APPENDIX H

SLOPE STABILITY EVALUATION, COMPOST MANAGEMENT UNIT

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SLOPE STABILITY EVALUATION
TAJIGUAS RESOURCE RECOVERY PROJECT
COMPOST MANAGEMENT UNIT (CMU)
TAJIGUAS SANITARY LANDFILL
SANTA BARBARA COUNTY, CALIFORNIA

Introduction

This letter report present the results of two-dimensional (2-D) stability analyses performed by **G**eo-**L**ogic **A**ssociates (**GLA**) for the proposed Compost Management Unit (CMU) proposed at the upper deck at the Tajiguas Sanitary Landfill (TSL), in Santa Barbara County (see Vicinity Map, Figure 1).

Scope of Work

The work completed by GLA for the scope of work for this project includes the following:

- Review of prior static and seismic stability analyses conducted at the site (see References).
- Development of five cross sections for two-dimensional (2-D) stability analyses using pre-landfill topography, existing site topography (April 2013), the proposed closure plan (SWT, 2013), the proposed Compost Management Unit (CMU), and recent groundwater elevation data (County of Santa Barbara, 2013);
- Performance of 2-D static and pseudo-static stability analyses on the cross sections using the SLOPE/W computer program;
- Evaluation of the results of the analyses; and
- Preparation of this letter report.

Background

The Tajiguas Sanitary Landfill, an existing Class III municipal solid waste (MSW) landfill owned and operated by the County of Santa Barbara since 1967, is located within a south-facing coastal canyon approximately 26 miles west of the City of Santa Barbara, California (Figure 1). Immediately south of the landfill site are U.S. Highway 101, the Union Pacific Railroad tracks, and the Pacific Ocean. The unlined southern portion of the landfill is within the California Coastal Zone.

The existing refuse fill slope at the south face of the TSL is in excess of 380 feet in height with a current overall gradient near 3.5:1 (horizontal:vertical) including the large (150-foot wide) mid-slope bench area. Currently, landfill operations are taking place on lined northern portions of the site.

As part of the Resource Recovery Project, the landfill proposes a Compost Management Unit (CMU) on the upper deck at an approximate elevation of 620 feet mean sea level. The approximate dimensions and footprint of the CMU facility are presented on Figure 2. The approximate density of the wetted compost was provided as 44.6 pcf. The compost is proposed to be stored in rows of 50 foot in width, with 20 feet between each row to a maximum height of 20 feet. The compost will be set back a minimum of 25 feet from the top of the slope. The working surface of the CMU facility will be composed of 3 inches of asphalt concrete (AC) over 3 inches of base course. The base course will be underlain (from top to bottom) by a 12-inch minimum thick layer of compacted earth fill, a drainage composite, a cushion (non-woven) geotextile, a LLDPE membrane, an additional cushion geotextile, daily cover, and refuse.

Material Properties and Model Stratigraphy

Materials modeled in the slope stability evaluation include compost, MSW refuse fill, compacted fill soil, alluvium/weathered soil derived from shale of the Rincon Formation, and unweathered Rincon Formation bedrock. Lined and unlined areas will underlie the various cross sections modeled. Both smooth and textured HDPE/LLDPE against non-woven geotextile will be used in the cross sections and analyzed, as appropriate.

The unit weight and shear strength parameters for the materials modeled in this slope stability evaluation are presented in Table 1. Unit weight properties for the MSW refuse fill are based on a review of pertinent literature (Kavazanjian, 1995). The static and dynamic shear strengths of MSW are based on Bray et al. (2009). For comparison to more traditional shear strength parameters, a linear approximation of these functions would result in friction angle and cohesion parameters of about 32 degrees and 500 pounds per square foot (for static conditions). For soil and rock materials, properties used were based on previous shear testing of site soils and our experience with similar materials. The material properties used in this slope stability evaluation are consistent with those used in the previous investigations for Tajiguas Landfill (**GLA**, 2002, 2003, 2004, and 2010). Interface friction angles for the smooth and textured HDPE/LLDPE against non-woven geotextile are taken from Koerner, 2005. The strength of the compost is taken from Bajwa, et. al., 2011).

The strength parameters used in the analysis are presented below.

Table 1
Geotechnical Material Parameter Strength Summary

Material	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Compost	44.6	45	100
Refuse Fill (MSW) static and dynamic	72	Approx. 32	Approx. 500
Compacted Fill below compost	120	25	200
Compacted Fill at 380' deck	125	32	350
Alluvium/Weather bedrock	120	21	550
Textured LLDPE/Non-woven geotextile (base liner), peak strength	10*	26	170
Textured HDPE/Non-woven geotextile (base liner), peak strength	10*	25	167
Smooth HDPE/Non-woven geotextile interface (slope liner), residual strength	10*	8	0
Unweathered Bedrock	130	28	1000

Notes: "/" Implies interface; * Not significant in the analysis.

Since neither the areal distribution of refuse fill thickness nor site-specific pre-development surveys of canyon topography were available, the pre-development topography and refuse fill depth were estimated by digitizing elevation contours from U.S. Geological Survey (USGS) 7.5 Minute topographic maps (Gaviota and Tajiguas Quadrangles; USGS 1995; topography compiled in 1947). The depth of weathering of the Rincon Formation as observed from previous investigations at the site ranged from 24 to 46 feet. As in previous site stability evaluations (**GLA**, 2001, 2004, 2012), the thickness of the (upper) weathered zone of the Rincon Formation was conservatively assumed to be a uniform 50 feet.

Groundwater Conditions

For the slope stability evaluation, groundwater elevation levels within the landfill were based on monitoring well data provided by the County from their 2013 First Semi-annual monitoring survey. In areas beyond the available data, groundwater elevations were conservatively extrapolated. Currently, the County has several methods to dewater the site. The stability analysis herein assumes that these methods of dewatering will continue, thus maintaining near-current groundwater levels.

Seismic Hazard Evaluation

Faulting in the vicinity of the site is a complex system of onshore and offshore reverse low-angle thrust faults and high-angle, left-lateral strike-slip/oblique slip faults that appear to be continuous with similar faults at the northern extent of the Los Angeles Basin.

California Code of Regulations (CCR) Title 27 requires that stability analyses performed for a Class III landfill be based on the expected peak ground acceleration at the site associated with the maximum probable earthquake (MPE). The MPE has been defined by the California Division of Mines and Geology (now known as the California Geological Survey) as the “maximum earthquake that is likely to occur during a 100-year interval” (CDMG, 1975). In order to satisfy this requirement, **GLA** performed a deterministic seismic hazard evaluation (DSHA) for the site in GLA (2012). The results of the DSHA analyses show that the seismic risk at the site is generally controlled by the nearby Pitas Point (Lower, west) fault, an offshore low-angle reverse thrust fault that dips beneath the site at an angle of about 13 degrees to the northeast. The MPE magnitude along this fault is M=6.1 and the peak ground acceleration (PGA) associated with this fault is 0.42g at a distance of 23 km.

Slope Stability and Seismic Deformation Analyses

Two dimensional slope stability analyses were performed for Cross Sections A-A’ through D-D’ using the computer program SLOPE/W, the well known slope stability software (GEO-SLOPE International, 2010). These 2-D analyses were performed to efficiently determine the factor of safety of the slopes with the proposed 20 foot high compost stockpile in place.

Cross section A-A’ was constructed in a north-south direction across the proposed compost stockpile footprint to evaluate the local stability of the compost piles above the proposed LLDPE membrane. The interface between the LLDPE and the overlying and underlying non-woven geotextiles was assumed to be the critical interface. The compost was assumed to be one continuous pile (with no intervening vehicle access rows) to be conservative. The location of cross section A-A' is presented on Figure 2.

Cross sections B-B', C-C', and D-D' were constructed to evaluate the overall (gross) stability of the refuse slopes in the post-closure configuration in three directions with the maximum height of the compost piles in place. Cross section B-B' was constructed through the highest part of the landfill (front face) in the unlined area. Cross section C-C' was constructed in an east-west direction in the area of the current landfill maintenance trailers across the 380 foot deck. Cross section D-D' was constructed through the area of the lined cells at the northwest portion of the landfill. Cross section E-E' was constructed to analyze the stability of the interim refuse slope condition (north of the proposed CMU facility) at the time of construction of the CMU facility. Cross section locations are presented on Figure 3. Complete graphical results of the SLOPE/W 2-D slope stability analyses showing slope configuration, piezometric surfaces, factors of safety, and failure surfaces are presented in Appendix A (Figures A-1 through A-12).

Standard practice within the solid waste industry is to use peak shear strength parameters for base liners and large deformation (a.k.a., residual) shear strength parameters for slope liners (Stark and Choi, 2004; Koerner and Bowman, 2003; Gilbert, 2001; Stark and Poeppel, 1994). The basis for this approach is that refuse settlement along the slope liner would cause displacement and mobilize residual strength conditions, whereas with the base liner, no such corresponding pre-shearing occurs. This procedure was followed for this analysis. Peak shear strength was used for the floor liner and a residual strength was used for the smooth HDPE to non-woven geotextile interface layer along the side slopes. The analysis is only applicable, however, if the seismic displacements are less than the displacement needed to trigger residual strength parameters along the interface (which is the case for the refuse floor interfaces analyzed for the site). A summary of the slope stability analyses of the cross sections analyzed is presented below:

Table 2
Static and Pseudo-Static Slope Stability Analysis

Description of Analysis	Figure No.	Static Factor of Safety	Figure No.	Yield Acceleration, k_y
Section A-A'-North Side	A-1	2.50	A-2	0.57g
Section A-A'-South Side	A-3	2.92	A-4	0.48g
Section B-B'	A-5	1.55	A-6	0.127g
Section C-C'	A-7	2.50	A-8	0.30g
Section D-D'	A-9	3.68	A-10	0.31g
Section E-E'	A-11	2.96	A-12	0.29g

Potential Seismically-Induced Displacements of the Waste Mass

CCR Title 27 requires that further analysis be done to demonstrate that the proposed design will be functional during the MPE if the pseudo-static analysis indicates a factor-of-safety less than 1.5. Conventional dynamic (pseudo-static) stability analyses for the refuse fill slopes were performed on the five constructed cross sections using the SLOPE/W (Geo-Slope, 2007) computer program. Under pseudo-static conditions, the yield acceleration (k_y) is determined by subjecting the model to varying horizontal seismic accelerations until the factor of safety of the section is 1.0 (i.e., unity). For the cross sections analyzed, the yield acceleration was calculated and is presented in Table 2.

The minimum static factor of safety for the cross sections analyzed with the proposed compost in place is 1.55. This result exceeds the CCR Title 27 minimum requirement of 1.5.

The approximate locations of the cross sections are presented on Figures 2 and 3. Seismic-induced permanent displacements due to the MPE were estimated using procedures described by Bray et. al., (1998), and Bray and Rathje (1998). The procedure is based on the methods described by Newmark (1965) for determining displacement of a rigid block resting on a sliding plane subjected to earthquake-type motions. The procedure is based on the premise that the sliding block will undergo displacement only during the periods when the maximum ground acceleration (k_{max}) exceeds the yield acceleration (k_y) for the sliding block, (i.e., displacements occur when k_{max} is greater than k_y). Bray and Rathje (1998) refined the procedure for waste fills to incorporate the dynamic response characteristics of the sliding block, and intensity and duration of ground motions at the site. The site design seismic parameters used in the analysis were as presented previously and are summarized below:

Table 3
Maximum Probable Earthquake Design Characteristics

Earthquake Magnitude	M=6.1 on the Pitas Point (Lower, west) fault at a distance of 23 km
Maximum Site Acceleration	0.42g (for the MPE)
Duration of Significant Shaking, D_{5-95}	8 seconds (Bray et. al., 1998)
Mean Period of Shaking, T_m	0.45 sec. for Magnitude 6.1 earthquake (Bray et. al., 1998)

Based on the yield acceleration values provided in Table 2, permanent seismic displacement calculations were performed for the compost (Figures A-1 through A-4) and refuse prism (Figures A-5 through A-12) in accordance with the procedures described above. The displacement calculations are presented in Table A-1 (Appendix A). The results of the calculations indicate a negligible permanent dynamic displacement of the compost slopes and refuse prism from the PGA based on the MPE design earthquake for the five cross sections analyzed with the maximum compost height and footprint.

Conclusions and Recommendations

Based on the results of this slope stability analyses, the proposed construction of the CMU facility on the upper deck of the Tajiguas Sanitary Landfill is feasible and can be completed in compliance with CCR Title 27 regulations.

SWT has performed a settlement analysis of the facility which indicates that there is a potential for up to 20 to 30 feet of total settlement at the CMU facility during the 30-year period after the facility is constructed. If it is desired, methods to reduce the amount of post-construction settlement include:

- Delaying construction of the facility until a portion of the initial refuse settlement has occurred.
- Soil surcharging.

As an alternative, the use of a heavy geogrid (Tensar TX 160 or equivalent) placed at the base of the 12 inch thick (minimum) compacted fill zone underlying the CMU facility can be used to somewhat reduce the magnitude of the adjacent, differential settlements typically associated with construction on refuse, but the geogrid will not reduce the magnitude of the total refuse settlement.

The southern front face of the Tajiguas Sanitary Landfill is heavily dependent on maintenance of the groundwater elevations at or below the levels assumed in our stability analyses. Currently, the County has several methods to dewater the site. The stability analysis herein assumes that these methods of dewatering will continue, thus maintaining near-current groundwater levels Monitoring of the existing network of groundwater wells and their elevations, should continue through the course of the remaining landfill life, through closure, and extending through the post-closure monitoring period.

Closure

This report is based on the limited study described herein. If the proposed grading plan for CMU facility varies in concept significantly from those shown in this evaluation, **GLA** may need to re-assess stability conditions. In addition, **GLA** should be notified if conditions are found to differ from those described in this report since this situation may require a re-evaluation of the conclusions and recommendations included herein.

This report was prepared in accordance with generally accepted geologic, geotechnical and hydrogeologic practices and makes no warranties, either express or implied, as to the professional advice or data included in it.

This report has not been prepared for use by parties and projects other than those named or described herein. It may not contain sufficient information for other parties or other purposes.

We appreciate and opportunity to be of service on this project.

Geo-Logic Associates

Joseph G. Franzone, PE, GE 2189
Supervising Geotechnical Engineer

Distribution: (1) Addressee, electronic submittal

Attachments

References
Figure 1 – Vicinity Map
Figure 2 – Site Plan
Figure 3 – Cross Section Location Map

Appendices

Appendix A – Slope Stability Analysis (Table A-1 – Seismic-Induced Permanent Displacement) and Figures A-1 through A-12.

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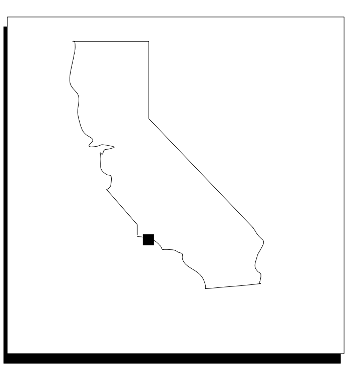

FIGURE 1

VICINITY MAP

RESOURCE RECOVERY PROJECT
TAJIGUAS LANDFILL
COUNTY OF SANTA BARBARA, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	8/2013	2013-0125

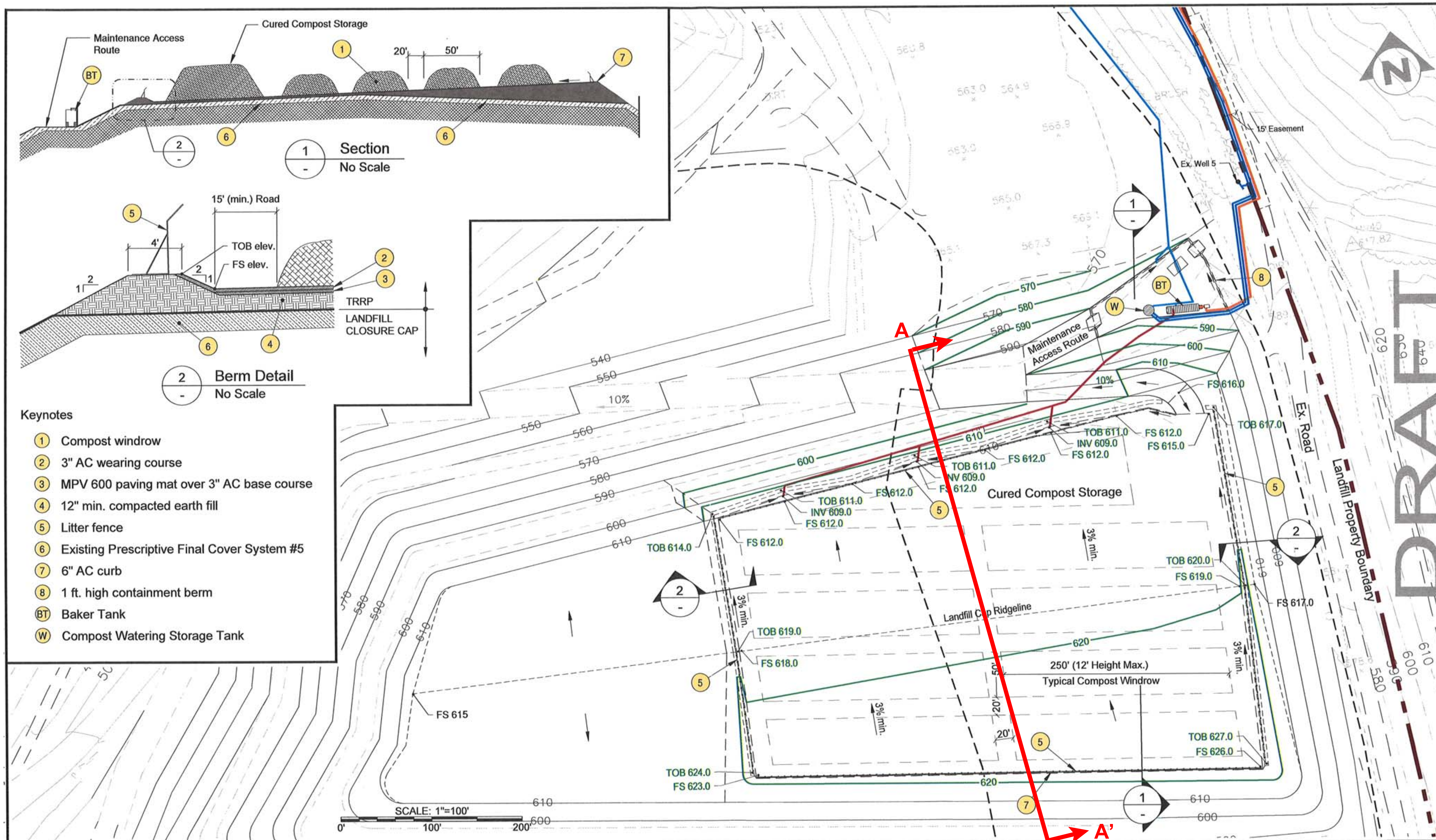

FIGURE 2

Prepared by:

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Legend

CMU Runoff Collection	Water Supply from Well or Storage Tank
CMU Runoff to Storage Tank	Landfill Liner Limits
Overflow Collection to Pila Creek	600 Landfill Closure Grading
	600 CMU Grading

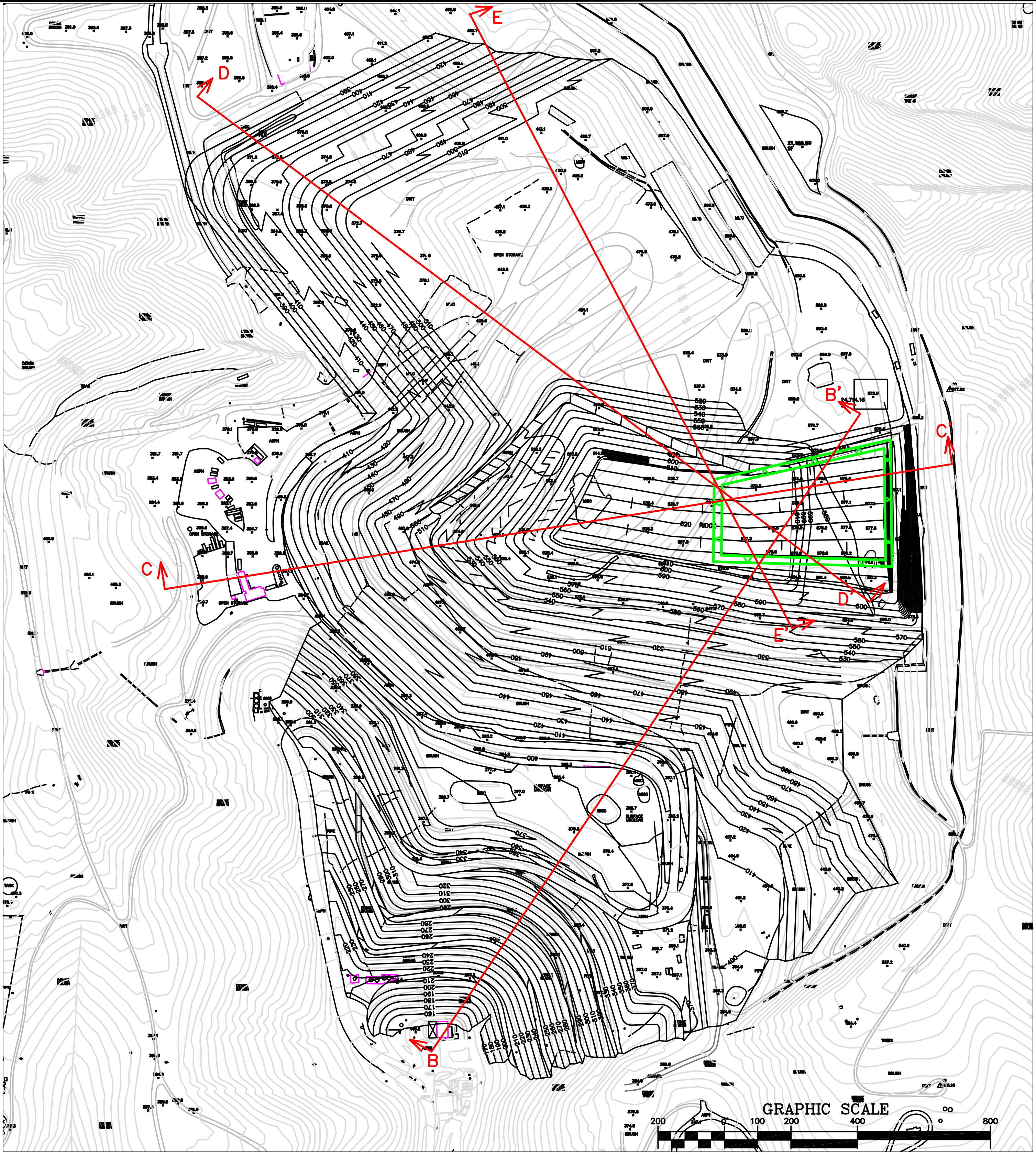
A – A' Approximate location of cross section

SITE PLAN
RESOURCE RECOVERY PROJECT
CMU SLOPE STABILITY
SANTA BARBARA COUNTY, CALIFORNIA

Geo-Logic ASSOCIATES

Draft	Date	Project No.
JGF	08/2013	2013.0125

NOTES: Exhibit CMU-2, CMU Layout and Grading Plan, John Kular Consulting, 2013.
Location of CMU facility shown on Figure 3.



Reference: County of Santa Barbara, 2013 and SWT, 2013.

LEGEND

E E' APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION

NOTES: 1). GRAY CONTOURS ARE EXISTING (2013), BLACK CONTOURS ARE PROPOSED CLOSURE PLAN.
2). GREEN LINES INDICATE MAXIMUM FOOTPRINT OF COMPOST PILES.
3) LOCATION OF CROSS SECTION E–E' IS PRESENTED ON FIGURE 2.

N

FIGURE 3

CROSS SECTION LOCATION MAP

RESOURCE RECOVERY PROJECT
TAJIGUAS SANITARY LANDFILL
COUNTY OF SANTA BARBARA, CA

Geo-Logic ASSOCIATES

DRAWN BY:	DATE:	JOB NO.
JGF	AUG 2013	2013–0125

APPENDIX A

SLOPE STABILITY ANALYSES

TABLE A-1 - ESTIMATED SEISMICALLY-INDUCED DISPLACEMENT
TAJIGUAS LANDFILL - CMU SLOPE STABILITY
SANTA BARBARA COUNTY, CALIFORNIA
(Using ASCE/SCEC, 2002 as adopted from Bray and Rathje, 1998 and Bray et.al., 1998 Procedure)

Cross Section	Critical Slope	Failure Wedge Height(1) (ft)	Static F.S.	k_y (2) (g)	Average Shear Wave Velocity(3) (fps)	T_s (4) (sec)	T_m (5), (sec)	T_s/T_m	MHEA /MHA* NRF (6)	D_{5-95}, sec (7)	NRF(8)	MHEA base, or k_{max}	k_y/k_{max}	Calculated Displacement (9), inches
Assumptions: Design horizontal site acceleration in rock = 0.42g for M=6.1 (MPE) event on the Pitas Point at 23 km from the site.														
MHA_{rock}=		**0.42 g**												
A-A' (north side)	Failure of Compost	20	2.50	0.57	500	0.16	0.45	0.356	1.00	8	0.98	0.41	1.38	0.0
A-A' (south side)	Failure of Compost	20	2.92	0.48	500	0.16	0.45	0.356	1.00	8	0.98	0.41	1.17	0.0
B-B'	Failure of MSW	200	1.55	0.127	775	1.03	0.45	2.294	0.30	8	0.98	0.12	1.03	0.0
C-C'	Failure of MSW	300	2.50	0.30	875	1.37	0.45	3.048	0.23	8	0.98	0.09	3.17	0.0
D-D'	Failure of MSW	200	3.68	0.31	775	1.03	0.45	2.294	0.30	8	0.98	0.12	2.51	0.0
E-E'	Failure of MSW	125	2.96	0.29	700	0.71	0.45	1.587	0.38	8	0.98	0.16	1.85	0.0

NOTES:

(1) From slope stability analysis (Appendix A).

(2) k_y = yield acceleration obtained from pseudo-static slope stability analysis (Appendix A).

(3) Estimated from Bray et.al., 1998, Figure 3.

(4) $T_s = 4H/V_s$

where: H = Height of the failure surface in pseudo-static analysis

V_s= Average shear wave velocity of the failure wedge

(5) T_m = Mean Period of the MPE as determined from data in Bray, et. al., (1998), Figure 2b.

(6) MHEA is the Maximum Horizontal Equivalent Acceleration of the potential failure mass in the slope. This is the same as $k_{max.}$

MHA is the Maximum Horizontal Acceleration for the MPE at the site. For this evaluation a value of 0.42 g is calculated.

Ratio MHEA/MHA*NRF obtained from Bray & Rathje, 1998, Figure 7b (rock site) or ASCE/SCEC, Fig. 11.2. This publication recommends this ratio need not be taken to be >1.

(7) D_{5-95} from Bray et. al., (1998), Figure 2c.

(8) NRF, Non-linear response factor from Bray and Rathje (1998). Figure 6b.

(9) From Bray and Rathje (1998), Figure 11, and ASCE/SCEC, 2002.

References: Bray, J.D., E.M. Rathje, A.J. Augello and S.M. Merry, 1998, "Simplified Seismic Design Procedure for Geosynthetic-Lined, Solid-Waste Landfills," Geosynthetics International, Vol. 5, Nos. 1-2.

Bray, J.D., and E.M. Rathje, 1998, "Earthquake Induced Displacements of Solid Waste Landfills," ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 124, No. 3, March.

ASCE/SCEC, 2002, Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Landslide Hazards in CA.

Title: Tajiguas LF
Comments: CMU Stability
File Name: 1 Section A-A'_north side.gsz
Date: 8/23/2013
Time: 3:19:16 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Horz Seismic Load: 0

Name: Compost
Model: Mohr-Coulomb
Unit Weight: 44.6 pcf
Cohesion: 100 psf
Phi: 45 °

Name: Compacted Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 25 °

Name: Textured LLDPE vs. NW Geotextile
Model: Mohr-Coulomb
Unit Weight: 10 pcf
Cohesion: 170 psf
Phi: 26 °

Name: Bedrock
Model: Bedrock (Impenetrable)

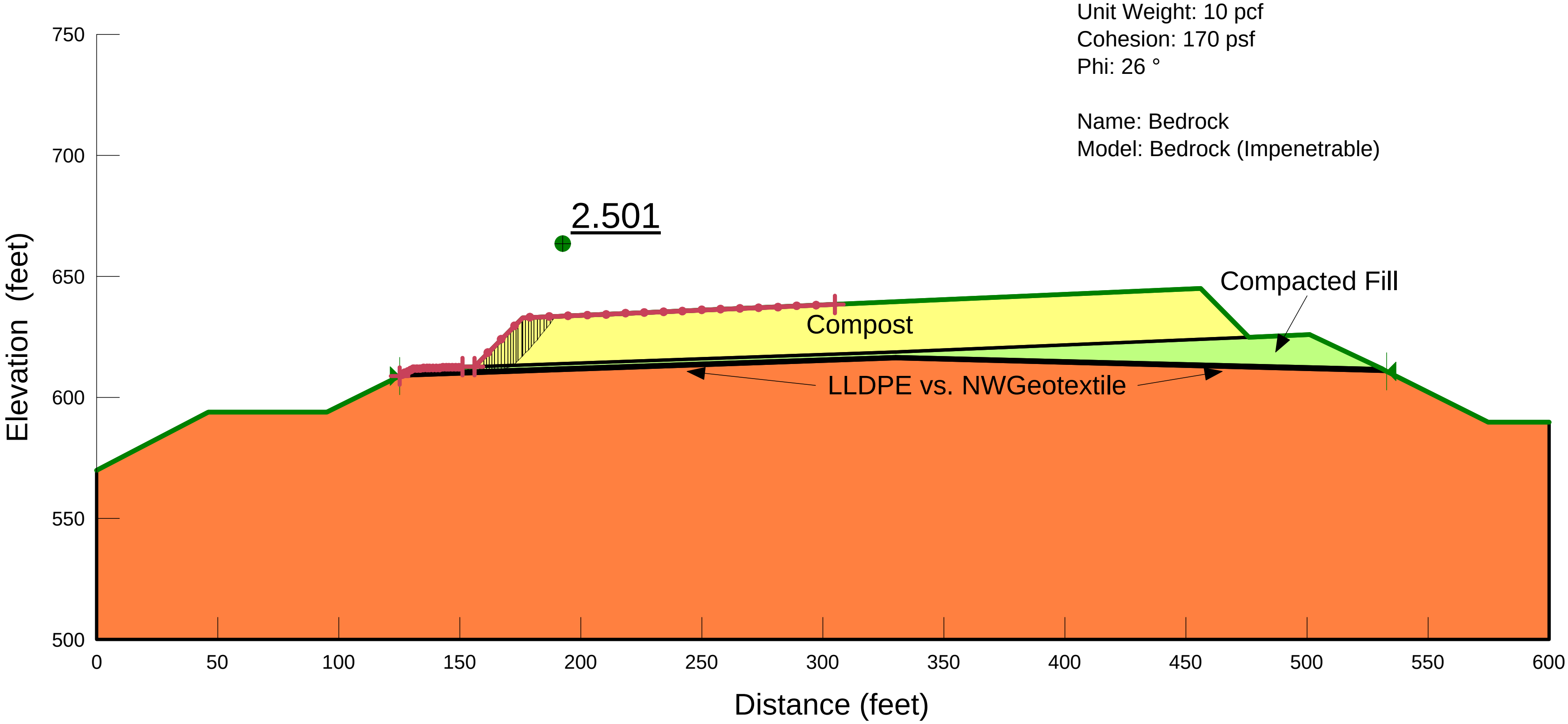


FIGURE A-1 - Tajiguas CMU Facility - North Side - Static

Title: Tajiguas LF
Comments: CMU Stability
File Name: 2 Section A-A'_north side-eq.gsz
Date: 8/23/2013
Time: 3:50:29 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Horz Seismic Load: 0.567

Name: Compost
Model: Mohr-Coulomb
Unit Weight: 44.6 pcf
Cohesion: 250 psf
Phi: 26 °

Name: Compacted Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 25 °

Name: Textured LLDPE vs. NW Geotextile
Model: Mohr-Coulomb
Unit Weight: 10 pcf
Cohesion: 170 psf
Phi: 26 °

Name: Bedrock
Model: Bedrock (Impenetrable)

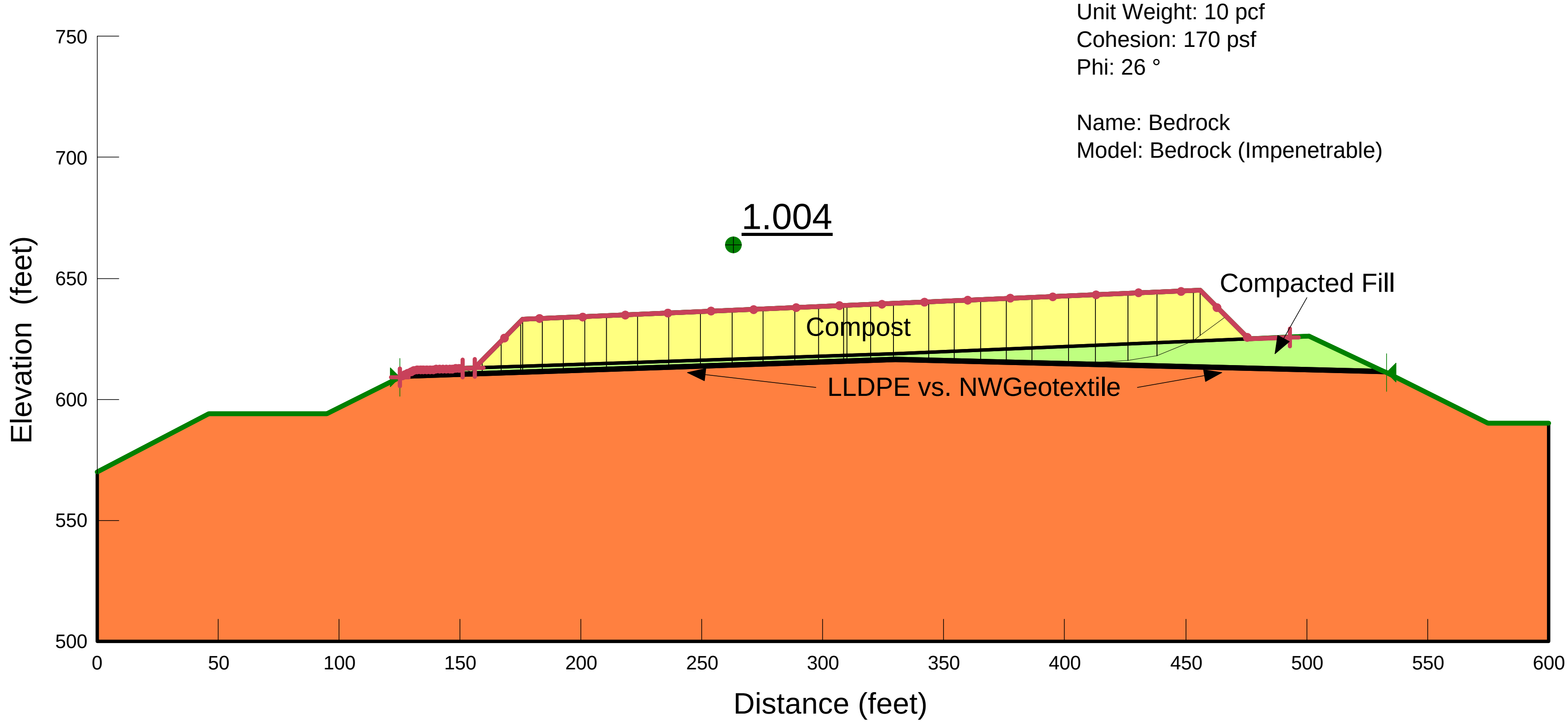


FIGURE A-2 - Tajiguas CMU Facility - North Side with Seismic Loading

Title: Tajiguas LF
Comments: CMU Stability
File Name: 3 Section A-A'_south side.gsz
Date: 8/23/2013
Time: 3:11:40 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Horz Seismic Load: 0

Name: Compost
Model: Mohr-Coulomb
Unit Weight: 44.6 pcf
Cohesion: 100 psf
Phi: 45 °

Name: Compacted Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 25 °

Name: Textured LLDPE vs. NW Geotextile
Model: Mohr-Coulomb
Unit Weight: 10 pcf
Cohesion: 170 psf
Phi: 26 °

Name: Bedrock
Model: Bedrock (Impenetrable)

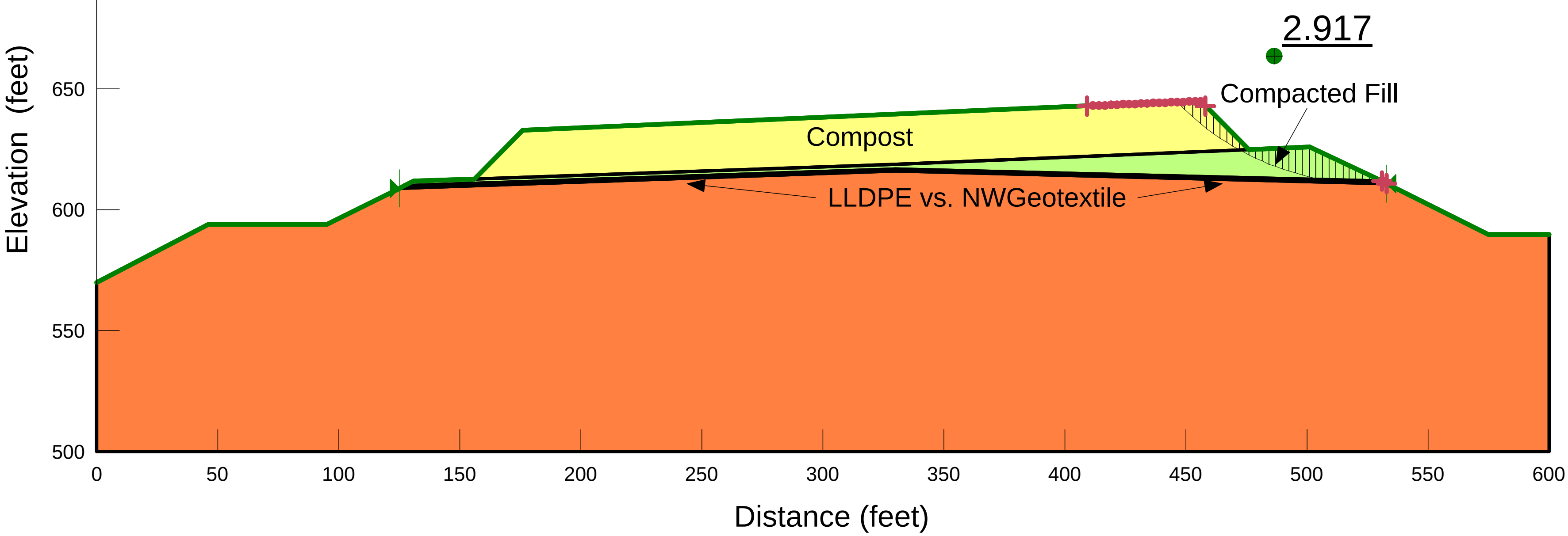


FIGURE A-3 - Tajiguas CMU Facility - South Side_Static

Title: Tajiguas LF
Comments: CMU Stability
File Name: 4 Section A-A'_south side_eq.gsz
Date: 8/23/2013
Time: 3:53:24 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Horz Seismic Load: 0.481

Name: Compost
Model: Mohr-Coulomb
Unit Weight: 44.6 pcf
Cohesion: 100 psf
Phi: 45 °

Name: Compacted Fill
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 200 psf
Phi: 25 °

Name: Textured LLDPE vs. NW Geotextile
Model: Mohr-Coulomb
Unit Weight: 10 pcf
Cohesion: 170 psf
Phi: 26 °

Name: Bedrock
Model: Bedrock (Impenetrable)

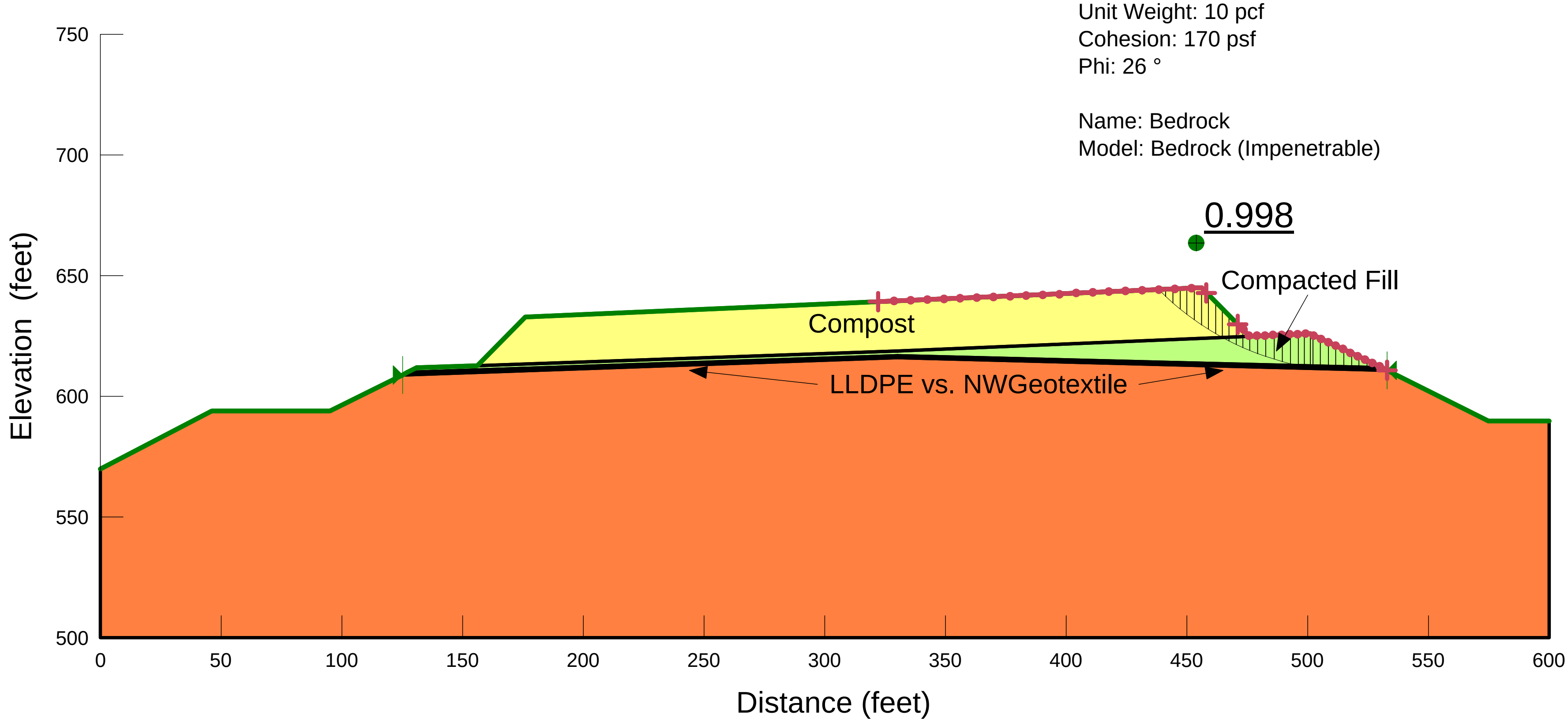


FIGURE A-4 - Tajiguas CMU Facility - South Side with Seismic Loading

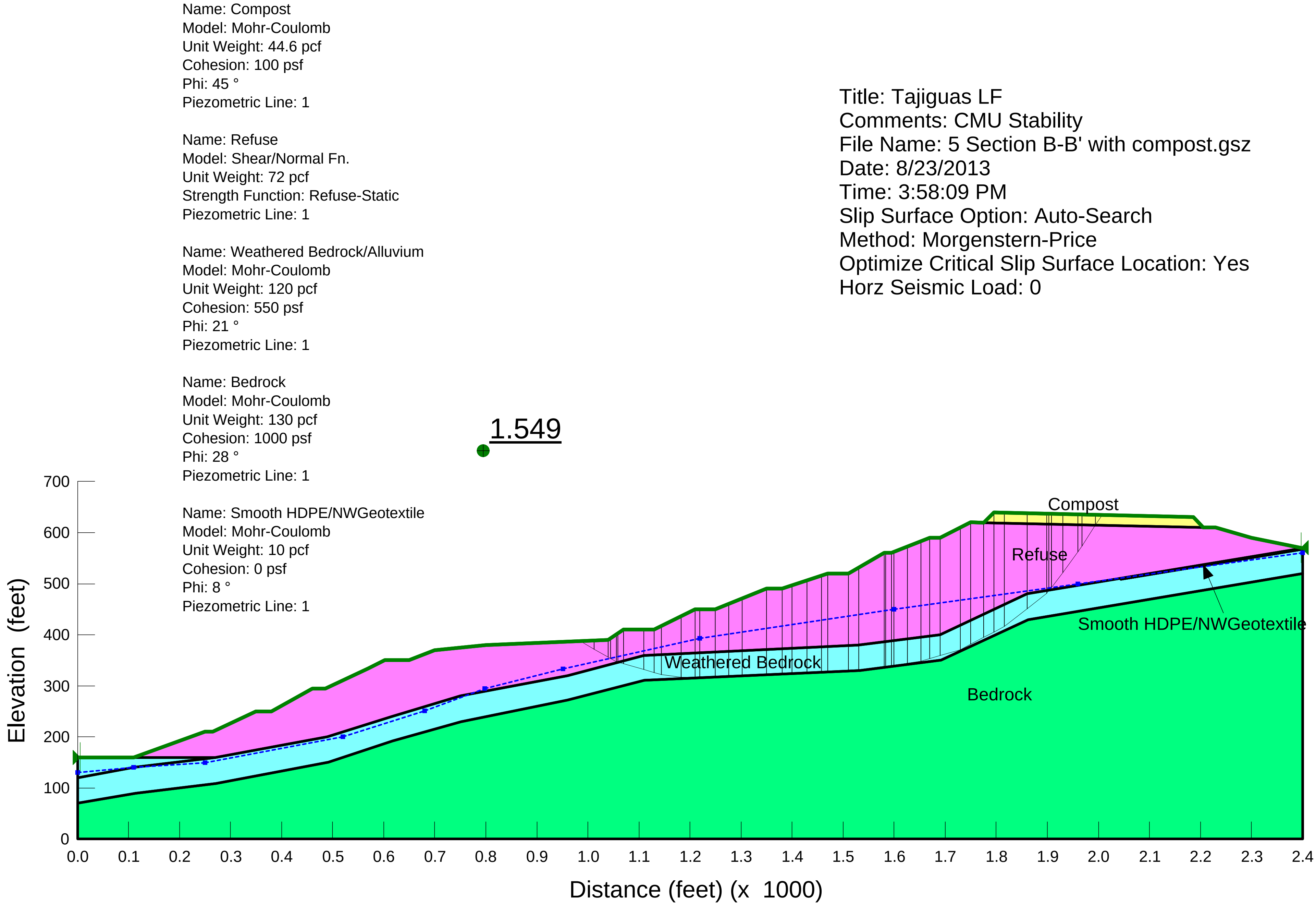
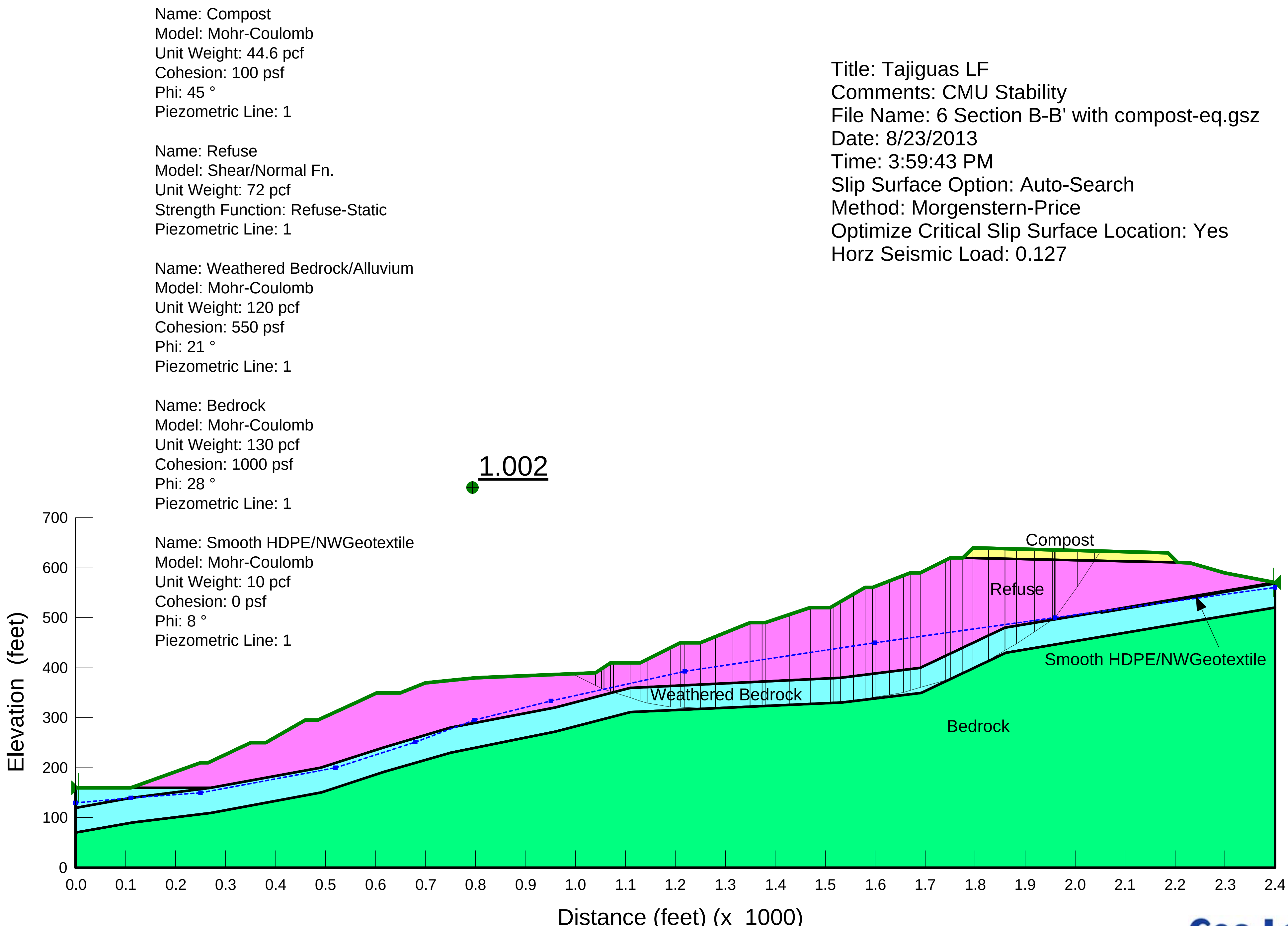


FIGURE A-5 - Tajiguas CMU Facility - Cross Section B-B'_20' high compost

Geo-Logic
ASSOCIATES



Geo-Logic ASSOCIATES

FIGURE A-6 - Tajiguas CMU Facility - Cross Section B-B'_20' high compost, with Seismic Loading

Title: Tajiguas LF
Comments: CMU Stability
File Name: 7 Section C-C' with compost.gsz
Date: 8/23/2013
Time: 4:01:28 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0

Name: Compost Model: Mohr-Coulomb Unit Weight: 44.6 pcf Cohesion: 100 psf Phi: 45 ° Piezometric Line: 1
Name: Refuse Model: Shear/Normal Fn. Unit Weight: 72 pcf Strength Function: Refuse-Static Piezometric Line: 1
Name: Weathered Bedrock/Alluvium Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 550 psf Phi: 21 ° Piezometric Line: 1
Name: Bedrock Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion: 1000 psf Phi: 28 ° Piezometric Line: 1
Name: Liner Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 0 psf Phi: 8 ° Piezometric Line: 1
Name: Compacted Fill Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion: 350 psf Phi: 32 ° Piezometric Line: 1

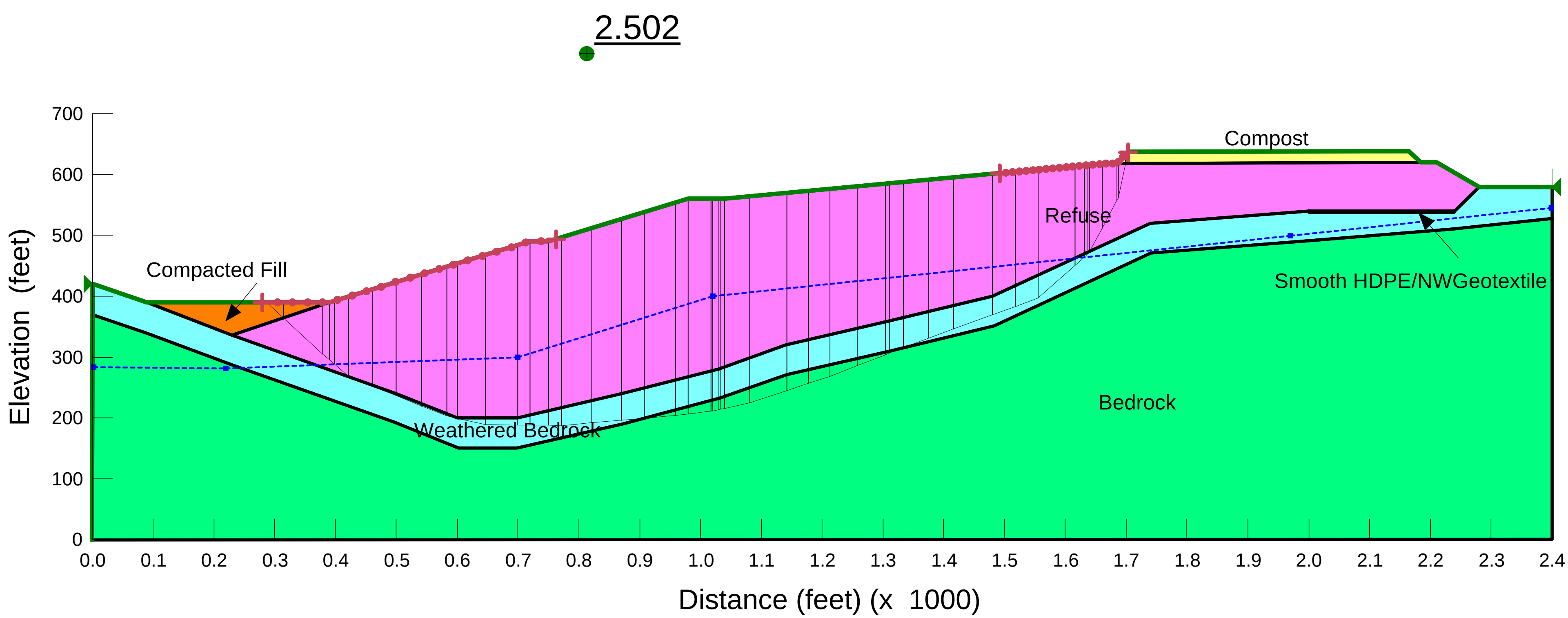


FIGURE A-7 - Tajiguas CMU Facility - Cross Section C-C'_with compost

Geo-Logic ASSOCIATES

Title: Tajiguas LF
Comments: CMU Stability
File Name: 8 Section C-C' with compost_eq.gsz
Date: 8/23/2013
Time: 4:02:41 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0.3

Name: Compost   Model: Mohr-Coulomb   Unit Weight: 44.6 pcf   Cohesion: 100 psf   Phi: 45 °   Piezometric Line: 1
Name: Refuse   Model: Shear/Normal Fn.   Unit Weight: 72 pcf   Strength Function: Refuse-Static   Piezometric Line: 1
Name: Weathered Bedrock/Alluvium   Model: Mohr-Coulomb   Unit Weight: 120 pcf   Cohesion: 550 psf   Phi: 21 °   Piezometric Line: 1
Name: Bedrock   Model: Mohr-Coulomb   Unit Weight: 130 pcf   Cohesion: 1000 psf   Phi: 28 °   Piezometric Line: 1
Name: Liner   Model: Mohr-Coulomb   Unit Weight: 10 pcf   Cohesion: 0 psf   Phi: 8 °   Piezometric Line: 1
Name: Compacted Fill   Model: Mohr-Coulomb   Unit Weight: 125 pcf   Cohesion: 350 psf   Phi: 32 °   Piezometric Line: 1

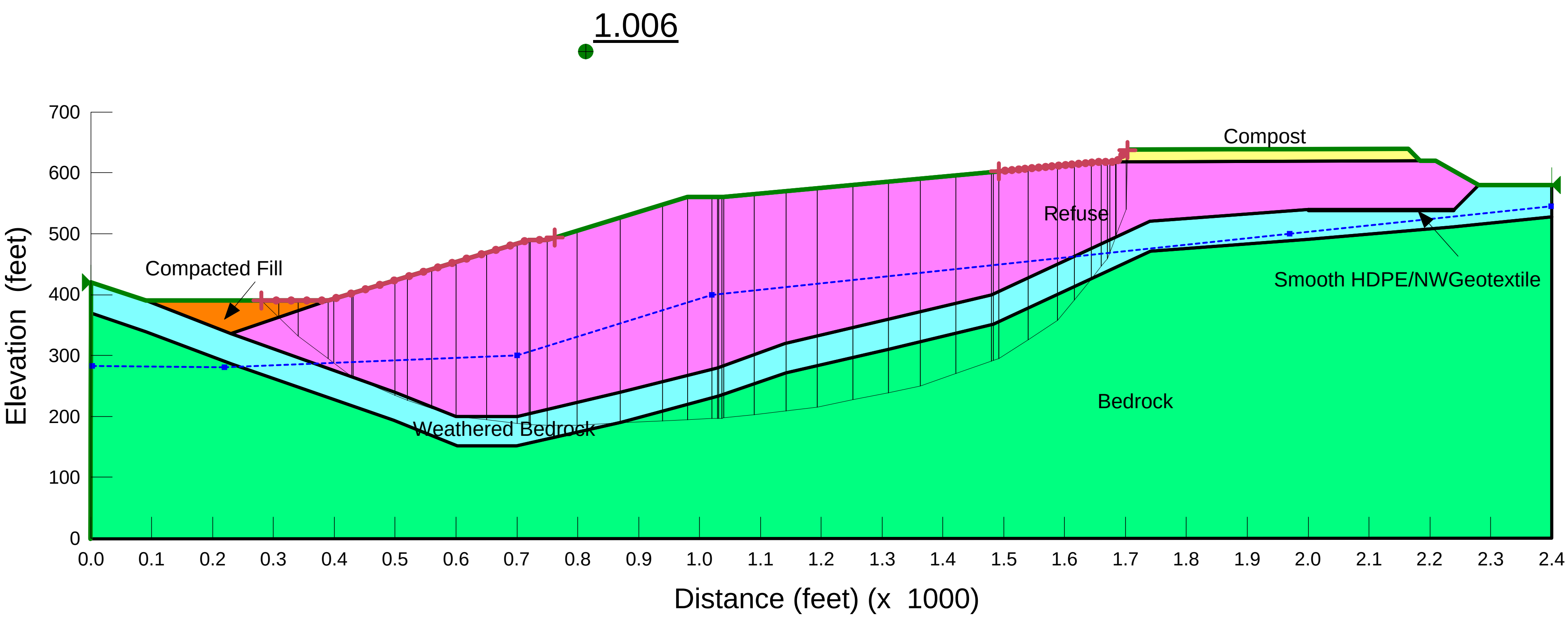


FIGURE A-8 - Tajiguas CMU Facility - Cross Section C-C'_with compost_with Seismic Loading

Title: Tajiguas LF
Comments: CMU Stability
File Name: 9 Section D-D' with compost.gsz
Date: 8/23/2013
Time: 4:04:03 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0

Name: Compost Model: Mohr-Coulomb Unit Weight: 44.6 pcf Cohesion: 100 psf Phi: 45 ° Piezometric Line: 1
Name: Refuse Model: Shear/Normal Fn. Unit Weight: 72 pcf Strength Function: Refuse-Static Piezometric Line: 1
Name: Weathered Bedrock/Alluvium Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 550 psf Phi: 21 ° Piezometric Line: 1
Name: Bedrock Model: Bedrock (Impenetrable) Piezometric Line: 1
Name: Smooth HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 0 psf Phi: 8 ° Piezometric Line: 1
Name: Textured HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 167 psf Phi: 25 ° Piezometric Line: 1

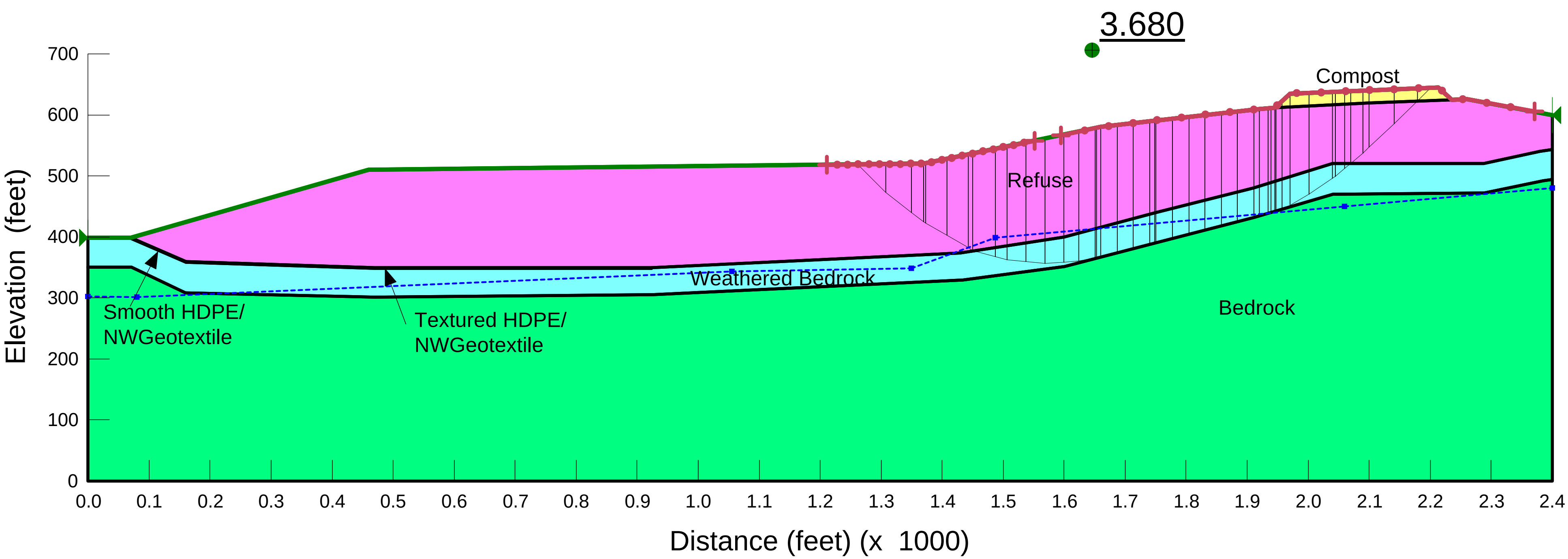


FIGURE A-9 - Tajiguas CMU Facility - Cross Section D-D'_with compost

Geo-Logic ASSOCIATES

Title: Tajiguas LF
Comments: CMU Stability
File Name: 10 Section D-D' with compost_eq.gsz
Date: 8/23/2013
Time: 4:05:48 PM
Slip Surface Option: Entry and Exit
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0.305

Name: Compost Model: Mohr-Coulomb Unit Weight: 44.6 pcf Cohesion: 100 psf Phi: 45 ° Piezometric Line: 1
Name: Refuse Model: Shear/Normal Fn. Unit Weight: 72 pcf Strength Function: Refuse-Static Piezometric Line: 1
Name: Weathered Bedrock/Alluvium Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 550 psf Phi: 21 ° Piezometric Line: 1
Name: Bedrock Model: Bedrock (Impenetrable) Piezometric Line: 1
Name: Smooth HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 0 psf Phi: 8 ° Piezometric Line: 1
Name: Textured HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 167 psf Phi: 25 ° Piezometric Line: 1

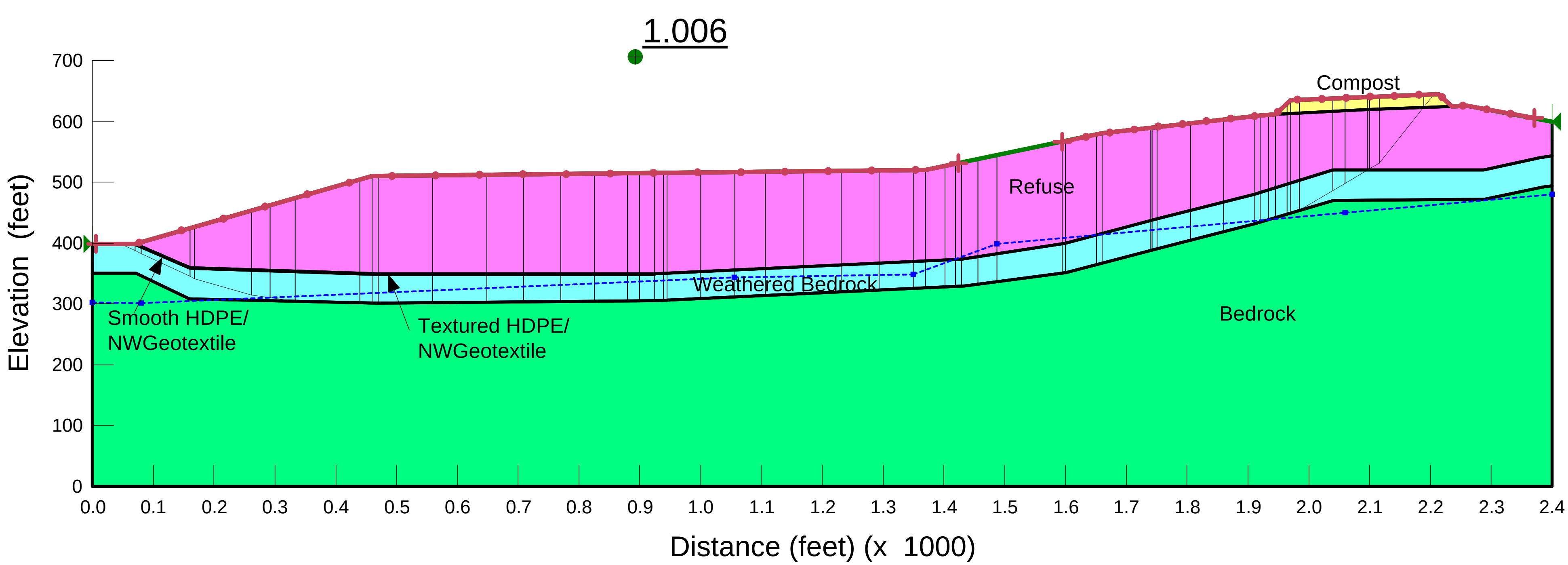


FIGURE A-10 - Tajiguas CMU Facility - Cross Section D-D'_with compost_& Seismic Loading

Title: Tajiguas LF
Comments: CMU Stability
File Name: 11 Section E-E' with compost.gsz
Date: 8/30/2013
Time: 5:08:02 PM
Slip Surface Option: Auto-Search
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0

Name: Compost Model: Mohr-Coulomb Unit Weight: 44.6 pcf Cohesion: 100 psf Phi: 45 ° Piezometric Line: 1
Name: Refuse Model: Shear/Normal Fn. Unit Weight: 72 pcf Strength Function: Refuse-Static Piezometric Line: 1
Name: Weathered Bedrock/Alluvium Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 550 psf Phi: 21 ° Piezometric Line: 1
Name: Bedrock Model: Bedrock (Impenetrable) Piezometric Line: 1
Name: Smooth HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 0 psf Phi: 8 ° Piezometric Line: 1
Name: Textured HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 167 psf Phi: 25 ° Piezometric Line: 1

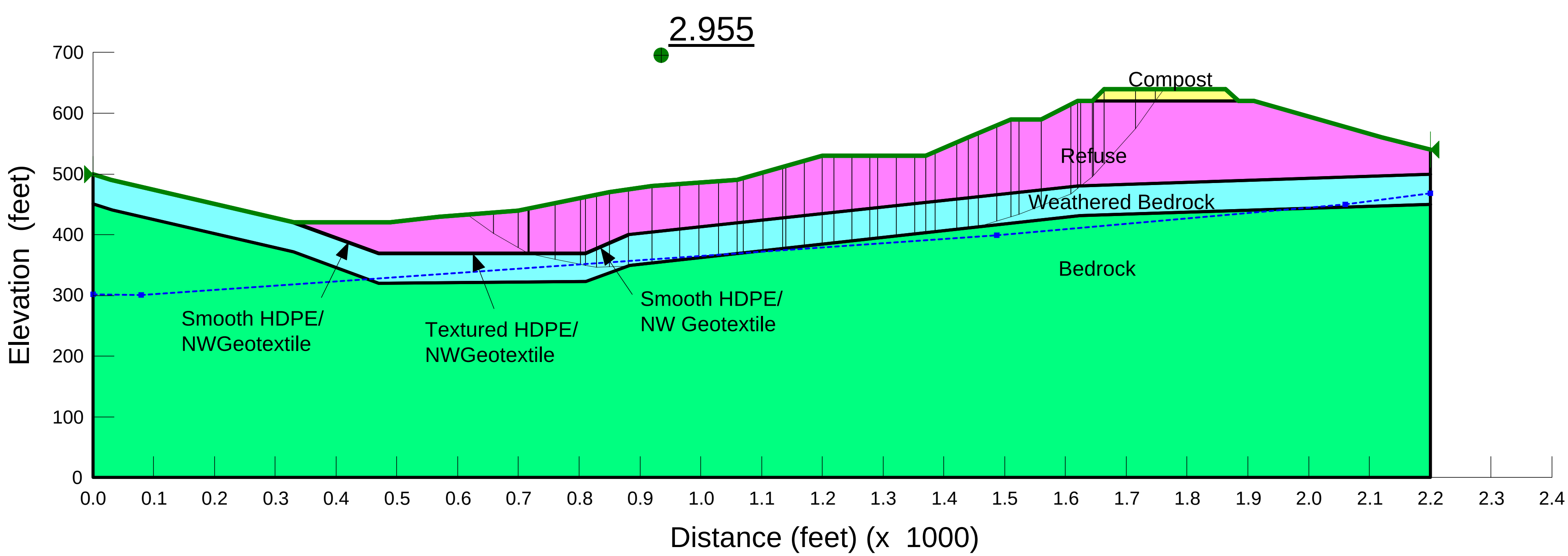


FIGURE A-11 - Tajiguas CMU Facility - Cross Section E-E'_with compost

Title: Tajiguas LF
Comments: CMU Stability
File Name: 12 Section E-E' with compost-eq.gsz
Date: 8/30/2013
Time: 5:16:32 PM
Slip Surface Option: Auto-Search
Method: Morgenstern-Price
Optimize Critical Slip Surface Location: Yes
Horz Seismic Load: 0.293

Name: Compost Model: Mohr-Coulomb Unit Weight: 44.6 pcf Cohesion: 100 psf Phi: 45 ° Piezometric Line: 1
Name: Refuse Model: Shear/Normal Fn. Unit Weight: 72 pcf Strength Function: Refuse-Static Piezometric Line: 1
Name: Weathered Bedrock/Alluvium Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion: 550 psf Phi: 21 ° Piezometric Line: 1
Name: Bedrock Model: Bedrock (Impenetrable) Piezometric Line: 1
Name: Smooth HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 0 psf Phi: 8 ° Piezometric Line: 1
Name: Textured HDPE/NWGeotextile Model: Mohr-Coulomb Unit Weight: 10 pcf Cohesion: 167 psf Phi: 25 ° Piezometric Line: 1

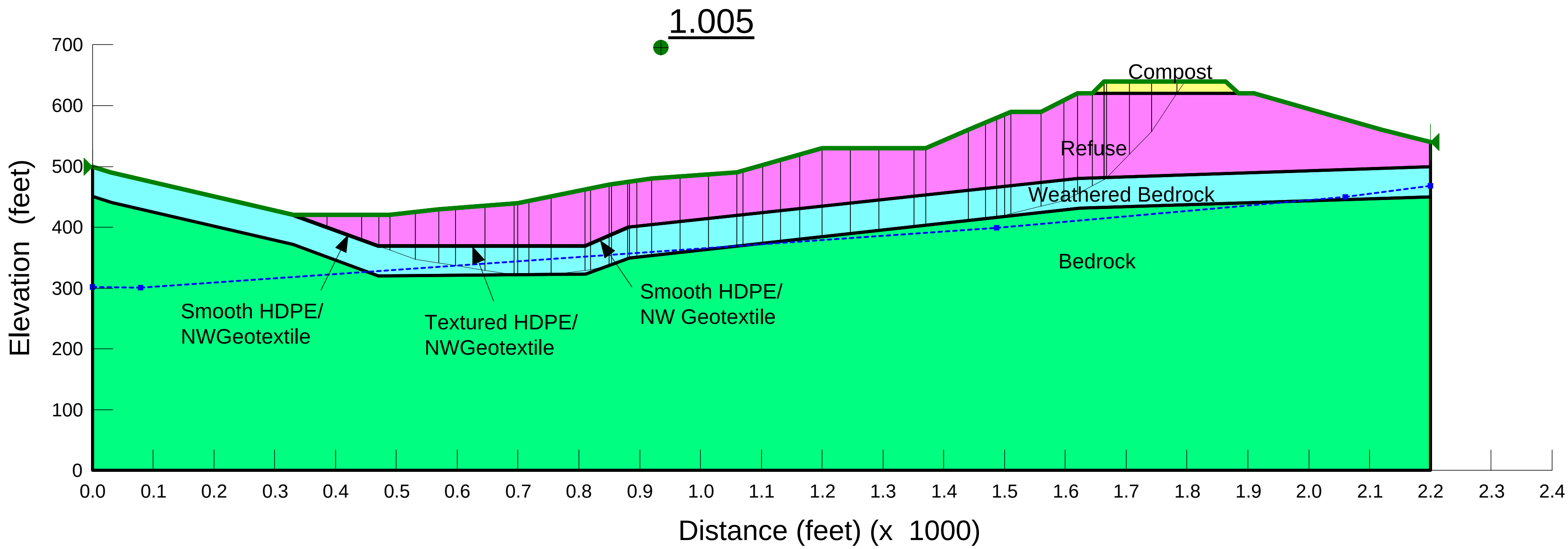


FIGURE A-12 - Tajiguas CMU Facility - Cross Section E-E'_with compost & Seismic Loading