FINAL ROADWAY GEOTECHNICAL ENGINEERING REPORT

S-51 (BATTERY PARK ROAD) REPLACEMENT BRIDGE OVER BLACK MINGO CREEK

WILLIAMSBURG COUNTY, SOUTH CAROLINA

PREPARED FOR

JE INFRASTRUCTURE CONSULTING & ENGINEERING

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1021 Briargate Circle
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PREPARED BY

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FEBRUARY 17, 2016

SCDOT Project No.: P029461
F&ME Project No.: G5556.02

F&ME
CONSULTANTS

February 17, 2016

Mr. Andy Gillis, P.E.
Infrastructure Consulting & Engineering, PLLC
1021 Briargate Circle
Columbia, South Carolina 29210

Re.: Final Roadway Geotechnical Engineering Report
S-51 (Battery Park Rd.) Replacement Bridge over Black Mingo Creek
Williamsburg County, South Carolina
SCDOT Project ID. P029461
F&ME File No. G5556.020

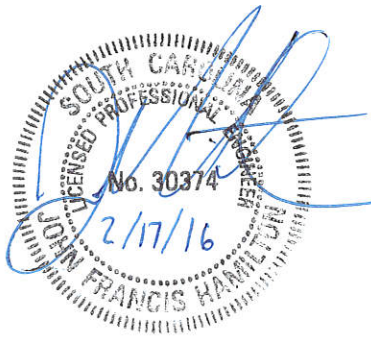
Dear Mr. Gillis:

Submitted herein is the final roadway geotechnical report for the above referenced project. Included is a summary of the performed field investigation, our analysis of the subsurface findings, and our conclusions and recommendations for the proposed roadway embankment construction.

Please notify us if there are any questions or if we may be of further assistance with the implementation of our recommendations.

Sincerely,

F&ME CONSULTANTS



John F. Hamilton, P.E.
Geotechnical Design Manager

Attachments

JFH/jfh

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1. INTRODUCTION

The project is located on route S-51 (Battery Park Road) over Black Mingo Creek in Williamsburg County, South Carolina. A site location plan is presented in Section 1 of the Appendix.

It is our understanding that the project will include the demolition and removal of the existing bridge structure and the replacement with a new bridge structure on the existing horizontal alignment.

The proposed roadway construction begins at Station 55+60.00 and continues to Station 86+00.00. The approximate length of the proposed S-51 roadway project, less the bridge construction over Black Mingo Creek, is approximately 2,900 linear feet. Based on the roadway plans, the maximum fill height required to meet planned roadway grade elevation is approximately two (2) feet relative to the existing grade.

As defined in the project's Request for Proposals (RFP), the Roadway Operational Classification (ROC) is IV. The specified ROC performance criteria applies for roadway embankments located at least 50 feet away from the proposed bridge ends. Furthermore, this report applies to the roadway segments from Station 55+60 (begin roadway construction) to 61+50 (begin bridge approach embankment) and 69+75 (end bridge approach embankment) to 86+00 (end roadway construction). Roadway segments not included in this report are discussed in the Final Bridge Geotechnical Engineering Report associated with this project.

The final subsurface investigation was performed by F&ME in general accordance with the 2010 GDM. The final roadway embankment analyses and the development of the final design recommendations were performed in general accordance with the 2010 GDM.

2. SUBSURFACE INVESTIGATION

2.1. Final Subsurface Investigation

On April 6, 2015, five (5) cone penetrometer soundings (designated as CPT-4 through CPT-8) were performed for final roadway design purposes. The CPT equipment was advanced utilizing a CME 45 trailer mounted rig. The CPT's were advanced to depths were the maximum reaction force was observed and were subsequently terminated. The CPT's were extended to an approximate depth ranging from four (4) feet to twenty-five (25) feet below existing grade from the top of the existing embankment.

2.2. Field Investigation Summary

The survey coordinates of the CPT's performed during the final subsurface investigation were collected by F&ME personnel utilizing a Trimble R8 GPS rover on the SC VRS system. The survey coordinates of the CPT locations were placed on the provided CAD drawing (provided by ICE) for the proposed roadway alignment. Subsequently, the station and offset of each CPT location relative to the proposed roadway alignment was determined.

The locations of the CPTs performed by F&ME are provided in the following table.

Soil Testing Location Table					
Test Number	Test Hole Locale	Station	Offset from CL (ft)	Elevation (ft-MSL)	Depth (ft)
CPT-4	Roadway	62+00	CL	25.7	3.6
CPT-5	Roadway	67+11	1-RT	25.4	16.3
CPT-6	Roadway	69+77	CL	26.3	24.9
CPT-7	Roadway	73+98	1-RT	33.8	24.1
CPT-8	Roadway	79+00	CL	43.3	16.4

We have provided a testing location plan in Section 2 of the Appendix displaying the locations of the CPT's performed during the final subsurface investigation.

3. GENERAL SITE GEOLOGY

The site is located in the Lower Coastal Plain physiographical province of South Carolina. The Lower Coastal Plain is a gently seaward dipping surface containing six terraces, which represent sedimentary sequences formed during eustatic sea level transgression or regression and/or tectonic uplift or subsidence over geologic time. The geology underlying the bridge site is described in general terms.

The near surface geology at the site includes recent alluvial sediments, which in turn are underlain by Pleistocene age sediments. Underlying these sediments unconformably in the vicinity are sediments of the Paleocene aged Rhems Formation (where not eroded away) and then the Cretaceous aged PeeDee Formation. The sediments in the area consist of fluvial, beach, backbarrier, estuarine, and continental shelf deposits. Due to uplift and subsequent erosion, sediments from the Pliocene through the Eocene are not present in the area.

4. SUBSURFACE CONDITIONS

The below soil descriptions, strata depths, and consistencies are generalized and were interpreted by F&ME based on the subsurface conditions as encountered in the CPT soundings. We have included the CPT logs in Section 3 of the Appendix for detailed descriptions of the encountered soil conditions. As with any geologic formation, the depth and thickness of the soil strata will vary across the site. Although the CPT soundings designate strata changes at specific depths in the description of the soil stratigraphy on the soil testing logs, transitions between soil strata are generally gradual. Therefore, the outlined subsurface profile shown on the logs should only be considered general on-site soil conditions and should not be utilized as an absolute indicator.

4.1. Soil Stratigraphy

The CPT's performed during the subsurface investigations indicate three (3) main strata. The following table summarizes the encountered soils at the site.

Soil Stratification Table					
Geologic Formation	Elevation of Top of Layer (ft-MSL)	Depth to Top of Layer (ft)	USCS Soil Type	Average CPT Tip Resistance (tsf)	Comments
Fill	+26	0	SM	90	Existing Embankment
Pleistocene	+20	6	SC & SM	20	Original Ground
Pee Dee Formation	+7	19	SC, SM, SP-SM, & CL	80	

4.2. Groundwater Conditions

Based on the totality of information collected at the site, the depth to the static groundwater table is approximately eight (8) to ten (10) feet below the top of the existing embankment. We have selected a design water table elevation of +18 ft-MSL for the geotechnical foundation and embankment design.

5. CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations presented in this report are based upon the general soil conditions as encountered in the CPT soundings, our analyses of the site and subsurface conditions, and our experience on similar projects. The recommendations do not reflect variations in subsurface conditions or the presence of undiscovered obstructions that could exist intermediate of the testing locations or in unexplored areas of the site. If subsurface conditions are discovered during construction activities that deviate from the soils encountered during the above referenced field investigation, F&ME should be contacted to evaluate the impact of the identified conditions on the proposed roadway system.

5.1. Embankment Construction

Based on the subsurface conditions as encountered during this field investigation, the soil subgrade below the planned roadway embankment areas are considered as adequate for construction of the roadway embankments. Extensive undercutting or other ground modifications are not anticipated for acceptable roadway embankment performance.

Site preparation should be performed in accordance with Section 201 of the SCDOT Standard Specifications for Highway Construction, 2007 Edition, Supplemental Specifications, and/or Special Provisions. Where existing ground surface approximates final grade or where final roadway embankment fill heights will not exceed five (5) feet above existing grade, the ground surface below the embankment footprint should by stripped of any organic materials and topsoil to depths as required, and grubbing of tree root systems will be required. Stump holes and other holes resulting from obstruction removal shall be backfilled with suitable material and properly compacted. In

planned roadway embankment areas where fill heights will exceed five (5) feet, stumps may be left in place as long as stumps do not extend more than 8 inches above ground line.

5.2. Roadway Embankment Seismic Design

As previously mentioned, the ROC for the roadway portion of this project is IV. In accordance with Design Memorandum DM0211 (design memo developed by SCDOT and dated July 7, 2011), roadway embankments classified as ROC IV do not require seismic evaluation. Therefore, soil shear loss calculations and seismic slope stability analyses are not included with this report.

5.3. Roadway Embankment Static Settlements

Roadway embankment will require fill placement to meet the proposed grade. The maximum fill height is estimated to be approximately two (2) feet relative to the existing roadway.

Deformations are predicted to occur in predominantly sandy soils below the groundwater table. As such, the predicted settlements are anticipated to occur rapidly after placement of new fill. Long term settlements attributed to embankment fill placement are not expected following asphalt paving. The maximum predicted settlement at the roadway centerline for the approach embankments at the beginning of the bridge and at the end of the bridge are summarized in the following tables.

Embankment Performance Limits at SLS for ROC IV				
Deformation ID No.		Service Limit State Performance Limit Description	Predicted	Performance Limit
Settlement (Longitudinal)	EV-01	Maximum Vertical Settlement along the profile grade over the design life of the embankment. (inches)	0	16.00
	EV-02	Maximum Settlement Rate per year after the roadway has been paved. (inches/year)	0	0.20
	EV-03	Maximum Vertical Differential Settlement occurring longitudinally along the profile grade after the roadway has been paved. Differential ratio is shown in parenthesis for informational purposes. (inches per 50 feet of embankment longitudinally)	0	2.00 (1/300)

The detailed static settlement calculations are provided in Section 5 of the Appendix.

5.4. Roadway Embankment Slope Stability

F&ME has performed static global slope stability analyses of the roadway embankment side slopes. F&ME utilized the computer software program *Slide* v. 6.029 developed by Rocscience for the global slope stability analyses. In accordance with Chapter 17 of the GDM, a minimum of three (3) slope stability methodologies were utilized. The three slope stability design methodologies utilized were the Bishop Method, the Spencer Method, and the General Limit Equilibrium Method.

The subsurface soil stratigraphy, ground water conditions, and soil strength parameters utilized in these analyses were based on generalized conditions as indicated by the CPT soundings performed at each respective roadway embankment location.

For the side slope stability analyses, we have analyzed final constructed side slopes for the planned roadway embankment geometry. A uniform distributed live loading of 250 pounds per square foot (psf) was applied within planned pavement areas.

In accordance with DM 0211, a slope stability evaluation is not required for roadway embankments with 2H:1V slopes or flatter and less than three (3) feet of fill placement. Therefore, stability analyses were not performed at Station 62+00 (ie. CPT-4 location), Station 74+00 (ie. CPT-7 location) and 79+00 (ie. CPT-8 location).

The SLIDE output yields factors of safety while the GDM design criteria lists resistance factors. In accordance with the GDM, the factor of safety results were inverted to convert the values to resistance factor results. The following table presents the calculated geotechnical resistance factor (ϕ) results from the slope stability analyses.

Global Embankment Slope Stability Results Summary					
Location	Design Event	Resistance Factor, φ			Design Criteria[1]
		Bishop Method	Spencer Method	GLE Method	
Sta. 67+56 Left Side Slope	Static	0.63	0.65	0.65	0.75
Sta. 67+56 Right Side Slope	Static	0.61	0.63	0.63	0.75
Sta. 70+00 Left Side Slope	Static	0.39	0.39	0.39	0.75
Sta. 70+00 Right Side Slope	Static	0.58	0.58	0.58	0.75

[1] Design Criteria based on Roadway Operation Classification (ROC) = IV

The SLIDE output graphs depicting the slope geometry, soil strength parameters, soil profiles and the computer generated critical failure circles of each of the above listed slope stability analyses are presented in Section 6 of the Appendix.

5.5. Usability of Cut Soils

All soil material noted in our investigation that will be excavated is suitable for "general" fill. The soils may not be suitable for top 18" subgrade fills and may require selective placement in the fill embankments depending upon construction location and sequencing.

6. VIBRATION MONITORING

Currently, no structures are located in the vicinity of the proposed roadway construction. As such, a vibration monitoring program is not recommended. In accordance with the project's Special Provisions, the Contractor is required to monitor vibrations at all structures within a 300 foot radius of the proposed roadway construction.

7. LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained herein are based upon applicable standards in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The conclusions and recommendations submitted herein are based, in part, upon the data obtained from the referenced subsurface exploration. The nature and extent of variations between the CPT soundings or beyond the soundings will not become evident until construction begins. If variations appear evident, we request the opportunity to re-evaluate this report. In the event that any changes in nature, design grades, or location of the embankments occur, the comments contained in this report will not be considered valid unless the changes are reviewed and verified in writing.

APPENDIX

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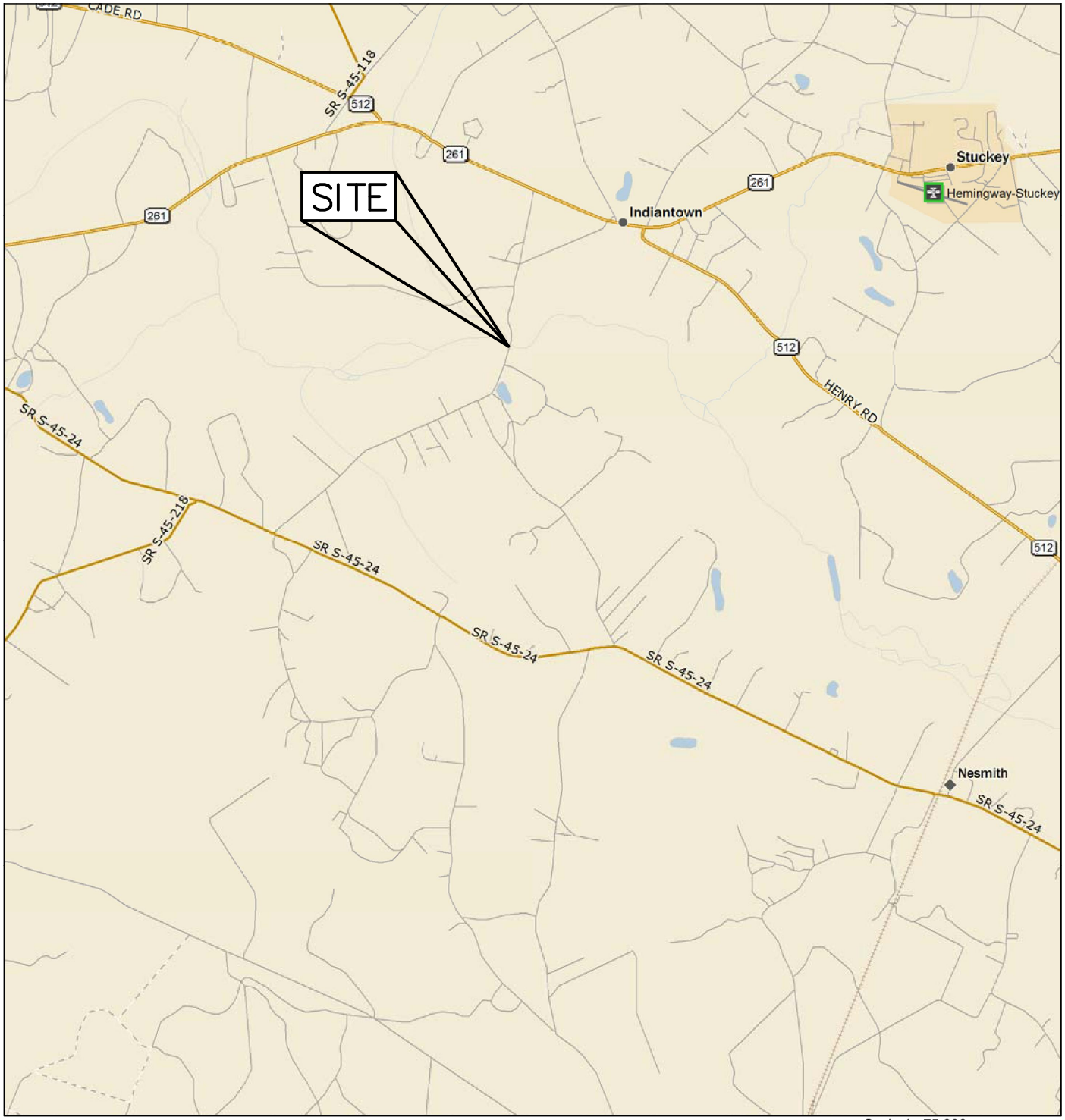
SECTION 2	SOIL TESTING LOCATION PLAN
SECTION 3	CPT LOGS
SECTION 4	SOIL PARAMETER CORRELATIONS
SECTION 5	STATIC SETTLEMENT CALCULATIONS
SECTION 6	EMBANKMENT SLOPE STABILITY ANALYSES

APPENDIX

SECTION 1

SITE LOCATION PLAN

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	WILLIAMSBURG	P029461	S-45-51	



TN
MN (8.1°W)

Scale 1 : 75,000
1" = 1.18 mi
Data Zoom 11-4

F&ME CONSULTANTS
GEOTECHNICAL – ENVIRONMENTAL – MATERIALS
COLUMBIA, SOUTH CAROLINA

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. CTC DATE 2/11/2016 GROUP ___ - ___
R/W _____ DATE _____

S-45-51 (BATTERY PARK ROAD)
OVER BLACK MINGO CREEK, WILLIAMSBURG COUNTY

SITE LOCATION PLAN

SCALE = AS NOTED

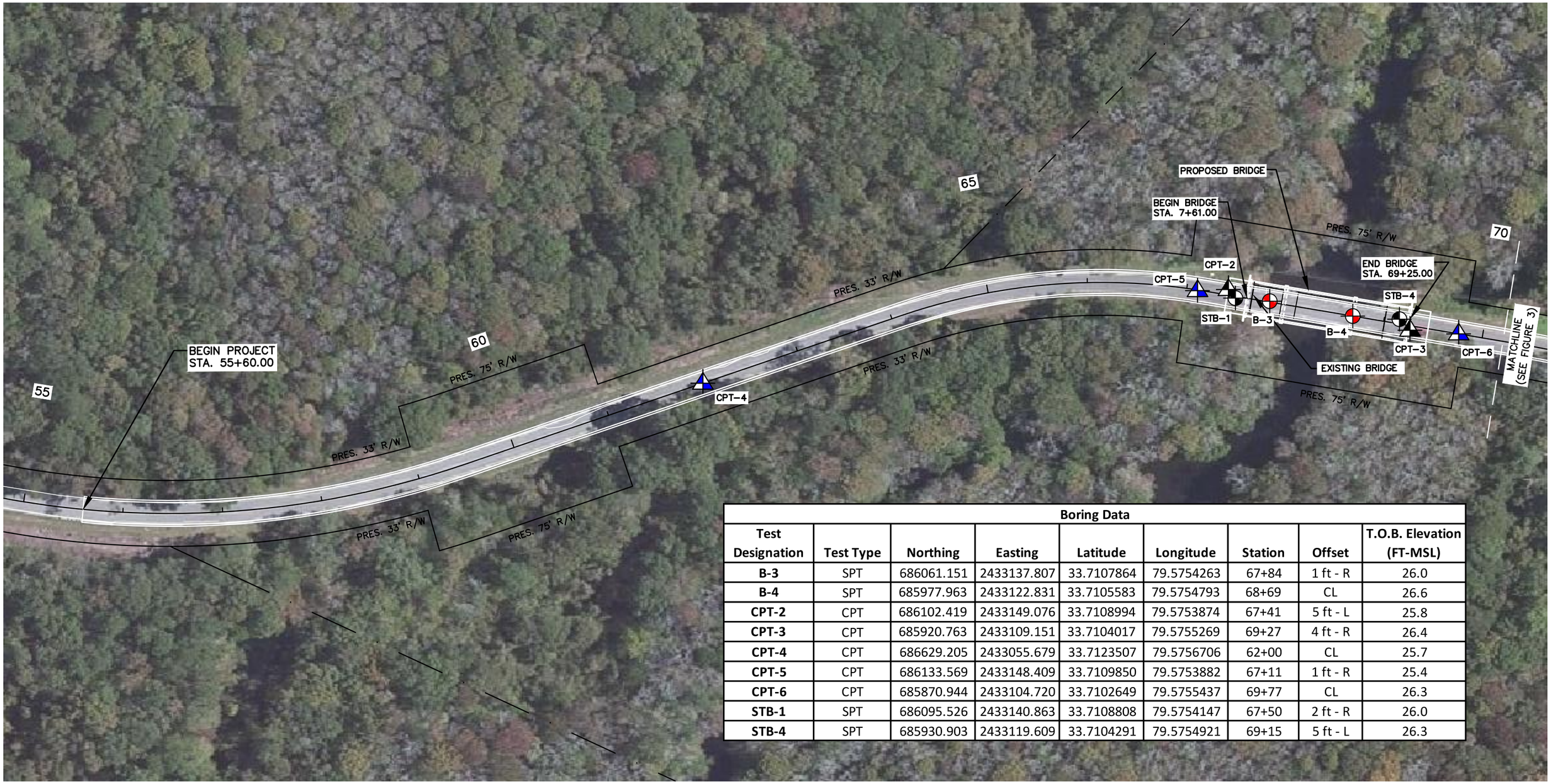
FIGURE 1

APPENDIX

SECTION 2

SOIL TESTING LOCATION PLAN

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	WILLIAMSBURG	P029461	S-45-51	



Boring Data

Test Designation	Test Type	Northing	Easting	Latitude	Longitude	Station	Offset	T.O.B. Elevation (FT-MSL)
B-3	SPT	686061.151	2433137.807	33.7107864	79.5754263	67+84	1 ft - R	26.0
B-4	SPT	685977.963	2433122.831	33.7105583	79.5754793	68+69	CL	26.6
CPT-2	CPT	686102.419	2433149.076	33.7108994	79.5753874	67+41	5 ft - L	25.8
CPT-3	CPT	685920.763	2433109.151	33.7104017	79.5755269	69+27	4 ft - R	26.4
CPT-4	CPT	686629.205	2433055.679	33.7123507	79.5756706	62+00	CL	25.7
CPT-5	CPT	686133.569	2433148.409	33.7109850	79.5753882	67+11	1 ft - R	25.4
CPT-6	CPT	685870.944	2433104.720	33.7102649	79.5755437	69+77	CL	26.3
STB-1	SPT	686095.526	2433140.863	33.7108808	79.5754147	67+50	2 ft - R	26.0
STB-4	SPT	685930.903	2433119.609	33.7104291	79.5754921	69+15	5 ft - L	26.3

LEGEND:

- SOIL TEST BORING LOCATION (PERFORMED BY F&ME)
- CPT LOCATION (PERFORMED BY F&ME)
- BORING LOCATION (PREVIOUSLY PERFORMED BY OTHERS)
- CPT LOCATION (PREVIOUSLY PERFORMED BY OTHERS)

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. CTC DATE 2/11/2016 GROUP ___ - ___
R/W _____ DATE _____

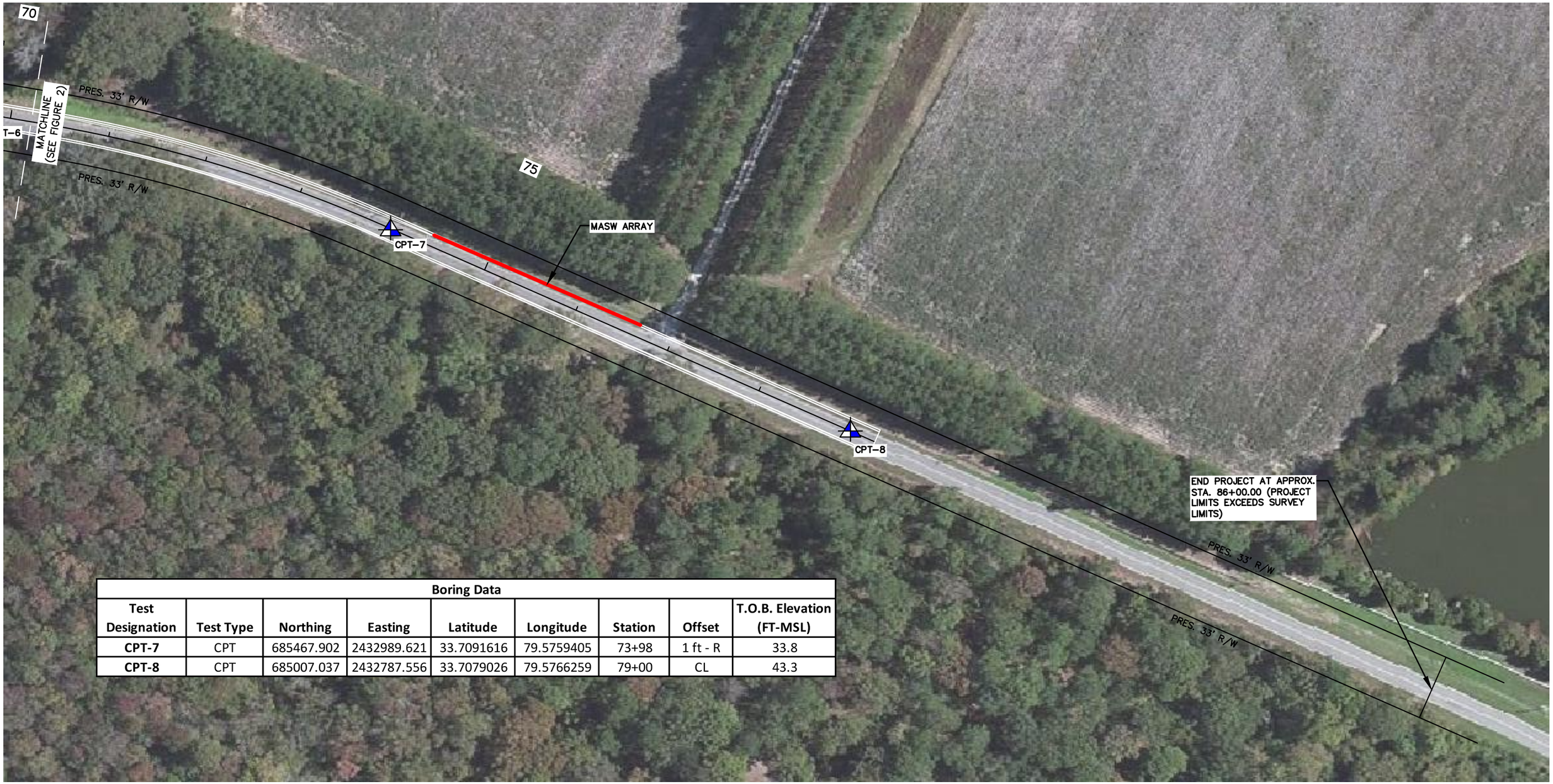
F&ME CONSULTANTS
GEOTECHNICAL – ENVIRONMENTAL – MATERIALS
COLUMBIA, SOUTH CAROLINA

S-45-51 (BATTERY PARK ROAD)
OVER BLACK MINGO CREEK, WILLIAMSBURG COUNTY

PROPOSED BORING LOCATION PLAN

SCALE = NTS | FIGURE 2

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	WILLIAMSBURG	P029461	S-45-51	



Boring Data

Test Designation	Test Type	Northing	Easting	Latitude	Longitude	Station	Offset	T.O.B. Elevation (FT-MSL)
CPT-7	CPT	685467.902	2432989.621	33.7091616	79.5759405	73+98	1 ft - R	33.8
CPT-8	CPT	685007.037	2432787.556	33.7079026	79.5766259	79+00	CL	43.3

LEGEND:

CPT LOCATION (PERFORMED BY F&ME)

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. CTC DATE 2/11/2016 GROUP ___ - ___
R/W _____ DATE _____

F&ME CONSULTANTS
GEOTECHNICAL – ENVIRONMENTAL – MATERIALS
COLUMBIA, SOUTH CAROLINA

S-45-51 (BATTERY PARK ROAD)
OVER BLACK MINGO CREEK, WILLIAMSBURG COUNTY

PROPOSED BORING LOCATION PLAN

SCALE = NTS

FIGURE 3

APPENDIX

SECTION 3

CPT LOGS

F&ME CONSULTANTS

S-51 (Battery Park Rd.) RBO Black Mingo Creek
Williamsburg County, South Carolina
Project No. :G5556.02

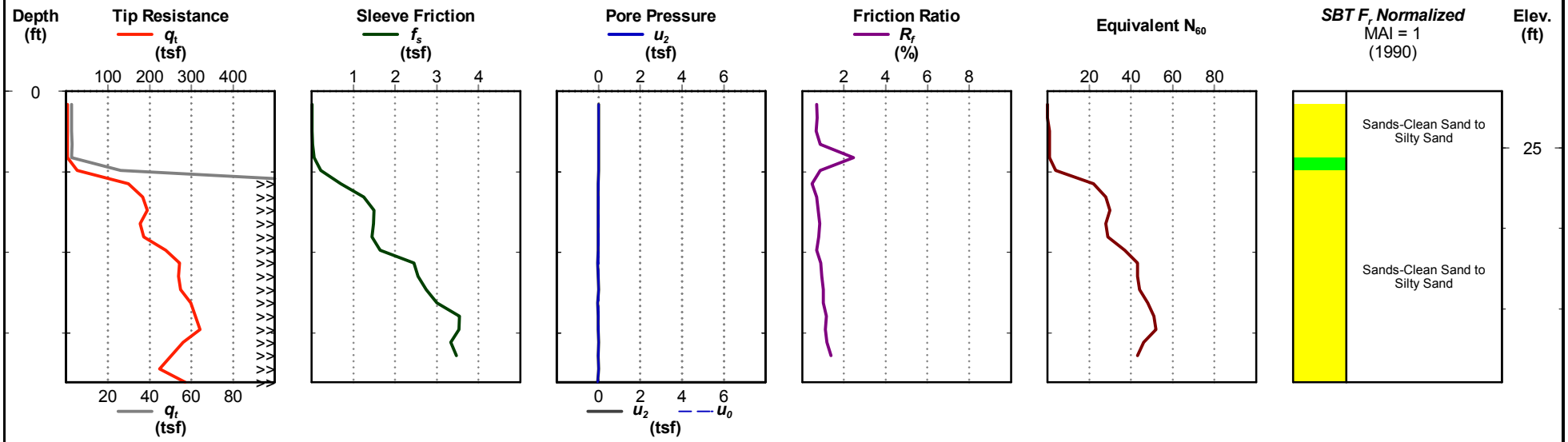
Cone Penetration Test

CPT-4

Date: Feb. 2, 2016
Estimated Water Depth:
Rig/Operator: PJ

Station: 62+00
Offset: CL
Elevation: 25.7

Total Depth: 3.6 ft
Termination Criteria: Maximum Reaction Force
Cone Size:



CPT REPORT - STANDARD G5556.02 BLACK MINGO CPT.GPJ CPT TEST.GPJ 2/11/16

CPT-4

Electronic File Name: G5556.02 S-51 over Black Mingo Creek CPT

F&ME CONSULTANTS

S-51 (Battery Park Rd.) RBO Black Mingo Creek
Williamsburg County, South Carolina
Project No. :G5556.02

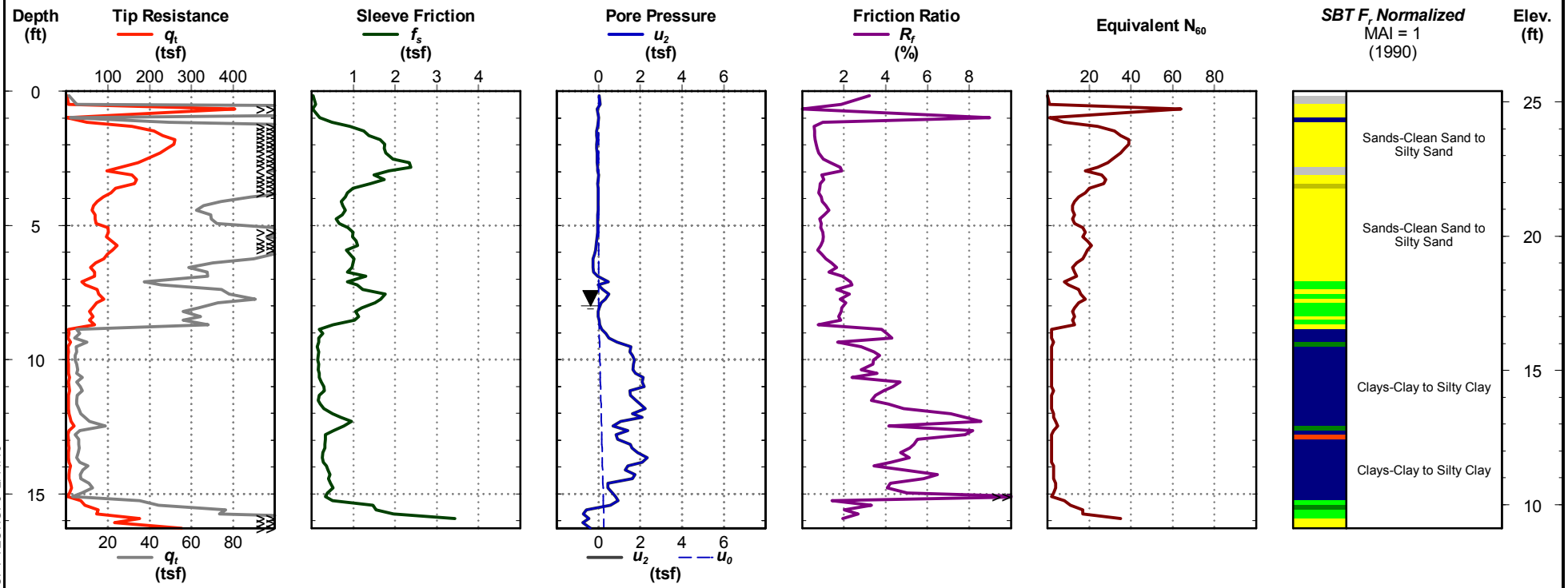
Cone Penetration Test

CPT-5

Date: Feb. 2, 2016
Estimated Water Depth: 8 ft
Rig/Operator: PJ

Station: 67+11
Offset: 1'-RT
Elevation: 25.4

Total Depth: 16.3 ft
Termination Criteria: Maximum Reaction Force
Cone Size:



CPT REPORT - STANDARD G5556.02 BLACK MINGO CPT.GPJ CPT TEST.GPJ 2/11/16

CPT-5

Electronic File Name: G5556.02 S-51 over Black Mingo Creek CPT

F&ME CONSULTANTS

S-51 (Battery Park Rd.) RBO Black Mingo Creek
Williamsburg County, South Carolina
Project No. :G5556.02

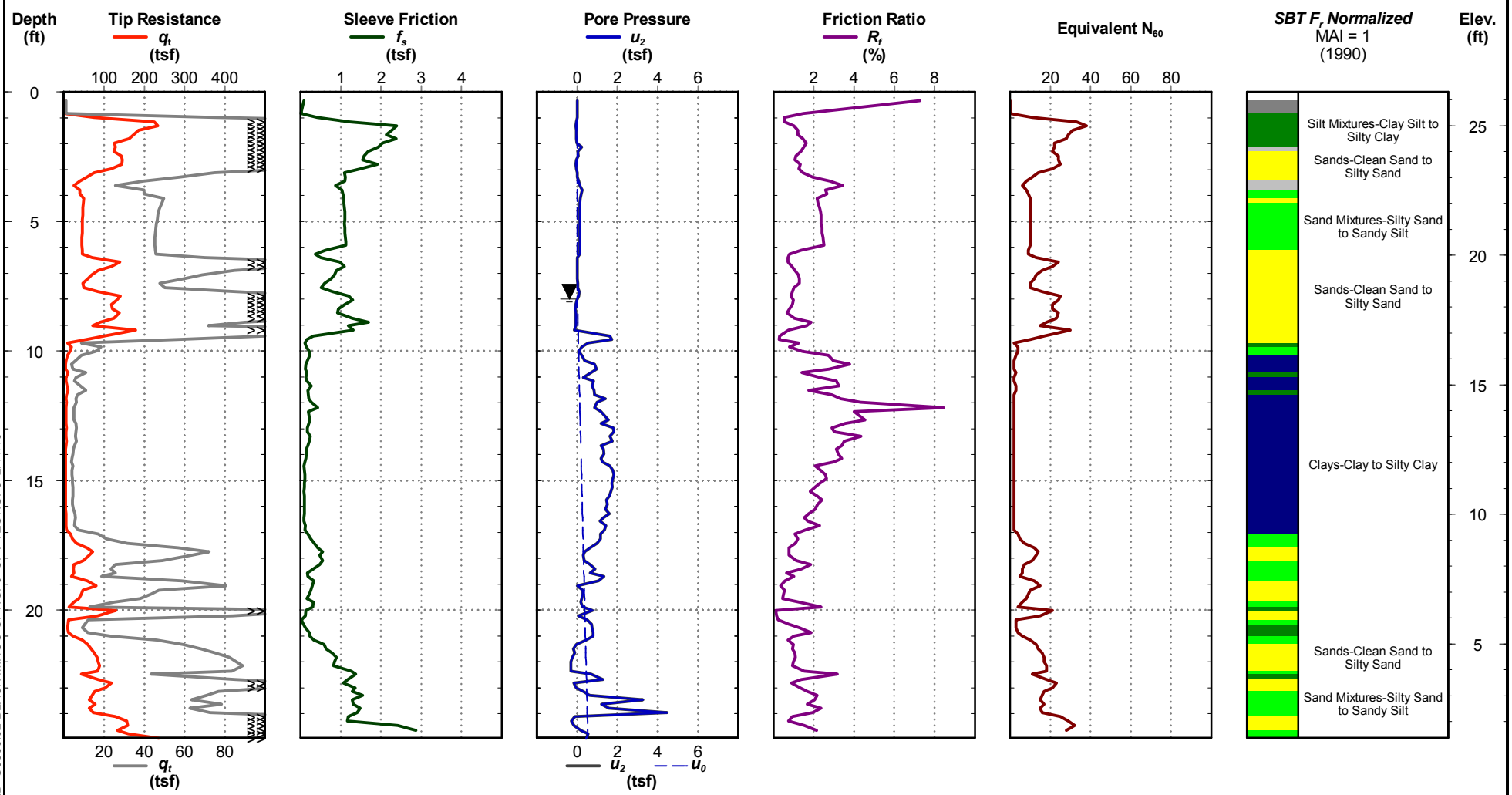
Cone Penetration Test

CPT-6

Date: Feb. 1, 2016
Estimated Water Depth: 8 ft
Rig/Operator: PJ

Station: 69+77
Offset: CL
Elevation: 26.3

Total Depth: 24.9 ft
Termination Criteria: Maximum Reaction Force
Cone Size:



CPT REPORT - STANDARD G5556.02 BLACK MINGO CPT.GPJ CPT TEST.GPJ 2/11/16

CPT-6

Electronic File Name: G5556.02 S-51 over Black Mingo Creek CPT

F&ME CONSULTANTS

S-51 (Battery Park Rd.) RBO Black Mingo Creek
Williamsburg County, South Carolina
Project No. :G5556.02

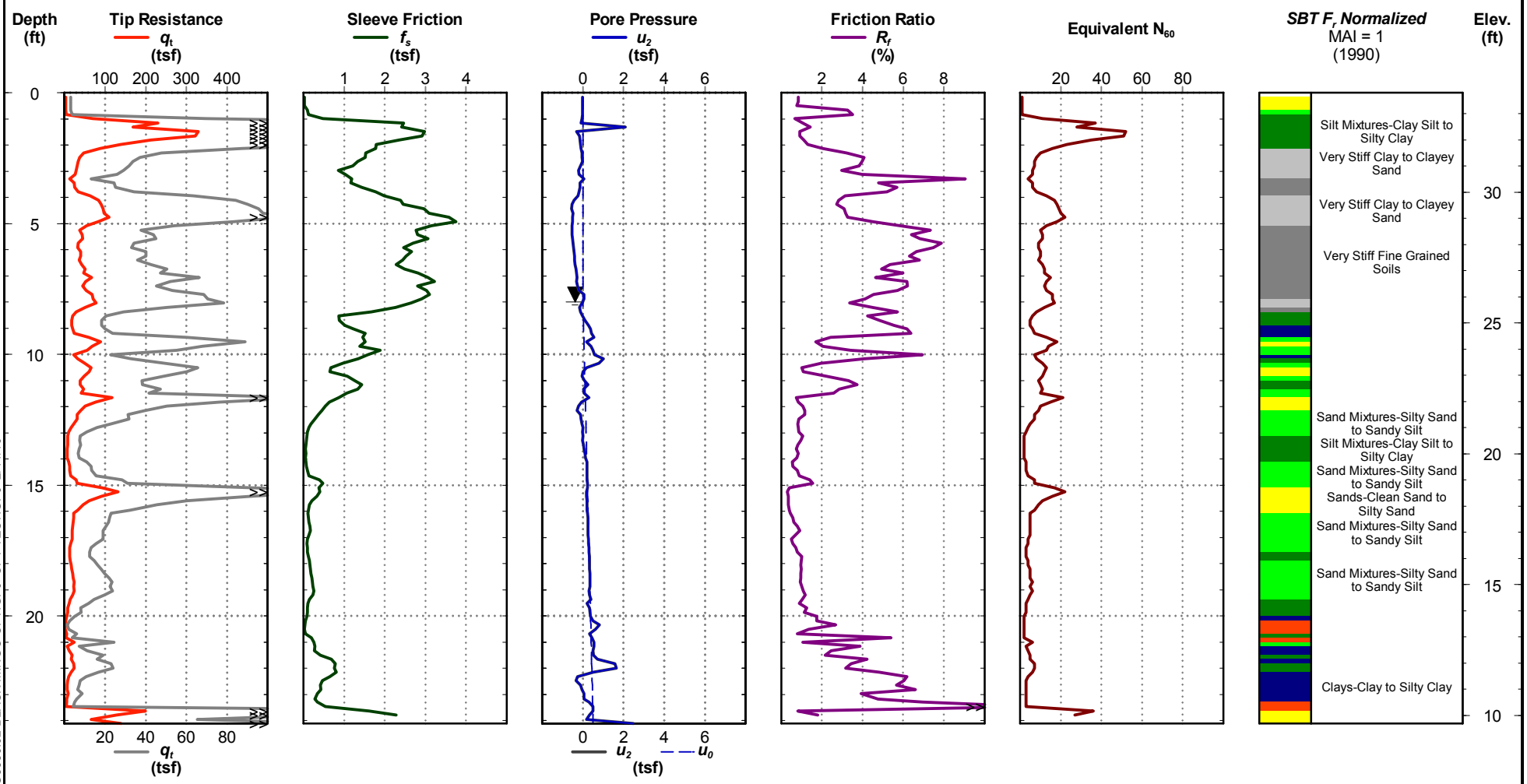
Cone Penetration Test

CPT-7

Date: Feb. 1, 2016
Estimated Water Depth: 8 ft
Rig/Operator: PJ

Station: 73+98
Offset: 1'-RT
Elevation: 33.8

Total Depth: 24.1 ft
Termination Criteria: Maximum Reaction Force
Cone Size:



CPT REPORT - STANDARD G5556.02 BLACK MINGO CPT.GPJ CPT TEST.GPJ 2/11/16

CPT-7

Electronic File Name: G5556.02 S-51 over Black Mingo Creek CPT

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S-51 (Battery Park Rd.) RBO Black Mingo Creek
Williamsburg County, South Carolina
Project No. :G5556.02

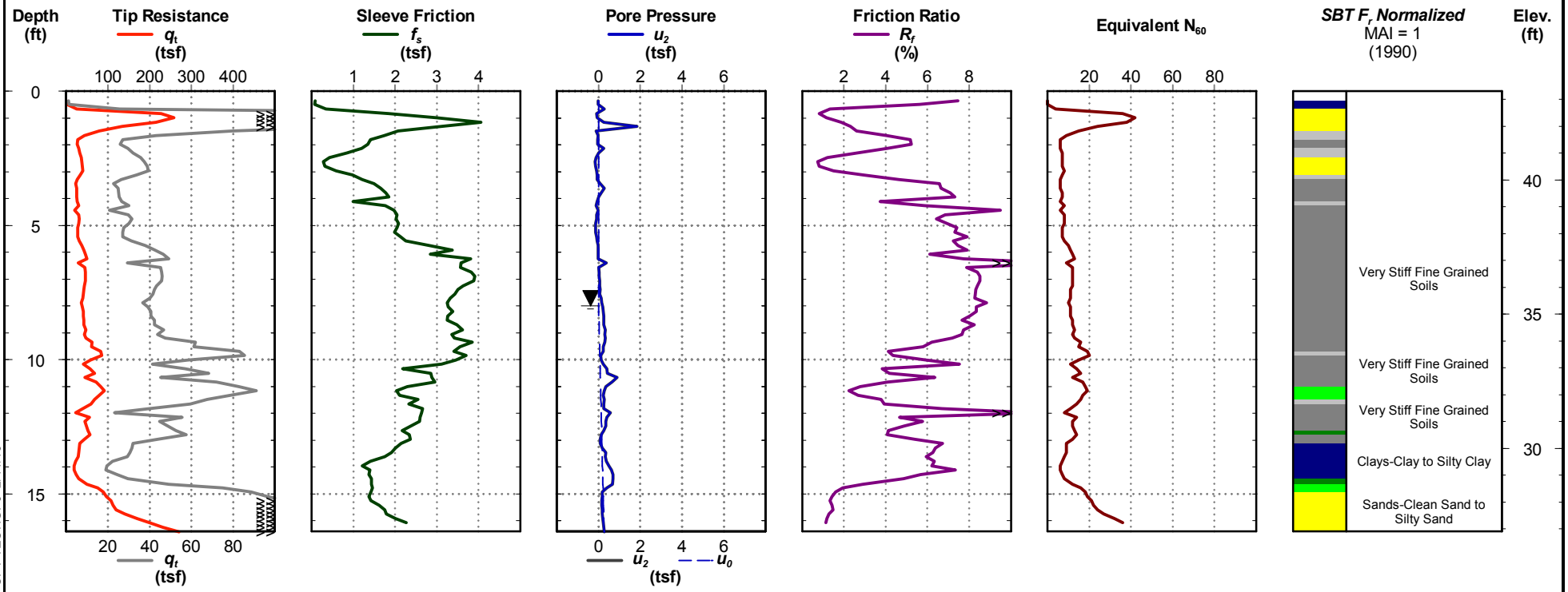
Cone Penetration Test

CPT-8

Date: Feb. 1, 2016
Estimated Water Depth: 8 ft
Rig/Operator: PJ

Station: 79+00
Offset: CL
Elevation: 43.3

Total Depth: 16.4 ft
Termination Criteria: Maximum Reaction Force
Cone Size:



CPT REPORT - STANDARD G5556.02 BLACK MINGO CPT.GPJ CPT TEST.GPJ 2/11/16

CPT-8

Electronic File Name: G5556.02 S-51 over Black Mingo Creek CPT

APPENDIX

SECTION 4

SOIL PARAMETER CORRELATIONS

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-4
Correlations from CPeT-IT v.1.7.6.42

F&ME CONSULTANTS

In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.164	2.58619	0.01792	5	1.34E-05	1	32.181	37	36	25.67633	32.181	0	0	0	0.33	0	130.89694	-0.04508	0	0	20
0.328	2.50046	0.01806	5	6.70E-06	1	36.09211	32	35	28.7969	36.09211	0	0	0	0.33	0	138.62318	-0.02718	0	0	20
0.492	2.62429	0.01785	5	3.81E-06	1	36.35973	30	34	32.85568	41.17912	0	0	0	0.33	0	148.0704	-0.01997	0	0	20
0.656	2.75765	0.02382	5	1.52E-06	1	36.90979	30	34	39.36125	49.33276	0	0	0	0.33	0	162.06807	-0.05131	0	0	20
0.82	2.6481	0.06541	6	1.84E-05	3	124.65951	44	38	99.46237	124.6595	0	0	0	0.33	0	257.62762	-0.08926	0	0	20
0.984	26.09524	0.2251	6	6.80E-04	11	366.99386	75	43	292.8143	366.9939	0	0	0	0.33	0	442.03751	-0.19623	0	0	20
1.148	148.851	0.70188	6	1.70E-03	21	626.53006	96	45	499.891	626.5301	0	0	0	0.33	0	577.56476	-0.26641	0	0	20
1.312	182.7095	1.25333	6	2.53E-03	29	857.51149	100	46	684.1847	857.5115	0	0	0	0.33	0	675.69342	-0.30689	0	0	20
1.476	194.5355	1.50061	6	1.94E-03	32	948.22767	100	47	756.5646	948.2277	0	0	0	0.33	0	710.53589	-0.31452	0	0	20
1.64	177.2323	1.4861	6	1.70E-03	32	975.65746	100	47	778.4501	975.6575	0	0	0	0.33	0	720.73962	-0.31194	0	0	20
1.804	185.2767	1.45034	6	1.97E-03	34	1024.65562	100	47	817.5444	1024.656	0	0	0	0.33	0	738.61597	-0.31495	0	0	20
1.969	238.0577	1.64238	6	2.11E-03	40	1170.7958	100	47	934.1456	1170.796	0	0	0	0.33	0	789.53302	-0.32994	0	0	20
2.133	271.6924	2.45709	6	2.06E-03	44	1317.61278	100	48	1051.287	1317.613	0	0	0	0.33	0	837.57483	-0.34239	0	0	20
2.297	269.192	2.54938	6	1.67E-03	47	1432.52455	100	48	1142.972	1432.525	0	0	0	0.33	0	873.33478	-0.3483	0	0	20
2.461	273.8738	2.74234	6	1.55E-03	49	1498.36134	100	48	1195.501	1498.361	0	0	0	0.33	0	893.17798	-0.35021	0	0	20
2.625	297.8305	3.00029	6	1.37E-03	52	1605.42398	100	48	1280.923	1605.424	0	0	0	0.33	0	924.5376	-0.35518	0	0	20
2.789	309.1612	3.54718	6	1.32E-03	55	1701.04492	100	48	1357.217	1701.045	0	0	0	0.33	0	951.67267	-0.3597	0	0	20
2.953	320.6109	3.53538	6	1.10E-03	55	1723.33038	100	48	1374.998	1723.33	0	0	0	0.33	0	957.88635	-0.35583	0	0	20
3.117	280.0511	3.33843	6	1.00E-03	54	1698.05805	100	48	1354.834	1698.058	0	0	0	0.33	0	950.83679	-0.34942	0	0	20
3.281	251.4983	3.46684	6	6.25E-04	50	1643.34428	100	47	1311.179	1643.344	0	0	0	0.33	0	935.39276	-0.33575	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-5
Correlations from CPeT-IT v.1.7.6.42

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In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.164	1.32405	0.04266	5	3.64E-06	1	36.01452	45	38	32.80679	41.11784	0	0	0	0.33	0	147.96019	-0.13803	0	0	20
0.492	5.07712	0.09477	0	0.00E+00	19	437.25227	0	0	348.8715	437.2523	0	0	0	0.33	0	482.49826	0	0	0	20
0.656	403.8832	0.02112	0	0.00E+00	19	450.46642	0	0	359.4147	450.4664	0	0	0	0.33	0	489.73477	0	0	0	20
0.984	2.15754	0.19417	7	1.62E-02	21	530.50393	93	45	423.2744	530.5039	0	0	0	0.33	0	531.46423	-0.25831	0	0	20
1.148	49.44235	0.48895	6	4.87E-04	14	459.22888	80	43	366.406	459.2289	0	0	0	0.33	0	494.47498	-0.21595	0	0	20
1.312	157.5716	0.92158	6	1.85E-03	24	719.41027	100	46	573.9976	719.4103	0	0	0	0.33	0	618.89648	-0.27981	0	0	20
1.476	210.2098	1.25731	7	3.56E-03	33	918.14856	100	47	732.5653	918.1486	0	0	0	0.33	0	699.17548	-0.31418	0	0	20
1.64	231.3946	1.37021	7	4.06E-03	38	1049.73015	100	47	837.5507	1049.73	0	0	0	0.33	0	747.59875	-0.32899	0	0	20
1.804	259.9522	1.64245	7	3.92E-03	40	1129.13954	100	47	900.9092	1129.14	0	0	0	0.33	0	775.36023	-0.33451	0	0	20
1.969	258.3376	1.75628	7	3.38E-03	41	1175.90927	100	47	938.2255	1175.909	0	0	0	0.33	0	791.25531	-0.3348	0	0	20
2.133	242.0156	1.74327	6	2.61E-03	41	1175.64826	100	47	938.0172	1175.648	0	0	0	0.33	0	791.16748	-0.32838	0	0	20
2.297	224.9839	1.77661	6	1.65E-03	38	1159.55777	100	47	925.1791	1159.558	0	0	0	0.33	0	785.73468	-0.31802	0	0	20
2.526	191.7207	1.95301	6	8.46E-04	37	1171.23026	100	47	934.4922	1171.23	0	0	0	0.33	0	789.6795	-0.30701	0	0	20
2.657	172.7649	2.34248	6	3.58E-04	33	1149.95584	100	46	917.518	1149.956	0	0	0	0.33	0	782.47467	-0.29172	0	0	20
2.822	131.1239	2.38052	6	1.66E-04	29	1070.02491	96	45	853.7433	1070.025	0	0	0	0.33	0	754.79089	-0.27616	0	0	20
2.953	97.37015	1.8524	6	1.87E-04	28	1007.68109	93	45	804.0009	1007.681	0	0	0	0.33	0	732.47241	-0.26418	0	0	20
3.117	157.8907	1.50167	6	3.21E-04	29	1001.90391	93	45	799.3914	1001.904	0	0	0	0.33	0	730.36969	-0.26009	0	0	20
3.281	168.1878	1.74497	6	6.36E-04	31	1024.89904	96	45	817.7386	1024.899	0	0	0	0.33	0	738.70367	-0.26871	0	0	20
3.445	163.9537	1.40668	6	5.72E-04	29	960.92745	92	45	766.6974	960.9275	0	0	0	0.33	0	715.27826	-0.25508	0	0	20
3.609	118.7026	0.98862	6	5.19E-04	25	846.42001	85	44	675.3351	846.42	0	0	0	0.33	0	671.30933	-0.23271	0	0	20
3.773	107.7244	0.85908	6	3.31E-04	21	740.44663	77	43	590.7819	740.4466	0	0	0	0.33	0	627.87994	-0.20446	0	0	20
3.937	88.56378	0.81607	6	2.23E-04	19	682.60881	72	42	544.6347	682.6088	0	0	0	0.33	0	602.85889	-0.18812	0	0	20
4.101	74.03256	0.71098	6	1.26E-04	17	639.41677	67	42	510.173	639.4168	0	0	0	0.33	0	583.4743	-0.17506	0	0	20
4.265	65.85963	0.75002	6	7.79E-05	16	617.11053	63	41	492.3754	617.1105	0	0	0	0.33	0	573.2066	-0.16638	0	0	20
4.429	62.46378	0.80448	6	6.68E-05	15	619.08971	62	41	493.9546	619.0897	0	0	0	0.33	0	574.12506	-0.16377	0	0	20
4.593	69.18405	0.74106	6	7.86E-05	16	612.02462	62	41	488.3175	612.0246	0	0	0	0.33	0	570.83966	-0.15941	0	0	20
4.757	69.45553	0.58464	6	1.02E-04	16	612.27366	62	41	488.5162	612.2737	0	0	0	0.33	0	570.95581	-0.15725	0	0	20
4.921	72.09411	0.66434	6	1.45E-04	18	656.87409	65	41	524.1017	656.8741	0	0	0	0.33	0	591.38568	-0.16576	0	0	20
5.085	99.31812	0.86989	6	1.62E-04	20	727.60875	68	42	580.5389	727.6088	0	0	0	0.33	0	622.41302	-0.17837	0	0	20
5.249	100.8089	0.98877	6	1.74E-04	21	781.70725	71	42	623.7026	781.7073	0	0	0	0.33	0	645.13678	-0.18659	0	0	20
5.413	96.07943	0.97796	6	1.65E-04	22	812.55717	71	42	648.3169	812.5572	0	0	0	0.33	0	657.74365	-0.18947	0	0	20
5.577	108.2436	1.07202	6	1.94E-04	23	844.53579	73	43	673.8318	844.5358	0	0	0	0.33	0	670.56171	-0.19349	0	0	20
5.741	122.2175	1.0984	6	2.46E-04	24	847.02297	73	43	675.8162	847.023	0	0	0	0.33	0	671.5484	-0.19272	0	0	20
5.906	111.3727	0.831	6	2.37E-04	23	829.81982	72	42	662.0903	829.8198	0	0	0	0.33	0	664.69379	-0.18769	0	0	20
6.07	99.13237	0.92627	6	1.65E-04	22	799.76321	68	42	638.1089	799.7632	0	0	0	0.33	0	652.54492	-0.17894	0	0	20
6.234	89.84973	1.01763	6	8.19E-05	20	782.55741	64	41	624.3809	782.5574	0	0	0	0.33	0	645.48749	-0.17071	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-5
Correlations from CPeT-IT v.1.7.6.42

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In situ data									Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
6.398	70.22234	0.99204	6	4.03E-05	18	749.787	60	41	598.2343	749.787	0	0	0	0.33	0	631.8277	-0.16075	0	0	20
6.562	58.65356	0.96403	6	2.87E-05	17	715.37508	57	40	570.778	715.3751	0	0	0	0.33	0	617.15839	-0.15195	0	0	20
6.726	67.55994	0.85553	5	2.18E-05	17	742.55438	56	40	592.4636	742.5544	0	0	0	0.33	0	628.77295	-0.15571	0	0	20
6.89	67.71235	1.29847	5	1.44E-05	16	712.52457	53	40	568.5036	712.5246	0	0	0	0.33	0	615.92755	-0.1494	0	0	20
7.087	37.36396	0.86171	5	7.03E-06	15	707.06835	50	39	564.1503	707.0684	0	0	0	0.33	0	613.56476	-0.15137	0	0	20
7.218	45.58927	1.09136	5	8.49E-06	15	714.2672	51	39	569.894	714.2672	0	0	0	0.33	0	616.6803	-0.14923	0	0	20
7.382	74.47073	1.23235	5	1.23E-05	18	841.06791	56	40	671.0648	841.0679	0	0	0	0.33	0	669.18353	-0.1677	0	0	20
7.546	78.00471	1.76978	5	2.07E-05	21	940.91092	61	41	750.7268	940.9109	0	0	0	0.33	0	707.78925	-0.17957	0	0	20
7.743	90.42126	1.65446	5	1.72E-05	21	965.48062	61	41	770.3303	965.4806	0	0	0	0.33	0	716.97083	-0.18148	0	0	20
7.874	72.67516	1.52023	5	1.69E-05	20	908.80642	58	40	725.1115	908.8064	0	0	0	0.33	0	695.60938	-0.17133	0	0	20
8.071	63.44491	1.19822	5	1.16E-05	18	824.17804	54	40	657.5889	824.178	0	0	0	0.33	0	662.43036	-0.15724	0	0	20
8.202	56.04832	1.04941	5	1.20E-05	17	783.56312	53	39	625.1833	783.5631	0	0	0	0.33	0	645.9021	-0.14907	0	0	20
8.399	64.38317	1.12841	5	1.10E-05	16	762.98478	51	39	608.7645	762.9848	0	0	0	0.33	0	637.3642	-0.14465	0	0	20
8.53	56.04356	1.03662	6	2.00E-05	17	731.09209	52	39	583.3182	731.0921	0	0	0	0.33	0	623.90112	-0.1354	0	0	20
8.694	67.91715	0.51511	5	9.69E-06	12	568.46411	44	38	453.5618	568.4641	0	0	0	0.33	0	550.15015	-0.10166	0	0	20
8.858	4.92947	0.18848	5	3.78E-06	8	363.21242	35	35	328.7232	411.9997	0	0	0	0.33	0	468.35825	-0.06383	0	0	20
9.022	6.4869	0.26619	3	8.53E-09	3	41.66415	0	0	0	221.1721	14	0.33038	0.64342	0.33	2.9726	343.15863	0	0.95507	1.55016	20
9.186	3.90071	0.17192	3	3.17E-08	3	75.07974	0	0	0	235.4369	14	0.44585	0.85917	0.33	3.96935	354.05197	0	1.05435	2.16695	20
9.35	9.65891	0.1668	3	3.05E-08	3	60.07209	0	0	0	212.869	14	0.40039	0.76548	0.33	3.53651	336.6557	0	0.91912	2.49949	31.91002
9.514	4.3627	0.13224	3	3.73E-08	3	66.35407	0	0	0	217.445	14	0.42421	0.79806	0.33	3.68704	340.25494	0	0.91743	2.64535	33.7597
9.711	4.72943	0.17241	3	7.55E-09	3	30.56285	0	0	0	197.4065	14	0.28846	0.54057	0.33	2.49746	324.19803	0	0.74967	1.84388	32.99722
9.843	3.84832	0.15528	3	6.22E-09	3	28.74528	0	0	0	199.0393	14	0.28076	0.52237	0.33	2.41335	325.53607	0	0.73493	1.73123	33.05948
10.007	4.02931	0.14909	3	6.01E-09	3	28.15054	0	0	0	199.0669	14	0.27908	0.51465	0.33	2.37767	325.55862	0	0.72711	1.7343	33.19129
10.171	4.65323	0.16872	3	9.36E-09	3	34.94893	0	0	0	205.6081	14	0.31232	0.57092	0.33	2.63763	330.86426	0	0.76439	1.92875	33.56339
10.367	5.26763	0.15826	3	1.01E-08	3	38.41928	0	0	0	213.7678	14	0.32917	0.59548	0.33	2.75112	337.36566	0	0.78042	1.89605	33.70548
10.499	4.76277	0.18343	3	1.97E-08	3	53.83068	0	0	0	225.0833	14	0.391	0.70242	0.33	3.24518	346.17953	0	0.83825	2.19469	34.95907
10.663	7.18226	0.18208	3	1.30E-08	3	50.0671	0	0	0	234.791	14	0.3787	0.67452	0.33	3.1163	353.56595	0	0.81462	1.84038	35.26826
10.827	4.69609	0.23946	3	1.41E-08	3	59.85398	0	0	0	254.0445	14	0.41583	0.73438	0.33	3.39284	367.77701	0	0.84507	1.7147	36.01205
10.991	6.27257	0.29143	3	1.07E-08	3	60.28465	0	0	0	269.2141	14	0.41909	0.73392	0.33	3.3907	378.5983	0	0.85718	1.47549	35.13274
11.155	7.47755	0.30416	3	1.22E-08	3	60.27769	0	0	0	264.18	14	0.42082	0.73081	0.33	3.37636	375.04181	0	0.8663	1.58945	34.31286
11.319	4.91042	0.18279	3	1.06E-08	3	48.60222	0	0	0	244.3802	14	0.37944	0.65352	0.33	3.01924	360.71378	0	0.82831	1.70862	33.22022
11.516	4.63894	0.16594	3	6.02E-09	3	32.53385	0	0	0	222.4659	14	0.31198	0.53205	0.33	2.45807	344.16083	0	0.74398	1.65606	32.94271
11.647	4.58179	0.20512	3	5.45E-09	3	36.0361	0	0	0	239.153	14	0.32941	0.55814	0.33	2.57859	356.83511	0	0.74769	1.46611	34.06829
11.811	5.52482	0.28951	3	4.47E-09	3	46.92919	0	0	0	284.0543	14	0.37744	0.63436	0.33	2.93075	388.89322	0	0.80059	1.11475	34.26078
12.008	6.72027	0.50082	3	5.22E-09	4	73.05903	0	0	0	346.2568	14	0.47321	0.7877	0.33	3.63917	429.36722	0	0.89174	0.9307	35.20942
12.139	8.62062	0.70452	3	6.64E-09	5	116.1441	0	0	0	419.3148	14	0.59855	0.99002	0.33	4.57388	472.49783	0	1.02253	0.81157	34.78087

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-5
Correlations from CPeT-IT v.1.7.6.42

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In situ data							Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
12.303	11.04487	0.96296	3	2.62E-08	6	171.85296	0	0	0	479.1634	14	0.8768	1.43885	0.33	6.64748	505.0932	0	1.2577	1.05388	20
12.467	18.62244	0.77853	3	2.20E-08	6	159.77516	0	0	0	459.9122	14	0.81518	1.32729	0.33	6.13206	494.84268	0	1.22346	1.05544	20
12.631	6.19637	0.52926	3	1.56E-08	5	127.15617	0	0	0	389.3387	14	0.64876	1.04813	0.33	4.84237	455.29565	0	1.12854	1.16058	20
12.795	4.12932	0.33566	3	2.54E-09	3	37.49838	0	0	0	303.1064	14	0.34545	0.55382	0.33	2.55866	401.72351	0	0.81132	0.84655	29.08807
12.959	5.8725	0.3348	3	2.79E-09	3	34.97385	0	0	0	282.9522	14	0.3349	0.53281	0.33	2.46159	388.13809	0	0.79682	0.99002	29.03948
13.156	5.75819	0.32407	3	4.11E-09	4	44.94221	0	0	0	291.4349	14	0.38137	0.60124	0.33	2.77773	393.91315	0	0.82261	1.14045	30.85613
13.287	5.96776	0.32428	3	4.20E-09	3	42.82992	0	0	0	284.2267	14	0.37342	0.58518	0.33	2.70352	389.0112	0	0.79523	1.19452	32.07797
13.451	5.37241	0.27074	3	3.51E-09	3	36.92845	0	0	0	273.6268	14	0.34804	0.54134	0.33	2.50099	381.68845	0	0.75363	1.19994	32.75613
13.648	4.56274	0.25773	3	4.10E-09	3	37.99991	0	0	0	271.0372	14	0.35464	0.54669	0.33	2.52573	379.87802	0	0.74921	1.28942	33.35727
13.812	6.18208	0.28013	3	1.05E-08	4	64.50545	0	0	0	298.9452	14	0.46375	0.70966	0.33	3.27865	398.95648	0	0.85856	1.52572	33.83017
13.944	10.07803	0.35578	3	1.46E-08	4	85.03139	0	0	0	324.2549	14	0.53402	0.81239	0.33	3.75325	415.50189	0	0.93468	1.52978	33.09644
14.108	7.74903	0.3904	3	1.13E-08	4	86.11181	0	0	0	342.9334	14	0.53936	0.81457	0.33	3.76332	427.30167	0	0.94219	1.33216	32.57778
14.272	6.50595	0.44415	3	5.15E-09	4	61.88519	0	0	0	336.5452	14	0.45889	0.68806	0.33	3.17883	423.30307	0	0.86782	1.0863	31.98434
14.436	6.68217	0.4074	3	8.26E-09	4	81.07795	0	0	0	354.9649	14	0.52713	0.78474	0.33	3.62552	434.73282	0	0.9372	1.18194	31.38706
14.6	10.8115	0.45965	3	1.96E-08	5	127.16624	0	0	0	381.6288	14	0.66252	0.97931	0.33	4.52439	450.76511	0	1.10262	1.41179	20
14.764	12.47847	0.51262	3	2.17E-08	5	131.08462	0	0	0	381.6976	14	0.67503	0.99077	0.33	4.57738	450.80576	0	1.10702	1.46787	20
14.961	7.42993	0.37974	3	6.34E-09	4	67.69626	0	0	0	344.132	14	0.48714	0.70901	0.33	3.27564	428.04776	0	0.98731	1.16634	20
15.092	2.88148	0.33559	4	1.42E-07	6	200.85334	0	0	0	412.6556	14	1.02476	1.4367	0.33	6.63756	468.7309	0	1.25706	2.48054	20
15.256	34.98734	0.49925	4	5.30E-07	10	372.2906	0	0	480.749	602.5387	14	1.89944	2.56799	0.33	11.86412	566.39862	0	1.53328	2.42315	20
15.42	44.21283	1.46975	5	3.30E-06	16	714.38696	43	38	662.5774	830.4303	0	0	0	0.33	0	664.93823	-0.13241	0	0	20
15.584	76.49967	1.54248	5	3.97E-06	20	892.26699	48	39	800.133	1002.833	0	0	0	0.33	0	730.70844	-0.15684	0	0	20
15.748	73.46578	1.96367	5	5.75E-06	22	1027.42239	51	39	861.7325	1080.038	0	0	0	0.33	0	758.31433	-0.16359	0	0	20
15.912	175.7892	3.42802	6	2.89E-05	36	1545.58222	70	42	1233.177	1545.582	0	0	0	0.33	0	907.14307	-0.2108	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-6
Correlations from CPeT-IT v.1.7.6.42

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In situ data										Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.328	1.18593	0.08617	3	1.53E-07	0	16.338	0	0	0	33.08257	14	0.08336	2.66811	0.33	12.32668	132.71785	0	1.55347	1.28953	20
0.82	1.19069	0.0177	6	1.79E-04	6	204.75337	58	40	163.3671	204.7534	0	0	0	0.33	0	330.17581	-0.12849	0	0	20
0.984	75.5233	0.41763	6	1.66E-03	18	530.72616	90	45	423.4517	530.7262	0	0	0	0.33	0	531.5755	-0.25028	0	0	20
1.148	224.8648	1.22567	6	2.16E-03	30	896.81785	100	47	715.5462	896.8179	0	0	0	0.33	0	691.00604	-0.32058	0	0	20
1.312	234.0189	2.39602	6	1.77E-03	37	1121.70991	100	48	894.9813	1121.71	0	0	0	0.33	0	772.80511	-0.34406	0	0	20
1.476	186.1864	2.263	6	9.26E-04	37	1161.92213	100	48	927.0655	1161.922	0	0	0	0.33	0	786.53534	-0.33837	0	0	20
1.64	174.0175	2.13068	6	5.66E-04	34	1117.92666	100	47	891.9628	1117.927	0	0	0	0.33	0	771.50079	-0.32297	0	0	20
1.804	162.8773	2.37519	6	3.74E-04	31	1064.39049	100	46	849.2477	1064.39	0	0	0	0.33	0	752.80103	-0.30658	0	0	20
1.969	125.1609	2.0379	6	2.61E-04	29	1022.39079	100	46	815.7373	1022.391	0	0	0	0.33	0	737.79919	-0.2935	0	0	20
2.133	127.99	1.93523	6	2.26E-04	26	952.66266	98	45	760.1032	952.6627	0	0	0	0.33	0	712.19562	-0.27856	0	0	20
2.297	124.437	1.67409	6	3.01E-04	27	947.0811	97	45	755.6498	947.0811	0	0	0	0.33	0	710.1062	-0.2714	0	0	20
2.461	142.9166	1.58543	6	3.92E-04	27	941.84166	96	45	751.4694	941.8417	0	0	0	0.33	0	708.13922	-0.2692	0	0	20
2.625	145.217	1.5422	6	3.99E-04	29	982.4322	97	45	783.8555	982.4322	0	0	0	0.33	0	723.23761	-0.27119	0	0	20
2.789	143.5119	1.91419	6	3.21E-04	28	964.25703	94	45	769.354	964.257	0	0	0	0.33	0	716.51636	-0.26206	0	0	20
2.953	118.8455	1.50132	6	1.89E-04	24	877.76657	87	44	700.3457	877.7666	0	0	0	0.33	0	683.62701	-0.24442	0	0	20
3.117	74.78031	1.08596	6	9.16E-05	19	744.69597	76	43	594.1723	744.696	0	0	0	0.33	0	629.67902	-0.21754	0	0	20
3.281	57.40571	1.11895	6	2.73E-05	15	633.03027	66	42	505.0774	633.0303	0	0	0	0.33	0	580.5531	-0.1945	0	0	20
3.445	39.45005	1.10608	5	8.55E-06	12	556.01077	58	40	443.6256	556.0108	0	0	0	0.33	0	544.0907	-0.18402	0	0	20
3.609	25.49513	0.87707	5	4.82E-06	10	485.62367	54	40	420.6024	527.1549	0	0	0	0.33	0	529.784	-0.18073	0	0	20
3.773	39.68343	1.02645	5	4.79E-06	11	487.51619	53	39	422.7088	529.7951	0	0	0	0.33	0	531.10901	-0.17716	0	0	20
3.937	39.85965	1.05688	5	8.63E-06	12	586.38404	56	40	467.8596	586.384	0	0	0	0.33	0	558.75421	-0.1784	0	0	20
4.101	49.69002	1.07558	5	1.02E-05	13	608.3964	57	40	485.4227	608.3964	0	0	0	0.33	0	569.14514	-0.17771	0	0	20
4.298	48.67555	1.08212	5	1.16E-05	13	627.60991	58	40	500.7526	627.6099	0	0	0	0.33	0	578.06226	-0.17634	0	0	20
4.462	47.60392	1.08966	5	1.02E-05	13	630.07524	57	40	502.7196	630.0752	0	0	0	0.33	0	579.19647	-0.17486	0	0	20
4.626	46.97047	1.09826	5	9.20E-06	13	633.10975	56	40	505.1408	633.1098	0	0	0	0.33	0	580.58954	-0.1734	0	0	20
4.757	46.69423	1.0994	5	8.57E-06	13	635.65344	55	40	507.1703	635.6534	0	0	0	0.33	0	581.7547	-0.17219	0	0	20
4.921	46.38465	1.09854	5	8.05E-06	13	638.4237	55	40	509.3806	638.4237	0	0	0	0.33	0	583.021	-0.17036	0	0	20
5.085	46.02745	1.09207	5	7.53E-06	13	641.73537	54	40	512.0229	641.7354	0	0	0	0.33	0	584.53119	-0.16879	0	0	20
5.249	45.77502	1.10174	5	7.04E-06	13	645.0597	53	40	514.6753	645.0597	0	0	0	0.33	0	586.04327	-0.16731	0	0	20
5.446	45.47496	1.10196	5	6.52E-06	13	650.55072	53	39	519.0564	650.5507	0	0	0	0.33	0	588.53229	-0.16594	0	0	20
5.61	45.31303	1.11077	5	6.09E-06	13	655.69778	52	39	523.1631	655.6978	0	0	0	0.33	0	590.8559	-0.16505	0	0	20
5.774	45.20825	1.12577	5	5.70E-06	13	628.46999	52	39	527.9196	661.6592	0	0	0	0.33	0	593.53577	-0.16438	0	0	20
5.906	45.11776	1.13374	5	7.53E-06	13	629.18717	51	39	502.011	629.1872	0	0	0	0.33	0	578.78815	-0.15156	0	0	20
6.102	45.33208	0.62147	5	1.30E-05	12	571.62425	49	39	456.0832	571.6243	0	0	0	0.33	0	551.67719	-0.12964	0	0	20
6.266	45.57975	0.36459	6	4.37E-05	13	542.92063	52	39	433.1814	542.9206	0	0	0	0.33	0	537.64783	-0.11625	0	0	20
6.398	69.92228	0.50878	6	1.69E-04	18	673.07443	62	41	537.0275	673.0744	0	0	0	0.33	0	598.63385	-0.15053	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-6
Correlations from CPeT-IT v.1.7.6.42

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In situ data							Estimations														
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
6.562	138.6539	0.97775	6	2.44E-04	23	812.35791	69	42	648.1579	812.3579	0	0	0	0.33	0	657.66302	-0.17745	0	0	20
6.726	118.7502	1.08759	6	2.17E-04	24	866.76373	71	42	691.5668	866.7637	0	0	0	0.33	0	679.32886	-0.18448	0	0	20
6.89	84.55828	0.89975	6	9.50E-05	21	799.8784	64	41	638.2009	799.8784	0	0	0	0.33	0	652.59192	-0.16677	0	0	20
7.054	68.7554	0.84607	6	4.47E-05	17	716.26623	57	40	571.489	716.2662	0	0	0	0.33	0	617.54266	-0.14622	0	0	20
7.218	59.5442	0.7636	6	2.61E-05	15	651.96024	52	39	520.181	651.9602	0	0	0	0.33	0	589.16949	-0.13049	0	0	20
7.382	47.74681	0.60405	6	2.19E-05	14	600.52785	49	39	479.1446	600.5279	0	0	0	0.33	0	565.4527	-0.11701	0	0	20
7.546	49.9996	0.51177	6	3.71E-05	15	636.20406	52	39	507.6096	636.2041	0	0	0	0.33	0	582.00665	-0.12324	0	0	20
7.71	85.32033	0.80334	6	1.09E-04	21	788.98115	62	41	629.5062	788.9812	0	0	0	0.33	0	648.13135	-0.15698	0	0	20
7.874	140.0303	1.20519	6	1.78E-04	26	937.34232	70	42	747.8795	937.3423	0	0	0	0.33	0	706.44574	-0.18331	0	0	20
8.038	131.6812	1.29691	6	2.08E-04	28	994.94512	72	42	793.8392	994.9451	0	0	0	0.33	0	727.82886	-0.19156	0	0	20
8.202	117.993	1.10907	6	1.95E-04	26	955.977	70	42	762.7476	955.977	0	0	0	0.33	0	713.43341	-0.1847	0	0	20
8.366	120.541	0.939	6	2.57E-04	26	924.07138	70	42	737.291	924.0714	0	0	0	0.33	0	701.427	-0.18088	0	0	20
8.53	137.6537	0.92627	6	2.44E-04	27	948.11264	71	42	756.4729	948.1126	0	0	0	0.33	0	710.4928	-0.18356	0	0	20
8.727	124.0226	1.28283	6	1.14E-04	26	1000.43874	69	42	798.2224	1000.439	0	0	0	0.33	0	729.83545	-0.1852	0	0	20
8.891	90.03547	1.69207	6	4.34E-05	23	967.09375	63	41	771.6174	967.0938	0	0	0	0.33	0	717.56958	-0.1743	0	0	20
9.022	71.75595	1.18443	6	8.50E-05	26	1020.1456	68	42	813.946	1020.146	0	0	0	0.33	0	736.98865	-0.18471	0	0	20
9.186	178.3897	1.31184	6	2.04E-04	25	895.58933	67	42	714.566	895.5893	0	0	0	0.33	0	690.53259	-0.17155	0	0	20
9.416	99.50387	0.31433	6	3.73E-04	22	767.00194	65	41	611.9696	767.0019	0	0	0	0.33	0	639.03986	-0.1557	0	0	20
9.547	55.75303	0.15684	6	1.21E-04	12	460.09566	46	38	367.0976	460.0957	0	0	0	0.33	0	494.94141	-0.07075	0	0	20
9.678	8.5206	0.10779	5	1.41E-05	8	339.34322	34	35	270.7526	339.3432	0	0	0	0.33	0	425.05908	-0.02044	0	0	20
9.843	18.3462	0.14568	5	8.65E-07	5	191.39808	25	32	226.1688	283.4649	0	0	0	0.33	0	388.48956	-0.02626	0	0	20
10.007	15.76478	0.22332	5	5.95E-07	5	191.4918	25	33	242.0839	303.4118	0	0	0	0.33	0	401.92584	-0.04122	0	0	20
10.171	8.63491	0.2379	4	1.31E-07	4	132.02837	0	0	0	275.1477	14	0.67361	1.17047	0.33	5.40756	382.74774	0	1.17196	3.14067	20
10.367	5.60102	0.16936	3	1.75E-08	3	52.79112	0	0	0	226.8843	14	0.38586	0.69803	0.33	3.22489	347.56174	0	0.98205	2.07056	20
10.499	3.55779	0.14063	3	7.38E-09	3	29.21409	0	0	0	197.9497	14	0.28804	0.51746	0.33	2.39068	324.64383	0	0.80195	1.93862	27.74298
10.696	4.4008	0.12684	3	3.48E-08	3	59.57706	0	0	0	214.9789	14	0.41413	0.73398	0.33	3.39097	338.31998	0	0.91753	2.87813	30.29292
10.827	10.86865	0.15556	4	5.60E-08	3	75.20843	0	0	0	224.14	14	0.47054	0.81549	0.33	3.76756	345.45331	0	1.03571	3.26078	20
11.024	6.06301	0.14184	4	5.39E-08	3	78.90245	0	0	0	232.0928	14	0.48399	0.83176	0.33	3.84275	351.52853	0	1.04273	3.09326	20
11.155	5.03425	0.1626	3	2.02E-08	3	58.9113	0	0	0	238.2272	14	0.41602	0.72248	0.33	3.33787	356.14383	0	0.99369	2.14366	20
11.352	8.03004	0.26612	3	4.62E-08	4	93.37754	0	0	0	261.0617	14	0.52939	0.89993	0.33	4.15767	372.82184	0	1.0712	2.51592	20
11.516	10.75434	0.1899	3	5.35E-08	4	104.27518	0	0	0	270.3928	14	0.56296	0.94503	0.33	4.36606	379.42615	0	1.08927	2.55084	20
11.68	6.46308	0.19282	3	4.29E-08	4	86.63433	0	0	0	256.6322	14	0.51335	0.86104	0.33	3.97798	369.64539	0	0.97922	2.5665	31.80324
11.844	5.84392	0.20533	3	1.20E-08	3	52.6301	0	0	0	251.7836	14	0.40003	0.67124	0.33	3.10115	366.13681	0	0.87296	1.76824	30.64352
11.975	5.99633	0.26698	3	4.44E-09	3	42.85084	0	0	0	272.8314	14	0.36212	0.60374	0.33	2.78929	381.13327	0	0.83491	1.18269	30.01215
12.172	4.89613	0.42787	3	3.15E-09	3	35.86201	0	0	0	268.0027	14	0.33286	0.54969	0.33	2.53955	377.74548	0	0.80943	1.09614	29.0029
12.336	4.69609	0.19794	3	2.73E-09	3	29.79277	0	0	0	259.6979	14	0.30459	0.49905	0.33	2.30559	371.84674	0	0.76624	1.04741	29.47065

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-6
Correlations from CPeT-IT v.1.7.6.42

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In situ data							Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
12.664	4.72467	0.22915	3	4.84E-09	3	33.45149	0	0	0	241.2428	14	0.32527	0.5247	0.33	2.4241	358.39087	0	0.77641	1.49383	30.15717
12.795	5.75819	0.21308	3	7.23E-09	3	39.39942	0	0	0	244.2552	14	0.3541	0.56769	0.33	2.62271	360.62149	0	0.79055	1.67782	31.47814
12.959	5.80582	0.17824	3	1.05E-08	3	43.77407	0	0	0	241.6791	14	0.37467	0.59609	0.33	2.75392	358.71478	0	0.80344	1.93422	32.04997
13.123	5.56292	0.17817	3	8.42E-09	3	41.41816	0	0	0	245.4727	14	0.36584	0.57763	0.33	2.66863	361.51917	0	0.78475	1.78562	32.44889
13.287	5.32954	0.24593	3	7.60E-09	3	41.93425	0	0	0	252.6126	14	0.3695	0.57903	0.33	2.6751	366.73907	0	0.78767	1.6783	32.30817
13.484	6.0011	0.22318	3	6.11E-09	3	37.94876	0	0	0	251.0878	14	0.35308	0.54836	0.33	2.5334	365.63058	0	0.78237	1.60128	31.02962
13.648	5.03902	0.17917	3	5.96E-09	3	32.68878	0	0	0	234.997	14	0.32892	0.50705	0.33	2.34258	353.72101	0	0.76396	1.76273	30.09858
13.78	4.40557	0.14625	3	4.09E-09	3	24.09271	0	0	0	216.571	14	0.28322	0.43402	0.33	2.00516	339.5704	0	0.72773	1.77768	28.57089
13.976	4.18648	0.14298	3	3.06E-09	3	18.88638	0	0	0	205.2327	14	0.25186	0.3826	0.33	1.7676	330.56204	0	0.6949	1.7433	27.87773
14.14	3.75307	0.13551	3	2.70E-09	2	15.53014	0	0	0	196.3469	14	0.22921	0.34568	0.33	1.59706	323.32684	0	0.6727	1.72394	27.18245
14.272	3.49588	0.11241	3	2.98E-09	2	15.5072	0	0	0	189.0766	14	0.22971	0.34443	0.33	1.59126	317.28433	0	0.66465	1.98179	27.66451
14.436	4.17219	0.09285	3	3.24E-09	2	15.36382	0	0	0	182.5948	14	0.22947	0.34161	0.33	1.57822	311.7984	0	0.64864	2.25544	28.59535
14.6	3.65781	0.09385	3	3.88E-09	2	16.4422	0	0	0	183.9242	14	0.23823	0.35214	0.33	1.62688	312.93143	0	0.64343	2.38464	29.60995
14.764	3.78164	0.107	3	3.17E-09	2	15.64772	0	0	0	187.2231	14	0.23322	0.34231	0.33	1.58149	315.72531	0	0.63369	2.18043	29.66476
14.928	3.96263	0.11361	3	3.43E-09	3	16.70496	0	0	0	190.91	14	0.24182	0.35245	0.33	1.62833	318.81888	0	0.64358	2.2035	29.61893
15.092	4.05788	0.10203	3	4.16E-09	3	17.77323	0	0	0	190.8182	14	0.2503	0.36228	0.33	1.67375	318.74222	0	0.6536	2.37882	29.53566
15.256	4.18171	0.09371	3	5.38E-09	3	18.69254	0	0	0	187.469	14	0.25758	0.37025	0.33	1.71056	315.93262	0	0.66296	2.702	29.37489
15.42	4.31984	0.08454	3	5.53E-09	3	18.69064	0	0	0	187.1737	14	0.25845	0.36896	0.33	1.70461	315.68369	0	0.66592	2.76659	29.08975
15.584	4.14838	0.09641	3	4.63E-09	3	17.62252	0	0	0	188.2766	14	0.25182	0.35705	0.33	1.64956	316.6124	0	0.66556	2.60976	28.38308
15.748	3.9912	0.10274	3	3.75E-09	3	16.42739	0	0	0	189.5066	14	0.24395	0.34356	0.33	1.58725	317.64493	0	0.66132	2.43078	27.84133
15.912	4.05312	0.09591	3	3.98E-09	3	16.93426	0	0	0	191.0016	14	0.24852	0.34765	0.33	1.60614	318.89542	0	0.67024	2.47513	27.47575
16.109	4.41033	0.09655	3	6.29E-09	3	20.73151	0	0	0	195.3023	14	0.27608	0.38312	0.33	1.77	322.46558	0	0.69164	2.82304	28.14132
16.273	5.15332	0.09506	3	1.06E-08	3	26.1965	0	0	0	200.5935	14	0.31138	0.42924	0.33	1.98308	326.80453	0	0.72723	3.2564	28.3257
16.437	5.60579	0.08951	3	1.35E-08	3	29.28869	0	0	0	203.5005	14	0.33033	0.45237	0.33	2.08996	329.16406	0	0.7487	3.49883	28.09063
16.568	5.29144	0.093	3	1.08E-08	3	27.95077	0	0	0	207.7125	14	0.32354	0.44077	0.33	2.03634	332.55316	0	0.74633	3.15016	27.58584
16.732	4.92947	0.11945	3	1.36E-08	3	33.04525	0	0	0	217.2742	14	0.35294	0.4777	0.33	2.20696	340.12131	0	0.76843	3.19352	28.06902
16.896	6.85839	0.11248	4	9.73E-08	4	102.22257	0	0	0	270.8623	14	0.6285	0.82983	0.33	3.83379	379.75543	0	0.96751	4.48629	31.13747
17.06	16.8888	0.17995	4	4.10E-07	6	197.33553	0	0	266.886	334.4971	14	1.00681	1.28611	0.33	5.94182	422.01306	0	1.21034	5.41812	20
17.257	20.90381	0.25389	5	1.46E-06	8	311.16136	28	33	334.294	418.9818	0	0	0	0.33	0	472.31015	-0.03594	0	0	20
17.421	31.3581	0.33978	5	5.99E-06	11	495.64038	35	36	412.6608	517.2016	0	0	0	0.33	0	524.75867	-0.05098	0	0	20
17.585	56.55318	0.43484	6	1.92E-05	14	620.50802	42	37	495.0862	620.508	0	0	0	0.33	0	574.78235	-0.07304	0	0	20
17.749	72.20841	0.55052	6	3.40E-05	16	673.79405	46	38	537.6016	673.7941	0	0	0	0.33	0	598.9538	-0.08607	0	0	20
17.881	63.664	0.48468	6	2.50E-05	16	683.41507	45	38	545.278	683.4151	0	0	0	0.33	0	603.21478	-0.0864	0	0	20
18.077	48.93274	0.555	5	8.02E-06	13	623.87674	39	37	497.774	623.8767	0	0	0	0.33	0	576.34045	-0.07364	0	0	20
18.241	25.49513	0.47423	5	2.26E-06	11	441.99731	33	35	439.0484	550.2739	0	0	0	0.33	0	541.27655	-0.06557	0	0	20
18.406	23.21852	0.32563	5	1.24E-06	8	333.01081	29	34	368.6581	462.0515	0	0	0	0.33	0	495.99225	-0.04713	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-6
Correlations from CPeT-IT v.1.7.6.42

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In situ data							Estimations														
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
18.57	25.54752	0.16701	5	1.41E-06	8	301.15427	27	33	325.6025	408.0885	0	0	0	0.33	0	466.12982	-0.02697	0	0	20
18.701	18.56053	0.18919	5	7.71E-06	10	463.13938	33	35	369.5261	463.1394	0	0	0	0.33	0	496.57584	-0.02881	0	0	20
18.865	58.23443	0.33758	6	3.44E-05	13	547.81321	41	37	437.085	547.8132	0	0	0	0.33	0	540.06494	-0.05277	0	0	20
19.062	80.5004	0.29278	6	5.91E-05	15	587.87227	44	38	469.047	587.8723	0	0	0	0.33	0	559.46277	-0.06608	0	0	20
19.226	47.09907	0.26015	6	5.09E-05	14	554.00945	42	37	442.0288	554.0095	0	0	0	0.33	0	543.11066	-0.05585	0	0	20
19.39	43.30314	0.21713	6	2.02E-05	11	488.49673	37	36	389.758	488.4967	0	0	0	0.33	0	509.98868	-0.03261	0	0	20
19.554	37.93073	0.16637	5	8.23E-06	10	472.60107	33	35	377.0753	472.6011	0	0	0	0.33	0	501.62256	-0.02831	0	0	20
19.685	24.97122	0.31383	5	1.67E-06	8	337.35875	28	33	353.9153	443.5738	0	0	0	0.33	0	485.97357	-0.03231	0	0	20
19.882	12.82615	0.30252	6	4.65E-05	14	549.61783	41	37	438.5249	549.6178	0	0	0	0.33	0	540.95374	-0.052	0	0	20
20.013	129.0759	0.13004	6	2.16E-04	16	565.9489	48	39	451.555	565.9489	0	0	0	0.33	0	548.9317	-0.07134	0	0	20
20.21	83.89626	0.12862	6	3.73E-04	15	510.86747	47	38	407.607	510.8675	0	0	0	0.33	0	521.53546	-0.06507	0	0	20
20.374	11.99266	0.02837	6	2.73E-05	9	380.28768	33	35	303.421	380.2877	0	0	0	0.33	0	449.97235	0.0055	0	0	20
20.538	10.31141	0.07949	4	2.03E-07	4	101.09639	0	0	0	252.1908	14	0.66851	0.77156	0.33	3.56462	366.43277	0	1.01628	8.68479	20
20.669	9.11119	0.11845	4	8.41E-08	5	100.37952	0	0	0	293.8891	14	0.66407	0.77122	0.33	3.56303	395.5683	0	1.01612	4.62288	20
20.866	11.76881	0.22439	4	2.38E-07	6	189.40891	0	0	0	354.3177	14	0.96637	1.10212	0.33	5.09178	434.33633	0	1.14809	4.94683	20
20.997	23.03277	0.2315	5	1.99E-06	9	361.26544	29	34	367.3028	460.3528	0	0	0	0.33	0	495.07968	-0.03055	0	0	20
21.161	46.01792	0.33438	5	7.55E-06	12	582.10866	36	36	464.4484	582.1087	0	0	0	0.33	0	556.7135	-0.05294	0	0	20
21.325	59.2108	0.58742	6	1.61E-05	16	690.77602	42	37	551.1511	690.776	0	0	0	0.33	0	606.45465	-0.07561	0	0	20
21.49	68.22673	0.63747	6	1.96E-05	18	780.27236	45	38	622.5577	780.2724	0	0	0	0.33	0	644.54437	-0.09288	0	0	20
21.654	75.15181	0.78813	6	2.37E-05	19	841.58504	47	38	671.4774	841.585	0	0	0	0.33	0	669.38922	-0.10379	0	0	20
21.818	82.32454	0.89769	6	2.74E-05	21	883.75471	49	39	705.1234	883.7547	0	0	0	0.33	0	685.95496	-0.11092	0	0	20
21.982	85.62038	0.84757	6	3.35E-05	21	901.13751	50	39	718.9927	901.1375	0	0	0	0.33	0	692.66821	-0.11431	0	0	20
22.146	88.89717	0.82211	6	2.63E-05	22	946.26328	50	39	754.9973	946.2633	0	0	0	0.33	0	709.79956	-0.11952	0	0	20
22.343	83.57239	1.26904	5	8.76E-06	20	961.8888	46	38	767.4645	961.8888	0	0	0	0.33	0	715.63593	-0.12042	0	0	20
22.474	43.15549	1.37298	5	6.70E-06	21	993.62601	46	38	792.7867	993.626	0	0	0	0.33	0	727.34625	-0.12568	0	0	20
22.671	85.26318	1.1727	5	1.43E-05	22	1012.29036	49	39	807.6785	1012.29	0	0	0	0.33	0	734.14569	-0.12605	0	0	20
22.802	118.7693	1.06356	6	3.59E-05	25	1065.63668	55	40	850.242	1065.637	0	0	0	0.33	0	753.24158	-0.1364	0	0	20
22.999	102.4854	1.3599	6	2.95E-05	25	1072.86504	54	40	856.0093	1072.865	0	0	0	0.33	0	755.79193	-0.13558	0	0	20
23.13	76.89022	1.29406	5	1.09E-05	23	1076.71811	49	39	859.0836	1076.718	0	0	0	0.33	0	757.14789	-0.13359	0	0	20
23.294	70.84626	1.53999	5	5.36E-06	21	966.32633	45	38	820.7674	1028.695	0	0	0	0.33	0	740.07043	-0.12912	0	0	20
23.458	62.72097	1.28745	5	5.40E-06	21	972.422	45	38	824.8519	1033.814	0	0	0	0.33	0	741.90961	-0.12925	0	0	20
23.622	78.04757	1.31639	5	4.66E-06	21	933.85558	44	38	813.7975	1019.96	0	0	0	0.33	0	736.92145	-0.12769	0	0	20
23.786	62.42091	1.47878	5	5.28E-06	21	977.55495	45	38	832.7191	1043.675	0	0	0	0.33	0	745.43927	-0.12967	0	0	20
23.95	71.87502	1.40825	5	1.36E-05	24	1086.05565	50	39	866.5338	1086.056	0	0	0	0.33	0	760.42389	-0.13219	0	0	20
24.114	127.7185	1.19467	6	5.90E-05	28	1134.9968	58	40	905.5826	1134.997	0	0	0	0.33	0	777.36865	-0.14595	0	0	20
24.278	156.5095	1.16602	6	9.09E-05	34	1304.34699	65	41	1040.702	1304.347	0	0	0	0.33	0	833.34778	-0.17009	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-6
Correlations from CPeT-IT v.1.7.6.42

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In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
24.442	158.386	2.41458	6	7.42E-05	37	1447.6799	67	42	1155.064	1447.68	0	0	0	0.33	0	877.94232	-0.18235	0	0	20
24.639	133.5148	2.86428	5	2.37E-05	37	1598.99661	63	41	1275.795	1598.997	0	0	0	0.33	0	922.68506	-0.18696	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-7
Correlations from CPeT-IT v.1.7.6.42

F&ME CONSULTANTS

In situ data							Estimations													
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.164	2.99102	0.02538	5	1.43E-05	1	36.98813	40	37	29.5118	36.98813	0	0	0	0.33	0	140.33334	-0.06379	0	0	20
0.328	2.94816	0.0246	5	7.61E-06	1	41.41658	35	35	33.04514	41.41658	0	0	0	0.33	0	148.4967	-0.04207	0	0	20
0.492	3.05294	0.02353	5	2.14E-06	1	41.92983	34	35	42.06385	52.72002	0	0	0	0.33	0	167.53961	-0.08008	0	0	20
0.656	3.08152	0.10075	4	8.76E-07	1	45.23192	0	0	53.32509	66.83411	14	0.23078	2.93823	0.33	13.57463	188.63785	0	1.60557	2.67154	20
0.82	3.68639	0.12968	6	9.27E-05	6	226.28675	60	41	180.5479	226.2868	0	0	0	0.33	0	347.10373	-0.14951	0	0	20
0.984	69.66985	0.4748	6	5.93E-04	19	642.5943	98	45	512.7082	642.5943	0	0	0	0.33	0	584.92224	-0.27493	0	0	20
1.148	229.8515	2.46449	6	7.81E-04	29	944.57002	100	47	753.6463	944.57	0	0	0	0.33	0	709.16418	-0.32288	0	0	20
1.312	168.4927	2.41365	6	1.42E-03	43	1316.33825	100	48	1050.27	1316.338	0	0	0	0.33	0	837.16962	-0.36554	0	0	20
1.476	328.7076	2.98322	6	1.79E-03	47	1421.99402	100	49	1134.57	1421.994	0	0	0	0.33	0	870.1189	-0.37159	0	0	20
1.64	321.7397	2.91255	6	2.08E-03	49	1458.03282	100	49	1163.324	1458.033	0	0	0	0.33	0	881.07599	-0.37068	0	0	20
1.804	213.1484	2.35094	6	1.18E-03	40	1258.70706	100	48	1004.288	1258.707	0	0	0	0.33	0	818.63831	-0.34002	0	0	20
1.969	137.768	1.78934	6	3.64E-04	29	1014.3188	100	46	809.2969	1014.319	0	0	0	0.33	0	734.88092	-0.29371	0	0	20
2.133	87.41119	1.7828	6	8.84E-05	21	814.78128	88	44	650.0915	814.7813	0	0	0	0.33	0	658.64325	-0.25966	0	0	20
2.297	47.58011	1.52848	8	1.82E-05	15	683.79718	75	43	545.5829	683.7972	0	0	0	0.33	0	603.38342	-0.24075	0	0	20
2.461	37.1544	1.51603	8	5.46E-06	12	550.29241	65	41	465.8359	583.8476	0	0	0	0.33	0	557.54443	-0.23136	0	0	20
2.625	33.65376	1.33722	8	3.55E-06	11	476.54936	60	41	436.2072	546.713	0	0	0	0.33	0	539.52234	-0.22452	0	0	20
2.789	31.82009	1.21856	5	3.50E-06	10	438.23561	57	40	402.2103	504.1036	0	0	0	0.33	0	518.07141	-0.20704	0	0	20
2.953	29.01006	0.86363	5	2.89E-06	9	402.11454	54	40	381.9766	478.744	0	0	0	0.33	0	504.87213	-0.19788	0	0	20
3.117	25.98093	1.03256	9	1.13E-06	8	314.86069	0	0	354.2912	444.045	14	1.60643	5.89919	0.33	27.25428	486.23163	0	2.03779	1.53073	20
3.281	13.11668	1.18919	9	6.80E-07	8	293.18255	0	0	361.8153	453.4751	14	1.49583	5.53465	0.33	25.5701	491.36752	0	1.99382	1.29823	20
3.445	24.38064	1.16573	9	4.85E-07	8	289.34229	0	0	379.5589	475.7138	14	1.47624	5.41456	0.33	25.01527	503.27182	0	1.97891	1.14604	20
3.609	25.17602	1.43214	9	9.91E-07	10	387.71321	0	0	446.9684	560.2004	14	1.97813	6.5681	0.33	30.34463	546.13678	0	2.11405	1.32754	20
3.773	34.27768	1.78294	9	2.70E-06	13	569.16405	0	0	547.4357	686.1194	14	2.9039	8.5655	0.33	39.5726	604.4071	0	2.31501	1.64043	20
3.937	63.31155	1.98934	8	7.76E-06	17	841.41547	67	42	671.3421	841.4155	0	0	0	0.33	0	669.32178	-0.23174	0	0	20
4.101	84.3773	2.38919	8	1.61E-05	21	963.81838	74	43	769.004	963.8184	0	0	0	0.33	0	716.35339	-0.23894	0	0	20
4.265	90.0831	2.45368	8	1.87E-05	24	1066.56117	77	43	850.9797	1066.561	0	0	0	0.33	0	753.56824	-0.24877	0	0	20
4.429	95.66031	2.96317	8	1.79E-05	25	1128.71074	78	43	900.5671	1128.711	0	0	0	0.33	0	775.21301	-0.25389	0	0	20
4.593	97.7988	3.08752	8	1.68E-05	27	1221.11314	80	43	974.2924	1221.113	0	0	0	0.33	0	806.32043	-0.26239	0	0	20
4.757	109.9153	3.57882	8	1.16E-05	27	1251.84819	79	43	998.815	1251.848	0	0	0	0.33	0	816.40479	-0.26607	0	0	20
4.921	83.13421	3.75066	8	5.98E-06	24	1148.52317	73	43	956.6057	1198.946	0	0	0	0.33	0	798.9682	-0.26469	0	0	20
5.085	54.26704	3.15621	9	1.87E-06	19	811.82716	0	0	834.5355	1045.951	14	4.14198	10.09136	0.33	46.62211	746.25183	0	2.44853	1.25868	20
5.249	37.79737	2.76787	9	8.60E-07	16	628.85516	0	0	743.8144	932.2474	14	3.20844	8.03217	0.33	37.10863	704.52319	0	2.26467	1.08026	20
5.413	43.9604	2.80789	9	6.45E-07	15	585.42957	0	0	729.4028	914.1849	14	2.98689	7.4333	0.33	34.34185	697.66467	0	2.20544	1.01624	20
5.577	44.98916	3.06534	9	5.69E-07	15	569.49998	0	0	725.9928	909.911	14	2.90561	7.115	0.33	32.8713	696.03198	0	2.17267	0.9961	20
5.741	34.40628	2.70267	9	4.19E-07	14	518.52069	0	0	698.6733	875.6705	14	2.64551	6.44593	0.33	29.7802	682.8103	0	2.10051	0.94457	20
5.906	33.05365	2.46627	9	3.78E-07	14	495.48059	0	0	680.0308	852.3053	14	2.52796	6.0525	0.33	27.96254	673.63916	0	2.05575	0.94893	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-7
Correlations from CPeT-IT v.1.7.6.42

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In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
6.07	40.06445	2.66328	9	4.69E-07	14	522.35205	0	0	689.5395	864.2228	14	2.66506	6.15916	0.33	28.45532	678.33246	0	2.06807	1.02302	20
6.234	40.17876	2.5294	9	5.04E-07	14	536.34338	0	0	698.9024	875.9576	14	2.73645	6.16159	0.33	28.46656	682.92224	0	2.06835	1.05324	20
6.398	36.06849	2.44579	9	5.94E-07	14	548.40988	0	0	693.6891	869.4236	14	2.79801	6.11176	0.33	28.23631	680.37042	0	2.06261	1.13413	20
6.562	42.66969	2.27807	9	8.05E-07	15	596.76433	0	0	714.3118	895.2708	14	3.04472	6.40965	0.33	29.6126	690.40979	0	2.09646	1.24093	20
6.726	50.55684	2.48966	9	9.65E-07	16	648.58205	0	0	751.4087	941.7655	14	3.30909	6.76652	0.33	31.26132	708.1106	0	2.13568	1.28287	20
6.89	47.1848	2.81586	9	1.38E-06	18	759.0773	0	0	823.8277	1032.531	14	3.87284	7.62923	0.33	35.24704	741.44885	0	2.22515	1.35973	20
7.054	66.35973	3.06833	9	1.16E-06	19	766.82595	0	0	859.8144	1077.634	14	3.91238	7.63677	0.33	35.28188	757.46985	0	2.2259	1.26216	20
7.218	52.2381	3.22908	9	1.07E-06	19	757.97913	0	0	861.3854	1079.603	14	3.86724	7.44121	0.33	34.37841	758.16156	0	2.20624	1.24806	20
7.382	45.30827	2.81244	9	7.52E-07	18	695.59776	0	0	843.0658	1056.642	14	3.54897	6.82277	0.33	31.52119	750.05609	0	2.14173	1.15048	20
7.546	53.00491	3.02773	9	1.13E-06	19	771.98185	0	0	868.6295	1088.682	14	3.93868	7.30062	0.33	33.72888	761.3429	0	2.1919	1.29466	20
7.71	68.56489	3.10402	9	1.88E-06	21	888.96979	0	0	912.9973	1144.29	14	4.53556	8.08259	0.33	37.34156	780.54468	0	2.26952	1.47611	20
7.874	70.3414	2.90182	8	3.30E-06	23	1007.19272	59	41	934.1745	1170.832	0	0	0	0.33	0	789.54523	-0.22217	0	0	20
8.038	78.3381	2.64309	8	2.85E-06	21	922.13372	57	40	878.4209	1100.954	0	0	0	0.33	0	765.62189	-0.21324	0	0	20
8.202	50.4092	2.26854	4	1.60E-06	17	729.23348	0	0	771.1169	966.4665	14	3.72058	6.36948	0.33	29.42702	717.33685	0	2.09196	1.66353	20
8.366	29.07197	1.66385	4	4.85E-07	12	459.30715	0	0	602.6278	755.2935	14	2.3434	4.14544	0.33	19.15194	634.14355	0	1.80616	1.4345	20
8.53	20.51803	0.87039	4	1.96E-07	9	308.83727	0	0	0	598.1674	14	1.5757	2.84325	0.33	13.13584	564.34033	0	1.58762	1.35693	20
8.694	18.1414	0.87977	3	1.42E-07	8	258.22589	0	0	0	530.1716	14	1.31748	2.36634	0.33	10.9325	531.29767	0	1.49099	1.40215	20
8.891	18.17475	1.0123	3	1.02E-07	8	255.10572	0	0	0	556.206	14	1.30156	2.319	0.33	10.71378	544.18628	0	1.48072	1.22568	20
9.022	19.80838	1.22993	3	1.01E-07	9	281.09565	0	0	0	614.4409	14	1.43416	2.52235	0.33	11.65326	571.96545	0	1.52391	1.12221	20
9.186	23.67099	1.51504	4	6.32E-07	13	475.29396	0	0	594.4389	745.0301	14	2.42497	3.93164	0.33	18.16416	629.82025	0	1.77374	1.69487	20
9.35	59.76805	1.4615	5	4.25E-06	17	796.69109	49	39	705.728	884.5124	0	0	0	0.33	0	686.2489	-0.1611	0	0	20
9.514	88.74953	1.51938	5	1.11E-05	20	935.02622	54	40	746.0316	935.0262	0	0	0	0.33	0	705.57245	-0.15956	0	0	20
9.678	67.60281	1.38081	5	8.19E-06	20	966.38764	53	40	771.054	966.3876	0	0	0	0.33	0	717.30756	-0.16443	0	0	20
9.843	55.19102	1.88667	5	1.70E-06	16	671.55648	45	38	702.3419	880.2685	0	0	0	0.33	0	684.60065	-0.16673	0	0	20
10.007	22.60412	1.57881	4	5.46E-07	14	508.15065	0	0	652.596	817.9203	14	2.59261	3.93663	0.33	18.18721	659.91077	0	1.77451	1.58485	20
10.171	32.49641	1.34398	4	6.62E-07	13	479.47948	0	0	594.6881	745.3424	14	2.44632	3.66891	0.33	16.95038	629.95227	0	1.73227	1.84973	20
10.335	49.01847	0.96545	5	4.55E-06	15	679.62129	44	38	594.7463	745.4153	0	0	0	0.33	0	629.98309	-0.12732	0	0	20
10.499	65.59768	0.6706	5	1.49E-05	16	714.6354	47	38	570.1878	714.6354	0	0	0	0.33	0	616.83923	-0.113	0	0	20
10.663	60.24433	0.64835	5	1.34E-05	16	727.74956	47	38	580.6513	727.7496	0	0	0	0.33	0	622.47327	-0.11517	0	0	20
10.827	48.91369	1.08198	5	4.31E-06	15	677.54888	44	38	598.8328	750.5371	0	0	0	0.33	0	632.14368	-0.12647	0	0	20
10.991	37.98788	1.2615	5	1.38E-06	14	575.33546	41	37	624.8137	783.0998	0	0	0	0.33	0	645.71112	-0.146	0	0	20
11.155	38.32128	1.43441	4	1.12E-06	14	566.5848	0	0	638.7843	800.6097	14	2.89074	4.11402	0.33	19.00677	652.8902	0	1.80146	2.10787	20
11.319	47.0562	1.33601	5	1.38E-06	14	582.9962	41	37	633.3746	793.8295	0	0	0	0.33	0	650.11969	-0.14629	0	0	20
11.483	41.54091	1.06733	5	1.34E-05	19	854.25895	50	39	681.5896	854.259	0	0	0	0.33	0	674.41077	-0.13457	0	0	20
11.647	116.4832	0.87039	6	3.64E-05	19	816.04864	53	40	651.1026	816.0486	0	0	0	0.33	0	659.15527	-0.12817	0	0	20
11.811	76.26153	0.63591	6	6.36E-05	19	765.49226	54	40	610.7651	765.4923	0	0	0	0.33	0	638.41064	-0.12163	0	0	20

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In situ data									Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
11.975	50.43301	0.53715	6	1.99E-05	15	642.46692	45	38	512.6066	642.4669	0	0	0	0.33	0	584.86426	-0.09122	0	0	20
12.139	39.55484	0.45553	5	7.42E-06	12	557.59172	39	36	444.887	557.5917	0	0	0	0.33	0	544.86371	-0.07334	0	0	20
12.303	31.38192	0.36744	5	5.28E-06	10	468.44288	35	36	399.0481	500.1403	0	0	0	0.33	0	516.03082	-0.05959	0	0	20
12.467	31.77723	0.27736	5	3.93E-06	9	389.80849	32	35	350.2918	439.0324	0	0	0	0.33	0	483.47943	-0.04291	0	0	20
12.664	22.68509	0.18543	5	2.82E-06	7	317.70982	29	34	303.1138	379.9026	0	0	0	0.33	0	449.74451	-0.02484	0	0	20
12.795	15.94577	0.13544	5	1.12E-06	6	220.18023	25	32	248.3754	311.2972	0	0	0	0.33	0	407.1152	-0.00774	0	0	20
12.959	10.8877	0.09406	4	3.72E-07	4	150.7201	0	0	207.4708	260.0301	14	0.76898	1.05423	0.33	4.87052	372.08447	0	1.13078	7.2285	20
13.123	7.82047	0.08326	4	1.53E-07	4	87.72098	0	0	0	225.3874	14	0.56729	0.78893	0.33	3.64486	346.41327	0	1.02404	6.68899	20
13.287	7.50613	0.07202	4	1.05E-07	3	67.16121	0	0	0	210.7147	14	0.49587	0.69103	0.33	3.19255	334.94778	0	0.97867	6.62937	20
13.451	7.9062	0.06463	4	1.11E-07	3	62.92273	0	0	0	202.7319	14	0.48177	0.66636	0.33	3.07857	328.5419	0	0.96658	7.43628	20
13.615	7.24418	0.05382	4	1.05E-07	3	58.22977	0	0	0	197.3613	14	0.46466	0.63938	0.33	2.95392	324.16095	0	0.95301	7.80103	20
13.78	6.79648	0.05667	4	9.55E-08	3	53.58345	0	0	0	193.1469	14	0.44667	0.61205	0.33	2.82769	320.68127	0	0.93888	7.93391	20
13.944	7.16321	0.05503	4	1.77E-07	3	75.28827	0	0	0	206.6796	14	0.53456	0.71858	0.33	3.31983	331.72525	0	0.99185	9.11531	20
14.108	10.94009	0.06072	5	3.95E-07	4	120.08757	19	30	182.1748	228.3257	0	0	0	0.33	0	348.664	0.0279	0	0	20
14.272	13.03095	0.07387	5	6.17E-07	5	161.99436	21	31	203.4848	255.0342	0	0	0	0.33	0	368.49277	0.01936	0	0	20
14.436	13.2167	0.10331	5	6.96E-07	5	183.80418	22	31	225.8881	283.1131	0	0	0	0.33	0	388.24838	0.00692	0	0	20
14.633	15.64095	0.13793	5	9.13E-07	7	254.24648	26	33	297.5284	372.9022	0	0	0	0.33	0	445.58157	-0.0278	0	0	20
14.797	28.15752	0.3963	5	1.34E-06	8	336.88174	29	34	367.7082	460.861	0	0	0	0.33	0	495.35287	-0.05217	0	0	20
14.928	30.9485	0.47899	6	1.75E-05	13	597.59454	41	37	476.8042	597.5945	0	0	0	0.33	0	564.07001	-0.06946	0	0	20
15.092	92.4121	0.37505	6	1.44E-04	19	692.95564	52	39	552.8901	692.9556	0	0	0	0.33	0	607.41071	-0.10385	0	0	20
15.256	132.0527	0.40199	6	4.00E-04	21	714.22563	58	40	569.8609	714.2256	0	0	0	0.33	0	616.66235	-0.12195	0	0	20
15.42	91.81199	0.33509	6	3.23E-04	19	665.82104	55	40	531.2402	665.821	0	0	0	0.33	0	595.39954	-0.10647	0	0	20
15.584	60.13478	0.20818	6	1.14E-04	15	556.68432	46	38	444.163	556.6843	0	0	0	0.33	0	544.42017	-0.06859	0	0	20
15.748	45.44162	0.15307	6	4.26E-05	11	461.14208	38	36	367.9325	461.1421	0	0	0	0.33	0	495.50391	-0.03257	0	0	20
15.945	32.22493	0.12478	6	1.61E-05	9	398.35605	33	35	317.8373	398.3561	0	0	0	0.33	0	460.53796	-0.00765	0	0	20
16.076	22.93752	0.10679	5	6.15E-06	8	361.17289	29	34	288.1699	361.1729	0	0	0	0.33	0	438.51785	0.00372	0	0	20
16.24	22.13737	0.12506	5	3.28E-06	7	298.17544	27	33	276.8124	346.9382	0	0	0	0.33	0	429.78946	0.00503	0	0	20
16.404	21.62299	0.13146	5	2.29E-06	7	285.76968	26	33	283.2062	354.9517	0	0	0	0.33	0	434.72476	-0.00137	0	0	20
16.568	20.3037	0.16296	5	1.57E-06	7	270.8161	26	33	287.3154	360.1019	0	0	0	0.33	0	437.86722	-0.00718	0	0	20
16.732	18.9606	0.17554	5	1.27E-06	7	257.7748	25	32	284.1876	356.1818	0	0	0	0.33	0	435.47739	-0.00759	0	0	20
16.896	18.85582	0.1331	5	1.41E-06	6	251.38575	25	32	271.9272	340.8154	0	0	0	0.33	0	425.98013	0.00074	0	0	20
17.06	18.9606	0.09349	5	1.46E-06	6	235.33536	24	32	252.9533	317.0347	0	0	0	0.33	0	410.84985	0.01222	0	0	20
17.224	15.54569	0.09037	5	1.05E-06	6	208.66871	22	31	237.9569	298.2393	0	0	0	0.33	0	398.48517	0.01751	0	0	20
17.388	13.16431	0.09605	5	5.38E-07	5	177.01967	21	30	227.903	285.6385	0	0	0	0.33	0	389.97617	0.0154	0	0	20
17.552	12.20223	0.09755	4	3.25E-07	5	157.81699	0	0	0	286.4339	14	0.82676	0.97391	0.33	4.49945	390.5188	0	1.10054	7.65677	20
17.717	12.3594	0.12385	4	3.09E-07	5	168.28495	0	0	0	300.2046	14	0.8586	1.00692	0.33	4.65199	399.79596	0	1.11316	6.92217	20

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17.881	14.52646	0.14326	4	3.76E-07	5	187.14963	0	0	257.0853	322.2136	14	0.95485	1.11133	0.33	5.13432	414.19196	0	1.15136	6.60264	20
18.045	16.26964	0.15805	5	5.28E-07	6	212.78446	22	31	274.9268	344.5749	0	0	0	0.33	0	428.32312	-0.00893	0	0	20
18.209	17.87945	0.17505	5	7.02E-07	6	236.80338	24	32	290.6119	364.2336	0	0	0	0.33	0	440.37201	-0.01238	0	0	20
18.373	19.69883	0.18891	5	9.12E-07	7	262.30808	25	32	306.9852	384.7548	0	0	0	0.33	0	452.60748	-0.01612	0	0	20
18.537	21.76111	0.20931	5	1.16E-06	7	287.23457	26	33	321.8659	403.4053	0	0	0	0.33	0	463.44748	-0.0192	0	0	20
18.701	23.2471	0.22104	5	1.24E-06	8	299.44248	26	33	331.6439	415.6604	0	0	0	0.33	0	470.43433	-0.02204	0	0	20
18.865	22.34217	0.2283	5	1.23E-06	8	307.86885	26	33	341.3673	427.847	0	0	0	0.33	0	477.28079	-0.02562	0	0	20
19.029	23.60431	0.2578	5	9.37E-07	8	290.60165	26	33	338.4451	424.1845	0	0	0	0.33	0	475.23358	-0.02713	0	0	20
19.193	19.57976	0.23306	5	6.36E-07	7	253.61266	24	32	316.8365	397.1017	0	0	0	0.33	0	459.81229	-0.02203	0	0	20
19.357	14.43597	0.14973	4	3.48E-07	6	198.67995	0	0	0	346.9821	14	1.01367	1.13002	0.33	5.22067	429.81665	0	1.15795	6.07397	20
19.521	11.88312	0.10786	4	1.48E-07	5	118.61558	0	0	0	293.8085	14	0.73546	0.82286	0.33	3.80161	395.51404	0	1.0389	6.03895	20
19.685	7.92525	0.10046	4	7.33E-08	4	74.80889	0	0	0	264.74	14	0.58357	0.65404	0.33	3.02165	375.43912	0	0.96043	5.68601	20
19.849	8.09671	0.09342	3	2.04E-08	4	38.14578	0	0	0	238.3098	14	0.41675	0.467	0.33	2.15755	356.20551	0	0.85592	4.36941	20
20.013	4.87232	0.08653	3	5.91E-09	3	17.91532	0	0	0	204.8763	14	0.28637	0.31919	0.33	1.47464	330.2749	0	0.75146	3.7533	20
20.177	2.4433	0.04437	3	1.10E-09	2	3.60789	0	0	0	154.9135	14	0.12597	0.13966	0.33	0.64523	287.19336	0	0.56641	2.18132	20
20.341	1.29547	0.03889	2	3.53E-10	2	3.62707	0	0	0	115.2704	14	0.05946	0.06557	0.33	0.30294	247.73572	0	0.43735	1.55023	20
20.505	2.05752	0.02951	3	1.73E-09	2	4.39084	0	0	0	146.3631	14	0.1429	0.15677	0.33	0.72426	279.15509	0	0.58924	3.60972	20
20.669	6.01538	0.04799	3	1.77E-09	3	8.24863	0	0	0	199.4617	14	0.19638	0.2143	0.33	0.99009	325.88135	0	0.65574	2.07154	20
20.833	3.64829	0.20121	4	7.46E-08	5	111.19277	0	0	0	327.5662	14	0.72436	0.78319	0.33	3.61833	417.61807	0	1.02149	4.16593	20
20.997	24.28062	0.262	3	4.74E-08	5	120.18147	0	0	0	369.967	14	0.75372	0.81352	0.33	3.75848	443.82446	0	1.03485	2.96182	20
21.161	7.23465	0.28496	4	9.51E-08	6	180.17759	0	0	0	401.4164	14	0.92748	0.99115	0.33	4.57912	462.30359	0	1.10717	3.32688	20
21.325	10.96391	0.27266	3	3.82E-08	6	134.18081	0	0	0	408.5071	14	0.80029	0.85544	0.33	3.95212	466.3688	0	1.05279	2.42455	20
21.49	18.97013	0.4128	3	5.46E-08	7	197.93229	0	0	0	483.129	14	1.00986	1.07247	0.33	4.95482	507.17899	0	1.13743	2.17109	20
21.654	16.0315	0.68205	4	8.40E-08	8	253.09523	0	0	0	571.5446	14	1.2913	1.36093	0.33	6.28748	551.63873	0	1.23398	2.01269	20
21.818	22.59936	0.7914	3	8.60E-08	9	275.11929	0	0	0	618.6662	14	1.40367	1.47198	0.33	6.80054	573.92865	0	1.26753	1.8511	20
21.982	23.49476	0.75592	3	8.00E-08	9	278.02402	0	0	0	633.4448	14	1.41849	1.48095	0.33	6.84199	580.74316	0	1.27017	1.77086	20
22.146	16.7221	0.80768	3	3.31E-08	8	220.17583	0	0	0	588.5978	14	1.12335	1.17073	0.33	5.40876	559.80792	0	1.17205	1.49093	20
22.31	10.60193	0.65155	3	7.11E-09	6	110.50774	0	0	0	510.1651	14	0.73736	0.76464	0.33	3.53264	521.17682	0	1.01315	1.12882	20
22.474	7.71093	0.46122	3	2.74E-09	5	52.50157	0	0	0	434.1371	14	0.5095	0.52574	0.33	2.42892	480.77646	0	0.89132	0.98217	20
22.638	7.31086	0.41237	3	2.07E-09	5	34.2835	0	0	0	393.0817	14	0.41274	0.42379	0.33	1.95793	457.47894	0	0.82797	0.93126	20
22.802	6.52024	0.42944	3	2.52E-09	5	38.69037	0	0	0	387.3556	14	0.43954	0.44911	0.33	2.07487	454.13467	0	0.84456	1.08855	20
22.966	8.78732	0.34533	3	2.38E-09	4	33.19371	0	0	0	367.7232	14	0.40812	0.41497	0.33	1.91715	442.47653	0	0.82203	1.13088	20
23.163	5.98681	0.28624	3	2.10E-09	4	27.20017	0	0	0	351.0653	14	0.37052	0.37454	0.33	1.7304	432.33826	0	0.79371	1.11388	20
23.294	4.91042	0.34639	2	9.49E-10	4	13.85322	0	0	0	345.3662	14	0.26494	0.26678	0.33	1.23253	428.8147	0	0.70675	0.66647	20
23.458	4.29126	0.53608	5	1.21E-05	19	875.76946	44	38	698.7522	875.7695	0	0	0	0.33	0	682.84888	-0.09645	0	0	20
23.622	199.0744	1.61579	6	9.30E-05	31	1181.38045	61	41	942.5908	1181.38	0	0	0	0.33	0	793.09387	-0.15249	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-7
Correlations from CPeT-IT v.1.7.6.42

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In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
23.786	127.6281	2.28461	6	5.53E-05	36	1466.72685	65	41	1170.261	1466.727	0	0	0	0.33	0	883.69897	-0.17736	0	0	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-8
Correlations from CPeT-IT v.1.7.6.42

F&ME CONSULTANTS

In situ data									Estimations										
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
0.361	1.20022	0.0893	3	9.91E-08	1	16.61898	0	0	0	36.42506	14	0.08479	2.81604	0.33	13.01011	139.26112	0	1.58241	1.00608	20
0.492	1.23356	0.06918	5	1.22E-05	3	119.69855	51	39	95.50416	119.6986	0	0	0	0.33	0	252.4493	-0.14002	0	0	20
0.656	25.54752	0.34412	6	7.39E-04	16	517.58097	96	45	412.9635	517.581	0	0	0	0.33	0	524.95111	-0.26847	0	0	20
0.82	227.3081	1.84913	6	1.34E-03	30	934.84633	100	48	745.888	934.8463	0	0	0	0.33	0	705.50458	-0.34287	0	0	20
0.984	257.9423	2.97554	6	1.08E-03	42	1333.42872	100	49	1063.906	1333.429	0	0	0	0.33	0	842.58673	-0.38228	0	0	20
1.148	215.6251	4.06015	8	4.56E-04	40	1350.39054	100	49	1077.439	1350.391	0	0	0	0.33	0	847.92883	-0.37117	0	0	20
1.312	133.5196	3.11113	8	1.62E-04	31	1150.45224	100	47	917.914	1150.452	0	0	0	0.33	0	782.64355	-0.34184	0	0	20
1.476	79.58595	2.0679	8	4.89E-05	21	853.29576	98	45	680.8211	853.2958	0	0	0	0.33	0	674.03046	-0.29945	0	0	20
1.64	42.99356	1.74284	8	1.28E-05	14	633.99476	79	43	505.8469	633.9948	0	0	0	0.33	0	580.99524	-0.26576	0	0	20
1.804	27.15734	1.40704	9	3.39E-06	10	446.53777	0	0	412.0746	516.4668	14	2.27825	11.18943	0.33	51.69517	524.3858	0	2.53657	1.48741	20
1.969	25.88567	1.35329	9	2.36E-06	9	383.16539	0	0	377.4477	473.0678	14	1.95493	9.41478	0.33	43.49627	501.87021	0	2.39109	1.45082	20
2.133	29.39108	1.20121	8	3.63E-06	9	406.08508	60	41	370.21	463.9966	0	0	0	0.33	0	497.03516	-0.2217	0	0	20
2.297	32.08681	0.84593	5	9.06E-06	9	437.78153	59	40	349.2938	437.7815	0	0	0	0.33	0	482.79019	-0.18738	0	0	20
2.461	35.80177	0.43256	6	2.57E-05	9	391.98148	56	40	312.7512	391.9815	0	0	0	0.33	0	456.83829	-0.15134	0	0	20
2.625	37.3592	0.28119	6	5.91E-05	9	358.97408	55	40	286.4155	358.9741	0	0	0	0.33	0	437.18097	-0.12787	0	0	20
2.789	38.94996	0.31404	6	4.92E-05	9	382.48666	55	40	305.1755	382.4867	0	0	0	0.33	0	451.27145	-0.13277	0	0	20
2.953	39.25478	0.58855	5	1.86E-05	10	441.60492	56	40	352.3444	441.6049	0	0	0	0.33	0	484.89383	-0.1555	0	0	20
3.117	33.74425	0.9872	5	5.46E-06	10	460.30705	55	40	389.6685	488.3845	0	0	0	0.33	0	509.93011	-0.18249	0	0	20
3.281	26.25241	1.21891	9	1.51E-06	9	383.20352	0	0	409.4134	513.1314	14	1.95512	6.72489	0.33	31.06899	522.68982	0	2.13117	1.55387	20
3.445	22.72796	1.49307	9	6.67E-07	9	341.8125	0	0	423.325	530.5674	14	1.74394	6.21875	0.33	28.73063	531.49597	0	2.07489	1.17463	20
3.609	24.8331	1.65297	9	4.60E-07	9	336.27001	0	0	445.4909	558.3486	14	1.71566	6.08789	0.33	28.12605	545.2334	0	2.05986	1.02361	20
3.773	25.05695	1.78166	9	4.26E-07	9	348.4945	0	0	468.1135	586.7022	14	1.77803	6.12277	0.33	28.28718	558.90576	0	2.06388	0.9878	20
3.937	25.39035	1.85738	9	5.77E-07	9	356.04996	0	0	452.6954	567.3782	14	1.81658	5.89178	0.33	27.22002	549.62445	0	2.03692	1.15291	20
4.101	26.55246	0.99339	9	6.97E-07	10	379.45713	0	0	466.2315	584.3435	14	1.93601	5.985	0.33	27.6507	557.78113	0	2.04788	1.23233	20
4.265	30.15312	1.76801	9	5.05E-07	10	357.82954	0	0	466.0852	584.1601	14	1.82566	5.60785	0.33	25.90826	557.6936	0	2.0028	1.13324	20
4.429	20.78951	1.97497	9	3.68E-07	10	373.23384	0	0	514.843	645.2699	14	1.90425	5.8087	0.33	26.83619	586.13873	0	2.02705	0.96729	20
4.593	29.8864	2.04487	9	3.39E-07	11	379.10356	0	0	0	665.206	14	1.9342	5.75816	0.33	26.60268	595.12445	0	2.021	0.9414	20
4.757	31.43431	2.02069	9	4.67E-07	11	422.43838	0	0	558.1243	699.5158	14	2.1553	6.08999	0.33	28.13573	610.27905	0	2.0601	1.0297	20
4.921	30.12931	2.08824	9	4.04E-07	11	411.51097	0	0	558.0606	699.436	14	2.09955	5.82731	0.33	26.92216	610.24426	0	2.02927	1.00308	20
5.085	27.58599	2.04479	9	3.24E-07	11	391.70062	0	0	0	692.7843	14	1.99847	5.47842	0.33	25.31028	607.33563	0	1.98687	0.95994	20
5.249	27.22878	1.9877	9	2.65E-07	11	377.54495	0	0	0	692.5373	14	1.92625	5.2095	0.33	24.06791	607.22736	0	1.95296	0.91773	20
5.413	27.11923	2.13836	9	2.80E-07	11	394.92128	0	0	0	717.4573	14	2.0149	5.28983	0.33	24.43902	618.05585	0	1.9632	0.92731	20
5.577	31.32476	2.26214	9	3.22E-07	12	444.5858	0	0	0	787.1341	14	2.26829	5.75429	0.33	26.58483	647.37225	0	2.02053	0.9229	20
5.741	37.87834	2.82538	9	3.90E-07	14	516.92948	0	0	705.4736	884.1935	14	2.6374	6.45377	0.33	29.8164	686.12524	0	2.10139	0.91711	20
5.906	42.63635	3.36723	9	5.29E-07	16	587.7875	0	0	759.0939	951.3977	14	2.99892	7.03861	0.33	32.51838	711.7226	0	2.16467	0.97513	20
6.07	46.52754	2.84906	9	5.63E-07	17	640.73424	0	0	818.2011	1025.479	14	3.26905	7.47568	0.33	34.53765	738.91254	0	2.20973	0.95837	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-8
Correlations from CPeT-IT v.1.7.6.42

F&ME CONSULTANTS

In situ data									Estimations											
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
6.234	49.25184	3.81223	9	3.51E-07	16	578.79294	0	0	0	1009.108	14	2.95303	6.78589	0.33	31.35079	732.99072	0	2.13776	0.84814	20
6.398	29.31487	3.57505	9	2.79E-07	16	572.98757	0	0	0	1041.085	14	2.92341	6.65529	0.33	30.74742	744.51392	0	2.1236	0.78459	20
6.562	45.30827	3.56723	9	2.40E-07	16	556.01851	0	0	0	1038.762	14	2.83683	6.3721	0.33	29.43908	743.68292	0	2.09225	0.76032	20
6.726	45.6369	3.82709	9	3.57E-07	17	632.98793	0	0	0	1100.008	14	3.22953	6.95468	0.33	32.13064	765.29266	0	2.1558	0.83981	20
6.89	45.90361	3.91156	9	3.27E-07	18	634.56008	0	0	0	1120.303	14	3.23755	6.86223	0.33	31.70351	772.32025	0	2.14596	0.81852	20
7.054	45.66547	3.89009	9	3.08E-07	17	623.6277	0	0	0	1113.182	14	3.18177	6.63074	0.33	30.63403	769.862	0	2.12092	0.8181	20
7.251	43.31743	3.63271	9	2.88E-07	17	606.0715	0	0	0	1095.072	14	3.0922	6.31495	0.33	29.17508	763.57379	0	2.08582	0.8241	20
7.382	42.1696	3.50871	9	2.71E-07	17	586.14962	0	0	0	1070.616	14	2.99056	6.03143	0.33	27.86522	754.99927	0	2.0533	0.83121	20
7.546	41.41708	3.43619	9	2.55E-07	16	571.19735	0	0	0	1055.456	14	2.91427	5.78451	0.33	26.72443	749.63495	0	2.02416	0.83477	20
7.71	40.12637	3.31895	9	2.19E-07	16	545.70611	0	0	0	1036.247	14	2.78421	5.46499	0.33	25.24825	742.7818	0	1.9852	0.81835	20
7.874	36.72098	3.24743	9	2.04E-07	16	534.97475	0	0	0	1029.104	14	2.72946	5.27604	0.33	24.37531	740.21753	0	1.96145	0.81571	20
8.038	39.12142	3.27124	9	1.97E-07	16	536.46751	0	0	0	1038.284	14	2.73708	5.20308	0.33	24.03825	743.51172	0	1.95213	0.8129	20
8.202	40.45976	3.38045	9	2.17E-07	16	554.60888	0	0	0	1054.656	14	2.82964	5.26304	0.33	24.31523	749.35071	0	1.9598	0.83884	20
8.366	40.6217	3.2657	9	2.36E-07	16	569.41517	0	0	0	1067.046	14	2.90518	5.29337	0.33	24.45536	753.73962	0	1.96365	0.86355	20
8.53	42.31248	3.24472	9	2.36E-07	17	577.33502	0	0	0	1081.41	14	2.94559	5.27628	0.33	24.37642	758.79578	0	1.96148	0.86652	20
8.694	42.17912	3.48361	9	2.57E-07	17	605.82868	0	0	0	1117.515	14	3.09096	5.42786	0.33	25.07673	771.35864	0	1.98058	0.87838	20
8.891	46.74186	3.61735	9	2.53E-07	17	612.55888	0	0	0	1132.832	14	3.1253	5.38508	0.33	24.87905	776.62683	0	1.97522	0.87847	20
9.055	43.77942	3.35855	9	2.93E-07	18	637.14747	0	0	0	1147.947	14	3.25075	5.48447	0.33	25.33823	781.79102	0	1.98762	0.91948	20
9.186	47.4658	3.4182	9	4.15E-07	19	707.52354	0	0	954.9328	1196.849	14	3.60981	5.94235	0.33	27.45366	798.26929	0	2.04288	0.99919	20
9.35	61.84938	3.84465	9	5.98E-07	21	788.35362	0	0	995.8532	1248.136	14	4.02221	6.43948	0.33	29.75038	815.19342	0	2.09979	1.09356	20
9.514	61.14449	3.55073	9	1.25E-06	23	953.26215	0	0	1053.505	1320.393	14	4.86358	7.48978	0.33	34.60281	838.45801	0	2.21116	1.32302	20
9.678	82.85321	3.41237	9	1.95E-06	25	1062.4328	0	0	1083.805	1358.369	14	5.42058	8.11961	0.33	37.51258	850.42999	0	2.27307	1.4938	20
9.843	85.3108	3.7053	9	1.84E-06	25	1048.39882	0	0	1080.447	1354.16	14	5.34897	7.92391	0.33	36.60844	849.11139	0	2.25418	1.48655	20
10.007	58.18681	3.46115	9	8.43E-07	22	854.14925	0	0	1014.069	1270.966	14	4.3579	6.52826	0.33	30.16057	822.61523	0	2.10965	1.24673	20
10.171	41.25515	3.11021	9	6.00E-07	19	721.70118	0	0	911.1249	1141.943	14	3.68215	5.50053	0.33	25.41247	779.74384	0	1.98961	1.23726	20
10.335	56.90086	2.17825	9	8.89E-07	19	768.81083	0	0	903.9346	1132.931	14	3.9225	5.71598	0.33	26.40783	776.66101	0	2.01592	1.41665	20
10.499	68.25531	2.85198	9	1.02E-06	20	786.91252	0	0	902.6455	1131.316	14	4.01486	5.75484	0.33	26.58735	776.10699	0	2.0206	1.49313	20
10.663	45.03203	2.87508	9	1.14E-06	21	856.70456	0	0	962.5889	1206.445	14	4.37094	6.169	0.33	28.50077	801.46295	0	2.0692	1.48082	20
10.827	71.83692	2.95094	4	1.76E-06	22	923.17195	0	0	959.5226	1202.602	14	4.71006	6.49396	0.33	30.00211	800.18536	0	2.10585	1.70502	20
10.991	82.54363	2.29563	5	5.12E-06	24	1136.72469	55	40	973.5014	1220.122	0	0	0	0.33	0	805.99304	-0.18879	0	0	20
11.155	90.94516	2.03512	5	7.41E-06	24	1171.96997	56	40	935.0824	1171.97	0	0	0	0.33	0	789.92883	-0.17945	0	0	20
11.319	78.44765	2.10501	5	5.22E-06	24	1096.98491	54	40	936.2495	1173.433	0	0	0	0.33	0	790.42163	-0.18153	0	0	20
11.483	67.57423	2.55599	5	2.61E-06	22	949.6439	51	39	919.0344	1151.856	0	0	0	0.33	0	783.12103	-0.18525	0	0	20
11.647	59.40608	2.33139	4	9.17E-07	19	768.67034	0	0	898.7921	1126.486	14	3.92179	5.30935	0.33	24.52919	774.44867	0	1.96568	1.52642	20
11.811	39.69296	2.66627	3	2.45E-07	16	561.58322	0	0	0	1044.703	14	2.86522	3.97753	0.33	18.37618	745.80634	0	1.78079	1.10432	20
11.975	23.16613	2.63036	3	1.97E-07	16	543.57838	0	0	0	1052.538	14	2.77336	3.84602	0.33	17.7686	748.59808	0	1.76043	1.03274	20

S-51 over Black Mingo Creek - Estimated Soil Parameter Correlations
CPT-8
Correlations from CPeT-IT v.1.7.6.42

F&ME CONSULTANTS

In situ data				Estimations																
Depth (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	SPT N60 (blows/ft)	Constrained Mod. (tsf)	Dr (%)	Friction angle (°)	Es (tsf)	Go (tsf)	Nkt	Su (tsf)	Su ratio	Kocr	OCR	Vs (ft/s)	State parameter	Ko	Sensitivity	Peak phi (°)
12.139	55.54823	2.59858	3	2.36E-07	16	566.99511	0	0	0	1061.848	14	2.89283	3.97049	0.33	18.34367	751.90137	0	1.77971	1.08846	20
12.303	44.72245	2.58479	4	5.48E-07	18	685.75318	0	0	880.0525	1102.999	14	3.49874	4.68483	0.33	21.64392	766.33264	0	1.88332	1.35967	20
12.467	48.68984	2.38194	4	5.66E-07	18	671.74983	0	0	856.9477	1074.041	14	3.4273	4.55978	0.33	21.0662	756.20612	0	1.86597	1.41187	20
12.631	52.6096	2.17007	4	8.53E-07	19	730.51918	0	0	865.4307	1084.673	14	3.72714	4.88761	0.33	22.58077	759.93976	0	1.91081	1.58876	20
12.795	57.38666	2.34504	4	7.43E-07	18	707.25615	0	0	859.0234	1076.643	14	3.60845	4.71986	0.33	21.80575	757.12134	0	1.88813	1.54234	20
12.959	43.78894	2.36332	4	4.04E-07	17	610.57427	0	0	828.1487	1037.946	14	3.11517	4.10399	0.33	18.96044	743.39081	0	1.79996	1.33507	20
13.123	31.95345	2.15165	3	1.79E-07	15	489.37974	0	0	0	963.9791	14	2.49684	3.32555	0.33	15.36402	716.41315	0	1.67502	1.12471	20
13.287	31.43907	2.0118	3	1.18E-07	13	427.2788	0	0	0	907.1689	14	2.17999	2.91045	0.33	13.44627	694.98236	0	1.60036	1.05577	20
13.451	30.45794	1.90715	3	1.20E-07	13	414.96778	0	0	0	878.5951	14	2.11718	2.80873	0.33	12.97635	683.94958	0	1.581	1.09833	20
13.615	29.29582	1.74831	3	9.54E-08	12	371.43737	0	0	0	819.7223	14	1.89509	2.51017	0.33	11.59697	660.63733	0	1.52139	1.10063	20
13.78	22.09927	1.40668	3	6.95E-08	11	320.16798	0	0	0	748.1655	14	1.63351	2.16353	0.33	9.99549	631.14417	0	1.44599	1.09956	20
13.944	19.47022	1.21266	3	4.15E-08	9	271.84524	0	0	0	697.3491	14	1.38697	1.84327	0.33	8.51589	609.33319	0	1.36889	1.01503	20
14.108	18.91297	1.39794	3	4.82E-08	10	281.56547	0	0	0	703.0547	14	1.43656	1.89226	0.33	8.74225	611.82086	0	1.38123	1.05981	20
14.272	24.15203	1.37455	3	8.00E-08	11	328.08933	0	0	0	747.5449	14	1.67393	2.17157	0.33	10.03264	630.88232	0	1.44783	1.16866	20
14.436	29.42918	1.43861	4	3.41E-07	13	468.83599	0	0	0	821.5949	14	2.39202	3.00693	0.33	13.89204	661.39148	0	1.61831	1.65758	20
14.633	49.09467	1.42951	5	1.75E-06	17	705.05422	42	37	733.1683	918.9043	0	0	0	0.33	0	699.4632	-0.14372	0	0	20
14.764	74.86128	1.46043	5	6.86E-06	21	998.08846	49	39	796.3472	998.0885	0	0	0	0.33	0	728.97766	-0.14222	0	0	20
14.928	88.5352	1.42581	5	1.62E-05	23	1046.36311	53	40	834.8642	1046.363	0	0	0	0.33	0	746.3988	-0.14588	0	0	20
15.092	96.43664	1.37241	6	2.66E-05	25	1075.35807	56	40	857.9985	1075.358	0	0	0	0.33	0	756.66956	-0.15015	0	0	20
15.256	106.8576	1.42254	6	3.33E-05	26	1115.82831	58	40	890.2885	1115.828	0	0	0	0.33	0	770.77637	-0.15589	0	0	20
15.42	111.9442	1.6138	6	3.75E-05	28	1173.12227	60	41	936.0018	1173.122	0	0	0	0.33	0	790.31708	-0.16317	0	0	20
15.584	119.5552	1.75265	6	4.72E-05	30	1235.97953	63	41	986.1539	1235.98	0	0	0	0.33	0	811.21387	-0.17165	0	0	20
15.748	139.9065	1.7845	6	7.33E-05	33	1319.41471	67	42	1052.725	1319.415	0	0	0	0.33	0	838.14734	-0.18422	0	0	20
15.912	169.5643	2.00725	6	1.05E-04	36	1381.38104	71	42	1102.166	1381.381	0	0	0	0.33	0	857.60333	-0.1939	0	0	20
16.076	199.2745	2.26918	6	1.64E-04	41	1512.714	77	43	1206.953	1512.714	0	0	0	0.33	0	897.44562	-0.21124	0	0	20

APPENDIX

SECTION 5

STATIC SETTLEMENT CALCULATIONS

F&ME CONSULTANTS

Project: S-51 over Black Mingo Creek - **Static Settlement Calculations**
Location : 62+00
Calc. By: JFH
Date: 2/16/2016
Method: FHWA *The Flat Blade Dilatometer Test (SA-91-044) & Boussinesq Stress Distribution*

	@ CL		
Soil Fill Height =	0.6	ft	
Stone Fill Height =	0.0		
Embankment Width, B =	41	ft	=> For Boussineq pressure distribution
Side Slope =	2:1	ft	
Soil Fill Unit Wgt. =	125.0	pcf	
Stone Fill Unit Wgt. =	100.0	pcf	
ΔP ' =	75.0	psf	
Ex. Ground EL @ CL =	26.0	ft-MSL	
Groundwater Table EL =	14.0	ft-MSL	

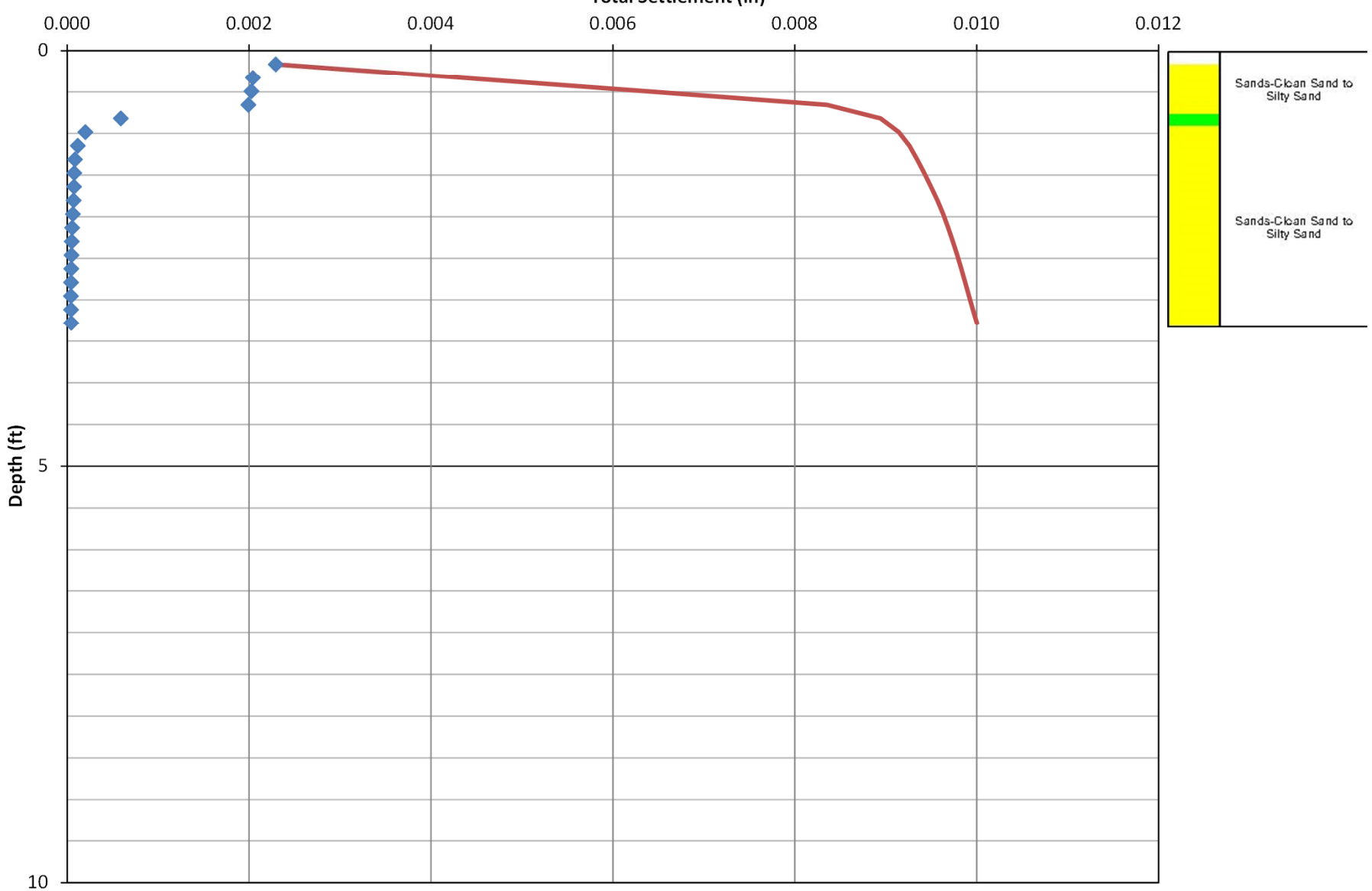
CPT-4

Embankment Settlement at CL

Depth	M_i	H	q/q_o	S_i	Cum. S_i	I_d
ft	*tsf*	*ft*	*dim*	*in*	*in*	*dim*
0.164	32.18	0.2	1.00	0.002	0.002	
0.328	36.09	0.2	1.00	0.002	0.004	
0.492	36.36	0.2	1.00	0.002	0.006	
0.656	36.91	0.2	1.00	0.002	0.008	
0.82	124.66	0.2	1.00	0.001	0.009	
0.984	366.99	0.2	0.99	0.000	0.009	
1.148	626.53	0.2	0.99	0.000	0.009	
1.312	857.51	0.2	0.99	0.000	0.009	
1.476	948.23	0.2	0.99	0.000	0.009	
1.64	975.66	0.2	0.99	0.000	0.009	Sand/ Silt
1.804	1024.66	0.2	0.99	0.000	0.010	
1.969	1170.80	0.2	0.99	0.000	0.010	
2.133	1317.61	0.2	0.99	0.000	0.010	
2.297	1432.52	0.2	0.99	0.000	0.010	
2.461	1498.36	0.2	0.98	0.000	0.010	
2.625	1605.42	0.2	0.98	0.000	0.010	
2.789	1701.04	0.2	0.98	0.000	0.010	
2.953	1723.33	0.2	0.98	0.000	0.010	
3.117	1698.06	0.2	0.98	0.000	0.010	
3.281	1643.34	0.2	0.98	0.000	0.010	
			Total Settlement (in) =	0.010		

F&ME
CONSULTANTS

CPT-4 Estimated Settlement



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F&ME CONSULTANTS

Project: S-51 over Black Mingo Creek - **Static Settlement Calculations**
Location : Beginning of Bridge Embankment
Calc. By: JFH
Date: 2/16/2016
Method: FHWA *The Flat Blade Dilatometer Test (SA-91-044) & Boussinesq Stress Distribution*

	@ CL	
Soil Fill Height =	2.0	ft
Stone Fill Height =	0.0	
Embankment Width, B =	41	ft
Side Slope =	2:1	ft
Soil Fill Unit Wgt. =	125.0	pcf
Stone Fill Unit Wgt. =	100.0	pcf
ΔP ' =	250.0	psf

=> For Boussineq pressure distribution

Ex. Ground EL @ CL =	25.8	ft-MSL
Groundwater Table EL =	17.8	ft-MSL

CPT-5

Embankment Settlement at CL

Depth	M_i	H	q/q_o	S_i	Cum. S_i	I_d
ft	*tsf*	*ft*	*dim*	*in*	*in*	*dim*
0.164	36.01	0.2	1.00	0.007	0.007	
0.492	437.25	0.3	1.00	0.001	0.008	
0.656	450.47	0.2	1.00	0.001	0.008	
0.984	530.50	0.3	1.00	0.001	0.009	
1.148	459.23	0.2	1.00	0.001	0.010	
1.312	719.41	0.2	0.99	0.000	0.010	
1.476	918.15	0.2	0.99	0.000	0.011	
1.64	1049.73	0.2	0.99	0.000	0.011	
1.804	1129.14	0.2	0.99	0.000	0.011	
1.969	1175.91	0.2	0.99	0.000	0.011	
2.133	1175.65	0.2	0.99	0.000	0.011	
2.297	1159.56	0.2	0.99	0.000	0.012	
2.526	1171.23	0.2	0.99	0.000	0.012	
2.657	1149.96	0.1	0.99	0.000	0.012	Sand
2.822	1070.02	0.2	0.98	0.000	0.012	
2.953	1007.68	0.1	0.98	0.000	0.013	
3.117	1001.90	0.2	0.98	0.000	0.013	
3.281	1024.90	0.2	0.98	0.000	0.013	
3.445	960.93	0.2	0.98	0.000	0.013	
3.609	846.42	0.2	0.98	0.000	0.014	
3.773	740.45	0.2	0.98	0.000	0.014	
3.937	682.61	0.2	0.98	0.000	0.014	
4.101	639.42	0.2	0.98	0.000	0.015	
4.265	617.11	0.2	0.97	0.000	0.015	
4.429	619.09	0.2	0.97	0.000	0.015	
4.593	612.02	0.2	0.97	0.000	0.016	
4.757	612.27	0.2	0.97	0.000	0.016	

4.921	656.87	0.2	0.97	0.000	0.016	
5.085	727.61	0.2	0.97	0.000	0.017	
5.249	781.71	0.2	0.97	0.000	0.017	
5.413	812.56	0.2	0.97	0.000	0.017	
5.577	844.54	0.2	0.96	0.000	0.018	
5.741	847.02	0.2	0.96	0.000	0.018	
5.906	829.82	0.2	0.96	0.000	0.018	
6.07	799.76	0.2	0.96	0.000	0.019	
6.234	782.56	0.2	0.96	0.000	0.019	
6.398	749.79	0.2	0.96	0.000	0.019	
6.562	715.38	0.2	0.96	0.000	0.020	
6.726	742.55	0.2	0.96	0.000	0.020	
6.89	712.52	0.2	0.96	0.000	0.020	Sand
7.087	707.07	0.2	0.95	0.000	0.021	
7.218	714.27	0.1	0.95	0.000	0.021	
7.382	841.07	0.2	0.95	0.000	0.021	
7.546	940.91	0.2	0.95	0.000	0.021	
7.743	965.48	0.2	0.95	0.000	0.022	
7.874	908.81	0.1	0.95	0.000	0.022	
8.071	824.18	0.2	0.95	0.000	0.022	
8.202	783.56	0.1	0.95	0.000	0.022	
8.399	762.98	0.2	0.95	0.000	0.023	
8.53	731.09	0.1	0.94	0.000	0.023	
8.694	568.46	0.2	0.94	0.000	0.023	
8.858	363.21	0.2	0.94	0.001	0.024	
9.022	41.66	0.2	0.94	0.006	0.030	
9.186	75.08	0.2	0.94	0.003	0.033	
9.35	60.07	0.2	0.94	0.004	0.037	
9.514	66.35	0.2	0.94	0.003	0.040	
9.711	30.56	0.2	0.94	0.009	0.049	
9.843	28.75	0.1	0.94	0.006	0.056	
10.007	28.15	0.2	0.93	0.008	0.064	
10.171	34.95	0.2	0.93	0.007	0.070	
10.367	38.42	0.2	0.93	0.007	0.077	
10.499	53.83	0.1	0.93	0.003	0.081	
10.663	50.07	0.2	0.93	0.005	0.085	
10.827	59.85	0.2	0.93	0.004	0.089	
10.991	60.28	0.2	0.93	0.004	0.093	
11.155	60.28	0.2	0.93	0.004	0.097	
11.319	48.60	0.2	0.93	0.005	0.101	Clay
11.516	32.53	0.2	0.92	0.008	0.110	
11.647	36.04	0.1	0.92	0.005	0.115	
11.811	46.93	0.2	0.92	0.005	0.120	
12.008	73.06	0.2	0.92	0.004	0.123	
12.139	116.14	0.1	0.92	0.002	0.125	
12.303	171.85	0.2	0.92	0.001	0.126	
12.467	159.78	0.2	0.92	0.001	0.128	
12.631	127.16	0.2	0.92	0.002	0.129	
12.795	37.50	0.2	0.91	0.006	0.135	
12.959	34.97	0.2	0.91	0.006	0.142	
13.156	44.94	0.2	0.91	0.006	0.148	
13.287	42.83	0.1	0.91	0.004	0.152	
13.451	36.93	0.2	0.91	0.006	0.158	

13.648	38.00	0.2	0.91	0.007	0.165	Clay
13.812	64.51	0.2	0.91	0.003	0.169	
13.944	85.03	0.1	0.91	0.002	0.171	
14.108	86.11	0.2	0.91	0.003	0.173	
14.272	61.89	0.2	0.90	0.004	0.177	
14.436	81.08	0.2	0.90	0.003	0.180	
14.6	127.17	0.2	0.90	0.002	0.181	
14.764	131.08	0.2	0.90	0.002	0.183	
14.961	67.70	0.2	0.90	0.004	0.187	
15.092	200.85	0.1	0.89	0.001	0.188	Sand
15.256	372.29	0.2	0.89	0.001	0.189	
15.42	714.39	0.2	0.88	0.000	0.189	
15.584	892.27	0.2	0.88	0.000	0.189	
15.748	1027.42	0.2	0.87	0.000	0.189	
15.912	1545.58	0.2	0.87	0.000	0.189	
		Total Settlement (in) =		0.189		

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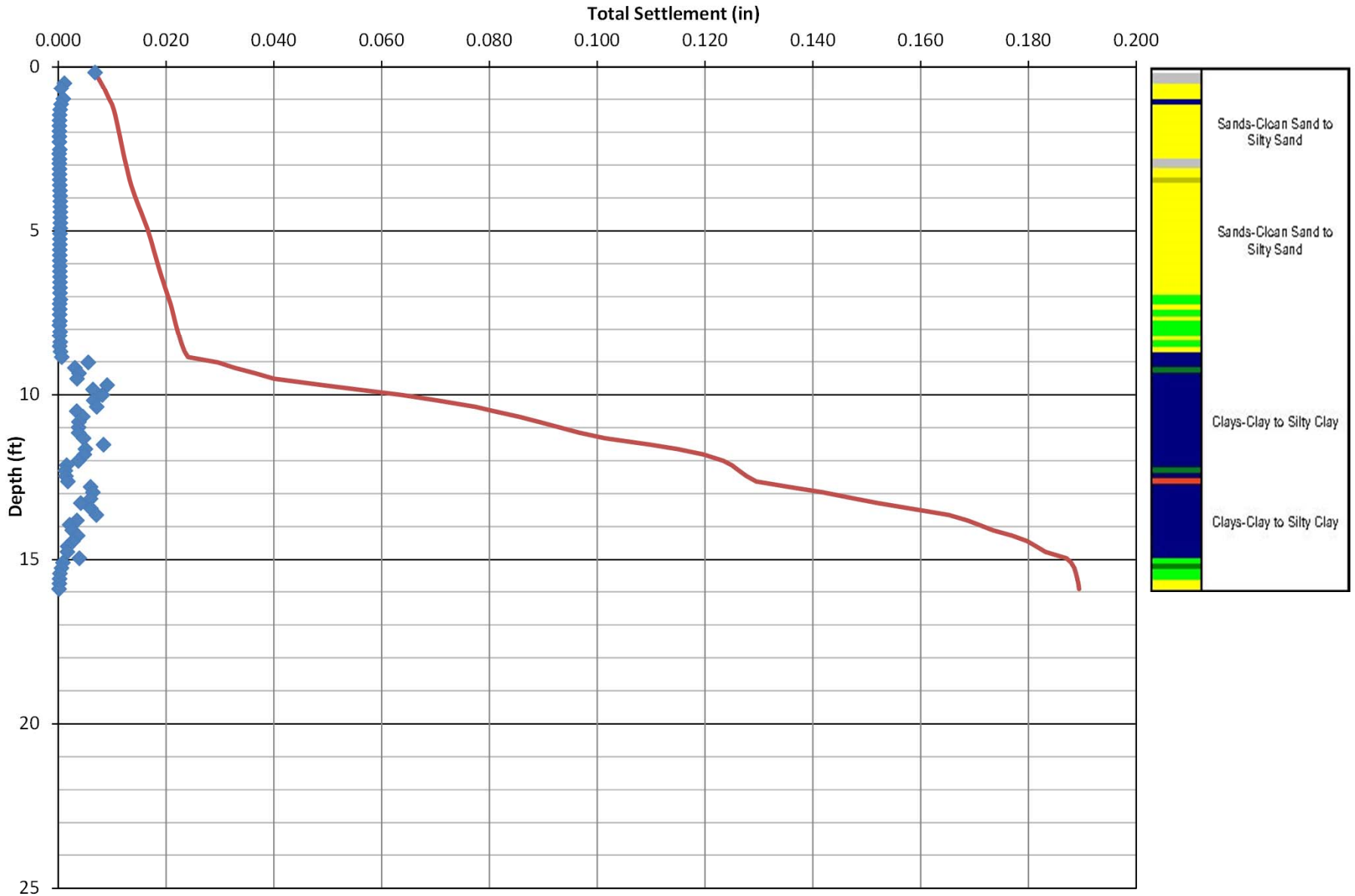
CPT-5 Estimated Settlement



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Project: S-51 over Black Mingo Creek - **Static Settlement Calculations**
Location : End of Bridge Embankment
Calc. By: JFH
Date: 2/16/2016
Method: FHWA *The Flat Blade Dilatometer Test (SA-91-044) & Boussinesq Stress Distribution*

	@ CL	
Soil Fill Height =	1.0	ft
Stone Fill Height =	0.0	
Embankment Width, B =	41	ft
Side Slope =	2:1	ft
Soil Fill Unit Wgt. =	125.0	pcf
Stone Fill Unit Wgt. =	100.0	pcf
ΔP ' =	125.0	psf

=> For Boussineq pressure distribution

Ex. Ground EL @ CL =	26.8	ft-MSL
Groundwater Table EL =	18.8	ft-MSL

CPT-6

Embankment Settlement at CL

Depth	M_i	H	q/q_o	S_i	Cum. S_i	I_d
ft	*tsf*	*ft*	*dim*	*in*	*in*	*dim*
0.328	16.34	0.3	1.00	0.015	0.015	
0.82	204.75	0.5	1.00	0.002	0.017	
0.984	530.73	0.2	1.00	0.000	0.017	
1.148	896.82	0.2	1.00	0.000	0.017	
1.312	1121.71	0.2	1.00	0.000	0.017	
1.476	1161.92	0.2	0.99	0.000	0.017	
1.64	1117.93	0.2	0.99	0.000	0.018	
1.804	1064.39	0.2	0.99	0.000	0.018	
1.969	1022.39	0.2	0.99	0.000	0.018	
2.133	952.66	0.2	0.99	0.000	0.018	
2.297	947.08	0.2	0.99	0.000	0.018	
2.461	941.84	0.2	0.99	0.000	0.018	
2.625	982.43	0.2	0.99	0.000	0.018	
2.789	964.26	0.2	0.99	0.000	0.018	Sand
2.953	877.77	0.2	0.98	0.000	0.019	
3.117	744.70	0.2	0.98	0.000	0.019	
3.281	633.03	0.2	0.98	0.000	0.019	
3.445	556.01	0.2	0.98	0.000	0.019	
3.609	485.62	0.2	0.98	0.000	0.019	
3.773	487.52	0.2	0.98	0.000	0.020	
3.937	586.38	0.2	0.98	0.000	0.020	
4.101	608.40	0.2	0.98	0.000	0.020	
4.298	627.61	0.2	0.98	0.000	0.020	
4.462	630.08	0.2	0.97	0.000	0.020	
4.626	633.11	0.2	0.97	0.000	0.021	
4.757	635.65	0.1	0.97	0.000	0.021	
4.921	638.42	0.2	0.97	0.000	0.021	

5.085	641.74	0.2	0.97	0.000	0.021	
5.249	645.06	0.2	0.97	0.000	0.021	
5.446	650.55	0.2	0.97	0.000	0.022	
5.61	655.70	0.2	0.97	0.000	0.022	
5.774	628.47	0.2	0.96	0.000	0.022	
5.906	629.19	0.1	0.96	0.000	0.022	
6.102	571.62	0.2	0.96	0.000	0.022	
6.266	542.92	0.2	0.96	0.000	0.023	
6.398	673.07	0.1	0.96	0.000	0.023	
6.562	812.36	0.2	0.96	0.000	0.023	
6.726	866.76	0.2	0.96	0.000	0.023	
6.89	799.88	0.2	0.96	0.000	0.023	
7.054	716.27	0.2	0.96	0.000	0.023	
7.218	651.96	0.2	0.95	0.000	0.023	
7.382	600.53	0.2	0.95	0.000	0.024	
7.546	636.20	0.2	0.95	0.000	0.024	Sand
7.71	788.98	0.2	0.95	0.000	0.024	
7.874	937.34	0.2	0.95	0.000	0.024	
8.038	994.95	0.2	0.95	0.000	0.024	
8.202	955.98	0.2	0.95	0.000	0.024	
8.366	924.07	0.2	0.95	0.000	0.024	
8.53	948.11	0.2	0.95	0.000	0.025	
8.727	1000.44	0.2	0.94	0.000	0.025	
8.891	967.09	0.2	0.94	0.000	0.025	
9.022	1020.15	0.1	0.94	0.000	0.025	
9.186	895.59	0.2	0.94	0.000	0.025	
9.416	767.00	0.2	0.94	0.000	0.025	
9.547	460.10	0.1	0.94	0.000	0.025	
9.678	339.34	0.1	0.94	0.000	0.026	
9.843	191.40	0.2	0.94	0.001	0.026	
10.007	191.49	0.2	0.94	0.001	0.027	
10.171	132.03	0.2	0.93	0.001	0.028	
10.367	52.79	0.2	0.93	0.003	0.030	
10.499	29.21	0.1	0.93	0.003	0.034	
10.696	59.58	0.2	0.93	0.002	0.036	
10.827	75.21	0.1	0.93	0.001	0.037	
11.024	78.90	0.2	0.93	0.002	0.039	
11.155	58.91	0.1	0.93	0.002	0.040	
11.352	93.38	0.2	0.93	0.001	0.042	
11.516	104.28	0.2	0.93	0.001	0.043	
11.68	86.63	0.2	0.92	0.001	0.044	
11.844	52.63	0.2	0.92	0.002	0.046	
11.975	42.85	0.1	0.92	0.002	0.049	Clay
12.172	35.86	0.2	0.92	0.004	0.052	
12.336	29.79	0.2	0.92	0.004	0.056	
12.664	33.45	0.3	0.92	0.007	0.063	
12.795	39.40	0.1	0.92	0.002	0.065	
12.959	43.77	0.2	0.92	0.003	0.068	
13.123	41.42	0.2	0.91	0.003	0.070	
13.287	41.93	0.2	0.91	0.003	0.073	
13.484	37.95	0.2	0.91	0.004	0.077	
13.648	32.69	0.2	0.91	0.003	0.080	
13.78	24.09	0.1	0.91	0.004	0.084	

13.976	18.89	0.2	0.91	0.007	0.091	Clay
14.14	15.53	0.2	0.91	0.007	0.098	
14.272	15.51	0.1	0.91	0.006	0.104	
14.436	15.36	0.2	0.91	0.007	0.111	
14.6	16.44	0.2	0.90	0.007	0.118	
14.764	15.65	0.2	0.90	0.007	0.125	
14.928	16.70	0.2	0.90	0.007	0.132	
15.092	17.77	0.2	0.90	0.006	0.138	
15.256	18.69	0.2	0.90	0.006	0.144	
15.42	18.69	0.2	0.89	0.006	0.150	
15.584	17.62	0.2	0.89	0.006	0.156	
15.748	16.43	0.2	0.88	0.007	0.162	
15.912	16.93	0.2	0.88	0.006	0.169	
16.109	20.73	0.2	0.87	0.006	0.175	
16.273	26.20	0.2	0.87	0.004	0.179	
16.437	29.29	0.2	0.86	0.004	0.183	
16.568	27.95	0.1	0.86	0.003	0.186	
16.732	33.05	0.2	0.85	0.003	0.189	
16.896	102.22	0.2	0.85	0.001	0.190	
17.06	197.34	0.2	0.84	0.001	0.190	Sand
17.257	311.16	0.2	0.84	0.000	0.191	
17.421	495.64	0.2	0.83	0.000	0.191	
17.585	620.51	0.2	0.83	0.000	0.191	
17.749	673.79	0.2	0.82	0.000	0.191	
17.881	683.42	0.1	0.82	0.000	0.191	
18.077	623.88	0.2	0.81	0.000	0.192	
18.241	442.00	0.2	0.81	0.000	0.192	
18.406	333.01	0.2	0.80	0.000	0.192	
18.57	301.15	0.2	0.80	0.000	0.192	
18.701	463.14	0.1	0.79	0.000	0.193	
18.865	547.81	0.2	0.79	0.000	0.193	
19.062	587.87	0.2	0.79	0.000	0.193	
19.226	554.01	0.2	0.78	0.000	0.193	
19.39	488.50	0.2	0.78	0.000	0.193	
19.554	472.60	0.2	0.78	0.000	0.194	
19.685	337.36	0.1	0.77	0.000	0.194	
19.882	549.62	0.2	0.77	0.000	0.194	
20.013	565.95	0.1	0.76	0.000	0.194	
20.21	510.87	0.2	0.76	0.000	0.194	
20.374	380.29	0.2	0.76	0.000	0.195	
20.538	101.10	0.2	0.75	0.001	0.195	
20.669	100.38	0.1	0.75	0.001	0.196	
20.866	189.41	0.2	0.75	0.001	0.197	
20.997	361.27	0.1	0.74	0.000	0.197	
21.161	582.11	0.2	0.74	0.000	0.197	
21.325	690.78	0.2	0.74	0.000	0.197	
21.49	780.27	0.2	0.73	0.000	0.197	
21.654	841.59	0.2	0.73	0.000	0.198	
21.818	883.75	0.2	0.73	0.000	0.198	
21.982	901.14	0.2	0.72	0.000	0.198	
22.146	946.26	0.2	0.72	0.000	0.198	
22.343	961.89	0.2	0.71	0.000	0.198	
22.474	993.63	0.1	0.71	0.000	0.198	

22.671	1012.29	0.2	0.71	0.000	0.198	
22.802	1065.64	0.1	0.70	0.000	0.198	
22.999	1072.87	0.2	0.70	0.000	0.198	
23.13	1076.72	0.1	0.70	0.000	0.198	
23.294	966.33	0.2	0.69	0.000	0.198	
23.458	972.42	0.2	0.69	0.000	0.198	
23.622	933.86	0.2	0.69	0.000	0.199	Sand
23.786	977.55	0.2	0.68	0.000	0.199	
23.95	1086.06	0.2	0.68	0.000	0.199	
24.114	1135.00	0.2	0.68	0.000	0.199	
24.278	1304.35	0.2	0.68	0.000	0.199	
24.442	1447.68	0.2	0.67	0.000	0.199	
24.639	1599.00	0.2	0.67	0.000	0.199	
		Total Settlement (in) =		0.199		

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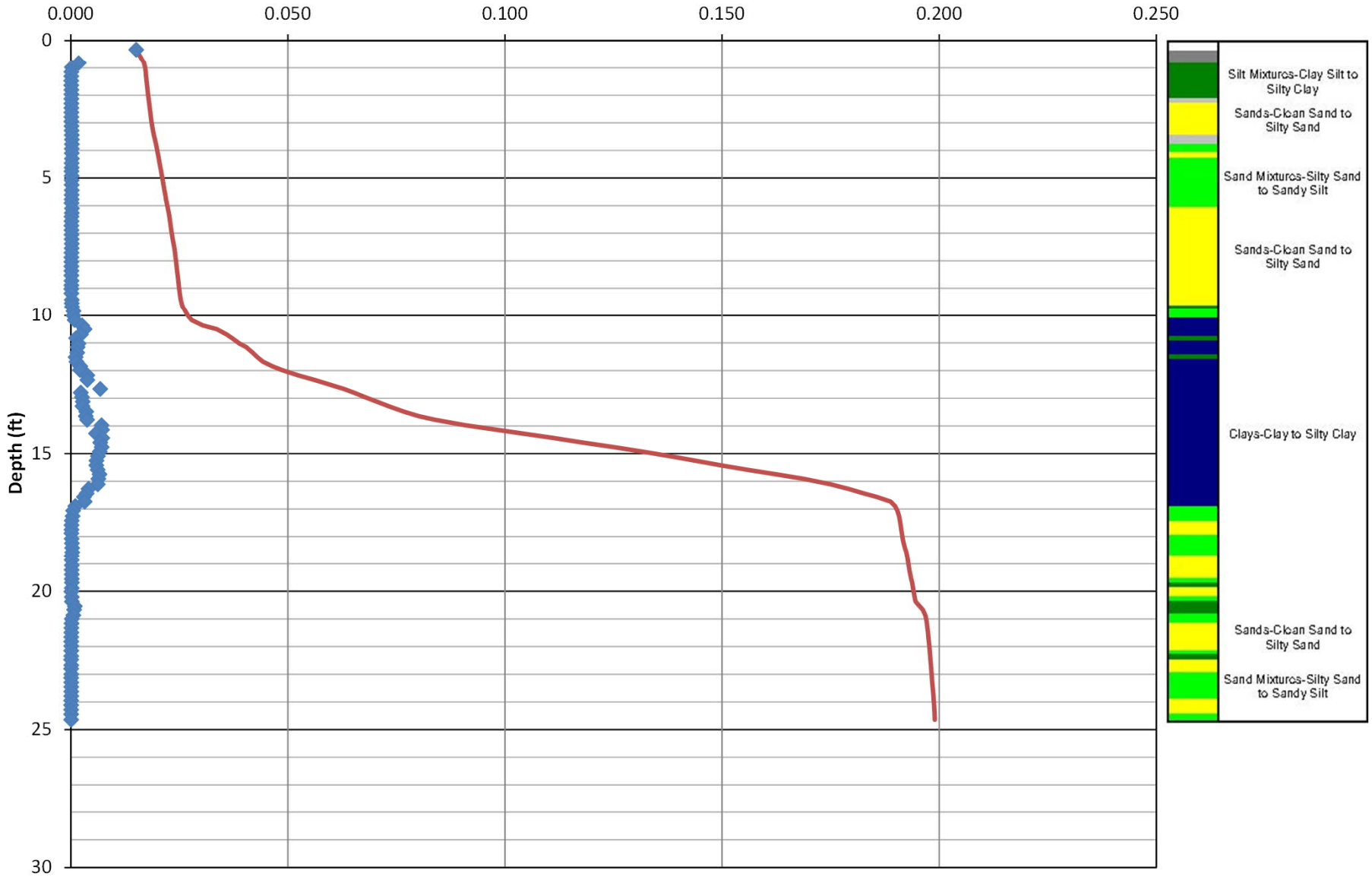
CPT-6 Estimated Settlement



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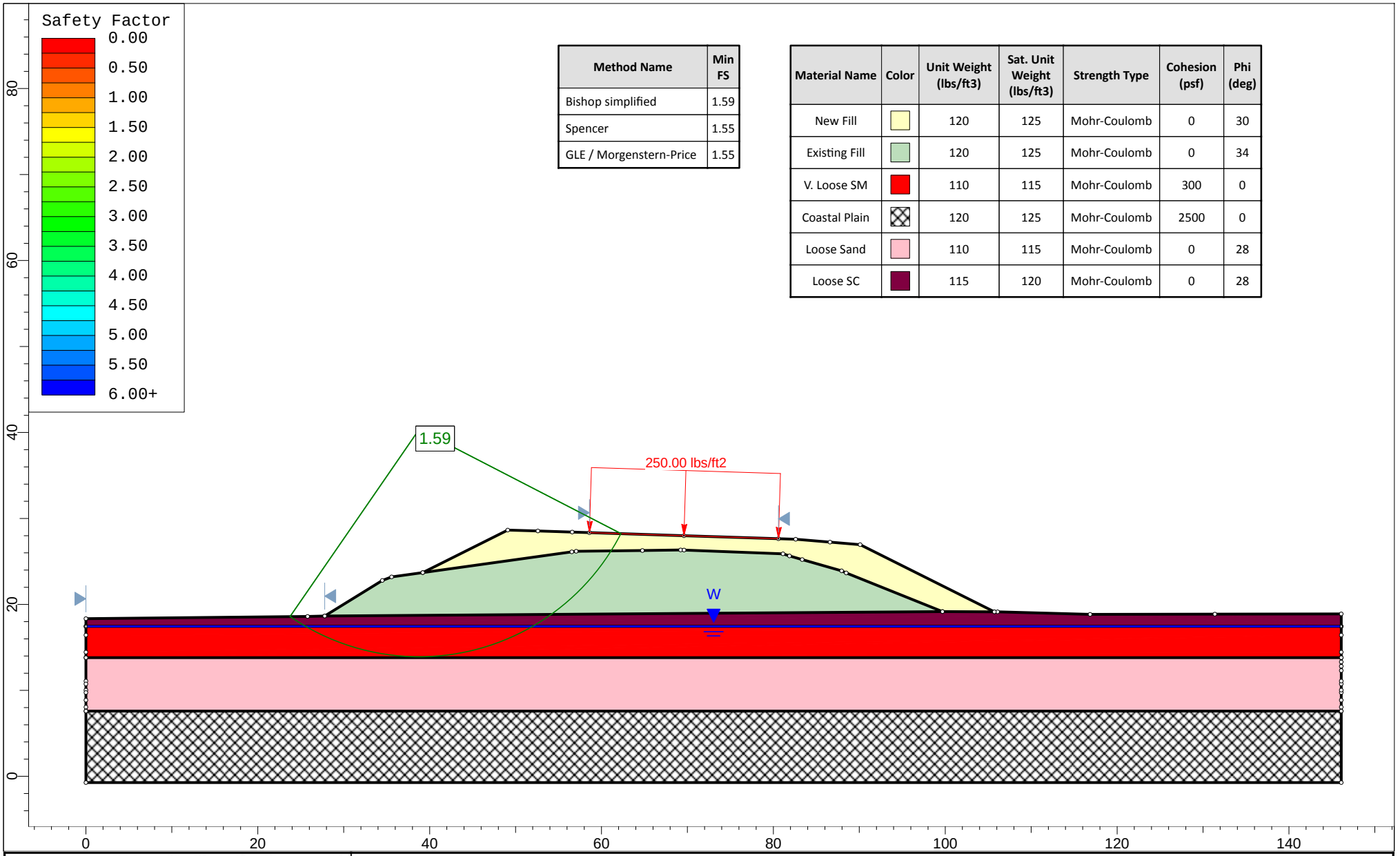
APPENDIX

SECTION 6

EMBANKMENT SLOPE STABILITY ANALYSES



Method Name	Min FS
Bishop simplified	1.59
Spencer	1.55
GLE / Morgenstern-Price	1.55

Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Fill		120	125	Mohr-Coulomb	0	30
Existing Fill		120	125	Mohr-Coulomb	0	34
V. Loose SM		110	115	Mohr-Coulomb	300	0
Coastal Plain		120	125	Mohr-Coulomb	2500	0
Loose Sand		110	115	Mohr-Coulomb	0	28
Loose SC		115	120	Mohr-Coulomb	0	28

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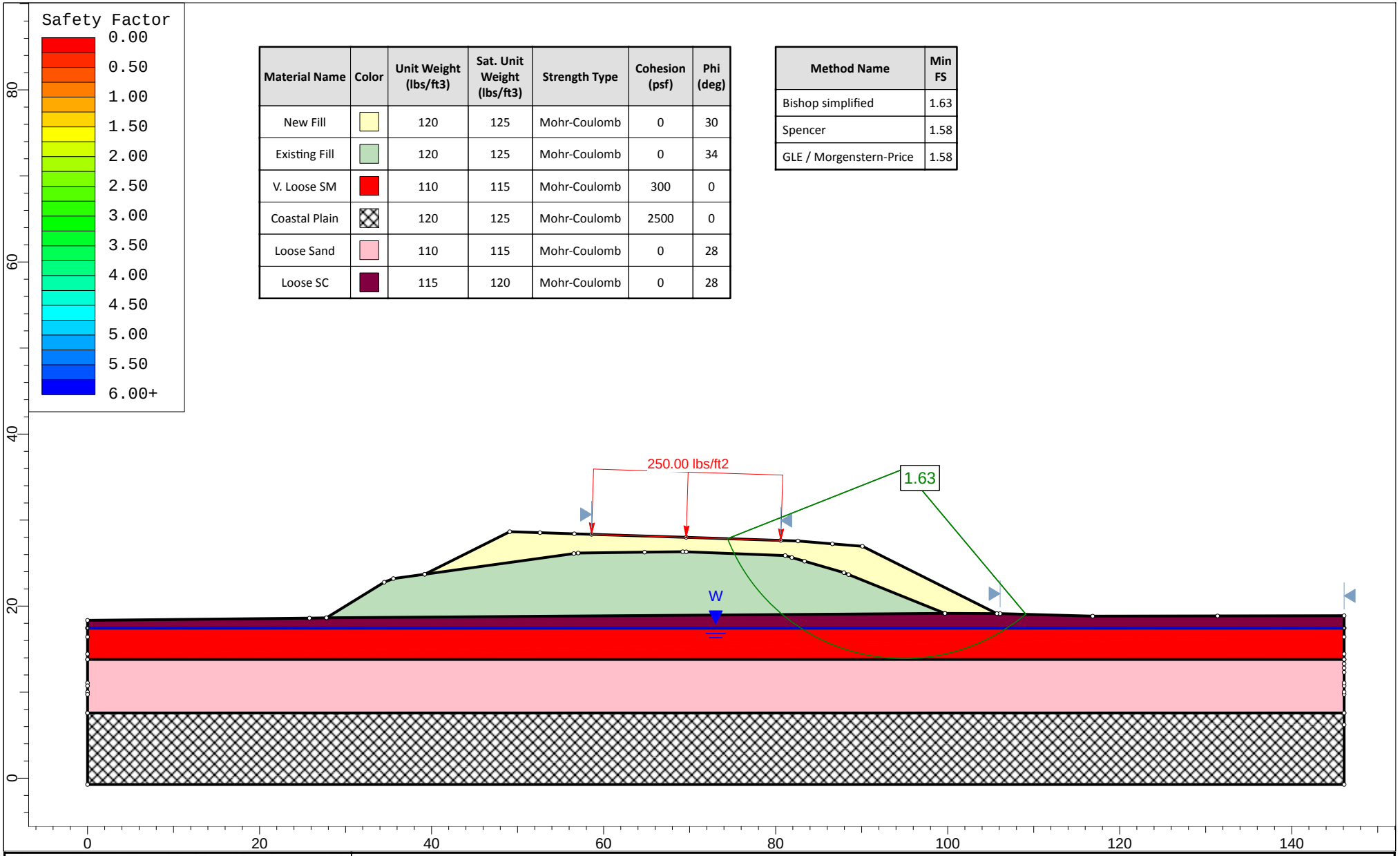
SLIDEINTERPRET 7.009

Project	S-51 Emergency Bridge Replacement over Black Mingo Creek		
Analysis Description	Begin Bridge_LT Side Slope_Static		
Drawn By	JFH	*Scale* 1:185	*Company* F&ME, Inc.
Date	02/03/2016, 2:00 PM	*File Name*	Begin Bridge_LT Side Slope_Static.slim



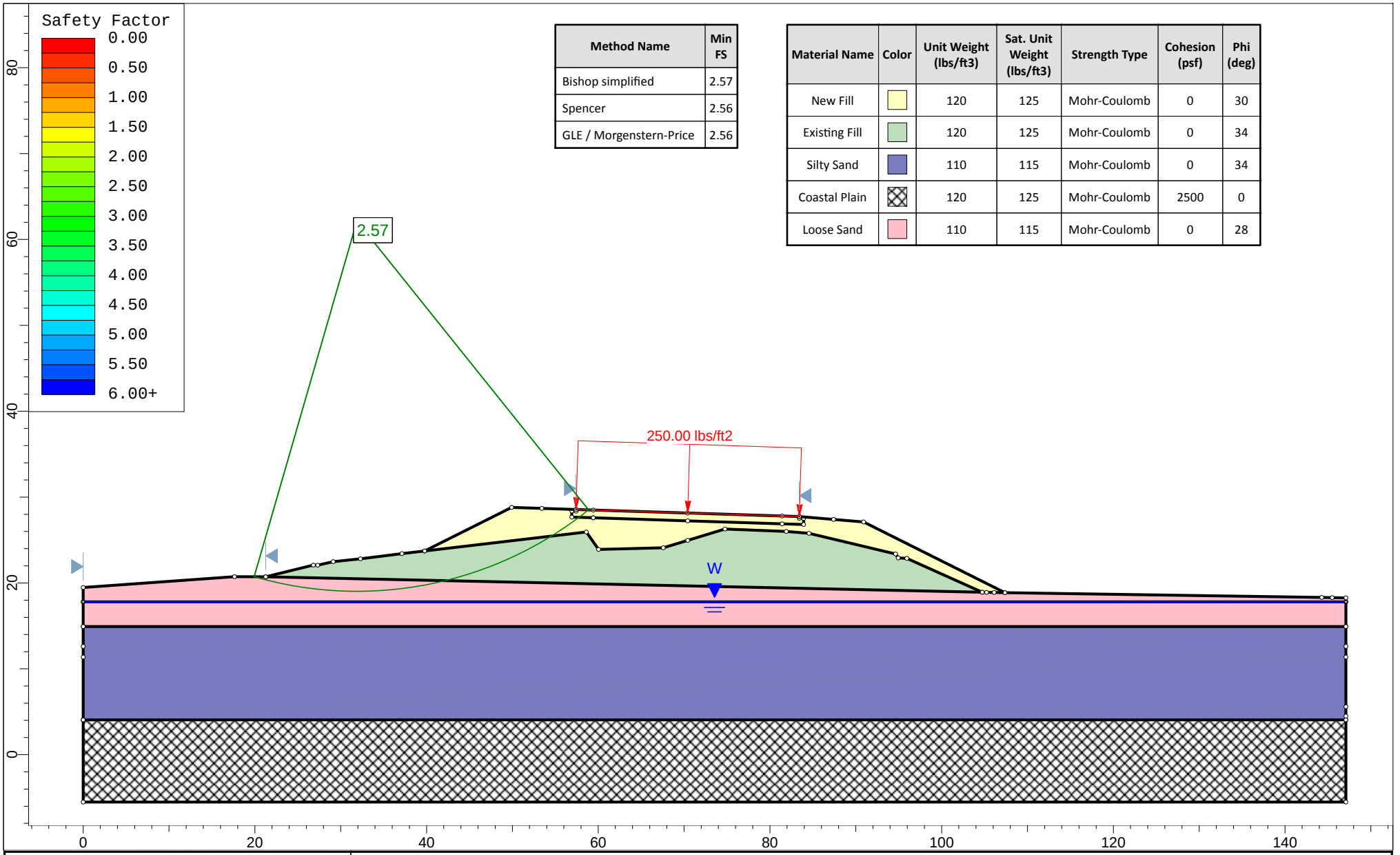
Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Fill		120	125	Mohr-Coulomb	0	30
Existing Fill		120	125	Mohr-Coulomb	0	34
V. Loose SM		110	115	Mohr-Coulomb	300	0
Coastal Plain		120	125	Mohr-Coulomb	2500	0
Loose Sand		110	115	Mohr-Coulomb	0	28
Loose SC		115	120	Mohr-Coulomb	0	28

Method Name	Min FS
Bishop simplified	1.63
Spencer	1.58
GLE / Morgenstern-Price	1.58

F&ME CONSULTANTS

SLIDEINTERPRET 7.009

Project	S-51 Emergency Bridge Replacement over Black Mingo Creek		
Analysis Description	Begin Bridge_RT Side Slope_Static		
Drawn By	JFH	*Scale* 1:185	*Company* F&ME, Inc.
Date	02/03/2016, 2:00 PM	*File Name*	Begin Bridge_RT Side Slope_Static.slim



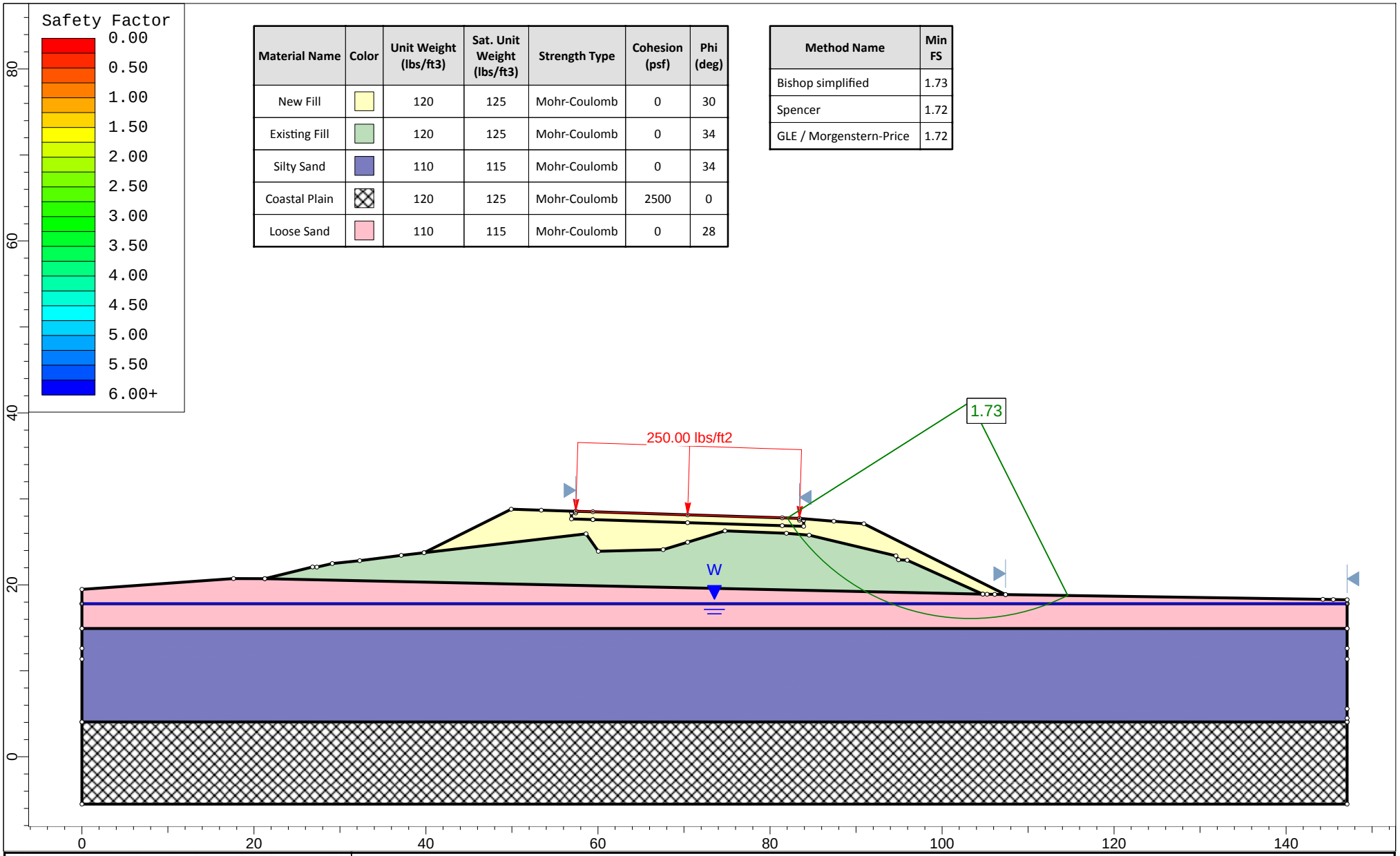
Method Name	Min FS
Bishop simplified	2.57
Spencer	2.56
GLE / Morgenstern-Price	2.56

Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Fill		120	125	Mohr-Coulomb	0	30
Existing Fill		120	125	Mohr-Coulomb	0	34
Silty Sand		110	115	Mohr-Coulomb	0	34
Coastal Plain		120	125	Mohr-Coulomb	2500	0
Loose Sand		110	115	Mohr-Coulomb	0	28

F&ME CONSULTANTS

SLIDEINTERPRET 7.009

Project	S-51 Emergency Bridge Replacement over Black Mingo Creek		
Analysis Description	End Bridge_LT Side Slope_Static		
Drawn By	JFH	*Scale* 1:185	*Company* F&ME, Inc.
Date	02/03/2016, 1:45 PM	*File Name*	End Bridge_LT Side Slope_Static.slim



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
New Fill		120	125	Mohr-Coulomb	0	30
Existing Fill		120	125	Mohr-Coulomb	0	34
Silty Sand		110	115	Mohr-Coulomb	0	34
Coastal Plain		120	125	Mohr-Coulomb	2500	0
Loose Sand		110	115	Mohr-Coulomb	0	28

Method Name	Min FS
Bishop simplified	1.73
Spencer	1.72
GLE / Morgenstern-Price	1.72

F&ME CONSULTANTS

SLIDEINTERPRET 7.009

Project	S-51 Emergency Bridge Replacement over Black Mingo Creek		
Analysis Description	End Bridge_RT Side Slope_Static		
Drawn By	JFH	*Scale* 1:185	*Company* F&ME, Inc.
Date	02/03/2016, 1:45 PM	*File Name*	End Bridge_RT Side Slope_Static.slim