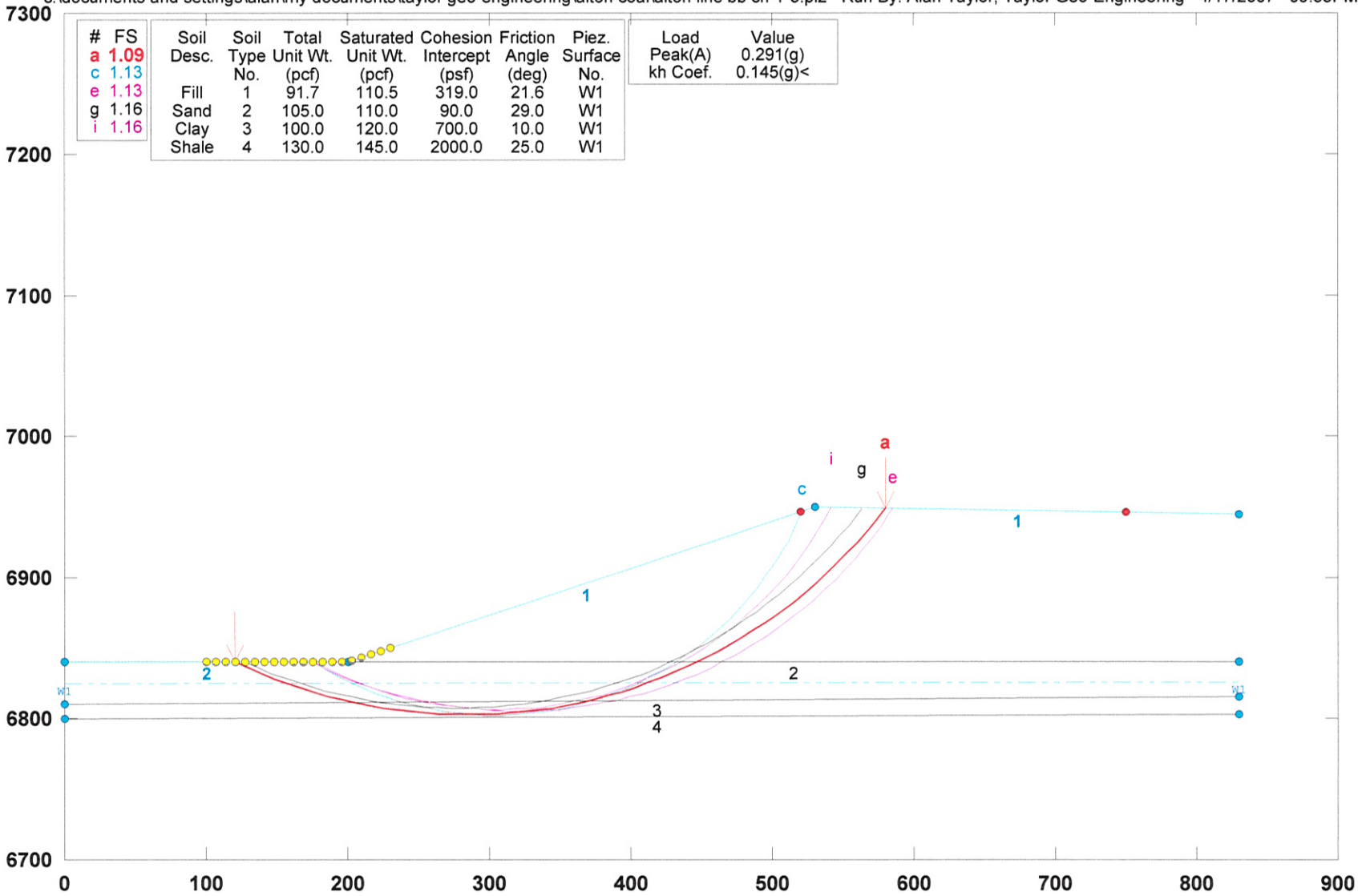
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 26

Alton Coal Hollow Stock Pile: Line B-B, Soil CH-1-3 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-1-3.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:33PM



GSTABL7 v.2 FSmin=1.09

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

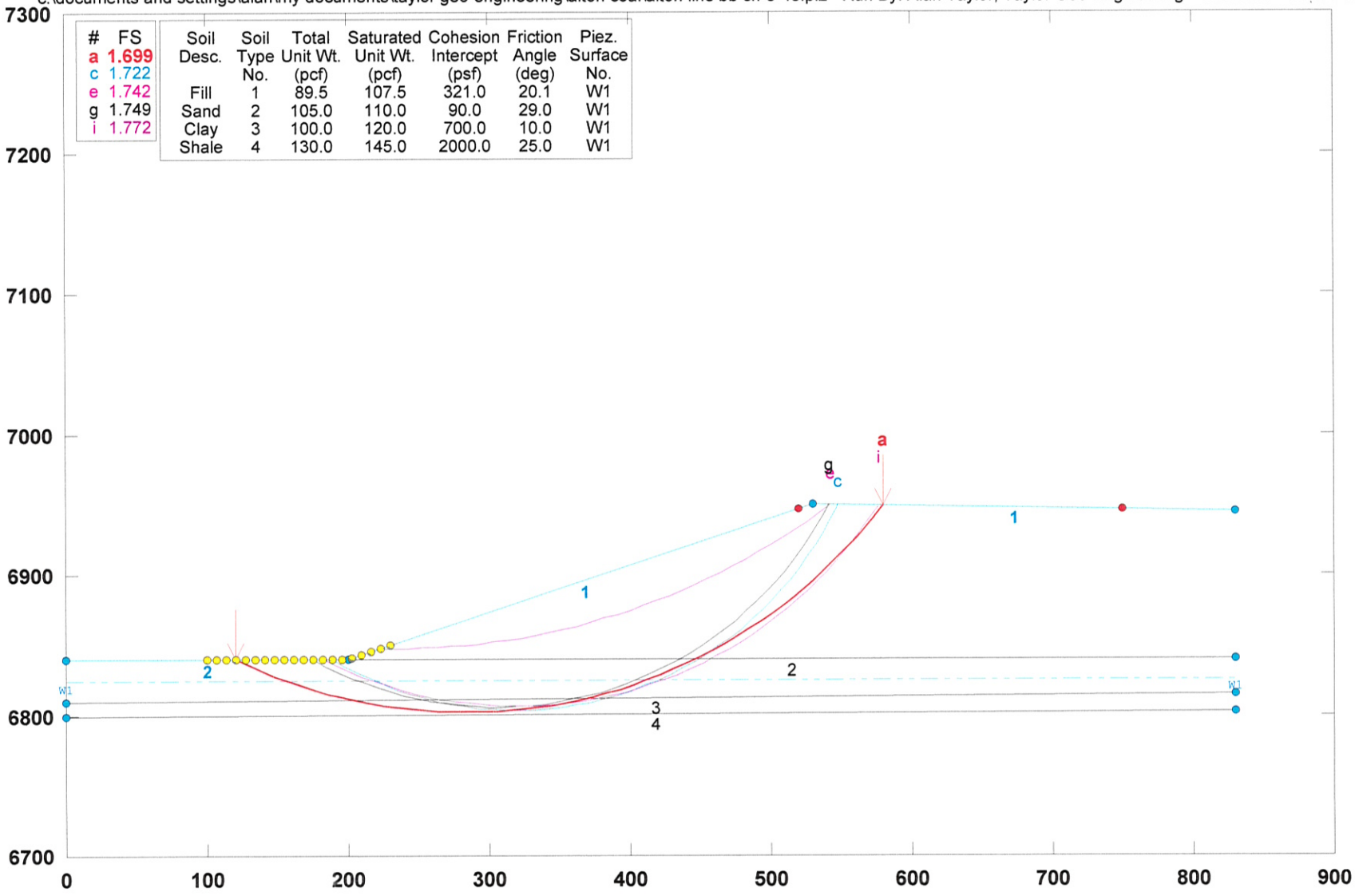
Figure 27

Alton Coal Hollow Stock Pile: Line B-B, Soil CH-5-48 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-5-48.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:27PM

#	FS
a	1.699
c	1.722
e	1.742
g	1.749
i	1.772

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	89.5	107.5	321.0	20.1	W1
Sand	2	105.0	110.0	90.0	29.0	W1
Clay	3	100.0	120.0	700.0	10.0	W1
Shale	4	130.0	145.0	2000.0	25.0	W1



GSTABL7 v.2 FSmin=1.699

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 28

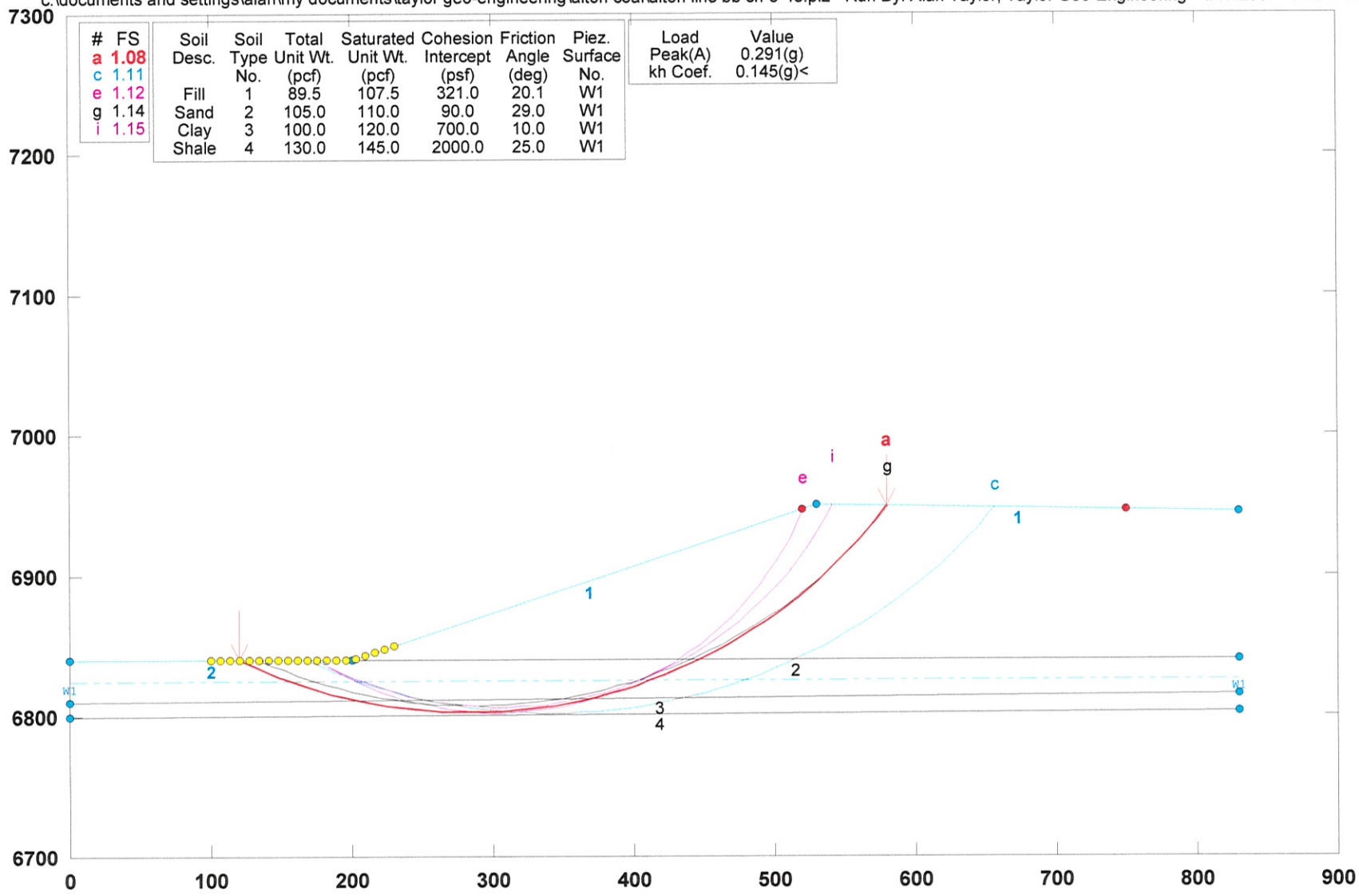
Alton Coal Hollow Stock Pile: Line B-B, Soil CH-5-48 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-5-48.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:30PM

#	FS
a	1.08
c	1.11
e	1.12
g	1.14
i	1.15

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	89.5	107.5	321.0	20.1	W1
Sand	2	105.0	110.0	90.0	29.0	W1
Clay	3	100.0	120.0	700.0	10.0	W1
Shale	4	130.0	145.0	2000.0	25.0	W1

Load	Value
Peak(A)	0.291(g)
kh Coef.	0.145(g)<



GSTABL7 v.2 FSmin=1.08

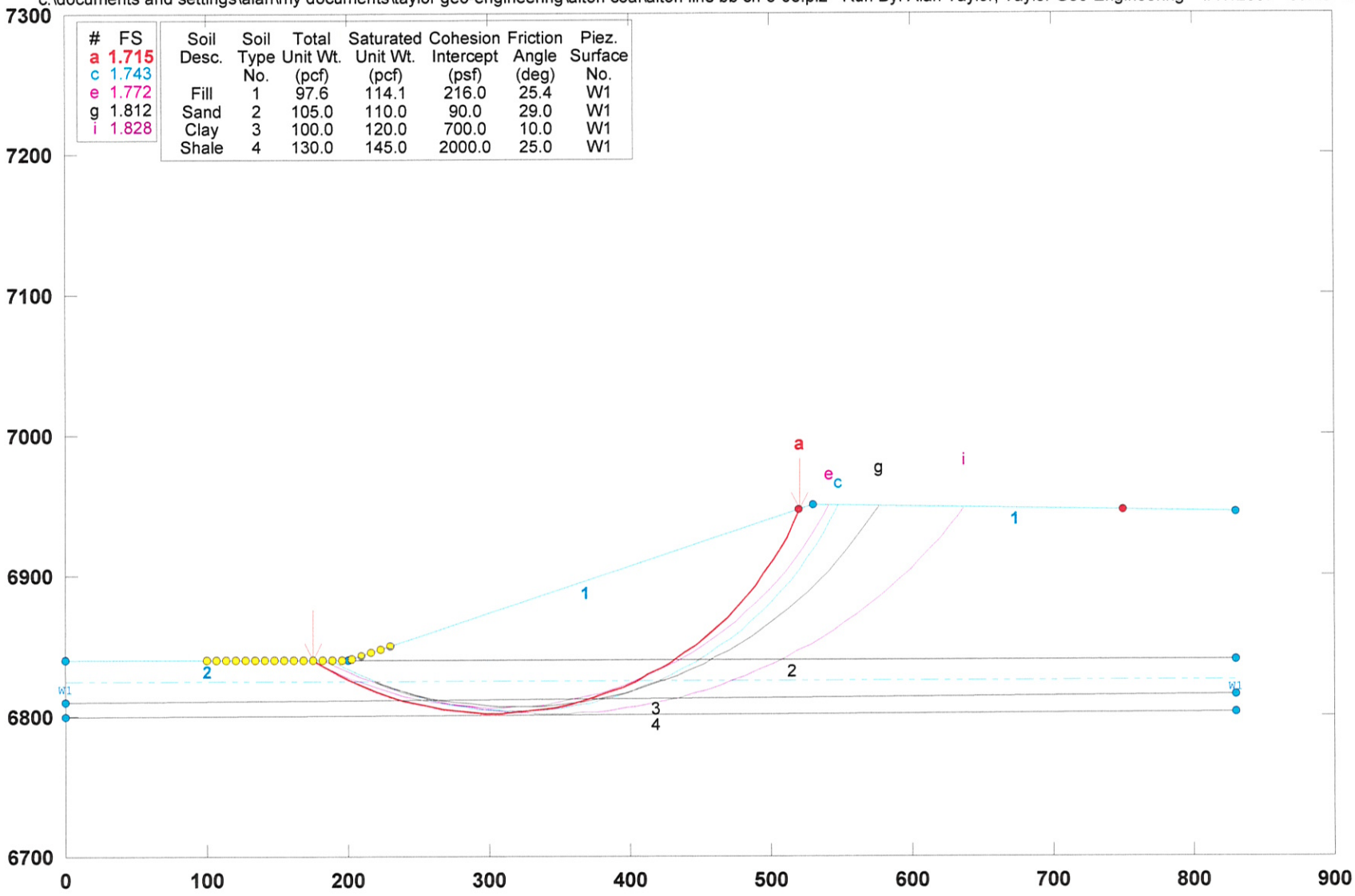
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 29

Alton Coal Hollow Stock Pile: Line B-B, Soil CH-5-98 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-5-98.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:25PM



#	FS
a	1.715
c	1.743
e	1.772
g	1.812
i	1.828

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	97.6	114.1	216.0	25.4	W1
Sand	2	105.0	110.0	90.0	29.0	W1
Clay	3	100.0	120.0	700.0	10.0	W1
Shale	4	130.0	145.0	2000.0	25.0	W1

GSTABL7 v.2 FSmin=1.715

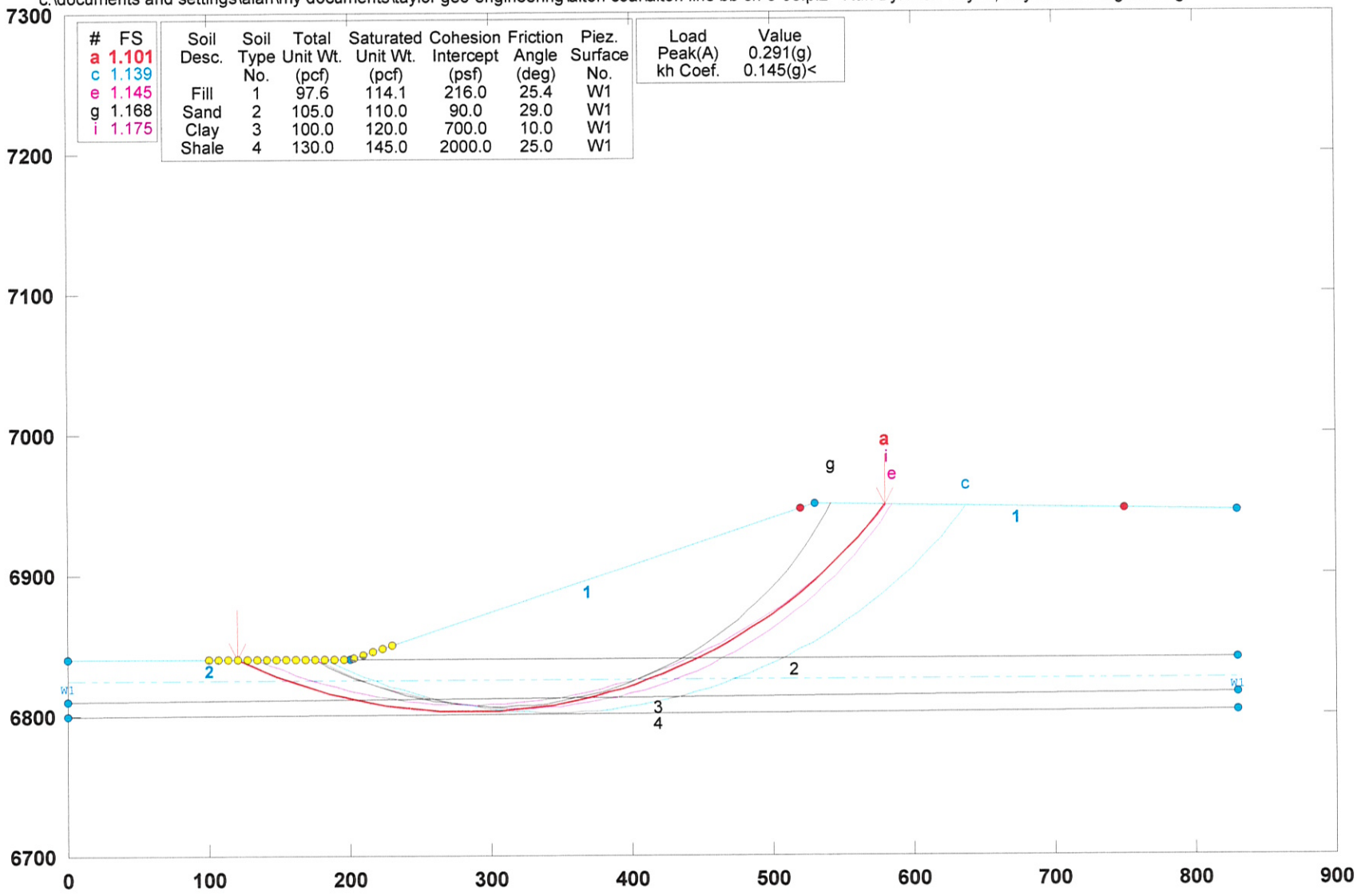
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 30

Alton Coal Hollow Stock Pile: Line B-B, Soil CH-5-98 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line bb ch-5-98.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 09:10PM



GSTABL7 v.2 FSmin=1.101

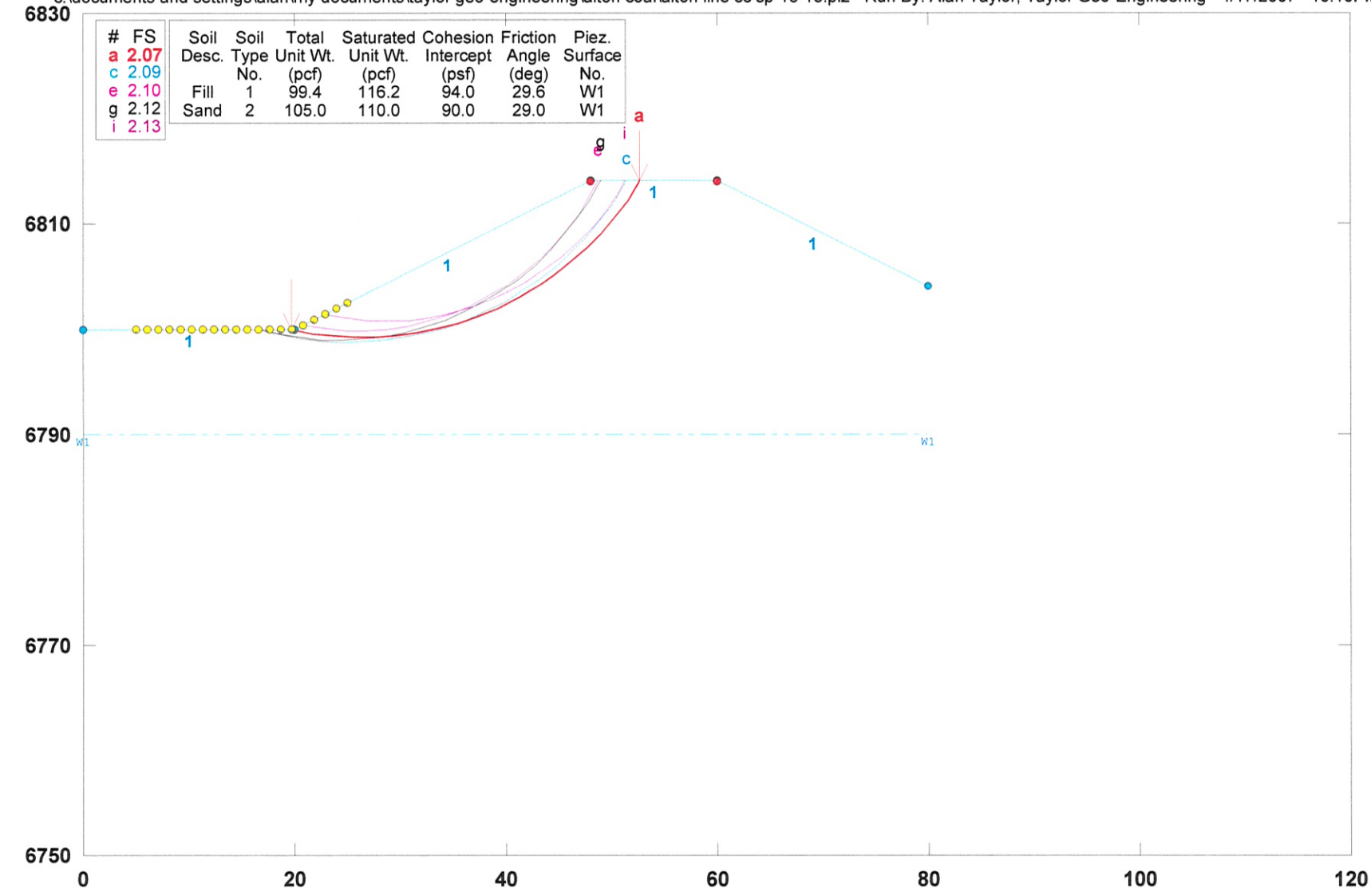
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 31

Alton Coal Hollow Sedimentation Pond 3: Line CC, Soil SP-16-13 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line cc sp-16-13.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 10:10PM



GSTABL7 v.2 FSmin=2.07

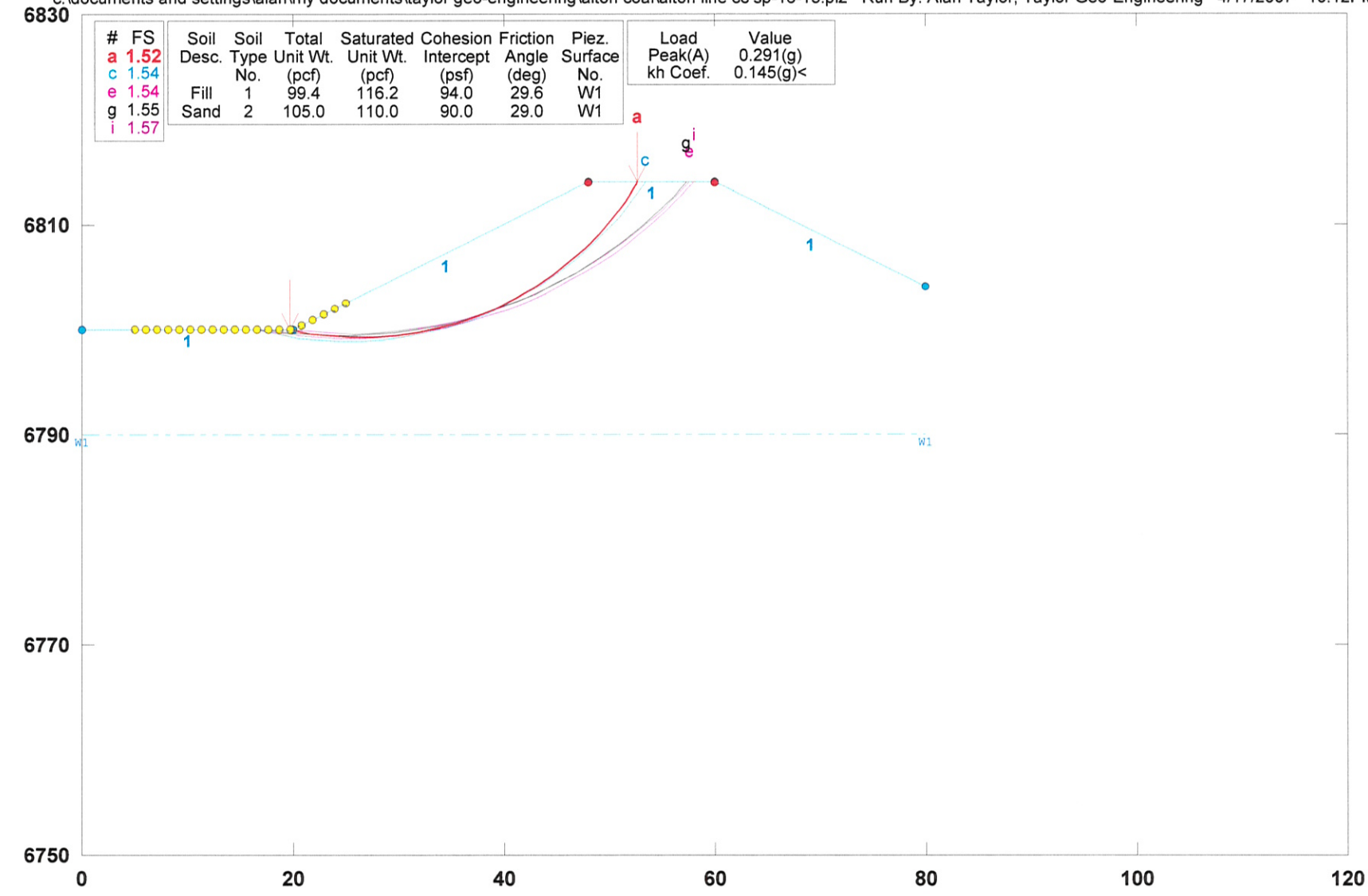
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 32

Alton Coal Hollow Sedimentation Pond 3: Line CC, Soil SP-16-13 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line cc sp-16-13.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/17/2007 10:12PM



GSTABL7 v.2 FSmin=1.52

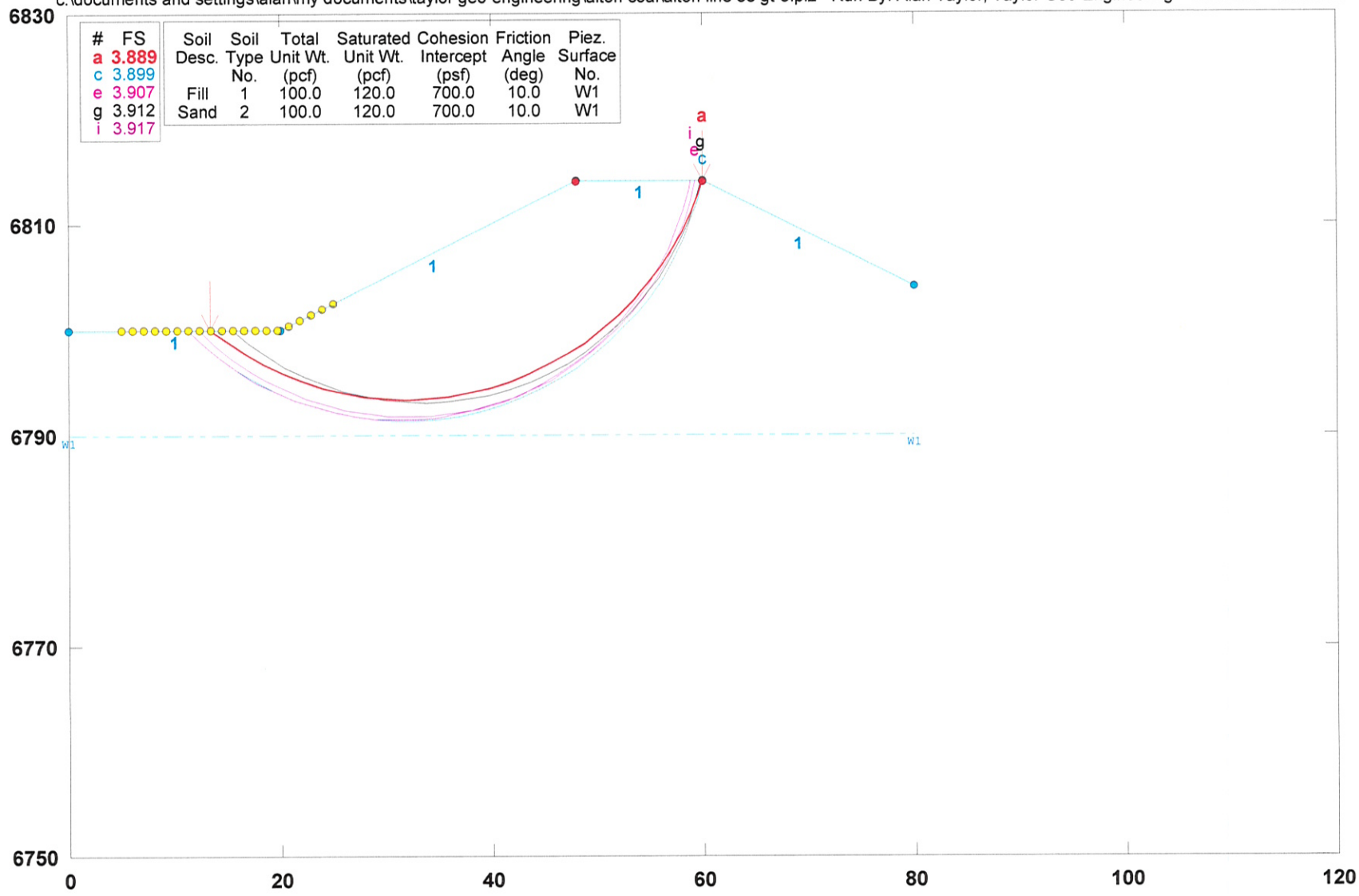
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 33

Alton Coal Hollow Sedimentation Pond 3: Line E-E, Soil GT-5 - Static

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line ee gt-5.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/23/2007 05:47AM



#	FS
a	3.889
c	3.899
e	3.907
g	3.912
i	3.917

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Fill	1	100.0	120.0	700.0	10.0	W1
Sand	2	100.0	120.0	700.0	10.0	W1

GSTABL7 v.2 FSmin=3.889

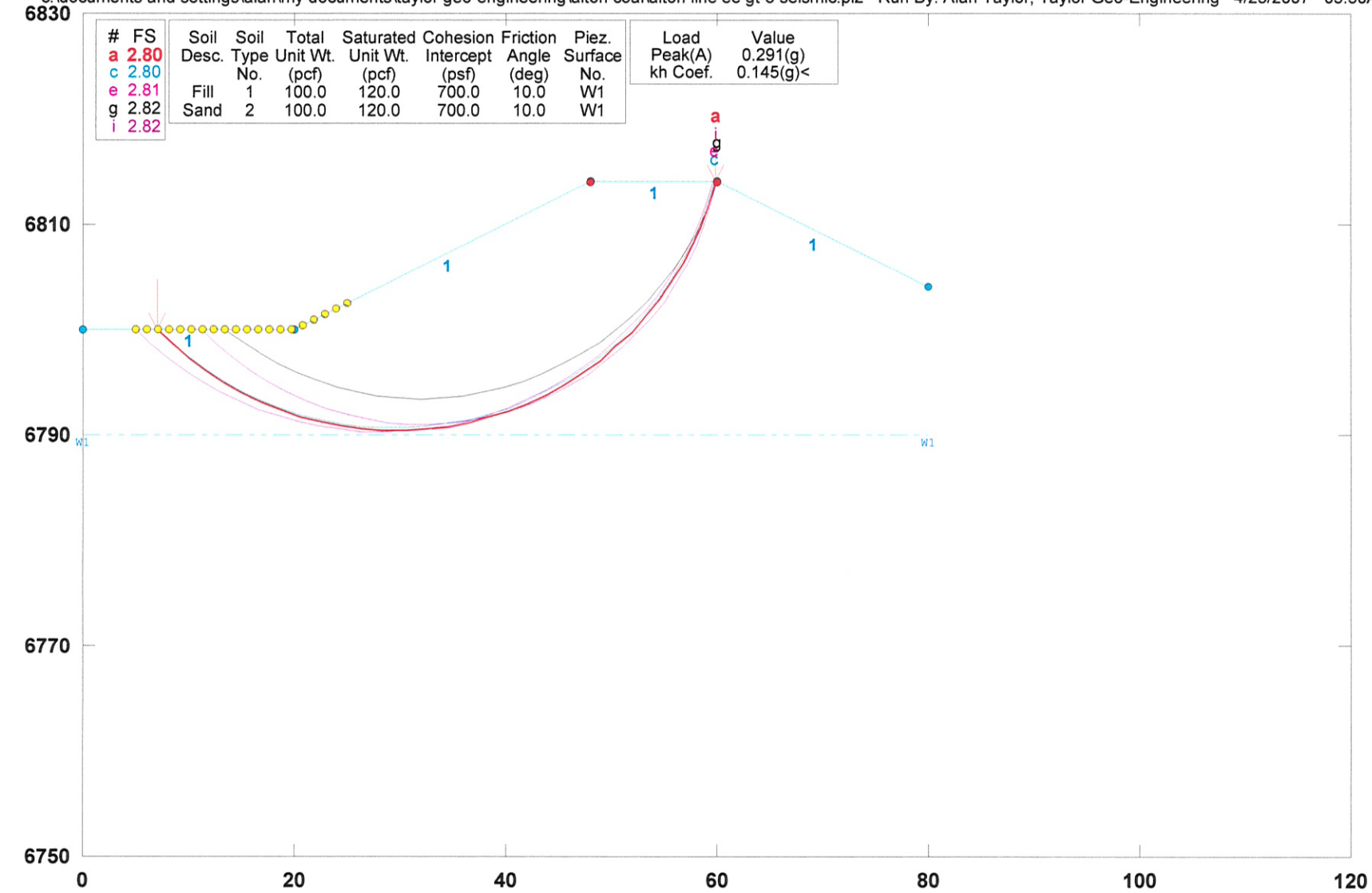
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 34

Alton Coal Hollow Sedimentation Pond 3: Line E-E, Soil GT-5 - Seismic

c:\documents and settings\alan\my documents\taylor geo-engineering\alton coal\alton line ee gt-5 seismic.pl2 Run By: Alan Taylor, Taylor Geo-Engineering 4/23/2007 05:50AM



GSTABL7 v.2 FSmin=2.80

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Figure 35

APPENDIX E-1

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE A-A, SOIL SAMPLE SET SP-16-13

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/23/2007
Time of Run: 06:35AM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil SP-16-13 - Static

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00

3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 300.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 3.276 FS Min = 1.818 FS Ave = 2.592
Standard Deviation = 0.390 Coefficient of Variation = 15.06 %
Failure Surface Specified By 48 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	263.158	6819.398
2	272.206	6815.141
3	281.384	6811.170
4	290.683	6807.492
5	300.093	6804.108
6	309.605	6801.023
7	319.210	6798.240
8	328.898	6795.762
9	338.660	6793.590
10	348.485	6791.728
11	358.364	6790.176
12	368.287	6788.938
13	378.244	6788.012
14	388.225	6787.402
15	398.221	6787.106
16	408.221	6787.127
17	418.215	6787.463
18	428.194	6788.114
19	438.147	6789.080
20	448.065	6790.359
21	457.937	6791.951
22	467.755	6793.853
23	477.507	6796.064
24	487.185	6798.583
25	496.779	6801.404
26	506.278	6804.528
27	515.675	6807.949
28	524.959	6811.666
29	534.120	6815.673
30	543.151	6819.967
31	552.042	6824.545
32	560.784	6829.401

33	569.368	6834.530
34	577.787	6839.928
35	586.030	6845.588
36	594.091	6851.506
37	601.961	6857.676
38	609.633	6864.090
39	617.098	6870.744
40	624.350	6877.629
41	631.381	6884.741
42	638.184	6892.070
43	644.752	6899.611
44	651.079	6907.355
45	657.158	6915.295
46	662.984	6923.423
47	668.550	6931.730
48	673.721	6940.000

Circle Center At X = 402.575 ; Y = 7103.919 ; and Radius = 316.843

Factor of Safety

*** 1.818 ***

Individual data on the 58 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2176.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.2	599.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	6.6	5017.4	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.4	1442.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.7	3342.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	6.6	10422.5	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.4	8699.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.0	11568.5	0.0	347.0	0.	0.	0.0	0.0	0.0
9	9.5	27113.7	0.0	2444.8	0.	0.	0.0	0.0	0.0
10	9.6	33837.3	0.0	4629.7	0.	0.	0.0	0.0	0.0
11	9.7	40321.4	0.0	6628.8	0.	0.	0.0	0.0	0.0
12	1.1	4964.5	0.0	866.6	0.	0.	0.0	0.0	0.0
13	8.7	41527.6	0.0	7443.5	0.	0.	0.0	0.0	0.0
14	9.8	52286.6	0.0	9572.6	0.	0.	0.0	0.0	0.0
15	9.9	57744.1	0.0	10637.9	0.	0.	0.0	0.0	0.0
16	9.9	62840.6	0.0	11508.6	0.	0.	0.0	0.0	0.0
17	10.0	67550.5	0.0	12183.8	0.	0.	0.0	0.0	0.0
18	10.0	71852.6	0.0	12662.8	0.	0.	0.0	0.0	0.0
19	10.0	75726.7	0.0	12945.3	0.	0.	0.0	0.0	0.0
20	1.8	13850.6	0.0	2319.7	0.	0.	0.0	0.0	0.0
21	8.2	65307.4	0.0	10711.4	0.	0.	0.0	0.0	0.0
22	10.0	82130.9	0.0	12920.0	0.	0.	0.0	0.0	0.0
23	10.0	84634.8	0.0	12611.9	0.	0.	0.0	0.0	0.0
24	10.0	86661.0	0.0	12107.7	0.	0.	0.0	0.0	0.0
25	9.9	88203.2	0.0	11407.2	0.	0.	0.0	0.0	0.0
26	9.9	89258.8	0.0	10511.4	0.	0.	0.0	0.0	0.0
27	9.8	89827.6	0.0	9421.2	0.	0.	0.0	0.0	0.0
28	9.8	89913.0	0.0	8137.9	0.	0.	0.0	0.0	0.0
29	9.7	89519.0	0.0	6662.3	0.	0.	0.0	0.0	0.0
30	9.6	88655.3	0.0	4996.2	0.	0.	0.0	0.0	0.0
31	3.2	29686.3	0.0	1283.6	0.	0.	0.0	0.0	0.0
32	6.3	57689.5	0.0	1931.9	0.	0.	0.0	0.0	0.0
33	9.4	85797.8	0.0	1507.6	0.	0.	0.0	0.0	0.0
34	2.9	26416.3	0.0	96.8	0.	0.	0.0	0.0	0.0
35	6.4	57516.4	0.0	0.0	0.	0.	0.0	0.0	0.0
36	4.7	42362.0	0.0	0.0	0.	0.	0.0	0.0	0.0
37	4.4	39702.3	0.0	0.0	0.	0.	0.0	0.0	0.0
38	9.0	79707.8	0.0	0.0	0.	0.	0.0	0.0	0.0
39	8.9	76975.8	0.0	0.0	0.	0.	0.0	0.0	0.0
40	2.2	18906.9	0.0	0.0	0.	0.	0.0	0.0	0.0
41	6.5	55074.8	0.0	0.0	0.	0.	0.0	0.0	0.0

42	8.6	70844.9	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.4	67442.0	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.2	63789.5	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.1	59915.1	0.0	0.0	0.	0.	0.0	0.0	0.0
46	7.9	55847.1	0.0	0.0	0.	0.	0.0	0.0	0.0
47	7.7	51616.2	0.0	0.0	0.	0.	0.0	0.0	0.0
48	7.5	47253.6	0.0	0.0	0.	0.	0.0	0.0	0.0
49	7.3	42790.6	0.0	0.0	0.	0.	0.0	0.0	0.0
50	7.0	38261.0	0.0	0.0	0.	0.	0.0	0.0	0.0
51	6.8	33698.9	0.0	0.0	0.	0.	0.0	0.0	0.0
52	1.8	8407.5	0.0	0.0	0.	0.	0.0	0.0	0.0
53	4.8	20356.9	0.0	0.0	0.	0.	0.0	0.0	0.0
54	6.3	22956.4	0.0	0.0	0.	0.	0.0	0.0	0.0
55	6.1	17321.3	0.0	0.0	0.	0.	0.0	0.0	0.0
56	5.8	11948.3	0.0	0.0	0.	0.	0.0	0.0	0.0
57	5.6	6871.2	0.0	0.0	0.	0.	0.0	0.0	0.0
58	5.2	2124.2	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/23/2007
Time of Run: 06:38AM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13 seismic.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13 seismic.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project sp-16-13 seismic.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil SP-16-13 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00

3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 300.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.028 FS Min = 1.171 FS Ave = 1.655
Standard Deviation = 0.231 Coefficient of Variation = 13.97 %
Failure Surface Specified By 54 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	263.158	6819.398
2	272.395	6815.568
3	281.724	6811.967
4	291.139	6808.597
5	300.635	6805.461
6	310.205	6802.562
7	319.844	6799.899
8	329.546	6797.476
9	339.305	6795.293
10	349.115	6793.352
11	358.970	6791.654
12	368.864	6790.201
13	378.790	6788.992
14	388.744	6788.029
15	398.718	6787.313
16	408.707	6786.844
17	418.705	6786.622
18	428.705	6786.646
19	438.701	6786.918
20	448.688	6787.438
21	458.658	6788.203
22	468.607	6789.215
23	478.527	6790.473
24	488.414	6791.976
25	498.260	6793.722
26	508.060	6795.712
27	517.808	6797.943
28	527.498	6800.415
29	537.124	6803.125
30	546.679	6806.072
31	556.159	6809.255
32	565.558	6812.671
33	574.869	6816.318

34	584.087	6820.195
35	593.206	6824.298
36	602.221	6828.626
37	611.127	6833.175
38	619.917	6837.942
39	628.587	6842.926
40	637.130	6848.123
41	645.543	6853.529
42	653.820	6859.141
43	661.955	6864.957
44	669.944	6870.971
45	677.782	6877.182
46	685.464	6883.584
47	692.985	6890.174
48	700.341	6896.948
49	707.527	6903.902
50	714.539	6911.032
51	721.373	6918.333
52	728.024	6925.800
53	734.489	6933.429
54	737.712	6937.429

Circle Center At X = 422.694 ; Y = 7190.977 ; and Radius = 404.379

Factor of Safety

*** 1.171 ***

Individual data on the 65 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.2	2017.5	0.0	0.0	0.	0.	292.5	0.0	0.0
2	2.2	1091.3	0.0	0.0	0.	0.	158.2	0.0	0.0
3	5.4	3733.9	0.0	0.0	0.	0.	541.4	0.0	0.0
4	1.7	1606.4	0.0	0.0	0.	0.	232.9	0.0	0.0
5	5.1	6168.7	0.0	0.0	0.	0.	894.5	0.0	0.0
6	4.4	6862.7	0.0	0.0	0.	0.	995.1	0.0	0.0
7	7.5	14791.5	0.0	0.0	0.	0.	2144.8	0.0	0.0
8	2.0	4555.5	0.0	50.7	0.	0.	660.5	0.0	0.0
9	9.6	25803.1	0.0	1566.1	0.	0.	3741.4	0.0	0.0
10	9.6	32309.0	0.0	3657.2	0.	0.	4684.8	0.0	0.0
11	9.7	38625.6	0.0	5602.3	0.	0.	5600.7	0.0	0.0
12	0.5	1952.3	0.0	305.8	0.	0.	283.1	0.0	0.0
13	9.3	42733.2	0.0	6941.4	0.	0.	6196.3	0.0	0.0
14	9.8	50450.4	0.0	8534.9	0.	0.	7315.3	0.0	0.0
15	9.9	55966.8	0.0	9670.2	0.	0.	8115.2	0.0	0.0
16	9.9	61217.4	0.0	10653.1	0.	0.	8876.5	0.0	0.0
17	9.9	66189.0	0.0	11484.0	0.	0.	9597.4	0.0	0.0
18	10.0	70863.6	0.0	12161.3	0.	0.	10275.2	0.0	0.0
19	10.0	75230.5	0.0	12685.3	0.	0.	10908.4	0.0	0.0
20	1.3	9960.2	0.0	1658.8	0.	0.	1444.2	0.0	0.0
21	8.7	69315.8	0.0	11396.3	0.	0.	10050.8	0.0	0.0
22	10.0	82990.1	0.0	13271.0	0.	0.	12033.6	0.0	0.0
23	10.0	86361.8	0.0	13332.5	0.	0.	12522.5	0.0	0.0
24	10.0	89384.0	0.0	13239.6	0.	0.	12960.7	0.0	0.0
25	10.0	92049.8	0.0	12993.1	0.	0.	13347.2	0.0	0.0
26	10.0	94352.1	0.0	12592.1	0.	0.	13681.1	0.0	0.0
27	9.9	96286.8	0.0	12037.3	0.	0.	13961.6	0.0	0.0
28	9.9	97851.6	0.0	11329.2	0.	0.	14188.5	0.0	0.0
29	9.9	99043.5	0.0	10467.8	0.	0.	14361.3	0.0	0.0
30	9.8	99863.8	0.0	9454.4	0.	0.	14480.2	0.0	0.0
31	1.7	17752.3	0.0	1562.1	0.	0.	2574.1	0.0	0.0
32	8.1	82629.1	0.0	6838.3	0.	0.	11981.2	0.0	0.0
33	9.7	100672.4	0.0	7442.6	0.	0.	14597.5	0.0	0.0
34	9.7	100598.2	0.0	6341.2	0.	0.	14586.7	0.0	0.0
35	9.6	100159.4	0.0	5088.3	0.	0.	14523.1	0.0	0.0
36	9.6	99360.5	0.0	3684.6	0.	0.	14407.3	0.0	0.0

37	9.5	98210.0	0.0	2131.3	0.	0.	14240.4	0.0	0.0
38	7.0	71784.9	0.0	488.2	0.	0.	10408.8	0.0	0.0
39	1.2	12808.6	0.0	0.0	0.	0.	1857.2	0.0	0.0
40	1.2	12137.9	0.0	0.0	0.	0.	1760.0	0.0	0.0
41	9.3	95194.0	0.0	0.0	0.	0.	13803.1	0.0	0.0
42	9.2	93437.2	0.0	0.0	0.	0.	13548.4	0.0	0.0
43	9.1	91393.0	0.0	0.0	0.	0.	13252.0	0.0	0.0
44	4.4	43305.4	0.0	0.0	0.	0.	6279.3	0.0	0.0
45	4.6	45794.8	0.0	0.0	0.	0.	6640.3	0.0	0.0
46	8.9	86706.6	0.0	0.0	0.	0.	12572.5	0.0	0.0
47	8.8	84092.6	0.0	0.0	0.	0.	12193.4	0.0	0.0
48	8.7	81245.5	0.0	0.0	0.	0.	11780.6	0.0	0.0
49	8.5	78180.9	0.0	0.0	0.	0.	11336.2	0.0	0.0
50	2.9	25796.4	0.0	0.0	0.	0.	3740.5	0.0	0.0
51	5.5	48607.1	0.0	0.0	0.	0.	7048.0	0.0	0.0
52	8.3	68802.1	0.0	0.0	0.	0.	9976.3	0.0	0.0
53	8.1	63008.9	0.0	0.0	0.	0.	9136.3	0.0	0.0
54	8.0	57181.0	0.0	0.0	0.	0.	8291.2	0.0	0.0
55	7.8	51338.9	0.0	0.0	0.	0.	7444.1	0.0	0.0
56	7.7	45504.1	0.0	0.0	0.	0.	6598.1	0.0	0.0
57	7.5	39697.9	0.0	0.0	0.	0.	5756.2	0.0	0.0
58	7.4	33941.6	0.0	0.0	0.	0.	4921.5	0.0	0.0
59	7.2	28257.5	0.0	0.0	0.	0.	4097.3	0.0	0.0
60	7.0	22666.4	0.0	0.0	0.	0.	3286.6	0.0	0.0
61	6.8	17191.0	0.0	0.0	0.	0.	2492.7	0.0	0.0
62	6.7	11851.9	0.0	0.0	0.	0.	1718.5	0.0	0.0
63	2.0	2558.8	0.0	0.0	0.	0.	371.0	0.0	0.0
64	4.5	3778.4	0.0	0.0	0.	0.	547.9	0.0	0.0
65	3.2	812.6	0.0	0.0	0.	0.	117.8	0.0	0.0

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

APPENDIX E-2

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE A-A, SOIL SAMPLE SET CH-1-3

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 07:47PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-1-3 - Static

BOUNDARY COORDINATES

4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	91.7	110.5	319.0	21.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 3.343 FS Min = 1.735 FS Ave = 2.609
Standard Deviation = 0.448 Coefficient of Variation = 17.18 %
Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	275.790	6819.850
2	285.751	6818.977
3	295.728	6818.287
4	305.715	6817.781
5	315.710	6817.459
6	325.709	6817.321
7	335.708	6817.367
8	345.706	6817.597
9	355.697	6818.010
10	365.679	6818.607
11	375.649	6819.388
12	385.602	6820.352
13	395.536	6821.499
14	405.448	6822.829
15	415.333	6824.340
16	425.188	6826.034
17	435.011	6827.908
18	444.798	6829.962
19	454.545	6832.197
20	464.249	6834.610
21	473.908	6837.201
22	483.517	6839.970
23	493.074	6842.915
24	502.574	6846.035
25	512.016	6849.329
26	521.396	6852.796
27	530.710	6856.436
28	539.956	6860.246
29	549.130	6864.225
30	558.229	6868.373
31	567.251	6872.687
32	576.191	6877.167
33	585.048	6881.810
34	593.818	6886.615
35	602.497	6891.581
36	611.085	6896.705
37	619.576	6901.987
38	627.969	6907.424
39	636.260	6913.014
40	644.447	6918.756
41	652.527	6924.648
42	660.497	6930.688

43 668.355 6936.873
44 672.182 6940.000

Circle Center At X = 328.234 ; Y = 7360.777 ; and Radius = 543.464

Factor of Safety
*** 1.735 ***

Individual data on the 46 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	114.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.8	976.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	4740.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	8449.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	11973.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	15305.5	0.0	0.0	0.	0.	0.0	0.0	0.0
7	10.0	18442.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	10.0	21378.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	10.0	24110.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	10.0	26635.4	0.0	0.0	0.	0.	0.0	0.0	0.0
11	10.0	28950.3	0.0	0.0	0.	0.	0.0	0.0	0.0
12	10.0	31053.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.9	32940.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.9	34612.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.2	617.3	0.0	0.0	0.	0.	0.0	0.0	0.0
16	9.7	35531.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.9	37566.1	0.0	0.0	0.	0.	0.0	0.0	0.0
18	9.8	38788.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.8	39815.8	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.7	40648.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.7	41287.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.7	41733.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.6	41988.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	9.6	42054.8	0.0	0.0	0.	0.	0.0	0.0	0.0
25	9.5	41934.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	9.4	41630.9	0.0	0.0	0.	0.	0.0	0.0	0.0
27	9.4	41147.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	9.3	40486.1	0.0	0.0	0.	0.	0.0	0.0	0.0
29	9.2	39653.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	9.2	38652.1	0.0	0.0	0.	0.	0.0	0.0	0.0
31	9.1	37488.0	0.0	0.0	0.	0.	0.0	0.0	0.0
32	9.0	36165.6	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.9	34690.6	0.0	0.0	0.	0.	0.0	0.0	0.0
34	8.9	33069.7	0.0	0.0	0.	0.	0.0	0.0	0.0
35	8.8	31308.8	0.0	0.0	0.	0.	0.0	0.0	0.0
36	8.7	29414.2	0.0	0.0	0.	0.	0.0	0.0	0.0
37	8.6	27392.7	0.0	0.0	0.	0.	0.0	0.0	0.0
38	8.5	25252.7	0.0	0.0	0.	0.	0.0	0.0	0.0
39	8.4	23000.6	0.0	0.0	0.	0.	0.0	0.0	0.0
40	8.3	20644.7	0.0	0.0	0.	0.	0.0	0.0	0.0
41	3.7	8591.5	0.0	0.0	0.	0.	0.0	0.0	0.0
42	4.4	9299.0	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.1	13557.7	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.0	9013.2	0.0	0.0	0.	0.	0.0	0.0	0.0
45	7.9	4481.8	0.0	0.0	0.	0.	0.0	0.0	0.0
46	3.8	548.6	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 07:51PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Coal Hollow Project CH-1-3.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-1-3 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	91.7	110.5	319.0	21.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.034 FS Min = 1.150 FS Ave = 1.651
Standard Deviation = 0.254 Coefficient of Variation = 15.38 %
Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	275.790	6819.850
2	284.919	6815.769
3	294.160	6811.948
4	303.506	6808.391
5	312.949	6805.100
6	322.482	6802.079
7	332.097	6799.330
8	341.785	6796.854
9	351.540	6794.654
10	361.354	6792.732
11	371.218	6791.089
12	381.125	6789.726
13	391.066	6788.645
14	401.034	6787.846
15	411.021	6787.331
16	421.018	6787.099
17	431.018	6787.150
18	441.012	6787.486
19	450.993	6788.104
20	460.952	6789.006
21	470.882	6790.189
22	480.774	6791.654
23	490.621	6793.399
24	500.414	6795.422
25	510.146	6797.723
26	519.809	6800.298
27	529.394	6803.147
28	538.895	6806.267
29	548.304	6809.654
30	557.613	6813.308
31	566.814	6817.224
32	575.901	6821.399
33	584.866	6825.830
34	593.701	6830.514
35	602.400	6835.446
36	610.955	6840.624
37	619.360	6846.042
38	627.608	6851.696
39	635.693	6857.582
40	643.607	6863.694
41	651.344	6870.029
42	658.899	6876.581
43	666.265	6883.345

44	673.436	6890.314
45	680.406	6897.485
46	687.171	6904.850
47	693.723	6912.404
48	700.059	6920.141
49	706.173	6928.055
50	712.059	6936.138
51	714.707	6940.000

Circle Center At X = 424.199 ; Y = 7139.575 ; and Radius = 352.491

Factor of Safety

*** 1.150 ***

Individual data on the 61 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	449.2	0.0	0.0	0.	0.	65.1	0.0	0.0
2	4.9	1990.9	0.0	0.0	0.	0.	288.7	0.0	0.0
3	1.9	1236.5	0.0	0.0	0.	0.	179.3	0.0	0.0
4	7.4	7839.2	0.0	0.0	0.	0.	1136.7	0.0	0.0
5	4.0	6285.0	0.0	0.0	0.	0.	911.3	0.0	0.0
6	5.3	10148.3	0.0	0.0	0.	0.	1471.5	0.0	0.0
7	4.8	10895.2	0.0	0.0	0.	0.	1579.8	0.0	0.0
8	4.6	11818.3	0.0	284.4	0.	0.	1713.6	0.0	0.0
9	9.5	29258.7	0.0	2287.9	0.	0.	4242.5	0.0	0.0
10	7.5	27403.9	0.0	3297.5	0.	0.	3973.6	0.0	0.0
11	2.1	8300.4	0.0	1139.0	0.	0.	1203.6	0.0	0.0
12	9.7	41854.6	0.0	6182.7	0.	0.	6068.9	0.0	0.0
13	9.8	47718.3	0.0	7641.2	0.	0.	6919.2	0.0	0.0
14	9.8	53309.0	0.0	8927.7	0.	0.	7729.8	0.0	0.0
15	9.9	58601.7	0.0	10040.0	0.	0.	8497.2	0.0	0.0
16	9.9	63575.5	0.0	10977.9	0.	0.	9218.4	0.0	0.0
17	9.9	68211.2	0.0	11740.2	0.	0.	9890.6	0.0	0.0
18	8.9	64788.3	0.0	11024.8	0.	0.	9394.3	0.0	0.0
19	1.0	7703.1	0.0	1301.9	0.	0.	1116.9	0.0	0.0
20	10.0	76399.9	0.0	12736.8	0.	0.	11078.0	0.0	0.0
21	10.0	79922.0	0.0	12969.9	0.	0.	11588.7	0.0	0.0
22	10.0	83046.6	0.0	13026.3	0.	0.	12041.8	0.0	0.0
23	10.0	85761.5	0.0	12905.4	0.	0.	12435.4	0.0	0.0
24	10.0	88061.3	0.0	12608.0	0.	0.	12768.9	0.0	0.0
25	10.0	89937.4	0.0	12133.6	0.	0.	13040.9	0.0	0.0
26	9.9	91386.7	0.0	11483.1	0.	0.	13251.1	0.0	0.0
27	9.9	92405.7	0.0	10656.7	0.	0.	13398.8	0.0	0.0
28	9.8	92995.7	0.0	9655.2	0.	0.	13484.4	0.0	0.0
29	9.4	89209.5	0.0	8146.9	0.	0.	12935.4	0.0	0.0
30	0.4	3948.8	0.0	332.7	0.	0.	572.6	0.0	0.0
31	9.7	93006.2	0.0	7315.5	0.	0.	13485.9	0.0	0.0
32	9.7	92533.5	0.0	6159.3	0.	0.	13417.4	0.0	0.0
33	9.6	91645.1	0.0	4829.6	0.	0.	13288.5	0.0	0.0
34	9.5	90351.0	0.0	3327.2	0.	0.	13100.9	0.0	0.0
35	9.4	88662.6	0.0	1654.1	0.	0.	12856.1	0.0	0.0
36	3.7	34960.6	0.0	155.7	0.	0.	5069.3	0.0	0.0
37	3.8	35181.5	0.0	0.0	0.	0.	5101.3	0.0	0.0
38	1.8	16549.7	0.0	0.0	0.	0.	2399.7	0.0	0.0
39	9.2	84669.8	0.0	0.0	0.	0.	12277.1	0.0	0.0
40	9.1	82308.6	0.0	0.0	0.	0.	11934.8	0.0	0.0
41	9.0	79641.6	0.0	0.0	0.	0.	11548.0	0.0	0.0
42	0.7	6507.3	0.0	0.0	0.	0.	943.6	0.0	0.0
43	8.1	70400.3	0.0	0.0	0.	0.	10208.0	0.0	0.0
44	8.7	74213.9	0.0	0.0	0.	0.	10761.0	0.0	0.0
45	8.6	71280.6	0.0	0.0	0.	0.	10335.7	0.0	0.0
46	8.4	68124.3	0.0	0.0	0.	0.	9878.0	0.0	0.0
47	8.2	64762.9	0.0	0.0	0.	0.	9390.6	0.0	0.0
48	8.1	61218.0	0.0	0.0	0.	0.	8876.6	0.0	0.0
49	4.3	31613.5	0.0	0.0	0.	0.	4584.0	0.0	0.0
50	3.6	25698.0	0.0	0.0	0.	0.	3726.2	0.0	0.0
51	7.7	51894.0	0.0	0.0	0.	0.	7524.6	0.0	0.0
52	7.6	46204.2	0.0	0.0	0.	0.	6699.6	0.0	0.0
53	7.4	40551.9	0.0	0.0	0.	0.	5880.0	0.0	0.0
54	7.2	34963.9	0.0	0.0	0.	0.	5069.8	0.0	0.0

55	7.0	29467.1	0.0	0.0	0.	0.	4272.7	0.0	0.0
56	6.8	24087.0	0.0	0.0	0.	0.	3492.6	0.0	0.0
57	6.6	18851.3	0.0	0.0	0.	0.	2733.4	0.0	0.0
58	6.3	13785.3	0.0	0.0	0.	0.	1998.9	0.0	0.0
59	6.1	8915.2	0.0	0.0	0.	0.	1292.7	0.0	0.0
60	5.9	4266.3	0.0	0.0	0.	0.	618.6	0.0	0.0
61	2.6	468.9	0.0	0.0	0.	0.	68.0	0.0	0.0

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

APPENDIX E-3

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE A-A, SOIL SAMPLE SET CH-5-48

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 07:56PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-5-48 - Static

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	89.5	107.5	321.0	20.1	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 3.374 FS Min = 1.668 FS Ave = 2.615
Standard Deviation = 0.471 Coefficient of Variation = 18.03 %
Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	275.790	6819.850
2	285.751	6818.977
3	295.728	6818.287
4	305.715	6817.781
5	315.710	6817.459
6	325.709	6817.321
7	335.708	6817.367
8	345.706	6817.597
9	355.697	6818.010
10	365.679	6818.607
11	375.649	6819.388
12	385.602	6820.352
13	395.536	6821.499
14	405.448	6822.829
15	415.333	6824.340
16	425.188	6826.034
17	435.011	6827.908
18	444.798	6829.962
19	454.545	6832.197
20	464.249	6834.610
21	473.908	6837.201
22	483.517	6839.970
23	493.074	6842.915
24	502.574	6846.035
25	512.016	6849.329
26	521.396	6852.796
27	530.710	6856.436
28	539.956	6860.246
29	549.130	6864.225
30	558.229	6868.373
31	567.251	6872.687
32	576.191	6877.167
33	585.048	6881.810
34	593.818	6886.615
35	602.497	6891.581
36	611.085	6896.705
37	619.576	6901.987
38	627.969	6907.424
39	636.260	6913.014
40	644.447	6918.756
41	652.527	6924.648
42	660.497	6930.688

43 668.355 6936.873
44 672.182 6940.000
Circle Center At X = 328.234 ; Y = 7360.777 ; and Radius = 543.464
Factor of Safety
*** 1.668 ***
Individual data on the 46 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	114.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.8	965.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	4667.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	8308.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	11763.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	15027.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	10.0	18095.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	10.0	20963.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	10.0	23627.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	10.0	26085.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	10.0	28332.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	10.0	30368.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.9	32190.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.9	33796.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.2	602.5	0.0	0.0	0.	0.	0.0	0.0	0.0
16	9.7	34679.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.9	36664.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	9.8	37857.9	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.8	38860.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.7	39673.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.7	40296.8	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.7	40732.4	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.6	40981.4	0.0	0.0	0.	0.	0.0	0.0	0.0
24	9.6	41045.9	0.0	0.0	0.	0.	0.0	0.0	0.0
25	9.5	40928.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	9.4	40632.1	0.0	0.0	0.	0.	0.0	0.0	0.0
27	9.4	40159.8	0.0	0.0	0.	0.	0.0	0.0	0.0
28	9.3	39514.8	0.0	0.0	0.	0.	0.0	0.0	0.0
29	9.2	38701.8	0.0	0.0	0.	0.	0.0	0.0	0.0
30	9.2	37724.8	0.0	0.0	0.	0.	0.0	0.0	0.0
31	9.1	36588.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	9.0	35297.9	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.9	33858.4	0.0	0.0	0.	0.	0.0	0.0	0.0
34	8.9	32276.3	0.0	0.0	0.	0.	0.0	0.0	0.0
35	8.8	30557.6	0.0	0.0	0.	0.	0.0	0.0	0.0
36	8.7	28708.5	0.0	0.0	0.	0.	0.0	0.0	0.0
37	8.6	26735.5	0.0	0.0	0.	0.	0.0	0.0	0.0
38	8.5	24646.8	0.0	0.0	0.	0.	0.0	0.0	0.0
39	8.4	22448.7	0.0	0.0	0.	0.	0.0	0.0	0.0
40	8.3	20149.4	0.0	0.0	0.	0.	0.0	0.0	0.0
41	3.7	8385.4	0.0	0.0	0.	0.	0.0	0.0	0.0
42	4.4	9075.9	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.1	13232.4	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.0	8797.0	0.0	0.0	0.	0.	0.0	0.0	0.0
45	7.9	4374.2	0.0	0.0	0.	0.	0.0	0.0	0.0
46	3.8	535.4	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 07:59PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-48.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-5-48 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	89.5	107.5	321.0	20.1	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.043 FS Min = 1.108 FS Ave = 1.650
Standard Deviation = 0.265 Coefficient of Variation = 16.05 %
Failure Surface Specified By 48 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	280.000	6820.000
2	289.999	6819.828
3	299.998	6819.778
4	309.998	6819.851
5	319.996	6820.046
6	329.991	6820.365
7	339.981	6820.806
8	349.966	6821.369
9	359.942	6822.055
10	369.909	6822.863
11	379.866	6823.793
12	389.810	6824.845
13	399.741	6826.020
14	409.657	6827.315
15	419.556	6828.733
16	429.437	6830.272
17	439.298	6831.932
18	449.138	6833.713
19	458.956	6835.614
20	468.749	6837.636
21	478.517	6839.778
22	488.258	6842.039
23	497.971	6844.420
24	507.653	6846.920
25	517.304	6849.538
26	526.922	6852.274
27	536.506	6855.129
28	546.055	6858.101
29	555.566	6861.189
30	565.038	6864.394
31	574.471	6867.715
32	583.862	6871.151
33	593.210	6874.703
34	602.514	6878.369
35	611.772	6882.148
36	620.983	6886.042
37	630.146	6890.047
38	639.258	6894.165
39	648.320	6898.395
40	657.329	6902.735
41	666.284	6907.185
42	675.184	6911.745
43	684.027	6916.414

44	692.812	6921.191
45	701.539	6926.075
46	710.204	6931.066
47	718.808	6936.163
48	725.107	6940.000

Circle Center At X = 299.074 ; Y = 7634.754 ; and Radius = 814.977

Factor of Safety

*** 1.108 ***

Individual data on the 49 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	1599.7	0.0	0.0	0.	0.	232.0	0.0	0.0
2	10.0	4734.5	0.0	0.0	0.	0.	686.5	0.0	0.0
3	10.0	7741.3	0.0	0.0	0.	0.	1122.5	0.0	0.0
4	10.0	10616.2	0.0	0.0	0.	0.	1539.4	0.0	0.0
5	10.0	13359.1	0.0	0.0	0.	0.	1937.1	0.0	0.0
6	10.0	15967.5	0.0	0.0	0.	0.	2315.3	0.0	0.0
7	10.0	18441.4	0.0	0.0	0.	0.	2674.0	0.0	0.0
8	4.8	9722.6	0.0	0.0	0.	0.	1409.8	0.0	0.0
9	5.2	11065.7	0.0	0.0	0.	0.	1604.5	0.0	0.0
10	10.0	23059.7	0.0	0.0	0.	0.	3343.7	0.0	0.0
11	10.0	25220.2	0.0	0.0	0.	0.	3656.9	0.0	0.0
12	9.9	27258.9	0.0	0.0	0.	0.	3952.5	0.0	0.0
13	9.9	29176.6	0.0	0.0	0.	0.	4230.6	0.0	0.0
14	9.9	30971.1	0.0	0.0	0.	0.	4490.8	0.0	0.0
15	9.9	32643.0	0.0	0.0	0.	0.	4733.2	0.0	0.0
16	9.9	34191.2	0.0	0.0	0.	0.	4957.7	0.0	0.0
17	9.9	35615.2	0.0	0.0	0.	0.	5164.2	0.0	0.0
18	9.8	36916.0	0.0	0.0	0.	0.	5352.8	0.0	0.0
19	9.8	38092.2	0.0	0.0	0.	0.	5523.4	0.0	0.0
20	9.8	39144.1	0.0	0.0	0.	0.	5675.9	0.0	0.0
21	9.8	40072.5	0.0	0.0	0.	0.	5810.5	0.0	0.0
22	9.7	40876.9	0.0	0.0	0.	0.	5927.2	0.0	0.0
23	9.7	41558.4	0.0	0.0	0.	0.	6026.0	0.0	0.0
24	9.7	42116.6	0.0	0.0	0.	0.	6106.9	0.0	0.0
25	9.7	42552.8	0.0	0.0	0.	0.	6170.1	0.0	0.0
26	9.6	42868.2	0.0	0.0	0.	0.	6215.9	0.0	0.0
27	9.6	43062.6	0.0	0.0	0.	0.	6244.1	0.0	0.0
28	9.5	43137.6	0.0	0.0	0.	0.	6255.0	0.0	0.0
29	9.5	43094.4	0.0	0.0	0.	0.	6248.7	0.0	0.0
30	9.5	42934.1	0.0	0.0	0.	0.	6225.4	0.0	0.0
31	9.4	42658.2	0.0	0.0	0.	0.	6185.4	0.0	0.0
32	9.4	42267.6	0.0	0.0	0.	0.	6128.8	0.0	0.0
33	9.3	41764.4	0.0	0.0	0.	0.	6055.8	0.0	0.0
34	9.3	41150.4	0.0	0.0	0.	0.	5966.8	0.0	0.0
35	9.3	40426.6	0.0	0.0	0.	0.	5861.9	0.0	0.0
36	9.2	39596.3	0.0	0.0	0.	0.	5741.5	0.0	0.0
37	9.2	38660.4	0.0	0.0	0.	0.	5605.8	0.0	0.0
38	9.1	37621.3	0.0	0.0	0.	0.	5455.1	0.0	0.0
39	0.7	3022.9	0.0	0.0	0.	0.	438.3	0.0	0.0
40	8.3	32426.9	0.0	0.0	0.	0.	4701.9	0.0	0.0
41	9.0	31797.2	0.0	0.0	0.	0.	4610.6	0.0	0.0
42	9.0	28084.1	0.0	0.0	0.	0.	4072.2	0.0	0.0
43	8.9	24322.3	0.0	0.0	0.	0.	3526.7	0.0	0.0
44	8.8	20515.3	0.0	0.0	0.	0.	2974.7	0.0	0.0
45	8.8	16667.0	0.0	0.0	0.	0.	2416.7	0.0	0.0
46	8.7	12782.5	0.0	0.0	0.	0.	1853.5	0.0	0.0
47	8.7	8864.0	0.0	0.0	0.	0.	1285.3	0.0	0.0
48	8.6	4917.1	0.0	0.0	0.	0.	713.0	0.0	0.0
49	6.3	1082.0	0.0	0.0	0.	0.	156.9	0.0	0.0

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

APPENDIX E-4

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE A-A, SOIL SAMPLE SET CH-5-98

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/18/2007
Time of Run: 08:46AM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-5-98 - Static

BOUNDARY COORDINATES
4 Top Boundaries

14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	97.6	114.1	216.0	25.4	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 3.258 FS Min = 1.769 FS Ave = 2.574
Standard Deviation = 0.404 Coefficient of Variation = 15.70 %
Failure Surface Specified By 51 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	275.790	6819.850
2	284.919	6815.769
3	294.160	6811.948
4	303.506	6808.391
5	312.949	6805.100
6	322.482	6802.079
7	332.097	6799.330
8	341.785	6796.854
9	351.540	6794.654
10	361.354	6792.732
11	371.218	6791.089
12	381.125	6789.726
13	391.066	6788.645
14	401.034	6787.846
15	411.021	6787.331
16	421.018	6787.099
17	431.018	6787.150
18	441.012	6787.486
19	450.993	6788.104
20	460.952	6789.006
21	470.882	6790.189
22	480.774	6791.654
23	490.621	6793.399
24	500.414	6795.422
25	510.146	6797.723
26	519.809	6800.298
27	529.394	6803.147
28	538.895	6806.267
29	548.304	6809.654
30	557.613	6813.308
31	566.814	6817.224
32	575.901	6821.399
33	584.866	6825.830
34	593.701	6830.514
35	602.400	6835.446
36	610.955	6840.624
37	619.360	6846.042
38	627.608	6851.696
39	635.693	6857.582
40	643.607	6863.694
41	651.344	6870.029
42	658.899	6876.581
43	666.265	6883.345
44	673.436	6890.314
45	680.406	6897.485
46	687.171	6904.850
47	693.723	6912.404
48	700.059	6920.141
49	706.173	6928.055
50	712.059	6936.138
51	714.707	6940.000

Circle Center At X = 424.199 ; Y = 7139.575 ; and Radius = 352.491

Factor of Safety

*** 1.769 ***

Individual data on the 61 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	449.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.9	2013.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.9	1256.4	0.0	0.0	0.	0.	0.0	0.0	0.0
4	7.4	7980.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.0	6404.5	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.3	10351.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.8	11125.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.6	12076.4	0.0	284.4	0.	0.	0.0	0.0	0.0
9	9.5	29917.6	0.0	2287.9	0.	0.	0.0	0.0	0.0
10	7.5	28041.0	0.0	3297.5	0.	0.	0.0	0.0	0.0

11	2.1	8496.5	0.0	1139.0	0.	0.	0.0	0.0	0.0
12	9.7	42865.6	0.0	6182.7	0.	0.	0.0	0.0	0.0
13	9.8	48910.0	0.0	7641.2	0.	0.	0.0	0.0	0.0
14	9.8	54683.8	0.0	8927.7	0.	0.	0.0	0.0	0.0
15	9.9	60161.4	0.0	10040.0	0.	0.	0.0	0.0	0.0
16	9.9	65321.5	0.0	10977.9	0.	0.	0.0	0.0	0.0
17	9.9	70144.1	0.0	11740.2	0.	0.	0.0	0.0	0.0
18	8.9	66679.8	0.0	11024.8	0.	0.	0.0	0.0	0.0
19	1.0	7931.5	0.0	1301.9	0.	0.	0.0	0.0	0.0
20	10.0	78706.4	0.0	12736.8	0.	0.	0.0	0.0	0.0
21	10.0	82414.0	0.0	12969.9	0.	0.	0.0	0.0	0.0
22	10.0	85722.5	0.0	13026.3	0.	0.	0.0	0.0	0.0
23	10.0	88619.0	0.0	12905.4	0.	0.	0.0	0.0	0.0
24	10.0	91097.6	0.0	12608.0	0.	0.	0.0	0.0	0.0
25	10.0	93149.1	0.0	12133.6	0.	0.	0.0	0.0	0.0
26	9.9	94769.8	0.0	11483.1	0.	0.	0.0	0.0	0.0
27	9.9	95955.6	0.0	10656.7	0.	0.	0.0	0.0	0.0
28	9.8	96707.4	0.0	9655.2	0.	0.	0.0	0.0	0.0
29	9.4	92910.2	0.0	8146.9	0.	0.	0.0	0.0	0.0
30	0.4	4115.9	0.0	332.7	0.	0.	0.0	0.0	0.0
31	9.7	97026.5	0.0	7315.5	0.	0.	0.0	0.0	0.0
32	9.7	96701.6	0.0	6159.3	0.	0.	0.0	0.0	0.0
33	9.6	95953.7	0.0	4829.6	0.	0.	0.0	0.0	0.0
34	9.5	94792.2	0.0	3327.2	0.	0.	0.0	0.0	0.0
35	9.4	93228.1	0.0	1654.1	0.	0.	0.0	0.0	0.0
36	3.7	36822.5	0.0	155.7	0.	0.	0.0	0.0	0.0
37	3.8	37090.7	0.0	0.0	0.	0.	0.0	0.0	0.0
38	1.8	17459.6	0.0	0.0	0.	0.	0.0	0.0	0.0
39	9.2	89457.2	0.0	0.0	0.	0.	0.0	0.0	0.0
40	9.1	87192.6	0.0	0.0	0.	0.	0.0	0.0	0.0
41	9.0	84612.3	0.0	0.0	0.	0.	0.0	0.0	0.0
42	0.7	6925.0	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.1	74929.8	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.7	78988.8	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.6	75866.8	0.0	0.0	0.	0.	0.0	0.0	0.0
46	8.4	72507.4	0.0	0.0	0.	0.	0.0	0.0	0.0
47	8.2	68929.7	0.0	0.0	0.	0.	0.0	0.0	0.0
48	8.1	65156.8	0.0	0.0	0.	0.	0.0	0.0	0.0
49	4.3	33647.6	0.0	0.0	0.	0.	0.0	0.0	0.0
50	3.6	27351.4	0.0	0.0	0.	0.	0.0	0.0	0.0
51	7.7	55232.8	0.0	0.0	0.	0.	0.0	0.0	0.0
52	7.6	49177.0	0.0	0.0	0.	0.	0.0	0.0	0.0
53	7.4	43161.1	0.0	0.0	0.	0.	0.0	0.0	0.0
54	7.2	37213.5	0.0	0.0	0.	0.	0.0	0.0	0.0
55	7.0	31363.0	0.0	0.0	0.	0.	0.0	0.0	0.0
56	6.8	25636.8	0.0	0.0	0.	0.	0.0	0.0	0.0
57	6.6	20064.2	0.0	0.0	0.	0.	0.0	0.0	0.0
58	6.3	14672.2	0.0	0.0	0.	0.	0.0	0.0	0.0
59	6.1	9488.8	0.0	0.0	0.	0.	0.0	0.0	0.0
60	5.9	4540.8	0.0	0.0	0.	0.	0.0	0.0	0.0
61	2.6	499.1	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 08:01PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton coal hollow project ch-5-98.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line A-A, Soil CH-5-98 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6810.00	280.00	6820.00	2
2	280.00	6820.00	640.00	6940.00	1
3	640.00	6940.00	730.00	6940.00	1
4	730.00	6940.00	880.00	6890.00	1
5	280.00	6820.00	500.00	6825.00	2
6	500.00	6825.00	850.00	6830.00	2
7	100.00	6805.00	280.00	6815.00	5
8	280.00	6815.00	500.00	6815.00	5
9	0.00	6800.00	100.00	6805.00	3
10	100.00	6805.00	280.00	6810.00	3
11	280.00	6810.00	500.00	6815.00	3
12	500.00	6815.00	850.00	6800.00	3
13	0.00	6780.00	500.00	6787.00	4
14	500.00	6787.00	850.00	6792.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	97.6	114.1	216.0	25.4	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	2500.0	0.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1
5	140.0	145.0	1000.0	45.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 7 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6795.00
2	280.00	6805.00
3	330.00	6808.00
4	400.00	6808.00
5	500.00	6808.00
6	700.00	6820.00
7	800.00	6820.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 200.00(ft)
and X = 280.00(ft)
Each Surface Terminates Between X = 640.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.007 FS Min = 1.143 FS Ave = 1.641
Standard Deviation = 0.236 Coefficient of Variation = 14.37 %
Failure Surface Specified By 51 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	275.790	6819.850
2	284.919	6815.769
3	294.160	6811.948
4	303.506	6808.391
5	312.949	6805.100
6	322.482	6802.079
7	332.097	6799.330
8	341.785	6796.854
9	351.540	6794.654
10	361.354	6792.732
11	371.218	6791.089
12	381.125	6789.726
13	391.066	6788.645
14	401.034	6787.846
15	411.021	6787.331
16	421.018	6787.099
17	431.018	6787.150
18	441.012	6787.486
19	450.993	6788.104
20	460.952	6789.006
21	470.882	6790.189
22	480.774	6791.654
23	490.621	6793.399
24	500.414	6795.422
25	510.146	6797.723
26	519.809	6800.298
27	529.394	6803.147
28	538.895	6806.267
29	548.304	6809.654
30	557.613	6813.308
31	566.814	6817.224
32	575.901	6821.399
33	584.866	6825.830
34	593.701	6830.514
35	602.400	6835.446
36	610.955	6840.624
37	619.360	6846.042
38	627.608	6851.696
39	635.693	6857.582
40	643.607	6863.694
41	651.344	6870.029
42	658.899	6876.581
43	666.265	6883.345

44	673.436	6890.314
45	680.406	6897.485
46	687.171	6904.850
47	693.723	6912.404
48	700.059	6920.141
49	706.173	6928.055
50	712.059	6936.138
51	714.707	6940.000

Circle Center At X = 424.199 ; Y = 7139.575 ; and Radius = 352.491

Factor of Safety

*** 1.143 ***

Individual data on the 61 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.2	449.2	0.0	0.0	0.	0.	65.1	0.0	0.0
2	4.9	2013.1	0.0	0.0	0.	0.	291.9	0.0	0.0
3	1.9	1256.4	0.0	0.0	0.	0.	182.2	0.0	0.0
4	7.4	7980.8	0.0	0.0	0.	0.	1157.2	0.0	0.0
5	4.0	6404.5	0.0	0.0	0.	0.	928.6	0.0	0.0
6	5.3	10351.4	0.0	0.0	0.	0.	1500.9	0.0	0.0
7	4.8	11125.6	0.0	0.0	0.	0.	1613.2	0.0	0.0
8	4.6	12076.4	0.0	284.4	0.	0.	1751.1	0.0	0.0
9	9.5	29917.6	0.0	2287.9	0.	0.	4338.1	0.0	0.0
10	7.5	28041.0	0.0	3297.5	0.	0.	4065.9	0.0	0.0
11	2.1	8496.5	0.0	1139.0	0.	0.	1232.0	0.0	0.0
12	9.7	42865.6	0.0	6182.7	0.	0.	6215.5	0.0	0.0
13	9.8	48910.0	0.0	7641.2	0.	0.	7091.9	0.0	0.0
14	9.8	54683.8	0.0	8927.7	0.	0.	7929.2	0.0	0.0
15	9.9	60161.4	0.0	10040.0	0.	0.	8723.4	0.0	0.0
16	9.9	65321.5	0.0	10977.9	0.	0.	9471.6	0.0	0.0
17	9.9	70144.1	0.0	11740.2	0.	0.	10170.9	0.0	0.0
18	8.9	66679.8	0.0	11024.8	0.	0.	9668.6	0.0	0.0
19	1.0	7931.5	0.0	1301.9	0.	0.	1150.1	0.0	0.0
20	10.0	78706.4	0.0	12736.8	0.	0.	11412.4	0.0	0.0
21	10.0	82414.0	0.0	12969.9	0.	0.	11950.0	0.0	0.0
22	10.0	85722.5	0.0	13026.3	0.	0.	12429.8	0.0	0.0
23	10.0	88619.0	0.0	12905.4	0.	0.	12849.8	0.0	0.0
24	10.0	91097.6	0.0	12608.0	0.	0.	13209.2	0.0	0.0
25	10.0	93149.1	0.0	12133.6	0.	0.	13506.6	0.0	0.0
26	9.9	94769.8	0.0	11483.1	0.	0.	13741.6	0.0	0.0
27	9.9	95955.6	0.0	10656.7	0.	0.	13913.6	0.0	0.0
28	9.8	96707.4	0.0	9655.2	0.	0.	14022.6	0.0	0.0
29	9.4	92910.2	0.0	8146.9	0.	0.	13472.0	0.0	0.0
30	0.4	4115.9	0.0	332.7	0.	0.	596.8	0.0	0.0
31	9.7	97026.5	0.0	7315.5	0.	0.	14068.8	0.0	0.0
32	9.7	96701.6	0.0	6159.3	0.	0.	14021.7	0.0	0.0
33	9.6	95953.7	0.0	4829.6	0.	0.	13913.3	0.0	0.0
34	9.5	94792.2	0.0	3327.2	0.	0.	13744.9	0.0	0.0
35	9.4	93228.1	0.0	1654.1	0.	0.	13518.1	0.0	0.0
36	3.7	36822.5	0.0	155.7	0.	0.	5339.3	0.0	0.0
37	3.8	37090.7	0.0	0.0	0.	0.	5378.2	0.0	0.0
38	1.8	17459.6	0.0	0.0	0.	0.	2531.6	0.0	0.0
39	9.2	89457.2	0.0	0.0	0.	0.	12971.3	0.0	0.0
40	9.1	87192.6	0.0	0.0	0.	0.	12642.9	0.0	0.0
41	9.0	84612.3	0.0	0.0	0.	0.	12268.8	0.0	0.0
42	0.7	6925.0	0.0	0.0	0.	0.	1004.1	0.0	0.0
43	8.1	74929.8	0.0	0.0	0.	0.	10864.8	0.0	0.0
44	8.7	78988.8	0.0	0.0	0.	0.	11453.4	0.0	0.0
45	8.6	75866.8	0.0	0.0	0.	0.	11000.7	0.0	0.0
46	8.4	72507.4	0.0	0.0	0.	0.	10513.6	0.0	0.0
47	8.2	68929.7	0.0	0.0	0.	0.	9994.8	0.0	0.0
48	8.1	65156.8	0.0	0.0	0.	0.	9447.7	0.0	0.0
49	4.3	33647.6	0.0	0.0	0.	0.	4878.9	0.0	0.0
50	3.6	27351.4	0.0	0.0	0.	0.	3966.0	0.0	0.0
51	7.7	55232.8	0.0	0.0	0.	0.	8008.8	0.0	0.0
52	7.6	49177.0	0.0	0.0	0.	0.	7130.7	0.0	0.0
53	7.4	43161.1	0.0	0.0	0.	0.	6258.4	0.0	0.0
54	7.2	37213.5	0.0	0.0	0.	0.	5396.0	0.0	0.0

55	7.0	31363.0	0.0	0.0	0.	0.	4547.6	0.0	0.0
56	6.8	25636.8	0.0	0.0	0.	0.	3717.3	0.0	0.0
57	6.6	20064.2	0.0	0.0	0.	0.	2909.3	0.0	0.0
58	6.3	14672.2	0.0	0.0	0.	0.	2127.5	0.0	0.0
59	6.1	9488.8	0.0	0.0	0.	0.	1375.9	0.0	0.0
60	5.9	4540.8	0.0	0.0	0.	0.	658.4	0.0	0.0
61	2.6	499.1	0.0	0.0	0.	0.	72.4	0.0	0.0

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

APPENDIX E-5

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE B-B, SOIL SAMPLE SET SP-16-13

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 10:17PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil SP-16-13 - Static

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 4.202 FS Min = 1.750 FS Ave = 2.825
Standard Deviation = 0.519 Coefficient of Variation = 18.36 %
Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.263	6840.000
2	183.760	6834.727
3	192.473	6829.819
4	201.387	6825.287
5	210.485	6821.138
6	219.752	6817.379
7	229.170	6814.018
8	238.723	6811.060
9	248.393	6808.511
10	258.162	6806.375
11	268.013	6804.657
12	277.929	6803.359
13	287.890	6802.484
14	297.880	6802.033
15	307.880	6802.008
16	317.872	6802.407
17	327.838	6803.231
18	337.760	6804.479
19	347.620	6806.146
20	357.400	6808.232
21	367.083	6810.731
22	376.650	6813.640
23	386.086	6816.953
24	395.371	6820.664
25	404.491	6824.767
26	413.428	6829.253
27	422.166	6834.116
28	430.690	6839.345
29	438.983	6844.933
30	447.032	6850.868
31	454.821	6857.139
32	462.336	6863.736
33	469.563	6870.647
34	476.491	6877.859
35	483.105	6885.359
36	489.395	6893.133
37	495.349	6901.168
38	500.955	6909.449
39	506.205	6917.960
40	511.087	6926.687
41	515.595	6935.614
42	519.718	6944.724
43	520.577	6946.859

Circle Center At X = 303.482 ; Y = 7037.113 ; and Radius = 235.146
Factor of Safety
*** 1.750 ***
Individual data on the 48 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.5	2352.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	8.7	7069.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.5	9558.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.4	2122.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	155.1	0.0	0.0	0.	0.	0.0	0.0	0.0

6	9.0	17765.0	0.0	1270.2	0.	0.	0.0	0.0	0.0
7	9.3	25101.9	0.0	3744.6	0.	0.	0.0	0.0	0.0
8	9.4	32116.3	0.0	5973.1	0.	0.	0.0	0.0	0.0
9	8.4	33678.4	0.0	6852.1	0.	0.	0.0	0.0	0.0
10	1.2	5221.4	0.0	1099.9	0.	0.	0.0	0.0	0.0
11	9.7	45545.3	0.0	9677.1	0.	0.	0.0	0.0	0.0
12	9.8	51913.3	0.0	11146.1	0.	0.	0.0	0.0	0.0
13	9.9	57835.1	0.0	12355.7	0.	0.	0.0	0.0	0.0
14	9.9	63259.8	0.0	13304.5	0.	0.	0.0	0.0	0.0
15	10.0	68139.8	0.0	13989.7	0.	0.	0.0	0.0	0.0
16	10.0	72436.6	0.0	14411.1	0.	0.	0.0	0.0	0.0
17	10.0	76113.6	0.0	14566.8	0.	0.	0.0	0.0	0.0
18	10.0	79144.7	0.0	14457.7	0.	0.	0.0	0.0	0.0
19	10.0	81508.6	0.0	14083.6	0.	0.	0.0	0.0	0.0
20	9.9	83190.5	0.0	13444.6	0.	0.	0.0	0.0	0.0
21	9.9	84184.5	0.0	12542.8	0.	0.	0.0	0.0	0.0
22	9.8	84488.7	0.0	11379.2	0.	0.	0.0	0.0	0.0
23	9.7	84111.3	0.0	9956.0	0.	0.	0.0	0.0	0.0
24	5.0	43153.8	0.0	4521.3	0.	0.	0.0	0.0	0.0
25	4.6	39942.3	0.0	3754.3	0.	0.	0.0	0.0	0.0
26	9.4	81653.1	0.0	6341.8	0.	0.	0.0	0.0	0.0
27	9.3	79653.2	0.0	4157.1	0.	0.	0.0	0.0	0.0
28	9.1	77089.6	0.0	1726.4	0.	0.	0.0	0.0	0.0
29	1.4	12034.3	0.0	36.2	0.	0.	0.0	0.0	0.0
30	7.5	62033.6	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.7	70687.4	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.5	66872.4	0.0	0.0	0.	0.	0.0	0.0	0.0
33	1.0	7478.0	0.0	0.0	0.	0.	0.0	0.0	0.0
34	7.3	55291.5	0.0	0.0	0.	0.	0.0	0.0	0.0
35	8.0	58483.1	0.0	0.0	0.	0.	0.0	0.0	0.0
36	7.8	53914.9	0.0	0.0	0.	0.	0.0	0.0	0.0
37	7.5	49119.0	0.0	0.0	0.	0.	0.0	0.0	0.0
38	7.2	44154.2	0.0	0.0	0.	0.	0.0	0.0	0.0
39	6.9	39081.8	0.0	0.0	0.	0.	0.0	0.0	0.0
40	6.6	33964.0	0.0	0.0	0.	0.	0.0	0.0	0.0
41	6.3	28866.0	0.0	0.0	0.	0.	0.0	0.0	0.0
42	6.0	23852.8	0.0	0.0	0.	0.	0.0	0.0	0.0
43	5.6	18989.7	0.0	0.0	0.	0.	0.0	0.0	0.0
44	5.2	14343.5	0.0	0.0	0.	0.	0.0	0.0	0.0
45	4.9	9978.0	0.0	0.0	0.	0.	0.0	0.0	0.0
46	4.5	5957.1	0.0	0.0	0.	0.	0.0	0.0	0.0
47	4.1	2343.1	0.0	0.0	0.	0.	0.0	0.0	0.0
48	0.9	78.9	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 10:18PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line bb sp-16-13.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil SP-16-13 - Seismic

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.299 FS Min = 1.133 FS Ave = 1.712
Standard Deviation = 0.249 Coefficient of Variation = 14.57 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324
15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436
Factor of Safety
*** 1.133 ***
Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	293.6	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	874.6	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	1434.1	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	1497.5	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	472.1	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	2493.4	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	2993.6	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	3460.6	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	3892.1	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	1879.8	0.0	0.0
11	2.8	8800.6	0.0	2486.8	0.	0.	1276.1	0.0	0.0
12	2.5	8279.4	0.0	2325.7	0.	0.	1200.5	0.0	0.0
13	9.8	35498.1	0.0	9735.7	0.	0.	5147.2	0.0	0.0
14	9.9	41072.3	0.0	10893.8	0.	0.	5955.5	0.0	0.0
15	9.9	46367.9	0.0	11886.5	0.	0.	6723.4	0.0	0.0
16	9.9	51366.9	0.0	12714.0	0.	0.	7448.2	0.0	0.0
17	10.0	56050.7	0.0	13374.6	0.	0.	8127.3	0.0	0.0
18	10.0	60405.5	0.0	13869.1	0.	0.	8758.8	0.0	0.0
19	10.0	64415.6	0.0	14196.0	0.	0.	9340.3	0.0	0.0
20	10.0	68068.6	0.0	14355.3	0.	0.	9869.9	0.0	0.0
21	10.0	71353.3	0.0	14347.4	0.	0.	10346.2	0.0	0.0
22	10.0	74260.4	0.0	14171.9	0.	0.	10767.8	0.0	0.0
23	10.0	76781.9	0.0	13828.6	0.	0.	11133.4	0.0	0.0
24	10.0	78912.7	0.0	13318.8	0.	0.	11442.3	0.0	0.0
25	9.9	80647.2	0.0	12641.5	0.	0.	11693.8	0.0	0.0
26	9.9	81984.9	0.0	11798.7	0.	0.	11887.8	0.0	0.0
27	9.8	82922.9	0.0	10789.9	0.	0.	12023.8	0.0	0.0
28	9.8	83462.1	0.0	9615.9	0.	0.	12102.0	0.0	0.0
29	5.1	43433.1	0.0	4483.6	0.	0.	6297.8	0.0	0.0
30	4.7	40198.0	0.0	3794.7	0.	0.	5828.7	0.0	0.0
31	9.7	83583.0	0.0	6777.5	0.	0.	12119.5	0.0	0.0
32	9.6	83200.1	0.0	5114.5	0.	0.	12064.0	0.0	0.0
33	9.5	82459.9	0.0	3290.7	0.	0.	11956.7	0.0	0.0
34	9.4	81369.6	0.0	1306.8	0.	0.	11798.6	0.0	0.0
35	1.2	9957.9	0.0	17.1	0.	0.	1443.9	0.0	0.0
36	8.2	70045.9	0.0	0.0	0.	0.	10156.7	0.0	0.0
37	9.2	78413.1	0.0	0.0	0.	0.	11369.9	0.0	0.0
38	9.1	76515.3	0.0	0.0	0.	0.	11094.7	0.0	0.0
39	7.3	60314.3	0.0	0.0	0.	0.	8745.6	0.0	0.0
40	1.7	14010.4	0.0	0.0	0.	0.	2031.5	0.0	0.0
41	8.9	71997.7	0.0	0.0	0.	0.	10439.7	0.0	0.0
42	8.8	69482.1	0.0	0.0	0.	0.	10074.9	0.0	0.0
43	8.6	66720.7	0.0	0.0	0.	0.	9674.5	0.0	0.0
44	8.5	63730.5	0.0	0.0	0.	0.	9240.9	0.0	0.0
45	8.4	60528.8	0.0	0.0	0.	0.	8776.7	0.0	0.0
46	8.2	57134.7	0.0	0.0	0.	0.	8284.5	0.0	0.0
47	8.1	53567.8	0.0	0.0	0.	0.	7767.3	0.0	0.0
48	7.9	49849.0	0.0	0.0	0.	0.	7228.1	0.0	0.0
49	7.7	45999.1	0.0	0.0	0.	0.	6669.9	0.0	0.0
50	6.0	33835.9	0.0	0.0	0.	0.	4906.2	0.0	0.0
51	1.5	8165.0	0.0	0.0	0.	0.	1183.9	0.0	0.0
52	7.4	36659.8	0.0	0.0	0.	0.	5315.7	0.0	0.0
53	7.2	30762.3	0.0	0.0	0.	0.	4460.5	0.0	0.0
54	7.0	24968.7	0.0	0.0	0.	0.	3620.5	0.0	0.0
55	6.8	19304.5	0.0	0.0	0.	0.	2799.1	0.0	0.0
56	6.6	13795.5	0.0	0.0	0.	0.	2000.3	0.0	0.0
57	6.4	8466.9	0.0	0.0	0.	0.	1227.7	0.0	0.0
58	6.2	3343.7	0.0	0.0	0.	0.	484.8	0.0	0.0
59	1.1	77.3	0.0	0.0	0.	0.	11.2	0.0	0.0

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

APPENDIX E-6

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE B-B, SOIL SAMPLE SET CH-1-3

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:34PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-1-3 - Static

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	91.7	110.5	319.0	21.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 4.289 FS Min = 1.713 FS Ave = 2.790
Standard Deviation = 0.605 Coefficient of Variation = 21.70 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324
15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436
Factor of Safety
*** 1.713 ***

Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	0.0	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	0.0	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	0.0	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	0.0	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	0.0	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	0.0	0.0	0.0
11	2.8	8790.3	0.0	2486.8	0.	0.	0.0	0.0	0.0
12	2.5	8252.6	0.0	2325.7	0.	0.	0.0	0.0	0.0
13	9.8	35239.5	0.0	9735.7	0.	0.	0.0	0.0	0.0
14	9.9	40564.0	0.0	10893.8	0.	0.	0.0	0.0	0.0
15	9.9	45606.6	0.0	11886.5	0.	0.	0.0	0.0	0.0
16	9.9	50350.2	0.0	12714.0	0.	0.	0.0	0.0	0.0
17	10.0	54777.0	0.0	13374.6	0.	0.	0.0	0.0	0.0
18	10.0	58873.8	0.0	13869.1	0.	0.	0.0	0.0	0.0
19	10.0	62625.7	0.0	14196.0	0.	0.	0.0	0.0	0.0
20	10.0	66020.9	0.0	14355.3	0.	0.	0.0	0.0	0.0
21	10.0	69049.2	0.0	14347.4	0.	0.	0.0	0.0	0.0
22	10.0	71701.8	0.0	14171.9	0.	0.	0.0	0.0	0.0
23	10.0	73971.5	0.0	13828.6	0.	0.	0.0	0.0	0.0
24	10.0	75854.1	0.0	13318.8	0.	0.	0.0	0.0	0.0
25	9.9	77344.5	0.0	12641.5	0.	0.	0.0	0.0	0.0
26	9.9	78442.9	0.0	11798.7	0.	0.	0.0	0.0	0.0
27	9.8	79147.3	0.0	10789.9	0.	0.	0.0	0.0	0.0
28	9.8	79459.2	0.0	9615.9	0.	0.	0.0	0.0	0.0
29	5.1	41266.6	0.0	4483.6	0.	0.	0.0	0.0	0.0
30	4.7	38141.4	0.0	3794.7	0.	0.	0.0	0.0	0.0
31	9.7	79147.2	0.0	6777.5	0.	0.	0.0	0.0	0.0
32	9.6	78559.9	0.0	5114.5	0.	0.	0.0	0.0	0.0
33	9.5	77624.3	0.0	3290.7	0.	0.	0.0	0.0	0.0
34	9.4	76348.0	0.0	1306.8	0.	0.	0.0	0.0	0.0
35	1.2	9325.4	0.0	17.1	0.	0.	0.0	0.0	0.0
36	8.2	65481.0	0.0	0.0	0.	0.	0.0	0.0	0.0
37	9.2	73050.4	0.0	0.0	0.	0.	0.0	0.0	0.0
38	9.1	70998.6	0.0	0.0	0.	0.	0.0	0.0	0.0
39	7.3	55745.9	0.0	0.0	0.	0.	0.0	0.0	0.0
40	1.7	12925.1	0.0	0.0	0.	0.	0.0	0.0	0.0
41	8.9	66420.4	0.0	0.0	0.	0.	0.0	0.0	0.0
42	8.8	64099.6	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.6	61552.2	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.5	58793.6	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.4	55839.9	0.0	0.0	0.	0.	0.0	0.0	0.0
46	8.2	52708.8	0.0	0.0	0.	0.	0.0	0.0	0.0
47	8.1	49418.2	0.0	0.0	0.	0.	0.0	0.0	0.0
48	7.9	45987.4	0.0	0.0	0.	0.	0.0	0.0	0.0
49	7.7	42435.8	0.0	0.0	0.	0.	0.0	0.0	0.0
50	6.0	31214.8	0.0	0.0	0.	0.	0.0	0.0	0.0
51	1.5	7532.5	0.0	0.0	0.	0.	0.0	0.0	0.0
52	7.4	33819.9	0.0	0.0	0.	0.	0.0	0.0	0.0
53	7.2	28379.3	0.0	0.0	0.	0.	0.0	0.0	0.0
54	7.0	23034.5	0.0	0.0	0.	0.	0.0	0.0	0.0
55	6.8	17809.1	0.0	0.0	0.	0.	0.0	0.0	0.0
56	6.6	12726.8	0.0	0.0	0.	0.	0.0	0.0	0.0
57	6.4	7811.0	0.0	0.0	0.	0.	0.0	0.0	0.0
58	6.2	3084.7	0.0	0.0	0.	0.	0.0	0.0	0.0
59	1.1	71.3	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:33PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-1-3.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-1-3 - Seismic

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	91.7	110.5	319.0	21.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.309 FS Min = 1.088 FS Ave = 1.676
Standard Deviation = 0.294 Coefficient of Variation = 17.55 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324
15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436
Factor of Safety
*** 1.088 ***
Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	293.6	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	874.6	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	1434.1	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	1497.5	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	472.1	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	2493.4	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	2993.6	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	3460.6	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	3892.1	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	1879.8	0.0	0.0
11	2.8	8790.3	0.0	2486.8	0.	0.	1274.6	0.0	0.0
12	2.5	8252.6	0.0	2325.7	0.	0.	1196.6	0.0	0.0
13	9.8	35239.5	0.0	9735.7	0.	0.	5109.7	0.0	0.0
14	9.9	40564.0	0.0	10893.8	0.	0.	5881.8	0.0	0.0
15	9.9	45606.6	0.0	11886.5	0.	0.	6613.0	0.0	0.0
16	9.9	50350.2	0.0	12714.0	0.	0.	7300.8	0.0	0.0
17	10.0	54777.0	0.0	13374.6	0.	0.	7942.7	0.0	0.0
18	10.0	58873.8	0.0	13869.1	0.	0.	8536.7	0.0	0.0
19	10.0	62625.7	0.0	14196.0	0.	0.	9080.7	0.0	0.0
20	10.0	66020.9	0.0	14355.3	0.	0.	9573.0	0.0	0.0
21	10.0	69049.2	0.0	14347.4	0.	0.	10012.1	0.0	0.0
22	10.0	71701.8	0.0	14171.9	0.	0.	10396.8	0.0	0.0
23	10.0	73971.5	0.0	13828.6	0.	0.	10725.9	0.0	0.0
24	10.0	75854.1	0.0	13318.8	0.	0.	10998.8	0.0	0.0
25	9.9	77344.5	0.0	12641.5	0.	0.	11214.9	0.0	0.0
26	9.9	78442.9	0.0	11798.7	0.	0.	11374.2	0.0	0.0
27	9.8	79147.3	0.0	10789.9	0.	0.	11476.4	0.0	0.0
28	9.8	79459.2	0.0	9615.9	0.	0.	11521.6	0.0	0.0
29	5.1	41266.6	0.0	4483.6	0.	0.	5983.7	0.0	0.0
30	4.7	38141.4	0.0	3794.7	0.	0.	5530.5	0.0	0.0
31	9.7	79147.2	0.0	6777.5	0.	0.	11476.3	0.0	0.0
32	9.6	78559.9	0.0	5114.5	0.	0.	11391.2	0.0	0.0
33	9.5	77624.3	0.0	3290.7	0.	0.	11255.5	0.0	0.0
34	9.4	76348.0	0.0	1306.8	0.	0.	11070.5	0.0	0.0
35	1.2	9325.4	0.0	17.1	0.	0.	1352.2	0.0	0.0
36	8.2	65481.0	0.0	0.0	0.	0.	9494.7	0.0	0.0
37	9.2	73050.4	0.0	0.0	0.	0.	10592.3	0.0	0.0
38	9.1	70998.6	0.0	0.0	0.	0.	10294.8	0.0	0.0
39	7.3	55745.9	0.0	0.0	0.	0.	8083.1	0.0	0.0
40	1.7	12925.1	0.0	0.0	0.	0.	1874.1	0.0	0.0
41	8.9	66420.4	0.0	0.0	0.	0.	9631.0	0.0	0.0
42	8.8	64099.6	0.0	0.0	0.	0.	9294.4	0.0	0.0
43	8.6	61552.2	0.0	0.0	0.	0.	8925.1	0.0	0.0
44	8.5	58793.6	0.0	0.0	0.	0.	8525.1	0.0	0.0
45	8.4	55839.9	0.0	0.0	0.	0.	8096.8	0.0	0.0
46	8.2	52708.8	0.0	0.0	0.	0.	7642.8	0.0	0.0
47	8.1	49418.2	0.0	0.0	0.	0.	7165.6	0.0	0.0
48	7.9	45987.4	0.0	0.0	0.	0.	6668.2	0.0	0.0
49	7.7	42435.8	0.0	0.0	0.	0.	6153.2	0.0	0.0
50	6.0	31214.8	0.0	0.0	0.	0.	4526.1	0.0	0.0
51	1.5	7532.5	0.0	0.0	0.	0.	1092.2	0.0	0.0
52	7.4	33819.9	0.0	0.0	0.	0.	4903.9	0.0	0.0
53	7.2	28379.3	0.0	0.0	0.	0.	4115.0	0.0	0.0
54	7.0	23034.5	0.0	0.0	0.	0.	3340.0	0.0	0.0
55	6.8	17809.1	0.0	0.0	0.	0.	2582.3	0.0	0.0
56	6.6	12726.8	0.0	0.0	0.	0.	1845.4	0.0	0.0
57	6.4	7811.0	0.0	0.0	0.	0.	1132.6	0.0	0.0
58	6.2	3084.7	0.0	0.0	0.	0.	447.3	0.0	0.0
59	1.1	71.3	0.0	0.0	0.	0.	10.3	0.0	0.0

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

APPENDIX E-7

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE B-B, SOIL SAMPLE SET CH-5-48

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:27PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-5-48 - Static

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	89.5	107.5	321.0	20.1	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 4.322 FS Min = 1.699 FS Ave = 2.785
Standard Deviation = 0.636 Coefficient of Variation = 22.83 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324
15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436
Factor of Safety
*** 1.699 ***

Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	0.0	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	0.0	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	0.0	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	0.0	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	0.0	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	0.0	0.0	0.0
11	2.8	8787.3	0.0	2486.8	0.	0.	0.0	0.0	0.0
12	2.5	8245.0	0.0	2325.7	0.	0.	0.0	0.0	0.0
13	9.8	35165.7	0.0	9735.7	0.	0.	0.0	0.0	0.0
14	9.9	40418.7	0.0	10893.8	0.	0.	0.0	0.0	0.0
15	9.9	45389.1	0.0	11886.5	0.	0.	0.0	0.0	0.0
16	9.9	50059.8	0.0	12714.0	0.	0.	0.0	0.0	0.0
17	10.0	54413.1	0.0	13374.6	0.	0.	0.0	0.0	0.0
18	10.0	58436.2	0.0	13869.1	0.	0.	0.0	0.0	0.0
19	10.0	62114.2	0.0	14196.0	0.	0.	0.0	0.0	0.0
20	10.0	65435.8	0.0	14355.3	0.	0.	0.0	0.0	0.0
21	10.0	68390.8	0.0	14347.4	0.	0.	0.0	0.0	0.0
22	10.0	70970.8	0.0	14171.9	0.	0.	0.0	0.0	0.0
23	10.0	73168.5	0.0	13828.6	0.	0.	0.0	0.0	0.0
24	10.0	74980.2	0.0	13318.8	0.	0.	0.0	0.0	0.0
25	9.9	76400.8	0.0	12641.5	0.	0.	0.0	0.0	0.0
26	9.9	77430.9	0.0	11798.7	0.	0.	0.0	0.0	0.0
27	9.8	78068.6	0.0	10789.9	0.	0.	0.0	0.0	0.0
28	9.8	78315.5	0.0	9615.9	0.	0.	0.0	0.0	0.0
29	5.1	40647.6	0.0	4483.6	0.	0.	0.0	0.0	0.0
30	4.7	37553.8	0.0	3794.7	0.	0.	0.0	0.0	0.0
31	9.7	77879.8	0.0	6777.5	0.	0.	0.0	0.0	0.0
32	9.6	77234.2	0.0	5114.5	0.	0.	0.0	0.0	0.0
33	9.5	76242.6	0.0	3290.7	0.	0.	0.0	0.0	0.0
34	9.4	74913.3	0.0	1306.8	0.	0.	0.0	0.0	0.0
35	1.2	9144.7	0.0	17.1	0.	0.	0.0	0.0	0.0
36	8.2	64176.7	0.0	0.0	0.	0.	0.0	0.0	0.0
37	9.2	71518.2	0.0	0.0	0.	0.	0.0	0.0	0.0
38	9.1	69422.4	0.0	0.0	0.	0.	0.0	0.0	0.0
39	7.3	54440.6	0.0	0.0	0.	0.	0.0	0.0	0.0
40	1.7	12615.0	0.0	0.0	0.	0.	0.0	0.0	0.0
41	8.9	64826.9	0.0	0.0	0.	0.	0.0	0.0	0.0
42	8.8	62561.8	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.6	60075.5	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.5	57383.1	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.4	54500.3	0.0	0.0	0.	0.	0.0	0.0	0.0
46	8.2	51444.2	0.0	0.0	0.	0.	0.0	0.0	0.0
47	8.1	48232.6	0.0	0.0	0.	0.	0.0	0.0	0.0
48	7.9	44884.1	0.0	0.0	0.	0.	0.0	0.0	0.0
49	7.7	41417.7	0.0	0.0	0.	0.	0.0	0.0	0.0
50	6.0	30465.9	0.0	0.0	0.	0.	0.0	0.0	0.0
51	1.5	7351.7	0.0	0.0	0.	0.	0.0	0.0	0.0
52	7.4	33008.6	0.0	0.0	0.	0.	0.0	0.0	0.0
53	7.2	27698.5	0.0	0.0	0.	0.	0.0	0.0	0.0
54	7.0	22481.9	0.0	0.0	0.	0.	0.0	0.0	0.0
55	6.8	17381.8	0.0	0.0	0.	0.	0.0	0.0	0.0
56	6.6	12421.5	0.0	0.0	0.	0.	0.0	0.0	0.0
57	6.4	7623.6	0.0	0.0	0.	0.	0.0	0.0	0.0
58	6.2	3010.7	0.0	0.0	0.	0.	0.0	0.0	0.0
59	1.1	69.6	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:30PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-48.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-5-48 - Seismic

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	89.5	107.5	321.0	20.1	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)

10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.313 FS Min = 1.078 FS Ave = 1.668
Standard Deviation = 0.309 Coefficient of Variation = 18.56 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324
15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436
Factor of Safety
*** 1.078 ***
Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	293.6	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	874.6	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	1434.1	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	1497.5	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	472.1	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	2493.4	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	2993.6	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	3460.6	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	3892.1	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	1879.8	0.0	0.0
11	2.8	8787.3	0.0	2486.8	0.	0.	1274.2	0.0	0.0
12	2.5	8245.0	0.0	2325.7	0.	0.	1195.5	0.0	0.0
13	9.8	35165.7	0.0	9735.7	0.	0.	5099.0	0.0	0.0
14	9.9	40418.7	0.0	10893.8	0.	0.	5860.7	0.0	0.0
15	9.9	45389.1	0.0	11886.5	0.	0.	6581.4	0.0	0.0
16	9.9	50059.8	0.0	12714.0	0.	0.	7258.7	0.0	0.0
17	10.0	54413.1	0.0	13374.6	0.	0.	7889.9	0.0	0.0
18	10.0	58436.2	0.0	13869.1	0.	0.	8473.2	0.0	0.0
19	10.0	62114.2	0.0	14196.0	0.	0.	9006.6	0.0	0.0
20	10.0	65435.8	0.0	14355.3	0.	0.	9488.2	0.0	0.0
21	10.0	68390.8	0.0	14347.4	0.	0.	9916.7	0.0	0.0
22	10.0	70970.8	0.0	14171.9	0.	0.	10290.8	0.0	0.0
23	10.0	73168.5	0.0	13828.6	0.	0.	10609.4	0.0	0.0
24	10.0	74980.2	0.0	13318.8	0.	0.	10872.1	0.0	0.0
25	9.9	76400.8	0.0	12641.5	0.	0.	11078.1	0.0	0.0
26	9.9	77430.9	0.0	11798.7	0.	0.	11227.5	0.0	0.0
27	9.8	78068.6	0.0	10789.9	0.	0.	11319.9	0.0	0.0
28	9.8	78315.5	0.0	9615.9	0.	0.	11355.8	0.0	0.0
29	5.1	40647.6	0.0	4483.6	0.	0.	5893.9	0.0	0.0
30	4.7	37553.8	0.0	3794.7	0.	0.	5445.3	0.0	0.0
31	9.7	77879.8	0.0	6777.5	0.	0.	11292.6	0.0	0.0
32	9.6	77234.2	0.0	5114.5	0.	0.	11199.0	0.0	0.0
33	9.5	76242.6	0.0	3290.7	0.	0.	11055.2	0.0	0.0
34	9.4	74913.3	0.0	1306.8	0.	0.	10862.4	0.0	0.0
35	1.2	9144.7	0.0	17.1	0.	0.	1326.0	0.0	0.0
36	8.2	64176.7	0.0	0.0	0.	0.	9305.6	0.0	0.0
37	9.2	71518.2	0.0	0.0	0.	0.	10370.1	0.0	0.0
38	9.1	69422.4	0.0	0.0	0.	0.	10066.2	0.0	0.0
39	7.3	54440.6	0.0	0.0	0.	0.	7893.9	0.0	0.0
40	1.7	12615.0	0.0	0.0	0.	0.	1829.2	0.0	0.0
41	8.9	64826.9	0.0	0.0	0.	0.	9399.9	0.0	0.0
42	8.8	62561.8	0.0	0.0	0.	0.	9071.5	0.0	0.0
43	8.6	60075.5	0.0	0.0	0.	0.	8710.9	0.0	0.0
44	8.5	57383.1	0.0	0.0	0.	0.	8320.6	0.0	0.0
45	8.4	54500.3	0.0	0.0	0.	0.	7902.5	0.0	0.0
46	8.2	51444.2	0.0	0.0	0.	0.	7459.4	0.0	0.0
47	8.1	48232.6	0.0	0.0	0.	0.	6993.7	0.0	0.0
48	7.9	44884.1	0.0	0.0	0.	0.	6508.2	0.0	0.0
49	7.7	41417.7	0.0	0.0	0.	0.	6005.6	0.0	0.0
50	6.0	30465.9	0.0	0.0	0.	0.	4417.6	0.0	0.0
51	1.5	7351.7	0.0	0.0	0.	0.	1066.0	0.0	0.0
52	7.4	33008.6	0.0	0.0	0.	0.	4786.2	0.0	0.0
53	7.2	27698.5	0.0	0.0	0.	0.	4016.3	0.0	0.0
54	7.0	22481.9	0.0	0.0	0.	0.	3259.9	0.0	0.0
55	6.8	17381.8	0.0	0.0	0.	0.	2520.4	0.0	0.0
56	6.6	12421.5	0.0	0.0	0.	0.	1801.1	0.0	0.0
57	6.4	7623.6	0.0	0.0	0.	0.	1105.4	0.0	0.0
58	6.2	3010.7	0.0	0.0	0.	0.	436.5	0.0	0.0
59	1.1	69.6	0.0	0.0	0.	0.	10.1	0.0	0.0

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

APPENDIX E-8

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE B-B, SOIL SAMPLE SET CH-5-98

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:25PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-5-98 - Static

BOUNDARY COORDINATES
3 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	97.6	114.1	216.0	25.4	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 4.196 FS Min = 1.715 FS Ave = 2.774
Standard Deviation = 0.550 Coefficient of Variation = 19.81 %
Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	175.263	6840.000
2	183.760	6834.727
3	192.473	6829.819
4	201.387	6825.287
5	210.485	6821.138
6	219.752	6817.379
7	229.170	6814.018
8	238.723	6811.060
9	248.393	6808.511
10	258.162	6806.375
11	268.013	6804.657
12	277.929	6803.359
13	287.890	6802.484
14	297.880	6802.033
15	307.880	6802.008
16	317.872	6802.407
17	327.838	6803.231
18	337.760	6804.479
19	347.620	6806.146
20	357.400	6808.232
21	367.083	6810.731
22	376.650	6813.640
23	386.086	6816.953
24	395.371	6820.664
25	404.491	6824.767
26	413.428	6829.253
27	422.166	6834.116
28	430.690	6839.345
29	438.983	6844.933
30	447.032	6850.868
31	454.821	6857.139
32	462.336	6863.736
33	469.563	6870.647
34	476.491	6877.859
35	483.105	6885.359
36	489.395	6893.133
37	495.349	6901.168
38	500.955	6909.449
39	506.205	6917.960
40	511.087	6926.687
41	515.595	6935.614
42	519.718	6944.724
43	520.577	6946.859

Circle Center At X = 303.482 ; Y = 7037.113 ; and Radius = 235.146
Factor of Safety
*** 1.715 ***
Individual data on the 48 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.5	2352.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	8.7	7069.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.5	9558.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.4	2122.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	155.0	0.0	0.0	0.	0.	0.0	0.0	0.0

6	9.0	17732.7	0.0	1270.2	0.	0.	0.0	0.0	0.0
7	9.3	25017.8	0.0	3744.6	0.	0.	0.0	0.0	0.0
8	9.4	31978.0	0.0	5973.1	0.	0.	0.0	0.0	0.0
9	8.4	33511.3	0.0	6852.1	0.	0.	0.0	0.0	0.0
10	1.2	5194.0	0.0	1099.9	0.	0.	0.0	0.0	0.0
11	9.7	45292.6	0.0	9677.1	0.	0.	0.0	0.0	0.0
12	9.8	51601.0	0.0	11146.1	0.	0.	0.0	0.0	0.0
13	9.9	57462.2	0.0	12355.7	0.	0.	0.0	0.0	0.0
14	9.9	62825.7	0.0	13304.5	0.	0.	0.0	0.0	0.0
15	10.0	67644.3	0.0	13989.7	0.	0.	0.0	0.0	0.0
16	10.0	71879.8	0.0	14411.1	0.	0.	0.0	0.0	0.0
17	10.0	75496.3	0.0	14566.8	0.	0.	0.0	0.0	0.0
18	10.0	78468.0	0.0	14457.7	0.	0.	0.0	0.0	0.0
19	10.0	80774.0	0.0	14083.6	0.	0.	0.0	0.0	0.0
20	9.9	82400.0	0.0	13444.6	0.	0.	0.0	0.0	0.0
21	9.9	83340.3	0.0	12542.8	0.	0.	0.0	0.0	0.0
22	9.8	83593.8	0.0	11379.2	0.	0.	0.0	0.0	0.0
23	9.7	83168.8	0.0	9956.0	0.	0.	0.0	0.0	0.0
24	5.0	42648.5	0.0	4521.3	0.	0.	0.0	0.0	0.0
25	4.6	39460.9	0.0	3754.3	0.	0.	0.0	0.0	0.0
26	9.4	80626.3	0.0	6341.8	0.	0.	0.0	0.0	0.0
27	9.3	78590.6	0.0	4157.1	0.	0.	0.0	0.0	0.0
28	9.1	75995.6	0.0	1726.4	0.	0.	0.0	0.0	0.0
29	1.4	11857.2	0.0	36.2	0.	0.	0.0	0.0	0.0
30	7.5	61090.3	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.7	69545.5	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.5	65714.4	0.0	0.0	0.	0.	0.0	0.0	0.0
33	1.0	7343.1	0.0	0.0	0.	0.	0.0	0.0	0.0
34	7.3	54290.3	0.0	0.0	0.	0.	0.0	0.0	0.0
35	8.0	57424.0	0.0	0.0	0.	0.	0.0	0.0	0.0
36	7.8	52938.5	0.0	0.0	0.	0.	0.0	0.0	0.0
37	7.5	48229.5	0.0	0.0	0.	0.	0.0	0.0	0.0
38	7.2	43354.6	0.0	0.0	0.	0.	0.0	0.0	0.0
39	6.9	38374.1	0.0	0.0	0.	0.	0.0	0.0	0.0
40	6.6	33348.9	0.0	0.0	0.	0.	0.0	0.0	0.0
41	6.3	28343.3	0.0	0.0	0.	0.	0.0	0.0	0.0
42	6.0	23420.9	0.0	0.0	0.	0.	0.0	0.0	0.0
43	5.6	18645.8	0.0	0.0	0.	0.	0.0	0.0	0.0
44	5.2	14083.8	0.0	0.0	0.	0.	0.0	0.0	0.0
45	4.9	9797.3	0.0	0.0	0.	0.	0.0	0.0	0.0
46	4.5	5849.2	0.0	0.0	0.	0.	0.0	0.0	0.0
47	4.1	2300.6	0.0	0.0	0.	0.	0.0	0.0	0.0
48	0.9	77.5	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 09:10PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\Alton Line BB CH-5-98.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Stock Pile:
Line B-B, Soil CH-5-98 - Seismic
BOUNDARY COORDINATES
3 Top Boundaries

6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6840.00	200.00	6840.00	2
2	200.00	6840.00	530.00	6950.00	1
3	530.00	6950.00	830.00	6945.00	1
4	200.00	6840.00	830.00	6840.00	2
5	0.00	6810.00	830.00	6815.00	3
6	0.00	6800.00	830.00	6803.00	4

User Specified Y-Origin = 6700.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	97.6	114.1	216.0	25.4	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1
3	100.0	120.0	700.0	10.0	0.00	0.0	1
4	130.0	145.0	2000.0	25.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6825.00
2	830.00	6826.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 230.00(ft)
Each Surface Terminates Between X = 520.00(ft)
and X = 750.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.290 FS Min = 1.101 FS Ave = 1.681
Standard Deviation = 0.269 Coefficient of Variation = 15.99 %
Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.526	6840.000
2	129.571	6835.736
3	138.728	6831.716
4	147.989	6827.943
5	157.348	6824.420
6	166.798	6821.150
7	176.333	6818.135
8	185.945	6815.376
9	195.627	6812.877
10	205.374	6810.639
11	215.176	6808.663
12	225.029	6806.951
13	234.924	6805.504
14	244.854	6804.324

15	254.812	6803.410
16	264.791	6802.764
17	274.784	6802.386
18	284.783	6802.277
19	294.782	6802.436
20	304.773	6802.864
21	314.749	6803.560
22	324.702	6804.523
23	334.626	6805.753
24	344.514	6807.249
25	354.357	6809.010
26	364.150	6811.035
27	373.885	6813.321
28	383.555	6815.869
29	393.154	6818.675
30	402.673	6821.738
31	412.107	6825.055
32	421.448	6828.625
33	430.690	6832.443
34	439.826	6836.509
35	448.850	6840.818
36	457.755	6845.369
37	466.535	6850.156
38	475.182	6855.178
39	483.692	6860.430
40	492.058	6865.908
41	500.274	6871.609
42	508.333	6877.529
43	516.231	6883.663
44	523.961	6890.006
45	531.519	6896.555
46	538.897	6903.305
47	546.092	6910.250
48	553.098	6917.386
49	559.909	6924.707
50	566.522	6932.208
51	572.931	6939.885
52	579.131	6947.730
53	580.202	6949.163

Circle Center At X = 283.855 ; Y = 7174.712 ; and Radius = 372.436

Factor of Safety

*** 1.101 ***

Individual data on the 59 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.0	2024.7	0.0	0.0	0.	0.	293.6	0.0	0.0
2	9.2	6031.9	0.0	0.0	0.	0.	874.6	0.0	0.0
3	9.3	9890.2	0.0	0.0	0.	0.	1434.1	0.0	0.0
4	7.3	10327.4	0.0	0.0	0.	0.	1497.5	0.0	0.0
5	2.0	3256.0	0.0	52.3	0.	0.	472.1	0.0	0.0
6	9.5	17195.6	0.0	1503.9	0.	0.	2493.4	0.0	0.0
7	9.5	20645.7	0.0	3471.9	0.	0.	2993.6	0.0	0.0
8	9.6	23866.3	0.0	5280.6	0.	0.	3460.6	0.0	0.0
9	9.7	26842.2	0.0	6928.3	0.	0.	3892.1	0.0	0.0
10	4.4	12964.4	0.0	3601.0	0.	0.	1879.8	0.0	0.0
11	2.8	8798.2	0.0	2486.8	0.	0.	1275.7	0.0	0.0
12	2.5	8273.1	0.0	2325.7	0.	0.	1199.6	0.0	0.0
13	9.8	35437.6	0.0	9735.7	0.	0.	5138.5	0.0	0.0
14	9.9	40953.5	0.0	10893.8	0.	0.	5938.3	0.0	0.0
15	9.9	46190.0	0.0	11886.5	0.	0.	6697.5	0.0	0.0
16	9.9	51129.2	0.0	12714.0	0.	0.	7413.7	0.0	0.0
17	10.0	55752.9	0.0	13374.6	0.	0.	8084.2	0.0	0.0
18	10.0	60047.4	0.0	13869.1	0.	0.	8706.9	0.0	0.0
19	10.0	63997.2	0.0	14196.0	0.	0.	9279.6	0.0	0.0
20	10.0	67589.9	0.0	14355.3	0.	0.	9800.5	0.0	0.0
21	10.0	70814.7	0.0	14347.4	0.	0.	10268.1	0.0	0.0
22	10.0	73662.3	0.0	14171.9	0.	0.	10681.0	0.0	0.0
23	10.0	76124.9	0.0	13828.6	0.	0.	11038.1	0.0	0.0

24	10.0	78197.7	0.0	13318.8	0.	0.	11338.7	0.0	0.0
25	9.9	79875.1	0.0	12641.5	0.	0.	11581.9	0.0	0.0
26	9.9	81156.9	0.0	11798.7	0.	0.	11767.7	0.0	0.0
27	9.8	82040.3	0.0	10789.9	0.	0.	11895.8	0.0	0.0
28	9.8	82526.3	0.0	9615.9	0.	0.	11966.3	0.0	0.0
29	5.1	42926.7	0.0	4483.6	0.	0.	6224.4	0.0	0.0
30	4.7	39717.2	0.0	3794.7	0.	0.	5759.0	0.0	0.0
31	9.7	82546.0	0.0	6777.5	0.	0.	11969.2	0.0	0.0
32	9.6	82115.4	0.0	5114.5	0.	0.	11906.7	0.0	0.0
33	9.5	81329.5	0.0	3290.7	0.	0.	11792.8	0.0	0.0
34	9.4	80195.8	0.0	1306.8	0.	0.	11628.4	0.0	0.0
35	1.2	9810.0	0.0	17.1	0.	0.	1422.5	0.0	0.0
36	8.2	68978.8	0.0	0.0	0.	0.	10001.9	0.0	0.0
37	9.2	77159.5	0.0	0.0	0.	0.	11188.1	0.0	0.0
38	9.1	75225.7	0.0	0.0	0.	0.	10907.7	0.0	0.0
39	7.3	59246.3	0.0	0.0	0.	0.	8590.7	0.0	0.0
40	1.7	13756.7	0.0	0.0	0.	0.	1994.7	0.0	0.0
41	8.9	70693.9	0.0	0.0	0.	0.	10250.6	0.0	0.0
42	8.8	68223.8	0.0	0.0	0.	0.	9892.5	0.0	0.0
43	8.6	65512.5	0.0	0.0	0.	0.	9499.3	0.0	0.0
44	8.5	62576.4	0.0	0.0	0.	0.	9073.6	0.0	0.0
45	8.4	59432.7	0.0	0.0	0.	0.	8617.7	0.0	0.0
46	8.2	56100.1	0.0	0.0	0.	0.	8134.5	0.0	0.0
47	8.1	52597.7	0.0	0.0	0.	0.	7626.7	0.0	0.0
48	7.9	48946.3	0.0	0.0	0.	0.	7097.2	0.0	0.0
49	7.7	45166.1	0.0	0.0	0.	0.	6549.1	0.0	0.0
50	6.0	33223.1	0.0	0.0	0.	0.	4817.4	0.0	0.0
51	1.5	8017.1	0.0	0.0	0.	0.	1162.5	0.0	0.0
52	7.4	35995.9	0.0	0.0	0.	0.	5219.4	0.0	0.0
53	7.2	30205.3	0.0	0.0	0.	0.	4379.8	0.0	0.0
54	7.0	24516.5	0.0	0.0	0.	0.	3554.9	0.0	0.0
55	6.8	18954.9	0.0	0.0	0.	0.	2748.5	0.0	0.0
56	6.6	13545.6	0.0	0.0	0.	0.	1964.1	0.0	0.0
57	6.4	8313.5	0.0	0.0	0.	0.	1205.5	0.0	0.0
58	6.2	3283.2	0.0	0.0	0.	0.	476.1	0.0	0.0
59	1.1	75.9	0.0	0.0	0.	0.	11.0	0.0	0.0

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

APPENDIX E-9

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE C-C, SEDIMENTATION PONDS #1, #2 AND #4

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 10:10PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Sedimentation Pond 3:
Line CC, Soil SP-16-13 - Static

BOUNDARY COORDINATES
4 Top Boundaries
4 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6800.00	20.00	6800.00	1
2	20.00	6800.00	48.00	6814.00	1
3	48.00	6814.00	60.00	6814.00	1
4	60.00	6814.00	80.00	6804.00	1

User Specified Y-Origin = 6750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6790.00
2	80.00	6790.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 5.00(ft)
and X = 25.00(ft)
Each Surface Terminates Between X = 48.00(ft)
and X = 60.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
2.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are

Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 3.515 FS Min = 2.071 FS Ave = 2.629
Standard Deviation = 0.324 Coefficient of Variation = 12.33 %
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.737	6800.000
2	21.700	6799.618
3	23.684	6799.365
4	25.680	6799.243
5	27.680	6799.251
6	29.675	6799.391
7	31.657	6799.661
8	33.617	6800.060
9	35.546	6800.586
10	37.437	6801.237
11	39.282	6802.011
12	41.071	6802.903
13	42.799	6803.911
14	44.457	6805.030
15	46.038	6806.255
16	47.535	6807.581
17	48.943	6809.001
18	50.254	6810.511
19	51.464	6812.104
20	52.568	6813.772
21	52.698	6814.000

Circle Center At X = 26.549 ; Y = 6829.780 ; and Radius = 30.549

Factor of Safety
*** 2.071 ***

Individual data on the 22 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	0.3	0.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.7	108.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	2.0	365.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.0	602.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.0	813.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.0	995.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.0	1143.9	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.0	1258.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.9	1336.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	1.9	1378.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.8	1385.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.8	1357.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.7	1298.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	1.7	1210.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.6	1097.1	0.0	0.0	0.	0.	0.0	0.0	0.0
16	1.5	963.9	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.5	280.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.9	513.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	1.3	553.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	1.2	323.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	1.1	116.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	0.1	1.5	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/17/2007
Time of Run: 10:12PM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line CC SP-16-13.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Sedimentation Pond 3:
Line CC, Soil SP-16-13 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
4 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6800.00	20.00	6800.00	1
2	20.00	6800.00	48.00	6814.00	1
3	48.00	6814.00	60.00	6814.00	1
4	60.00	6814.00	80.00	6804.00	1

User Specified Y-Origin = 6750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	99.4	116.2	94.0	29.6	0.00	0.0	1
2	105.0	110.0	90.0	29.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6790.00
2	80.00	6790.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 5.00(ft)
and X = 25.00(ft)
Each Surface Terminates Between X = 48.00(ft)
and X = 60.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
2.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 2.492 FS Min = 1.523 FS Ave = 1.895
Standard Deviation = 0.234 Coefficient of Variation = 12.33 %
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	19.737	6800.000
2	21.700	6799.618
3	23.684	6799.365
4	25.680	6799.243
5	27.680	6799.251
6	29.675	6799.391
7	31.657	6799.661
8	33.617	6800.060
9	35.546	6800.586
10	37.437	6801.237
11	39.282	6802.011
12	41.071	6802.903
13	42.799	6803.911
14	44.457	6805.030
15	46.038	6806.255
16	47.535	6807.581
17	48.943	6809.001
18	50.254	6810.511
19	51.464	6812.104
20	52.568	6813.772
21	52.698	6814.000

Circle Center At X = 26.549 ; Y = 6829.780 ; and Radius = 30.549

Factor of Safety
*** 1.523 ***

Individual data on the 22 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	0.3	0.7	0.0	0.0	0.	0.	0.1	0.0	0.0
2	1.7	108.3	0.0	0.0	0.	0.	15.7	0.0	0.0
3	2.0	365.7	0.0	0.0	0.	0.	53.0	0.0	0.0
4	2.0	602.6	0.0	0.0	0.	0.	87.4	0.0	0.0
5	2.0	813.7	0.0	0.0	0.	0.	118.0	0.0	0.0
6	2.0	995.1	0.0	0.0	0.	0.	144.3	0.0	0.0
7	2.0	1143.9	0.0	0.0	0.	0.	165.9	0.0	0.0
8	2.0	1258.2	0.0	0.0	0.	0.	182.4	0.0	0.0
9	1.9	1336.5	0.0	0.0	0.	0.	193.8	0.0	0.0
10	1.9	1378.6	0.0	0.0	0.	0.	199.9	0.0	0.0
11	1.8	1385.1	0.0	0.0	0.	0.	200.8	0.0	0.0
12	1.8	1357.6	0.0	0.0	0.	0.	196.9	0.0	0.0
13	1.7	1298.2	0.0	0.0	0.	0.	188.2	0.0	0.0
14	1.7	1210.1	0.0	0.0	0.	0.	175.5	0.0	0.0
15	1.6	1097.1	0.0	0.0	0.	0.	159.1	0.0	0.0
16	1.5	963.9	0.0	0.0	0.	0.	139.8	0.0	0.0
17	0.5	280.3	0.0	0.0	0.	0.	40.6	0.0	0.0
18	0.9	513.1	0.0	0.0	0.	0.	74.4	0.0	0.0
19	1.3	553.2	0.0	0.0	0.	0.	80.2	0.0	0.0
20	1.2	323.8	0.0	0.0	0.	0.	47.0	0.0	0.0
21	1.1	116.5	0.0	0.0	0.	0.	16.9	0.0	0.0
22	0.1	1.5	0.0	0.0	0.	0.	0.2	0.0	0.0

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

APPENDIX E-10

OUPTUT FILES OF STATIC AND PSEUDO-STATIC SLOPE STABILITY ANALYSES

LINE E-E, SEDIMENTATION POND #3

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/23/2007
Time of Run: 05:47AM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Sedimentation Pond 3:
Line E-E, Soil GT-5 - Static

BOUNDARY COORDINATES
4 Top Boundaries
4 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6800.00	20.00	6800.00	1
2	20.00	6800.00	48.00	6814.00	1
3	48.00	6814.00	60.00	6814.00	1
4	60.00	6814.00	80.00	6804.00	1

User Specified Y-Origin = 6750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	100.0	120.0	700.0	10.0	0.00	0.0	1
2	100.0	120.0	700.0	10.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6790.00
2	80.00	6790.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 5.00(ft)
and X = 25.00(ft)
Each Surface Terminates Between X = 48.00(ft)
and X = 60.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
2.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 12.042 FS Min = 3.889 FS Ave = 4.773
Standard Deviation = 1.255 Coefficient of Variation = 26.30 %
Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.421	6800.000
2	15.016	6798.793
3	16.690	6797.698
4	18.434	6796.720
5	20.241	6795.862
6	22.102	6795.129
7	24.008	6794.524
8	25.951	6794.051
9	27.922	6793.710
10	29.912	6793.505
11	31.911	6793.436
12	33.909	6793.503
13	35.899	6793.706
14	37.870	6794.043
15	39.814	6794.514
16	41.722	6795.116
17	43.584	6795.846
18	45.391	6796.701
19	47.137	6797.677
20	48.812	6798.770
21	50.409	6799.974
22	51.920	6801.284
23	53.339	6802.693
24	54.659	6804.196
25	55.873	6805.786
26	56.976	6807.454
27	57.964	6809.193
28	58.830	6810.995
29	59.572	6812.853
30	59.942	6814.000

Circle Center At X = 31.927 ; Y = 6822.799 ; and Radius = 29.365
Factor of Safety
*** 3.889 ***
Individual data on the 31 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.6	96.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.7	293.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.7	486.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.6	571.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.2	99.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.9	947.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.9	1277.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	1.9	1593.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	2.0	1889.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	2.0	2158.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.0	2395.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.0	2595.6	0.0	0.0	0.	0.	0.0	0.0	0.0

13	2.0	2755.3	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.0	2871.9	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.9	2943.5	0.0	0.0	0.	0.	0.0	0.0	0.0
16	1.9	2969.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.9	2950.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	1.8	2887.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	1.7	2783.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	0.9	1365.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	0.8	1258.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	1.6	2336.1	0.0	0.0	0.	0.	0.0	0.0	0.0
23	1.5	2020.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	1.4	1704.0	0.0	0.0	0.	0.	0.0	0.0	0.0
25	1.3	1392.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	1.2	1093.9	0.0	0.0	0.	0.	0.0	0.0	0.0
27	1.1	814.3	0.0	0.0	0.	0.	0.0	0.0	0.0
28	1.0	560.5	0.0	0.0	0.	0.	0.0	0.0	0.0
29	0.9	338.5	0.0	0.0	0.	0.	0.0	0.0	0.0
30	0.7	154.1	0.0	0.0	0.	0.	0.0	0.0	0.0
31	0.4	21.2	0.0	0.0	0.	0.	0.0	0.0	0.0

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

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

(All Rights Reserved-Unauthorized Use Prohibited)

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/23/2007
Time of Run: 05:50AM
Run By: Alan Taylor, Taylor Geo-Engineering
Input Data Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5 seismic.in
Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5 seismic.OUT
Unit System: English
Plotted Output Filename: C:\Documents and Settings\Alan\My Documents\Taylor Geo-Engineering\Alton Coal\alton line ee gt-5 seismic.PLT
PROBLEM DESCRIPTION: Alton Coal Hollow Sedimentation Pond 3:
Line E-E, Soil GT-5 - Seismic

BOUNDARY COORDINATES
4 Top Boundaries
4 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	6800.00	20.00	6800.00	1
2	20.00	6800.00	48.00	6814.00	1
3	48.00	6814.00	60.00	6814.00	1
4	60.00	6814.00	80.00	6804.00	1

User Specified Y-Origin = 6750.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	100.0	120.0	700.0	10.0	0.00	0.0	1
2	100.0	120.0	700.0	10.0	0.00	0.0	1

1 PIEZOMETRIC SURFACE(S) SPECIFIED
Unit Weight of Water = 62.40 (pcf)
Piezometric Surface No. 1 Specified by 2 Coordinate Points
Pore Pressure Inclination Factor = 0.50

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	6790.00
2	80.00	6790.00

Specified Peak Ground Acceleration Coefficient (A) = 0.291(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.145(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.
20 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 5.00(ft)
and X = 25.00(ft)
Each Surface Terminates Between X = 48.00(ft)
and X = 60.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 6700.00(ft)
2.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 400
Number of Trial Surfaces With Valid FS = 400
Statistical Data On All Valid FS Values:
FS Max = 9.178 FS Min = 2.801 FS Ave = 3.511
Standard Deviation = 0.931 Coefficient of Variation = 26.52 %
Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	7.105	6800.000
2	8.532	6798.598
3	10.046	6797.291
4	11.640	6796.084
5	13.309	6794.982
6	15.045	6793.989
7	16.842	6793.110
8	18.691	6792.348
9	20.585	6791.707
10	22.517	6791.188
11	24.478	6790.794
12	26.460	6790.528
13	28.455	6790.389
14	30.455	6790.379
15	32.452	6790.497
16	34.436	6790.743
17	36.401	6791.116
18	38.338	6791.615
19	40.239	6792.237
20	42.096	6792.979
21	43.901	6793.840
22	45.647	6794.815
23	47.327	6795.900
24	48.934	6797.091
25	50.461	6798.383
26	51.902	6799.770
27	53.251	6801.246
28	54.503	6802.806
29	55.651	6804.443
30	56.692	6806.151
31	57.621	6807.922
32	58.434	6809.750
33	59.128	6811.625
34	59.701	6813.542
35	59.806	6814.000

Circle Center At X = 29.615 ; Y = 6821.484 ; and Radius = 31.117

Factor of Safety
*** 2.801 ***

Individual data on the 36 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.4	100.0	0.0	0.0	0.	0.	14.5	0.0	0.0
2	1.5	311.1	0.0	0.0	0.	0.	45.1	0.0	0.0
3	1.6	528.2	0.0	0.0	0.	0.	76.6	0.0	0.0
4	1.7	745.4	0.0	0.0	0.	0.	108.1	0.0	0.0
5	1.7	957.4	0.0	0.0	0.	0.	138.8	0.0	0.0
6	1.8	1158.7	0.0	0.0	0.	0.	168.0	0.0	0.0
7	1.8	1344.5	0.0	0.0	0.	0.	195.0	0.0	0.0
8	1.3	1030.7	0.0	0.0	0.	0.	149.5	0.0	0.0
9	0.6	488.1	0.0	0.0	0.	0.	70.8	0.0	0.0
10	1.9	1801.8	0.0	0.0	0.	0.	261.3	0.0	0.0
11	2.0	2109.4	0.0	0.0	0.	0.	305.9	0.0	0.0
12	2.0	2393.1	0.0	0.0	0.	0.	347.0	0.0	0.0
13	2.0	2647.6	0.0	0.0	0.	0.	383.9	0.0	0.0
14	2.0	2868.7	0.0	0.0	0.	0.	416.0	0.0	0.0
15	2.0	3052.4	0.0	0.0	0.	0.	442.6	0.0	0.0
16	2.0	3195.9	0.0	0.0	0.	0.	463.4	0.0	0.0
17	2.0	3297.0	0.0	0.0	0.	0.	478.1	0.0	0.0
18	1.9	3354.5	0.0	0.0	0.	0.	486.4	0.0	0.0

19	1.9	3367.9	0.0	0.0	0.	0.	488.3	0.0	0.0
20	1.9	3337.8	0.0	0.0	0.	0.	484.0	0.0	0.0
21	1.8	3265.7	0.0	0.0	0.	0.	473.5	0.0	0.0
22	1.7	3153.7	0.0	0.0	0.	0.	457.3	0.0	0.0
23	1.7	3005.0	0.0	0.0	0.	0.	435.7	0.0	0.0
24	0.7	1189.3	0.0	0.0	0.	0.	172.4	0.0	0.0
25	0.9	1612.2	0.0	0.0	0.	0.	233.8	0.0	0.0
26	1.5	2483.5	0.0	0.0	0.	0.	360.1	0.0	0.0
27	1.4	2150.5	0.0	0.0	0.	0.	311.8	0.0	0.0
28	1.3	1820.0	0.0	0.0	0.	0.	263.9	0.0	0.0
29	1.3	1498.2	0.0	0.0	0.	0.	217.2	0.0	0.0
30	1.1	1191.5	0.0	0.0	0.	0.	172.8	0.0	0.0
31	1.0	905.8	0.0	0.0	0.	0.	131.3	0.0	0.0
32	0.9	646.9	0.0	0.0	0.	0.	93.8	0.0	0.0
33	0.8	420.0	0.0	0.0	0.	0.	60.9	0.0	0.0
34	0.7	230.0	0.0	0.0	0.	0.	33.3	0.0	0.0
35	0.6	81.1	0.0	0.0	0.	0.	11.8	0.0	0.0
36	0.1	2.4	0.0	0.0	0.	0.	0.4	0.0	0.0

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

APPENDIX F

RECOMMENDED EARTHWORK SPECIFICATIONS

APPENDIX E
RECOMMENDED EARTHWORK SPECIFICATIONS

1. Areas to receive fill and/or backfill should be stripped of all vegetation, organic material, and debris. Any existing undocumented or non-structural fill/backfill materials and other unsuitable materials should be excavated in their entirety. All areas that are to receive fill should be observed by TGE prior to placement of fill.

2. Fill should be compacted to 90% of the maximum density as compared to ASTM D 698 (standard Proctor) for the spoil pile and sedimentation dikes/embankments.

3. Lift thickness for the sedimentation ponds should not exceed 12-inch loose lifts or 8-inch compacted lifts. Since large equipment will be used for the spoil pile, lifts can be as large as 2 feet. The lift thickness may be increased or decreased relative to the results of compaction test results during field verification as approved by TGE.

4. Saturated soils should be placed in an area that will have minimal effect on the performance of the slopes.

5. Native, undisturbed soils to serve as subgrade for the pond embankments should be scarified to a minimum depth of 12 inches, moisture conditioned to, or slightly above, optimum moisture content and re-compacted to at least 90% relative compaction.

6. A qualified geotechnical engineering firm under the direction of TGE, should observe the placement of fill and conduct in-place field density tests on the fill to check for adequate moisture content and relative compaction as outlined herein. If less than the specified relative compaction is obtained, additional compactive effort should be applied and the fill moisture-conditioned as necessary until the specified relative compaction is attained. The Contractor should provide level testing pads on which geotechnical engineering firm may conduct field density tests. The Contractor should provide safe and timely access for engineering personnel throughout the grading site to allow continued monitoring and testing.

7. Wherever, in the opinion of the Owner's representatives, an unstable condition is being created either by cutting or filling, the work should not proceed in that area until an evaluation has been made and the grading operations revised, if found necessary.

8. Fill should not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain or freezing temperatures, fill operations should not be resumed until field tests indicate that the moisture content and density of the fill are as previously specified.

9. Whenever the words "supervision", "inspection", or "control" appear they should mean *observation* of the work and *testing* of the fill placement necessary by TGE or their representative to substantiate compliance with plans, specifications and design concepts.