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27 October 2021

Mr. Michael Malone
CPS Energy
500 McCullough Avenue
San Antonio, Texas 78215

Project No: 0352436

Subject: Structural Stability and Safety Factor Assessments – 5-Year Update
Calaveras Power Station
San Antonio, Texas

Dear Mr. Malone:

Environmental Resources Management Southwest, Inc. (ERM) is pleased to provide this review of structural stability and safety factor assessments performed at the Calaveras Power Station to assist CPS Energy in complying with Title 40, Code of Federal Regulations, Part 257 (40 CFR §257) [aka. the Coal Combustion Residual (CCR) Rule]. This review of the structural stability and safety factor assessments is the 5-year update required under 40 CFR §257.73 Structural Integrity Criteria for Existing CCR Surface Impoundments.

CPS Energy owns and operates the Calaveras Power Station, which is located in unincorporated Bexar County, Texas, approximately 13 miles southeast of San Antonio. Currently, CPS Energy operates the following two CCR surface impoundments at the Power Station:

- Sludge Recycle Holding (SRH) Pond (separated into the north pond and south pond by a concrete dividing wall); and
- Evaporation Pond (EP).

CPS Energy formerly operated two CCR surface impoundments at the Power Station:

- North Bottom Ash Pond (BAP); and
- South BAP.

The J.T. Deely Power Plant, located at the Calaveras Power Station, ceased operation at the end of December 2018 and sluiced bottom ash has not been received at the BAPs since that time.

All the surface impoundments are constructed as elevated diked structures. The SRH Pond, located adjacent to the Power Plants, receives CCR and non-CCR flows from various sources within the J.K. Spruce Plant and all flows are co-mingled in the SRH Pond. The SRH Pond shares a common embankment with the North and South BAPs. The EP, located approximately a mile north of the Power Plants, currently receives non-CCR flows (industrial wastestreams) that are trucked to the EP from the J.K. Spruce Plant and from other CPS Energy power generation facilities. While these flows are not considered CCR, the EP was originally constructed as a fly ash landfill in 1990, and then converted to a fly ash impoundment in 1996. The North and South BAPs share a common embankment that separates the BAPs, and are immediately east and share an embankment with the SRH Pond. The BAPs have been dewatered and are currently undergoing closure.

40 CFR §257.73(d) requires that facilities conduct initial and periodic structural stability assessments for CCR surface impoundments to document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. Table 1 provides a summary of the requirements within the regulation, and the relevant information for each surface impoundment.

40 CFR §257.73(e) requires that facilities conduct initial and periodic safety factor assessments for CCR surface impoundments to document whether the calculated factors of safety for each CCR unit achieves the minimum factors of safety required by the CCR Rule. Factors of safety were initially calculated by Raba Kistner Consultants, Inc. (RKCI) in May 2014. These assessments were provided in a report entitled "*Geotechnical Engineering Study for Ash Pond Berms – Spruce/Deely Generation Units, San Antonio, Texas.*" ERM reviewed the information in these reports to evaluate whether factors of safety met the limits set forth in 40 CFR §257.73(e). All but one embankment evaluated by RKCI met the safety factor limits. The single non-complying safety factor was for the exterior slope of the northwestern berm on the North BAP, identified as cross-section or Embankment G. The steady-state safety factor for Embankment G was calculated at 1.2, and 1.4 on a reanalysis using a deeper failure surface. The minimum required safety factor for steady-state conditions is 1.5.

The RKCI report indicated that slopes used in the calculation for Embankment G were based on design drawings and field observations, not actual surveys. CPS Energy therefore engaged the services of a land surveyor (Pape-Dawson Engineers, Inc.) to collect measurements in two locations along Embankment G. The results of this survey, and the original RKCI soil data, were provided to HTS, Inc. Consultants (HTS), a geotechnical consulting firm in Houston, Texas. HTS recalculated the steady-state factor of safety utilizing the actual survey data. The calculated safety factors for both slopes were greater than 4. The letter report from HTS is included in Attachment 1.

From the date of the initial review of the structural stability and safety factor assessments, no changes have been made to the construction or operation of the CCR surface impoundments with the exception of the BAPs being dewatered. ERM reviewed the weekly inspection records performed by CPS Energy from 2015 through 2020 and annual inspection reports prepared by ERM from 2015 through 2020 and findings of those inspections included only minor rutting, minor erosion, and woody plant growth on exterior embankments. These maintenance items are routinely addressed by CPS Energy and are not expected to affect the stability or operation of the operating CCR surface impoundments.

Based on our evaluation of the available information for the operating surface impoundments, the construction, operation, and maintenance of the CCR units are consistent with recognized and generally accepted good engineering practices and the structural stability and safety factor assessments meet the requirements of 40 CFR §257.73(d) and (e).

Sincerely,

Environmental Resources Management Southwest, Inc.

Charles Johnson, P.E.

STATE OF TEXAS
CHARLES O. JOHNSON
128280
LICENSED
PROFESSIONAL ENGINEER
10/27/2021

TABLE 1

TABLE 1
Summary of Structural Stability Requirements
Structural Stability and Safety Factor Assessments
CPS Energy, Calaveras Power Station
San Antonio, Texas, 10/27/2021

Regulatory Citation	Requirement	Sludge Recycle Holding Pond	Bottom Ash Ponds	Evaporation Pond
(d)(1)(i)	Stable foundations and abutments.	Based on calculated factors of safety, foundations and abutments are stable.	Based on calculated factors of safety, foundations and abutments are stable.	Based on calculated factors of safety, foundations and abutments are stable.
(d)(1)(ii)	Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.	Slopes are vegetated with a continuous, maintained grass cover and inspected regularly for evidence of erosion.	Slopes are vegetated with a continuous, maintained grass cover and inspected regularly for evidence of erosion.	Slopes are vegetated with a continuous, maintained grass cover and inspected regularly for evidence of erosion.
(d)(1)(iii)	Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.	Based on geotechnical analysis and current slope conditions, it is likely that the dikes were mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit. Construction records documenting this are not available.	Based on geotechnical analysis and current slope conditions, it is likely that the dikes were mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit. Construction records documenting this are not available.	Based on geotechnical analysis and current slope conditions, it is likely that the dikes were mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit. Construction records documenting this are not available.
(d)(1)(iv) *	Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike.	Grass on slopes is regularly mowed to maintain height below six inches.	Grass on slopes is regularly mowed to maintain height below six inches.	Grass on slopes is regularly mowed to maintain height below six inches.
(d)(1)(v)(A)	All spillways must be either: (1) Of non-erodible construction and designed to carry sustained flows; or (2) Earth- or grass-lined and designed to carry short-term, infrequent flows at nonerosive velocities where sustained flows are not expected.	Not applicable - Two concrete-lined overflow spillways have been filled with road base/caliche as of the 2019 annual inspection of this CCR unit.	Not applicable - Historically the BAPs discharged via steel piping for regular and overflow discharges; however, the BAPs have been dewatered and are currently undergoing closure.	Not applicable - There are no spillways for this CCR unit.
(d)(1)(v)(B)	Spillways must adequately manage flow during and following the peak discharge from the required design storm flow.	Inflow during a storm is provided by direct precipitation and water that falls into a portion of the Power Station. Sufficient headboard is maintained to capture design storm flow without requiring discharge.	Not applicable - Historically the inflow during a storm was limited to direct precipitation and sufficient headboard was maintained to capture design storm flow without requiring discharge; however, the BAPs have been dewatered and are currently undergoing closure.	Inflow during a storm is limited to direct precipitation. Sufficient headboard is maintained to capture design storm flow without requiring discharge.
(d)(1)(vi)	Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit must maintain structural integrity.	Not applicable - There are no hydraulic structures underlying this CCR unit.	Not applicable - Historically the steel pipes acting as outfalls were regularly inspected to verify no erosion or damage; however, the BAPs have been dewatered and are currently undergoing closure.	Not applicable - There are no hydraulic structures underlying this CCR unit.
(d)(1)(vii)	Maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.	Toe of embankments are at or above pool elevation of Calaveras Lake, which is maintained artificially. Therefore, no rapid drawdown or low pool conditions are likely.	Toe of embankments are at or above pool elevation of Calaveras Lake, which is maintained artificially. Therefore, no rapid drawdown or low pool conditions are likely.	Toe of embankments are at or above pool elevation of Calaveras Lake, which is maintained artificially. Therefore, no rapid drawdown or low pool conditions are likely.

* Remanded with vacatur (USCA Case #15-1219, Document #1619358).

ATTACHMENT 1 HTS REPORT

HTS, Inc. Consultants
416 Pickering Street, Houston, TX 77091
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HTS, INC.
Consultants

Excellence in Engineering, Consulting, Testing and Inspection

July 20, 2016

ERM, Inc.
840 W. Sam Houston Parkway N.
Suite 600
Houston, Texas 77024

Attn: Mr. Chris Cunningham P.E.

Re: Letter Report
Steady State Slope Stability Analysis
Ash Pond Berms - Spruce/Deely Generation Units
San Antonio, Texas

HTS Project No.: 16-S-303

Dear Mr. Cunningham:

This letter provides results of the slope stability analyses performed on the 2 sections provided by ERM, Inc. The original geotechnical investigation (report dated May 7, 2014) was performed by Raba Kistner Consultants (RKC). HTS was requested to perform steady state slope stability analyses on 2 sections that were modified due to low factors of safety (below 1.5) against a slope stability failure.

Slope stability analyses were performed using the soil parameters provided on page 11 of RKC report and the subsoil profile defined by Geotechnical Boring No. 7 which is located near section G as presented in RKC report, Figures A-1 and C-1b. The 2 section configurations used in our slope stability analyses are presented in Appendix A.

Slope stability analyses were performed in order to determine the factors of safety of the side slopes of the section configurations against a slope stability failure. The long term (steady state) shear strengths of the cohesive soils are based on the shear strength parameters from consolidated undrained triaxial tests performed and presented on the table on page 11 of RKC report. The cohesion and angle of friction for sands were assumed to be zero and 28°, respectively, for a conservative approach. The water gradient was also considered to be close to the ground surface for a conservative analysis. The results of these analyses are shown below and in Appendix B.

SECTION	FACTOR OF SAFETY (LONG TERM CONDITION)
Section Along CSA	4.06
Section Along CSB	4.08

The results of the stability analyses using the shear strength parameters as discussed above suggest that the slopes of the section configurations provided by ERM will be stable in the long term condition.

Should you have any questions or require additional information pertaining to this letter, please do not hesitate to contact us at your convenience.

Sincerely,

HTS, Inc. Consultants

STATE OF TEXAS
BONIFACIO F. MUSNGI, JR.
90666
LICENSED
PROFESSIONAL ENGINEER

07/20/16

Bonifacio F. Musngi Jr., P.E.
Senior Engineer

HTS, Inc. Consultants
F-3478

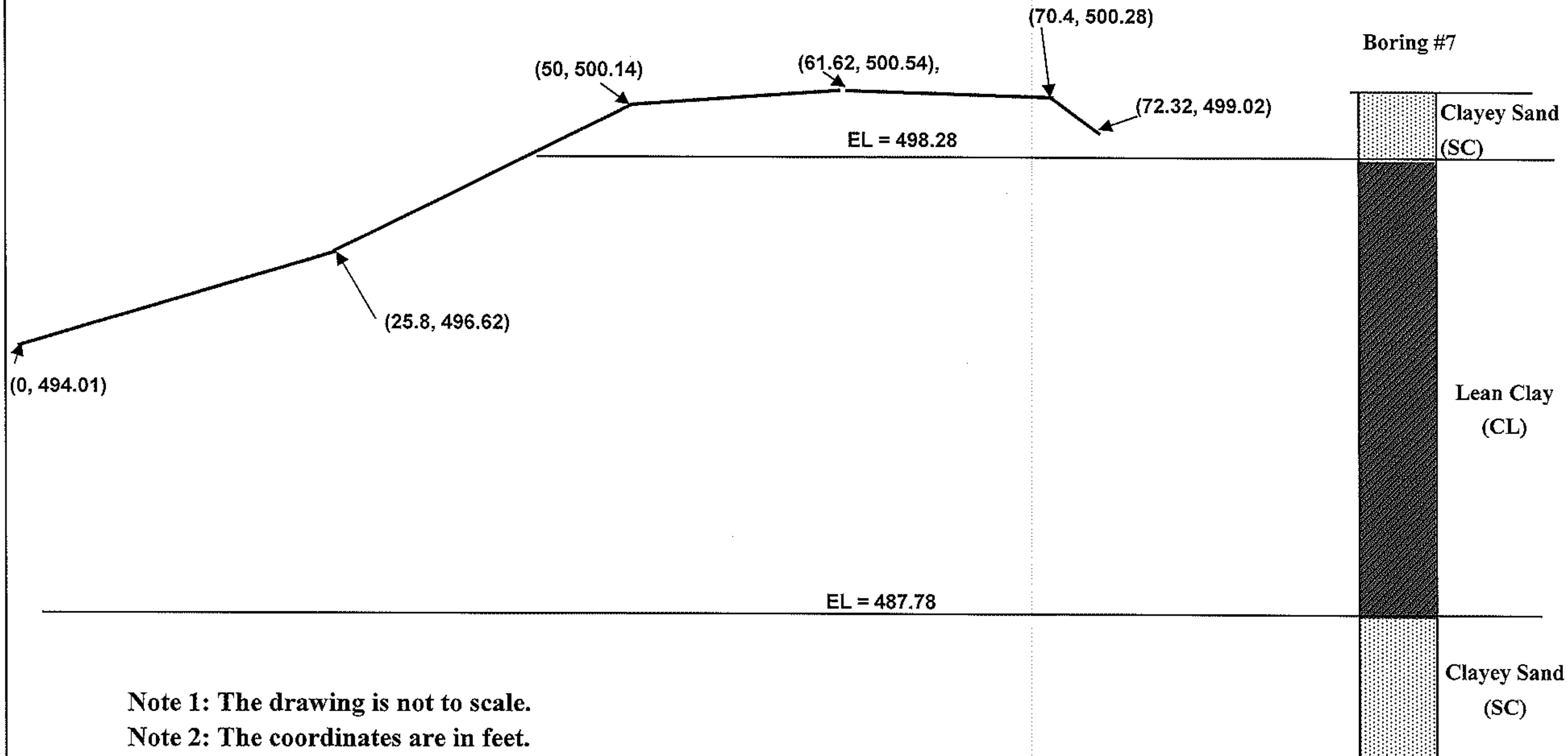
Attachments: Appendix A – Slope Section Configurations
Appendix B – Slope Stability Analyses Results

BFM/ba/cg

h:word/2016/300-349/16-303

APPENDIX A

SECTION ALONG CSA

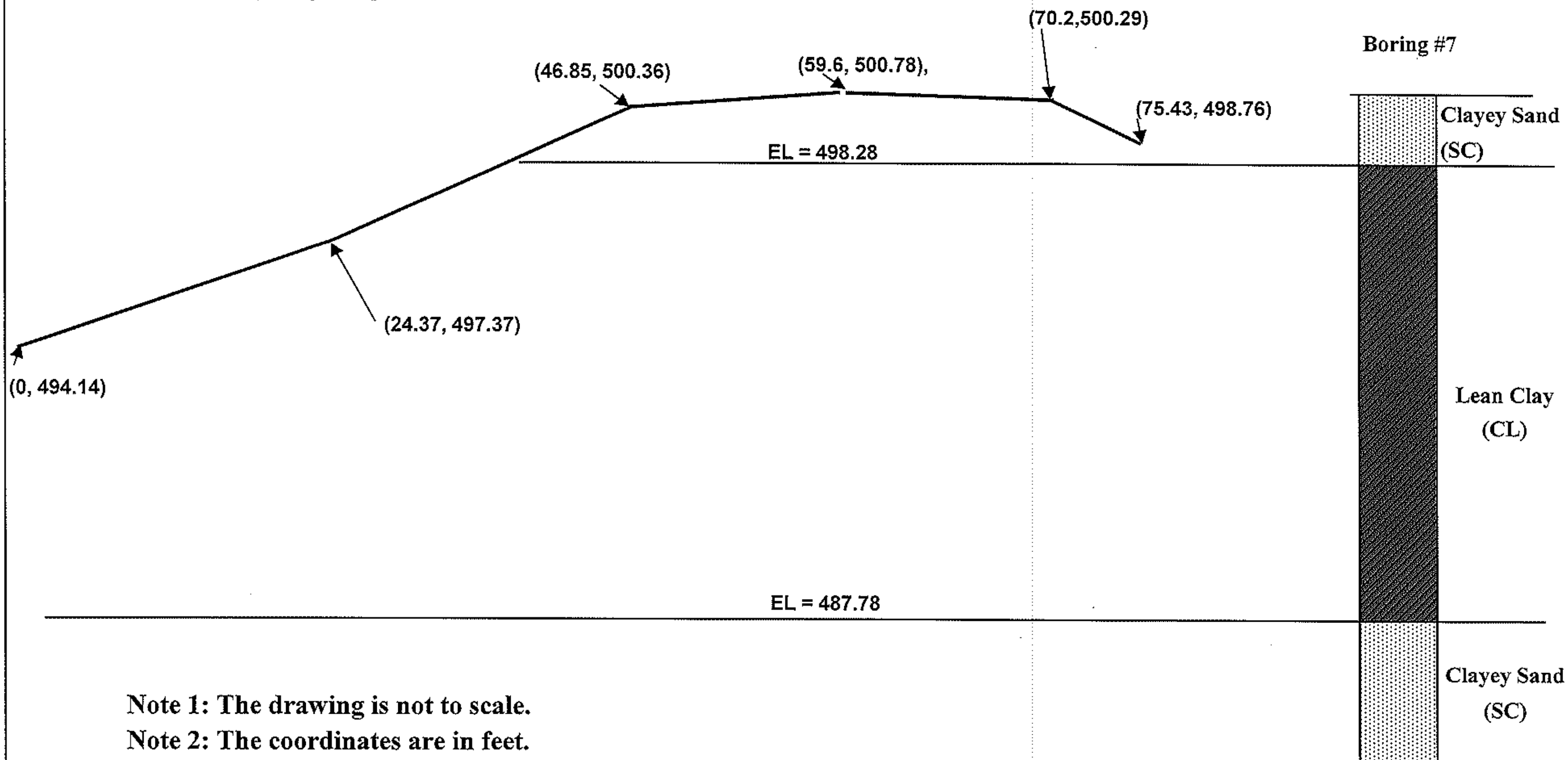


Note 1: The drawing is not to scale.
Note 2: The coordinates are in feet.

HTS, INC.
Consultants

Typical Section Configuration for Slope Stability Analyses - Section Along CSA		
Steady State Slope Stability Analysis Ash Pond Berms - Spruce/Deely Generation Units San Antonio, Texas		
Date: 7/18/16	**HTS Proj No.: 16-S-303**	**Plate 1**

SECTION ALONG CSB



Note 1: The drawing is not to scale.
Note 2: The coordinates are in feet.

HTS, INC. Consultants

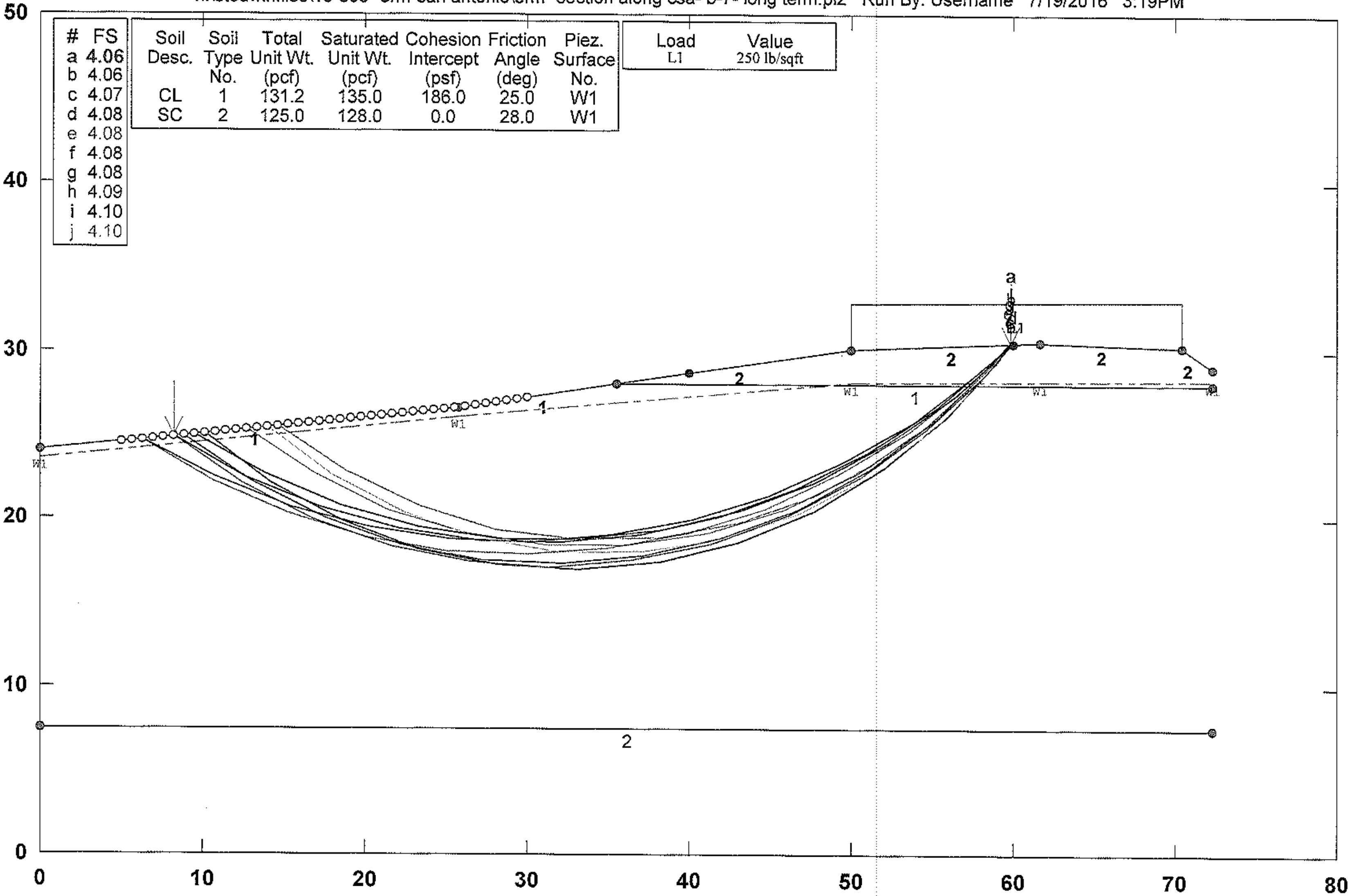
Typical Section Configuration for Slope Stability Analyses - Section Along CSB		
Steady State Slope Stability Analysis Ash Pond Berms - Spruce/Deely Generation Units San Antonio, Texas		
Date: 7/18/16	**HTS Proj No.: 16-S-303**	**Plate 2**

APPENDIX B

HTS, INC.
Consultants

Ash Pond Berms - Spruce/Deely, B-7 Long Term, CSA

h:\stedwinfiles\16-303- erm-san antonio\erm- section along csa- b-7- long term.pl2 Run By: Username 7/19/2016 3:19PM



#	FS
a	4.06
b	4.06
c	4.07
d	4.08
e	4.08
f	4.08
g	4.08
h	4.09
i	4.10
j	4.10

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CL	1	131.2	135.0	186.0	25.0	W1
SC	2	125.0	128.0	0.0	28.0	W1

Load	Value
L1	250 lb/sqft

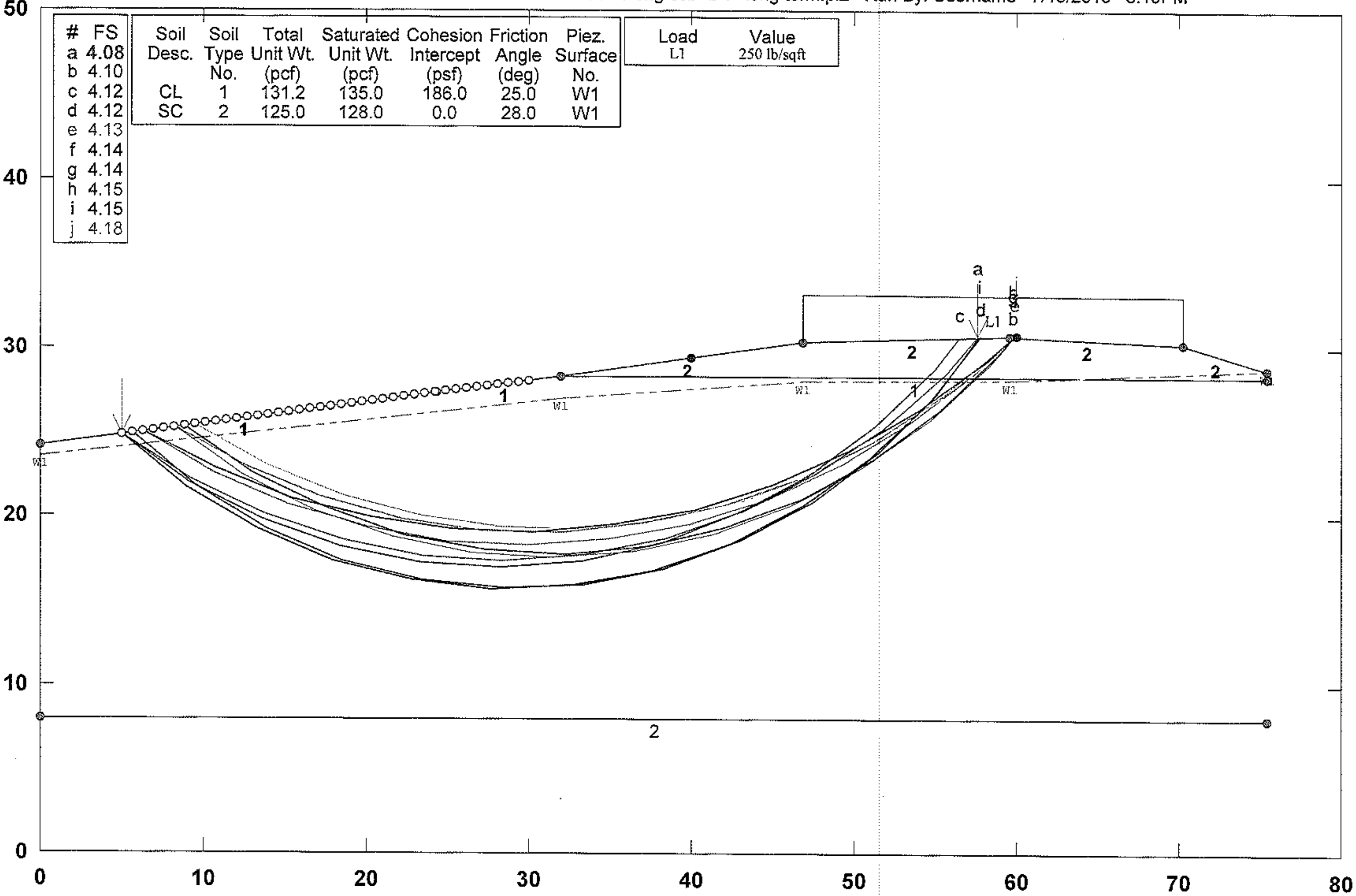
STABL6H FSmin=4.06

Safety Factors Are Calculated By The Modified Bishop Method

HTS, INC. Consultants

Ash Pond Berms - Spruce/Deely, B-7 Long Term, CSB

h:\stedwinfiles\16-303- erm-san antonio\erm- section along csb- b-7- long term.pl2 Run By: Username 7/19/2016 3:19PM



#	FS
a	4.08
b	4.10
c	4.12
d	4.12
e	4.13
f	4.14
g	4.14
h	4.15
i	4.15
j	4.18

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
CL	1	131.2	135.0	186.0	25.0	W1
SC	2	125.0	128.0	0.0	28.0	W1

Load	Value
L1	250 lb/sqft

STABL6H FSmin=4.08

Safety Factors Are Calculated By The Modified Bishop Method

HTS, INC.
Consultants