CITY WATER, LIGHT AND POWER
CITY OF SPRINGFIELD, ILLINOIS
MISTY BUSCHER, MAYOR
SCOTT M. ROGERS, CHIEF UTILITY ENGINEER

VIA E-MAIL: dierich.andrea@epa.gov

October 30, 2026

Andrea Dierich
EPA Project Officer
US EPA, Region 5
77 W Jackson Blvd
Chicago, IL 60604

RE: CCR Surface Impoundments
Periodic Safety Factor Assessment October 2026

Dear Ms. Dierich:

Provided herein is the revised Periodic Safety Assessment for the CCR Surface Impoundments in accordance with paragraph 274 and Attachment 2 of the Consent Agreement and Final Order effective January 14, 2025 and comments received from EPA on August 17, 2026.

Should you have any questions or require additional information, please contact me at 217-757-8610 ext. 1110.

Sincerely,

PJ Becker
Environmental Health and Safety Manager

Certification of City Water, Light and Power

City of Springfield, Office of Public Utilities, d/b/a City Water, Light and Power provides the following certification as required by paragraph 300 of the Consent Agreement and Final Order effective January 14, 2025.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: 
Name: PJ Becker
Title: Environmental Health and Safety Manager
Date: 10/30/2026

City Water, Light & Power
Springfield, Sangamon County, Illinois

Periodic Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments

October 2026

Prepared for:
City Water, Light & Power
3100 Stevenson Drive
Springfield, Illinois 62703

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1. INTRODUCTION

City Water, Light and Power (CWLP) Lakeside Ash Pond and Dallman Ash Pond are coal combustion residuals (CCR) surface impoundments. An Initial Safety Factor Assessment of the CCR surface impoundments was conducted as required by 40 CFR 257.73(e)(1) in October 2016.

Analysis is performed herein for the Periodic Safety Factor Assessment of the existing ash ponds at Springfield CWLP, Lakeside and Dallman Ash Ponds, Springfield, Illinois, as required per 40 CFR 257.73(e)(1). Based upon recent and historical geotechnical data and the existing conditions of the ash ponds, all factors of safety exceed the regulatory minimums as demonstrated within this report.

Information reviewed for this report includes the following documents:

- Geotechnical Investigation Addendum (July 2025)
- Lakeside and Dallman Geotechnical Investigation Report (June 2024)
- Coal Ash Impoundment Site Assessment Final Report (May 2011)
- Historical Aerial Photographs (April 1995 – July 2026)
- Engineering Report: Proposed Embankment Modification; CWLP Ash Disposal Area (July 1987).
- Construction Grading Plan for the Dallman Ash Pond (August 1976)

2. BACKGROUND

CWLP previously operated a series of ash and lime sludge clarification or settling ponds east of the power plant complex in Springfield, Illinois. The ponds were operated under National Pollutant Discharge Elimination System (NPDES) Permit Number IL0024767.

The Lakeside Ash Pond is primarily a diked embankment with some incising along the east perimeter and was placed into service prior to 1958. The northern half of the original Lakeside Ash Pond was divided into four separate ponds since it was expanded vertically in 1988: three lime ponds and the settling pond. The current Lakeside Ash Pond is approximately 35.0 acres and ceased receiving ash in 2009. Lakeside Ash Pond ceased receiving lime sludge in October 2023.

The second impoundment, the Dallman Ash Pond, which is a diked embankment, was placed into service in approximately 1976. The Dallman Ash Pond is approximately 34.5 acres and ceased receiving ash in 2021 and ceased receiving all CCR and non-CCR wastes in October 2023.

Settled water from both the Dallman Ash Pond and Lakeside Ash Pond flow into opposite sides of a Clarification Pond before being discharged to Sugar Creek at Outfall 004.

3. GEOMETRY OF THE STRUCTURES

According to personal interviews with CWLP staff, the most recent change made to the CCR surface impoundment was a vertical expansion to the Lakeside Ash Pond system in 1988. The vertical expansion consists of berms built on top and inside of the existing embankments in such a way that the toe of the outer slope of the expansion berms match up with the top of the inner slope of the existing embankments, typically identified as upstream construction. The vertical expansion berms are approximately ten feet in height.

A site map containing the 2023/2024/2025 geotechnical investigation boring locations, approximate boundaries for all of the CWLP CCR Units, including the ash and lime ponds, is provided in Figure 1.

No changes to the geometry of the structures are applicable for this report. No changes are apparent due to structure movement or deformation.

4. GEOTECHNICAL INFORMATION

4.1 Ash Pond Geotechnical Data

A review of the historical documents identified the construction plans for the upstream construction completed in the 1980s. These plans were used to develop the cross section. The Geotechnical Investigation Report for Unstable Areas Demonstration, Safety Factor and Liquefaction Analysis for Coal Combustion Residuals Surface Impoundments dated June 2024 provides the geotechnical data for Lakeside Ash Pond. The results of that geotechnical investigation are utilized within this assessment of the safety factors. Included in Appendix A are copies of the current boring logs and cross section that support the conservative geotechnical parameters provided in Table 1.

A geotechnical investigation was conducted in October 2023 to obtain site-specific information for the soils surrounding and within the embankments for the Lakeside Ash Pond and Dallman Ash Pond. As part of the geotechnical investigation, split-spoon samples were collected and blow counts recorded. Samples were visually classified, and pocket penetrometer readings were obtained to estimate unconfined compressive strength. Jar samples were also collected for laboratory moisture content testing and, as needed, additional Atterberg limits testing to support the liquefaction screening analysis. Shelby tubes were pushed with the samples analyzed in the laboratory for hydraulic conductivity, Atterberg limits, wet and dry densities, torvane, grain size distribution, and moisture content. An in situ field vane shear was used within the boreholes to determine the in situ shear strength of the soils and is recorded on the boring logs. A cone penetration test (CPT) sounding investigation was conducted in February 2024 as the split-spoon test (SPT) results from the geotechnical investigation for the liquefaction screening analysis were

inconclusive. The CPT soundings provided additional information about the soils surrounding the CCR ash ponds. An additional limited geotechnical investigation was conducted in April and May of 2024 to obtain samples of the clay directly below the CCR in Lakeside Ash Pond and Dallman Ash Pond as requested by the Illinois EPA. Laboratory analyses for hydraulic conductivity, Atterberg limits and grain size distribution were conducted on the clay liner samples collected from directly below the CCR in each ash pond. Included in Appendices A and B are copies of the boring logs. Included in Appendix C is a table of the compiled undrained soil shear strengths from the in situ vane shear investigation during the October 2023 geotechnical investigation and laboratory analyses results. Technical papers supporting the ash geotechnical parameters are included in Appendix D. Water levels are based upon vibrating wire measurements taken within the CCR and the embankment.

In May 2025, six additional borings were conducted to obtain Shelby tube samples of the various soil types from the softest depths, including the potentially weakest area of the embankment where the former meandering Sugar Creek coincided, for laboratory analysis. Laboratory analyses were completed for drained and undrained conditions, and one-dimensional consolidation of the cohesive soils. Included in Appendices A and B are copies of the boring logs and laboratory analysis that support the revised simplified geotechnical parameters provided in Table 1, including the rationale. The Ky'/Kx' ratios are based upon the approximate average for the ranges for the respective soil types and depositional histories. The soil strengths provided in Table 1 are conservative as they use the lower strengths for the material described based upon all available data.

TABLE 1
Soil Strength Parameters

Soil Description	Density (pcf)	Total Strengths (Short Term)		Effective Strengths (Long Term)		Ky'/ Kx'
		ϕ (degrees)	c (psf)	ϕ' (degrees)	c (psf)	
CCR Wet Ash	100	15	0	25	0	2.0
CCR Moist Ash	95	30	0	30	0	1.0
Clay Fill	125	0	1,600	27	500	3.0
Scrubber Sludge	125	0	750	30	0	1.0
Bottom Ash	115	35	0	35	0	1.0
Silty Clay	121	0	1,100	27	180	1.3
Former Creek Bottom Clay	119	0	300	19	0	1.2
Soft Clay/Clayey Silt	120	0	400	20	0	1.3
Upper Cohesive Clayey Silt	125	0	690	26	0	1.5
Lower Cohesive Clayey Silt	125	0	1,200	28	0	1.5
Sand	125	34	0	34	0	1.0
Shale	Bedrock (Impenetrable)					5.0

In the soil rational a discussion on the Former Creek Bottom Clay and the Soft Clay/Clayey Silt is provided. The Former Creek Bottom Clay was inadvertently not sampled during the supplemental geotechnical drilling investigation. It was previously assumed to be similar to the Soft Clay/Clayey Silt sample collected from beneath the Dallman Ash Pond embankment. The total strength of the Former Creek Bottom Clay is assumed to be approximately seventy-five percent of the Soft Clay/Clayey Silt to be conservative.

One-dimensional consolidation testing of various soils was performed. The resulting vertical effective stress vs void ratio graphs were evaluated with Casagrande's method to determine the preconsolidation pressures. The results were then compared to the in situ effective pressures. Table 2 provides the analysis of the over-consolidation.

TABLE 2
Soil Consolidation

Sample	Depth	Present (PSF)	Max Past (PSF)	OCR
B-2L-2 (Gray Clayey Silty)	10'-12'	1,375	1,130	0.82
B-6L-1 (Brown Silty Clay)	5'-7'	750	3,200	4.27
B-6L-2 (Gray Silty Clay)	11'-13'	1,500	1,600	1.07

Only sample B-6L-1 appears to have been over-consolidated. The brown silty clay may experience some minor reduction of undrained strength over time. The other soils do not appear to be over-consolidated.

4.2 Ash Pond Water Level Data

During the Fall 2023 Geotechnical Investigation, vibrating wires were installed within and surround Lakeside and Dallman Ash Ponds. The measurements have been recorded and compiled for the past year and a half. The vibrating wire water levels are included in Appendix E.

4.3 Seismic Ground Motion

CWLP is susceptible to potential seismic activity as provided by the USGS Earthquake Hazards Program. Included in Appendix D of this assessment is the USGS Earthquake Hazards Program Unified Hazard Tool, Edition Dynamic: Conterminous U.S. 2014 for the site (Latitude 39.766 North, Longitude 89.596 West). The Peak Horizontal Ground Acceleration is approximately 0.0955 g with a mean magnitude of 6.62.

Using the chart, Figure 1, *y* represents the depth to the potential sliding surface below the crest of the embankment, and *H* represents the total height of the embankment. As all generated failure surfaces extend below the full height of the embankment, the corresponding acceleration ratio was determined from the Makdisi and Seed "Variation of Maximum Acceleration Ratio with Depth of Sliding Mass" chart. This resulted in an average *Ky* value of approximately 0.33, which was used to estimate the average acceleration acting on the potential sliding mass at depth *y*.

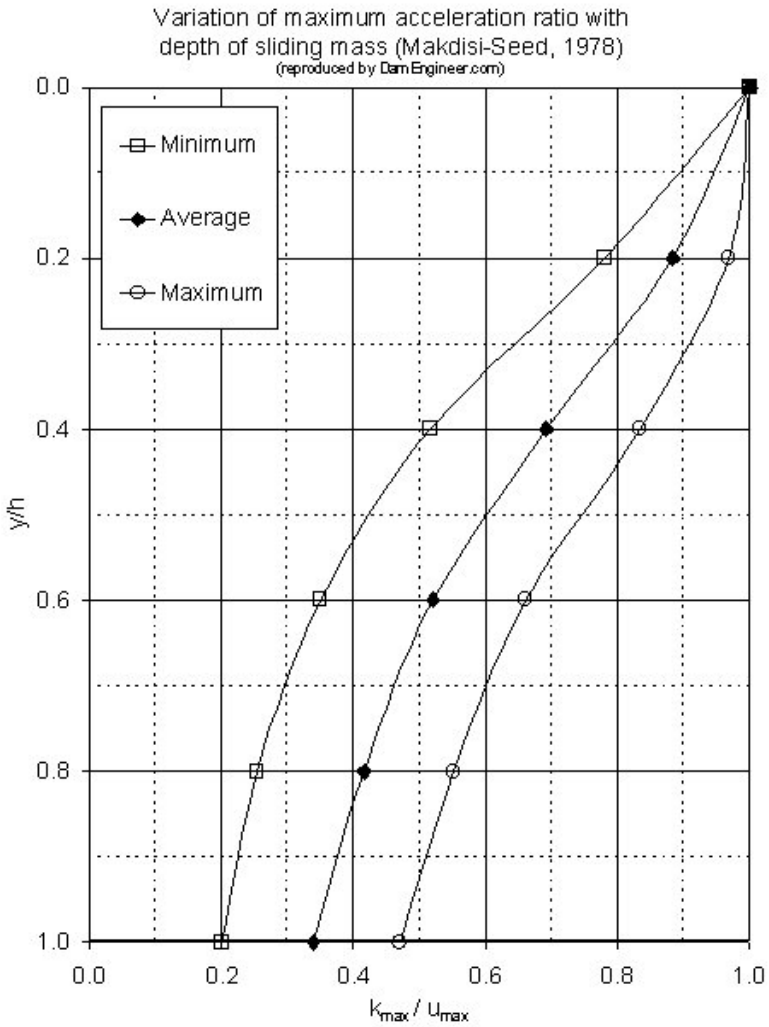


Figure 1

5. SLOPE STABILITY ANALYSIS

The static and seismic slope stability model utilized for the following analysis was the Morgenstern and Price Circular and Block Search Methods within the Slope/W computer-based slope stability modeling software. Morgenstern and Price satisfies all conditions of equilibrium. Optimized searches were conducted through a broad array of failure surfaces and then refining the search to target the lowest factor of safety failure surface with finer detail to locate the absolute lowest factor of safety. The optimized searches appear in the attachments directly behind the preceding search.

The periodic safety factor assessment requires that each CCR unit document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors. The calculated static factor of safety under the long-term, maximum storage pool loading condition must be equal

to or exceed 1.50. The calculated static factor of safety under the maximum surcharge pool loading condition must be equal to or exceed 1.40. The calculated seismic factor of safety must be equal to or exceed 1.00. For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must be equal to or exceed 1.20.

5.1 Lakeside Ash Pond Slope Stability

The slope stability analysis was performed on a critical cross section, identified as Section D-D' in the Geotechnical Investigation Addendum for Coal Combustion Residuals Surface Impoundments dated July 2025. Based upon a review of this report and existing conditions, Section D-D' appears to remain the critical cross section. Section D-D' is located on the west side of the Lakeside Ash Pond next to Sugar Creek.

5.1.1 Long-Term Static Slope Stability Analysis

The long-term static slope stability analysis was performed on the Lakeside Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The long-term analysis utilizes the effective shear strength parameters, which are the drained condition. A seepage analysis was conducted prior to the slope stability analysis and is included in Appendix G-1. The long-term static slope stability analysis for maximum storage pool found that the factor of safety for the most critical failure surface was 1.552. The critical failure surfaces and stability reports are included in Appendix G-2. This analysis verifies that Lakeside exceeds the factor of safety for the long-term, maximum storage pool loading condition and the maximum surcharge pool loading condition since the analysis was performed filled with ash and the pool elevation matching the top of the embankment.

Additional long-term static slope stability was performed on the Lakeside Ash Pond for the current conditions. The seepage analysis of the current conditions very closely approximated the potentiometric surface elevations of the vibrating wire piezometers. This seepage analysis was used in the long-term static slope stability and found that the factor of safety for the most critical failure surface was 1.561. The critical failure surfaces and stability reports are included in Appendix G-3.

5.1.2 Short-Term Static Slope Stability Analysis

The short-term static slope stability analysis was performed on the Lakeside Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The short-term analysis utilizes the total shear strength parameters, which are the undrained condition. The short-term static slope stability analysis under the maximum surcharge pool loading condition found that the factor of safety for the most critical failure surface was 1.476. The critical failure surface and stability report are included in Appendix G-4.

5.1.3 Seismic Slope Stability Analysis

The seismic slope stability analysis was performed on the Lakeside Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The seismic analysis uses total-stress shear strength parameters, which represent undrained conditions, since seismic loading occurs over a relatively short period of time. The Makdisi and Seed simplified procedure for estimating the horizontal acceleration at the slip surface within the embankment has been determined based on all of the failure surfaces being below the full height of the embankment, thus *y/h* is greater than one. From the Makdisi and Seed chart at the y/h equal to one, the average acceleration at the slip surface would be 0.33 x 0.1 = 0.033g. A horizontal acceleration of 0.033g was utilized within the modeling to represent the peak horizontal acceleration anticipated at the slip surface. The seismic slope stability analysis found that the factor of safety for the most critical failure surface was 1.243. The critical failure surface and stability report are included in Appendix G-5. This analysis verifies that Lakeside exceeds the seismic factor of safety. Since the seismic factor of safety exceeds unity, a deformation analysis is not required.

Additional seismic slope stability was performed on the Lakeside Ash Pond for the current conditions. The current conditions seepage analysis was used in the seismic slope stability and found that the factor of safety for the most critical failure surface was 1.284. The critical failure surfaces and stability reports are included in Appendix G-6. Since the seismic factor of safety exceeds unity, a deformation analysis is not required.

5.2 Dallman Ash Pond Slope Stability

The slope stability analysis was performed on a critical cross section, identified as Section F-F' in the Geotechnical Investigation Addendum for Coal Combustion Residuals Surface Impoundments dated July 2025. Based upon a review of this report and existing conditions, Section F-F' appears to remain the critical cross section. Section F-F' is located on the west side of the Dallman Ash Pond next to Sugar Creek.

5.2.1 Long-Term Static Slope Stability Analysis

The long-term static slope stability analysis was performed on the Dallman Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The long-term analysis utilizes the effective shear strength parameters, which are the drained conditions. A seepage analysis was conducted prior to the slope stability analysis and is included in Appendix H-1. The long-term static slope stability analysis found that the factor of safety for the most critical failure surface was 1.901. The critical failure surface and stability report are included in Appendix H-2. This analysis verifies that Dallman Ash Pond exceeds the factor of safety for the long term, maximum storage pool loading condition, which is the most critical condition thus not requiring an analysis of the current conditions.

5.2.2 Short-Term Static Slope Stability Analysis

The short-term static slope stability analysis was performed on the Dallman Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The short-term analysis utilizes the total shear strength parameters, which are the undrained condition. The short-term static slope stability analysis found that the factor of safety for the most critical failure surface was 1.404. The critical failure surface and stability report are included in Appendix H-3.

5.2.3 Seismic Slope Stability Analysis

The seismic slope stability analysis was performed on the Dallman Ash Pond cross section using the geotechnical parameters as provided in Table 1 and the Summarized Soil Data Table located in Appendix C. The seismic analysis utilizes the total shear strength parameters, which are the undrained conditions, since a seismic event occurs in a short period of time. In addition, a horizontal acceleration of 0.033g was utilized within the modeling to represent the peak horizontal acceleration anticipated at the slip surface. The seismic slope stability analysis found that the factor of safety for the most critical failure surface was 1.195. The critical failure surface and stability report are included in Appendix H-4. This analysis verifies that Dallman Ash Pond meets the required seismic factor of safety under the maximum surcharge pool loading condition, which represents the most critical loading condition. Therefore, an analysis of the current conditions is not required. Since the seismic factor of safety exceeds unity, a deformation analysis is not required.

5.2.4 Dallman Stockpile Global Stability Analysis

An analysis of stockpiling on the most critical cross section F-F' was evaluated. The stockpile analysis evaluates a 7.5-foot-high stockpile extending over a wide area near the access road and encompassing Dallman Ash Pond. The analysis uses the seepage analysis for current conditions, based on vibrating wire readings. The long-term (minimum FOS of 1.675), short-term (minimum FOS of 1.407) and seismic (minimum FOS of 1.178) conditions all pass. The critical failure surface and stability report are included in Appendix H-5.

5.2.5 Rapid Drawdown Analysis

The multi-staged rapid drawdown analysis was performed in Seep/W on the Lakeside Ash Pond embankment adjoining the Clarification Pond using the geotechnical parameters as provided in Table 1 and hydraulic inputs as used for the Lakeside Ash Pond cross section D-D', with the potentiometric surface closely matching the average vibrating wire readings and geometries. The steady-state seepage analysis was first utilized to develop the pore water pressures prior to the rapid rise from a 1,000-yr, 24-hr storm event and then rapid drawdown due to a hypothetical breach of the clarification pond embankment. The steady-state seepage analysis developed the porewater conditions during typical operations, provided in Appendix I-1. A transient seepage analysis was performed for a rapid rise of the clarification pond to a pool level of 550 feet MSL as

reported in the Inflow Design Flood Control Plan over a 16-hour period, provided in Appendix I-2. Then a rapid drawdown transient seepage analysis was conducted over a seven-day period with the clarification pond emptied of all free water instantaneously, provided in Appendix I-3. Then the transient seepage analysis results were analyzed in Slope/W with the generated modeling outputs provided in Appendix I-4. The rapid drawdown analysis found that the factor of safety for profile C-C' drained analysis exceeded a factor of safety of 1.0 after most of the first day after the hypothetical breach of the Clarification Pond. The failure surface generated is shallow as would be the resulting stabilizing failure surfaces until stabilization would occur without resulting in a loss of impounded ash. As the ash ponds are dewatered, the factor of safety for rapid drawdown will continue to improve. The Clarification Pond is highly unlikely to breach with continued maintenance and proper operations. The design storm water level remains below the crest of the Clarification Pond, maintaining more than two feet of freeboard in the analysis.

Lake Springfield's full pool elevation is 560 feet above sea level. When water exceeds this elevation, it overtops the gates at Spaulding Dam. Constructed in 1935, the dam is an earthen structure with a concrete and brick cutoff wall. It stands 48 feet high, spans approximately 2,000 feet in length, and is about 300 feet wide. The spillway is 225 feet wide and includes a controlled water-elevation structure. The lake has a maximum depth of 27 feet and holds approximately 17.5 billion gallons at its normal storage level, with the deepest point located near the intake tower just south of the dam.

The highest recorded lake elevation was 564.5 feet (4.5 feet above full pool) on April 12, 1994. The lowest recorded level since the lake first reached full pool in May 1935 was 547.44 feet (12.56 feet below full pool) on December 29, 1954. Dam gates are raised or lowered to maintain a typical operating level of 560.0 feet, or approximately 560.5 feet during summer.

In 2010, the dam underwent rehabilitation to modernize its gate system. The five movable spillway gates are each 8 feet tall and 50 feet wide. At maximum pool, the spillway can discharge more than 65,000 cubic feet per second (cfs). Since most major floods involve flows between 10,000 and 20,000 cfs, a release of 65,000 cfs—more than triple typical severe flood volumes—would likely raise downstream elevations to approximately 550–555 feet. This remains well below the Lakeside ash pond elevation of 570 feet. The water level would remain below the lake's normal pool of 560 feet but would consume much of the vertical "buffer" between the creek bed and the dam structure.

During extreme drought, any drawdown of the lake would occur gradually over weeks or months. This slow rate of decline, combined with the dam's substantial width of roughly 300 feet and its mixed earthen, brick, and concrete construction, would prevent any impact on the ash ponds.

6. LIQUEFACTION

6.1 Liquefaction Analysis

A liquefaction analysis was conducted on the CPT soundings CPT-2L, CPT-4L, CPT-6L and CPT-7L for the embankments of the ash ponds by adding the embankments to the loading of the previous surrounding CPT soundings. The liquefaction analysis was conducted using the CLiq software version 3.5.3.8, copyright by GeoLogismiki.

The liquefaction analysis reports are provided in Appendix J. Provided below in Figure 2 is the calculated lateral displacement at each of the CPT soundings surrounding the Lakeside Ash Pond and Dallman Ash Pond.

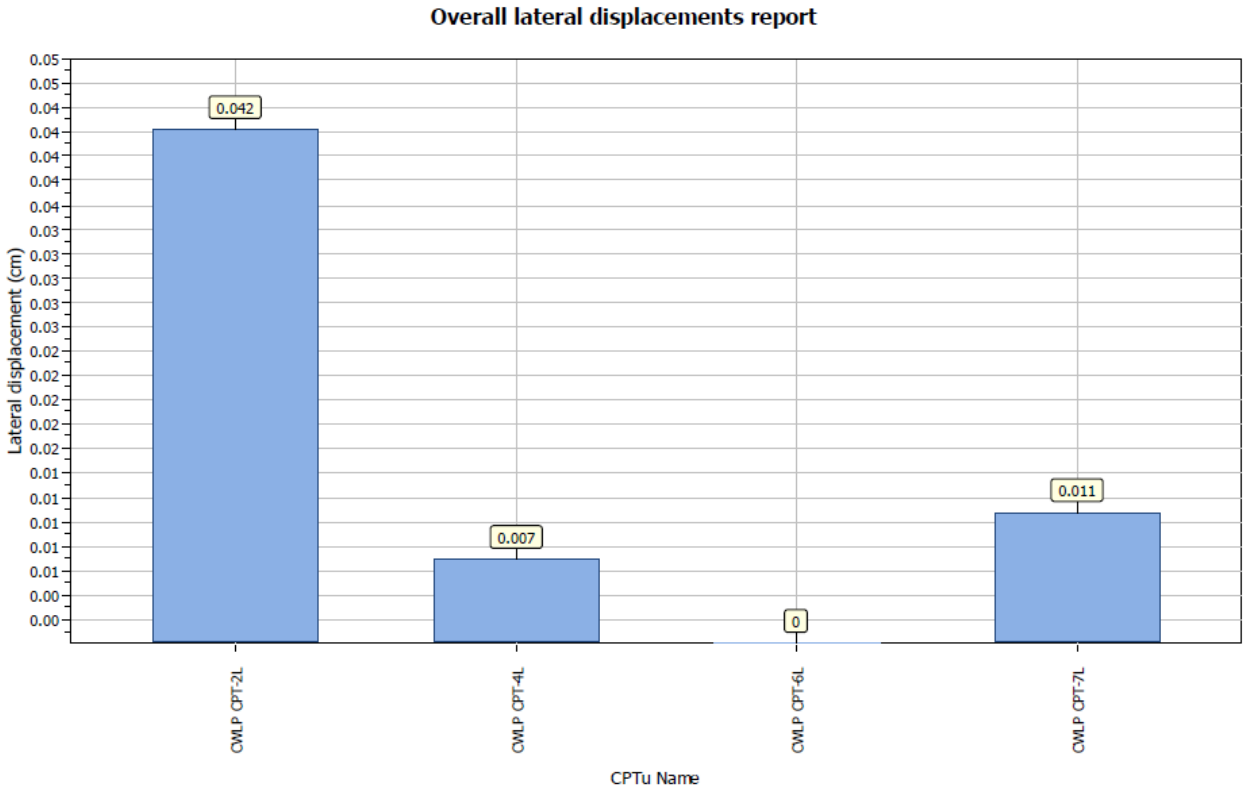


Figure 2

The lateral displacement calculated at CPT-2L with the confining embankment is less than half a millimeter with the remaining CPTs embankments being significantly less. This amount of displacement would have no impact on the embankment integrity. With insignificant transitional displacement along the embankment and with no rigid structures within the earthen embankment, displacement would not result in a catastrophic release because of the self-healing nature of clay soils of which the embankment is constructed.

7. SUMMARY

The geotechnical analysis indicates that Lakeside and Dallman Ash Ponds provide factors of safety equal to or greater than minimum values as required by 40 CFR 257.73(e). Table 2 and 3 below provides a summary of the slope stability results.

TABLE 2
Lakeside Ash Pond Slope Stability

Condition	Failure Geometry	Factor of Safety	Required Factor of Safety
Long Term Static Full Pool	Circular	1.605	1.5
Long Term Static Full Pool	Block	1.552	
Long Term Current Conditions	Circular	1.605	
Long Term Current Conditions	Block	1.561	
Short Term Maximum Surcharge	Circular	1.756	1.4
Short Term Maximum Surcharge	Block	1.476	
Seismic Full Pool	Circular	1.538	1.0
Seismic Full Pool	Block	1.243	
Seismic Current Conditions	Circular	1.546	
Seismic Current Conditions	Block	1.284	

TABLE 3
Dallman Ash Pond Slope Stability

Condition	Failure Geometry	Factor of Safety	Required Factor of Safety
Long Term Static Full Pool	Circular	1.947	1.5
Long Term Static Full Pool	Block	1.901	
Long Term Static Stockpile	Circular	1.724	
Long Term Static Stockpile	Block	1.675	
Short Term Maximum Surcharge	Circular	1.434	1.4
Short Term Maximum Surcharge	Block	1.404	
Short Term Stockpile	Circular	1.479	
Short Term Stockpile	Block	1.407	
Seismic Full Pool	Circular	1.217	1.0
Seismic Full Pool	Block	1.195	
Seismic Stockpile	Circular	1.300	
Seismic Stockpile	Block	1.178	

8. STATEMENT

This Periodic Safety Factor Assessment for Coal Combustion Residuals Surface Impoundments was completed for CWLP by Andrews Engineering, Inc. in accordance with the requirements under 40 CFR 257.73(e).

Signature: Karl Finke

Illinois L.P.E. No.: 062.068571

Date: 10/30/26



Lic. Exp. 11/30/27

FIGURES



LEGEND

- AS-BUILT BORING (2023-2025)
- AS-BUILT CPT

NOTES

1. LIDAR DATA DERIVED FROM HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: JUNE 20, 2023).

N

0 200 400 800

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: KWF | DRAWN BY: BCK | APPROVED BY: KWF

AS-BUILT BORING LOCATIONS

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: MARCH 2026

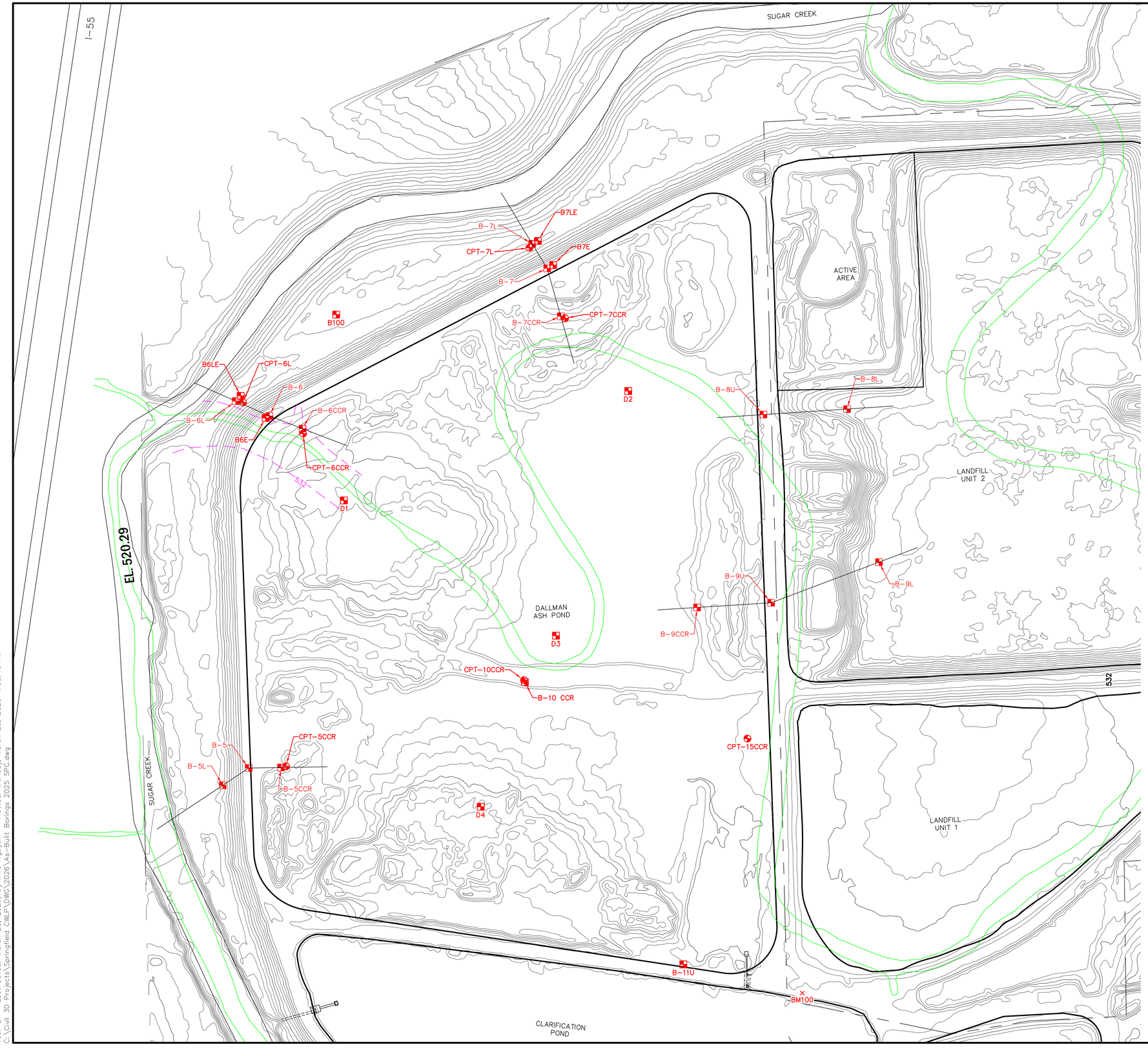
PROJECT ID: 240227/0006

SHEET NUMBER:

FIG. 1

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Tab: Layout1 Last Saved: March 23, 2026, by Mike Nguyen Plotted: Monday, March 23, 2026 4:30:16 PM
C:\Civil 3D Projects\Springfield CWLP\DWG\2026\As-Built Borings 2025 SPC.dwg



LEGEND

- AS-BUILT BORING (2023-2025)
- AS-BUILT CPT
- STREAM BOTTOM
- STREAM CREST

NOTES

1. LIDAR DATA DERIVED FROM HANSON PROFESSIONAL SERVICES, INC. (FLIGHT DATE: JUNE 20, 2023).

N

0 100 200 400

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

AS-BUILT BORING LOCATIONS WITH FORMER SUGAR CREEK

PREPARED FOR

CITY WATER, LIGHT, AND POWER

SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: MARCH 2026

PROJECT ID: 240227/0006

SHEET NUMBER:

FIG. 2

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Tab: 2 Last Saved: March 23, 2026, by Mike Nguyen Plotted: Monday, March 23, 2026 4:38:40 PM
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APPENDIX A:
Lakeside Boring Logs and Cross Section

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127355.19
Easting: 2456023.58

Weather: Sunny 65 F

Boring Information:
Boring No: B-1LL
Well No: B-1LL
Surf Elev.: 542.84

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	542.8
0	1						Brown clayey SILT; with sand; moist; loose	
	2		0.2/1.5	6 8 8				540.0
	3							
5	4		0.2/1.5	6 5 5				
	5							
	6		0.6/1.5	4 4 5			Gray silty CLAY; with cinders; dark yellowish brown mottling; moist; stiff	535.0
	7				2.25			
10	8		0.6/1.5	7 9 10			Gray SAND; medium to coarse grained; wet; loose	
	9							
	10		0.7/1.5	3 5 5			Gray silty CLAY; with black organic varved material; few ash fragments	530.0
	11				2.75			
15	12		2.0/2				16 mm VST@ 14.5' = 8.5, 3.6, 4.2	
	13				0.5		Very soft	
	14		1.4/1.5	1 2 2	0.75			525.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127370.68
Easting: 2456072.07

Weather: Sunny 72 F

Boring Information:
Boring No: B-1L
Well No: B-1L
Surf Elev.: 552.56

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/11/2023
Finish: 10/11/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Brown silty CLAY; moist; stiff; some dark brown mottling; few organics; trace ash fragments; trace gravel	
	2		1.1/1.5	2 6 7	3.75			550.0
	3							
5	4		1.0/1.5	3 5 4	3.5			
	5							
	6		0.6/1.5	2 3 3	2.5			545.0
	7							
							16 mm VST@ 9.5' = 7.7, 2.4, 2.8	
10	8		0.6/1.5	1 4 3	2.25		Brown SAND; medium to coarse grained; moist; loose	
	9							
							Black coal ASH fragments; wet; loose	
	10		0.3/1.5	1 3 3				540.0
	11							
15	12		0.6/1.5	0 2 2				
	13							
	14		0.5/1.5	4 10 3				535.0
							Dark gray sandy SILT; wet; soft; trace gravel	
	15							
							More clayey	
20	16		1.1/1.5	0 0 2	0.25		Dark gray CLAY; moist; soft; some organic fragments; trace gravel	
	17				0.5			
							20 mm VST@ 22.0' = 13.0+, 3.9, 3.9	
	18		1.4/2.0					530.0
	19							
25					2.0		End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127375.6
Easting: 2456111.7

Weather: Sunny 62 F

Boring Information:
Boring No: B-1
Well No: B-1
Surf Elev.: 557.77

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	557.8
0	1						CINDER and GRAVEL (fill)	
	2		0.3/1.5	3 4 2				555.0
	3							
5	4		0.2/1.5	1 2 1			CINDER (fill); dry; loose	
	5						Gray silty CLAY; with cinders; dry; medium stiff	
	6		0.5/1.5	1 3 2				550.0
	7							
10	8		0.9/1.5	1 2 8	1.0		Gray silty CLAY; with gravel and sand; moist; stiff; 20 mm VST@ 9.5' = 6.0, 3.2, 4.3	
	9							
	10		0.8/1.5	0 1 3	1.0		Gray sandy CLAY; moist; medium stiff	545.0
	11						Gray SANDY LOAM	
15	12		0.9/1.5	4 18 9			Black CINDER (fill); with gravel and silty clay; wet; loose	
	13							
	14		0.2/1.5	1 1 1				540.0
	15							
20	16		1.1/1.5	1 1 3	0.3		Gray SANDY LOAM; wet; slightly stiff	
	17							
	18		1.1/1.5	0 0 3			Gray SILTY LOAM; wet; soft; 20 mm VST@ 51.5' = 6.7, 2.3, 2.5	535.0
	19							
25	20		1.8/2.0				Gray SANDY LOAM; moist	
	21				0.7			
	22		1.2/1.5	2 3 5	1.5		Gray silty CLAY; moist; stiff	530.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127408.40
Easting: 2456167.19

Weather: Rainy 62 F

Boring Information:
Boring No: B-1U
Well No: B-1U
Surf Elev.: 564.17

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/13/2023
Finish: 10/13/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kergel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.2
0	1						Black CINDERS; moist; loose	
	2		1.0/1.5	4 5 6	2.0		Dark brown silty CLAY; moist; stiff; some black cinders; trace organics; trace gravel	
	3							560.0
5	4		0.9/1.5	2 3 5	1.5			
	5						Black fly ASH with CINDERS; moist to wet; moderately stiff	
	6		1.0/1.5	2 6 6	1.0			
	7							555.0
10	8		0.8/1.5	2 5 6				
	9							
	10		0.8/1.5	1 2 1				
	11							550.0
15	12		1.4/1.5	0 1 1			Black fly ASH; wet; soft	
	13						CINDERS	
	14		1.1/1.5	1 2 3	0.25		Black fly ASH; wet; soft; laminated	
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127389.92
Easting: 2456246.00

Weather: Sunny 64 F

Boring Information:
Boring No: B-1CCR
Well No: B-1CCR
Surf Elev.: 568.03

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	568.0
0	1						Black bottom ash and CINDERS; moist; loose	
	2		0.5/1.5	5 5 2				565.0
	3							
5	4		0.3/1.5	1 2 3				
	5						Black fly ASH; moist to wet	
	6		0.8/1.5	1 3 3	1.0			
							Black bottom ASH; moist to wet; moderately loose	560.0
	7							
10	8		1.0/1.5	1 1 1				
	9							
	10		1.2/1.5	1 0 1				555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black fly ASH; moist to wet; moderately firm	
	13						Black bottom ASH; wet; loose	
	14		0.9/1.5	2 6 7				550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128015.70
Easting: 2455909.16

Weather: Sunny 65 F

Boring Information:
Boring No: B-2L
Well No: B-2L
Surf Elev.: 536.92

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/10/2023
Finish: 10/10/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	536.9
0	1						Gray/brown silty CLAY; some iron concretions; moist; stiff; some organics; some ash fragments; some gravel	
	2		0.5/1.5	1 4 4	1.25			535.0
	3							
5	4		1.3/1.5	2 2 3	1.0			
	5							
	6		1.8/2.0				Light gray clayey SILT; few dark yellow brown mottling; moist; firm; trace iron concretions	530.0
	7				2.25			
10	8		1.5/1.5	1 2 2	0.75		20 mm VST@9.5' = 13.0, 3.2, 2.8	
	9				<0.25		Gray clayey SAND; wet; soft	
	10		1.5/1.5	0 1 1	<0.25			525.0
	11							
15	12		1.0/1.5	0 0 1	<0.25			
	13							
	14		1.0/1.5	0 1 1	0.25		Gray clayey SILT; laminated; moist to wet; soft	520.0
	15							
20	16		1.3/1.5	0 1 2			Brown SAND; medium to coarse grained; wet; loose	
	17							
	18		1.5/1.5	1 3 3	0.25		Dark gray clayey SILT; laminated; moist; soft; organic fragments	515.0
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128026.78
Easting: 2455971.03

Weather: Cloudy 62 F

Boring Information:
Boring No: B-2
Well No: B-2
Surf Elev.: 554.71

Depth Information:
Total: 30.0'
Auger: 30.0'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

Dates:
Start: 10/06/2023
Finish: 10/06/2023

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.7
0	1						Gray brown SILT; dry	
	2		0.4/1.5	3 5 5	4.75			
	3							
5	4		0.8/1.5	3 4 6	2.5		Becoming moist	550.0
	5							
	6		0.7/1.5	3 4 4	2.0		Brown silty CLAY; moist	
	7				2.5			
10	8		0.9/1.5	2 4 4				545.0
	9						Greenish brown silty CLAY; moist	
	10		1.0./1.5	2 3 4	1.5			
	11							
15	12		1.0/1.5	1 3 5	2.0		Brown silty CLAY; moist; trace black organics; 16 mm VST@ 14.5' = 7.0, 4.3, 4.2	540.0
	13							
	14		1.0/1.5	1 2 4	2.0			
	15							
20	16		1.4/1.5	1 3 4	2.5		Brownish gray silty CLAY; black/orange inclusions; organics; moist	535.0
	17							
	18		1.9/2.0					
	19							
25	20		1.5/1.5	1 3 4	1.0		Brownish/greenish gray silty CLAY; moist; trace brown organics; 16 mm VST@ 25.0' = 5.4, 3.2, 3.5	530.0
	21							
	22		1.5/1.5	0 2 2	<0.25		Becoming trace fine grained sand	
	23				<0.25		Orangish brown SILT; moist	
30								525.0
							End of Boring = 30 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128045.00
Easting: 2456005.51

Weather: Sunny 78 F

Boring Information:
Boring No: B-2U
Well No: B-2U
Surf Elev.: 562.33

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/12/2023
Finish: 10/12/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	562.3
0	1						Black coal ASH (cinders); moist; loose	
	2		0.4/1.5	2 5 1				560.0
	3							
5	4		0.2/1.5	1 1 2				
	5							
	6		0.8/1.5	2 4 8	2.0		Gray silty CLAY; some yellow brown mottling; some iron concretions; moist; stiff; trace gravel	555.0
	7							
10	8		0.4/1.5	2 5 4			Black coal ASH (cinders); wet; loose	
	9							
	10		1.5/1.5	1 2 11	<0.25		Black fly ASH; wet; soft; some cinders	550.0
	11							
15	12		1.0/1.5	1 0 2	<0.25		With cinders	
	13							
	14		0.4/1.5	3 3 4			Black coal ASH (cinders); wet; loose	545.0
	15							
20	16		0.5/2.0				Black fly ASH; wet; soft; 20 mm VST@ 19.5' = 3.0, 3.2, 3.8	
	17				<0.25			
	18		0.5/1.5	1 2 5			Black CINDERS; wet; loose	540.0
	19							
25	20		0.5/1.5	0 1 2	1.25		Olive brown CLAY; moist; stiff; some organics	
							End of Boring = 26 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128059.37
Easting: 2456087.51

Weather: Sunny 64 F

Boring Information:
Boring No: B-2CCR
Well No: B-2CCR
Surf Elev.: 566.77

Depth Information:
Total: 26.0'
Auger: 26.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	566.8
0	1						Mix of lime sludge, and fly and bottom ASH; some dark yellow brown mottling; moist; soft	
	2		1.3/1.5	1 1 1	0.25			565.0
	3							
5	4		1.6/1.5	1 0 1			More bottom ash	
	5							
	6		0.9/1.5	1 5 3	<0.25		Lime SLUDGE; wet; soft	560.0
	7							
10	8		1.5/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; some organic fragments	
	9							555.0
	10		1.5/1.5	0 0 0			Some bottom ash	
	11							
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		0.4/1.5	1 0 1			Black bottom ASH; wet; loose	550.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128663.99
Easting: 2456486.97

Weather: Sunny 69 F

Boring Information:
Boring No: B-3
Well No: B-3
Surf Elev.: 554.19

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.2
0	1						Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	2		0.5/1.5	1 1 2	1.0			
	3							
5	4		0.9/1.5	2 2 2			Brown/gray SAND; coarse grained; moist to wet; loose	550.0
	5							
	6		0.8/1.5	1 2 3	2.57		Dark yellowish brown silty CLAY; organic staining; moist; stiff	
	7							545.0
10	8		1.5/2.0				16 mm VST@ 9.5' = 9.3, 5.3, 5.4	
	9				1.5			
	10		1.0/1.5	1 3 3	1.5		Black/gray	
	11							540.0
15	12		1.3/1.5	2 3 4	1.5			
	13							
	14		1.2/1.5	1 2 5	1.25		With dark yellow brown mottling	
	15							535.0
20	16		1.6/2.0				16 mm VST@ 19.5' = 11.8, 5.0, 5.1	
	17				1.75			
	18		1.5/1.5	1 2 4			Manganese oxide concretions	
	19						Dark yellowish brown silty CLAY; more silty; organic staining; moist; stiff	
25	20		1.1/1.5	0 2 2	1.25		Yellow brownclayey SILT; some dark yellow brown mottling; laminated; some magnesium oxide concretions; moist; soft; 16 mm VST@ 24.5' = 9.1, 6.0, 5.9	530.0
	21							
	22		1.2/1.5	0 2 4	0.5			
	23				2.75		Yellow brown silty CLAY; some dark yellow brown mottling; few manganese oxide concretions; moist; stiff	525.0
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128634.05
Easting: 2456502.96

Weather: Sunny 64 F

Boring Information:
Boring No: B-3U
Well No: B-3U
Surf Elev.: 562.94

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	562.9
0	1						Dark yellowish brown silty CLAY; some iron concretions; moist; stiff; trace gravel	
	2		0.8/1.5	2 4 7	3.25		GYPSUM; moist; loose	560.0
	3							
5	4		0.5/1.5	2 2 2				
	5							
	6		0.7/1.5	2 4 6	1.5		Olive gray silty CLAY; few dark yellow brown mottling; laminated; some bottom ash; moist; stiff; trace gravel	555.0
	7							
10	8		1.3/2.0				16 mm VST@ 9.5' = 0.8, 3.9, 4.2	
	9						Bottom ASH; moist to wet; loose	
	10		0.5/1.5	1 0 1			Fly ASH; wet; soft	550.0
	11							
15	12		1.5/1.5	0 1 0				
	13				0.5		Little bottom ASH	
	14		1.5/1.5	0 0 1	0.5			545.0
	15				<0.25			
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128336.73
Easting: 2456638.09

Weather: Sunny 65 F

Boring Information:
Boring No: B-3CCR
Well No: B-3CCR
Surf Elev.: 564.05

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.0
0	1						Fly ash with bottom ASH; moist; moderately firm	
	2		0.7/1.5	1 3 4	1.0			
	3							560.0
5	4		1.5/1.5	1 0 0	<0.25		Light gray lime SLUDGE; with rootlets; some organics; moist; soft	
	5							
	6		0.9/1.5	0 1 1	<0.25			
	7							555.0
10	8		1.1/1.5	0 0 0	<0.25		Fly ASH; moist to wet; soft; strong petroleum odor	
	9						Some organic matter; strong petroleum odor	
	10		1.5/1.5	0 0 0	<0.25			
	11							550.0
15	12		1.4/1.5	0 0 0				
	13						Faint odor	
	14		1.5/1.5	0 0 0				
	15							545.0
20							End of Boring = 19.5 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127732.94
Easting: 2455960.98

Weather: Sunny 65 F

Boring Information:
Boring No: B-4L
Well No: B-4L
Surf Elev.: 533.51

Depth Information:
Total: 21.5'
Auger: 21.5'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

Dates:
Start: 10/10/2023
Finish: 10/10/2023

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.5
0	1						Dark gray silty CLAY; some dark yellow brown mottling; some organic fragments; moist; soft; some gravel; trace coal fragments	
	2		0.4/1.5	3 2 1	0.25			
	3							530.0
5	4		0.7/1.5	1 1 1	<0.25			
	5						Grading to light gray	
	6		1.4/1.5	1 2 2	0.25		Light gray silty CLAY; some dark yellow brown mottling; few iron concretions; moist; soft	
	7							525.0
10	8		1.5/1.5	1 1 2	0.75			
	9							
	10		1.2/2.0				16 mm VST@ 12.0' = 5.6, 2.6, 2.4	
	11				1.75		Gray clayey SILT; some dark yellow brown mottling; trace iron concretions; laminated; moist to wet; soft	520.0
15	12		1.4/1.5	0 1 2	0.5			
	13							
	14		1.5/1.5	0 0 0	<0.25		Light gray silty CLAY; some dark yellow brown mottling; moist; soft	
	15							515.0
20	16		0.0/2.0				Shelby tube attempted but no recovery; 20 mm VST@ 19.5' = 4.2, 1.4, 1.6	
							End of Boring = 21.5 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127789.13
Easting: 2456023.78

Weather: Sunny 62 F

Boring Information:
Boring No: B-4
Well No: B-4
Surf Elev.: 555.18

Depth Information:
Total: 34.5'
Auger: 34.5'
Core: -

Dates:
Start: 10/09/2023
Finish: 10/09/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.2
0	1						Gray silty CLAY; with cinders; dry; stiff	
	2		0.8/1.5	3 6 6	3.3		Brown silty CLAY; dry; stiff	
	3							
5	4		0.2/1.5	4 6 5	4.0		Gray silty CLAY; with cinders	550.0
	5							
	6		0.7/1.5	2 3 4	1.0		Brown/gray silty CLAY; moist; moderately stiff; trace cinders	
	7							
10	8		0.6/1.5	1 3 4			Gray silty CLAY; moist; moderately stiff; 16 mm VST@ 9.5' = 4.4, 2.5, 2.7	545.0
	9				1.0			
	10		0.8/1.5	0 1 2	0.5		Gray silty CLAY; moist; soft	
	11							
15	12		0.9/1.5	1 2 3	1.0		Brown/gray silty CLAY; mottling; moist; soft	540.0
	13							
	14		0.6/1.5	0 2 2	1.1			
	15							
20	16		1.3/2.0				Brown silty CLAY; oxidation staining; moist; moderately stiff; 16 mm VST@ 19.5' = 2.6, 1.7, 1.7	535.0
	17				2.1			
	18		0.8/1.5	0 0 1				
	19				0.5			
25	20		0.9/1.5	0 0 1	0.2-0.5		Soft	530.0
	21							
	22		1.5/1.5	0 1 2	0.1		Brown/gray silty LOAM; wet; soft; trace sand	
	23							
30	24		1.5/1.5	0 0 0	0.1		Brown sandy LOAM; wet; very soft	525.0
	25							
	26		1.5/1.5	0 0 0	0.5		Brown/gray silty CLAY; wet; soft	
	27							
35							End of Boring = 34.5 Feet	520.0

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127802.23
Easting: 2456057.41

Weather: Sunny 78 F

Boring Information:
Boring No: B-4U
Well No: B-4U
Surf Elev.: 563.01

Depth Information:
Total: 29.0'
Auger: 29.0'
Core: -

Dates:
Start: 10/12/2023
Finish: 10/12/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	563.0
0	1						Black CINDERS; moist; loose	
	2		0.4/1.5	3 6 1				560.0
	3						Black silty CLAY; with fly ash; moist; stiff; some organic fragments	
5	4		0.7/1.5	1 0 1	2.75			
	5						Olive gray silty CLAY; some dark yellow brown mottling; moist; stiff	
	6		0.7/1.5	1 2 2	1.75		Black CINDERS; wet; loose	555.0
	7							
10	8		0.8/1.5	1 0 0	<0.25		Black fly ASH; wet; soft	
	9							
	10		1.0/1.5	2 4 3				550.0
	11							
15	12		0.9/1.5	0 2 2				
	13							
	14		1.1/1.5	1 3 6				545.0
	15						Black CINDERS; wet; loose	
20	16		0.7/1.5	2 3 4				
	17						Light gray/black fly ASH	
	18		1.2/1.5	0 0				540.0
	19						Olive gray silty CLAY; some dark yellow brown mottling; moist; moderately stiff; trace organics	
25	20		0.4/1.5	0 0 1	1.25			
	21							
	22		1.9/2.0					535.0
					1.25		End of Boring = 29 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1127834.10
Easting: 2456152.87

Weather: Sunny 64 F

Boring Information:
Boring No: B-4CCR
Well No: B-4CCR
Surf Elev.: 567.59

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 10/17/2023
Finish: 10/17/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	567.6
0	1						Dark yellow brown silty CLAY; moist; stiff; some bottom ash	
	2		0.8/1.5	1 3 3	1.75			565.0
	3						Dark gray fly ash with bottom ASH; moist; moderately loose	
5	4		0.4/1.5	2 2 2				
	5						Gray lime SLUDGE; with layers of fly ash; wet; soft; few organic fragments	
	6		1.2/1.5	2 3 3	<0.25			560.0
	7							
10	8		1.4/1.5	0 0 0	<0.25		Black fly ASH; moist; soft; trace to some organic fragments	
	9							
	10		1.5/1.5	1 0 0	<0.25			555.0
	11							
15	12		1.5/1.5	0 0 1	<0.25		Black bottom ash with fly ASH; wet; moderately loose; some organic fragments	
	13				<0.25		Black fly ash with bottom ASH; wet; moderately soft; some organic fragments	
	14		0.2/1.5	0 1 1				550.0
	15							
20	16		0.9/1.5	0 1 3			Black bottom ASH; wet; loose	
							End of Boring = 21 Feet	

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127471.67
Easting: 2456542.99

Weather: Sunny 72 F

Boring Information:
Boring No: L1
Well No: L1
Surf Elev.: 568.96

Depth Information:
Total: 38.0'
Auger: 38.0'
Core: -

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

Dates:
Start: 05/02/2024
Finish: 05/02/2024

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	569.0
0	1						Light gray SLUDGE (fill)	
								565.0
5	2		0.8/2	3 3 3 4				
	3							560.0
10	4		1.4/2	WOH				
	5							555.0
15				1				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.4/2	1 2 1 3			Light gray SLUDGE (fill)	
	7							550.0
20	8		1.5/2	4 4 3 5			20.0' Water sample collected	
	9							545.0
25	10		1.6/2	2 3 4 5				
	11							540.0
30				WH				

Notes:

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FIELD BORING LOG

Boring Information: L1 Boring No: L1 Well No: L1

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		1.1/2	WH 1 1 2				
	13							535.0
35	14		1.5/1.5	5 6 8	0.75		Olive green silty CLAY; dark brown mottling; saturated	
	15		2.0/2					
							End of Boring = 38 Feet	530.0
40								
								525.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128216.45
Easting: 2456765.72

Weather: Sunny 72 F

Boring Information:
Boring No: L3
Well No: L3
Surf Elev.: 563.02

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

Dates:
Start: 05/02/2024
Finish: 05/02/2024

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	563.0
0	1						Dark gray ASH (fill)	
								560.0
5	2		0.22	WH WH 1 1				
	3							555.0
							9.5' Free water	
10	4		2.0/2	WH				
	5							550.0
15								

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WH				
	7							545.0
20	8		1.6/2	1 1 1 1			20.0' Water sample collected; saturated	
	9							540.0
25	10		1.6/2	1 1 1 1				
	11							535.0
30	12		0.8/1	WH				

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: L3 Boring No: L3 Well No: L3

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12			WH				
	13							
	14		1.5/1.5	WH 3 4 6			Brown silty CLAY; greenish gray mottling	530.0
35	15		1.8/2		0.75			
							End of Boring = 36.5 Feet	525.0
40								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1127968.18
Easting: 2457141.08

Weather: Sunny 72 F

Boring Information:
Boring No: L4
Well No: L4
Surf Elev.: 568.58

Depth Information:
Total: 21.0'
Auger: 21.0'
Core: -

Dates:
Start: 05/02/2024
Finish: 05/02/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	568.6
0							Gray ASH (fill)	
	1							565.0
5	2							
	3							560.0
10	4							
	5							555.0
15								

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: L4 Boring No: L4 Well No: L4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.4/2	1 1 4 6	1.0		Gray ASH (fill)	
							Brown silty CLAY; gray mottling; moist	
	7		1.5/2					550.0
20	8		1.5/2	6 8 10 12	4.75			
							End of Boring = 21 Feet	
								545.0
25								
								540.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1128308.56
Easting: 2456118.23

Weather: Cloudy 61 F

Boring Information:
Boring No: L5
Well No: L5
Surf Elev.: 565.19

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 05/03/2024
Finish: 05/03/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	565.2
0	1						Gray silty CLAY (fill)	
5	2		1.5/2				Light gray LIME SLUDGE (fill)	560.0
	3							
10	4		2.0/2				Dark gray to black COAL ASH (fill)	555.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2				16.0' Free water	
	7							
20	8		2.0/2					545.0
	9							
25	10		2.0/2					540.0
	11		3.0/3					
30								

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Boring Information: L5 Boring No: L5 Well No: L5

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		3.0/3					
	13		2.0/2				Light gray LIME SLUDGE (fill); Sample CA 32.5-35.2'	
35	14		3.0/3		1.0		Brown silty CLAY; greenish gray mottling	530.0
	15		2.0/2					
40							End of Boring = 39.5 Feet	525.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338

Location:
Coord. System: Latitude and Longitude
Northing: 39.76287927
Easting: -89.59989517

Weather: Sunny, 80F

Boring Information:
Boring No: B-2LE
Well No: n/a
Surf Elev.: 537.3

Depth Information:
Total: 12.0
Auger: 12.0
Core: 0.0

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB and 2.5' Shelby tubes

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

Dates:
Start: 5/13/2025
Finish: 5/13/2025

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	537.3
0	1		2.47				Yellowish brown (5/6 10YR) sandy CLAY, with organics, wet	
							Grey (5/1 10YR) silty CLAY, grading to olive (6/4 10Y), moist	535.0
5	2		2.04		1.1 T/SF			
	3		Full				Yellow (7/8 2.5Y) clayey SAND, with olive (6/4 10Y) and grey (5/1 10YR) mottles, wet, trace gravel and organics	530.0
10	4		1.92		0.5 T/SF			
							End of Boring = 12 Feet	525.0
15								
								520.0
20								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338|0011

Location:
Coord. System: Latitude & Longitude
Northing: 39.76232817
Easting: -89.5995108

Weather: Sunny, 80F

Boring Information:
Boring No: B-4E
Well No: B-4E
Surf Elev.: 555

Depth Information:
Total: 34.0
Auger: 34.0
Core: 0.0

Dates:
Start: 5/19/2025
Finish: 5/19/2025

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB and 2' Shelby Tube

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.0
0							Black (2/1) gravelly SILT	
	1		1.5				Light grey (7/1 10YR) SILT, with clay	
5							Light grey (7/1 10YR) silty CLAY, brownish yellow (6/4 10YR) and (6/8 10YR) mottles, with sand	550.0
	2		4.5				Grey (4/1 10YR) silty CLAY, with yellowish brown (5/8 10YR) and trace olive (6/2 10Y) mottles	
10	3		1.46		1.0 T/SF			545.0
	4		4.25				Pale brown (6/3 10YR) CLAY, with brownish yellow (6/8 10YR) and black (2/1 10YR) mottles, trace sand and organics, very moist	
15								540.0
	5		4.5				grades to olive grey (5/2 5GY) with reddish sandy mottles, moist	
20								535.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B-4E Boring No: B-4E Well No: B-4E

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

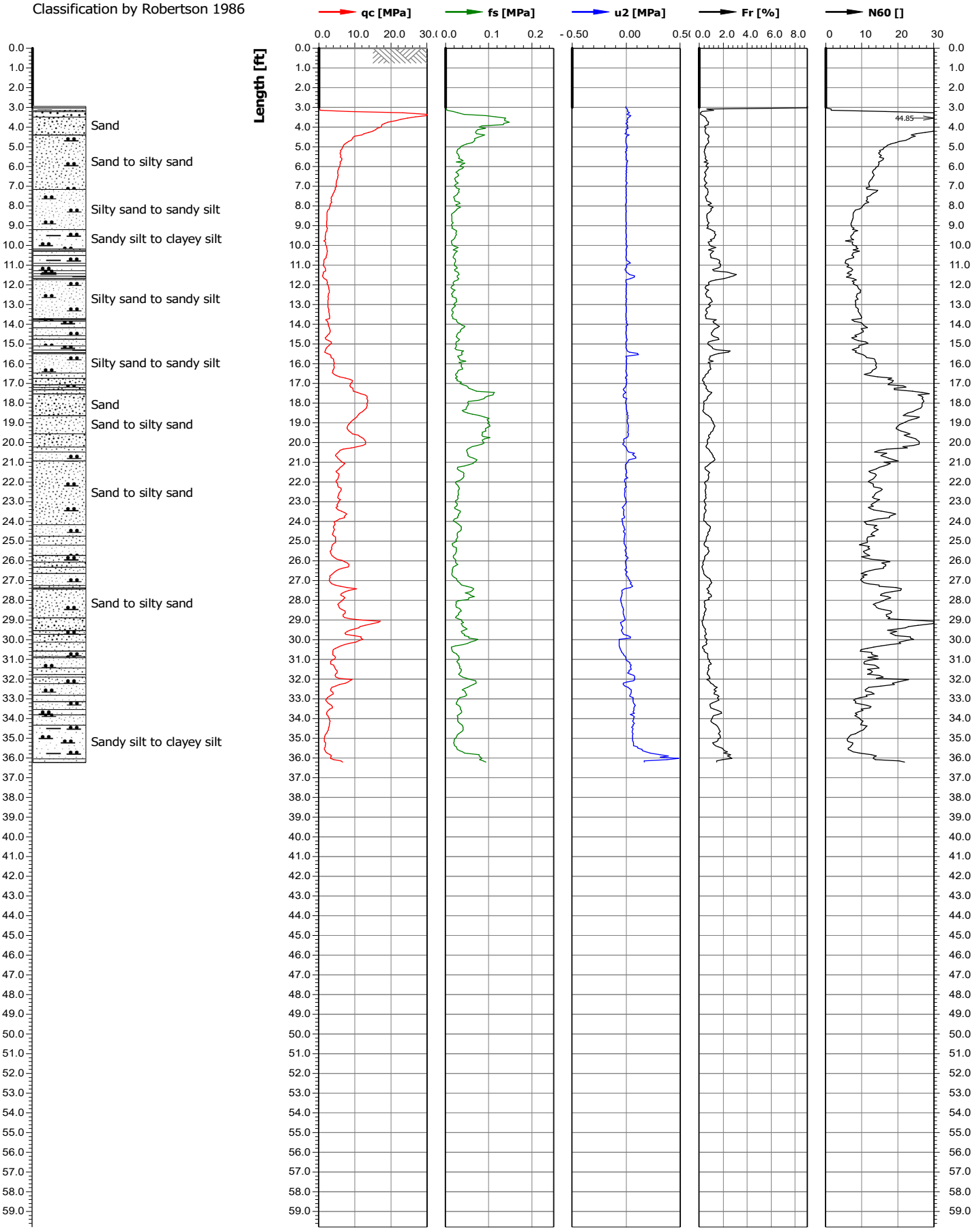
Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		3.6				Light grey (7/1 10YR) clayey SILT with yellowish brown (4/6 10YR) mottles and sand, moist	
							grades to yellowish brown (4/6 10YR) with grey (6/1 10YR) mottles	
25	7		2.25		1.4 T/SF			530.0
	8		2.75				Yellowish brown (6/4 10YR) sandy CLAY, moist, with brown (6/8 10YR) and light grey (7/1 10YR) mottles, and with trace organics	
30								525.0
	9		2.21				Yellowish brown (6/4 10YR) clayey SAND with light grey (7/1 10YR) mottles	
	10		1.975		0.4 T/SF			
							End of Boring = 34 Feet	
35								520.0
40								515.0

Notes:

Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	568.21	CPT-1CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1120729, Easting 2441681		MAS		u2

GEOTECHNICS
Soil & Material Testing

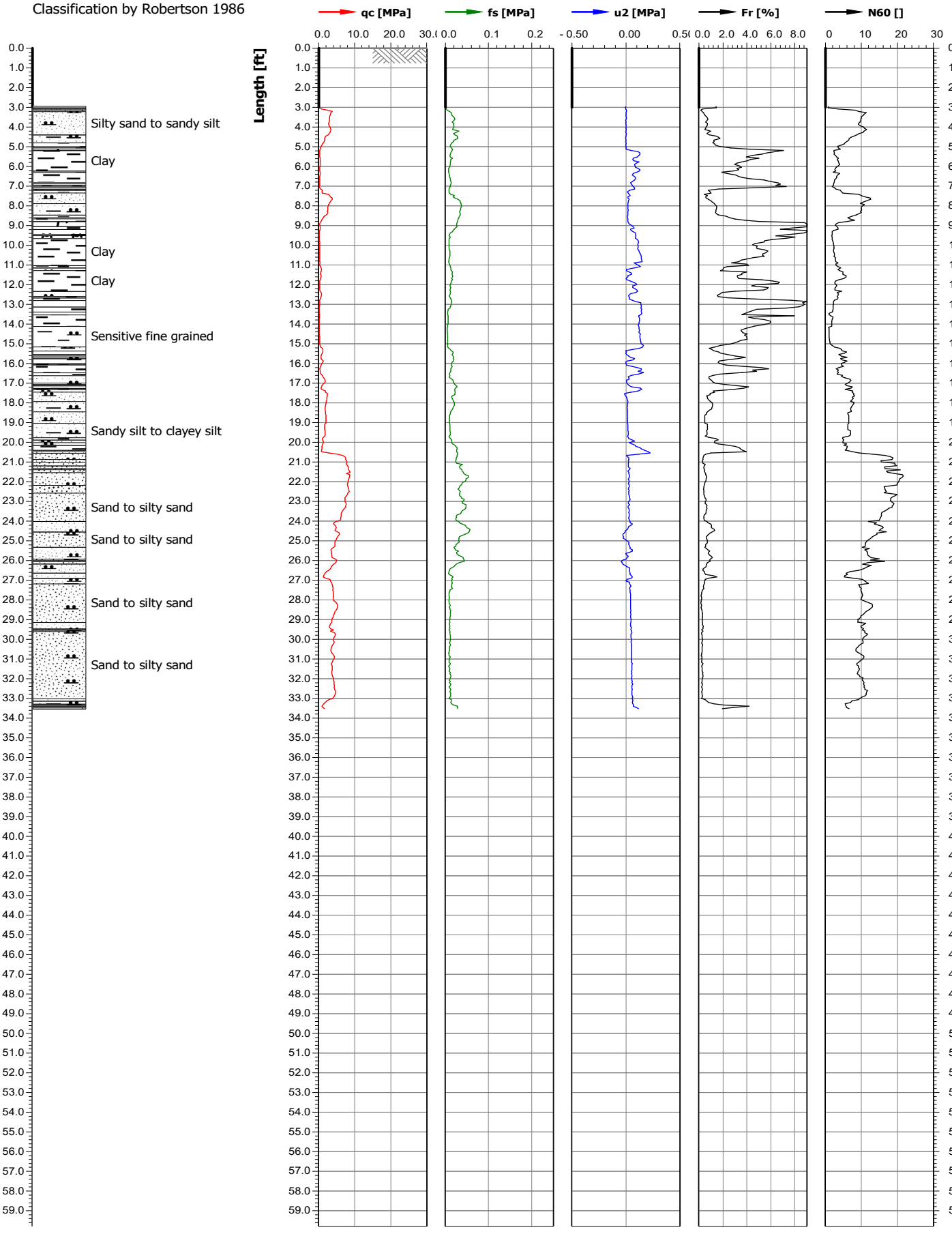
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	566.80	CPT-2CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121392, Easting 2441523		MAS		u2

GEOTECHNICS
Soil & Material Testing

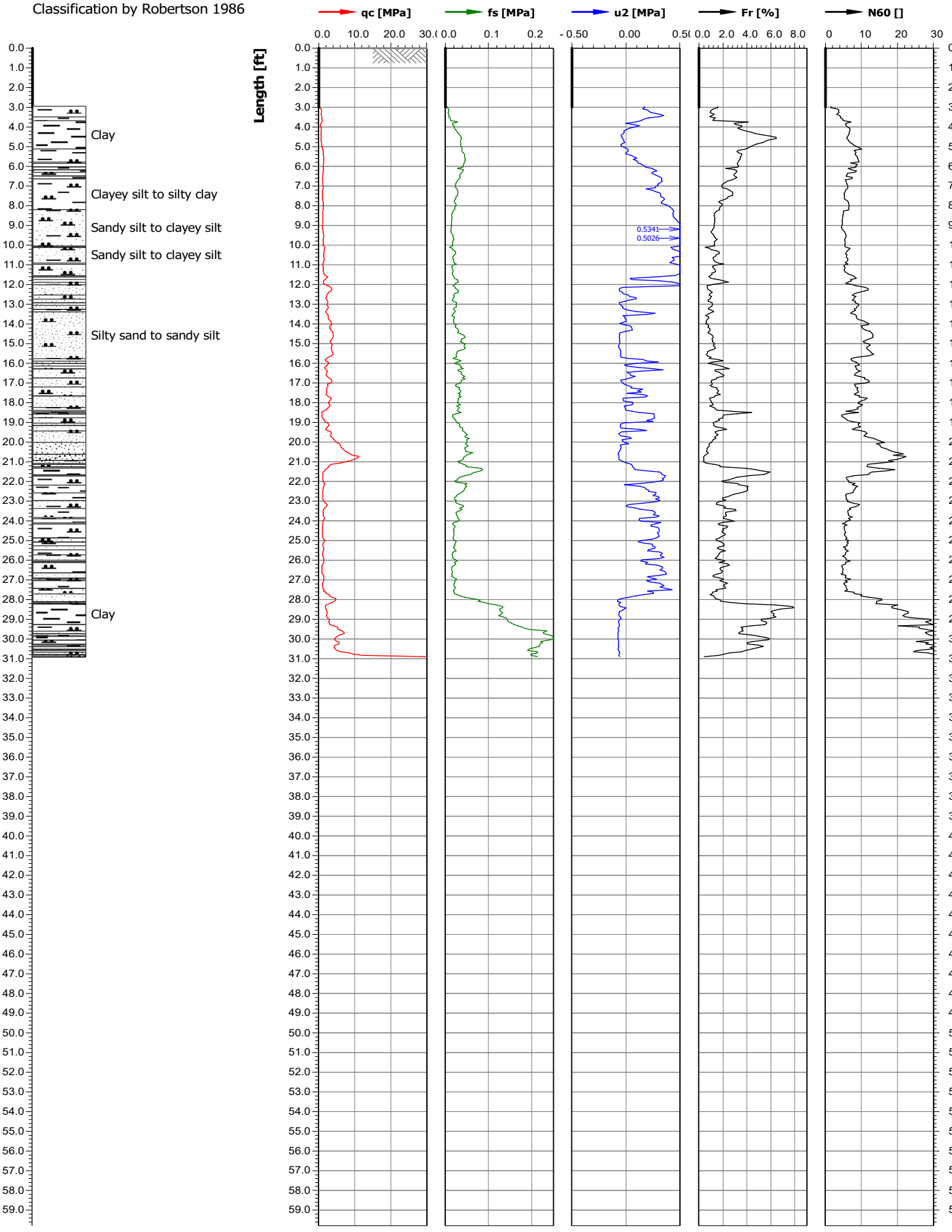
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	536.61	CPT-2L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121336, Easting 2441348		MAS		u2

GEOTECHNICS
Soil & Material Testing

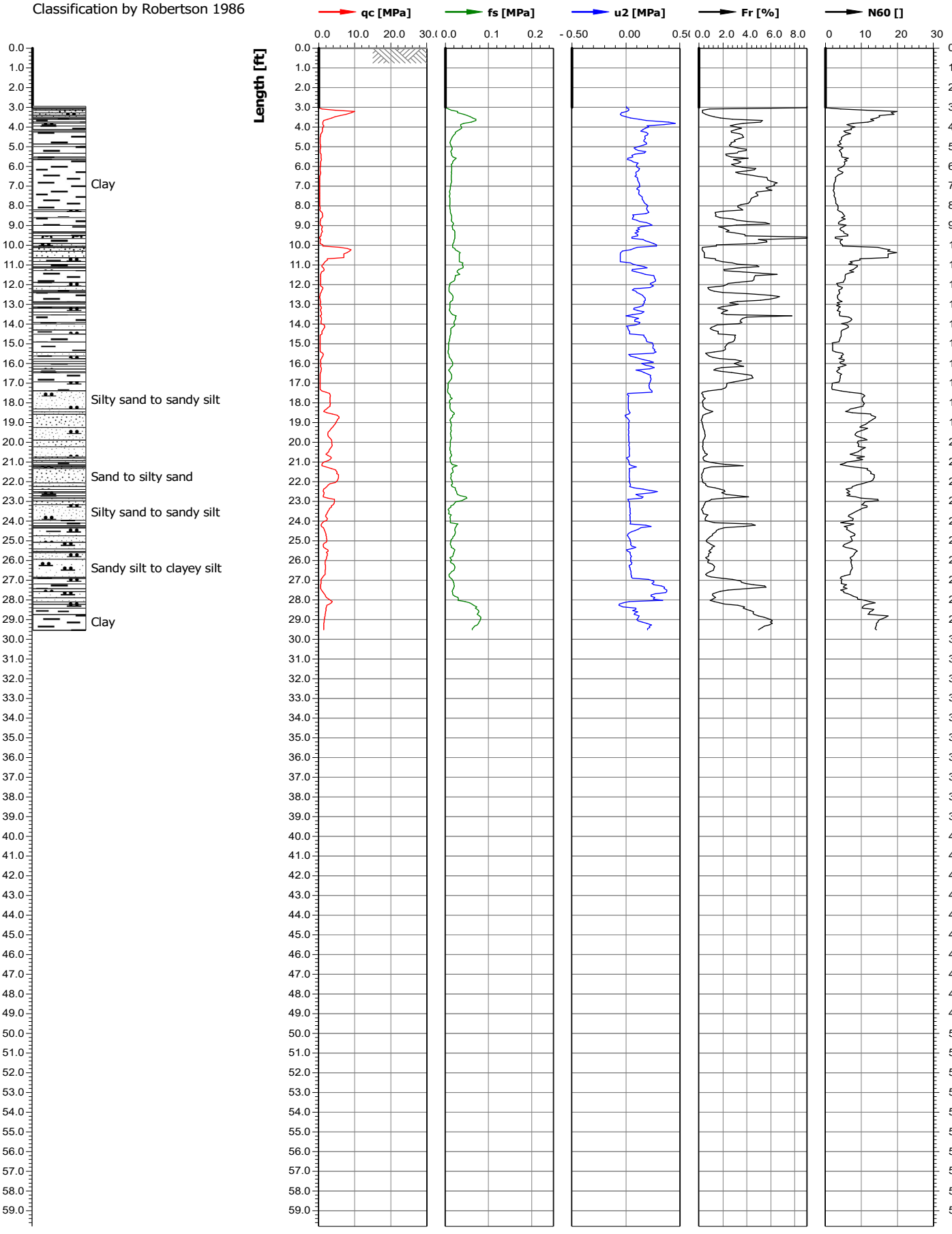
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	564.30	CPT-3CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121521, Easting 2442246		MAS		u2

GEOTECHNICS
Soil & Material Testing

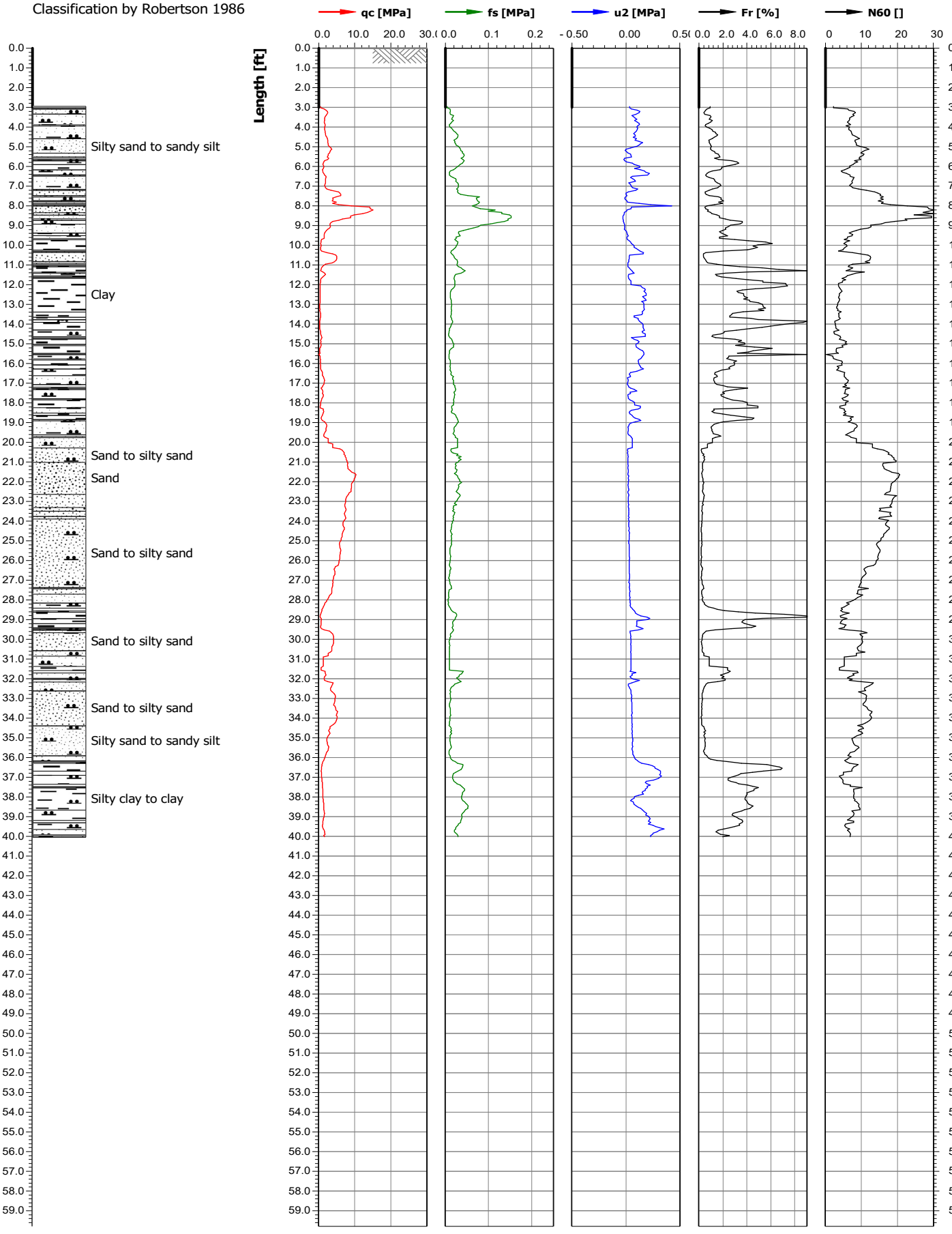
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	568.50	CPT-4CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121297, Easting 2441920		MAS		u2

GEOTECHNICS
Soil & Material Testing

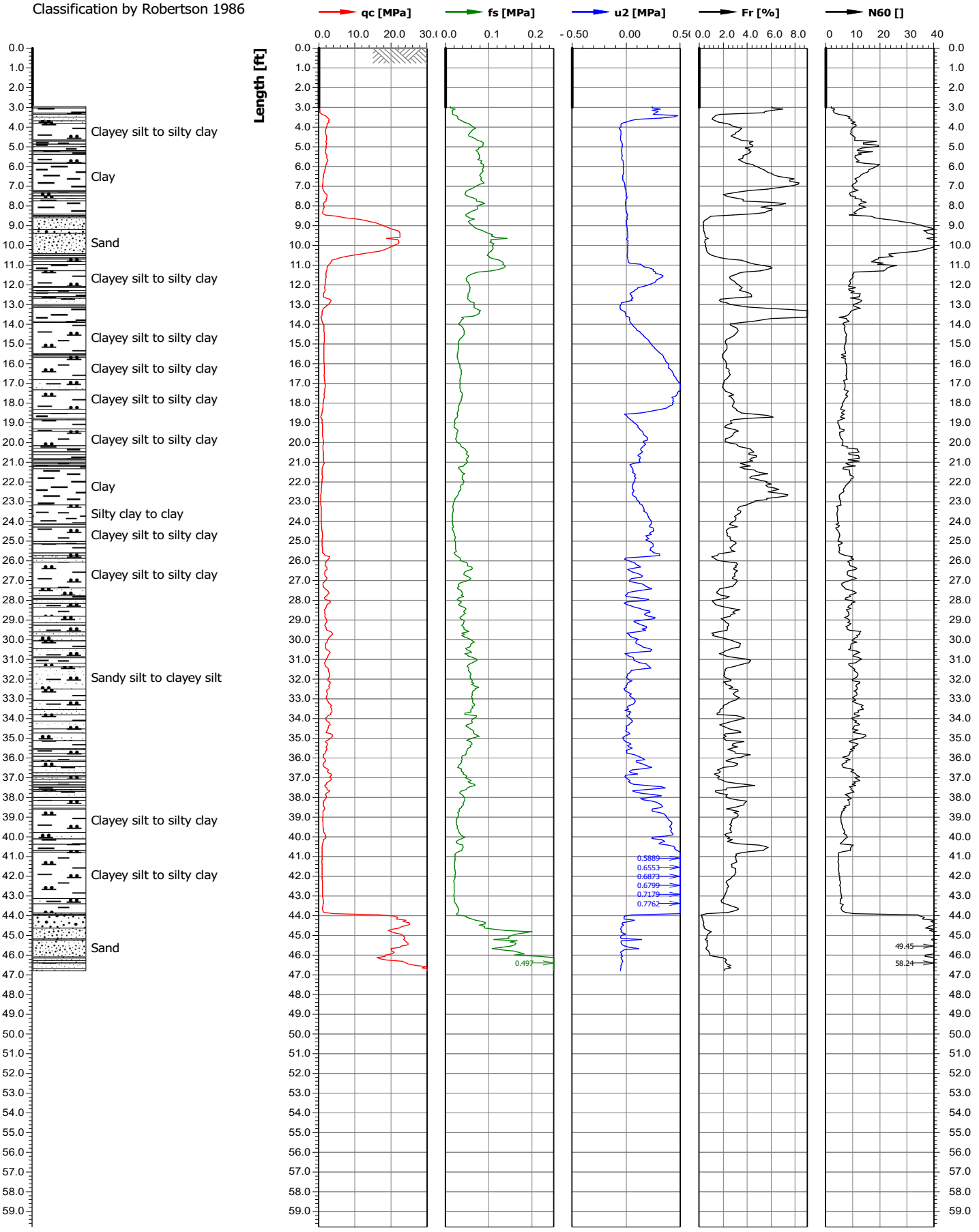
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	541.01	CPT-4L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1120958, Easting 2441425		MAS		u2

GEOTECHNICS
Soil & Material Testing

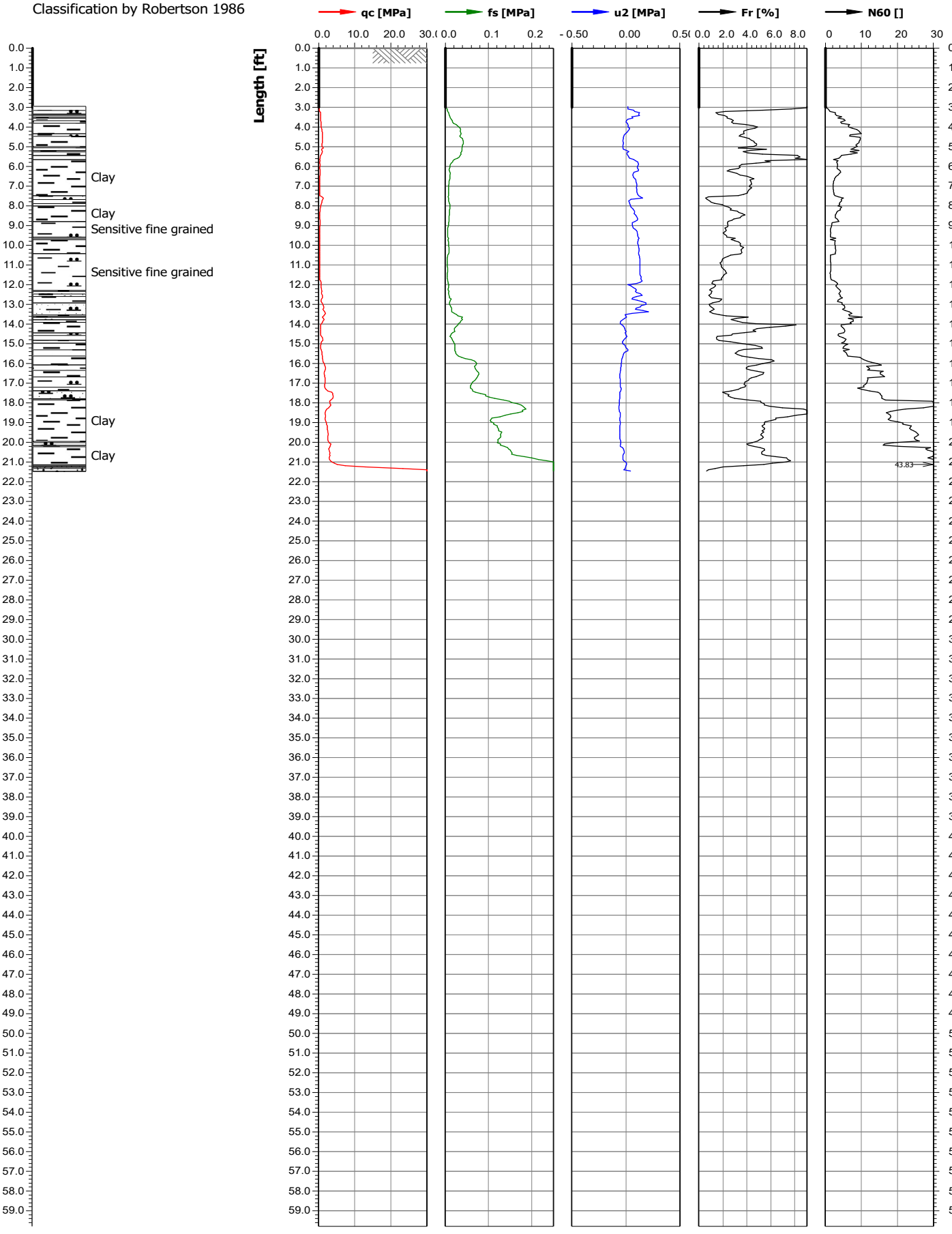
Classification by Robertson 1986

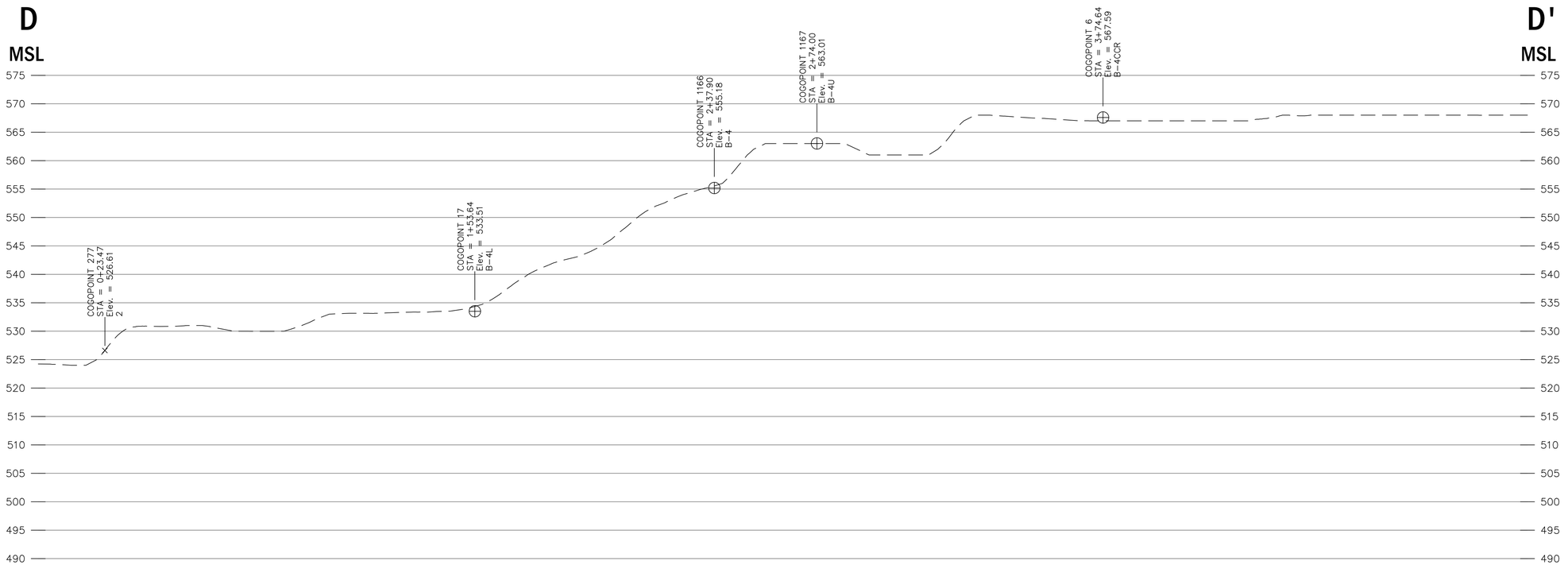


Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	566.01	CPT- 14CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1121321, Easting 2442579		MAS		u2

GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986





CROSS-SECTION LOCATION MAP



HORIZ. 0 20 40 80
VERT. 0 10 20 40
SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: KWF | DRAWN BY: BCK | APPROVED BY: KWF

PLAN AND PROFILE D-D'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

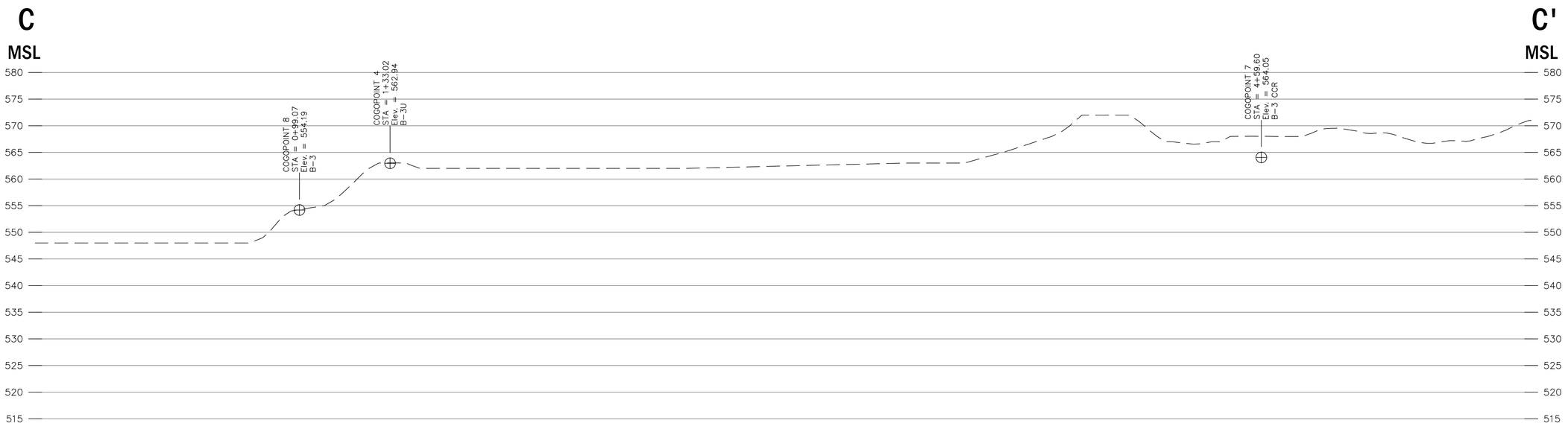
PROJECT ID: 220408/0029

SHEET NUMBER:

D-D'

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Tab: D SLOPE ANALYSIS Last Saved: June 26, 2024 by Ben Karpus Plotted: Thursday, June 27, 2024 8:33:52 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\As-Built Borings 2024 SPC KWF.dwg



CROSS-SECTION LOCATION MAP



HORIZ. 0 20 40 80
VERT. 0 10 20 40
SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: KWF | DRAWN BY: BCK | APPROVED BY: KWF

PLAN AND PROFILE C-C'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER: C-C'

© 2024 Andrews Engineering, Inc.

Tab: C SLOPE ANALYSIS Last Saved: June 26, 2024 by Ben Karpus Plotted: Thursday, June 27, 2024 8:34:45 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\As-Built Borings 2024 SPC KWF.dwg

APPENDIX B:

Dallman Boring Logs and Cross Section

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129295.29
Easting: 2455215.62

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5L
Well No: B-5L
Surf Elev.: 534.00

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	534.0
0	1						Dark brown silty CLAY; dry; stiff	
	2		0.5/1.5	4 6 5	>4.5			
	3							530.0
5	4		1.0/1.5	5 5 7				
	5				2.7			
	6		0.2/1.5	2 2 2				
	7						Soft	525.0
10	8		1.6/2.0		0.5		Gray silty CLAY; soft; 20 mm VST@ 9.5' = 5.8, 2.5, 2.9	
	9				0.2-0.7			
	10		1.5/1.5	0 2 1			Gray CLAY; very soft	
	11							520.0
15	12		1.5/1.5	0 1 2				
	13				0.2-0.5			
	14		1.5/1.5	0 0 0	0.1		Gray sandy CLAY; very soft	
	15							515.0
							Gray SAND; 20 mm VST@19.0' = 7.2, 3.2, 3.2	
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129302.48
Easting: 2455281.11

Weather: Cloudy, 62 F

Boring Information:
Boring No: B-5
Well No: B-5
Surf Elev.: 553.62

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

Dates:
Start: 10/06/2023
Finish: 10/06/2023

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.6
0	1						Greenish brown SILT; dry	
	2		0.9/1.5	3 7 7	4.5			550.0
	3							
5	4		0.7/1.5	3 4 8	3.5		Greenish brown silty CLAY	
	5							
	6		0.5/1.5	2 2 4	2.5		Brown mottling	
	7							545.0
10	8		0.9/1.5	2 4 5	1.5			
	9							
	10		0.9/1.5	2 5 6	3.5			
	11							540.0
15	12		0.8/1.5	3 4 7			16 mm VST@15.0' = 1.3, 3.3, 3.2	
	13				3.0			
	14		0.7/1.5	2 5 6	3.5			
	15							535.0
20	16		0.9/1.5	1 5 8	4.5		Dark gray clayey SILT; moist; wood chucks	
	17							
	18		0.9/1.5	2 5 5	2.0			
	19							530.0
25	20		1.9/2.0				16 mm VST@ 24.0' = 3.7-3.8	
	21							
	22		1.3/1.5	0 1 2	0.5		Brown silty CLAY; moist	
	23							525.0
30	24		1.2/1.5	0 0 1	<0.25		Saturated	
	25							
	26		1.2/1.5	0 1 2	0.5		Brown silty CLAY; trace greenish gray and dark brown mottling	
	27							520.0
35	28		1.5/1.5	0 2 2	0.25		BroVery little silt	
	29							
	30		1.5/1.5	0 0 2				
	31							515.0
40							End of Boring = 39.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129333.75
Easting: 2455341.56

Weather: Sunny, 87 F

Boring Information:
Boring No: B-5CCR
Well No: B-5CCR
Surf Elev.: 552.59

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/03/2023
Finish: 10/03/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Bottom ASH	
	2		0.9/1.5	14 12				550.0
	3				4.5		Dark gray sandy LOAM; stiff	
5	4		1.4/1.5	3 2 3	1.0		Dark gray SAND; bottom ash; wet	
	5							
	6		1.5/1.5	1 1 1	1.0		Dark gray sandy LOAM; bottom ash	545.0
	7							
10	8		0.6/1.5	1 4 6			Black SAND; bottom ash; wet	
	9							
	10		0.4/1.5	5 9 4				540.0
	11							
15	12		0.2/1.5	0 1 1			Black SAND; coarse grained; bottom ash; wet	
	13							
	14		0.2/1.5	3 2 3				535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130126.84
Easting: 2455243.51

Weather: Sunny, 85 F

Boring Information:
Boring No: B-6L
Well No: B-6L
Surf Elev.: 531.19

Depth Information:
Total: 23.5'
Auger: 23.5'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	531.2
0	1				1.5		Grayish brown silty CLAY; moist; firm; trace sand	530.0
	2		0.5/1.5	4 7 7				
	3							
5	4		0.5/1.5	3 2 3	1.5		Reddish brown silty CLAY; moist; firm; trace sand	525.0
	5							
	6		0.1/2.0					
	7							
10	8		0.6/1.5	W 1 1			20 mm VST@ 10.0' = 5.2, 2.8, 3.0	
	9				0		Gray clayey SILT; soft; moist	520.0
	10		1.5/1.5	W 1 1	0.5		Gray/reddish brown clayey SILT; soft; moist	
	11							
15	12		0.9/1.5	1 2 2				
	13				0-0.5		Gray SILT to reddish brown SAND; fine to coarse grained; moist	515.0
	14		1.1/1.5	W W W	0.25		Gray silty clay to clayey SILT; moist; soft; some organics, wood, bark, and ash	
	15							
20	16		0.9/1.5	W 1 2	3.9		20 mm VST@ 20.0' = 7.2, 3.9	
	17				0.5		Gray clayey SILT; moist	510.0
	18		0.9/1.5	W W W	0.5			
							End of Boring = 23.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130094.72
Easting: 2455316.59

Weather: Mostly Cloudy, 71 F

Boring Information:
Boring No: B-6
Well No: B-6
Surf Elev.: 553.93

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/05/2023
Finish: 10/05/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: S. Van Hook
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.9
0	1		1.3/2.0	5 15 37 33			Dark brown SILTY (fill)	
	2		0.8/2.0	5 5 6 7	+4.5		Dark brown silty CLAY; moist	550.0
	3							
5	4		0.7/1.5	2 3 5	2.25			
	5							
	6		0.8/1.5	1 3 7	2			545.0
	7							
10	8		0.8/1.5	5 8 7			8.2 mm VST@ 9.5' = 1.3-1.4	
	9				4.0			
	10		0.9/1.5	3 4 6	4.0			540.0
	11							
15	12		1.2/1.5	2 4 6	3.0		13 mm VST@ 15.0' = 4.7-4.6	
	13							
	14		2.0/2.0					535.0
20	15		1.4/2.0	2 5 6 10	2.7			
	16		1.5/2.0	5 10 11 12	4.2		Dark greenish gray silty CLAY; moist	
	17		1.3/2.0	2 4 6 8	3.0		Gray CLAY and SAND; with coal; brown mottling	530.0
25	18		1.6/2.0	1 5 6 6	2.0		Gray silty CLAY; 6.1 mm VST@ 25.5' = 4.0-3.9	
	19		2.0/2.0	1 1 2 2	1.0		Gray clayey SILT	
	20		1.9/2.0	0 0 0 2	0.25			525.0
30	21							
	22		2.0/2.0	0 0 0 2	<0.25		Gray silty CLAY; yellow brown mottling	520.0
	23		2.0/2.0	0 0 0 0	<0.25		Brown CLAY; mottling light brown; trace sand	
35	24		1.8/2.0	0 2 2 3	1.0		Light gray clayey sandy SILT; mottling yellow brown	
	25							515.0
40							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130067.17
Easting: 2455388.17

Weather: Sunny, 65 F

Boring Information:
Boring No: B-6CCR
Well No: B-6CCR
Surf Elev.: 553.32

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	553.3
0	1						Gray fly ASH; moist; friable; some gypsum; trace bottom ash	
	2		1.0/1.5	13 12				550.0
	3							
5	4		0.9/1.5	5 3 2			Bottom ASH; moist; loose	
	5							
	6		1.1/1.5	2 2 2	<0.25		Fly ASH; moist to wet; soft	545.0
	7							
10	8		1.5/1.5	1 0 0	<0.25		Fly ASH; wet; soft	
	9							
	10		0.6/1.5	0 0 0	<0.25			540.0
	11							
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			535.0
	15							
20	16		1.5/1.5	0 0 0	<0.25			
	17							
	18		1.5/1.5	0 0 0	<0.25			530.0
	19							
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130467.06
Easting: 2455885.37

Weather: Sunny, 85 F

Boring Information:
Boring No: B-7L
Well No: B-7L
Surf Elev.: 533.19

Depth Information:
Total: 20.0'
Auger: 20.0'
Core: -

Dates:
Start: 10/02/2023
Finish: 10/02/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: K. Finke
Driller: M. Sick
Helper(s): A. Kargel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.2
0	1				3.5		Gray silty CLAY; dry; very firm; trace sand	
	2		0.5/1.5	3 5 7				530.0
	3							
5	4		0.5/1.5	3 4 7	1.5		Reddish brown clayey SILT; moist; trace sand	
	5							
	6			3 3 3	1.0		Brownish red SAND; wet	525.0
	7							
10	8		0.6/1.5	W 3 2			20 mm VST@ 10.0' = 3.8, 1.2	
							Brownish red SAND with dark black SILT; ash	
	9				0.25			
	10		1.5/1.5	2 1 2			ASH	
	11				0.25		Gray silty CLAY; wet; soft	520.0
15	12		0.9/1.5	W W W			Gray clayey SILT; moist; soft	
					0.25			
	13							
	14		1.1/1.5	W W W	0			515.0
	15							
20							20 mm VST@ 20.0' = 6.7, 3.0, 3.1	
							End of Boring = 20 Feet	

Notes:

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Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130413.91
Easting: 2455917.71

Weather: Haze, 79 F

Boring Information:
Boring No: B-7
Well No: B-7
Surf Elev.: 552.56

Depth Information:
Total: 39.5'
Auger: 39.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.6
0	1						Brown/gray sandy CLAY; mottling; dry; very stiff	
	2		0.6/1.5	3 5 6	>4.5			550.0
	3						Brown silty CLAY; slightly moist; very stiff	
5	4		0.5/1.5	3 4 7	2.5			
	5						BrowGray silty LOAM; slightly moist; stiff	
	6		0.7/1.5	3 4 5	2.5			545.0
	7						Gray silty CLAY; 16 mm VST@ 9.5' = 13+, 5.2, 5.2	
10	8		0.7/1.5	2 3 6	2.4		Gray silty LOAM	
	9							
	10		0.8/1.5	2 4 7	2.2		Gray silty LOAMSlightly moist; fractured	540.0
	11							
15	12		0.9/1.5	2 4 7	2.3			
	13						Brown sandy LOAM; moist; stiff	
	14		0.5/1.5	2 4 5	2.5			535.0
	15						Brown/gray silty LOAM; mottling; moist; stiff; 16 mm VST@ 19.5' = 11.4, 6.1, 6.2	
20	16		2.0/2.0					
	17				2.1		Brown/gray silty CLAY; mottling; moist; stiff	
	18		1.2/1.5	2 3 5	1.6			530.0
	19						Red brown SAND; moist; loose	
25	20		1.4/1.5	2 3 5	1.7		Brown sandy LOAM; wet; soft	
	21							525.0
	22		1.5/1.5	0 1 2	0.2		Brown/gray silty LOAM; with sand; moist; soft	
	23							
30	24		1.5/1.5	0 2 2	0.5			
	25				1.2			
	26		1.5/1.5	0 1 1	0.2			520.0
	27							
35	28		1.5/1.5	0 0 2	0.5			
	29							
	30		1.5/1.5	1 1 1	0.8		Gray SILT; very moist; soft	515.0
	31							
40							End of Boring = 39.5 Feet	

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130310.33
Easting: 2455947.06

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-7CCR
Well No: B-7CCR
Surf Elev.: 552.18

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.2
0	1						Fly ash, bottom ASH and cinder (fill); moist to wet; soft	
	2		1.0/1.5	3 2 2	0.25			550.0
	3							
5	4		1.0/1.5	0 1 1	<0.25		Bottom ASH; moist; loose	
	5						Fly ASH; wet; soft	
	6		0.6/1.5	0 0 0	<0.25			545.0
	7							
10	8		1.1/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 0	<0.25			540.0
	11							
15	12		1.3/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			535.0
	15							
20							End of Boring = 19.5 Feet	

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130109.51
Easting: 2456566.64

Weather: Haze, 79 F

Boring Information:
Boring No: B-8L
Well No: B-8L
Surf Elev.: 530.62

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

Dates:
Start: 10/04/2023
Finish: 10/04/2023

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	530.6
0	1						Brown silty LOAM; dry; hard	
	2		0.8/1.5	4 6 7	>4.5			
	3							
5	4		0.2/1.5	4 3 4			Brown silty CLAY; moist; stiff	525.0
	5							
	6		1.1/1.5	1 1 1	0.1		Wet; soft	
	7							
10	8		1.5/1.5	1 1 1			20 mm VST@9.5' = 5.4, 3.4, 3.8	
	9				0.0-0.1		Wet; very soft	520.0
	10		1.6/2.0				Some mottling; wet; soft	
	11				0.5			
15	12		1.4/1.5	1 1 1	0.5		Brown sandy LOAM; wet; soft	515.0
	13						Gray sandy LOAM; wet; soft	
	14		1.1/1.5	0 1 3			Gray SAND; loose; trace clay	
	15							
20	16		1.4/1.5	0 0 1				
	17				0.2		Gray SILT; wet; soft	510.0
	18		1.5/1.5	0 0 0			20 mm VST@ 22.0' = 6.8, 3.4, 3.8	
	19				0.1		Gray sandy LOAM; wet; soft	
25							End of Boring = 24.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1130083.21
Easting: 2456391.16

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-8U
Well No: B-8U
Surf Elev.: 551.74

Depth Information:
Total: 33.5'
Auger: 33.5'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	551.7
0	1						Dark gray to brown silty CLAY; moist; moderatyely firm; some organic fragments; some bottom ash	
	2		0.8/1.5	1 2 2	1.0			550.0
	3							
5	4		0.9/1.5	3 5 5	4.0			
	5							545.0
	6		1.0/1.5	3 5 6	4.5			
	7							
10	8		1.8/2.0				16 mm VST@ 9.5' = 10.0, 3.8, 3.9	
	9				0.75			
	10		1.1/1.5	2 2 5	1.5		Color grades to light brown; more clayey; some dark yellow brown mottling; some iron oxide modules	540.0
	11							
15	12		0.8/1.5	2 3 5	1.5		Black/dark brown silty CLAY; moist; stiff; trace coal fragments	
	13							
	14		0.9/1.5	2 4 7	3.0			535.0
	15							
20	16		1.7/2.0				16 mm VST@ 19.5' = 11.2, 4.0, 3.8	
	17				2.25			
	18		1.0/1.5	3 6 7	2.5		Trace organic fragments	530.0
	19							
25	20		1.3/1.5	1 1 3	0.5		16 mm VST@ 24.5' = 5.8, 3.2, 3.0 More silty; some organics	
	21							
	22		1.5/1.5	1 1 2	0.5		Dark gray clayey SILT; moist to wet; moderately soft; some organics	525.0
	23							
30	24		1.3/1.5	1 1 2	0.75			
	25							
	26		1.5/1.5	0 1 1	0.5			520.0
							End of Boring = 33.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129778.29
Easting: 2456635.89

Weather: Haze, 79 F

Boring Information:
Boring No: B-9L
Well No: B-9L
Surf Elev.: 524.07

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/04/2023
Finish: 10/04/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: R. Carson
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	524.1
0	1						Brown silty LOAM; moist; soft	
	2		1.4/1.5	1 2 2	1.0 0.5			
	3							520.0
5	4		1.5/1.5	1 1 1	1.0			
	5				0.1		Brown SAND; medium grained; moist; soft	
	6		2.0/2.0					
	7							515.0
10	8		1.0/1.5	0 0 1	0.1		Brown sandy CLAY; wet; soft; gray at 10.5'	
	9							
	10		0.9/1.5	0 1 2	0.5		Gray silty CLAY; wet; soft	
	11							510.0
15	12		1.5/1.5	0 0 1	0.5 0.2			
	13							
	14		1.5/1.5	0 0 0	0.3			
	15						16 mm VST@19.5' = 5.4, 2.9, 3.1	505.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129690.26
Easting: 2456402.29

Weather: Cloudy, 58 F

Boring Information:
Boring No: B-9U
Well No: B-9U
Surf Elev.: 552.15

Depth Information:
Total: 40.0'
Auger: 40.0'
Core: -

Dates:
Start: 10/19/2023
Finish: 10/19/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.2
0	1						Dark brown/gray silty CLAY; moist; stiff	
	2		0.7/1.5	3 7 7	4.0			550.0
	3							
5	4		1.0/1.5	3 4 6	3.75			
	5							
	6		0.5/1.5	3 3 6	2.25		More clayey; trace bottom ash fragments	545.0
	7							
10	8		1.7/2.0				Yellow brown silty CLAY; moist; stiff; laminated; trace iron nodules; 16 mm VST@ 9.5' = 7.5, 4.1, 3.5	
	9				1.0			540.0
	10		0.8/1.5	2 4 5	2.75		Black silty CLAY; few cinders (bottom ash); moist; stiff	
	11							
15	12		0.8/1.5	3 5 8	3.0			
	13							
	14		0.7/1.5	2 4 6	2.5			535.0
	15							
20	16		1.9/2.0				16 mm VST@ 19.5' = 11.3, 6.0, 5.6	
	17				3.25			
	18		0.8/1.5	2 5 7	2.25		Trace organic fragments; trace coal fragments	530.0
	19							
25	20		0.9/1.5	1 4 5	2.25		16 mm VST@ 24.5' = 7.0, 3.8, 3.5	
	21		1.1/2.0	2 5 6 7	2.5 0.75		Light brown silty clay to CLAY; moist; stiff; some iron oxidized nodules; trace organic fragments; rootlets; more clayey at 26.5'	525.0
	22		1.2/2.0	3 4 5 6	0.75		Gray CLAY	
30	23		1.5/2.0	1 2 4 5	1.0		Some dark yellow brown mottling; some iron oxidized nodules	
	24		1.6/2.0	0 1 2 3	0.5		Black to dark gray clayey SILT; moist; soft; trace organic fragments	520.0
35	25		1.7/2.0	0 2 3 4	0.5			
	26		2.0/2.0	0 1 3 3	1.0		Dark gray clayey SILT; moist; moderately stiff; with organic fragments; some coal; glauconite the last 0.3'	515.0
	27		2.0/2.0	0 1 2 4	0.75		Dark gray clayey SAND; moist; moderately stiff; trace coal fragments	
40							Dark gray sandy CLAY; moist; moderately stiff; trace coal fragments	
							End of Boring = 40 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129680.19
Easting: 2456242.16

Weather: Sunny, 69 F

Boring Information:
Boring No: B-9CCR
Well No: B-9CCR
Surf Elev.: 553.97

Depth Information:
Total: 19.5'
Auger: 19.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.0
0	1						Bottom ASH; moist	
	2		0.3/1.5	1 6 4				
	3							550.0
5	4		1.5/1.5	0 1 0	<0.25		Fly ASH; wet; soft	
	5							
	6		1.5/1.5	0 0 0	<0.25			
	7							545.0
10	8		1.5/1.5	0 0 0	<0.25			
	9							
	10		1.5/1.5	0 0 1	<0.25			
	11							540.0
15	12		1.5/1.5	0 0 0	<0.25			
	13							
	14		1.5/1.5	0 0 0	<0.25			
	15							535.0
20							End of Boring = 19.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1129518.55
Easting: 2455869.56

Weather: Sunny, 65 F

Boring Information:
Boring No: B-10CCR
Well No: B-10CCR
Surf Elev.: 555.35

Depth Information:
Total: 24.5'
Auger: 24.5'
Core: -

Dates:
Start: 10/20/2023
Finish: 10/20/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: M. Sick
Helper(s): B. Hummel

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	555.4
0	1						Bottom ASH; moist to wet; loose	
	2		0.8/1.5	4 5 3				
	3							
5	4		0.8/1.5	2 7 12			Moist; loose	550.0
	5							
	6		1.3/1.5	1 2 1	<0.25		Fly ASH; moist to wet; soft; some bottom ash	
	7							
10	8		1.4/1.5	1 0 1	<0.25		Trace bottom ash	545.0
	9							
	10		1.3/1.5	0 0 0	<0.25		Wet; soft	
	11							
15	12		1.1/1.5	4 1 2			Bottom ASH; wet; loose	540.0
	13							
	14		0.9/1.5	0 0 0	<0.25		Fly ASH; wet; soft	
	15							
20	16		1.5/1.5	0 0 0	<0.25			535.0
	17							
	18		1.5/1.5	0 0 0	<0.25			
	19							
25							End of Boring = 24.5 Feet	

Notes:

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3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 220408

Location:
Coord. System:
Northing: 1128891.26
Easting: 2456234.99

Weather: Sunny, 69 F

Boring Information:
Boring No: B-11U
Well No: B-11U
Surf Elev.: 552.27

Depth Information:
Total: 29.5'
Auger: 29.5'
Core: -

Dates:
Start: 10/18/2023
Finish: 10/18/2023

Drilling Contractor:
Contractor Name: Geotechnics Soil & Material Testing
City: Hannibal, Missouri
Equipment: CME 55 w/ 3 1/4" HSA and 1.5" split spoon

Personnel:
Geologist: M. Hewitt
Driller: A. Kargel
Helper(s): M. Sick

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.3
0	1						Black silty CLAY; with sand and gravel; moist; moderately stiff	
	2		0.3/1.5	1 3 10/3"				550.0
	3							
5	4		0.4/1.5	1 1 2	1.25		Yellow brown silty CLAY; some dark yellow mottling; some iron oxide nodules; moist; moderately stiff	
	5							
	6		0.8/1.5	1 2 3	2.5			545.0
	7							
10	8		2.0/2.0				16 mm VST@ 9.5' = 9.2, 2.8, 2.8	
	9				2.0			
	10		1.2/1.5	2 4 5				540.0
	11				3.5		Gray	
15	12		0.9/1.5	4 7 7	2.25		Organic fragments	
	13						Dark gray clayey SILT; moist; moderately firm; some organic fragments	
	14		1.3/1.5	1 4 6	2.0			535.0
	15							
20	16		1.8/2.0				Dark gray brown silty CLAY; moist; stiff; 16 mm VST@19.5' = 13+, 7.4, 7.6	
	17				2.5			
	18		1.5/1.5	0 3 4	1.25		Yellow brown silty CLAY; some dark yellow brown mottling; iron oxide and manganese oxide concretions; moist; moderately stiff	530.0
	19						16 mm VST@ 24.5' = 4.9, 3.1, 3.1	
25	20		1.5/1.5	0 0 0	<0.25		Yellow brown clayey silt to SILT; wet; soft	
	21							
	22		1.5/1.5	0 0 0				525.0
	23							
30							End of Boring = 29.5 Feet	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130314.00
Easting: 2455461.00

Weather: Sunny 54F

Boring Information:
Boring No: B100
Well No: B100
Surf Elev.: 533.00

Depth Information:
Total: 106.00'
Auger: 106.00'
Core: -

Dates:
Start: 04/22/2024
Finish: 04/22/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	533.0
0					2.0		Dark brown silty CLAY (topsoil); organics Brownish green silty CLAY; mottling; moist	
	1		5.0/5					530.0
5								
	2		5.0/5		2.0		Saturated Silt seam	525.0
10							Trace organics	
	3		5.0/5				Sample CS3A	520.0
							Gray silty CLAY; saturated Sample CS3B	
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	4		4.2/5		0.5			515.0
20	5		4.6/5		1.0			510.0
25	6		5.0/5		1.5			505.0
							Gray silty SAND; very fine grained	
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray silty SAND; fine grained; saturated	
	7		5.0/5				Gray SHALE; weathered; trace black organics; fracture 35.1, 35.6, 35.7, 36.0, 36.1, 36.2, 36.6, 36.65, 36.85, 36.9, 37.15, 37.2, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.3, 38.9, 39.1, 39.65, 40.4, 40.75, 40.9, 41.3, 41.4, 41.5, 41.6, 41.7, 41.75, 41.8, 41.85, 41.95, 42.1, 42.2, 42.4, 42.5, 42.6, 42.7, 43.0, 43.2, 43.4, 44.7, 45.9, 45.1, 46.8, 47.2, 47.4, 47.9	500.0
35	8		1.0/1					
	9		5.0/5					495.0
40	10		5.0/5					490.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
								485.0
	11		5.0/5				Gray CLAYSTONE; less fissle; fractured 48.0, 48.35, 49.5, 49.6	
50								
								480.0
	12		5.0/5					
55								
								475.0
	13		5.0/5					
60								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Dark gray SHALE; fractured 61.4, 61.7, 61.8, 61.95, 62.0, 62.15, 62.2, 62.3, 62.35, 62.4 62.5, 62.7, 62.85, 63.6, 64.1, 64.2, 64.25, 64.3, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.15, 65.2, 65.3, 65.6, 65.8, 66.8, 67.1, 67.65, 67.9, 68.6, 68.7, 69.6, 69.85, 70.0, 70.1	470.0
	14		5.0/5					
65								
	15		5.0/5					465.0
70							Dark gray CLAYSTONE; trace mica; fractured 70.5	
							Fractured 72.3, 72.7, 74.3, 75.2, 76.2, 76.9	
	16		5.0/5					460.0
75								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Light gray SANDSTON bedding with CLAYSTONE; fine grained	
							Dark gray CLAYSTONE; fractured 77.8, 79-79.2	455.0
	17		5.0/5					
80								
	18		5.0/5					450.0
							Dark gray SHALE and CLAYSTONE	
85								
								445.0
	19		5.0/5					
90								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	20		5.0/5					440.0
95								
							Sandstone lens	
	21		5.0/5					435.0
100								
							Light gray LIMESTONE; fossils (shells)	
							Dark gray limey SHALE; fossils (shells)	
	22		5.0/5					430.0
105								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B100 Boring No: B100 Well No: B100

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Gray LIMESTONE	
							End of Boring = 106 Feet	
								425.0
110								
								420.0
115								
								415.0
120								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129934.00
Easting: 2455460.00

Weather: Cloudy 59F

Boring Information:
Boring No: D1
Well No: D1
Surf Elev.: 564.0

Depth Information:
Total: 40.5'
Auger: 40.5'
Core: -

Dates:
Start: 04/29/2024
Finish: 04/29/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	564.0
0	1						Dark gray ASH (fill)	
								560.0
5	2		2.0/2	WH				
	3							555.0
10	4		1.5/2	3 21 23 24				
	5							550.0
15				W				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		1.3/2	W 1 3 W			Dark gray ASH (fill) Saturated	
	7							545.0
20	8		2.0/2	WOH				
	9							540.0
25	10		2.0/2	2 3 1 1			Groundwater sample at 25.0'	
	11							535.0
30				W				

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D1 Boring No: D1 Well No: D1

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2	W W 1 1				
	13							530.0
35	14		2.0/2	W W 1 1				
	15		2.0/2	W W 3 4				
	16		1.9/2		1.0		Dark gray clayey SILT	525.0
40							End of Boring = 40.5 Feet	
								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1130169.00
Easting: 2456076.00

Weather: Cloudy 59F

Boring Information:
Boring No: D2
Well No: D2
Surf Elev.: 558.0

Depth Information:
Total: 37.5'
Auger: 37.5'
Core: -

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

Dates:
Start: 04/29/2024
Finish: 04/29/2024

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	558.0
0	1						Dark gray ASH (fill)	555.0
5	2		0.0/2	WOH				
	3							550.0
10	4		2.0/2	WOH				
	5							545.0
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Dark gray ASH (fill)	
	7							540.0
20	8		2.0/2	W W 1 1			Groundwater sample at 20.0'	
	9							535.0
25	10		2.0/2	WOH				
	11							530.0
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D2 Boring No: D2 Well No: D2

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		0.0/2	WOH				
	13		0.0/2	WOH				525.0
	14		2.0/2	W W W 6				
35							Gray clayey SILT; brown mottling; saturated	
	15		1.5/2					
							End of Boring = 37.5 Feet	520.0
40								
								515.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129640.00
Easting: 2455918.00

Weather: Sunny 66F

Boring Information:
Boring No: D3
Well No: D3
Surf Elev.: 554.9

Depth Information:
Total: 31.5'
Auger: 31.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.9
0	1						Dark gray ASH (fill); wet	
5	2		2.0/2	2 2 2 3				550.0
	3							
10	4		2.0/2	WH				545.0
	5						Free water at 12.0'	
15								540.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		0.2/2	WH 1				
	7							
20	8		0.1/2	WH			Groundwater sample at 20.0'	535.0
	9							
25	10		0.3/2	WH				530.0
	11		2.0/2					
30					0.75		Brown silty CLAY; greenish gray mottling; Jar Sample SS6A	525.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D3 Boring No: D3 Well No: D3

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					
							End of Boring = 31.5 Feet	
35								520.0
40								515.0
45								510.0

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: CWLP Ash Pond
Location: Springfield, Illinois
County: Sangamon
Site No.:
AEI No.: 240227

Location:
Coord. System:
Northing: 1129248.00
Easting: 2455777.00

Weather: Sunny 66F

Boring Information:
Boring No: D4
Well No: D4
Surf Elev.: 561.00

Depth Information:
Total: 36.5'
Auger: 36.5'
Core: -

Dates:
Start: 04/30/2024
Finish: 04/30/2024

Drilling Contractor:
Contractor Name: Skinner Limited
City: Hindsboro, Illinois
Equipment: 4 1/4" HSA 5' CSD 3"

Personnel:
Geologist: S. Van Hook
Driller: T. Skinner
Helper(s): NA

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	561.0
0	1						Dark gray ASH (fill); dry	560.0
5	2		1.2/2	W 1 2 3				555.0
	3							
10	4		0.5/2	WOH			Moist	550.0
	5							
15								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	6		2.0/2	WOH			Wet	
								545.0
	7							
							Free water at 19.5'; Groundwater sample at 20.0'	
20	8		2.0/2	WOH				
								540.0
	9							
							Saturated	
25	10		2.0/2	WOH				
								535.0
	11							
30								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: D4 Boring No: D4 Well No: D4

- Continuous Barrel (CB) - Split Spoon (SS) - Shelby Tube - Core - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
	12		2.0/2					530.0
	13		3.0/3	WH 2 3 2 1 1	0.75		Brown silty CLAY; greenish gray mottling	
35	14		2.0/2					525.0
							End of Boring = 36.5 Feet	
40								520.0
45								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338|0011

Location:
Coord. System: Site Grid
Northing: 39.76876193
Easting: -89.6021824

Weather: Sunny, 80F

Boring Information:
Boring No: B-6LE
Well No: n/a
Surf Elev.: 531

Depth Information:
Total: 13.0
Auger: 13.0
Core: 0.0

Dates:
Start: 5/13/2025
Finish: 5/13/2025

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB and 2.5' Shelby Tube

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	531.0
0	1		4.6				Dark grey (3/1 10YR) clayey SILT, moist, organics	530.0
5	2		1.81		1.1 T/SF		grades to (5/2 10YR) brownish Grey, moist	525.0
	3		Full				Grey (6/1 10YR) silty CLAY, soft, wet, pliable	
10	4		1.3					520.0
	5		2.24		1.0 T/SF		sandy, with gravel, and wet	
							End of Boring = 13 Feet	
15								515.0
20								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338|0011

Location:
Coord. System: Latitude & Longitude
Northing: 39.76862976
Easting: -89.60199143

Weather: Sunny, 80F

Boring Information:
Boring No: B-6E
Well No: n/a
Surf Elev.: 554

Depth Information:
Total: 37.0
Auger: 37.0
Core: 0.0

Dates:
Start: 5/16/2025
Finish: 5/16/2025

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB, 1.5' and 2.5' Shelby tube

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	554.0
0	1		1.3				Black (2/1 10YR) SILT, with grey (5/1 10YR) mottles, asphalt fragments	
							with coarse sand and gravel	550.0
5	2		2.4				Grey (4/1 10YR) clayey SILT, with organics, olive (6/2 10Y) mottles, with shale and coal fragments	
	3		1.16		2.0 T/SF			
	4		1.33		2.6 T/SF			
	5		1.9				Dark grey (3/1 10YR) clayey SILT, with trace fine sand	545.0
10	6		4.6				Black (2/1 10YR) clayey SILT, with olive (6/2 10Y) mottles with organics	
							grades to dark grey (3/1 10YR), no mottles	540.0
							Dark grey (4/1 10YR) silty CLAY, with olive (4/2 10YR) mottles	
15	7		4.9				with coal and shale fragments	
								535.0
20								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B-6E Boring No: B-6E Well No: n/a

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Greyish green (6/10GY) silty CLAY, with organics	
	8		3.28				Black (2/1 10YR) SILT, with organics	
							Dark grey (3/1 10YR) silty CLAY, tace organics, moist	530.0
25								
	9		3				black (2/1 10YR) with olive (6/2 5GY) mottles	
							Black (2/1 10YR) clayey SILT, black, with organics, shale, and coal, moist	525.0
30	10		2.33		0.9 T/SF			
							Grey (5/1 10YR) silty CLAY, with trace brown (5/6 10YR) mottles	
	11		2.5					
								520.0
35							Brownish grey (5/2 10YR) CLAY, with black (2/1 10YR) and (5/6 10YR) mottles, and trace organics, very moist	
	12		2.29		0.6 T/SF			
							End of Boring = 37 Feet	
								515.0
40								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338|0011

Location:
Coord. System: Site Grid
Northing: 39.76967105
Easting: -89.59988628

Weather: Sunny, 80F

Boring Information:
Boring No: B-7LE
Well No: n/a
Surf Elev.: 532.8

Depth Information:
Total: 16.0
Auger: 16.0
Core: 0.0

Dates:
Start: 5/14/2025
Finish: 5/14/2025

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB and 2.5' Shelby Tube

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
0							Ground Surface	532.8
							Black (2/1 10YR) SILT	
	1		4				Grey (6/1 10YR) and brown (5/4 10YR) clayey SILT, trace black mottles, with sand	530.0
5	2		2.08		0.85 T/SF		Brownish grey (5/2 7.5YR) SAND, with clay, with brown (4/6 7.5YR) mottles, wet	
	3		3.6					525.0
10							grades to (3/1 7.5YR) dark grey, trace organics, with gravel, wet	
	4		4.1				Dark grey (3/1 7.5YR) SAND and gravel with black mottles, wet	
								520.0
15	5		2.08		0.6 T/SF		Dark grey (4/1 10YR) silty CLAY, moist, with trace sand	
							End of Boring = 16 Feet	
								515.0
20								

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Site Information:
Name: Springfield City Water, Light, and Power
Location: Springfield, IL
County: Sangamon
Site No.: 1678250020
AEI No.: 240338|0011

Location:
Coord. System: Latitude & Longitude
Northing: 39.76952706
Easting: -89.59977029

Weather: Sunny, 80F

Boring Information:
Boring No: B-7E
Well No: n/a
Surf Elev.: 552.7

Depth Information:
Total: 35.0
Auger: 35.0
Core: 0.0

Dates:
Start: 5/16/2025
Finish: 5/16/2025

Drilling Contractor:
Contractor Name: Skinner LTD
City: Hindsburo, IL
Equipment: 4.25" HSA with 5' CB and 1.5' & 2.5' Shelby Tube

Personnel:
Geologist: N. Beck
Driller: T. Skinner
Helper(s): C. Vonbrehens, T. Buckler

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Ground Surface	552.7
0	1		0.25				Black (2/1 10YR) to dark grey (3/1 10YR) silty gravelly SAND	550.0
5	2		1.5				Dark grey (3/1 10YR) silty CLAY, with black (2/1 10YR) and brown (4/3 10YR) mottles, with trace sand	
	3		1.25		1.3 T/SF		Greyish olive (5/2 10YR) clayey SILT, with sand, moist	545.0
	4		1.33		1.6 T/SF		Grey (5/1 10YR) silty CLAY	
	5		2.6				Grey (5/1 10YR) SILT, with brown (6/8 10YR), black (2/1 10YR), and grey olive (5/2 5Y) mottles, moist	
10	6		Full				grades to black (2/1 10YR)	540.0
							Yellow (7/6 5Y) SILT, light grey (7/1 10YR), moist	
15							Black (2/1 10YR) CLAY, with silt	
	7		3.8				Grey (6/1 10YR) clayey SILT, with yellowish brown (5/4 10YR) mottles	535.0
							Yellowish brown (5/6 10YR) silty SAND, medium grain size	
20							Dark grey (4/2 10YR) silty CLAY, with organics	

Notes:

Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, IL 62711

FIELD BORING LOG

Boring Information: B-7E Boring No: B-7E Well No: n/a

- Continuous Barrel (CB) | - Split Spoon (SS) | - Shelby Tube | - Core | - Blind Drill

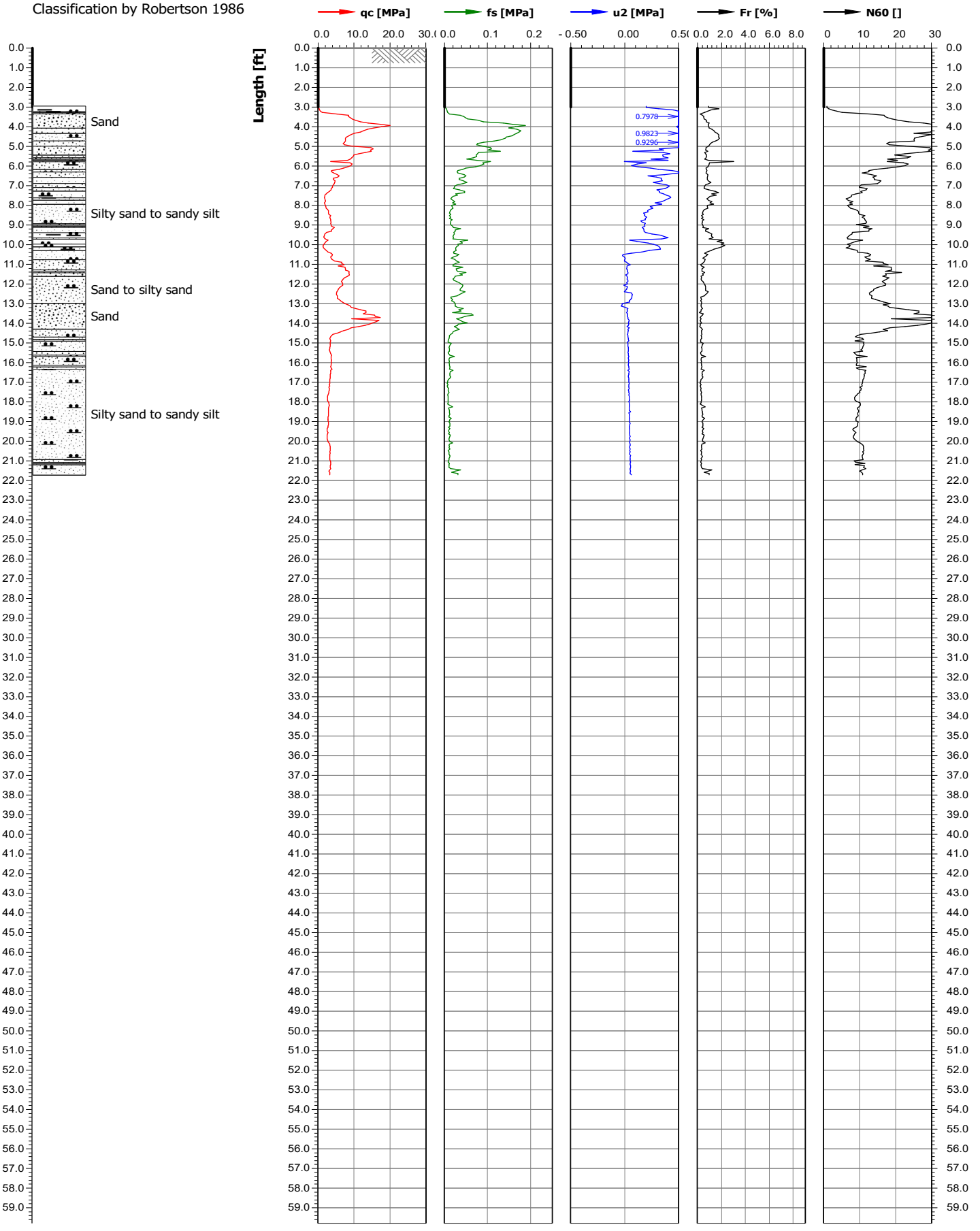
Depth (ft)	Run No.	Sample Type	Sample Recov.	Blow Count	qu/su (tsf)	Lithology	Description/Comments	Elev. (MSL)
							Light grey (7/1 10YR) silty CLAY, brown mottles, with brownish yellow (6/6 10YR), moist	
	8		Full					530.0
							grades to light bluish grey (8/1 10B) with brown (6/810YR) mottles	
25							Brown (4/3 10YR) CLAY, moist	
							Brown (5/4 10YR) SAND, medium to coarse grain size, with strong brown (5/6 7.5YR) mottles	
	9		4.3					525.0
							Grey (6/1 10YR) silty CLAY, with sand and gravel, brown (4/6 10YR) mottles	
30								
	10		3.1				Grey (6/1 10YR) silty CLAY, with trace sand, wet, with organics	520.0
	11		2.8		2.1 T/SF			
35							End of Boring = 35 Feet	
								515.0
40								

Notes:

Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.98	CPT- 5CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122667, Easting 2440793		MAS		u2

GEOTECHNICS
Soil & Material Testing

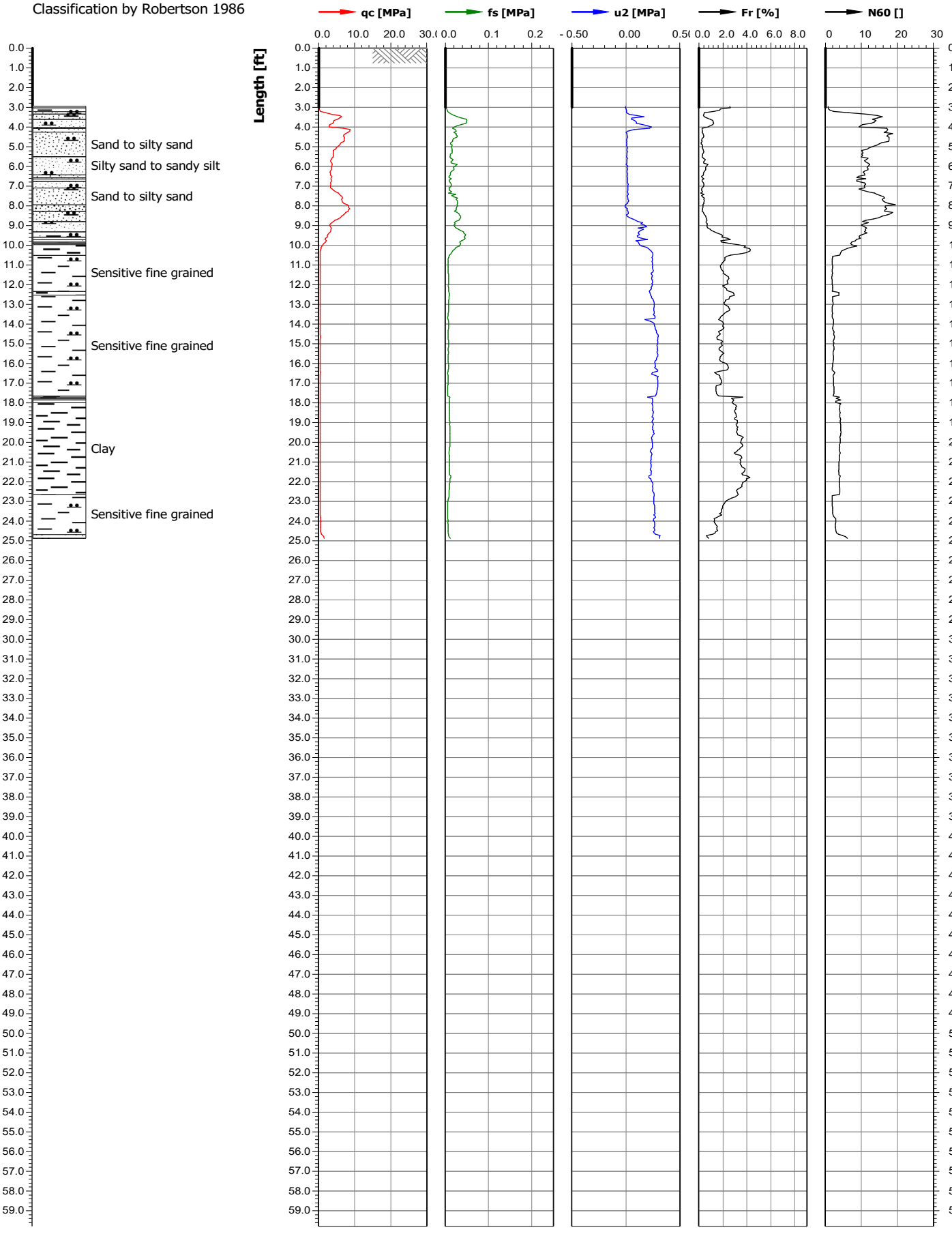
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.98	CPT-6CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/21/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123387, Easting 2440830		MAS		u2

GEOTECHNICS
Soil & Material Testing

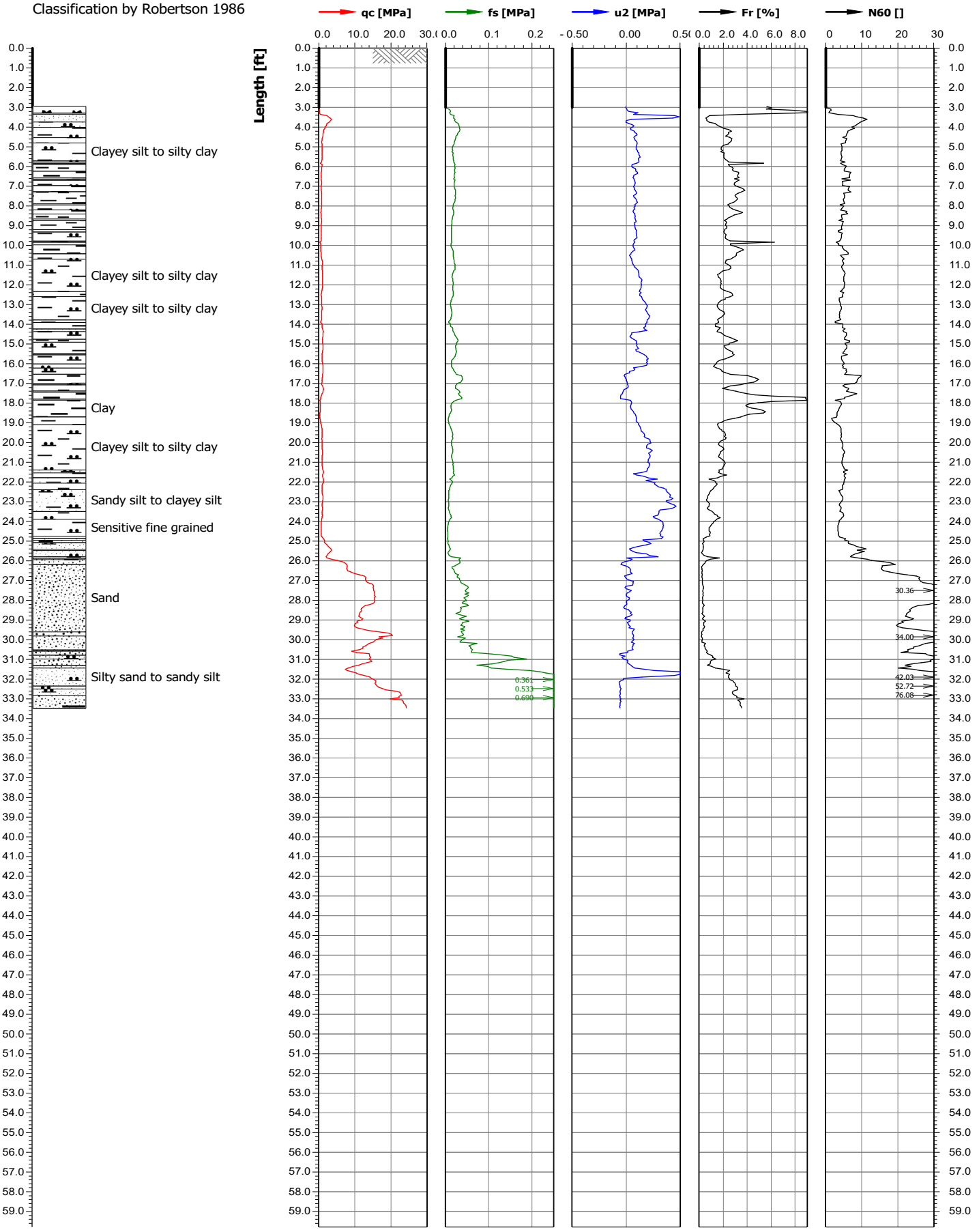
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	531.40	CPT-6L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123455, Easting 2440700		MAS		u2

GEOTECHNICS
Soil & Material Testing

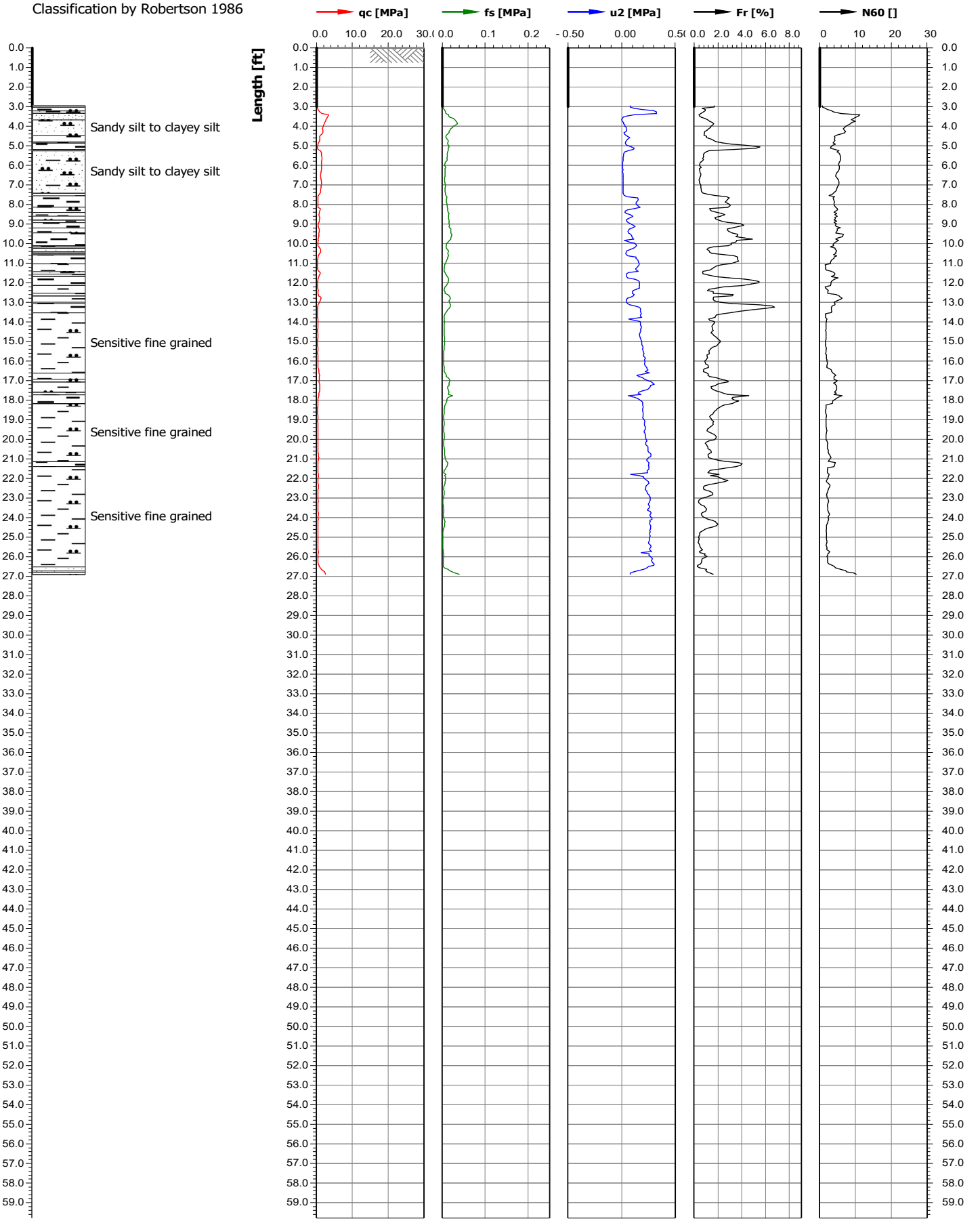
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.10	CPT- 7CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123637, Easting 2441397		MAS		u2

GEOTECHNICS
Soil & Material Testing

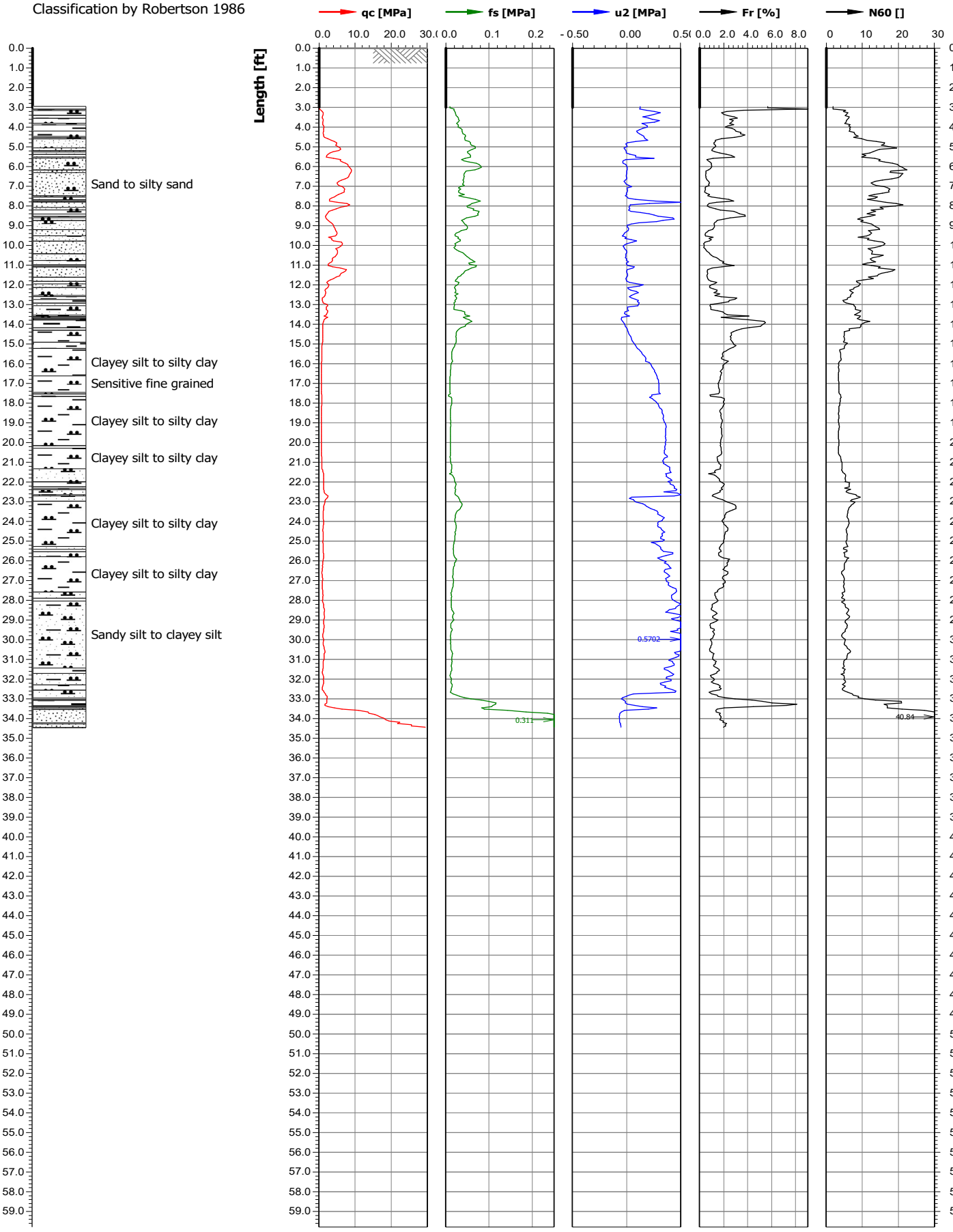
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	533.99	CPT-7L	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1123789, Easting 2441320		MAS		u2

GEOTECHNICS
Soil & Material Testing

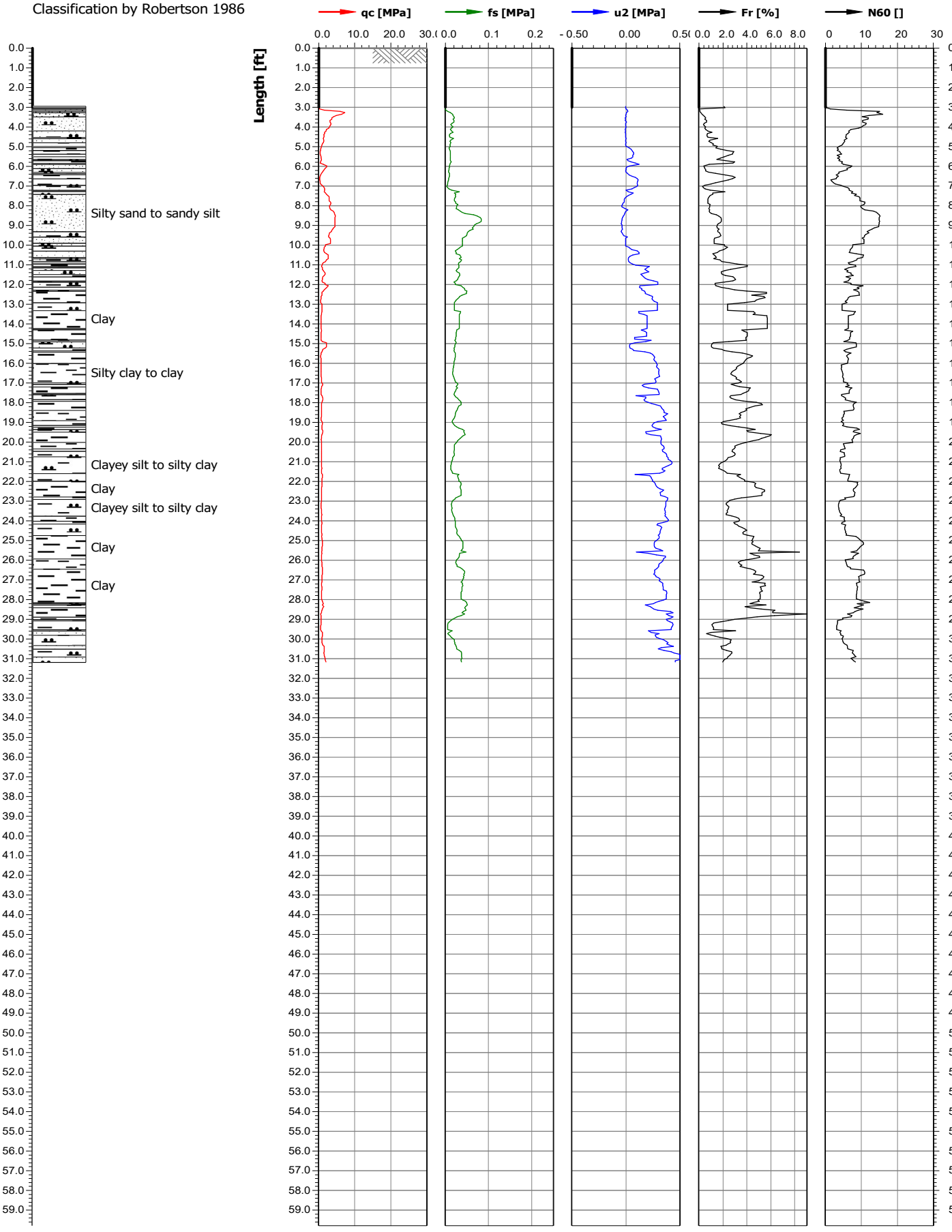
Classification by Robertson 1986



Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	555.41	CPT- 10CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122854, Easting 2441308		MAS		u2

GEOTECHNICS
Soil & Material Testing

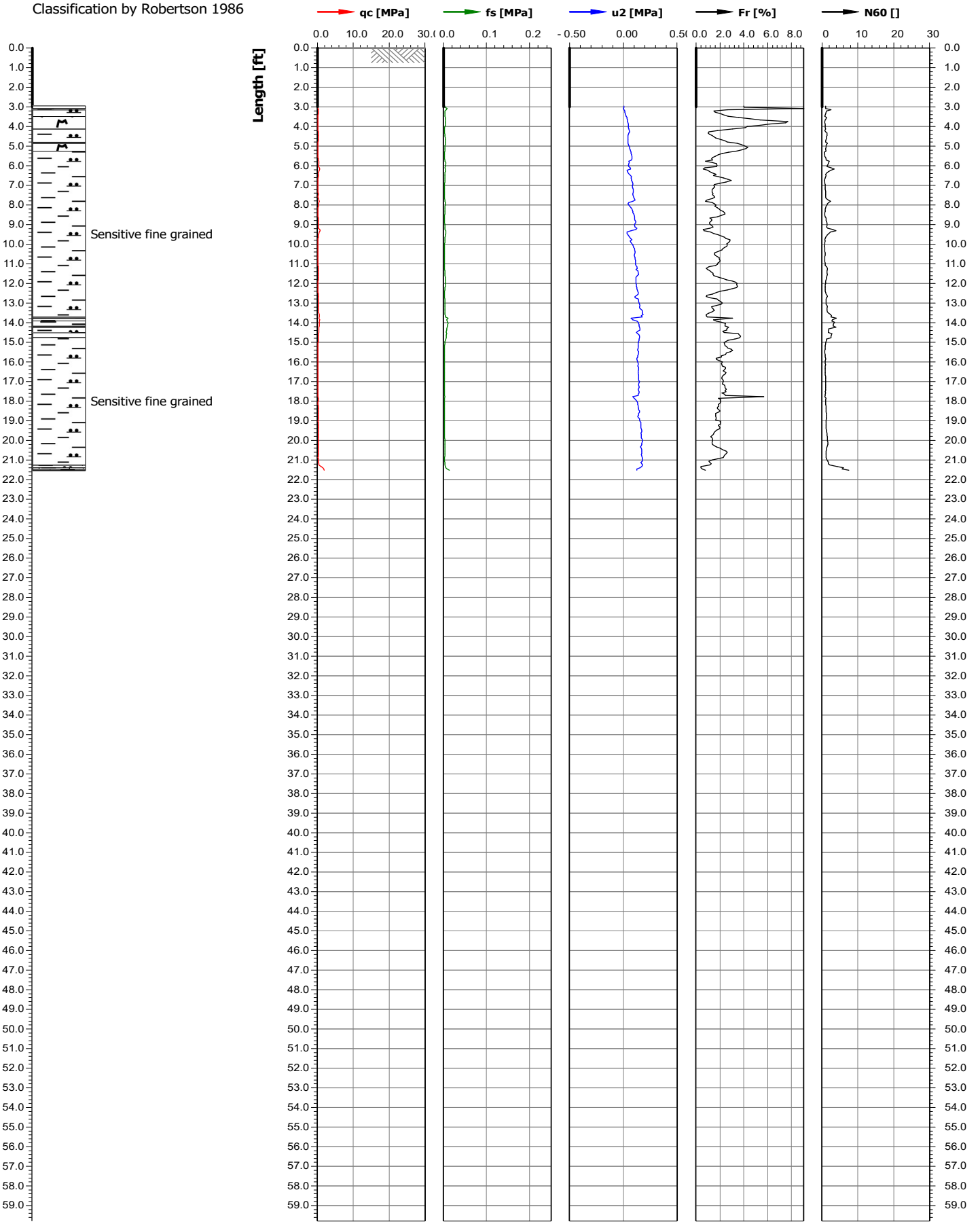
Classification by Robertson 1986

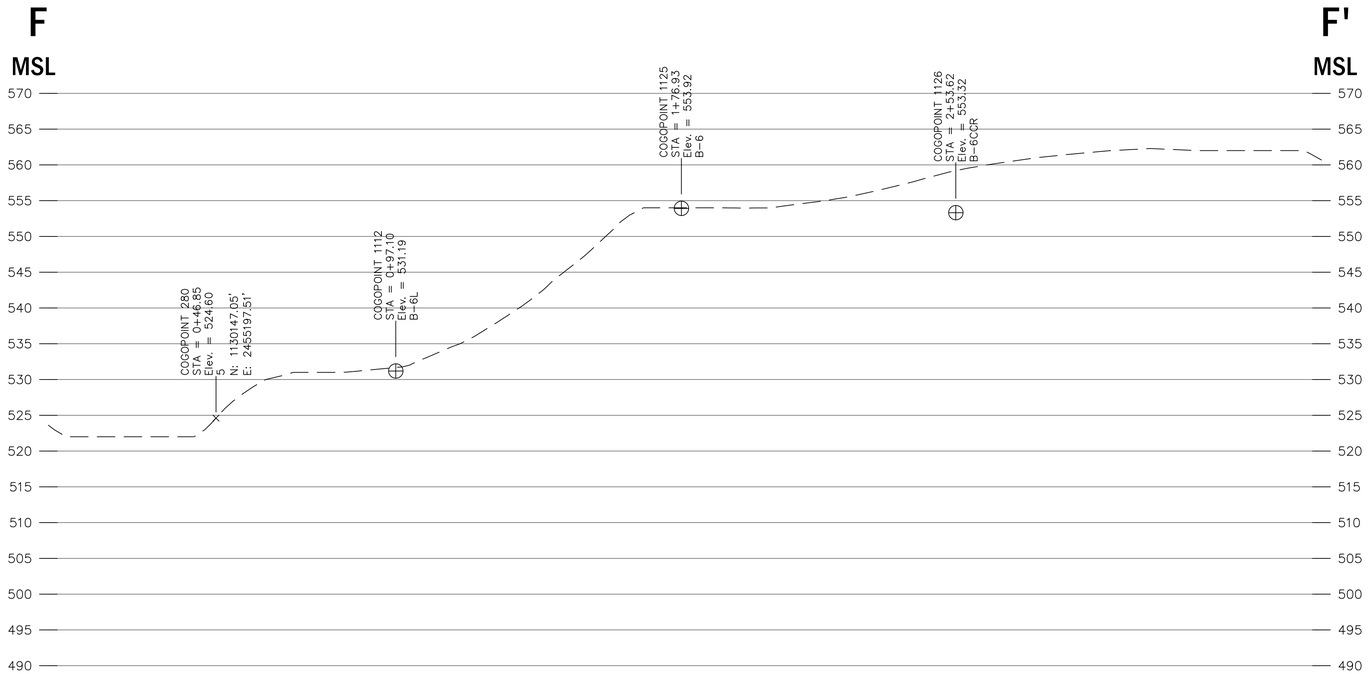


Test location name	Pre-excavated depth [ft]	Z value [ft]	Test name	Cone serial number
Springfield, IL CWLP	3.00	552.30	CPT- 15CCR	5732
Project ID	**Client**	**Date investigation**	**Standard/Standar...**	**Nominal surface area of...**
23-1071	Andrews Engineering	2/20/2024	/	10.0/150.0
Project name		**Page**	**Scale**	**Net surface area quotie...**
CWLP Ash Ponds		1/1	1:75	0.830/0.000
Remarks1		**Equipment operator**		**U**
Northing 1122726, Easting 2441795		MAS		u2

GEOTECHNICS
Soil & Material Testing

Classification by Robertson 1986





CROSS-SECTION LOCATION MAP



HORIZ. 0 20 40 80

VERT. 0 10 20 40

SCALE: IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWS-ENG.COM
PONTIAC, IL • LOMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO

DESIGNED BY: KWF | DRAWN BY: BCK | APPROVED BY: KWF

PLAN AND PROFILE F-F'

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2024

PROJECT ID: 220408/0029

SHEET NUMBER:

F-F'

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Tab: F SLOPE ANALYSIS Last Saved: June 26, 2024, by Ben Karpus Plotted: Thursday, June 27, 2024 8:28:28 AM
J:\S\Springfield CWLP\CWLP Ash Pond\DWG\2024\Geologic Cross Sections\As-Built Borings 2024 SPC KWF.dwg

APPENDIX C:

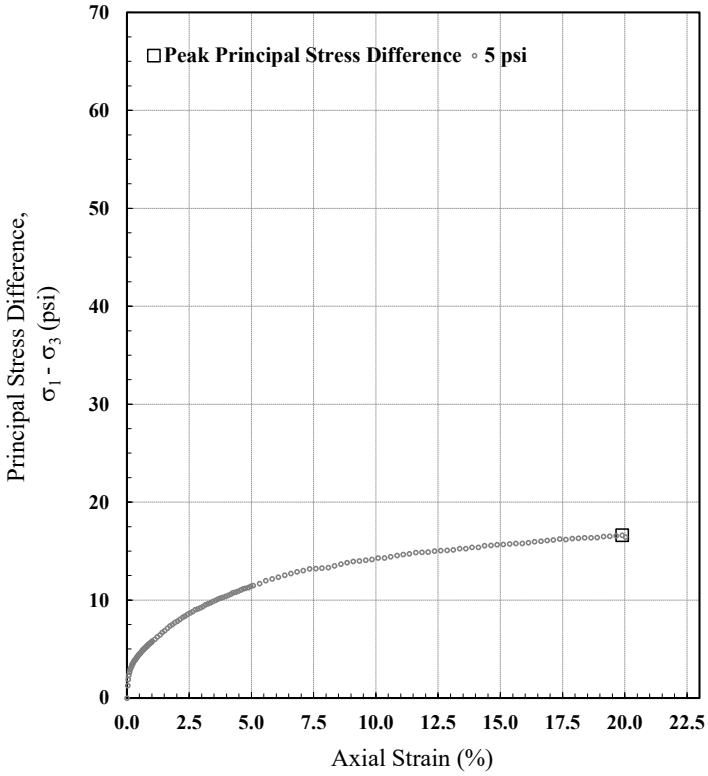
In situ Vane Shear Readings, Laboratory Analysis & Soil Strength Parameters Rational

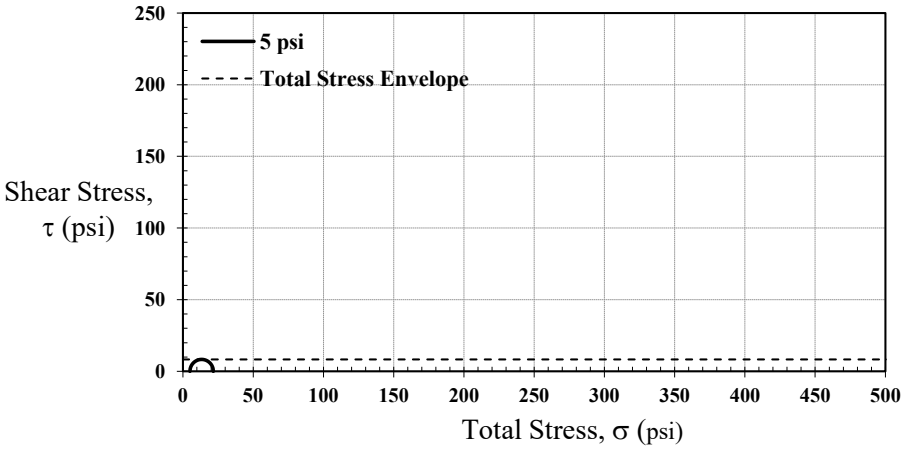
Field Vane Shear		Cohesive Soils	Shear Strength									Upper	Lower
Boring	Elevation (ft MSL)	Simplified Soil Description	Maximum (tsf)	Remolded (tsf)	Fill	Gray Silty Clay	Brown Silty Clay	Gray Clay	Gray Clayey Silt	Brown Clayey Silt	Gray Silt	Clayey Silt	Clayey Silt
B-1LL	528.3	Gray Silty Clay	1.7	0.72		1.7							
B-1L	543.1	Brown Silty Clay Fill	1.54	0.48	1.54								
B-1L	530.6	Dark Gray Clay	1.3	0.39				1.3					
B-1	548.3	Gray Silty Clay Fill	0.6	0.32	0.6								
B-1	535.8	Gray Silty Loam	0.67	0.23		0.67							
B-2L	527.4	Light Gray Clayey Silt	1.3	0.28					1.3			1.3	
B-2	540.2	Brown silty Clay Fill	1.4	0.8	1.4								
B-2	530.2	Brownish/Greenish Gray Silty Clay	1.08	0.64		1.08							
B-2U	542.8	Black Fly Ash Fill	1.3+	0.32									
B-3	544.7	Dark Yellowish Brown Silty Clay Fill	1.86	1.06	1.86								
B-3	534.7	Dark Yellowish Brown Silty Clay Fill	2.36	1	2.36								
B-3	529.7	Yellow Brown Clayey Silt	1.82	1.18						1.82		1.82	
B-3U	553.4	Olive Gray Silty Clay Fill	1.56	0.78	1.56								
B-4L	521.5	Light Gray Silty Clay	1.12	0.48		1.12							
B-4L	514	Light Gray Silty Clay	0.42	0.14		0.42							
B-4	545.7	Gray Silty Clay Fill	0.88	0.5	0.88								
B-4	535.7	Brown Silty Clay	0.52	0.34			0.52						
B-5L	524.5	Gray Silty Clay	0.58	0.25		0.58							
B-5	538.6	Greenish Brown Silty Clay Fill	2.6	0.64	2.6								
B-5	529.1	Dark Gray Clay Silt	0.9	0.37					0.9			0.9	
B-6L	521.2	Reddish Brown Silty Clay	0.52	0.28			0.52						
B-6L	511.2	Gray Silty Clay to Clayey Silt	0.72	0.39		0.72			0.72				0.72
B-6	544.4	Dark Brown Silty Clay Fill	0.82	0.13	0.82								
B-6	538.9	Dark Brown Silty Clay Fill	1.3	0.46	1.3								
B-6	528.4	Gray Silty Clay	0.61	0.39		0.61							
B-7L	513.2	Gray Clayey Silt	0.67	0.3					0.67				0.67
B-7	543.1	Gray Silty Clay Fill	2.6	1.04	2.6								
B-7	533.1	Brown/Gray Silty Loam	2.28	1.22		2.28							
B-8L	521.1	Brown Silty Clay	0.54	0.34			0.54						
B-8L	508.6	Gray Silt	0.68	0.34							0.68		
B-8U	542.2	Dark Gray to Brown Silty Clay Fill	2	0.76	2								
B-8U	532.2	Black/Dark Brown Silty Clay Fill	2.24	0.76	2.24								
B-8U	527.2	Black/Dark Brown Silty Clay Fill	1.16	0.6	1.16								
B-9L	504.6	Gray Silty Clay	1.08	0.58		1.08							
B-9U	542.7	Yellow Brown Silty Clay Fill	1.5	0.7	1.5								
B-9U	532.7	Black Silty Clay Fill	2.26	1.12	2.26								
B-9U	527.7	Black Silty Clay Fill	1.4	0.7	1.4								
B-11U	542.8	Yellow Brown Silty Clay Fill	1.84	0.56	1.84								
B-11U	532.8	Dark Gray Brown Silty Clay	2.6	1.48			2.6						
B-11U	527.8	Yellow Brown Silty Clay	0.98	0.62			0.98						
B-12L	524.2	Brown Silty Clay	1	0.38			1						
B-12U	543.9	Dark Yellow Brown Silty Clay Fill	2.16	0.86	2.16								
B-12U	533.9	Yellow Brown Silty Clay	2.6	1.2	2.6								
B-12U	528.9	Yellow Brown Silty Clay	1.9	0.74			1.9						
		Mean (tsf)			1.73	1.03	1.15	1.30	0.90	1.82	0.68	1.34	0.70
		Confidence Interval			0.27	0.36	0.60		0.28			0.52	0.05
		Standard Deviation			0.61	0.58	0.80		0.29			0.46	0.04
		Sample Count			20.00	10.00	7.00	1.00	4.00	1.00	1.00	3.00	2.00
		Lower Bound of Confidence (tsf)			1.46	0.67	0.56	1.30	0.62	1.82	0.68	0.82	0.65
		Lower Bound of Confidence (psf)			**2929.62**	**1336.20**	**1111.07**	**2600.00**	**1234.58**	**3640.00**	**1360.00**	**1635.99**	**1292.00**
					Clay Fill	**Gray Silty Clay**	**Brown Silty Clay**	**Gray Clay**	**Gray Clayey Silt**	**Brown Clayey Silt**	**Gray Silt**	**Upper Clayey Silt**	**Lower Clayey Silt**

Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-2L-1 (5-7_ft)

TRI Log #: 25-02906.1
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	5.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.84
Avg. Height (in)	6.30
Avg. Water Content (%)	27.2
Bulk Density (pcf)	121.2
Dry Density (pcf)	95.3
Saturation (%)	93.3
Void Ratio	0.80
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	19.9
Minor Total Stress (psi)	5.0
Major Total Stress (psi)	21.6
Principal Stress Diff. (psi)	16.6

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	8.3
S_u / σ_3	1.7

	Failure Type(s)
	Bulging - Middle
	Shear Plane - Angled
	Shear Plane - Vertical
	Matrix Failure - Crumble/disintegrate
X	Barrel Shape - Uniform Bulge
	End Failure
	Fracture/Bedding - Weak Planes
	Multiple Shear Planes
	Void Failure

Note: The calculated value of specimen saturation was less than 95%. The Mohr failure envelope was taken as a horizontal straight line, but noting that the calculated value of saturation indicates a partially saturated specimen.

Kelby Broussard 6/9/2025
Analysis & Quality Review/Date

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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-2L-1 (5-7_ft)

TRI Log #: 25-02906.1
Test Method: ASTM D2850

Pre-Shear Specimen	Post-Shear Specimen
	

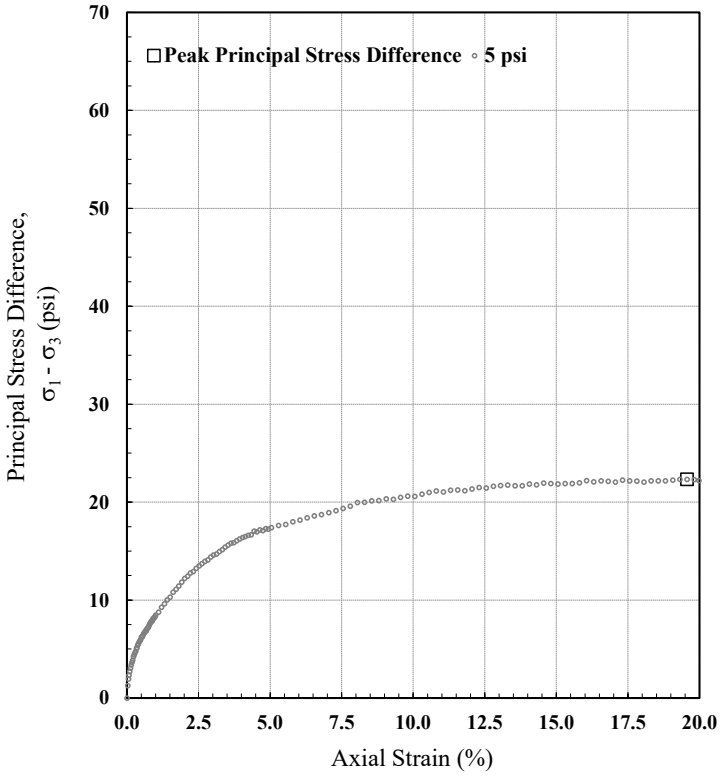
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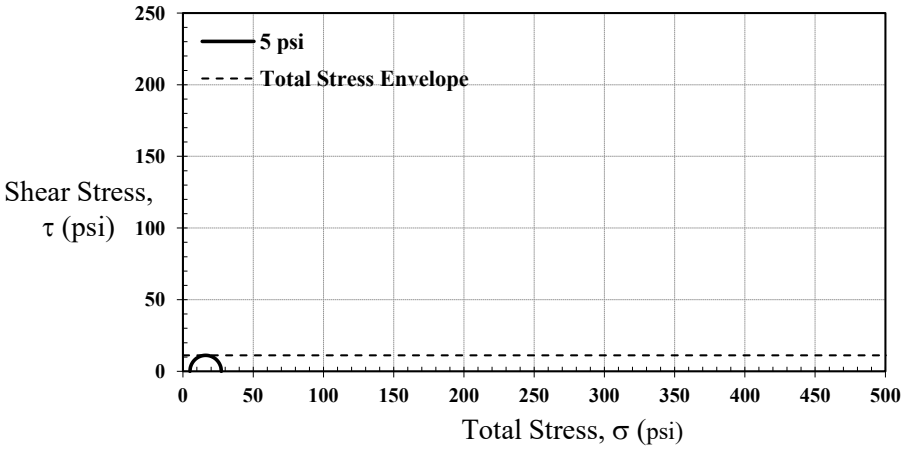
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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-4-1 (10-12_ft)

TRI Log #: 25-02906.3
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	5.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.84
Avg. Height (in)	6.21
Avg. Water Content (%)	24.8
Bulk Density (pcf)	122.5
Dry Density (pcf)	98.2
Saturation (%)	91.0
Void Ratio	0.75
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	19.6
Minor Total Stress (psi)	5.0
Major Total Stress (psi)	27.3
Principal Stress Diff. (psi)	22.3

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	11.2
S_u / σ_3	2.2

	Failure Type(s)
	Bulging - Middle
	Shear Plane - Angled
	Shear Plane - Vertical
	Matrix Failure - Crumble/disintegrate
X	Barrel Shape - Uniform Bulge
	End Failure
	Fracture/Bedding - Weak Planes
	Multiple Shear Planes
	Void Failure

Note: The calculated value of specimen saturation was less than 95%. The Mohr failure envelope was taken as a horizontal straight line, but noting that the calculated value of saturation indicates a partially saturated specimen.

Kelby Broussard 6/9/2025
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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-4-1 (10-12_ft)

TRI Log #: 25-02906.3
Test Method: ASTM D2850

Pre-Shear Specimen	Post-Shear Specimen
	

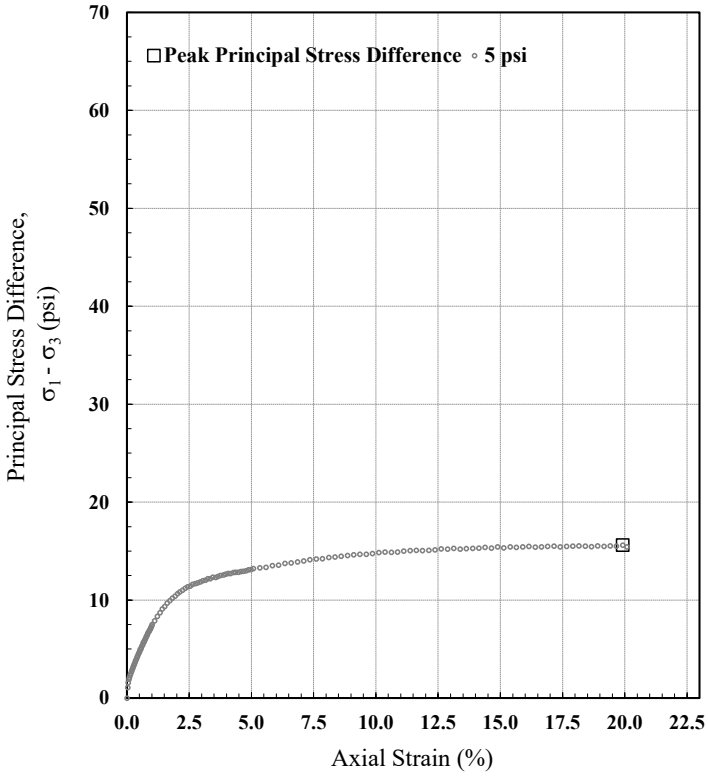
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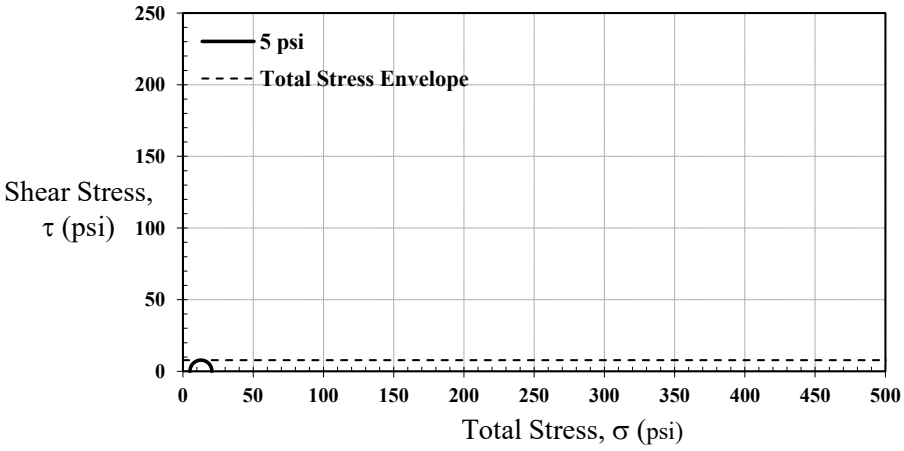
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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-4-2 (24-26_ft)

TRI Log #: 25-02906.4
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	5.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.85
Avg. Height (in)	6.18
Avg. Water Content (%)	25.9
Bulk Density (pcf)	123.7
Dry Density (pcf)	98.2
Saturation (%)	95.3
Void Ratio	0.75
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	19.9
Minor Total Stress (psi)	5.0
Major Total Stress (psi)	20.6
Principal Stress Diff. (psi)	15.6

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	7.8
S_u / σ_3	1.6

	Failure Type(s)
	Bulging - Middle
	Shear Plane - Angled
	Shear Plane - Vertical
	Matrix Failure - Crumble/disintegrate
X	Barrel Shape - Uniform Bulge
	End Failure
	Fracture/Bedding - Weak Planes
	Multiple Shear Planes
	Void Failure

Note: The calculated value of specimen saturation was approximately 95% or greater. The Mohr failure envelope was taken as a horizontal straight line.

Kelby Broussard 6/9/2025
Analysis & Quality Review/Date

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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-4-2 (24-26_ft)

TRI Log #: 25-02906.4
Test Method: ASTM D2850

Pre-Shear Specimen	Post-Shear Specimen
	

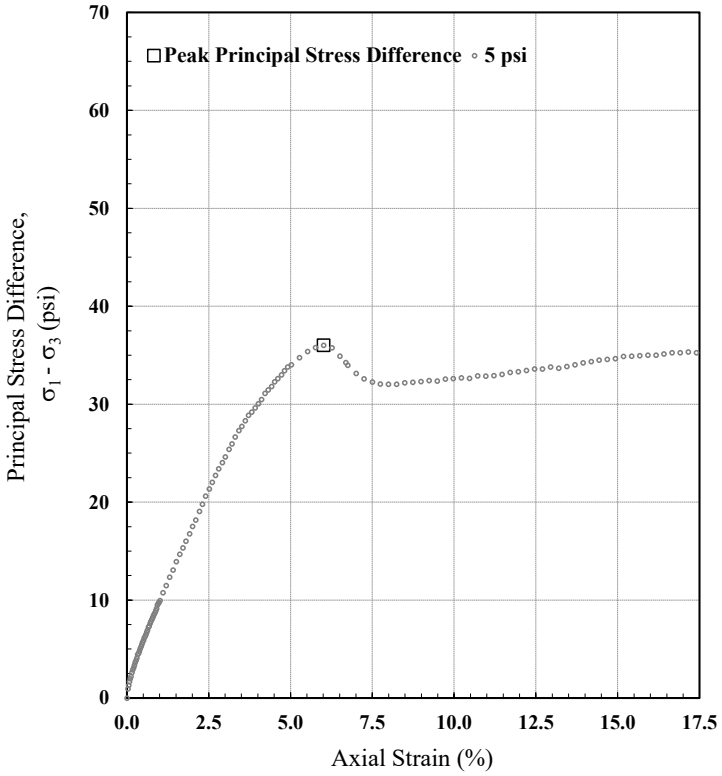
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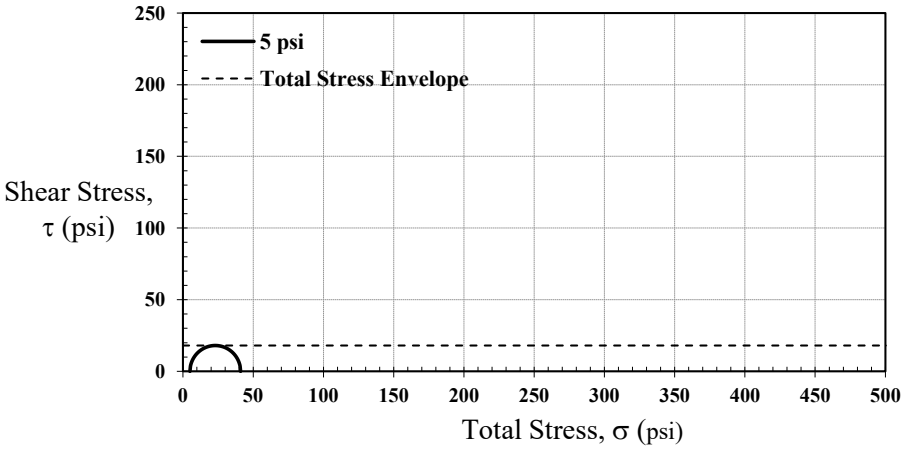
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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-11 (5-7_ft)

TRI Log #: 25-02906.10
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	5.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.81
Avg. Height (in)	6.47
Avg. Water Content (%)	18.3
Bulk Density (pcf)	130.7
Dry Density (pcf)	110.5
Saturation (%)	90.8
Void Ratio	0.55
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	6.0
Minor Total Stress (psi)	5.0
Major Total Stress (psi)	41.0
Principal Stress Diff. (psi)	36.0

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	18.0
S_u / σ_3	3.6

	Failure Type(s)
	Bulging - Middle
X	Shear Plane - Angled
	Shear Plane - Vertical
	Matrix Failure - Crumble/disintegrate
X	Barrel Shape - Uniform Bulge
	End Failure
	Fracture/Bedding - Weak Planes
	Multiple Shear Planes
	Void Failure

Note: The calculated value of specimen saturation was less than 95%. The Mohr failure envelope was taken as a horizontal straight line, but noting that the calculated value of saturation indicates a partially saturated specimen.

Kelby Broussard 6/9/2025
Analysis & Quality Review/Date

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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-11 (5-7_ft)

TRI Log #: 25-02906.10
Test Method: ASTM D2850

Pre-Shear Specimen	Post-Shear Specimen
	

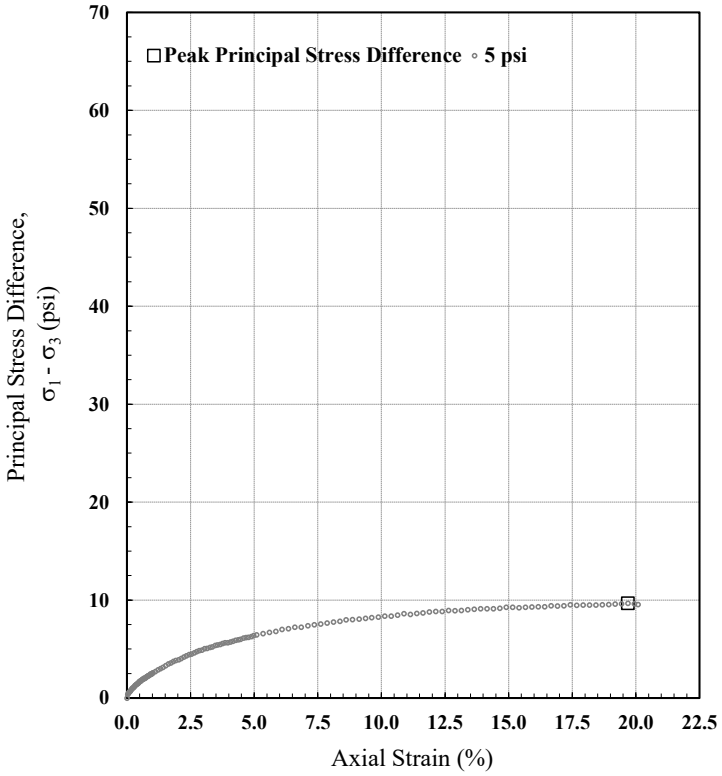
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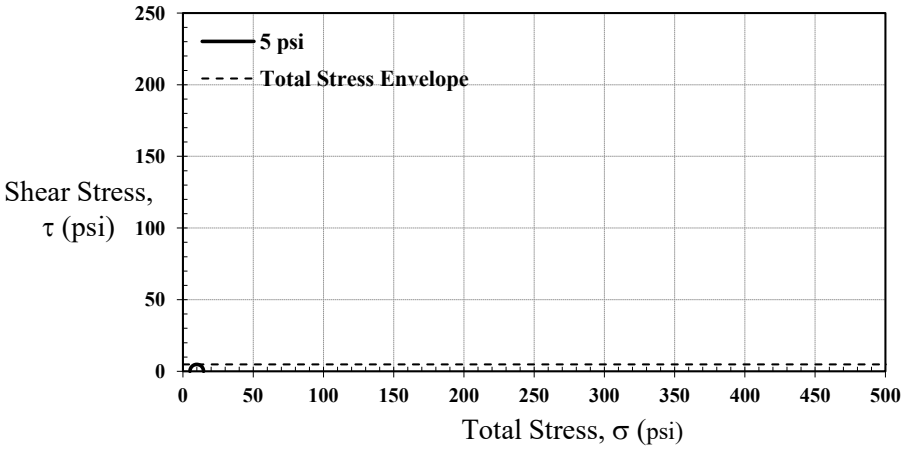
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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/3 (29-31_ft)

TRI Log #: 25-02906.12
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	5.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.81
Avg. Height (in)	6.28
Avg. Water Content (%)	28.0
Bulk Density (pcf)	124.9
Dry Density (pcf)	97.6
Saturation (%)	100.0
Void Ratio	0.76
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	19.7
Minor Total Stress (psi)	5.0
Major Total Stress (psi)	14.7
Principal Stress Diff. (psi)	9.7

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	4.8
S_u / σ_3	1.0

	Failure Type(s)
	Bulging - Middle
	Shear Plane - Angled
	Shear Plane - Vertical
	Matrix Failure - Crumble/disintegrate
X	Barrel Shape - Uniform Bulge
	End Failure
	Fracture/Bedding - Weak Planes
	Multiple Shear Planes
	Void Failure

Note: The calculated value of specimen saturation was approximately 95% or greater. The Mohr failure envelope was taken as a horizontal straight line.

Kelby Broussard 6/9/2025
Analysis & Quality Review/Date

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Unconsolidated-Undrained (Q) Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/3 (29-31_ft)

TRI Log #: 25-02906.12
Test Method: ASTM D2850

Pre-Shear Specimen	Post-Shear Specimen
	

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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

TRI Log #: 25-02906.5
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	28.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.10	2.07	2.00	-
Avg. Height (in)	4.17	4.05	4.13	-
Avg. Water Content (%)	17.6	18.8	19.9	-
Bulk Density (pcf)	121.8	120.6	127.5	-
Dry Density (pcf)	103.6	101.6	106.3	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	73.6	74.9	89.4	-
Void Ratio, n	0.66	0.69	0.61	-
B-Value, End of Saturation	0.99	0.98	1.00	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.65	0.68	0.58	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	16.0	18.4	16.7	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	5.0	15.0	15.0	-	2.9	6.1	6.1	-
Minor Effective Stress (psi), $\sigma_3'_f$	9.4	49.7	22.0	-	6.9	20.5	15.1	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	33.8	127.4	61.9	-	25.5	59.2	46.9	-
Pore Water Pressure, Δu_f (psi)	-4.2	-39.7	5.9	-	-1.7	-10.5	12.9	-
Major Effective Stress (psi), $\sigma_1'_f$	43.3	177.1	84.0	-	32.3	79.7	62.0	-
Secant Friction Angle (degrees)	39.9	34.2	35.8	-	40.6	36.3	37.5	-
Effective Friction Angle (degrees)	32.6				33.7			
Effective Cohesion (psi)	3.1				2.3			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 6/11/2025
Analysis & Quality Review/Date

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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

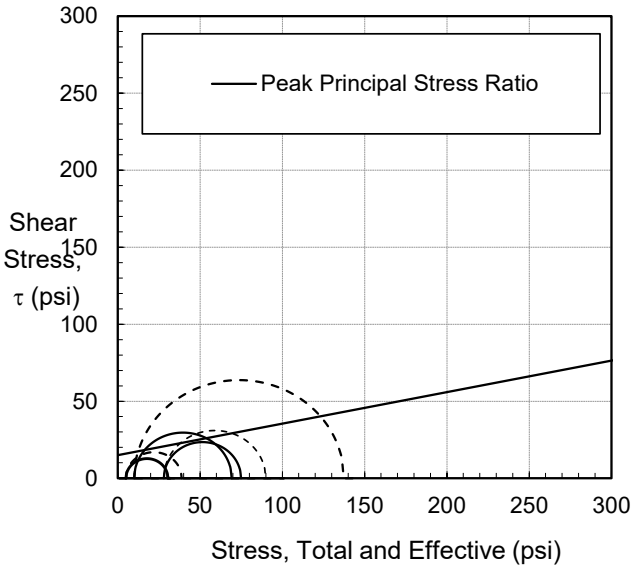
TRI Log #: 25-02906.5
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	-2.2	11.6
Cohesion (psi)	c_R	39.2	15.0

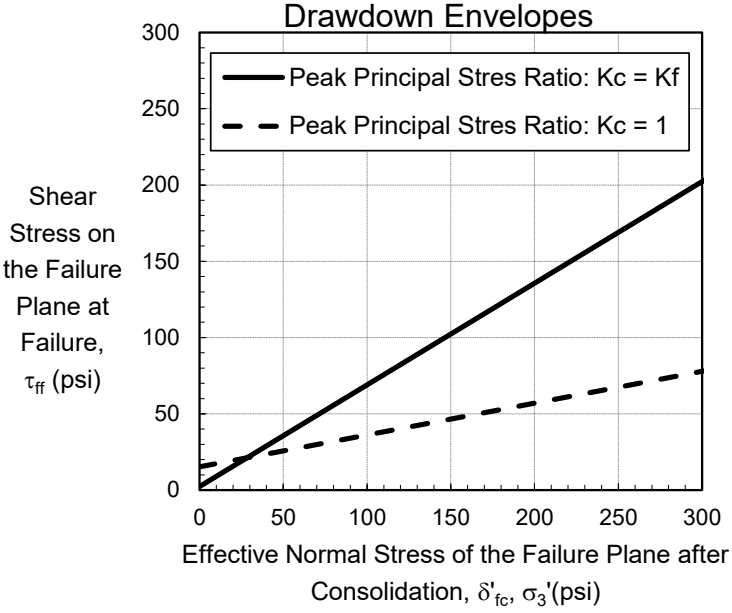
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	32.6	33.7
Effective Cohesion (psi)	c'	3.1	2.3

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	-	11.8
Cohesion (psi)	$\psi_{Kc=1}$	-	15.3

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown Envelopes



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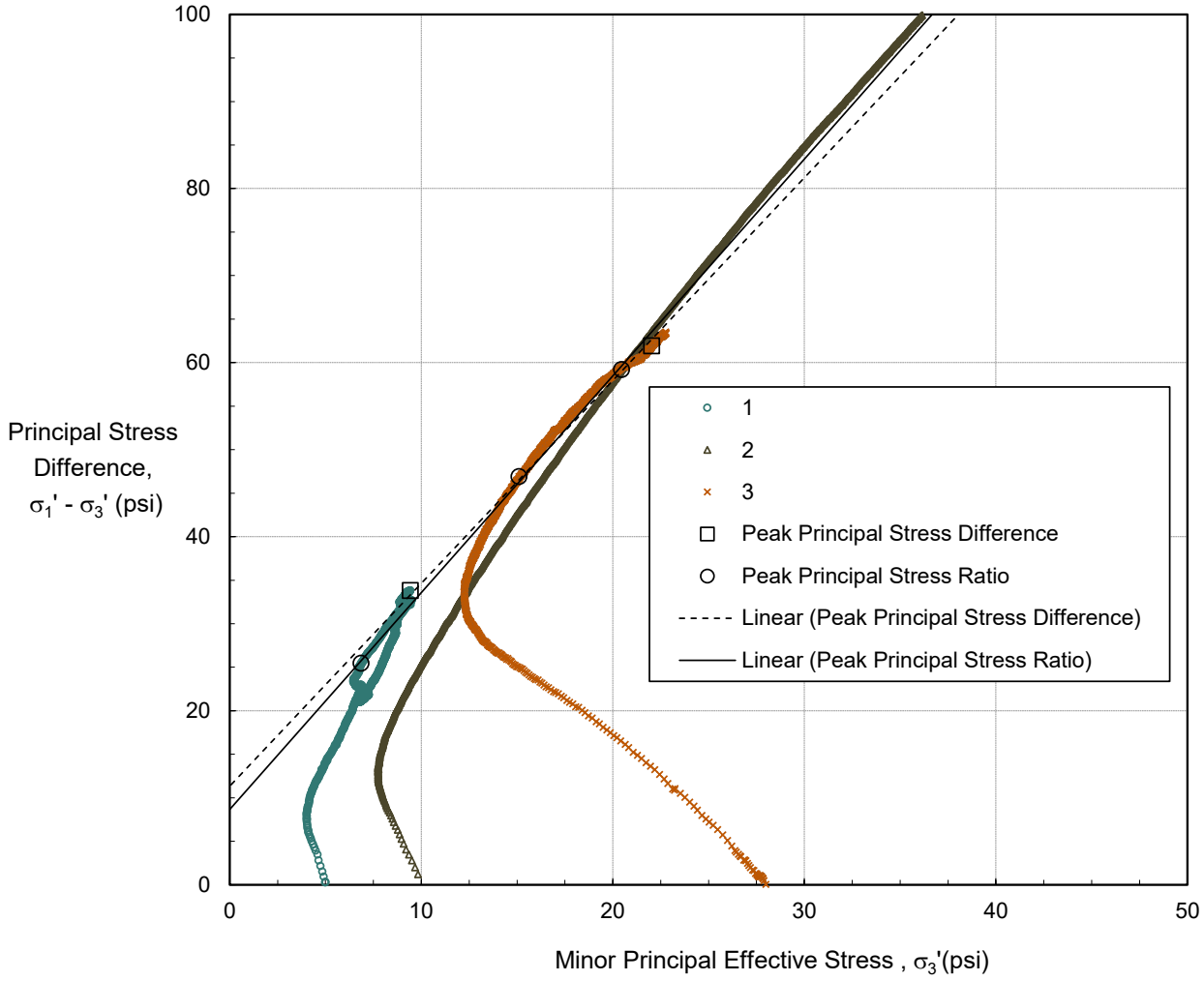
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

TRI Log #: 25-02906.5
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	32.6	33.7
Effective Cohesion (psi)	3.1	2.3

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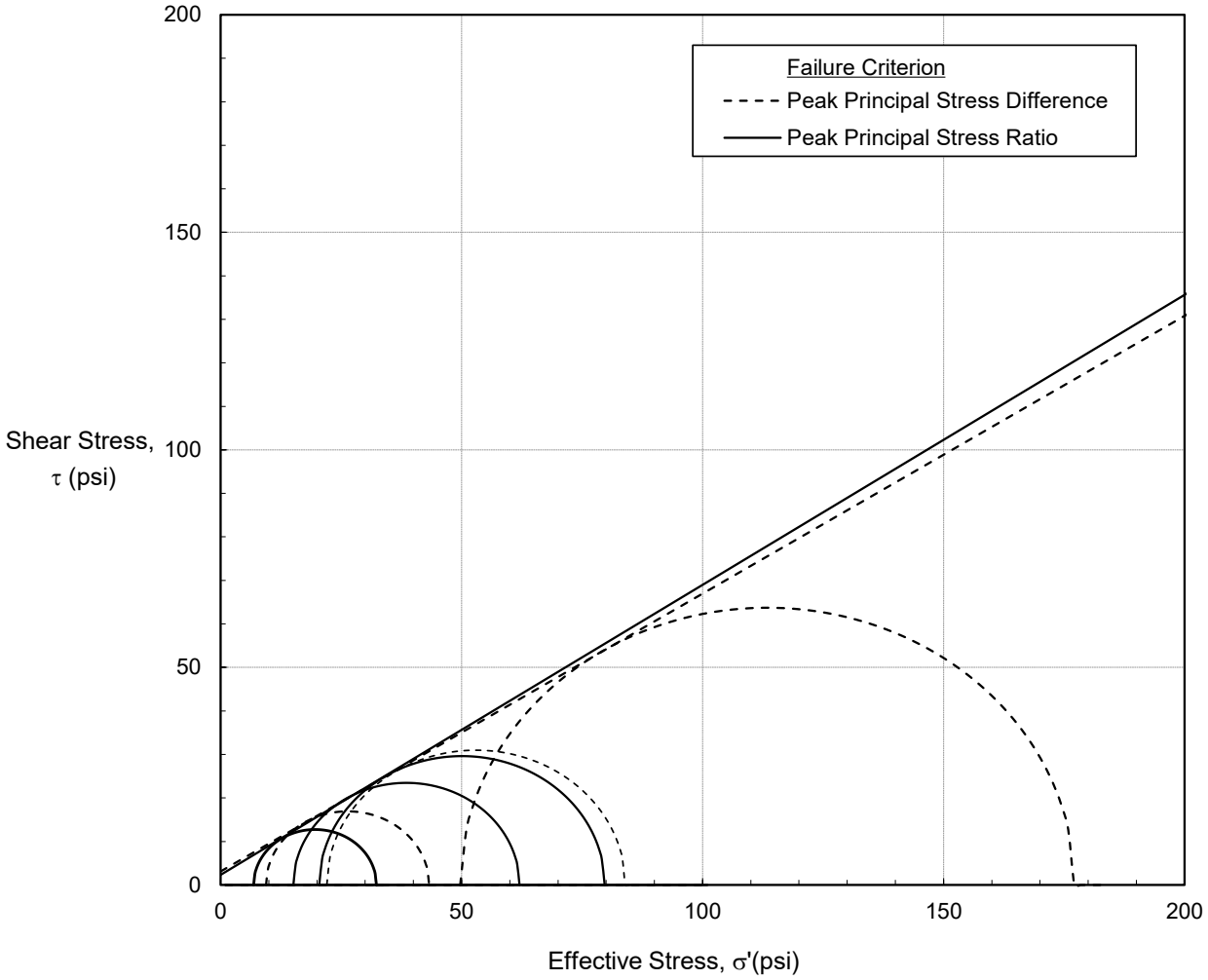
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

TRI Log #: 25-02906.5
Test Method: ASTM D4767

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	32.6	33.7
Effective Cohesion (psi)	3.1	2.3

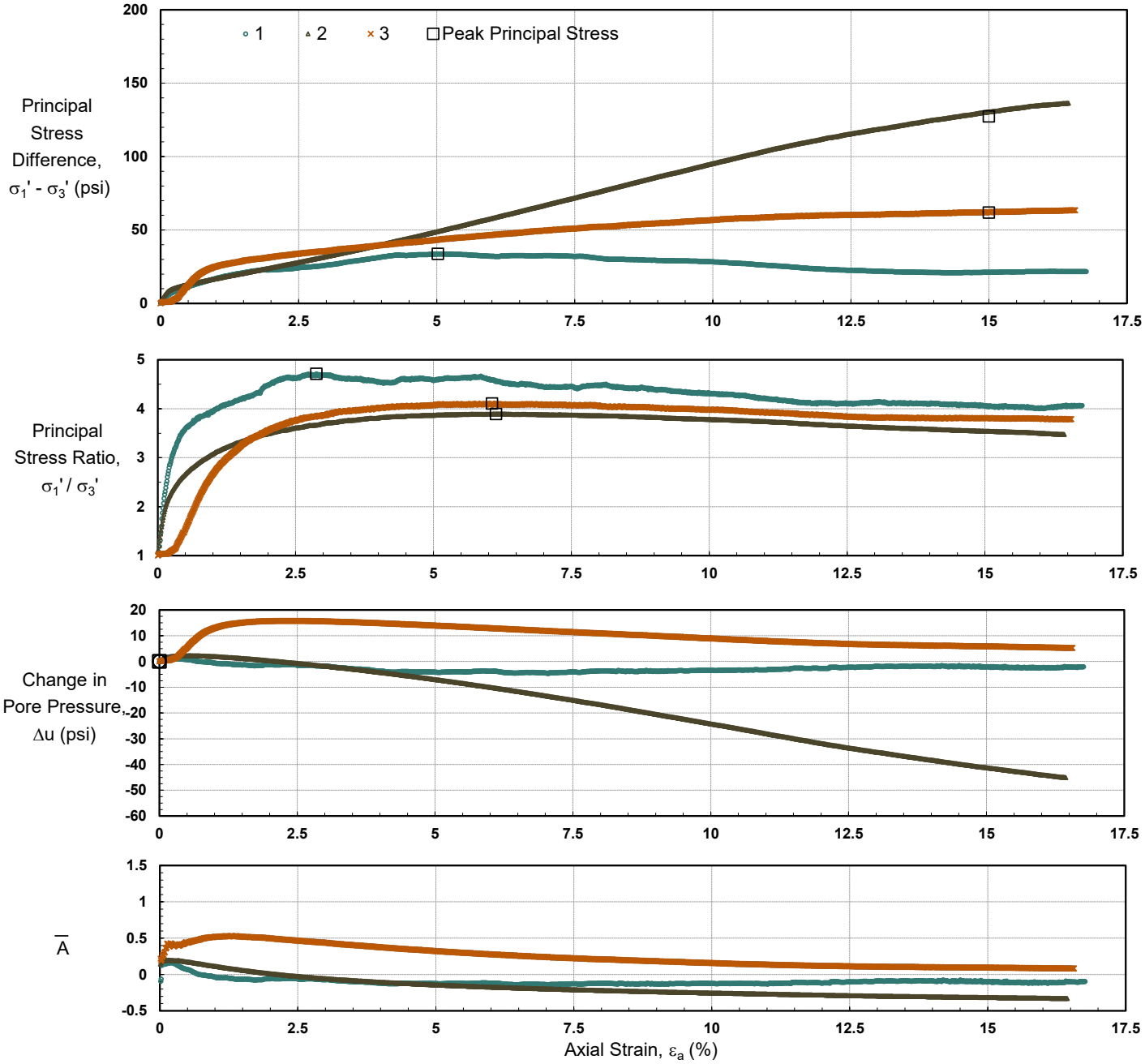
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

TRI Log #: 25-02906.5
Test Method: ASTM D4767



The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

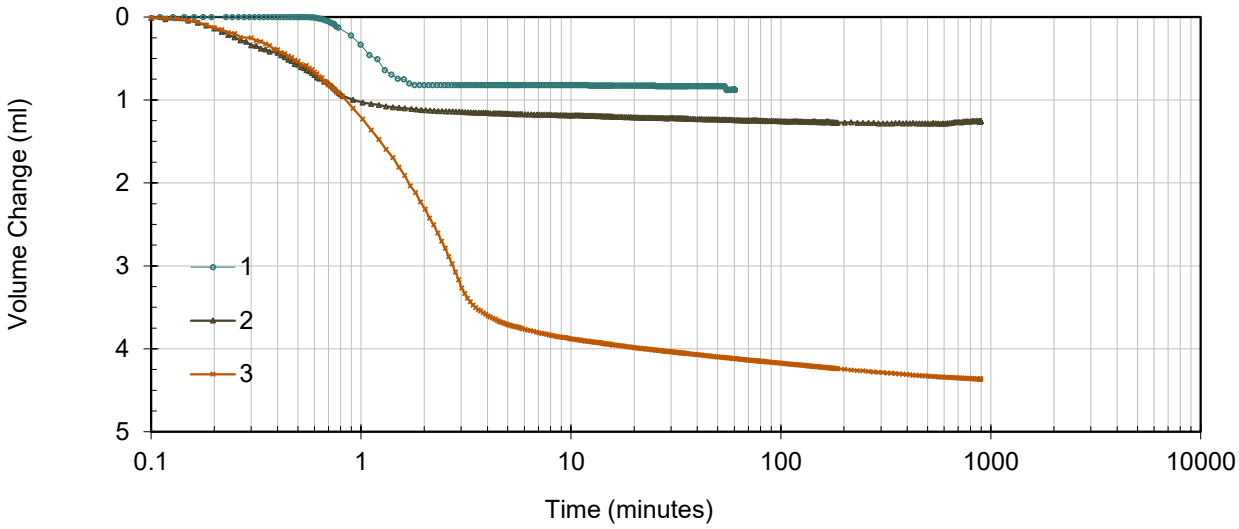
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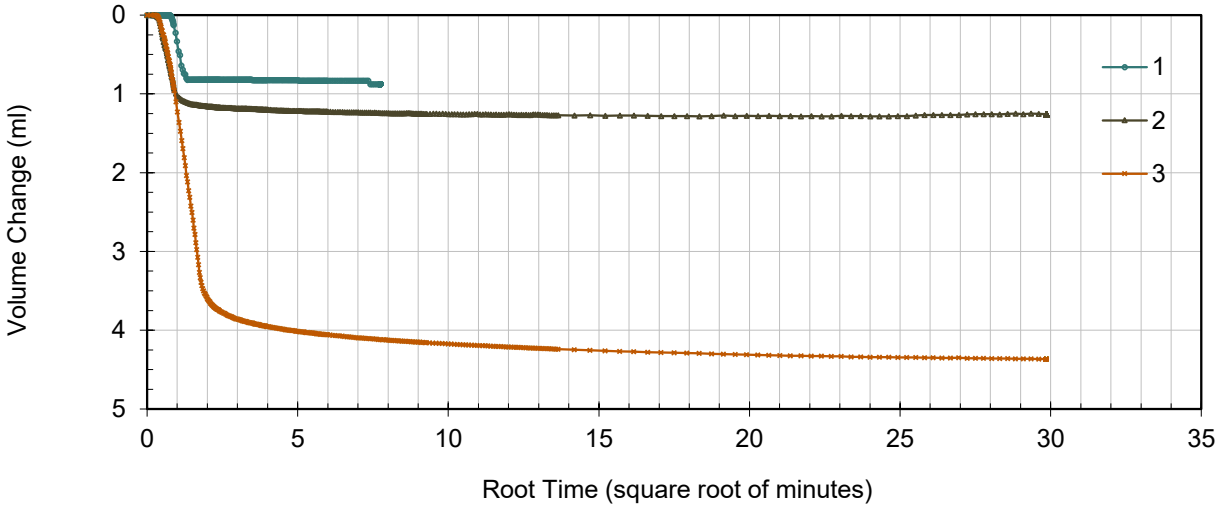
Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-4-3 (32-34_ft)

TRI Log #: 25-02906.5
Test Method: ASTM D4767

Consolidation





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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

TRI Log #: 25-02906.8
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	28.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.03	2.03	2.00	-
Avg. Height (in)	4.31	4.23	4.32	-
Avg. Water Content (%)	20.1	20.8	20.4	-
Bulk Density (pcf)	125.0	127.4	122.3	-
Dry Density (pcf)	104.1	105.5	101.6	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	85.2	91.3	81.3	-
Void Ratio, n	0.65	0.63	0.69	-
B-Value, End of Saturation	0.96	0.96	0.97	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.64	0.60	0.62	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	21.3	19.7	24.5	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	15.0	15.0	7.0	-	2.4	4.1	4.6	-
Minor Effective Stress (psi), $\sigma_3'_f$	10.4	14.4	15.8	-	3.8	7.6	14.9	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	29.2	34.4	35.8	-	15.5	21.7	34.8	-
Pore Water Pressure, Δu_f (psi)	-5.5	-4.4	12.2	-	1.3	2.3	13.1	-
Major Effective Stress (psi), $\sigma_1'_f$	39.6	48.8	51.6	-	19.2	29.3	49.7	-
Secant Friction Angle (degrees)	35.7	33.0	32.1	-	42.3	36.0	32.6	-
Effective Friction Angle (degrees)	22.5				27.7			
Effective Cohesion (psi)	5.5				2.6			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 6/11/2025
Analysis & Quality Review/Date

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Consolidated-Undrained Triaxial Compression

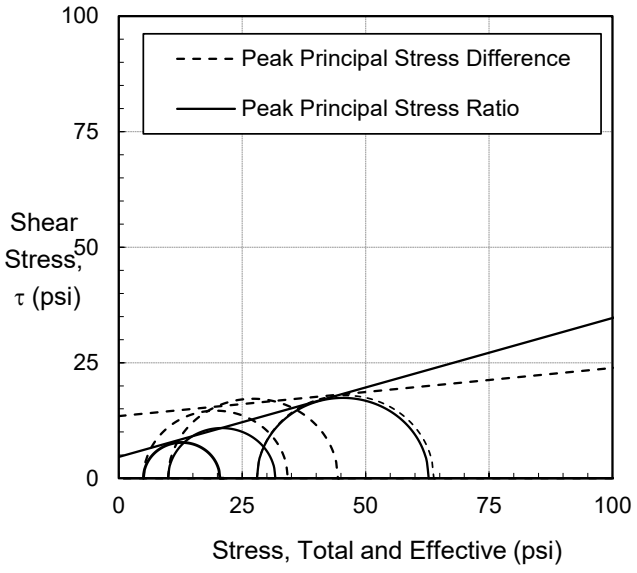
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Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

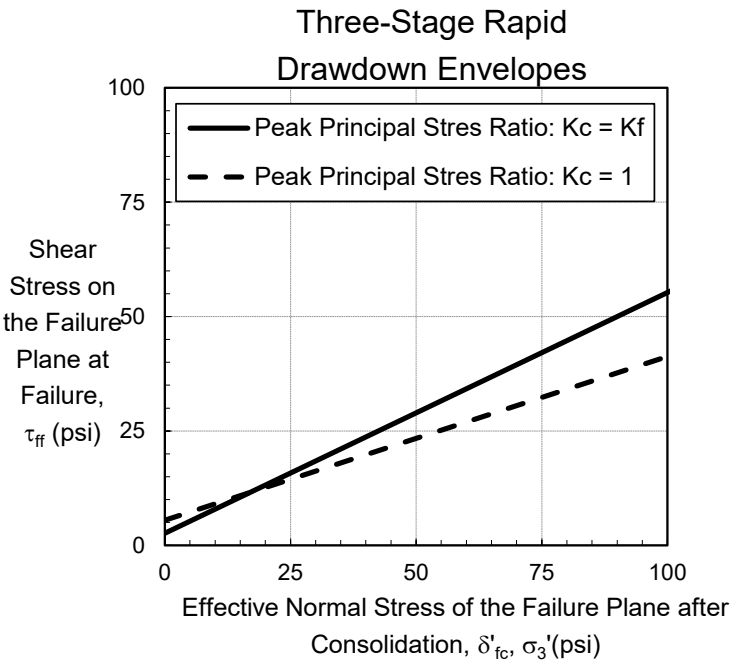
TRI Log #: 25-02906.8
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	5.9	16.7
Cohesion (psi)	c_R	13.4	4.6

Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	22.5	27.7
Effective Cohesion (psi)	c'	5.5	2.6

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	6.1	19.7
Cohesion (psi)	$\psi_{Kc=1}$	13.8	5.5





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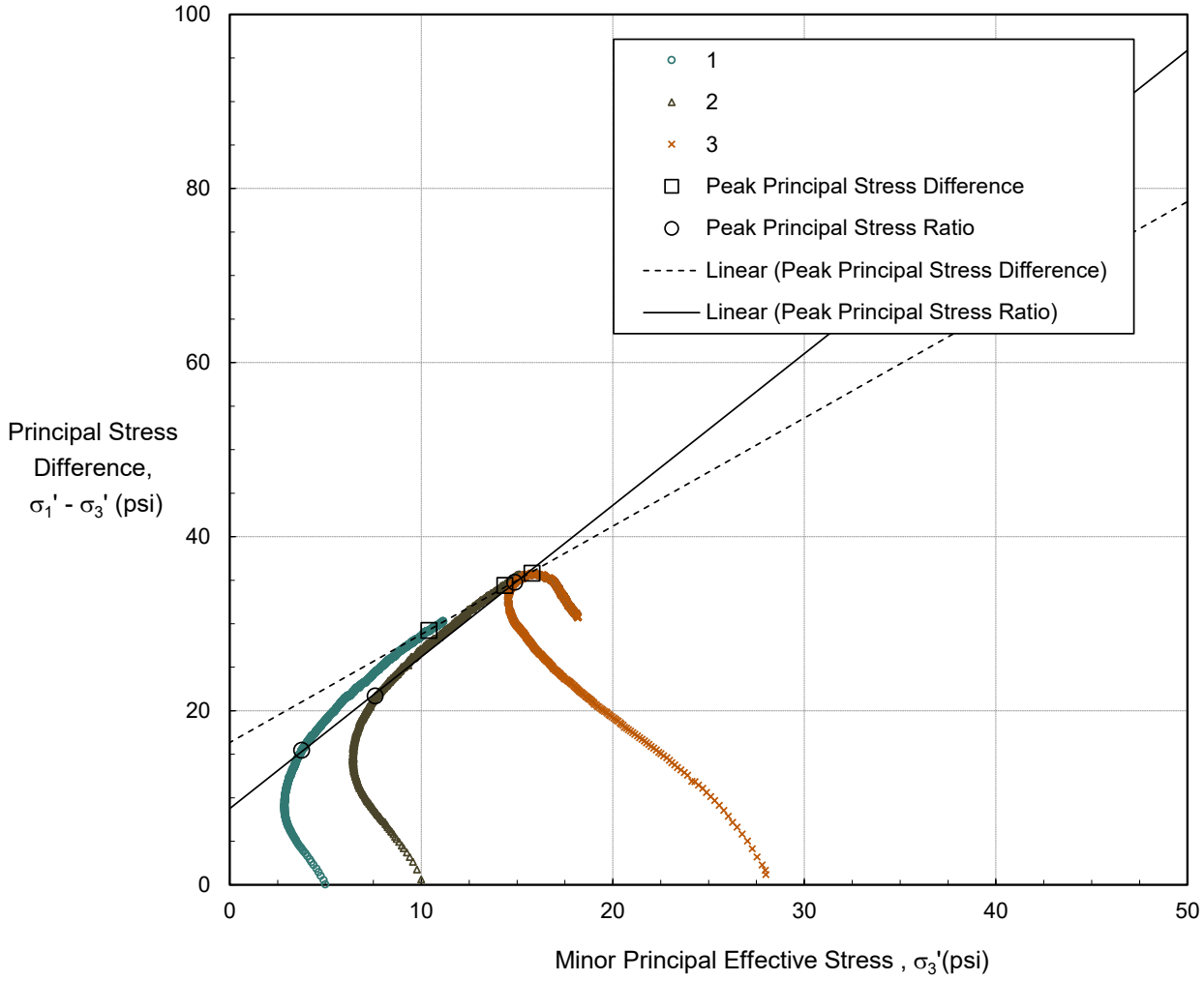
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

TRI Log #: 25-02906.8
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	22.5	27.7
Effective Cohesion (psi)	5.5	2.6

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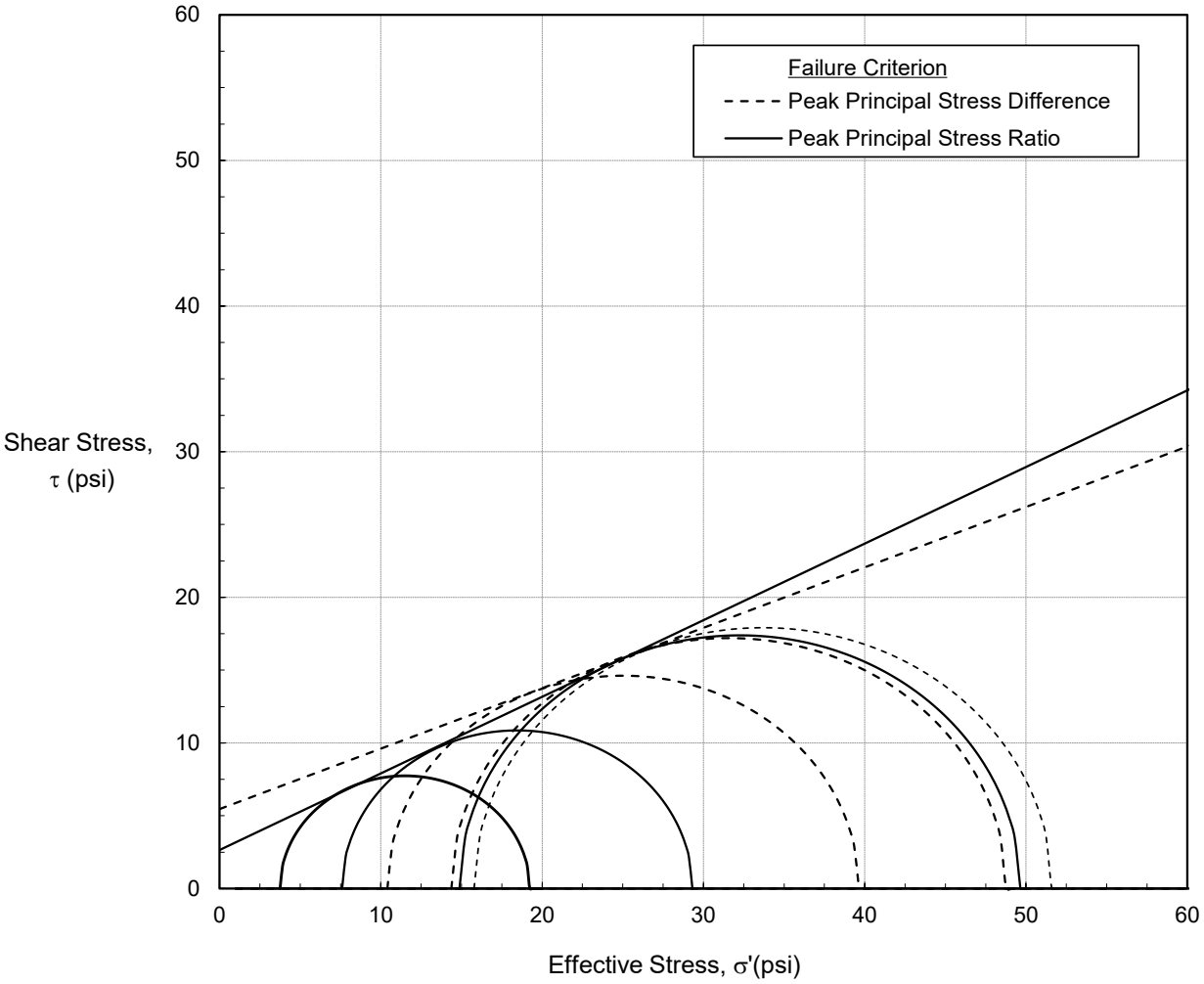
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

TRI Log #: 25-02906.8
Test Method: ASTM D4767

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	22.5	27.7
Effective Cohesion (psi)	5.5	2.6

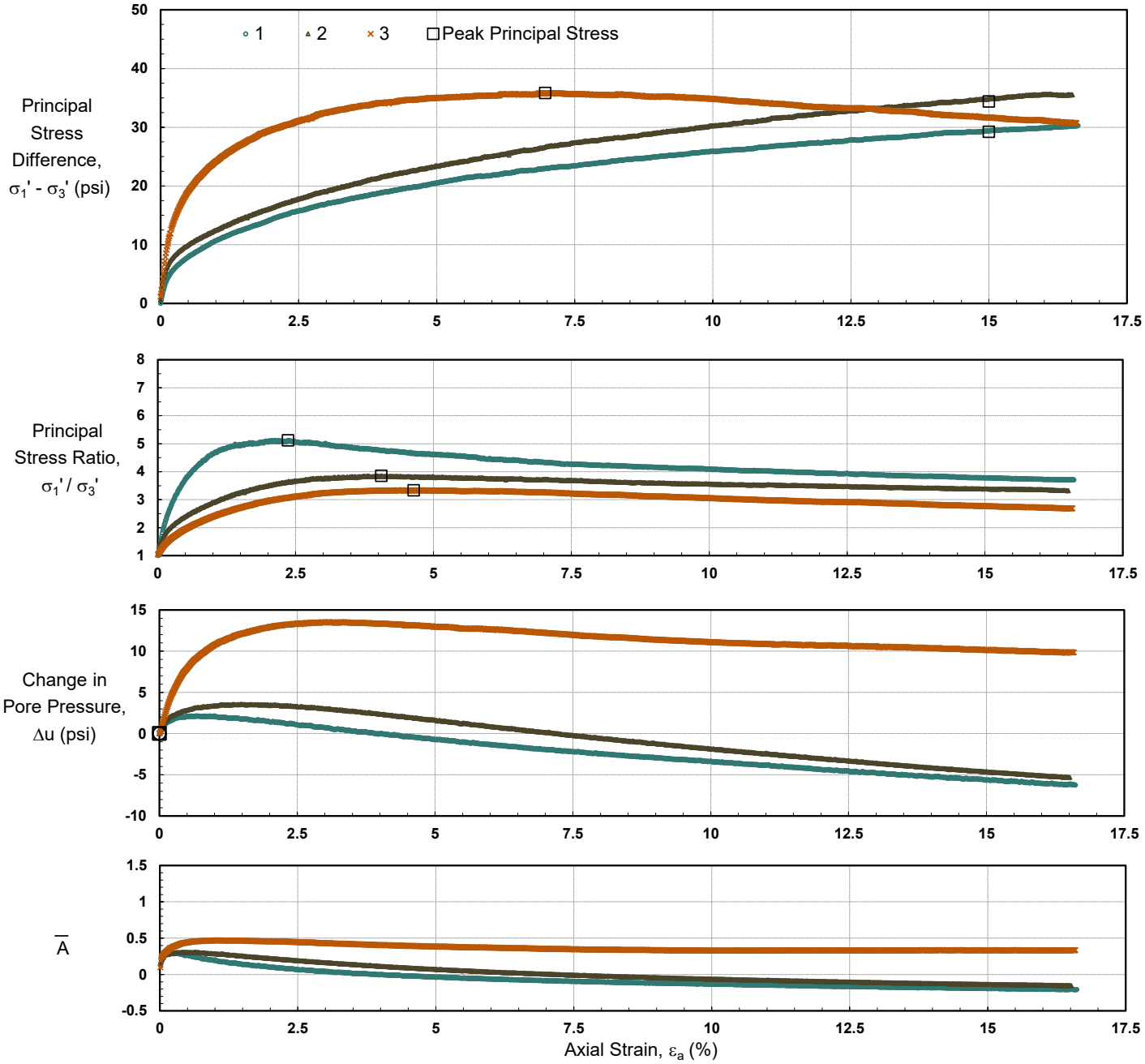
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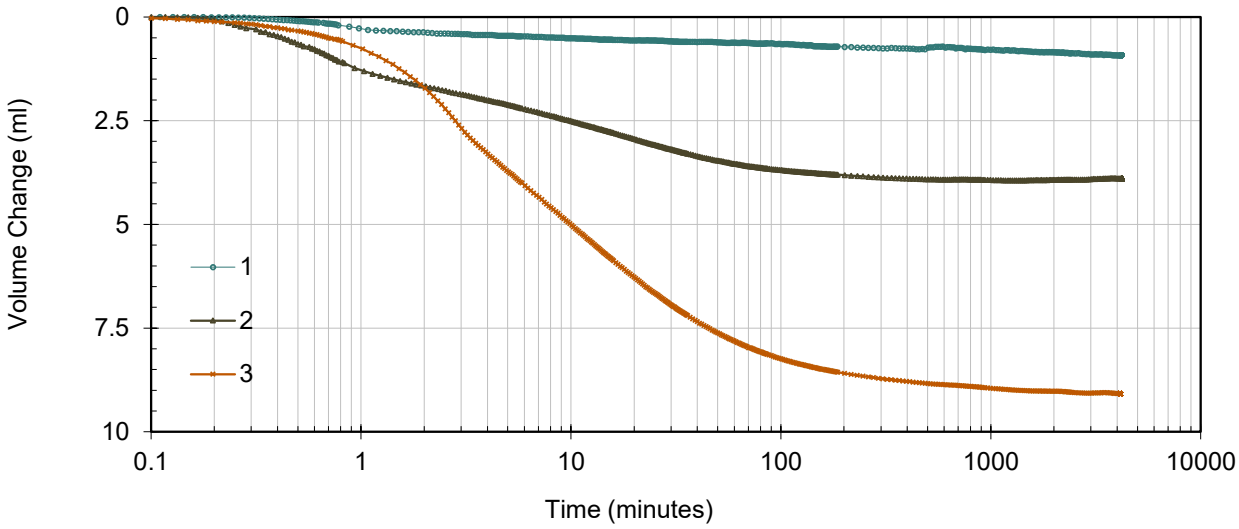
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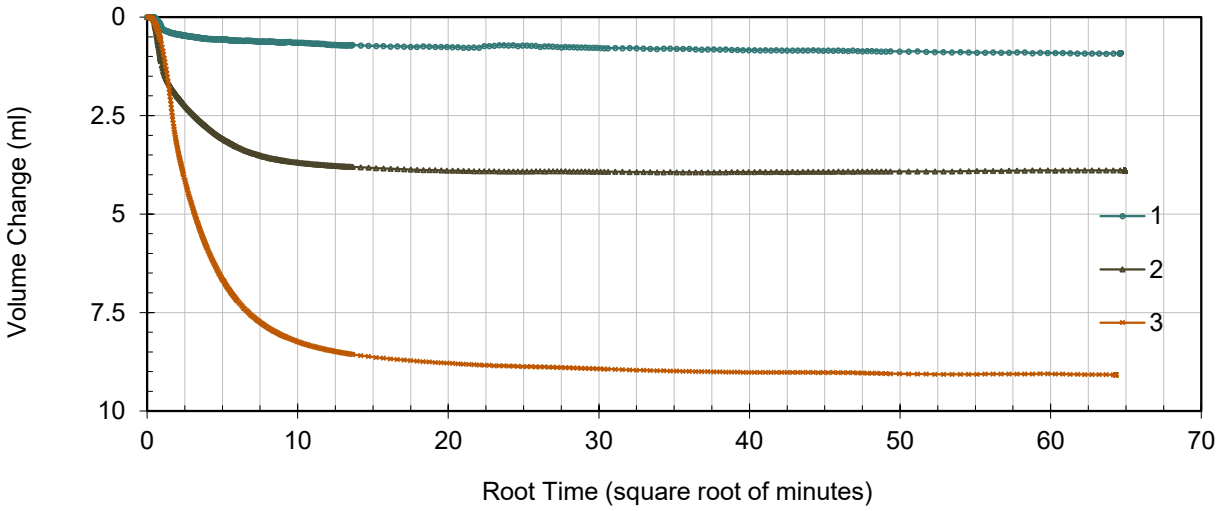
Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample B-6-1 (7-8_ft)

TRI Log #: 25-02906.8
Test Method: ASTM D4767

Consolidation





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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/2 (8-9_ft)

TRI Log #: 25-02906.9
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	28.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.03	2.07	2.02	-
Avg. Height (in)	4.92	5.02	4.88	-
Avg. Water Content (%)	22.0	18.6	18.5	-
Bulk Density (pcf)	125.8	128.9	121.6	-
Dry Density (pcf)	103.2	108.7	102.6	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	91.1	88.2	75.8	-
Void Ratio, n	0.66	0.58	0.67	-
B-Value, End of Saturation	0.97	0.99	0.97	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.66	0.56	0.59	-

Shear / Post-Shear				
Rate of Strain (%/hr)	0.50	0.50	0.50	-
Avg. Water Content (%)	20.7	20.7	19.8	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	15.0	15.0	15.0	-	5.5	6.0	11.9	-
Minor Effective Stress (psi), $\sigma_3'_f$	8.5	16.1	17.5	-	3.8	8.1	15.4	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	25.5	41.4	46.7	-	14.4	23.8	41.9	-
Pore Water Pressure, Δu_f (psi)	-3.5	-6.1	10.5	-	1.2	1.9	12.6	-
Major Effective Stress (psi), $\sigma_1'_f$	34.0	57.6	64.2	-	18.2	31.9	57.3	-
Secant Friction Angle (degrees)	36.9	34.2	34.8	-	40.7	36.5	35.2	-
Effective Friction Angle (degrees)	32.0				32.9			
Effective Cohesion (psi)	1.7				1.3			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 6/17/2025
Analysis & Quality Review/Date

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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/2 (8-9_ft)

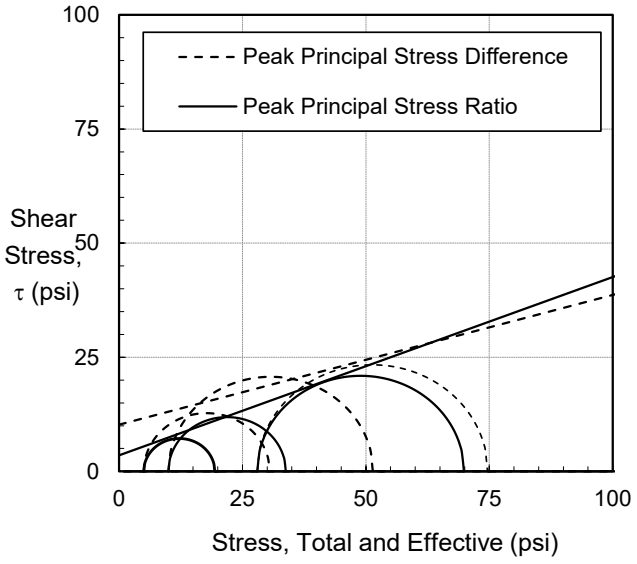
TRI Log #: 25-02906.9
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	15.9	21.3
Cohesion (psi)	c_R	10.2	3.5

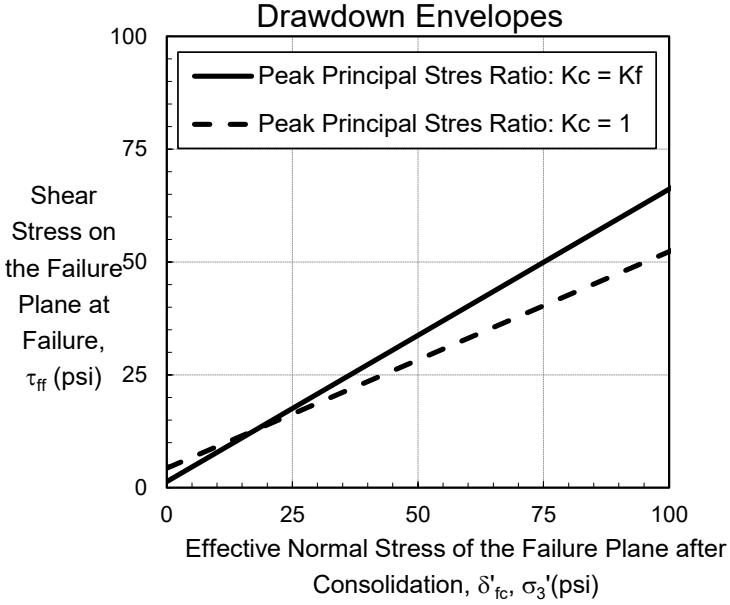
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	32.0	32.9
Effective Cohesion (psi)	c'	1.7	1.3

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	17.7	25.6
Cohesion (psi)	$\psi_{Kc=1}$	11.5	4.3

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown Envelopes



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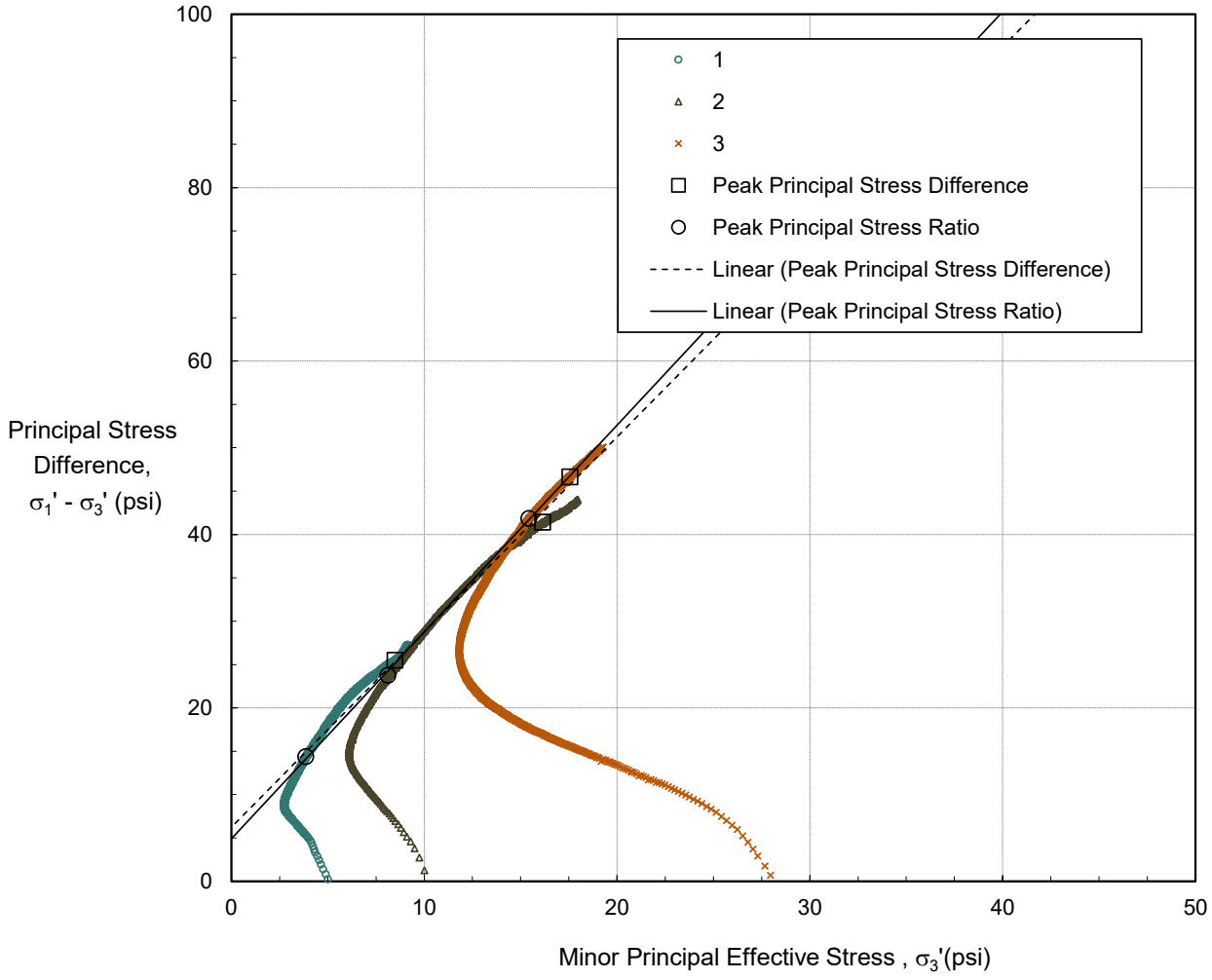
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/2 (8-9_ft)

TRI Log #: 25-02906.9
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	32.0	32.9
Effective Cohesion (psi)	1.7	1.3

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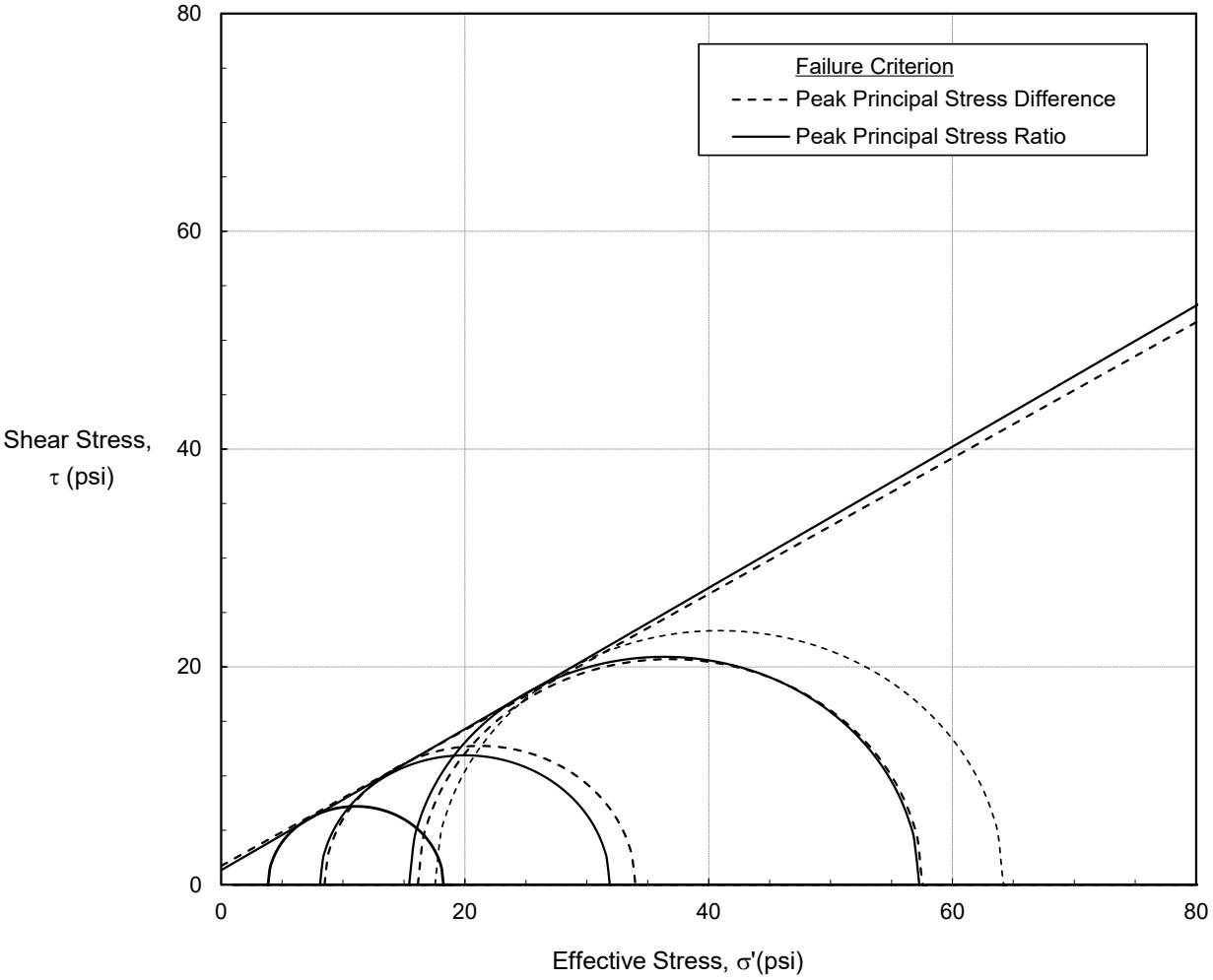
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/2 (8-9_ft)

TRI Log #: 25-02906.9
Test Method: ASTM D4767

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	32.0	32.9
Effective Cohesion (psi)	1.7	1.3

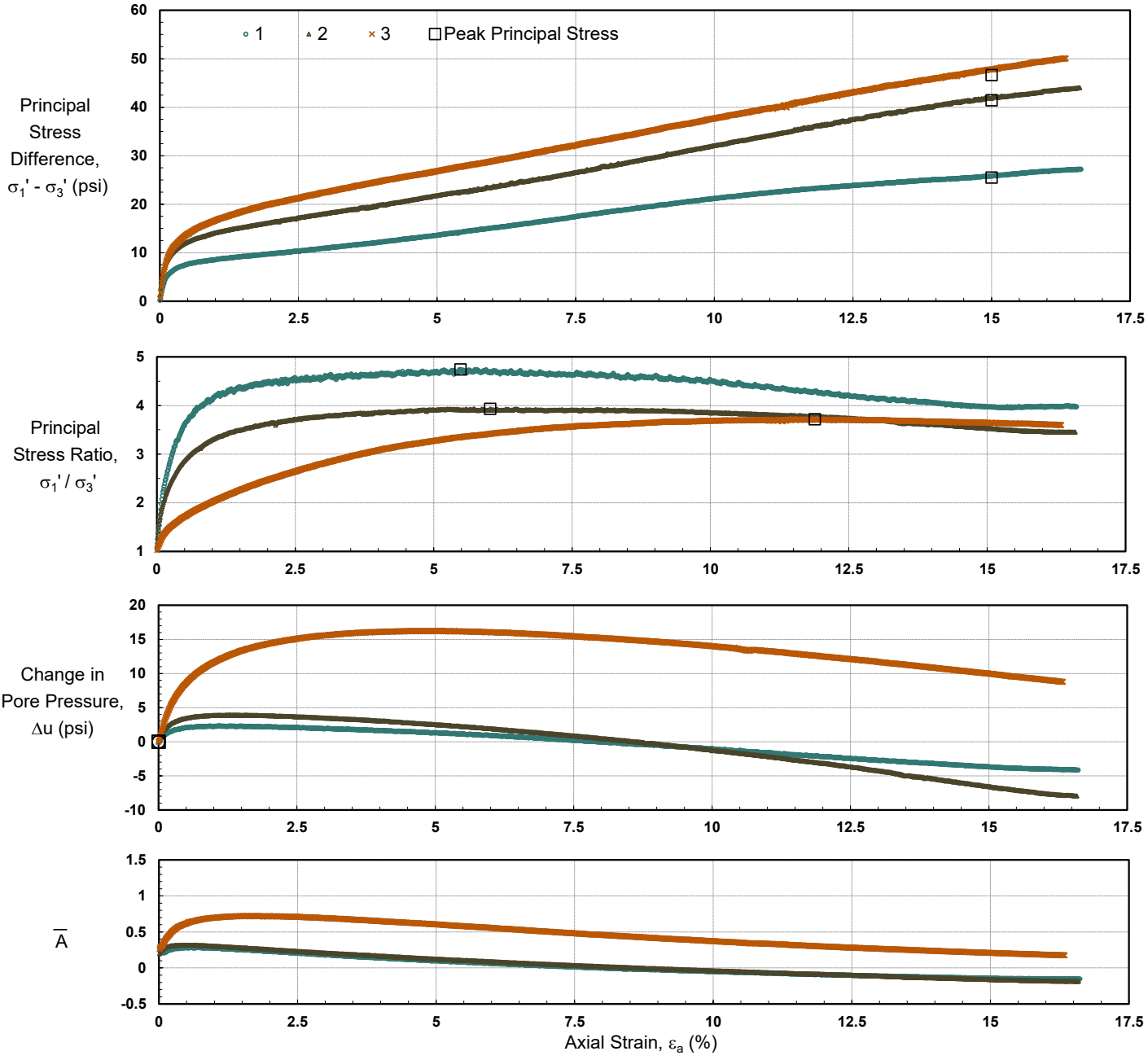
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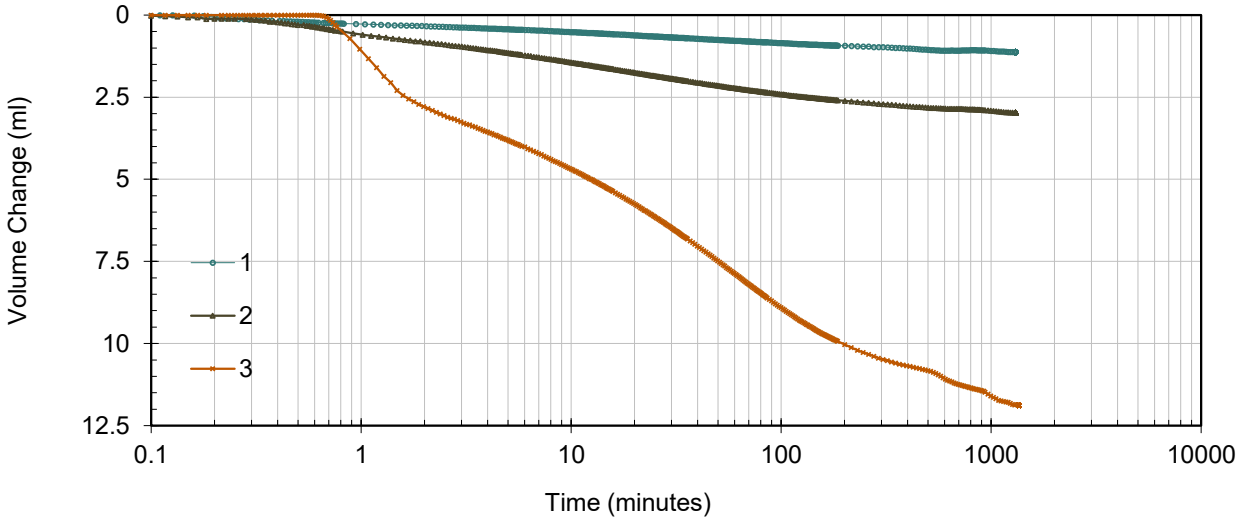
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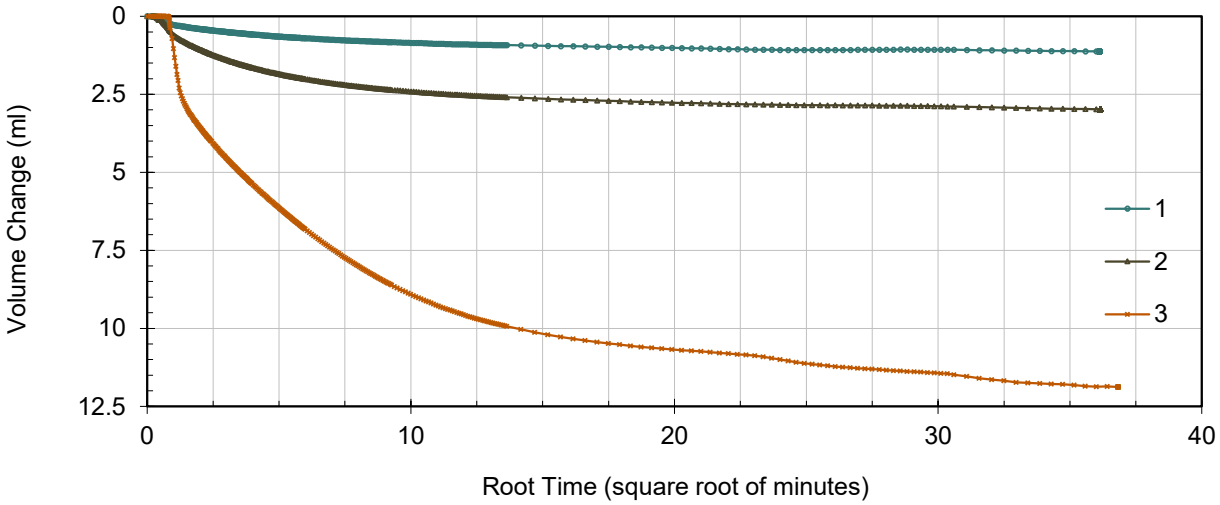
Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-6/2 (8-9_ft)

TRI Log #: 25-02906.9
Test Method: ASTM D4767

Consolidation





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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

TRI Log #: 25-02906.11
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	28.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.04	2.02	2.04	-
Avg. Height (in)	4.79	4.66	4.87	-
Avg. Water Content (%)	20.0	22.6	25.7	-
Bulk Density (pcf)	124.6	123.2	112.7	-
Dry Density (pcf)	103.8	100.5	89.6	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	84.2	87.8	77.4	-
Void Ratio, n	0.65	0.71	0.91	-
B-Value, End of Saturation	0.97	0.96	0.98	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.65	0.69	0.82	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	18.6	21.5	20.0	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	13.4	11.3	8.1	-	7.1	10.4	14.2	-
Minor Effective Stress (psi), $\sigma_3'_f$	6.0	5.6	8.9	-	5.5	5.5	8.6	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	16.8	11.5	18.9	-	15.9	11.4	18.6	-
Pore Water Pressure, Δu_f (psi)	-1.1	4.4	19.1	-	-0.6	4.4	19.4	-
Major Effective Stress (psi), $\sigma_1'_f$	22.8	17.1	27.8	-	21.4	16.9	27.2	-
Secant Friction Angle (degrees)	35.6	30.5	30.9	-	36.3	30.6	31.3	-
Effective Friction Angle (degrees)	27.1				26.3			
Effective Cohesion (psi)	1.3				1.5			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 6/17/2025
Analysis & Quality Review/Date

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Consolidated-Undrained Triaxial Compression

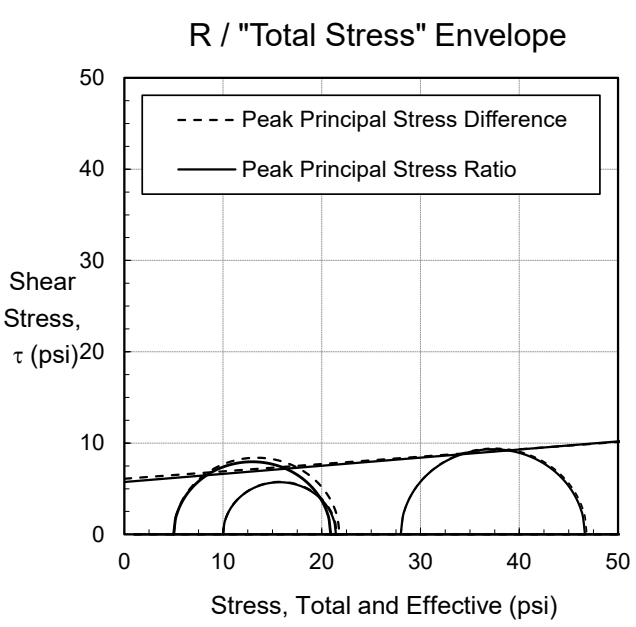
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

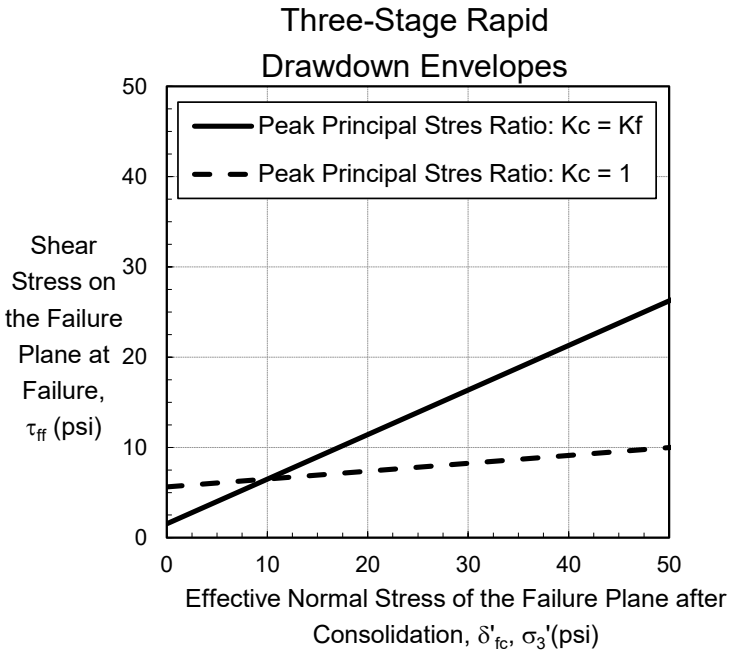
TRI Log #: 25-02906.11
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	4.6	5.1
Cohesion (psi)	c_R	6.1	5.7

Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	27.1	26.3
Effective Cohesion (psi)	c'	1.3	1.5

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	4.4	5.0
Cohesion (psi)	$\psi_{Kc=1}$	5.9	5.6





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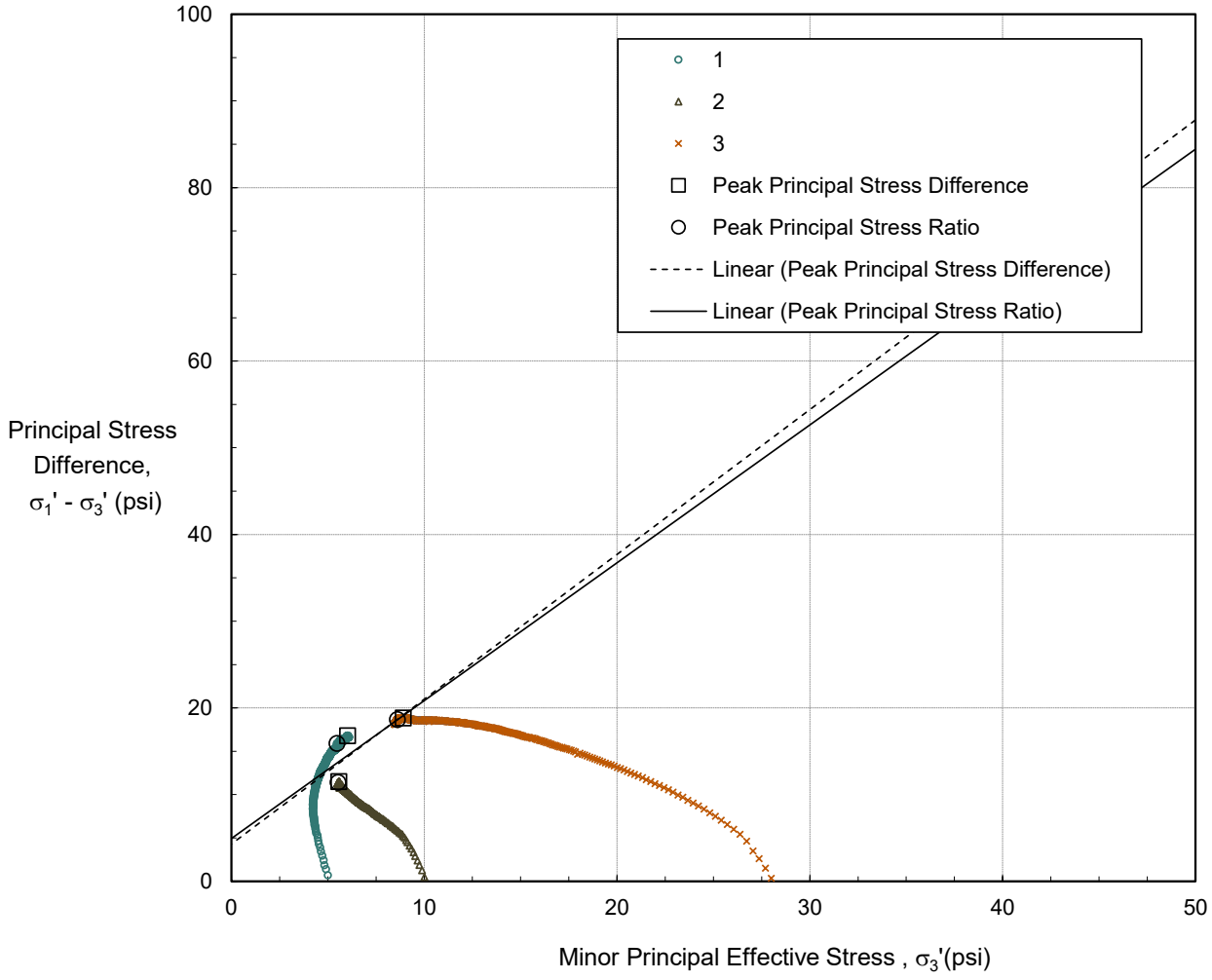
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

TRI Log #: 25-02906.11
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	27.1	26.3
Effective Cohesion (psi)	1.3	1.5

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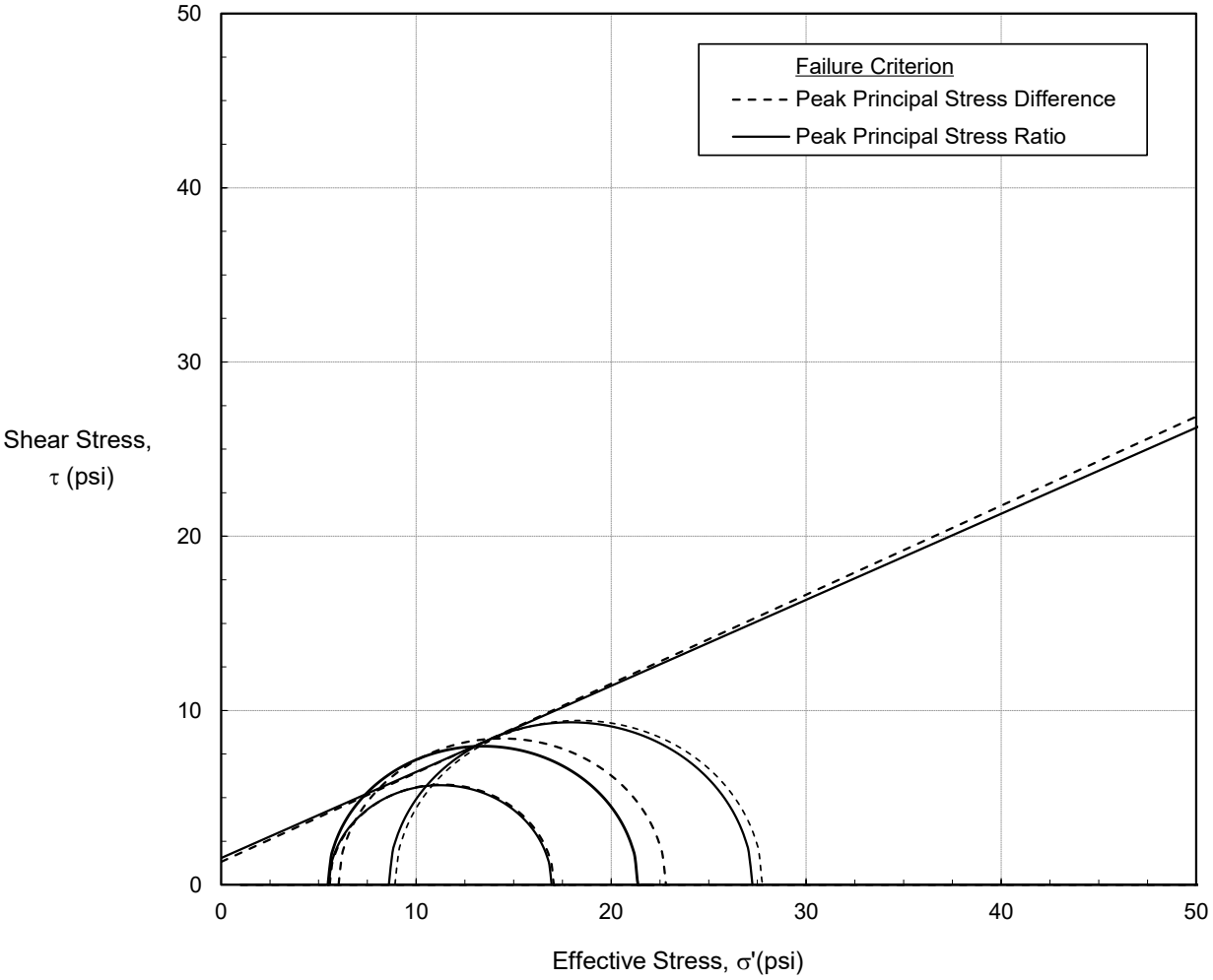
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

TRI Log #: 25-02906.11
Test Method: ASTM D4767

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	27.1	26.3
Effective Cohesion (psi)	1.3	1.5

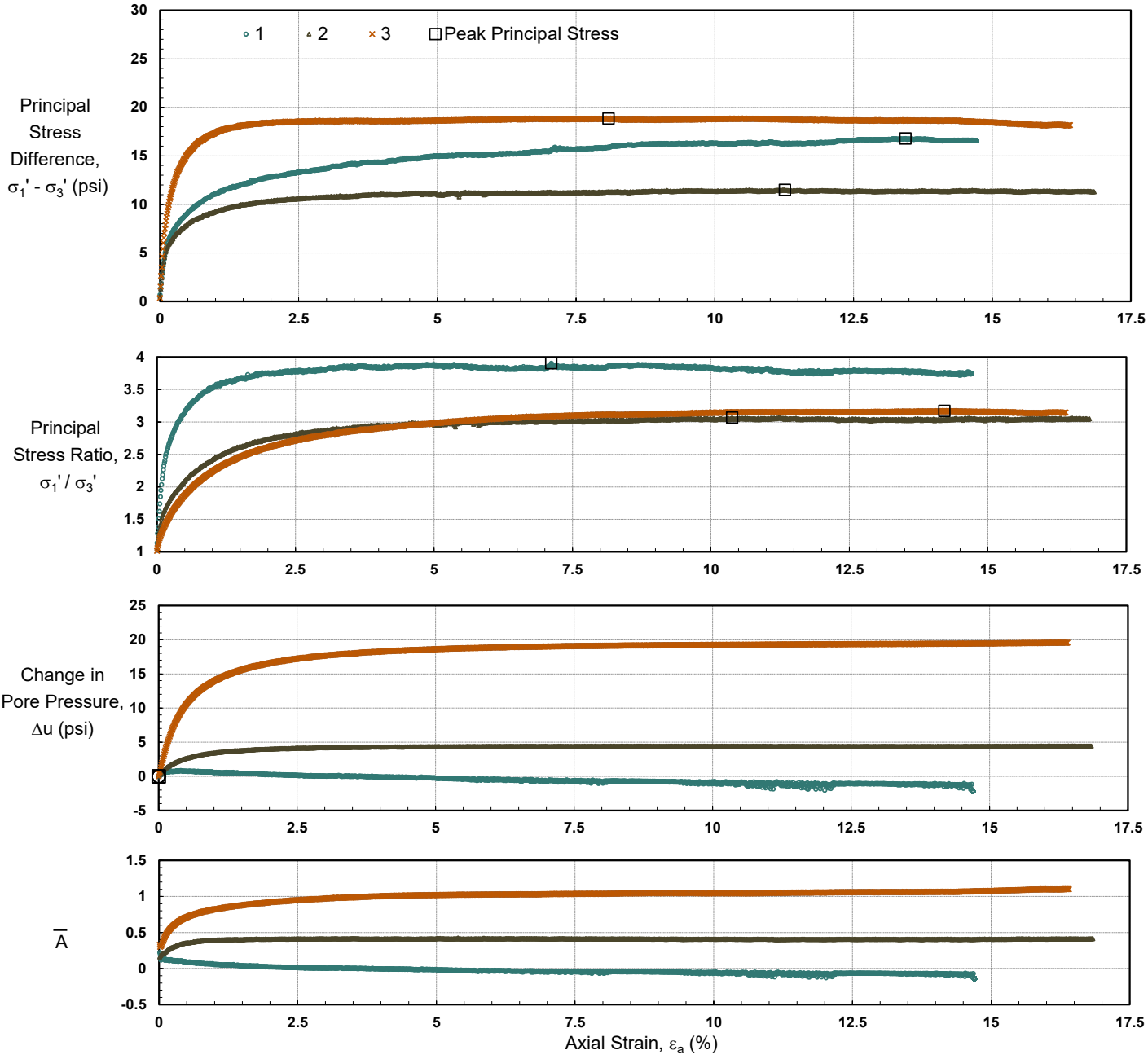
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Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

TRI Log #: 25-02906.11
Test Method: ASTM D4767



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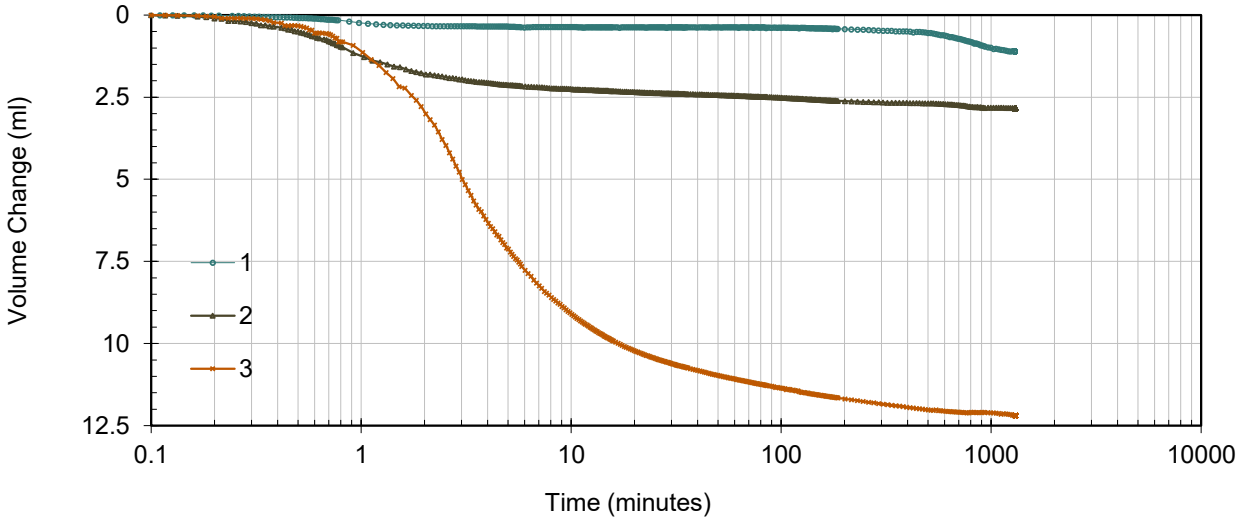
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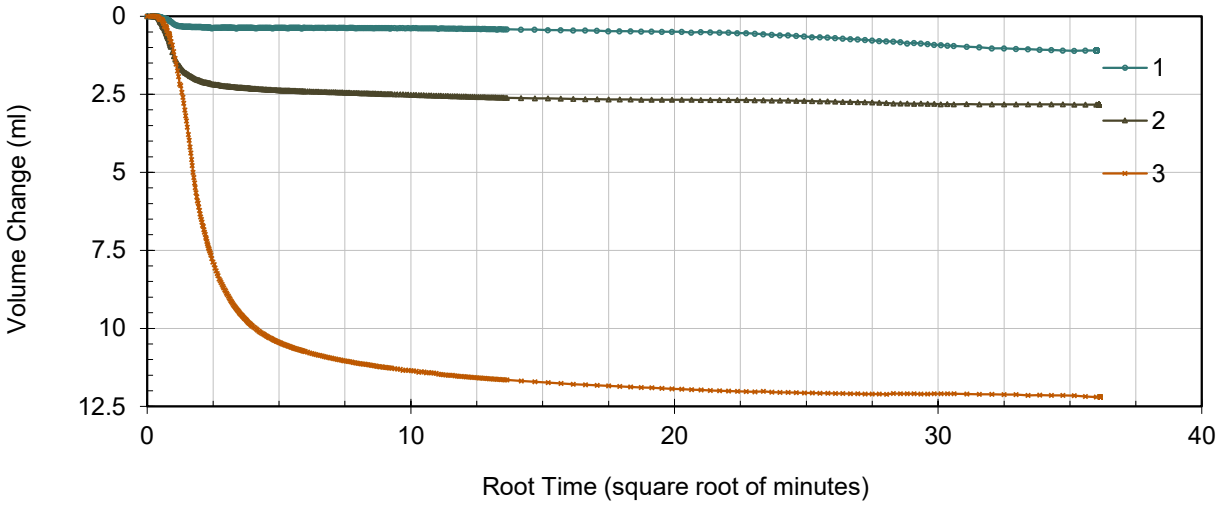
Consolidated-Undrained Triaxial Compression

Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Sample: B-7L-2 (13-15_ft)

TRI Log #: 25-02906.11
Test Method: ASTM D4767

Consolidation





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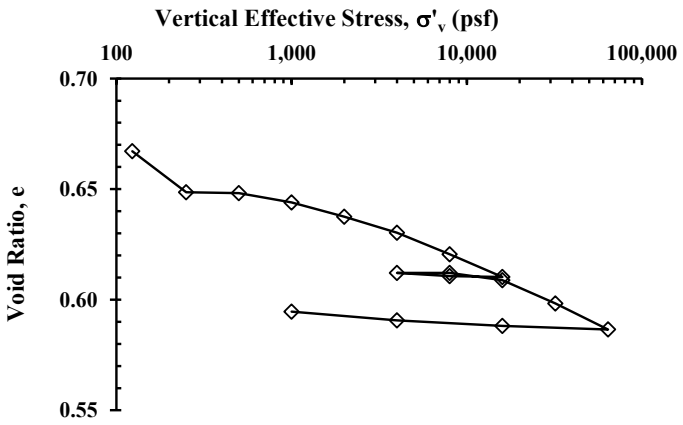
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

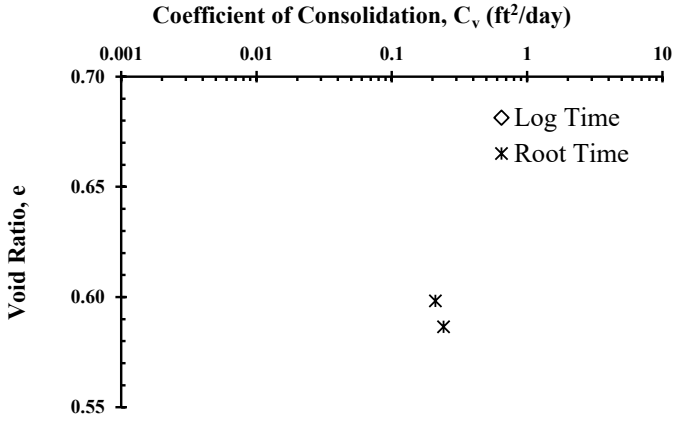
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

Soil Specimen Properties	Initial	Final
Water Content (%)	21.8	18.5
Diameter (in)	2.49	2.49
Height (in)	1.00	0.96
Dry Unit Weight, γ_o lb_f/ft^3	103.0	107.6
Specific Gravity (Assumed)	2.75	
Void Ratio, e	0.67	0.59
Degree of Saturation (%)	90.1	-

Test Setup		
Specimen Condition	●	Intact / "Undisturbed"
		Compacted/Remolded/Reconstituted
Test Water		Extracted Pore Water
	●	Potable Tap Water
		Demineralized Water
		Saline Water
		Other





Stage	σ'_v	log (σ'_v)	e	Strain, ε	δe	C_α	t_{50} (min)		C_v (ft^2/day)	
(#)	(psf)	log (psf)	(-)	(%)	δlog (σ'_v)	(x1,000)	Log Time	Root Time	Log Time	Root Time
1	< 125	2.09	0.667	0.00	-	-	-	-	-	-
2	250	2.40	0.649	1.11	-0.060	-	-	-	-	-
3	500	2.70	0.648	1.14	-0.001	-	-	-	-	-
4	1,000	3.00	0.644	1.39	-0.014	-	-	-	-	-
5	2,000	3.30	0.638	1.77	-0.021	-	-	-	-	-
6	4,000	3.60	0.630	2.21	-0.024	-	-	-	-	-
7	8,000	3.90	0.620	2.80	-0.033	-	-	-	-	-
8	16,000	4.20	0.610	3.41	-0.034	-	-	-	-	-
9	8,000	3.90	0.611	3.39	-0.001	-	-	-	-	-
10	4,000	3.60	0.612	3.30	-0.005	-	-	-	-	-
11	8,000	3.90	0.612	3.30	0.000	-	-	-	-	-
12	16,000	4.20	0.609	3.50	-0.011	-	-	-	-	-
13	32,000	4.51	0.598	4.13	-0.035	-	-	2.2	-	2.1E-01
14	64,000	4.81	0.586	4.84	-0.039	-	-	1.9	-	2.4E-01
15	16,000	4.20	0.588	4.74	-0.003	-	-	-	-	-
16	4,000	3.60	0.591	4.59	-0.004	-	-	-	-	-
17	1,000	3.00	0.595	4.35	-0.007	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-

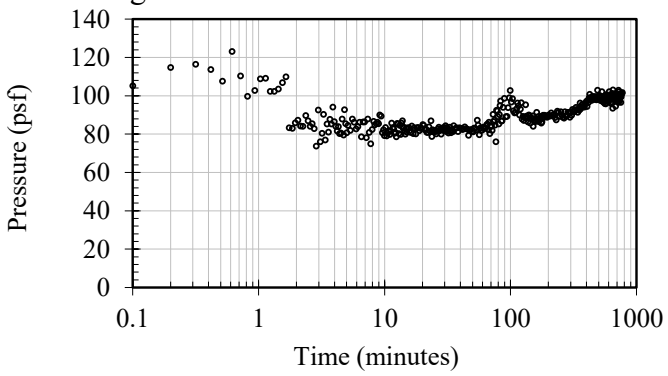
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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

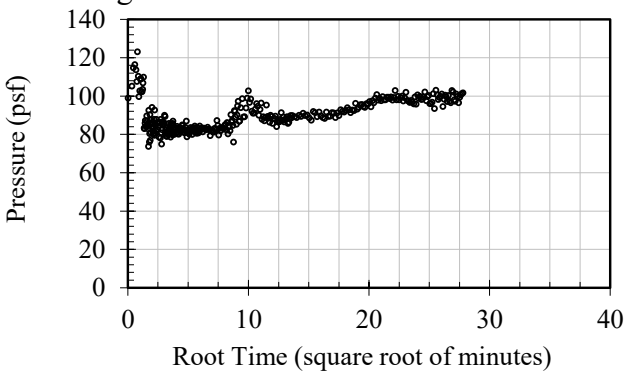
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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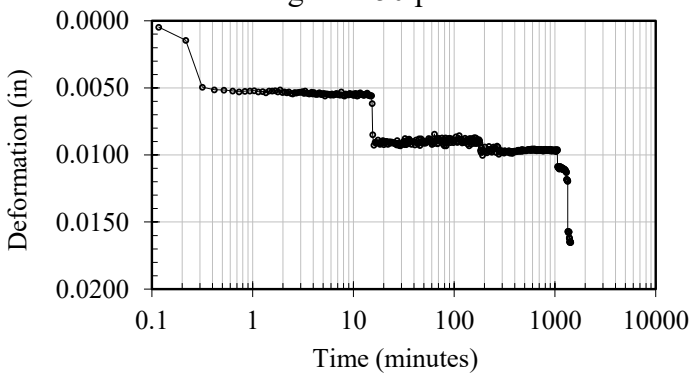
Stage 1: Swell Pressure Measurement



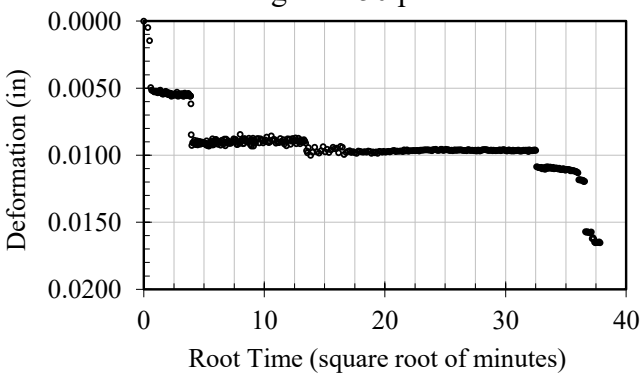
Stage 1: Swell Pressure Measurement



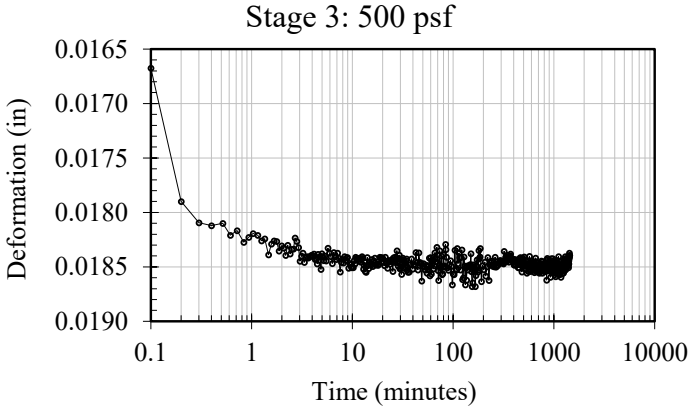
Stage 2: 250 psf



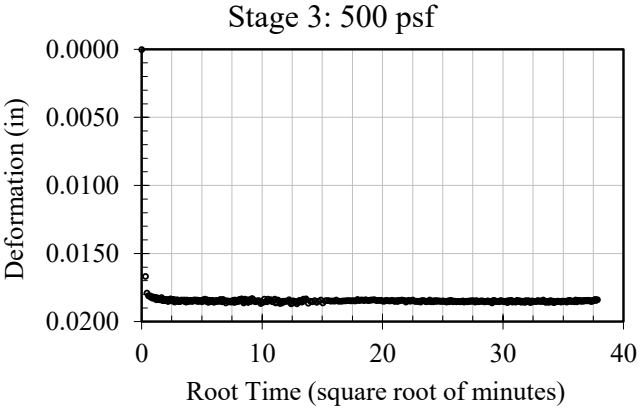
Stage 2: 250 psf



Stage 3: 500 psf



Stage 3: 500 psf

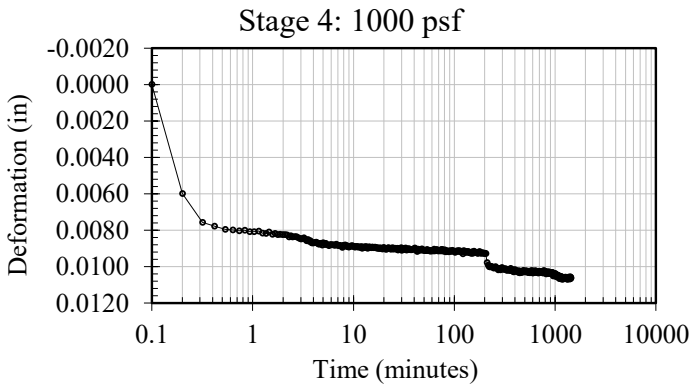


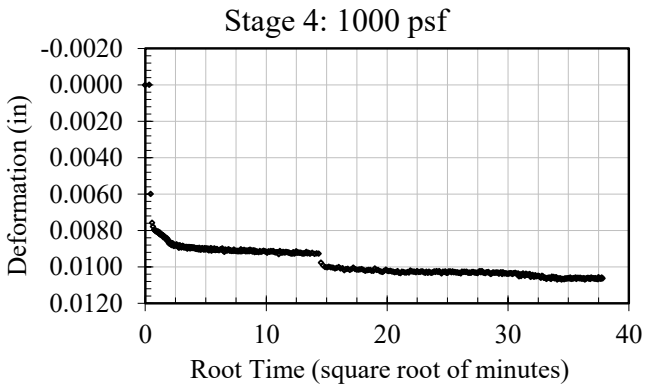
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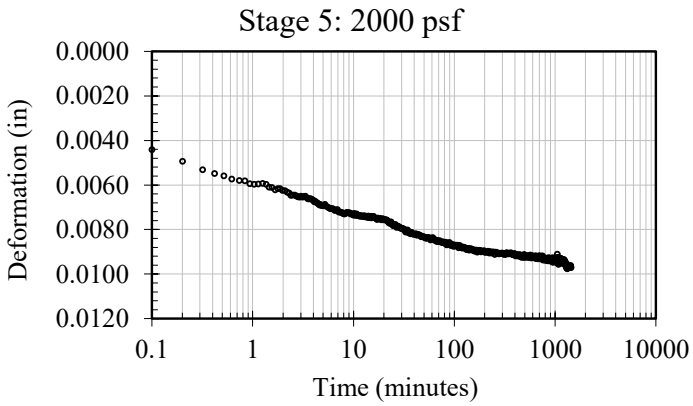
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

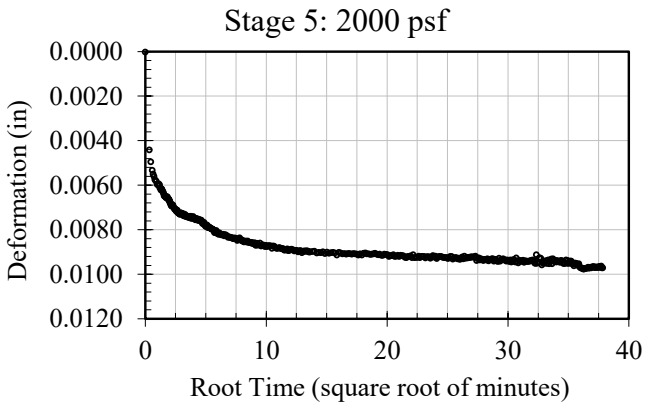
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

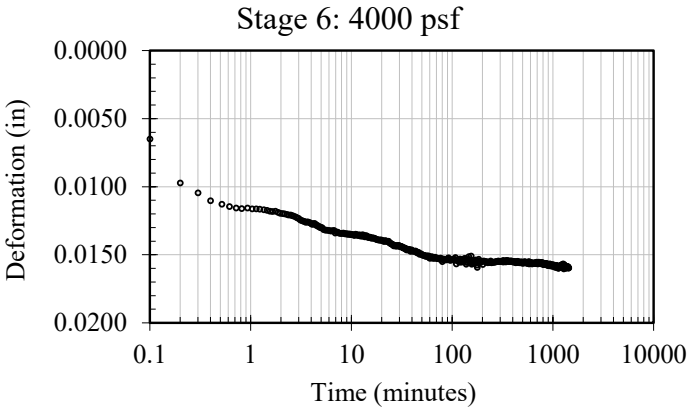
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

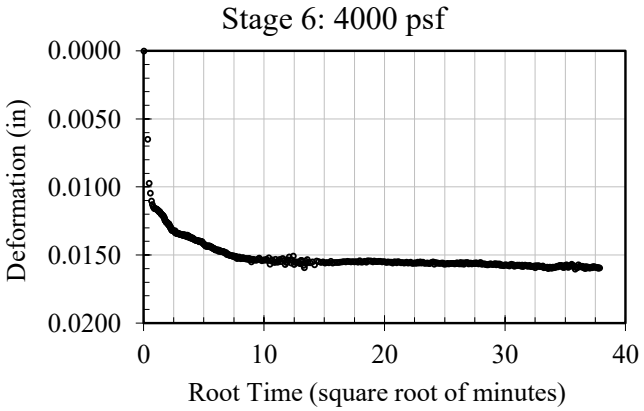










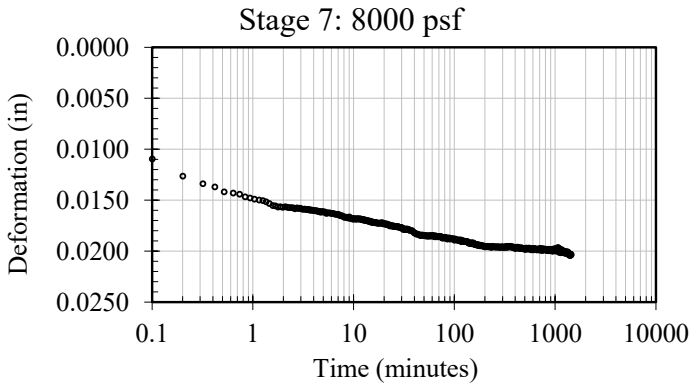


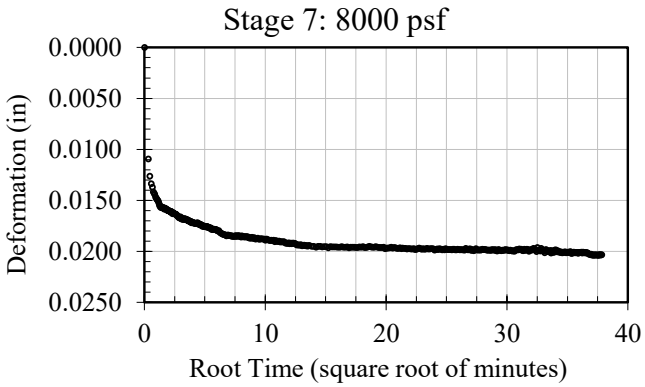
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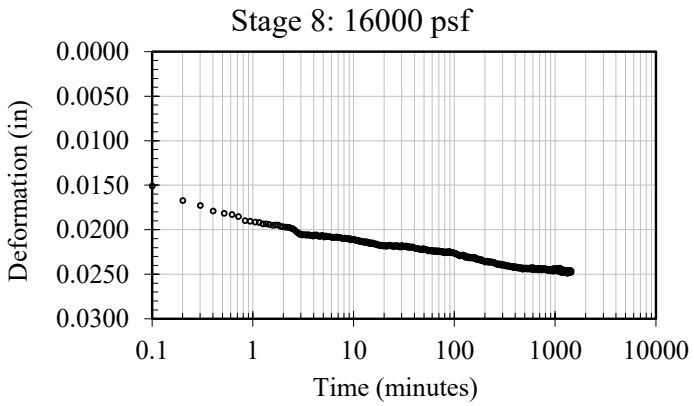
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

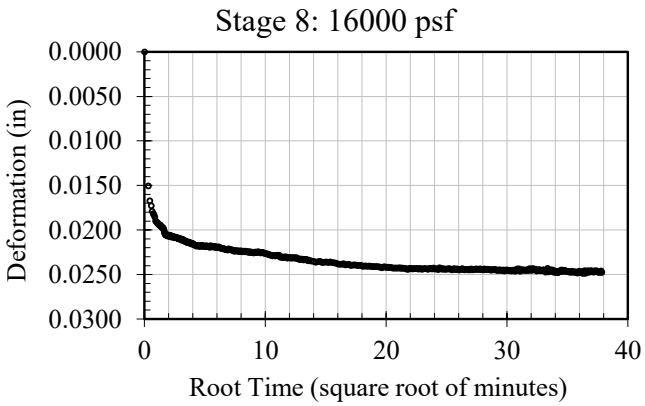
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

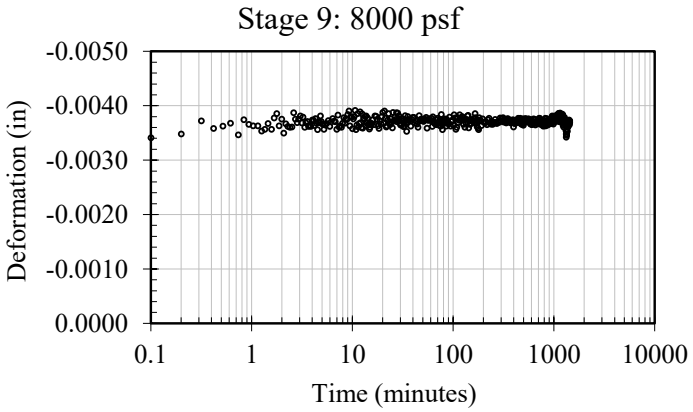
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

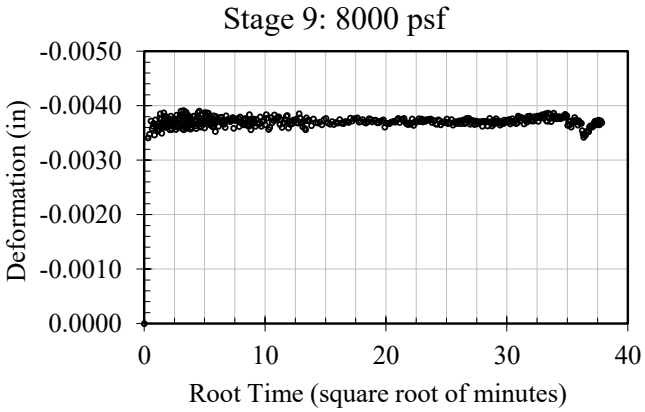










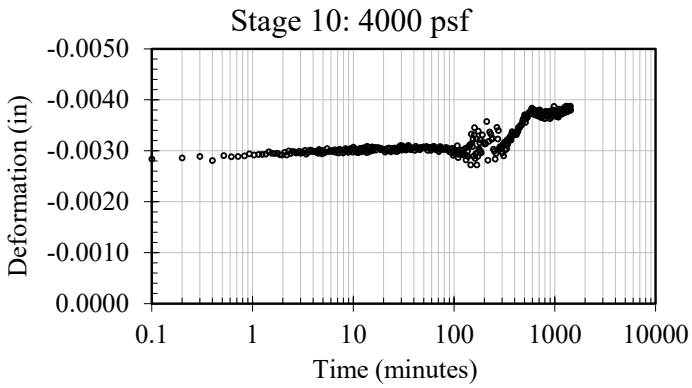


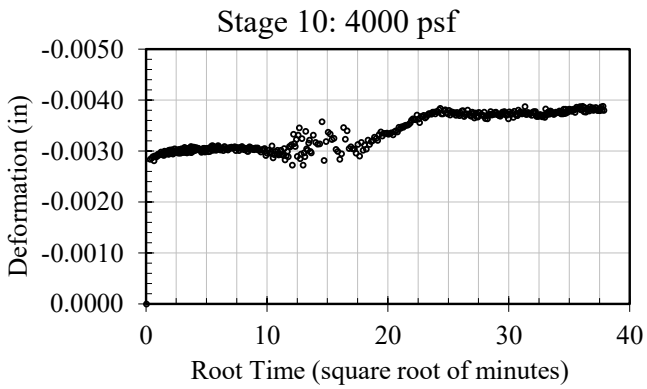
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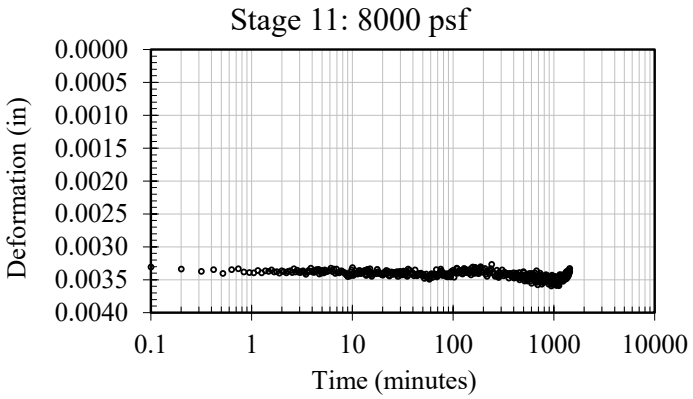
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

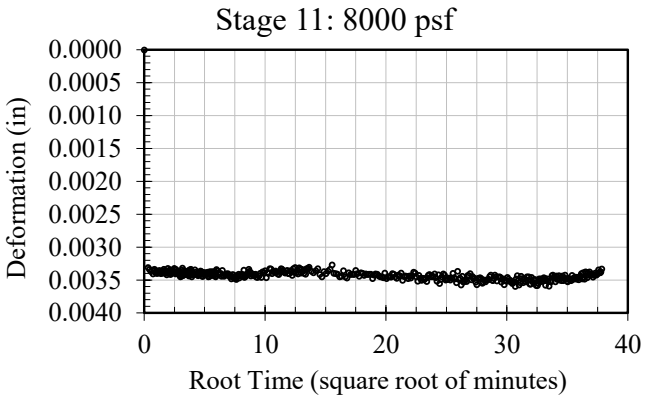
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

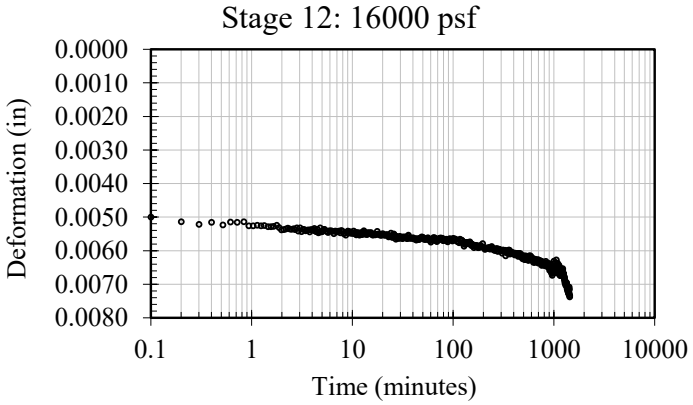
TRI Log No.: 25-02906.2
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

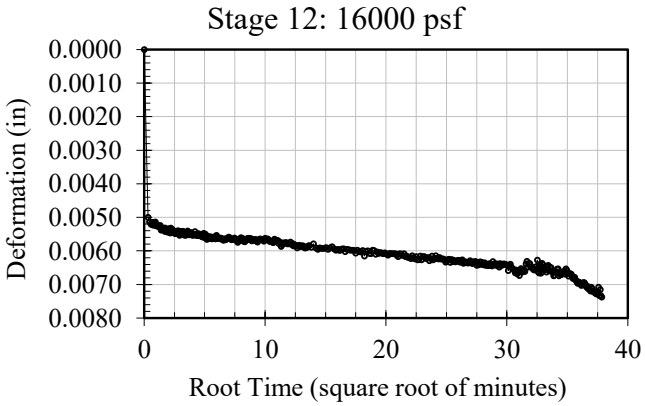










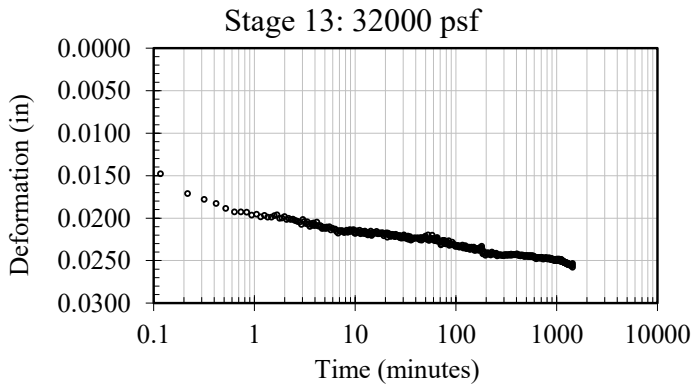


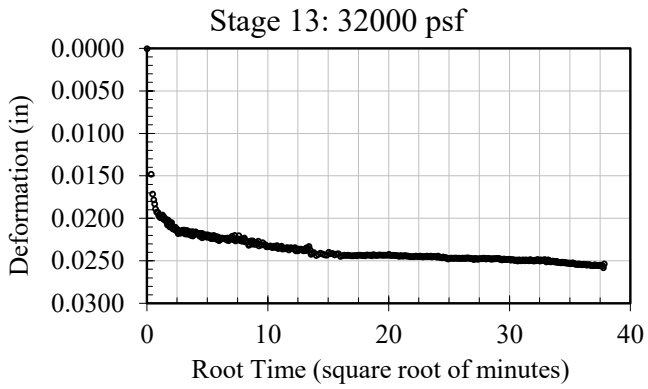
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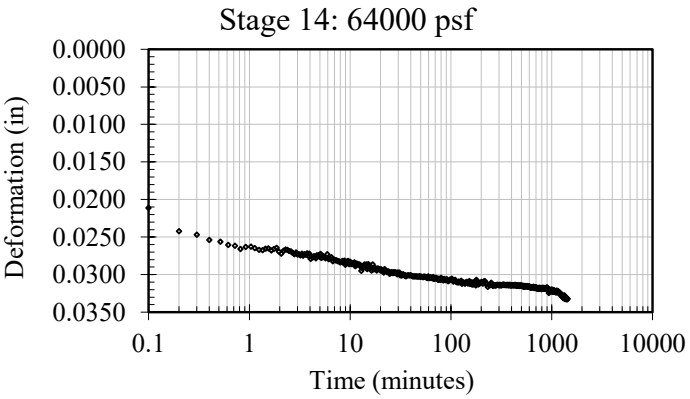
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

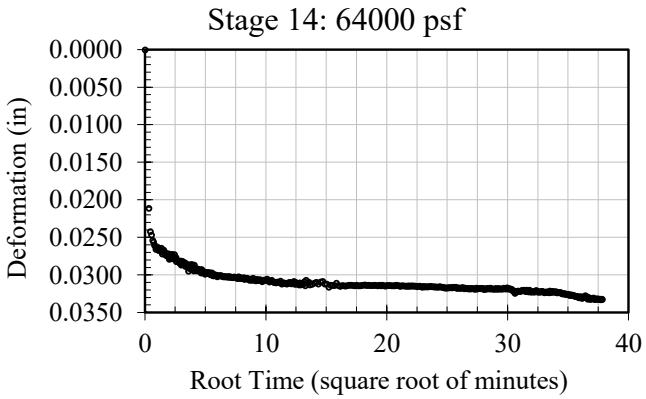
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

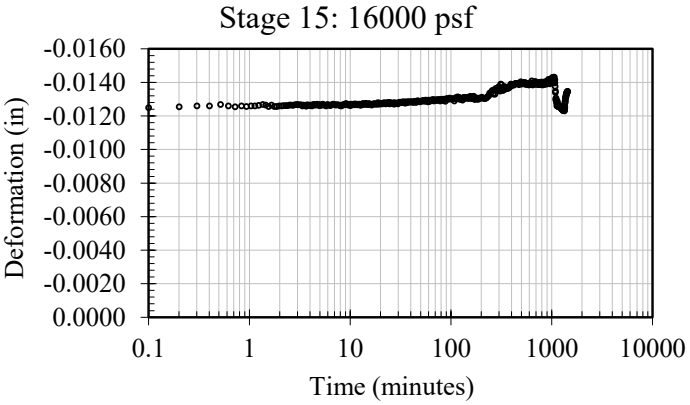
TRI Log No.: 25-02906.2
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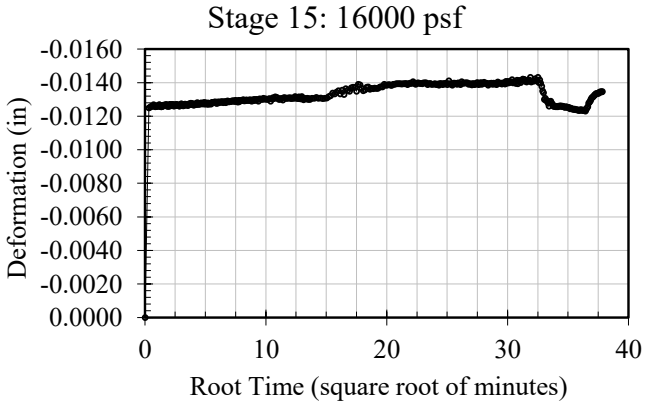










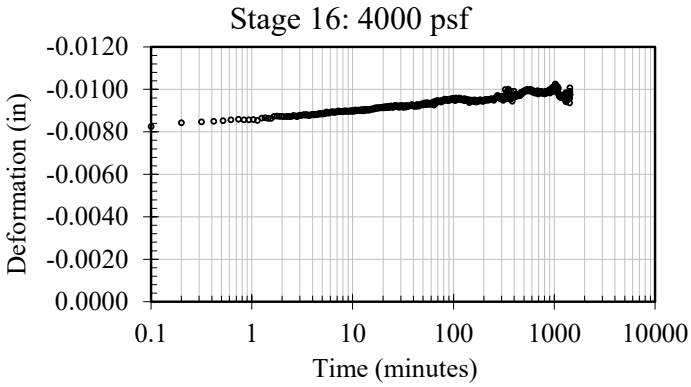


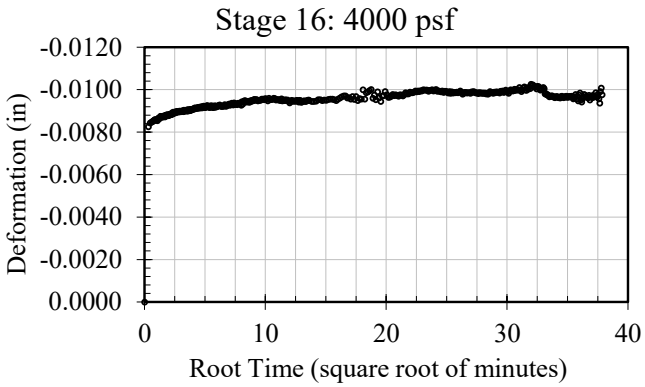
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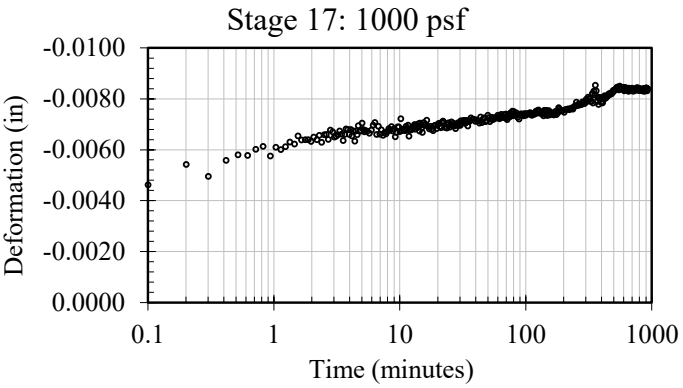
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

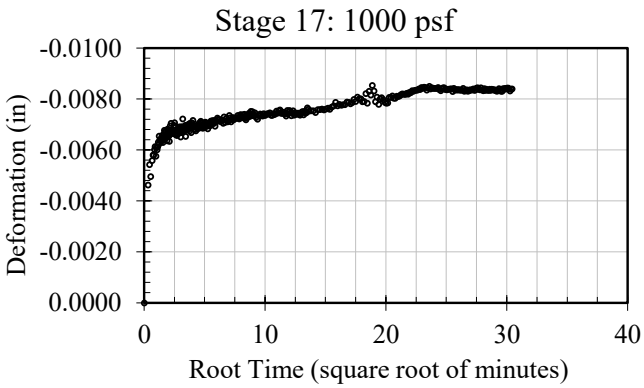
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-2L-2 (10-12_ft)

TRI Log No.: 25-02906.2
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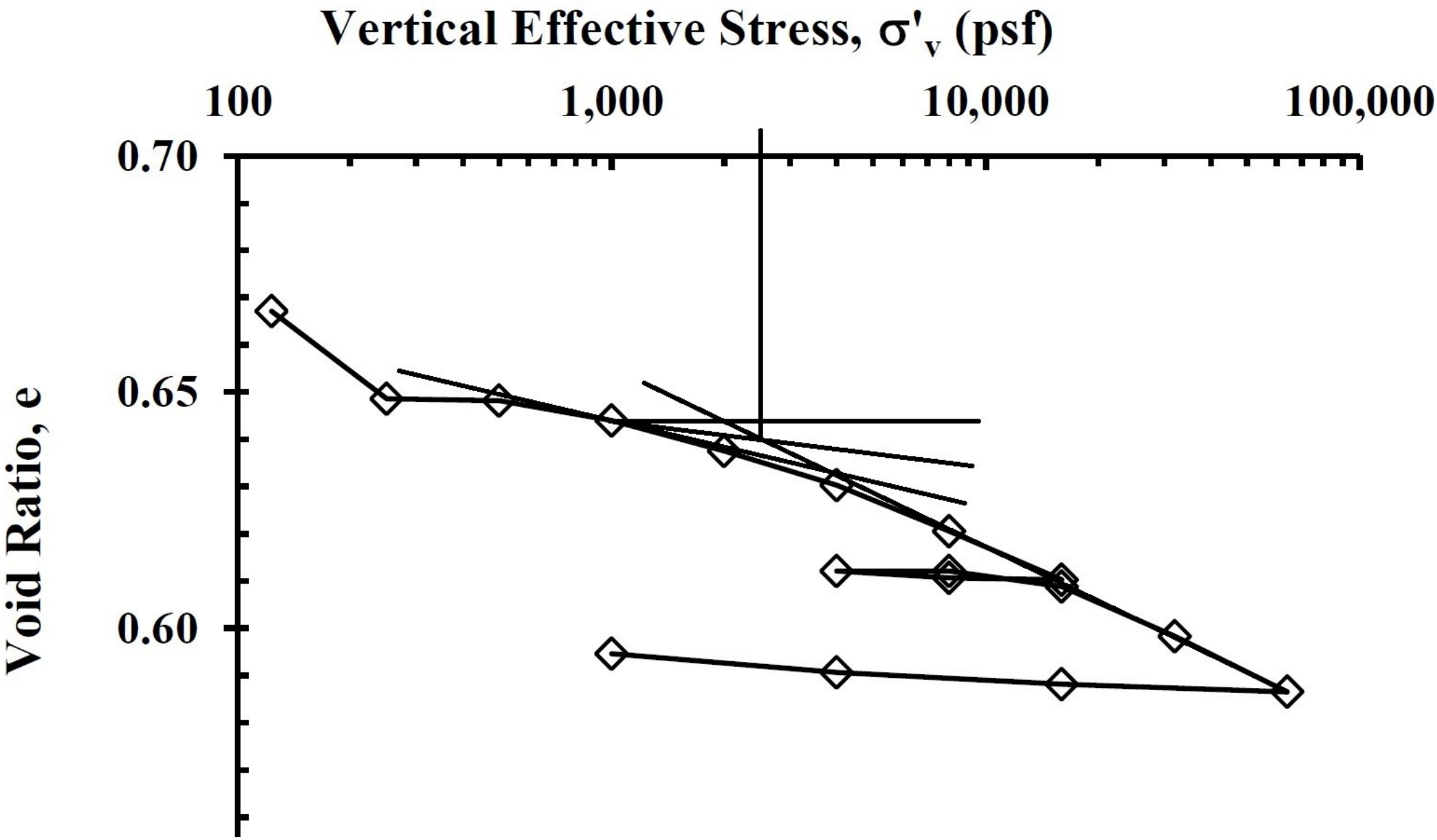








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Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.70
0.65
0.60
Void Ratio, e

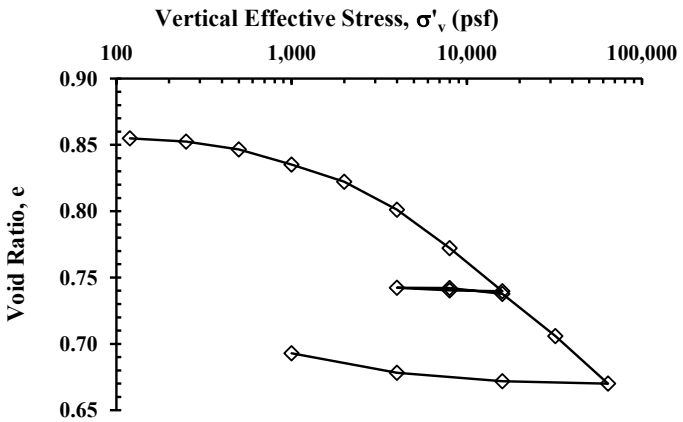
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

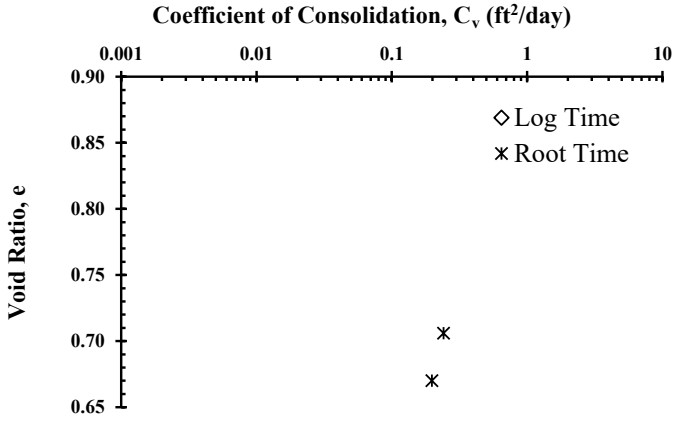
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

TRI Log No.: 25-02906.6
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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Soil Specimen Properties	Initial	Final
Water Content (%)	27.8	19.9
Diameter (in)	2.50	2.50
Height (in)	1.00	0.91
Dry Unit Weight, γ_o lb_f/ft^3	92.5	101.4
Specific Gravity (Assumed)	2.75	
Void Ratio, e	0.85	0.69
Degree of Saturation (%)	89.4	-

Test Setup		
Specimen Condition	●	Intact / "Undisturbed"
		Compacted/Remolded/Reconstituted
Test Water		Extracted Pore Water
	●	Potable Tap Water
		Demineralized Water
		Saline Water
		Other





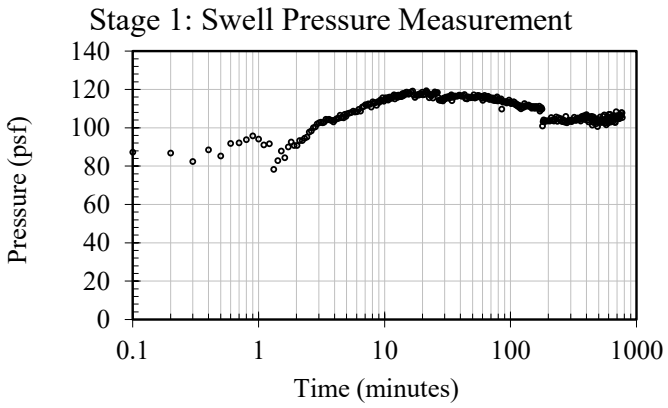
Stage	σ'_v	log (σ'_v)	e	Strain, ε	δe	C_α	t_{50} (min)		C_v (ft^2/day)	
(#)	(psf)	log (psf)	(-)	(%)	δlog (σ'_v)	(x1,000)	Log Time	Root Time	Log Time	Root Time
1	119	2.08	0.855	0.00	-	-	-	-	-	-
2	250	2.40	0.852	0.14	-0.008	-	-	-	-	-
3	500	2.70	0.847	0.45	-0.019	-	-	-	-	-
4	1,000	3.00	0.835	1.07	-0.038	-	-	-	-	-
5	2,000	3.30	0.822	1.76	-0.043	-	-	-	-	-
6	4,000	3.60	0.801	2.90	-0.070	-	-	-	-	-
7	8,000	3.90	0.772	4.46	-0.096	-	-	-	-	-
8	16,000	4.20	0.740	6.21	-0.108	-	-	-	-	-
9	8,000	3.90	0.740	6.18	-0.002	-	-	-	-	-
10	4,000	3.60	0.742	6.07	-0.006	-	-	-	-	-
11	8,000	3.90	0.742	6.09	-0.001	-	-	-	-	-
12	16,000	4.20	0.738	6.33	-0.015	-	-	-	-	-
13	32,000	4.51	0.706	8.03	-0.105	-	-	1.7	-	2.4E-01
14	64,000	4.81	0.670	9.97	-0.119	-	-	2.0	-	2.0E-01
15	16,000	4.20	0.672	9.88	-0.003	-	-	-	-	-
16	4,000	3.60	0.678	9.53	-0.011	-	-	-	-	-
17	1,000	3.00	0.693	8.74	-0.024	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-

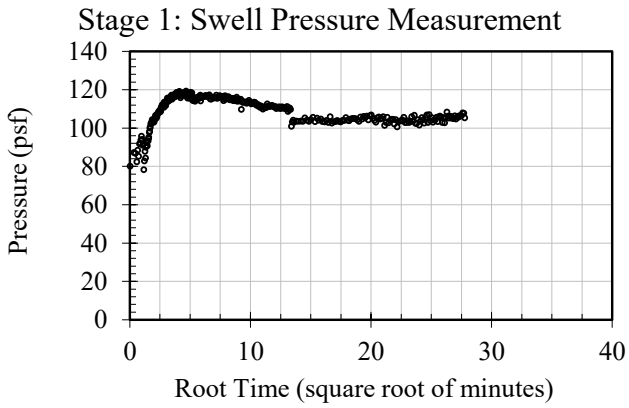
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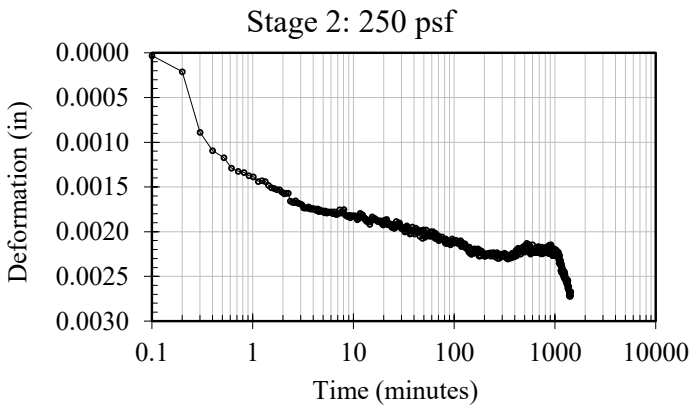
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

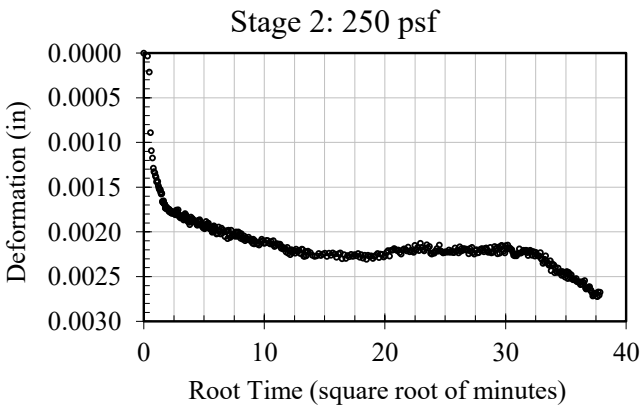
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

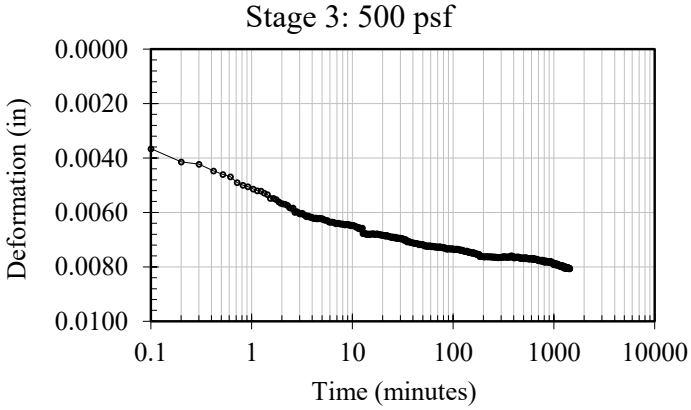
TRI Log No.: 25-02906.6
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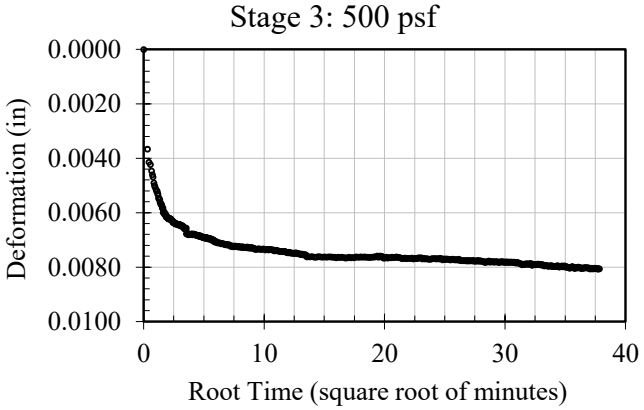










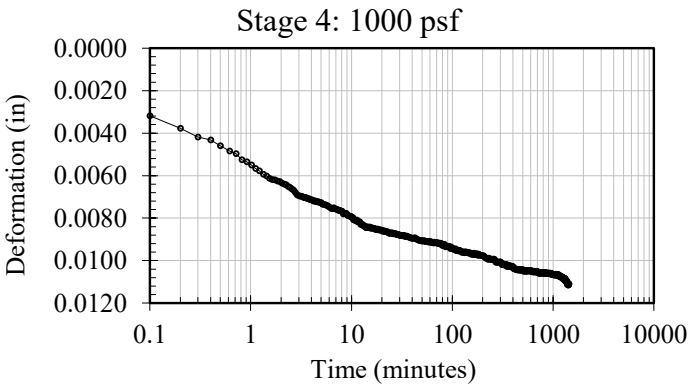


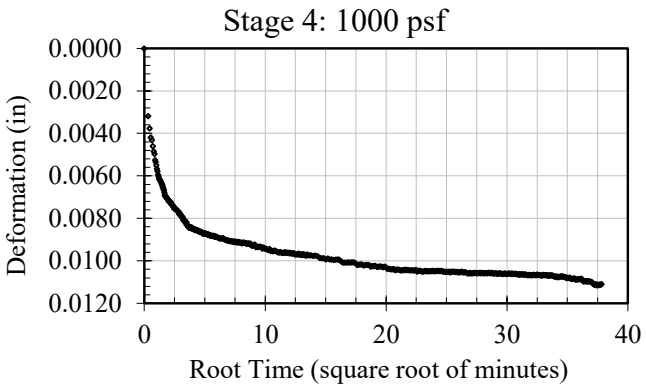
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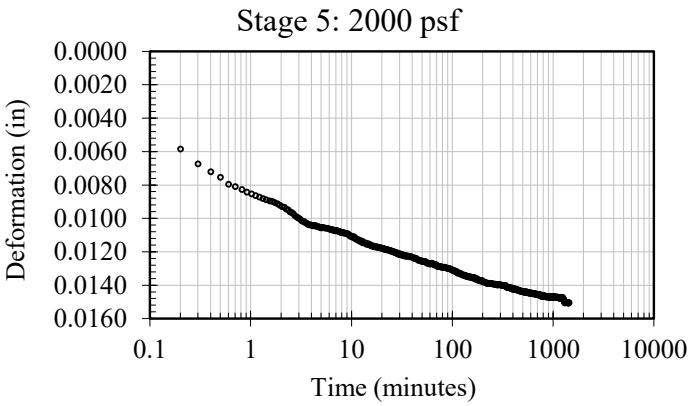
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

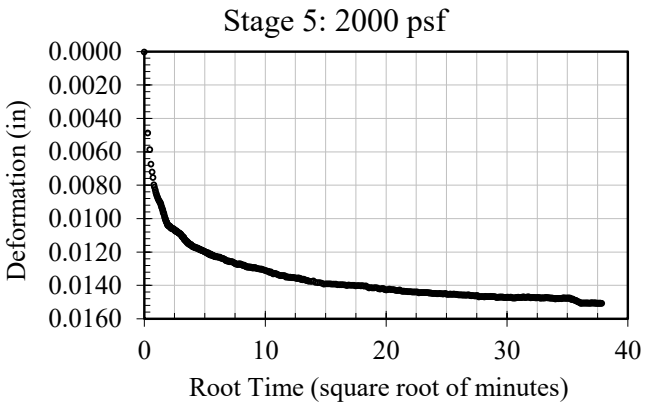
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Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

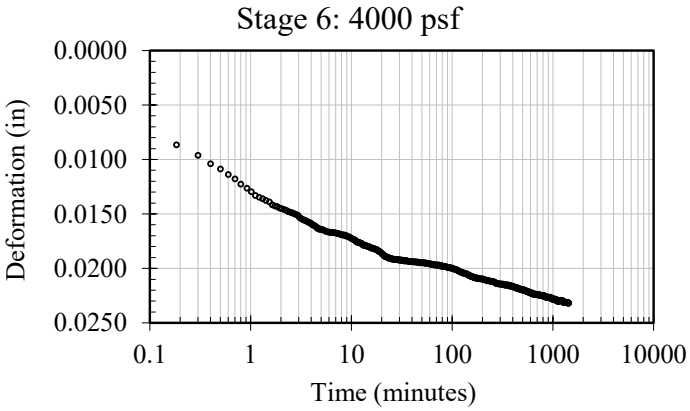
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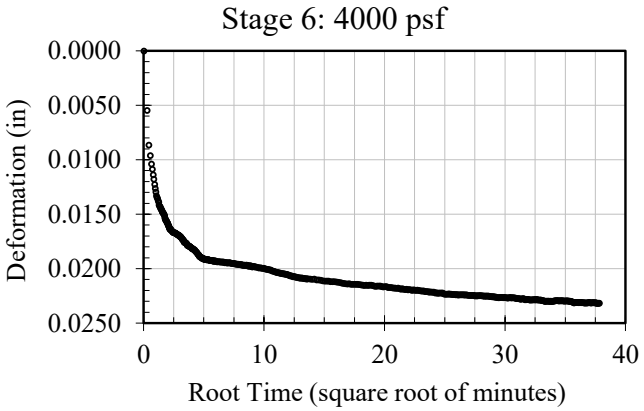










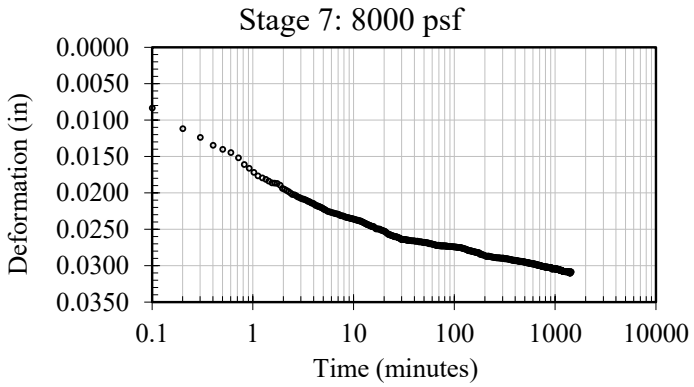


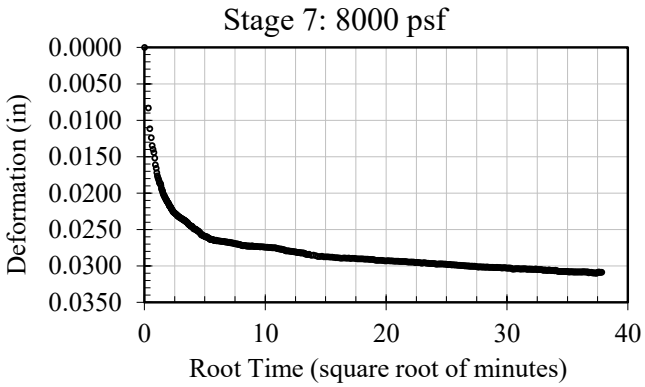
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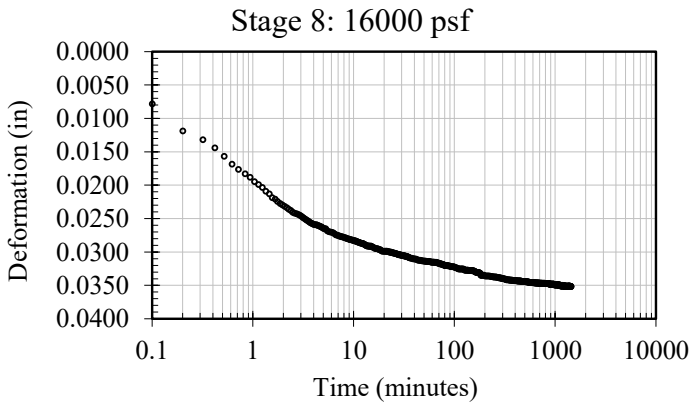
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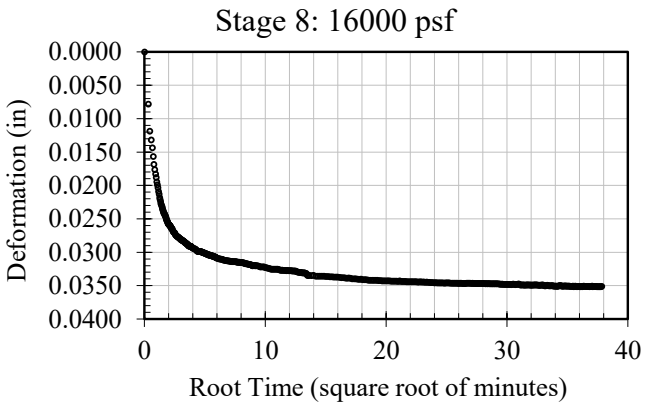
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Project: 240338/0014 CWLP-Ash Ponds
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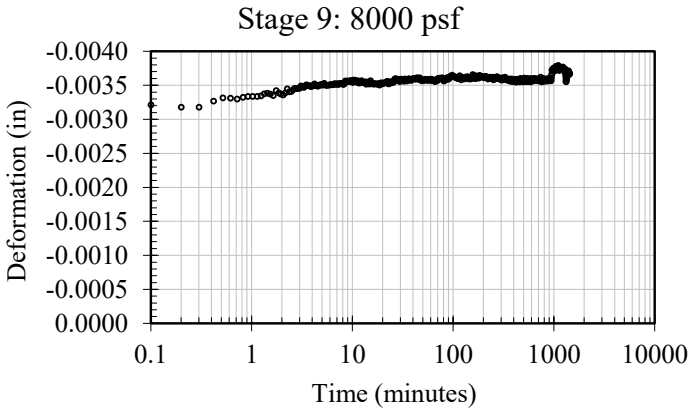
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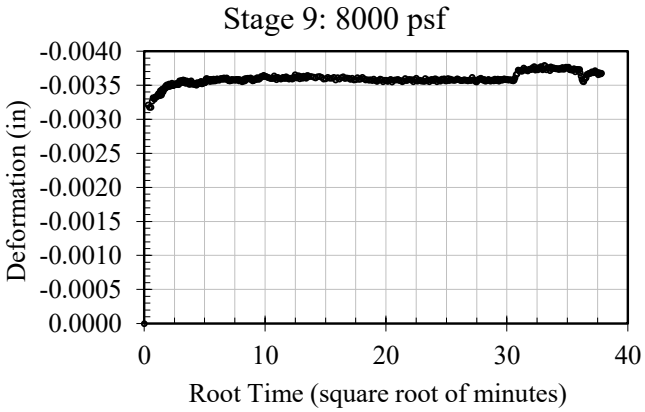










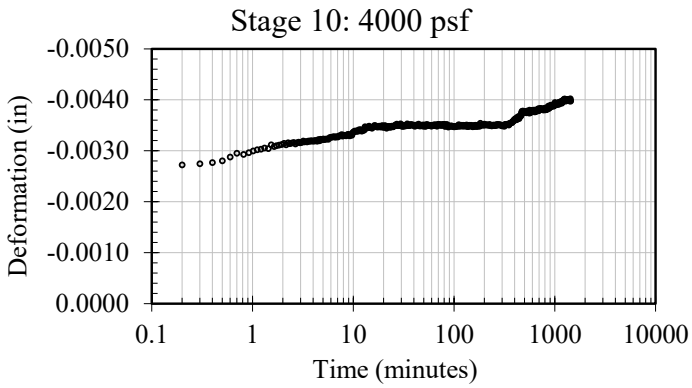


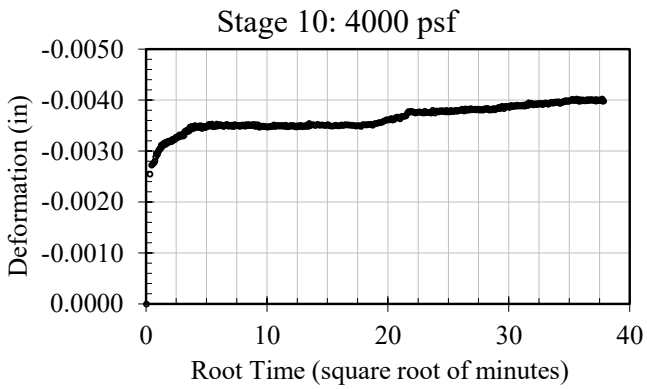
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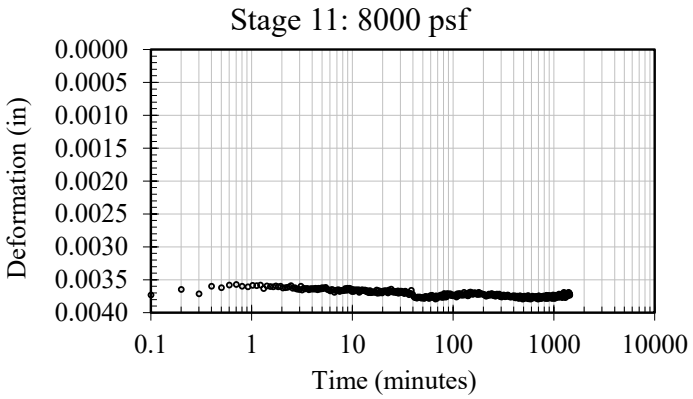
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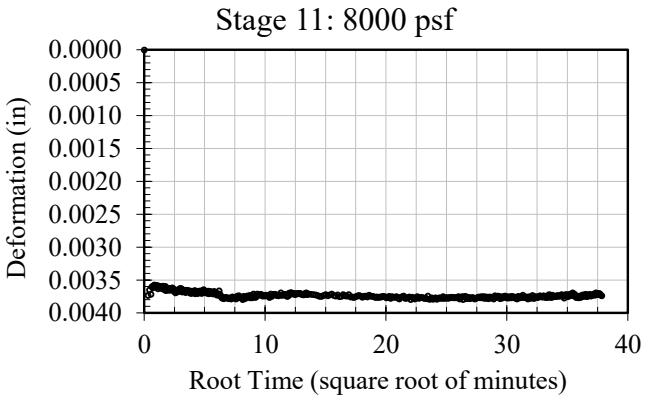
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

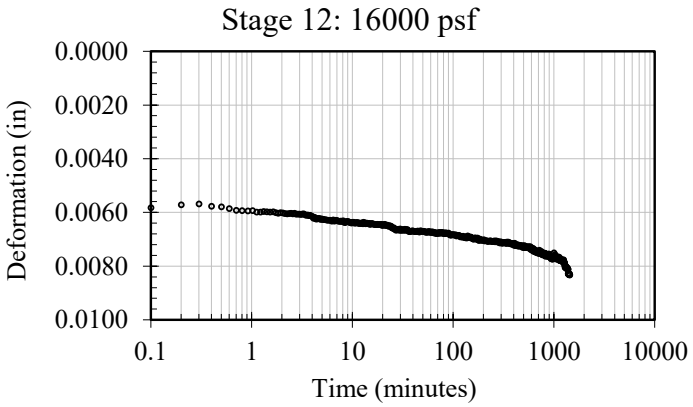
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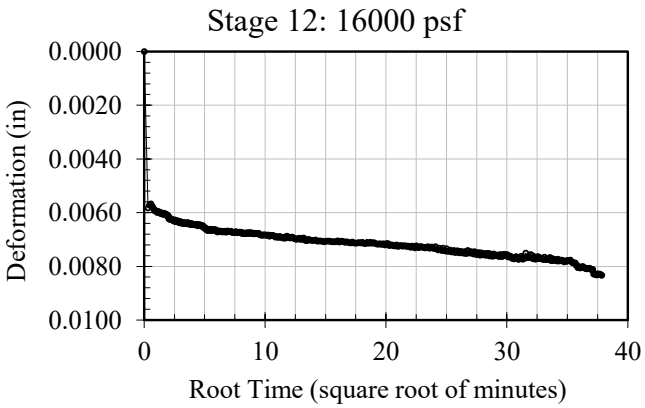










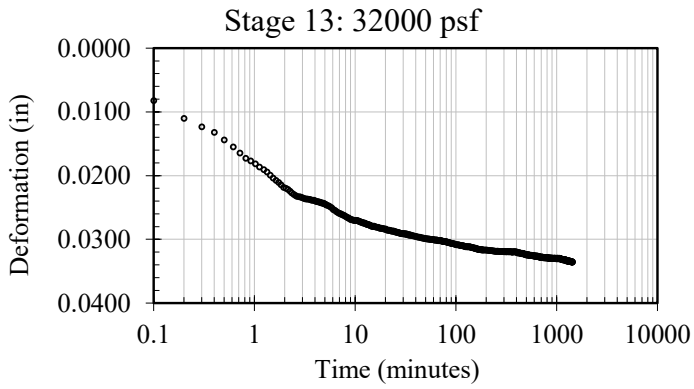


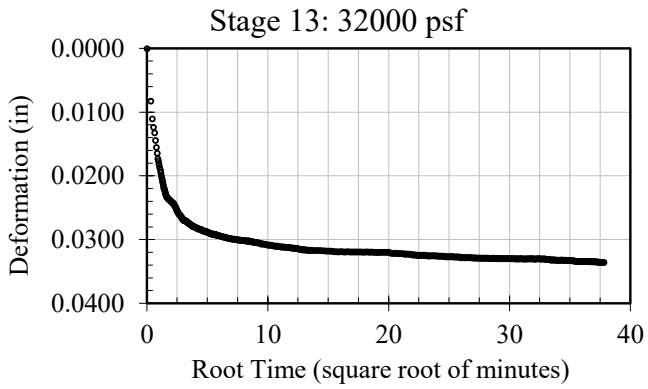
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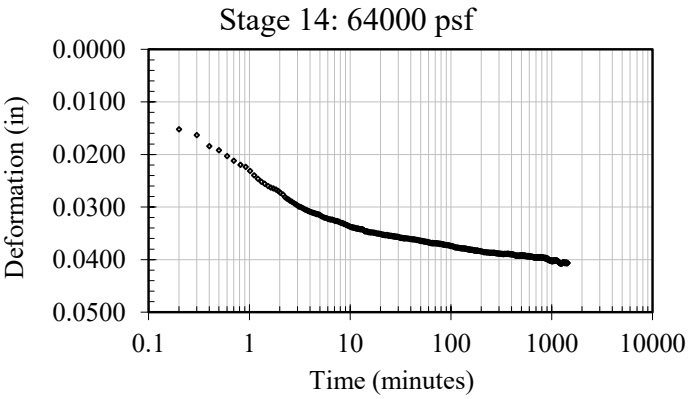
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

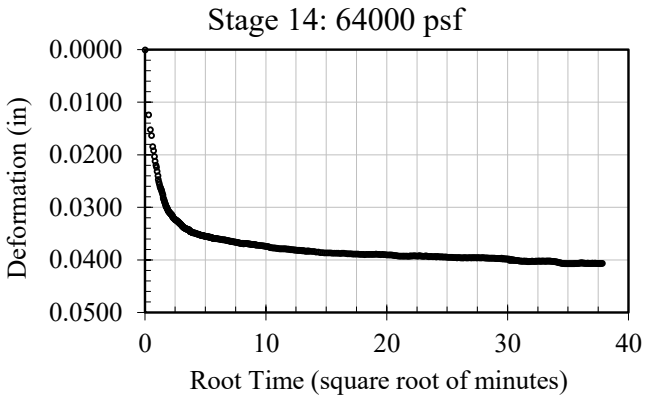
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

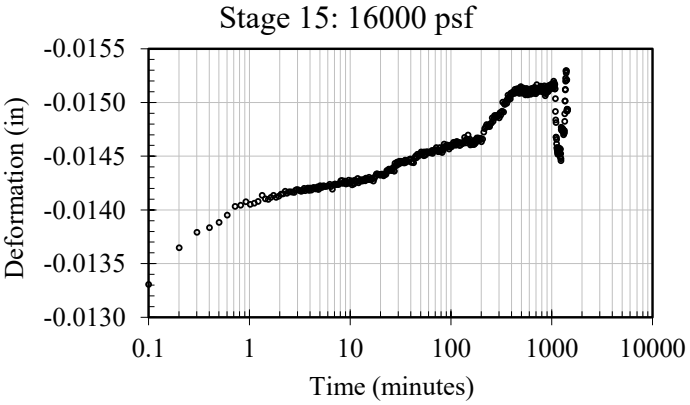
TRI Log No.: 25-02906.6
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

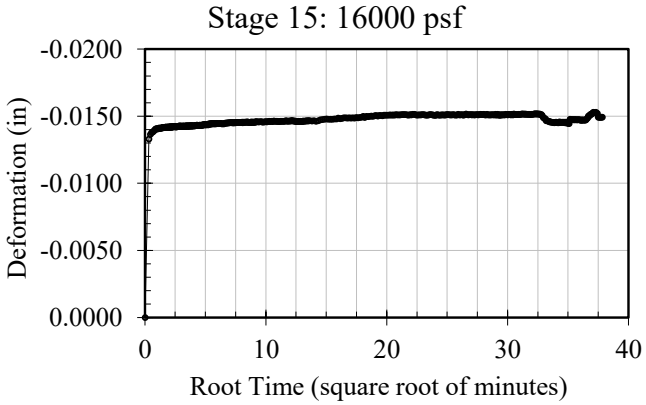










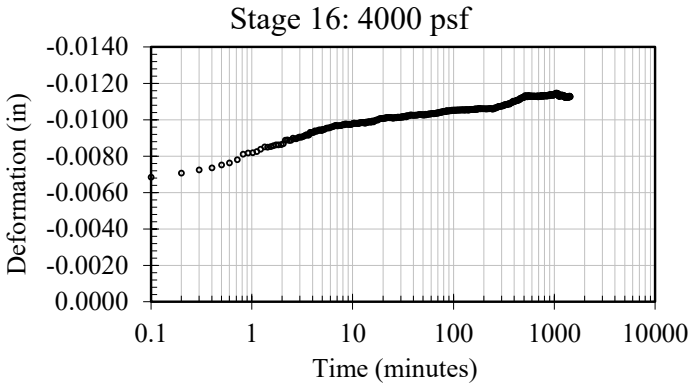


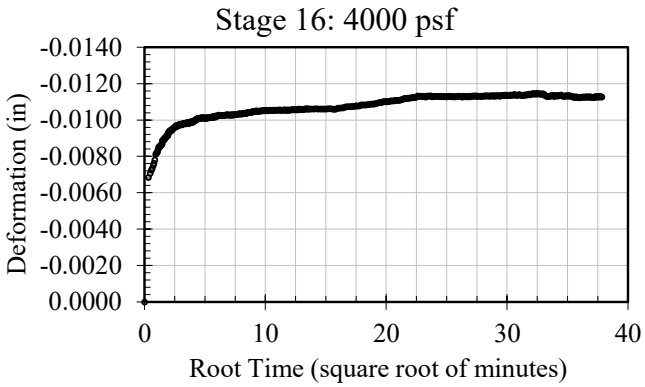
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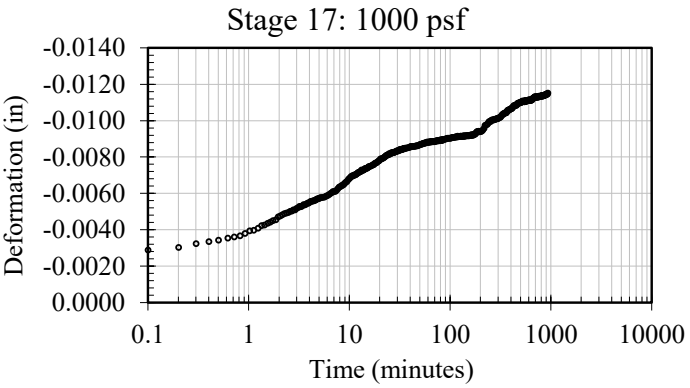
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

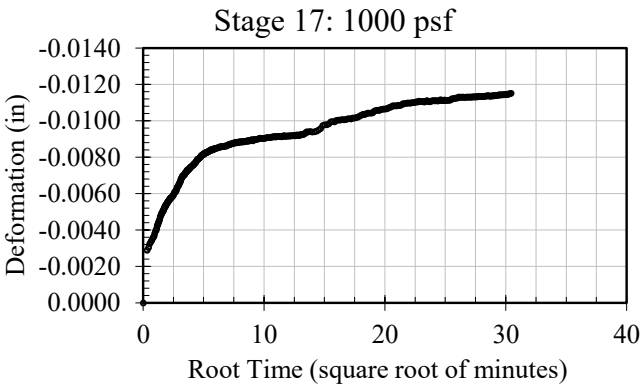
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-1 (5-7_ft)

TRI Log No.: 25-02906.6
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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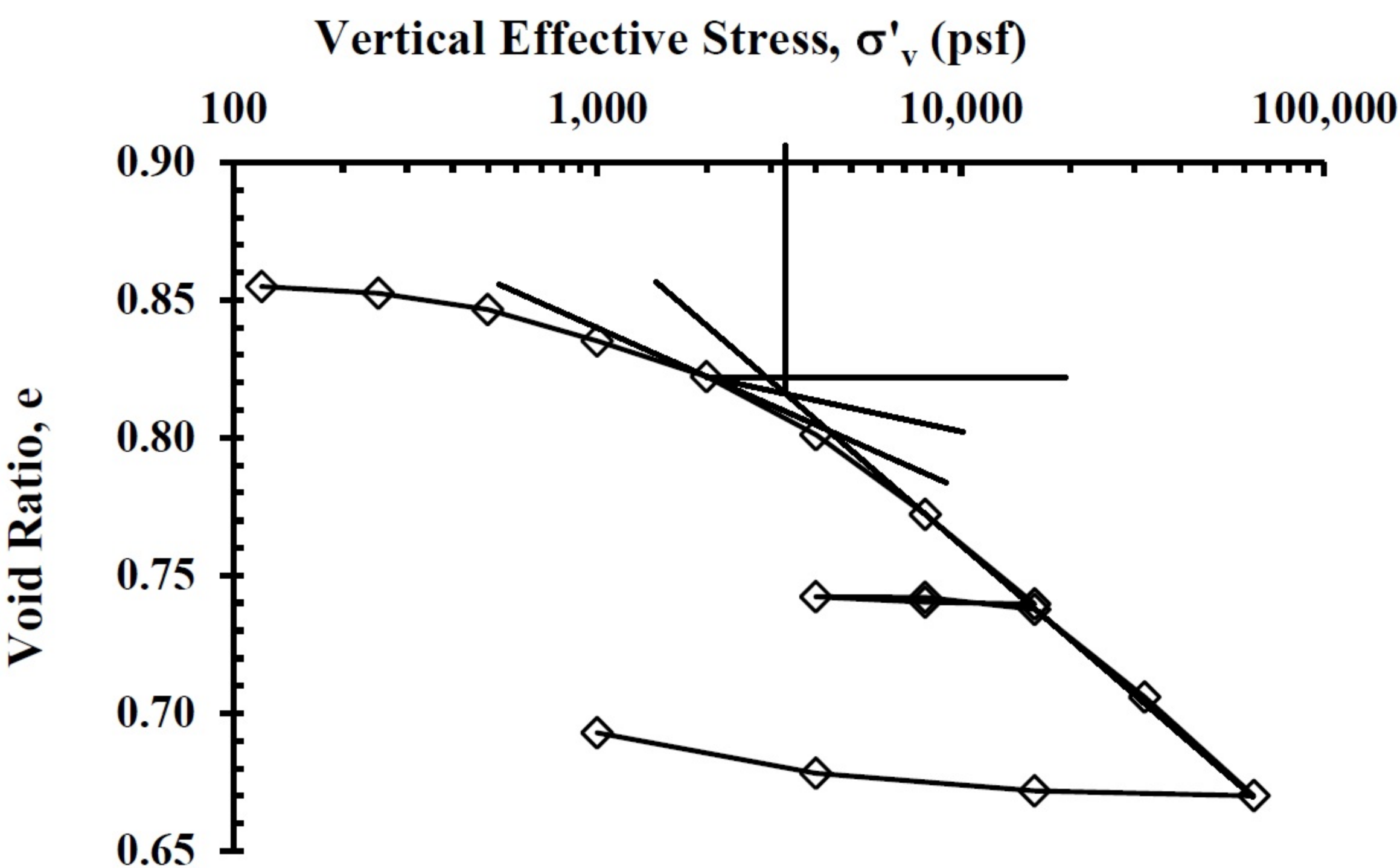








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Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.90
0.85
0.80
0.75
0.70
0.65
Void Ratio, e

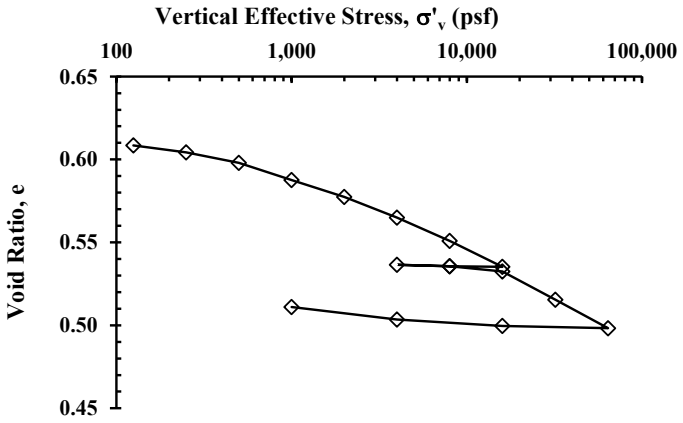
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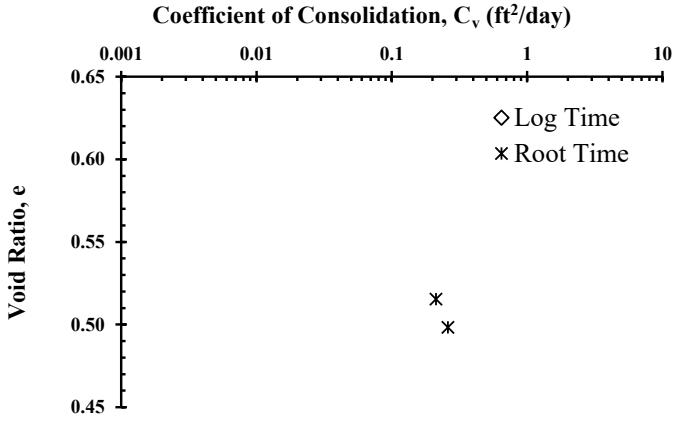
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

Soil Specimen Properties	Initial	Final
Water Content (%)	20.8	14.8
Diameter (in)	2.50	2.50
Height (in)	1.00	0.94
Dry Unit Weight, γ_o lb_f/ft^3	106.7	113.6
Specific Gravity (Assumed)	2.75	
Void Ratio, e	0.61	0.51
Degree of Saturation (%)	94.0	-

Test Setup		
Specimen Condition	●	Intact / "Undisturbed"
		Compacted/Remolded/Reconstituted
Test Water		Extracted Pore Water
	●	Potable Tap Water
		Demineralized Water
		Saline Water
		Other





Stage	σ'_v	log (σ'_v)	e	Strain, ε	δe	C_α	t_{50} (min)		C_v (ft^2/day)	
(#)	(psf)	log (psf)	(-)	(%)	δlog (σ'_v)	(x1,000)	Log Time	Root Time	Log Time	Root Time
1	125	2.10	0.608	0.00	-	-	-	-	-	-
2	250	2.40	0.604	0.26	-0.014	-	-	-	-	-
3	500	2.70	0.598	0.66	-0.021	-	-	-	-	-
4	1,000	3.00	0.588	1.30	-0.035	-	-	-	-	-
5	2,000	3.30	0.577	1.93	-0.034	-	-	-	-	-
6	4,000	3.60	0.565	2.70	-0.041	-	-	-	-	-
7	8,000	3.90	0.551	3.58	-0.047	-	-	-	-	-
8	16,000	4.20	0.535	4.56	-0.052	-	-	-	-	-
9	8,000	3.90	0.536	4.53	-0.001	-	-	-	-	-
10	4,000	3.60	0.536	4.48	-0.003	-	-	-	-	-
11	8,000	3.90	0.536	4.53	-0.003	-	-	-	-	-
12	16,000	4.20	0.532	4.73	-0.011	-	-	-	-	-
13	32,000	4.51	0.515	5.78	-0.056	-	-	2.0	-	2.1E-01
14	64,000	4.81	0.498	6.85	-0.057	-	-	1.6	-	2.6E-01
15	16,000	4.20	0.500	6.77	-0.002	-	-	-	-	-
16	4,000	3.60	0.503	6.53	-0.006	-	-	-	-	-
17	1,000	3.00	0.511	6.06	-0.013	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-

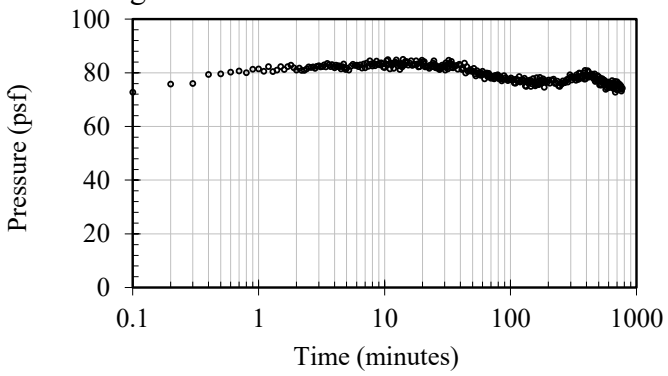
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One-Dimensional Consolidation Properties of Soil (ASTM D2435)

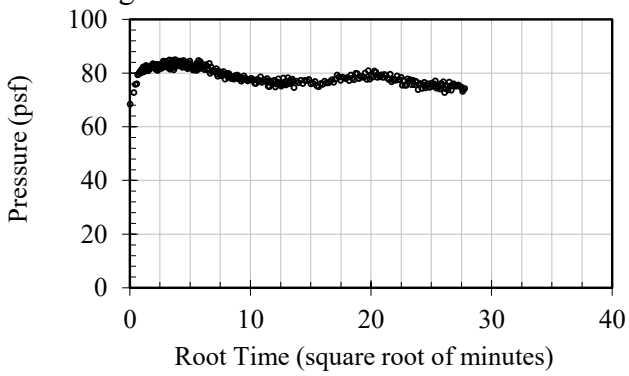
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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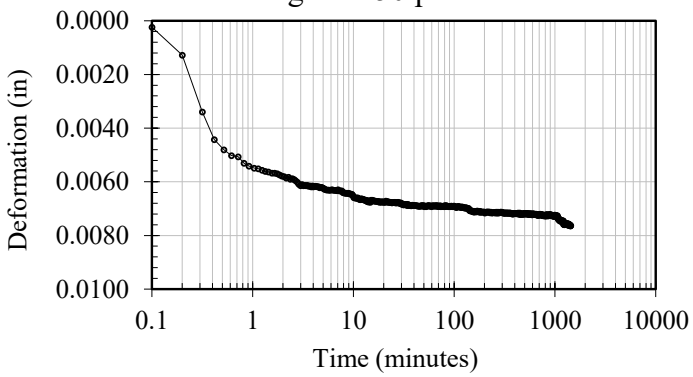
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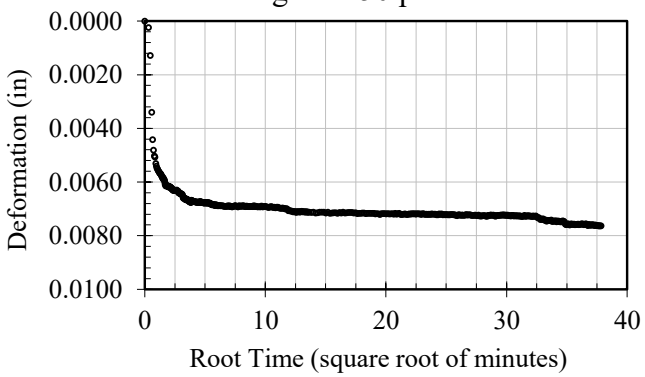
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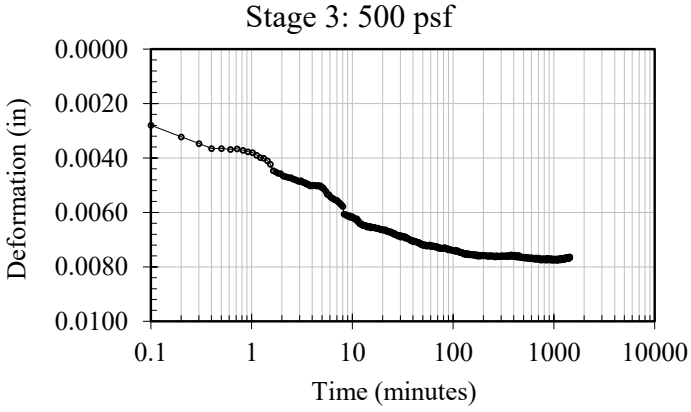
Stage 2: 250 psf



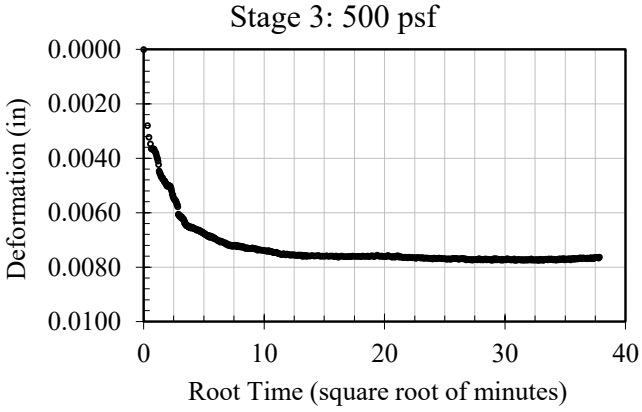
Stage 2: 250 psf



Stage 3: 500 psf



Stage 3: 500 psf

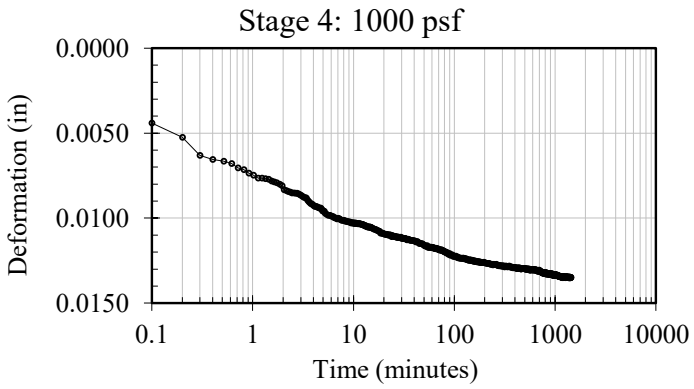


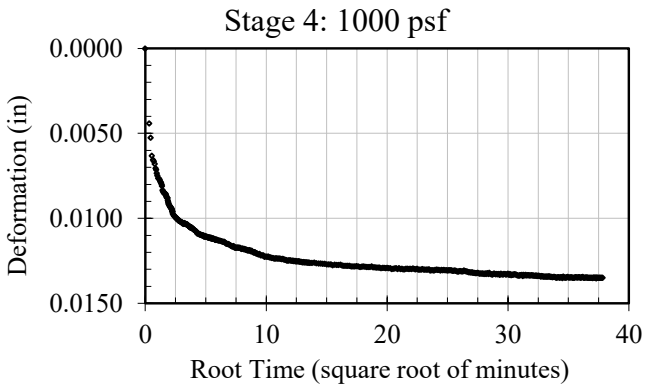
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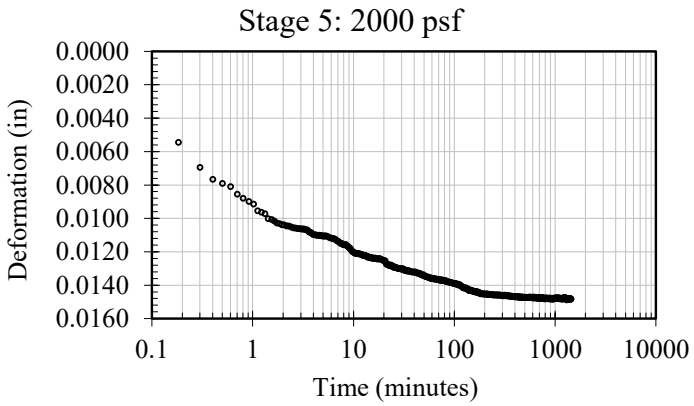
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

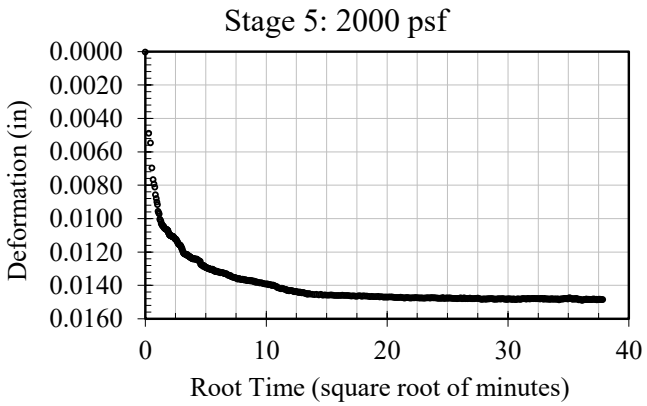
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Specimen: B-6L-2 (11-13_ft)

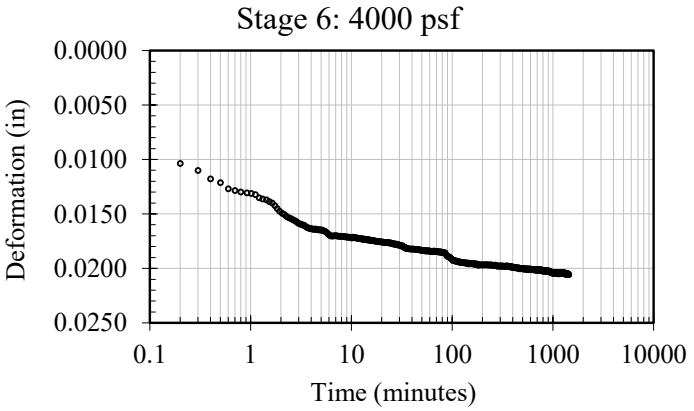
TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
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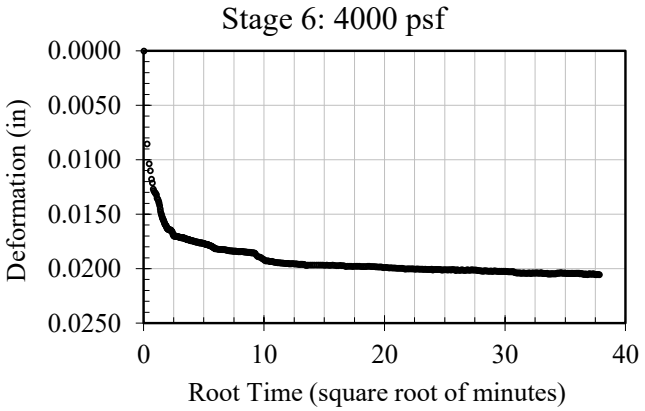










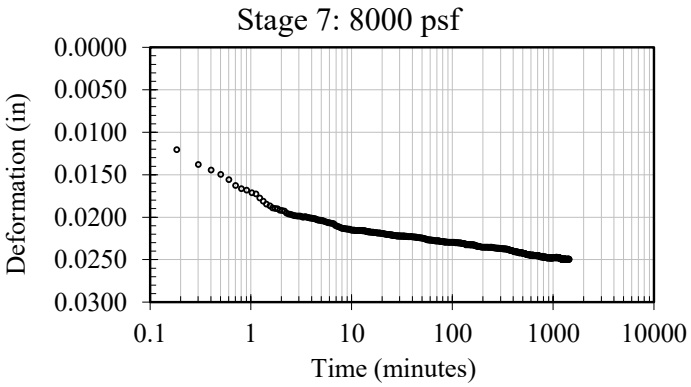


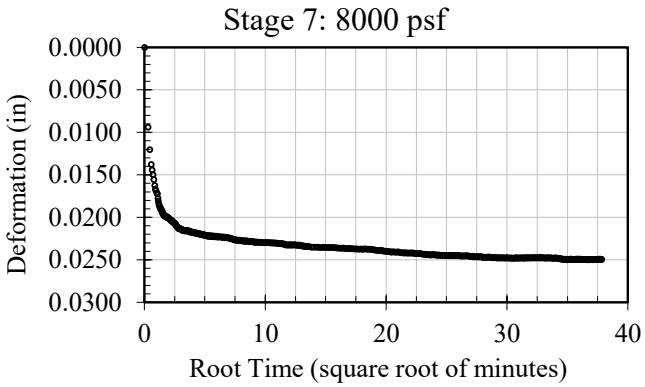
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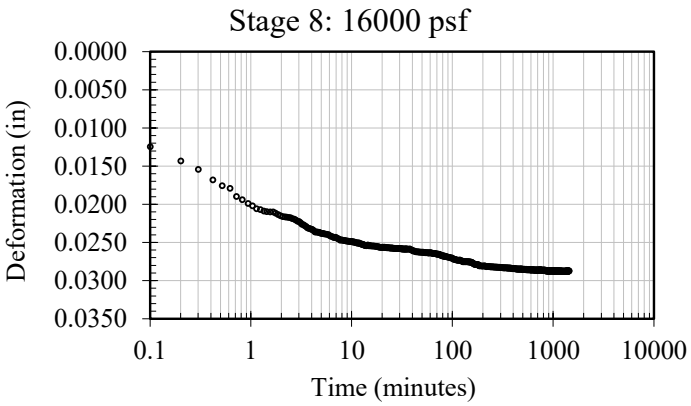
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

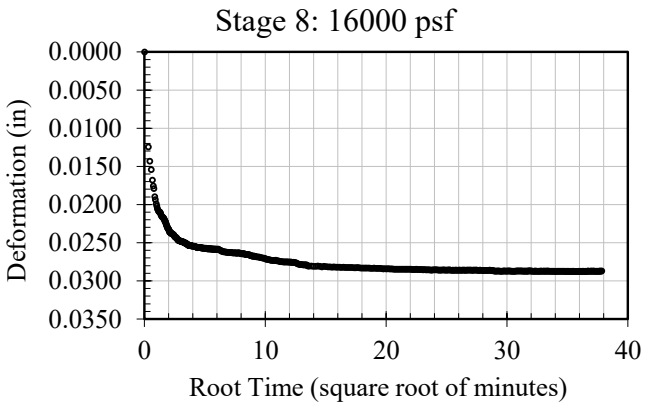
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Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

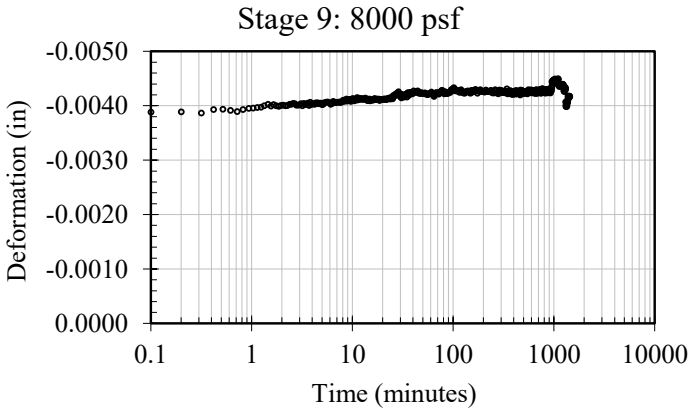
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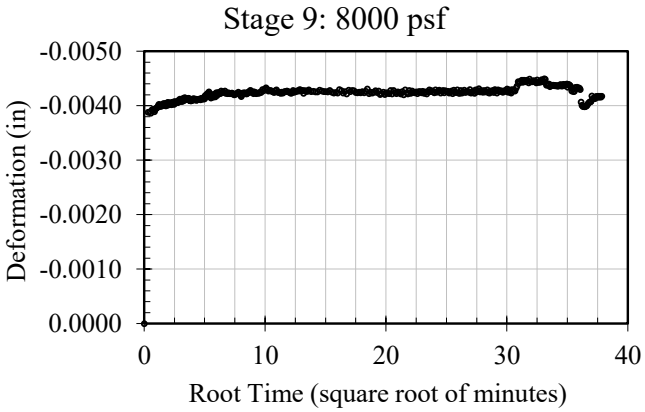










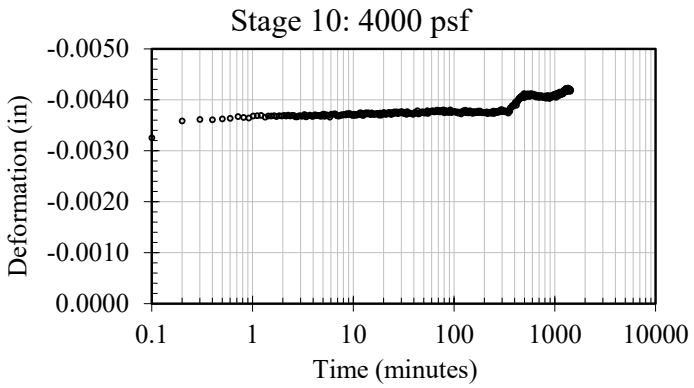


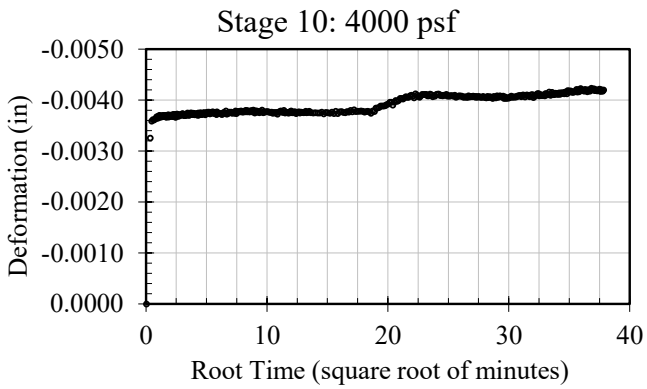
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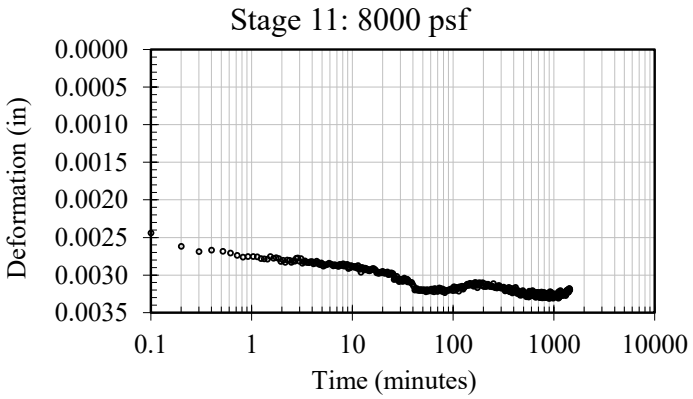
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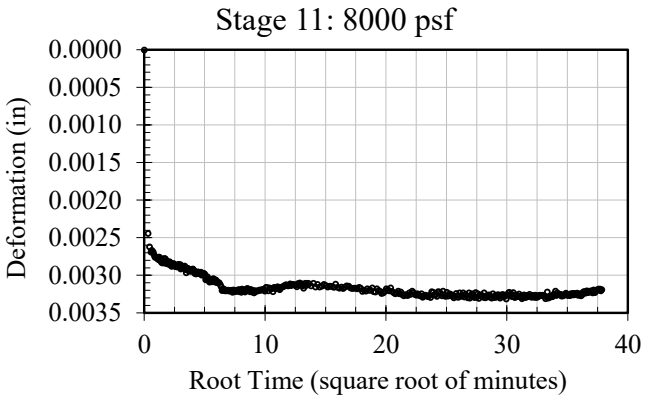
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

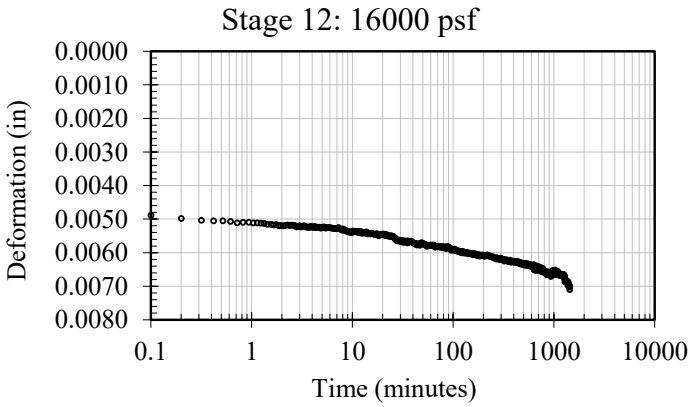
TRI Log No.: 25-02906.7
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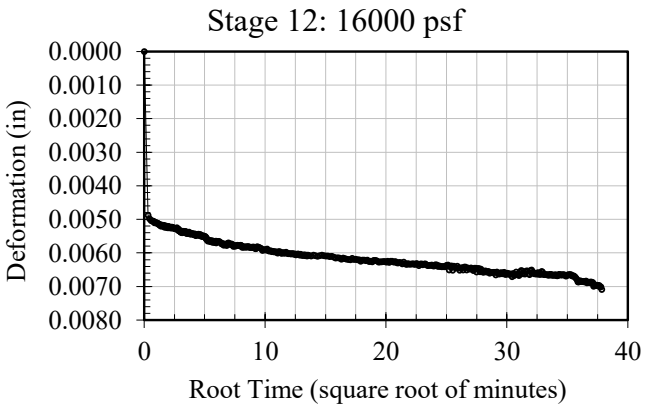










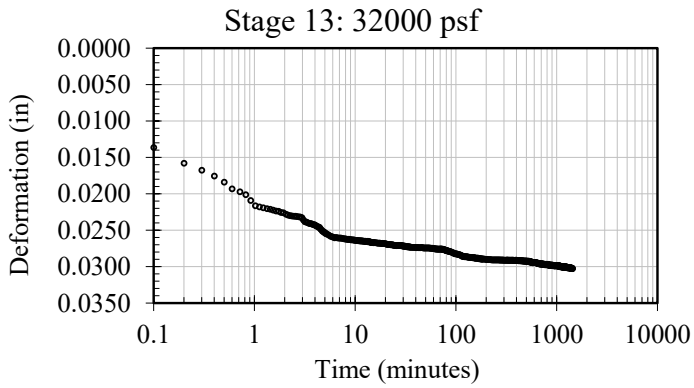


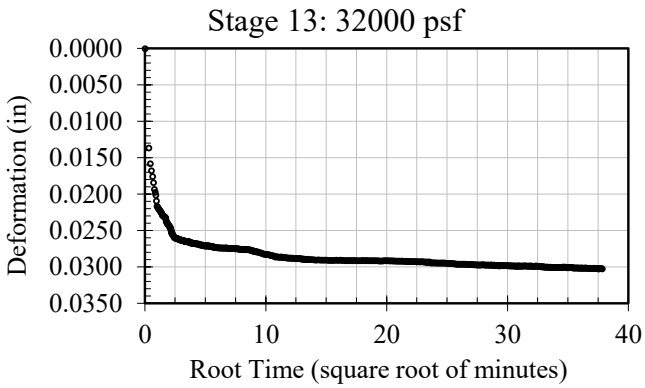
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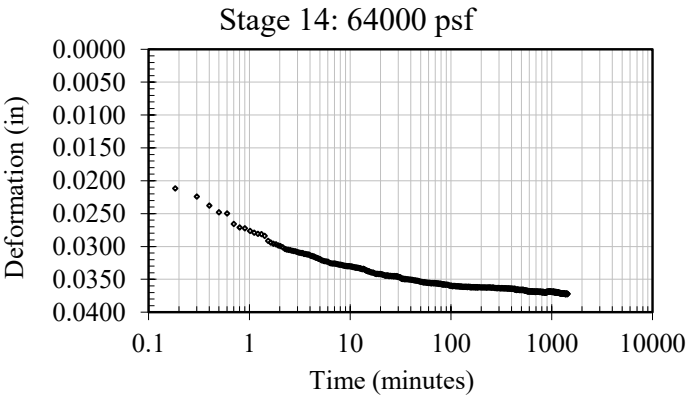
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

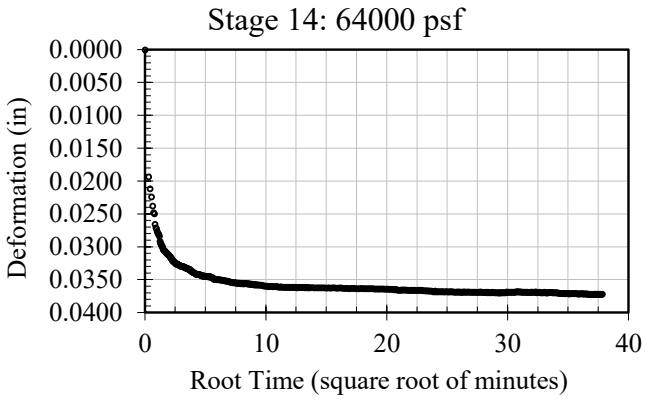
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

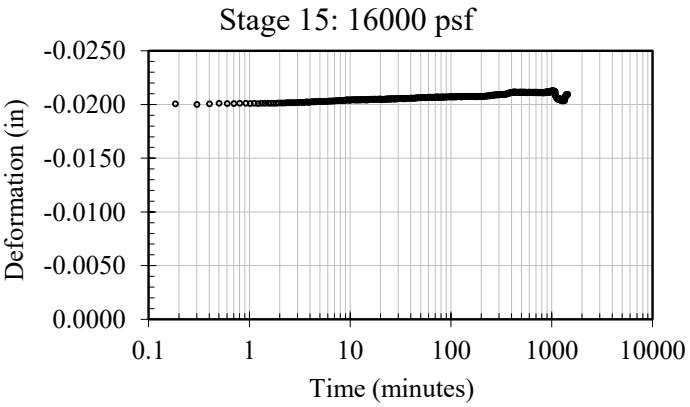
TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

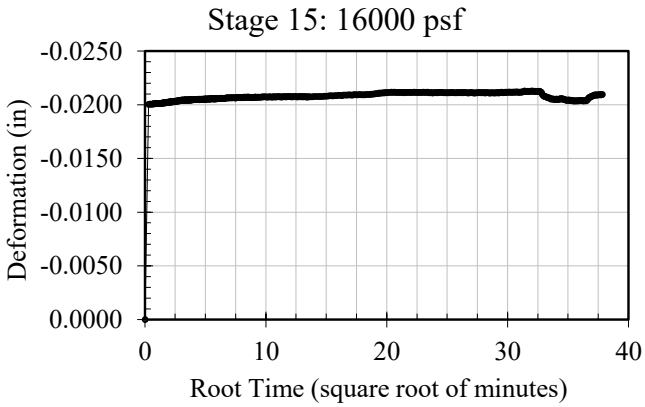










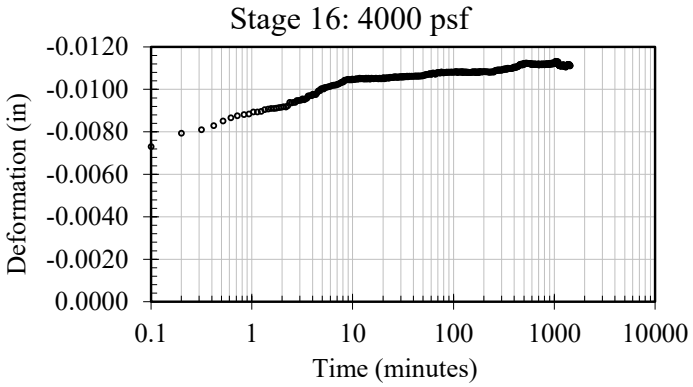


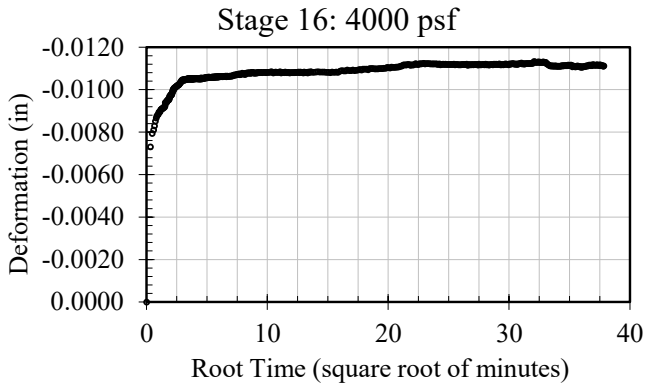
The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

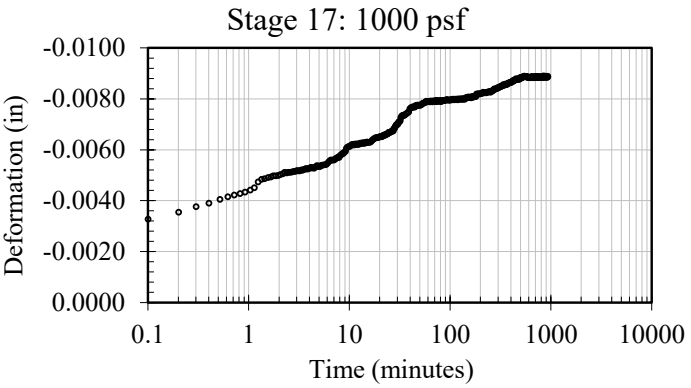
One-Dimensional Consolidation Properties of Soil (ASTM D2435)

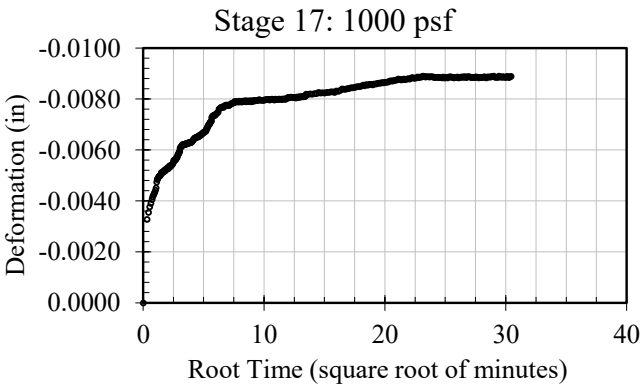
Client: Andrews Engineering, Inc.
Project: 240338/0014 CWLP-Ash Ponds
Specimen: B-6L-2 (11-13_ft)

TRI Log No.: 25-02906.7
Jeffrey A. Kuhn, Ph.D., P.E., 6/23/2025
Quality Review/Date

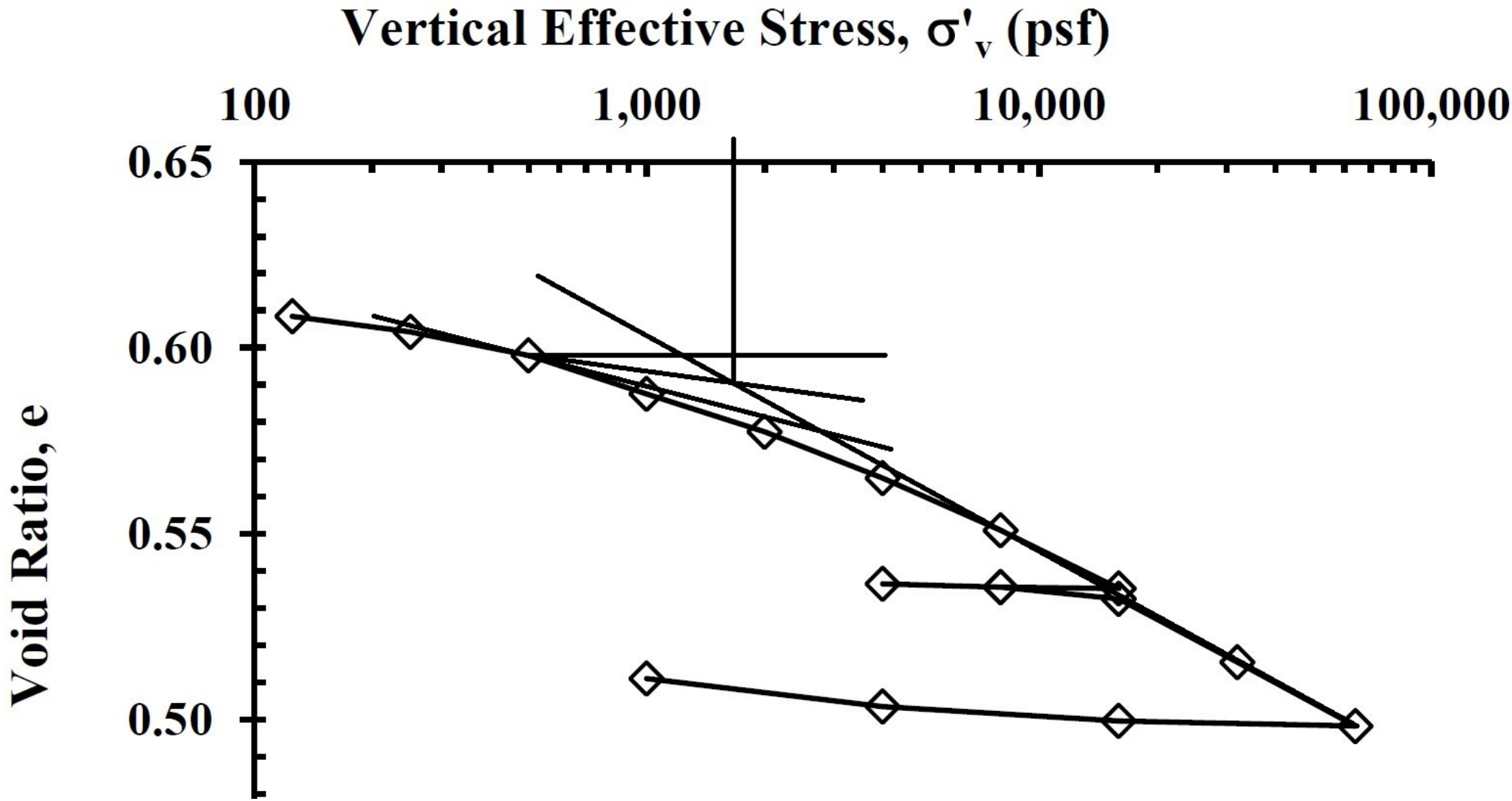








The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.


Vertical Effective Stress, σ'v (psf)
100
1,000
10,000
100,000
0.65
0.60
0.55
0.50
Void Ratio, e

GEOTECHNICS
Soil & Material Testing
A DIVISION OF KLINGNER
4510 Paris Gravel Road • Hannibal, MO 63401 • voice 573.221.7714 • fax 573.221.7762

January 4, 2024 23-1071

Andrews Engineering
101 East Walton
Warrenton, MO 63383

Attn: Mr. Karl Finke, P.E., R.G.

RE: Geotechnical Drilling Services: Andrews - Springfield Ash Ponds Revision 1

Dear Mr. Finke:

In accordance with your request, we have completed the geotechnical drilling and laboratory analysis for the Springfield Ash Ponds in Springfield, Illinois with additional Atterberg testing.

Scope of Services

The scope of our services for this project consisted of investigating the site's subsurface conditions by drilling thirty-nine (39) test borings and installing and completing twenty-nine (29) Vibrating Wire Piezometers (VW Piezo) near the requested locations in Springfield, Illinois. The test borings were drilled to depths of 8½ to 40 feet below the existing ground surface and the VW Piezo's were installed to depths of 18 to 41.1 feet below top of casing. The locations of the borings were determined by Andrews Engineering and staked in the field by Andrews. The proposed borings locations drawing provided to us is enclosed.

The scope of services consisted of exploratory geotechnical borings to help classify and determine the subsurface materials and groundwater conditions in the vicinity of the proposed site, with a field and laboratory testing program. The borings and samples were logged in the field by Andrews personnel with the samples retained by us for laboratory testing analysis. The laboratory testing results are enclosed.

Conclusions

The geotechnical investigation, including exploration, testing, and laboratory analyses has been completed for the exploratory geotechnical investigation borings for the Springfield Ash Pond project in Springfield, Illinois. Laboratory testing results, based on the investigation, have been included in this report.

These data are supplied for the benefit of the designers and owner and do not express or imply any warranty of the subsurface conditions. The scope of our services does not include environmental assessment of investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

As always, if you have any questions do not hesitate to contact us.

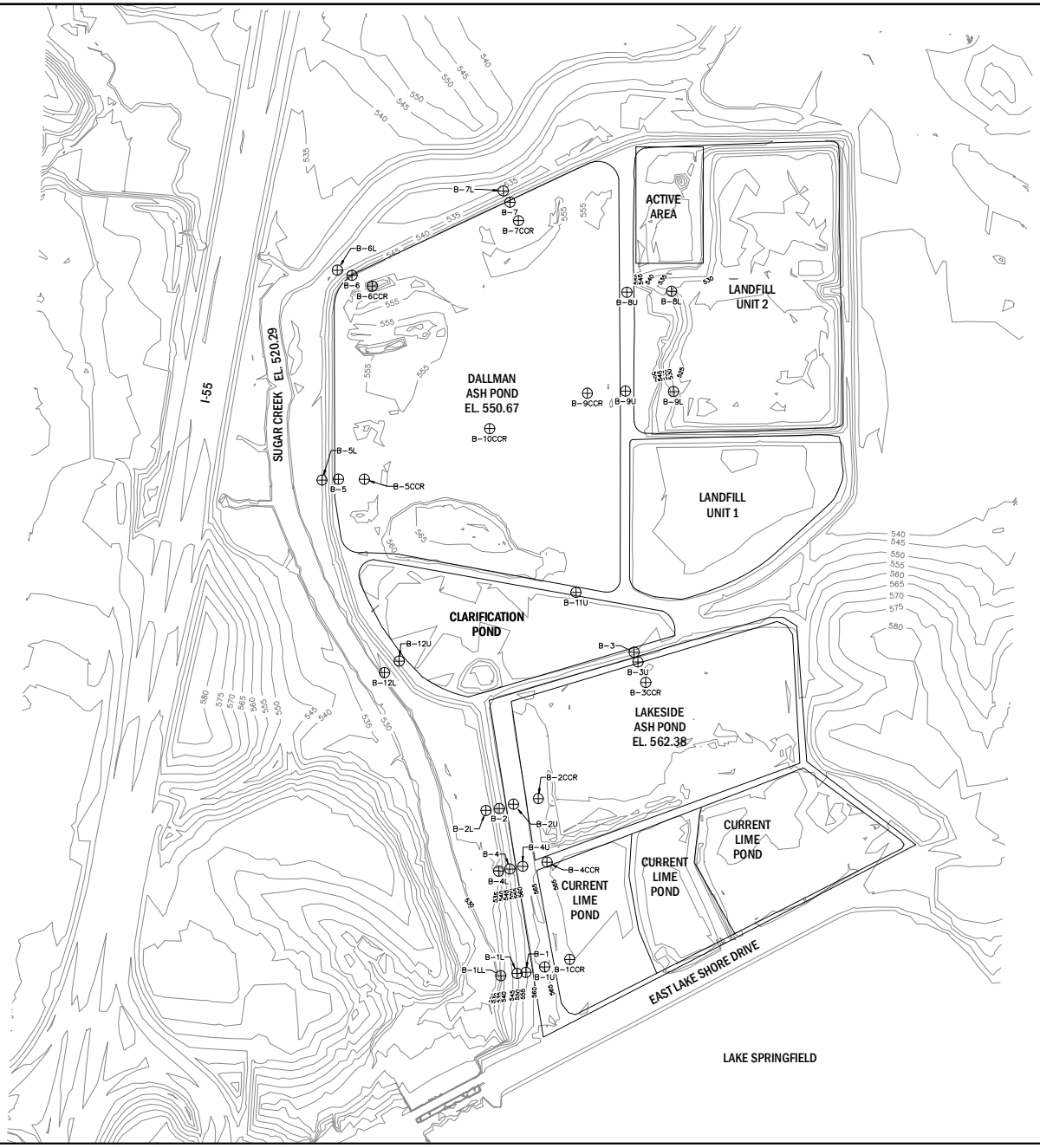
Sincerely,

GEOTECHNICS, A DIVISION OF KLINGNER



Brian Joseph Sick, P.E.
Geotechnical Services Department Manager

Encl. Proposed Boring Locations, Laboratory Data Summary, Laboratory Test Result Reports



LEGEND

⊕ PROPOSED BORING

NOTES

1. LIDAR DATA DERIVED FROM USGS WEBSITE (FLIGHT DATE: OCTOBER 15, 2018).
2. SUGAR CREEK SURFACE WATER ELEVATION IS BASED ON USGS GAGE 05576250 FOR 12/20/2022.

NO.	DATE	REVISION DESCRIPTION	BY

ANDREWS ENGINEERING
3300 GINGER CREEK DRIVE
SPRINGFIELD, ILLINOIS 62711-7233
PH (217) 787-2334 WWW.ANDREWSENG.COM
PONTIAC, IL • LEMBARD, IL • INDIANAPOLIS, IN • WARRENTON, MO
APPROVED BY: KWF | DESIGNED BY: KWF | DRAWN BY: BCK

PROPOSED BORING LOCATIONS

PREPARED FOR
CITY WATER, LIGHT, AND POWER
SPRINGFIELD, SANGAMON COUNTY, ILLINOIS

DATE: JUNE 2023

PROJECT ID: 220408/0029

SHEET NUMBER:

FIG. 1

© 2023 Andrews Engineering, Inc.

Tab: Layout1 Last Saved: July 28, 2023, by Ben Korpus Plotted: Friday, July 28, 2023 8:40:22 AM
\\ohs-west\JOBS\Springfield CWLP\Proposed Borings.dwg

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Moisture Content (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
1	2.5-3	14.5								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	5-5.5	10.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty, With Coal
1	7.5-8	19.8								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
1	10-10.5	21.7								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	13-13.5	21.3								Sandy Lean Clay (CL), Light Brown/Yellow Brown mottled Gray, Silty
1	15.5-16	24.8								Sandy Lean Clay (CL), Light Brown mottled Gray, Silty
1	17.5-18	47.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1	20.5-21	25.6								Lean Clay (CL), Gray mottled Greenish Gray, Black Oxidation, Silty
1	22.5-23	27.1								Lean Clay (CL), Gray mottled Light Gray, Silty
1 ST	24.5-26.5	27.9	127.7	99.8	0.49	85.70	65.7/20.0	30 / 17	1.23×10^{-6}	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist
1	28-28.5	25.5								Fat Clay (CL), Gray, Silty
1	32.5-33	26.0								Sandy Lean Clay (CL), Light Gray/Gray mottled Yellow Brown, Silty
1L	2-3.5	18.5								Fat Clay (CH), Yellow Brown mottled Brown
1L	4.5-6	21.4								Fat Clay (CH), Yellow Brown mottled Brown
1L	7-8.5	21.4								Lean Clay (CL), Yellow Brown mottled Brown, Silty
1L	9.5-11	17.7								Sandy Lean Clay (CL), Yellow Brown, Silty
1L	12-13.5	23.4								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	14.5-16	19.7								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
1L	17-18.5	n/a								
1L	19.5-21	30.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
1L ST-18	22-24	30.7	118.9	91.0	0.57	97.60	63.0/34.6	43/21	5.84×10^{-6}	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
1LL	2-3.5	11.7								Sandy Lean Clay with Gravel (CL), Yellow Brown mottled Brown, Silty
1LL	4.5-6	13.4								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	7-8.5	20.1								Fat Clay (CH), Yellow Brown mottled Light Gray
1LL	9.5-11	17.8								Poorly Graded Sand (SP), Yellow Brown, Fine to Medium
1LL	12-13.5	22.1								Fat Clay (CH), Gray mottled Light Gray
1LL ST-12	14.5-16.5	24.7	125.2	100.4	0.26	84.40	64.5/19.9	39/21	6.02×10^{-6}	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist
1LL	17-18.5	26.2								Fat Clay (CH), Light Brown, Silty
1U	2-3.5	14.6								Lean Clay (CL), Brown mottled Light Gray/Reddish Brown, Silty, With Coal
1U	4.5-6	21.0								Lean Clay (CL), Brown mottled Light Brown/Light Gray, Silty, Trace Gravel
1U	7-8.5	36.5								Silt (ML), Black, Clayey, With Coal
1U	9.5-11	6.1								Coal, Black, With Silt
1U	12-13.5	32.2								Coal, Black
1U	14.5-16	59.2								Silt (ML), Black, Clayey, With Coal
1U	17-18.5	68.6								Silt (ML), Black, With Coal and Ash
1CCR	2-3.5	10.7								Cinders, Black
1CCR	4.5-6	11.3								Cinders, Black
1CCR	7-8.5	22.2								Cinders/Ash Black
1CCR	9.5-11	21.5								Cinders/Ash Black
1CCR	12-13.5	20.1								Cinders. Black
1CCR	14.5-16	53.5								Cinders, Black, With Clayey Silt
1CCR	17-18.5	22.2								Cinders, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
2	2-3.5	18.5								Fat Clay (CH), Brown mottled Light Gray
2	4.5-6	22.0								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2	7-8.5	27.0								Fat Clay (CH), Dark Brown mottled Brown
2	9.5-11	24.9								Fat Clay (CH), Yellow Brown mottled Brown
2	12-13.5	28.4								Fat Clay (CH), Light Gray mottled yellow Brown
2	14.5-16	25.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
2	17-18.5	27.2								Fat Clay (CH), Light Gray mottled Yellow Brown
2	19.5-21	27.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2 ST	22-24	26.8	123.1	97.1	0.50	91.70	57.8/33.9	57/21	$6.87x10^{-8}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
2	24.5-26	24.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
2	27-27.5	21.2								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2	27.5-28.5	22.4								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
2L	2-3.5	21.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
2L	4.5-6	28.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
2L ST 6	7-9'	25.5	126.5	100.8	0.33	87.70	74.3/13.4	27/21	$8.24x10^{-6}$	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist
2L	9.5-11	22.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
2L	12-13.5	22.0								Sandy Lean Clay (CL), Yellow Brown mottled Brown, Silty
2L	14.5-16	23.6						20/16		Sandy Silty Clay (CL), Yellow Brown mottled Light Gray
2L	17-18.5	21.1								Sandy Lean Clay (CL), Light Brown mottled Yellow Brown/Brown, Silty
2L	19.5-21	21.4								Poorly Graded Sand (SP), Yellow Brown, Fine, With Clay Seams
2L	22-23.5	29.0								Lean Clay (CL), Light Gray, Silty
2U	2-3.5	8.1								Cinders, Dark Brown
2U	4.5-6	8.3								Cinders, Dark Brown
2U	7-8.5	20.2								Fat Clay (CH), Yellow Brown mottled Light Gray
2U	9.5-11	11.0								Cinders/Silt, Dark Brown
2U	12-13.5	65.7								Sandy Silt (ML), Dark Brown
2U	14.5-16	46.3								Sandy Silt (ML), Dark Brown
2U	17-18.5	24.6								Poorly Graded Sand (SP), Dark Brown, Fine to Coarse
2U	19.5-21	53.1								Coal, Dark Gray
2U	22-23.5	31.7								Poorly Graded Sand (SP), Dark Gray, Fine to Coarse
2U	24.5-26	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray
2CCR	2-3.5	58.6								Lean Clay (CL), Light Gray mottled Yellow Brown/Brown, Silty, Trace Coal
2CCR	4.5-6	23.5								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	7-8.5	238.7								Ash, Light Gray
2CCR	9.5-11	107.7								Coal/Ash, Black
2CCR	12-13.5	86.4								Coal, Black over Silt (ML), Light Gray, Clayey
2CCR	14.5-16	54.5								Coal, Black, Clayey, With Organics
2CCR	17-18.5	86.8								Coal, Black

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
3	2-3.5	25.9								Fat Clay (CH), Brown mottled reddish Brown
3	4.5-6	20.6								Poorly Graded Sand (SP), Brown, Fine to Medium
3	7-8.5	22.2								Lean Clay (CL), Light Brown mottled Brown
3 ST 8	9.5-11.5	25.8	122.9	97.7	0.67	98.10	67.6/30.5	60/24	$8.50x10^{-9}$	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist
3	12-13.5	26.6								Fat Clay (CH), Brown mottled Light Gray/Reddish Brown
3	14.5-16	24.8								Fat Clay (CH), Brown, Reddish Oxidation
3	17-18.5	27.1								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown
3 ST16	19.5-21.5	25.8	121.6	96.7	0.62	95.00	65.7/29.3	43/20	$4.27x10^{-7}$	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist
3	22-23.5	29.0								Fat Clay (CH), Light Gray mottled Yellow Brown, Silty
3	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Black Oxidation, Silty
3	27-28.5	28.9								Fat Clay (CH), Light Brown mottled Light Gray
3U	2-3.5	16.0								Lean Clay (CL), Brown mottled Yellow Brown/Light Brown, Silty, Trace Sand
3U	4.5-6	27.7								Ash, Yellow Brown
3U	7-8.5	20.7								Lean Clay (CL), Brown mottled Light gray, With Coal
3U ST 8	9.5-11.5	21.3	122.6	101.0	0.55	81.10	65.5/15.6	38/22	$1.52x10^{-8}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist
3U	12-13.5	37.2								Coal, Black
3U	14.5-16	32.0								Silt (ML), Brown, Clayey
3U	17-18.5	62.6								Silt (ML), Brown, Clayey
3CCR	2-3.5	22.7								Lean Clay (CL), Brown, Silty, Trace Coal
3CCR	4.5-6	91.2								Ash, Light Gray, With Clay Seams
3CCR	7-8.5	51.6								Ash, Light Gray, With Clay Seams
3CCR	9.5-11	113.5								Coal, Black
3CCR	12-13.5	86.9								Coal, Black, With Organics/Clay Seams
3CCR	14.5-16	61.1								Coal, Black, With Clay Seams
3CCR	17-18.5	65.8								Coal, Black, With Clay Seams
4	3-3.5	16.5								Lean Clay (CL), Light Gray mottled Yellow Brown
4	5.5-6	18.2								Lean Clay (CL), Yellow Brown mottled Brown
4	7.5-8	23.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	10.5-11	26.9								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	12.5-13	26.6								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4	14.5-16	26.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation, Trace Sand
4	17.5-18	27.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4 ST	19.5-21.5	28.3	124.0	96.7	0.95	97.20	64.8/32.4	49/22	$6.53x10^{-8}$	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4	22-22.5	30.1								Fat Clay (CH), Yellow Brown/Light Brown mottled Brown, Silty
4	25-25.5	33.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
4	27-27.5	22.7								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
4	30-30.5	23.5								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
4L	2-3.5	31.7								Lean Clay (CL), Dark Brown, Silty over Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Gravel
4L	4.5-6	27.7								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
4L	7-8.5	27.3								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation
4L	9.5-11	29.8								Fat Clay (CH), Yellow Brown mottled Light Gray, Trace Sand
4L ST10	12-14'	27.4	124.2	97.5	0.42	87.90	71.7/16.2	32/20	$9.53x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist
4L	14.5-16	25.7								Lean Clay with Sand (CL), Yellow Brown mottled Light gray
4L	17-18.5	27.4						31/23		Lean Clay (CL/ML), Light Gray, Silty
4U	2-3.5	6.5								Cinders, Black
4U	4.5-6	30.8								Fat Clay (CH), Yellow Brown mottled Gray, Silty
4U	7-8.5	23.0								Fat Clay (CH), Yellow Brown mottled Gray, Silty, With Cinders
4U	9.5-11	36.4								Silt (ML), Black, With Cinders
4U	12-13.5	24.5								Cinders, Black
4U	14.5-16	38.0								Cinders, Black, Silty
4U	17-18.5	24.8								Cinders, Black
4U	19.5-21	18.0								Coal, Black
4U	22-23.5	59.2								Ash, Light Gray
4U	24.5-26	28.0								Fat Clay (CH), Yellow Brown mottled Light Gray
4U ST22	27-29	26.9	125.3	98.7	0.53	97.10	69.6/27.5	62/24	$9.17x10^{-9}$	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist
4CCR	2-3.5	21.0								Lean Clay (CL), Yellow Brown, With Brick
4CCR	4.5-6	23.0								Silt (ML), Brown, Clayey, With Clay Seams
4CCR	7-8.5	56.0								Ash, Light Gray
4CCR	9.5-11	91.3								Cinder/Ash, Black
4CCR	12-13.5	83.6								Cinder/Ash, Black
4CCR	14.5-16	59.3								Cinders/Silt, Black
4CCR	17-18.5	33.0								Cinders, Black
4CCR	19.5-21	59.5								Ash/Cinders, Black
5	2-3.5	14.8								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	4.5-6	16.7								Fat Clay (CH), Yellow Brown mottled Brown, Trace Coal
5	7-8.5	13.6								Lean Clay with Sand (CL), Yellow Brown mottled Light Gray,
5	9.5-11	22.1								Fat Clay (CH), Yellow Brown mottled Light Gray, Silty
5	12-13.5	21.0								Fat Clay (CH), Yellow Brown mottled Light Gray
5	14.5-16	22.8								Fat Clay (CH), Brown mottled Yellow Brown
5	17-18.5	21.2								Lean Clay (CL), Brown mottled Light Brown
5	19.5-21	21.8								Fat Clay (CH), Brown, Silty
5	22-23.5	19.4								Sandy Lean Clay (CL), Light Gray mottled Gray/Yellow Brown
5 ST	24.5-26.5	24.3	124.0	99.8	0.25	90.20	67.3/22.9	43/22	$2.67x10^{-7}$	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist
5	27-28.5	25.6								Lean Clay (CL), Yellow Brown mottled Light Gray
5	29.5-31	24.5								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	32-33.5	24.7								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	34.5-36	24.6								Lean Clay (CL), Yellow Brown mottled Light Gray, Silty
5	37-38.5	23.6								Sandy Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
5L	3-3.5	18.9								Fat Clay (CH), Brown mottled Light Brown
5L	5-6'	23.1								Fat Clay (CH), Brown mottled Yellow Brown
5L	8-8.5	22.5								Fat Clay (CH), Brown mottled Light Gray
5L ST	9.5-11	28.8	119.9	93.1	0.51	94.60	73.2/21.4	46/24	$5.18x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
5L	13-13.5	30.1								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	15.5-16	30.9								Fat Clay (CH), Brown mottled Light Gray, Silty
5L	17-17.5	28.3						39/22		Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
5CCR	3-3.5	24.6								Silt with Sand (ML), Light Gray
5CCR	5.5-6	24.2								Sandy Lean Clay (CL), Gray, Silty
5CCR	7-7.5	27.8								Sandy Silt (ML), Gray
5CCR	9.5-10	13.5								Silty Sand (SM), Dark Brown, Trace Gravel
5CCR	15-15.5	9.8								Coal, Black
5CCR	17.5-18	13.9								Coal, Black
6	0-2	7.3								Clayey Sand with Gravel (SC), Brown
6	2-4'	21.3								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	5-7.5	24.0								Lean Clay (CL), Brown mottled Gray, Trace Sand, Fat Seams
6	7.5-9	20.5								Lean Clay (CL), Gray mottled Light Brown, Trace Sand/Coal
6	10-11.5	20.5								Fat Clay (CH/CL), Light Gray mottled Gray/Light Brown,
6	12.5-14	20.9								Lean Clay (CL), Brown, Silty
6	15-16.5	19.9								Lean Clay (CL), Light Gray mottled Light Brown, Silty
6 ST	17-19	21.9	128.6	105.5	0.95	90.20	61.9/28.3	34/19	$4.25x10^{-8}$	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
6	19-21	n/a								Lean Clay (CL), Brown, Silty, With Organics
6	21-23	22.0								Lean Clay (CL), Brown/Gray, Silty
6	23-25	20.6								Lean Clay with Sand (CL), Gray mottled Brown, With Coal
6	25-27	31.3								Lean Clay (CL), Gray, Silty
6	27-29	27.1								Sandy Silt (ML), Gray, Clayey
6	29-31	29.9								Silt (ML), Gray, Clayey
6	31-33	n/a								
6	33-35	28.2								Lean Clay (CL), Gray mottled Yellow Brown, Silty
6	35-37	27.1								Lean Clay (CL), Brown mottled Light Brown, Trace Sand, Fat Seams
6	37-39	21.0								Sandy Silt (ML), Light Gray mottled Yellow Brown, Clayey
6L	2.5-4	17.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
6L	5-6.5	21.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
6L ST1	7.5-9	26.6	121.9	96.3	0.44	91.60	74.1/17.5	41/23	$5.47x10^{-7}$	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist
6L	10-11.5	27.5								Lean Clay with Sand (CL), Brown, Silty
6L	12.5-14	23.5								Silty Clayey Sand (SC-SM), Light Gray mottled Yellow Brown
6L	15-16.5	24.9								Clayey Sand (SC), Yellow Brown mottled Light Gray
6L	17.5-19	35.9						31/19		Lean Clay (CL), Gray, Trace Organics
6L	20-21.5	21.1								Silty Clayey Sand (SC-SM), Gray
6L	22.5-24	24.0								Silty Clayey Sand (SC-SM), Light Gray mottled Light Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
6CCR	2-3.5	15.5								Ash/Cinders, Black, Clayey
6CCR	4.5-6	13.3								Ash/Cinders/Coal, Black, Clayey
6CCR	7-8.5	29.4								Ash, Gray
6CCR	9.5-11	39.1								Silt (ML), Brown mottled Light Gray
6CCR	12-13.5	44.4								Silt (ML), Light gray
6CCR	14.5-16	51.6								Silt (ML), Light Gray mottled Brown
6CCR	17-18.5	87.7								Silt (ML), Dark Brown mottled Light Brown
6CCR	19.5-21	106.5								Silt (ML), Dark Brown
6CCR	22-23.5	97.4								Silt (ML), Dark Brown mottled Brown
7	2.5-3	15.1								Sandy Lean Clay (CL), Yellow Brown mottled Light Gray
7	4.5-5	21.8								Lean Clay (CL), Light Brown/Brown mottled Yellow Brown, With Fat Clay Seams
7	7.5-8	21.1								Fat Clay (CH), Light Brown mottled Light Gray, Silty, With Lean Clay Seams
7	10-10.5	21.3								Lean Clay (CL), Light Brown mottled Brown/Light Gray, Silty
7	12-12.5	24.7								Lean Clay (CL), Brown mottled Light Brown, Silty
7	15-15.5	21.1								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, With Organics
7	17.5-18	19.5								Sandy Lean Clay (CL), Brown mottled Light Gray
7 ST	19.5-21.5	25.8	120.2	95.5	0.55	97.70	62.2/35.5	63/20	$1.71x10^{-8}$	Fat Clay (CH), Brown/ Yellow Brown mottled Light Gray, Silty, Stiff, Moist
7	23-23.5	24.4								Fat Clay (CH), Yellow Brown mottled Light Gray, Black Oxidation
7	25-25.5	26.1								Fat Clay (CH/CL), Light Gray mottled Yellow Brown
7	27.5-28	28.6								Silty Clayey Sand (SC-SM), Brown mottled Yellow Brown
7	30-30.5	30.7								Sandy Silt (ML), Light Brown, With Fat Clay Seams
7	32.5-33	38.1								Fat Clay (CH), Light Gray, With Silty Sand Seams
7	35-36.5	32.4								Silt (ML), Gray, Clayey
7	37-37.5	39.2								Silt (ML), Brown, Clayey
7CCR	2-3.5	26.5								Silt (ML), Brown, Clayey
7CCR	4.5-6	46.8								Silt (ML), Brown, Clayey, With Cinders
7CCR	7-8.5	54.9								Silt (ML), Brown, Clayey
7CCR	9.5-11	55.5								Sandy Silt (ML), Light Gray
7CCR	12-13.5	42.7								Silt (ML), Light Gray
7CCR	14.5-16	49.5								Silt (ML), Light Gray mottled Dark Brown
7CCR	17-18.5	45.8								Silty Sand (SM), Light Gray
7L	2-3.5	16.8								Fat Clay (CH), Yellow Brown mottled Light Gray
7L	4.5-6	14.6								Fat Clay (CH), Light Gray mottled Brown over Sandy Lean Clay (CL), Yellow Brown mottled Light Brown
7L	7-8.5	24.1								Sandy Lean Clay (CL), Yellow Brown mottled Brown over Poorly Graded Sand (SP), Yellow Brown, Fine, Silty
7L	9.5-11	27.3								Fat Clay (CH), Light Brown mottled Brown, Silty, Trace Sand
7L	12-13.5	37.7								Silt (ML), Brown
7L	15-16.5	29.2						33/25		Silt (ML), Brown, Trace Sand
7L	17-18.5	26.0								Fat Clay (CH/CL), Brown, Silty, Trace Sand

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
8L	3-3.5	15.5								Fat Clay (CH), Yellow Brown mottled Light Brown
8L	5.5-6	14.1								Lean Clay (CL), Yellow Brown mottled Brown
8L	7.5-8	27.2								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L	10.5-11	27.8								Lean Clay (CL), Yellow Brown mottled Light Brown/Light Gray, Silty
8L ST5	12-14'	23.8	126.4	102.1	0.33	69.80	56.6/13.2	26/19	$3.41x10^{-6}$	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist
8L	15.5-16	29.8								Sandy Lean Clay (CL), Light Gray, Silty
8L	17.5-18	33.5								Sandy Lean Clay (CL), Light Gray, Silty, With Organics
8L	20.5-21	32.3						39/26		Silt (ML), Gray, With Lean Clay (CL) Seams
8L	22.5-23	26.7						31/21		Lean Clay (CL), Gray, Silty
8U	2-3.5	24.8								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	4.5-6	22.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
8U	7-8.5	23.8								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
8U ST8	9.5-11.5	24.0	125.7	101.4	0.55	90.60	68.1/22.5	48/21	$2.25x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
8U	12-13.5	22.5								Fat Clay (CH), Light Gray mottled Yellow Brown
8U	14.5-16	23.9								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray
8U	17-18.5	21.9								Lean Clay (CL), Brown mottled Yellow Brown Light Gray, Silty
8U ST16	19.5-21.5	25.7	127.1	101.1	0.80	95.50	79.7/15.8	45/19	$9.40x10^{-9}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist
8U	22-23.5	27.8								Lean Clay (CL), Brown, Silty
8U	24.5-26	31.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	27-28.5	31.7								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	29.5-31	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
8U	32-33.5	29.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
9L	2-2.5	23.6								Sandy Lean Clay (CL), Light Brown mottled Light Gray
9L	4.5-5	24.6								Lean Clay with Sand (CL), Light Brown mottled Light Gray/Yellow Brown, Silty
9L ST	7-9'	28.0	126.5	98.8	0.15	79.90	65.0/14.9	26/17	$2.55x10^{-6}$	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist
9L	10.5-11	55.9								Silty Clayey Sand (SC-SM), Gray, With Organics
9L	13-13.5	27.2								Sandy Silt (ML), Gray, Clayey
9L	15.5-16	28.1						33/22		Lean Clay (CL), Gray, Silty
9L	18-18.5	28.6						46/21		Lean Clay (CL), Gray, Silty

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
9U	2-3.5	19.8								Fat Clay (CH), Yellow Brown mottled Light Gray/Brown
9U	4.5-5	20.3								Fat Clay (CH), Brown mottled Light GrayYellow Brown
9U	7-8.5	19.9								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	9.5-11	n/a								
9U	12-13.5	25.5								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	14.5-16	22.2								Fat Clay (CH), Gray mottled Yellow Brown
9U	17-18.5	23.6								Lean Clay with Sand (CL), Brown mottled Light Brown/Light Gray
9U ST 16	19.5-21.5	22.4	125.2	102.3	0.95	96.00	78.6/17.4	46/22	$2.63x10^{-8}$	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist
9U	22-23.5	21.3								Lean Clay (CL), Brown mottled Light Gray/Yellow Brown
9U	24.5-26	25.2								Fat Clay (CH), Gray mottled Yellow Brown, Trace Coal
9U	26-28	23.3								Fat Clay (CH), Yellow Brown mottled Light Brown/Light Gray
9U	28-30	28.7								Fat Clay (CH), Yellow Brown mottled Light Gray
9U	30-32	29.4								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray
9U	32-34	29.5								Fat Clay (CH/CL), Gray mottled Light Gray, Silty
9U	34-36	29.7								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9U	36-38	29.5								Sandy Lean Clay (CL), Gray mottled Light Gray
9U	38-40	24.6								Sandy Lean Clay (CL), Gray mottled Yellow Brown, Silty
9CCR	2-3.5	15.0								Sandy Lean Clay (CL), Gray mottled Light Brown
9CCR	4.5-5	42.3								Silt (ML), Gray mottled Light Gray
9CCR	7-8.5	64.2								Silt (ML), Gray mottled Light Gray
9CCR ST8	9.5-11.5	23.2	126.9	103.0	0.72	94.50	66.6/27.9	46/21	$9.55x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist
9CCR	12-13.5	46.9								Silt (ML), Gray mottled Light Gray
9CCR	14.5-16	41.4								Silt (ML), Gray mottled Light Gray
9CCR	17-18.5	41.0								Silt (ML), Gray mottled Light Gray
10CCR	2-3.5	25.9								Ash/Cinders, Gray
10CCR	4.5-5	13.8								Ash/Cinders, Gray
10CCR	7-8.5	28.7								Ash, Brown/Light Gray
10CCR	9.5-11	38.2								Ash, Brown/Light Gray
10CCR	12-13.5	58.1								Ash, Brown/Light Brown
10CCR	14.5-16	27.2								Ash/Cinders, Dark Gray mottled Light Brown
10CCR	17-18.5	52.9								Ash, Brown/Gray
10CCR	19.5-21	59.5								Ash/Cinders, Gray mottled Brown
10CCR	22-23.5	58.0								Ash/Cinders, Gray mottled Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
11U	2-3.5	18.0								Sandy Lean Clay (CL), Dark Brown
11U	4.5-5	20.4								Lean Clay with Sand (CL), Yellow Brown mottled Brown
11U	7-8.5	23.5								Fat Clay (CH), Light Gray mottled Yellow Brown, Trace Sand
11U ST8	9.5-11.5	21.8	129.9	106.7	0.80	92.50	52.4/40.1	36/20	$1.38x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist
11U	12-13.5	23.2								Fat Clay (CH), Yellow Brown mottled Light Gray/Gray, Trace Sand
11U	14.5-16	20.7								Lean Clay (CL), Brown mottled Yellow Brown
11U	17-18.5	28.6								Lean Clay (CL), Brown mottled Light Brown
11U ST16	19.5-21.5	25.7	123.1	97.9	0.50	95.90	66.8/29.1	48/21	$3.04x10^{-7}$	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist
11U	22-23.5	25.8								Fat Clay (CH), Yellow Brown mottled Brown
11U	24.5-26	28.3						34/21		Lean Clay (CL), Yellow Brown mottled Brown, Silty
11U	27-28.5	25.9								Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty
12L	3.5-4	14.5								Fat Clay (CH), Brown mottled Light Brown
12L	5.5-6	17.4								Fat Clay (CH), Brown mottled Light Brown/Yellow Brown
12L	8.5-9	23.2								Fat Clay (CH/CL), Yellow Brown mottled Light Gray
12L	11.5-12	24.5								Fat Clay (CH), Brown mottled Light Gray/Yellow Brown
12L	14-14.5	24.5								Lean Clay (CL), Light Gray mottled Yellow Brown/Gray
12L ST	14.5-16	23.2	127.7	103.6	0.55	87.10	71.6/15.5	30/19	$9.69x10^{-7}$	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist
12L	19-19.5	22.9								Lean Clay (CL), Light Gray mottled Yellow Brown
12L	20-20.5	10.0								Sandy Lean Clay (CL), Light Gray mottled Yellow Brown
12L	23-23.5	13.0								Lean Clay (CL), Light Gray mottled Yellow Brown, Silty
12U	2-3.5	19.0								Lean Clay (CL), Brown, Silty
12U	4.5-5	17.1								Lean Clay (CL), Brown mottled Light Brown/Reddish Brown, Black Oxidation, Silty
12U	7-8.5	20.0								Lean Clay (CL), Light Brown mottled Yellow Brown, Silty
12U ST8	9.5-11.5	21.8	129.5	106.2	0.75	95.20	69.6/25.6	45/22	$3.13x10^{-9}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	12-13.5	17.3								Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty
12U	14.5-16	15.2								Lean Clay (CL), Brown, With Lime Fines, Trace Gravel
12U	17-18.5	18.9								Lean Clay (CL), Brown, With Ash/Coal
12U ST16	19.5-21.5	21.6	123.3	101.4	0.95	96.10	73.0/23.1	42/22	$1.03x10^{-8}$	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist
12U	22-23.5	25.6								Lean Clay (CL), Brown mottled Reddish Brown, Silty
12U	24.5-26	25.8								Lean Clay (CL), Light Brown mottled Yellow Brown, Reddish Oxidation, Silty
12U	27-28.5	25.2								Lean Clay (CL), Light Gray mottled Yellow Brown/Light Brown, Reddish Oxidation, Silty
13L	2-3.5	15.9								Lean Clay (CL), Brown
13L	4.5-5	17.4								Lean Clay (CL), Brown
13L	7-8.5	19.3								Lean Clay (CL), Brown mottled Yellow Brown
13L	9.5-11	19.6								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13L	12-13.5	23.5								Lean Clay (CL), Brown mottled Reddish Brown
13L	14.5-16	27.4								Fat Clay (CH), Light Gray mottled Yellow Brown/Brown, Black Oxidation

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

Job #:
23-1071

Andrews Engineering
Springfield, IL Ash Ponds

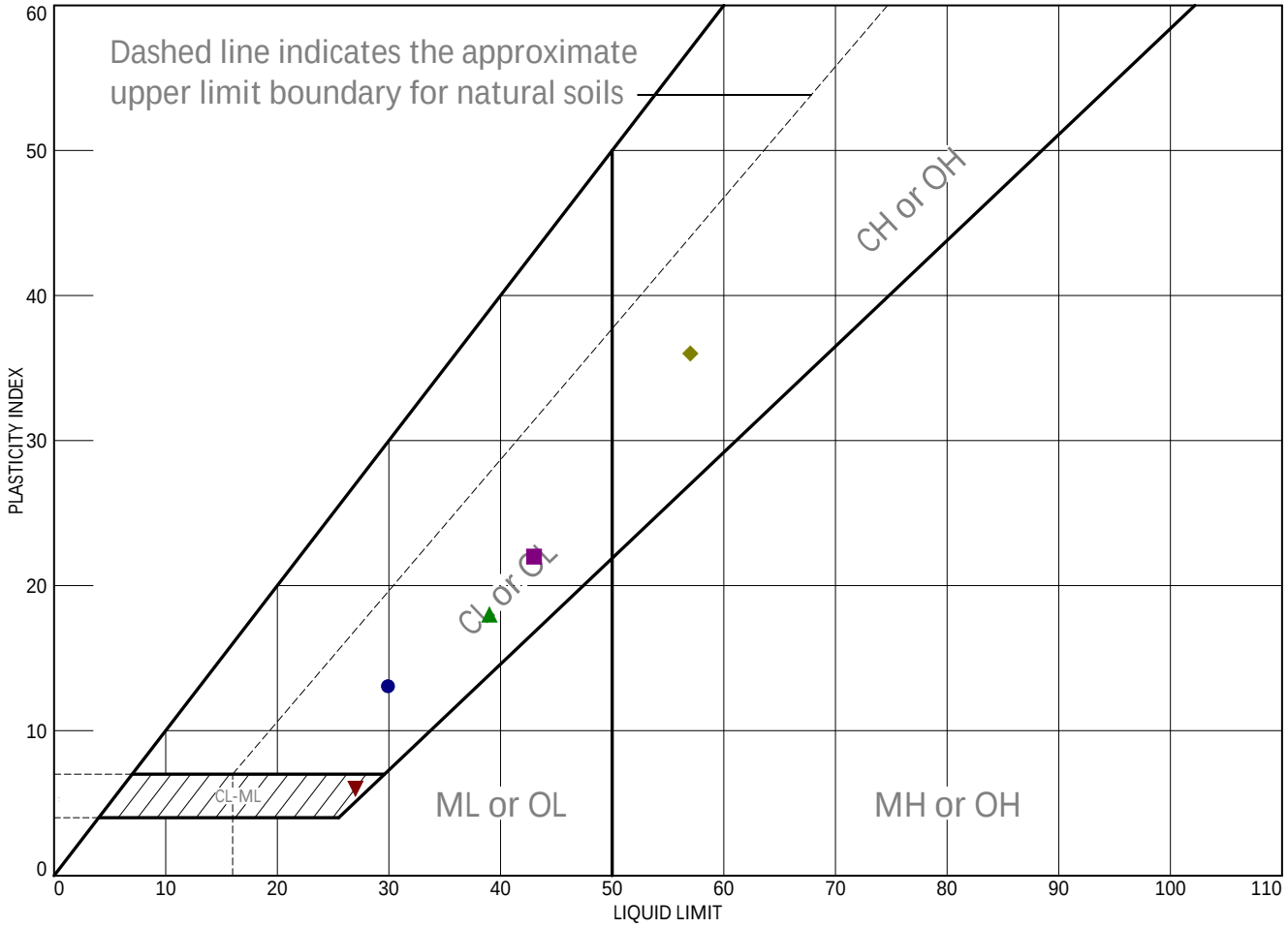
Sample No.	Depth (ft.)	Nat. Moist. (%)	Wet Density (PCF)	Dry Density (PCF)	Torvane (TSF)	Grad. -200 (%)	Silt/Clay (%)	Atterberg % (LL/PL)	Hydraulic Cond. (cm/sec)	USCS Visual Description
13BN	2-3.5	18.6								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Silty
13BN	4.5-5	21.1								Lean Clay (CL), Light Brown mottled Reddish Brown
13BN	7-8.5	15.5								Lean Clay (CL), Light Brown mottled Reddish Brown, Silty
13BN ST7	8.5-10.5	18.4	132.2	111.6	0.95	90.90	74.9/16.0	34/20	$8.84x10^{-9}$	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist
13BS	2-3.5	16.0								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	4.5-5	15.5								Lean Clay (CL), Brown mottled Reddish Brown, Silty
13BS	7-8.5	19.1								Lean Clay (CL), Brown mottled Light Brown/Light Gray
13BS ST7	8.5-10.5	21.1	127.5	105.3	0.95	94.90	78.6/16.3	52/25	$2.32x10^{-8}$	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist
13LF	2-3.5	12.4								Lean Clay (CL), Brown mottled Yellow Brown, Silty
13LF	4.5-5	22.3								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams
13LF	7-8.5	21.0								Lean Clay (CL), Light Brown mottled Yellow Brown/Light Gray, With Fat Seams, Over Light Gray Ash
13LF	9.5-11	21.4								Ash, Light Gray
13LF	12-13.5	21.1								Ash, Light Gray
13LF	14.5-16	19.1								Ash, Light Gray
13LF	17-18.5	20.9								Lean Clay (CL), Light Brown mottled Reddish Brown/Light Gray, Over Light Gray Ash
13LF	19.5-21	21.6								Ash, Yellow Brown mottled Light Gray
13LF	22-23.5	24.8								Ash, Yellow Brown
13LF	24.5-26	28.3								Ash, Yellow Brown

GEOTECHNICS
Soil & Material Testing

Lab Data Summary

* Shelby Tube Samples Colored in Yellow
* Additional Atterberg Testing Requested Colored in Red

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist	30	17	13	98.2	85.7	CL
■	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist	43	21	22	99.8	97.6	CL
▲	Lean Clay with Sand (CL), Gray, Silty, Medium, Moist	39	21	18	99.6	84.4	CL
◆	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	57	21	36	98.1	91.7	CH
▼	Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist	27	21	6	98.3	87.7	CL-ML

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

●	Location: Boring 1	Depth: 24½-26½ ft.	Sample Number:
■	Location: Boring 1L	Depth: 22-24 ft.	Sample Number: 18
▲	Location: Boring 1 LL	Depth: 14½-16½ ft.	Sample Number: 12
◆	Location: Boring 2	Depth: 22-24 ft.	Sample Number: 8
▼	Location: Boring 2L	Depth: 7-9 ft.	Sample Number: 6

Remarks:

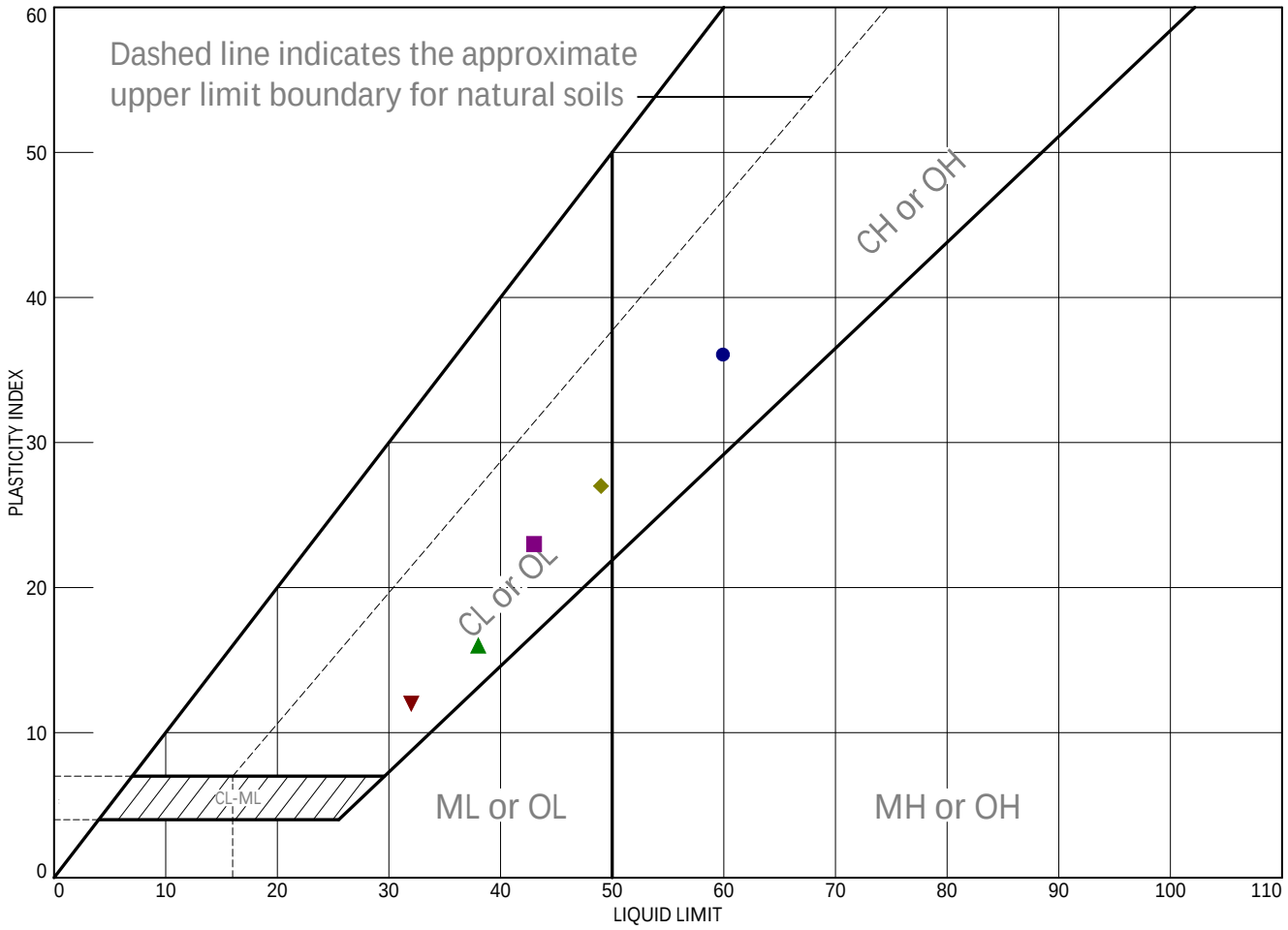
- ● Natural Moisture = 27.9%
- ■ Natural Moisture = 30.7%
- ▲ Natural Moisture = 24.7%
- ◆ Natural Moisture = 26.8%
- ▼ Natural Moisture = 25.5%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-1

Tested By: ○ DAW □ MAS △ DAW ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist	60	24	36	99.3	98.1	CH
■	Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist	43	20	23	98.5	95.0	CL
▲	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist	38	22	16	90.3	81.1	CL
◆	Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	49	22	27	99.5	97.2	CL
▼	Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist	32	20	12	97.4	87.9	CL

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 3 ST8	Depth: 9½-11½ ft.	Sample Number: 8
■ Location: Boring 3 ST16	Depth: 19½-21½ ft.	Sample Number: 16
▲ Location: Boring 3U ST8	Depth: 9½-11 ft.	Sample Number: 8
◆ Location: Boring 4	Depth: 19½-21½ ft.	Sample Number:
▼ Location: Boring 4L	Depth: 12-14 ft.	Sample Number: 10

Remarks:

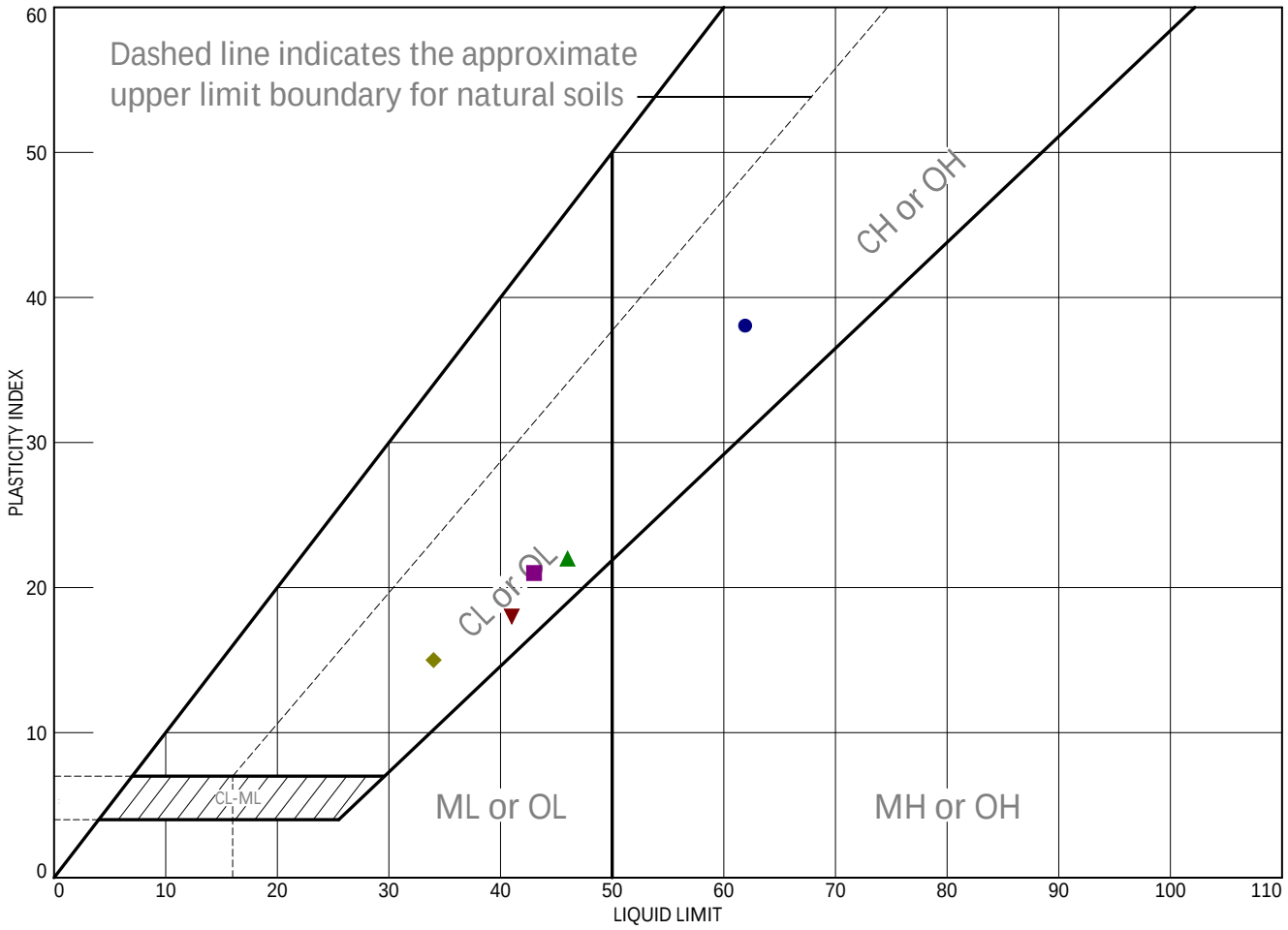
● Natural Moisture = 25.8%
■ Natural Moisture = 25.8%
▲ Natural Moisture = 21.3%
◆ Natural Moisture = 28.3%
▼ Natural Moisture = 27.4%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-2

Tested By: ○ DAW □ BRH △ DAW ◇ DAW ▽ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist	62	24	38	99.4	97.1	CH
■	Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist	43	22	21	98.7	90.2	CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	46	24	22	98.3	94.6	CL
◆	Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	19	15	99.0	90.2	CL
▼	Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist	41	23	18	99.6	91.6	CL

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 4U	Depth: 27-29 ft.	Sample Number: 22
■ Location: Boring 5	Depth: 24½-26½ ft.	Sample Number: 10
▲ Location: Boring 5L	Depth: 9½-11 ft.	Sample Number:
◆ Location: Boring 6	Depth: 17-19 ft.	Sample Number: 8
▼ Location: Boring 6L	Depth: 7½-9 ft.	Sample Number: ST1

Remarks:

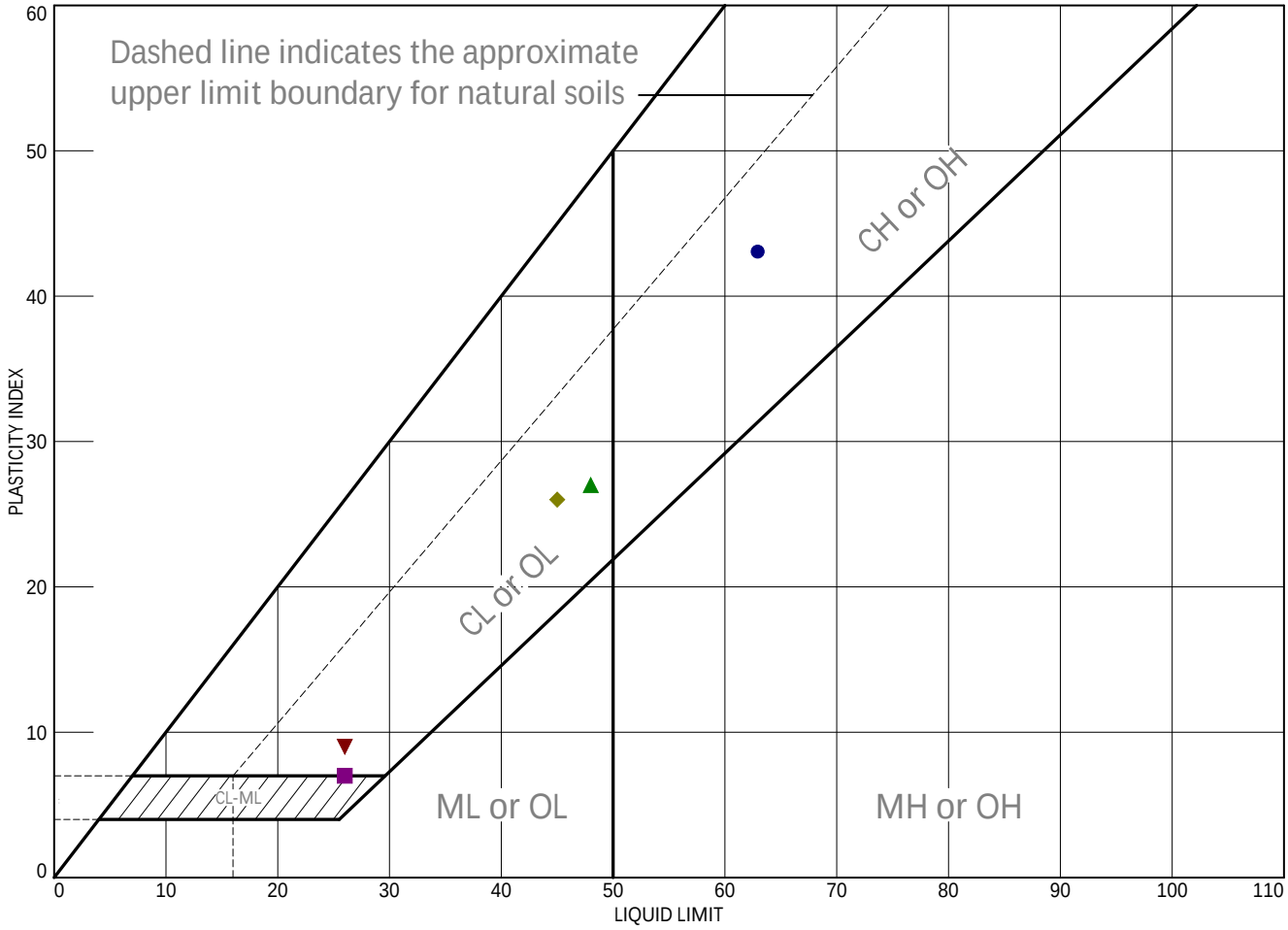
- ● Natural Moisture = 26.9%
- ■ Natural Moisture = 24.3%
- ▲ Natural Moisture = 28.8%
- ◆ Natural Moisture = 21.9%
- ▼ Natural Moisture = 26.6%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-3

Tested By: ○ MAS □ DAW △ DAW ◇ DAW ▽ BRH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist	63	20	43	98.8	97.7	CH
■	Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist	26	19	7	99.8	69.8	CL-ML
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	48	21	27	96.6	90.6	CL
◆	Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist	45	19	26	99.3	95.5	CL
▼	Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist	26	17	9	98.4	79.9	CL

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 7	Depth: 19½-21½ ft.	Sample Number: 7
■ Location: Boring 8L	Depth: 12-14 ft.	Sample Number: 5
▲ Location: Boring 8U ST8	Depth: 9½-11½ ft.	Sample Number: 8
◆ Location: Boring 8U ST16	Depth: 19½-21½ ft.	Sample Number: 16
▼ Location: Boring 9L	Depth: 7½-9 ft.	Sample Number:

Remarks:

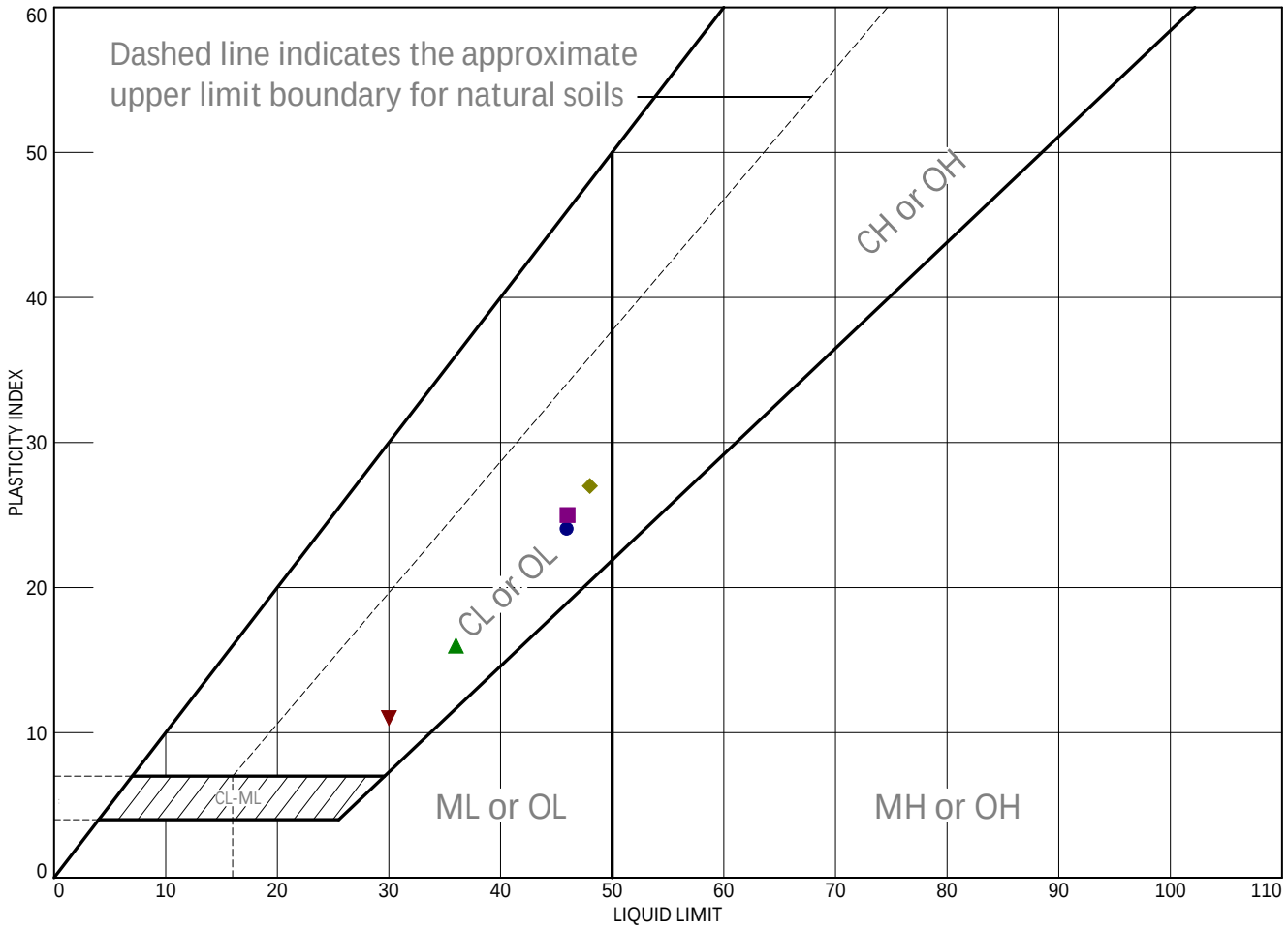
● Natural Moisture = 25.8%
■ Natural Moisture = 23.8%
▲ Natural Moisture = 24.0%
◆ Natural Moisture = 25.7%
▼ Natural Moisture = 28.0%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-4

Tested By: ○ DJS □ DAW △ BRH ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist	46	22	24	99.7	96.0	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist	46	21	25	99.2	94.5	CL
▲	Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist	36	20	16	98.2	92.5	CL
◆	Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist	48	21	27	99.2	95.9	CL
▼	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist	30	19	11	99.8	87.1	CL

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 9U ST16	Depth: 19½-21½ ft.	Sample Number: 16
■ Location: Boring 9 CCR ST8	Depth: 9½-11½ ft.	Sample Number: 8
▲ Location: Boring 11U ST8	Depth: 9½-11½ ft.	Sample Number:
◆ Location: Boring 11U ST16	Depth: 19½-21½ ft.	Sample Number:
▼ Location: Boring 12L	Depth: 14½-16 ft.	Sample Number:

Remarks:

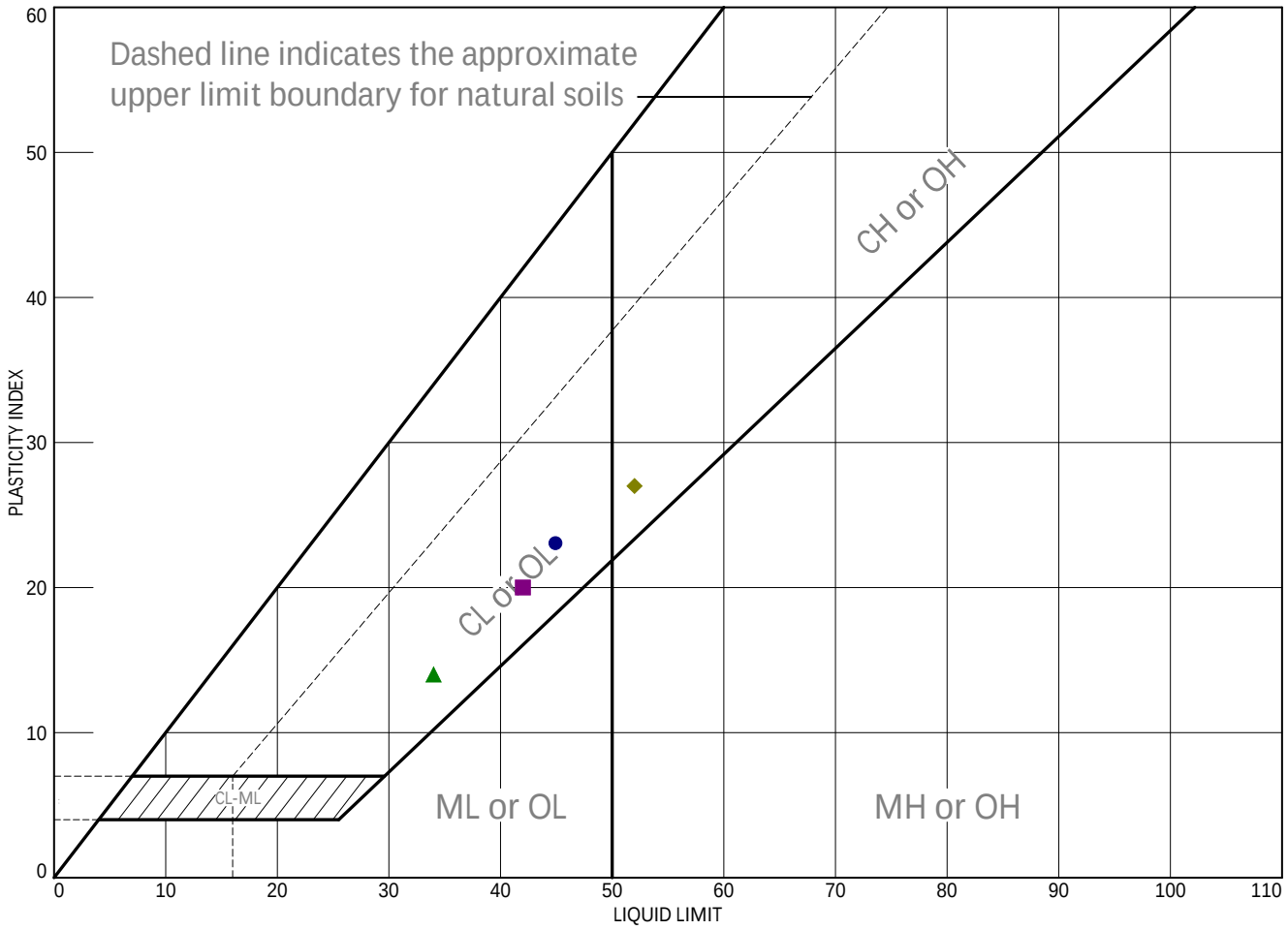
● Natural Moisture = 22.4%
■ Natural Moisture = 23.2%
▲ Natural Moisture = 21.8%
◆ Natural Moisture = 25.7%
▼ Natural Moisture = 23.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-5

Tested By: ○ NPP □ NPP △ MAS ◇ BRH ▽ DAW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	45	22	23	99.6	95.2	CL
■	Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist	42	22	20	99.3	96.1	CL
▲	Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist	34	20	14	99.9	90.9	CL
◆	Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist	52	25	27	99.3	94.9	CH

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 12U ST8	Depth: 9½-11½ ft.	Sample Number: 8
■ Location: Boring 12U ST16	Depth: 19½-21½ ft.	Sample Number: 16
▲ Location: Boring 13 BN ST7	Depth: 8½-10½ ft.	Sample Number: 7
◆ Location: Boring 13 BS ST7	Depth: 8½-10½ ft.	Sample Number: 7

Remarks:

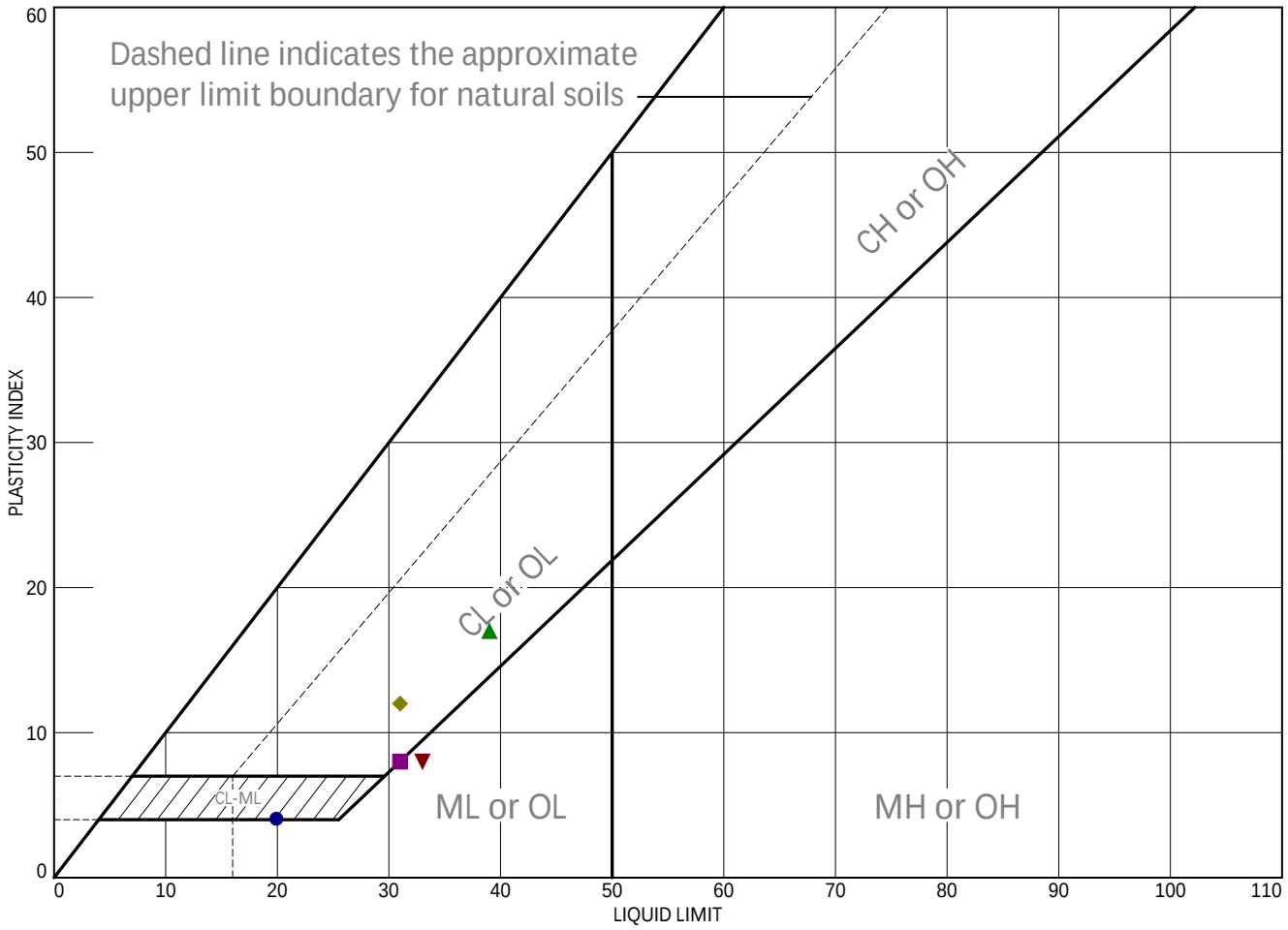
● Natural Moisture = 21.8%
■ Natural Moisture = 21.6%
▲ Natural Moisture = 18.4%
◆ Natural Moisture = 21.1%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-6

Tested By: ○ DAW □ DAW △ MAS ◇ MAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Moist	20	16	4			CL-ML
■	Lean Clay (CL/ML), Yellow Brown mottled Light Gray, Black Oxidation	31	23	8			CL
▲	Lean Clay (CL), Light Gray mottled Yellow Brown, Silty	39	22	17			CL
◆	Lean Clay (CL), Gray, Trace Organics	31	19	12			CL
▼	Silt (ML), Brown, Trace Sand	33	25	8			ML

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 2L	Depth: 14½-16	Sample Number:
■ Location: Boring 4L	Depth: 17-18½ ft.	Sample Number:
▲ Location: Boring 5L	Depth: 17-17½ ft.	Sample Number:
◆ Location: Boring 6L	Depth: 17½-19 ft.	Sample Number: 7
▼ Location: Boring 7L	Depth: 15-16½ ft.	Sample Number: 6

Remarks:

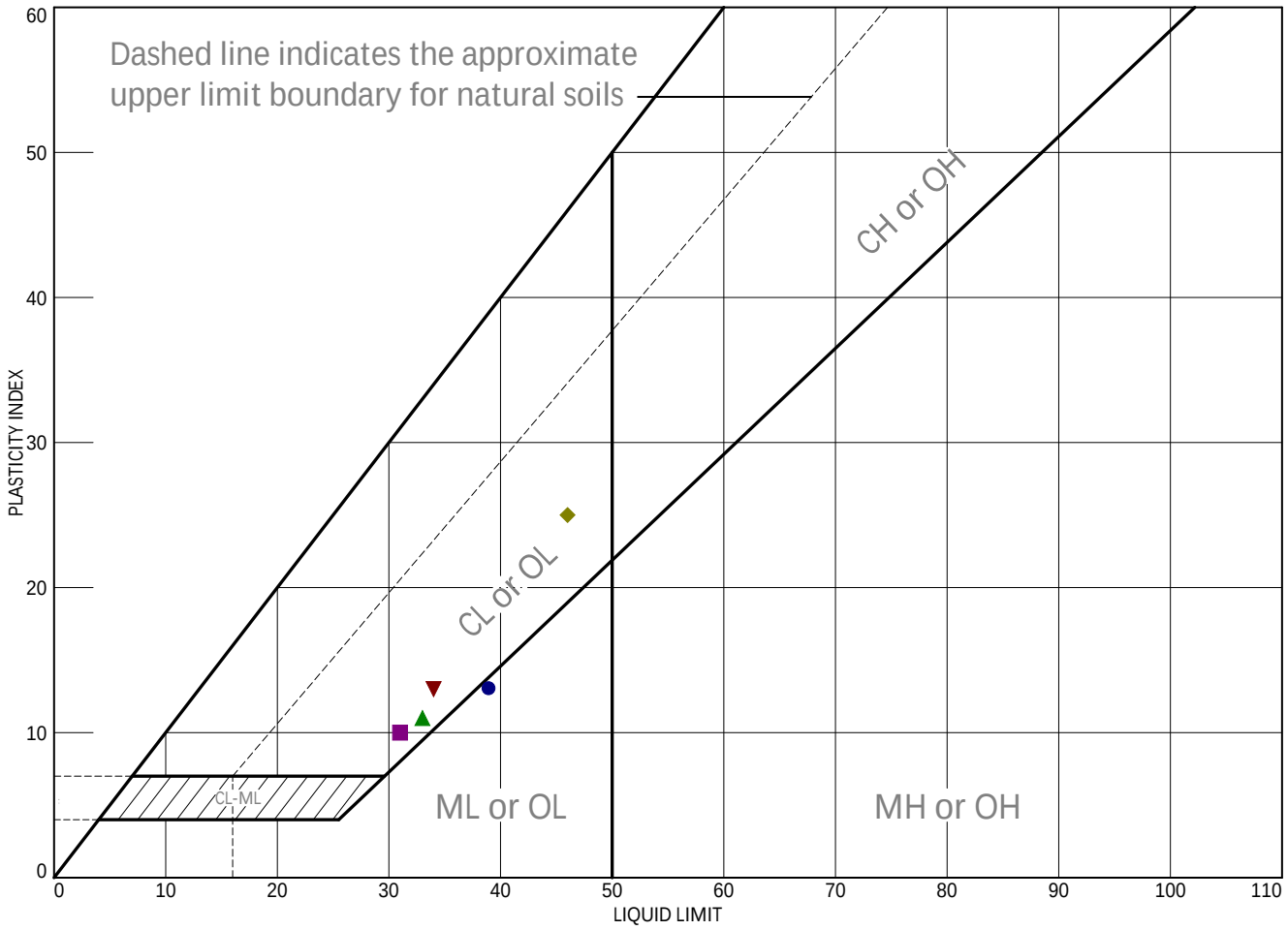
● Natural Moisture = 23.6%
■ Natural Moisture = 27.4%
▲ Natural Moisture = 28.3%
◆ Natural Moisture = 35.9%
▼ Natural Moisture = 29.2%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-7

Tested By: DAW Checked By: NAS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt (ML), Gray, With Lean Clay (CL) Seams	39	26	13			ML
■	Lean Clay (CL), Gray, Silty	31	21	10			CL
▲	Lean Clay (CL), Gray, Silty	33	22	11			CL
◆	Lean Clay (CL), Gray, Silty	46	21	25			CL
▼	Lean Clay (CL), Yellow Brown mottled Brown, Silty	34	21	13			CL

Project No. 23-1071 Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

● Location: Boring 8L Depth: 20½-21 ft.
■ Location: Boring 8L Depth: 22½-23 ft.
▲ Location: Boring 9L Depth: 15½-16 ft.
◆ Location: Boring 9L Depth: 18-18½ ft.
▼ Location: Boring 11U Depth: 24½-26 ft.

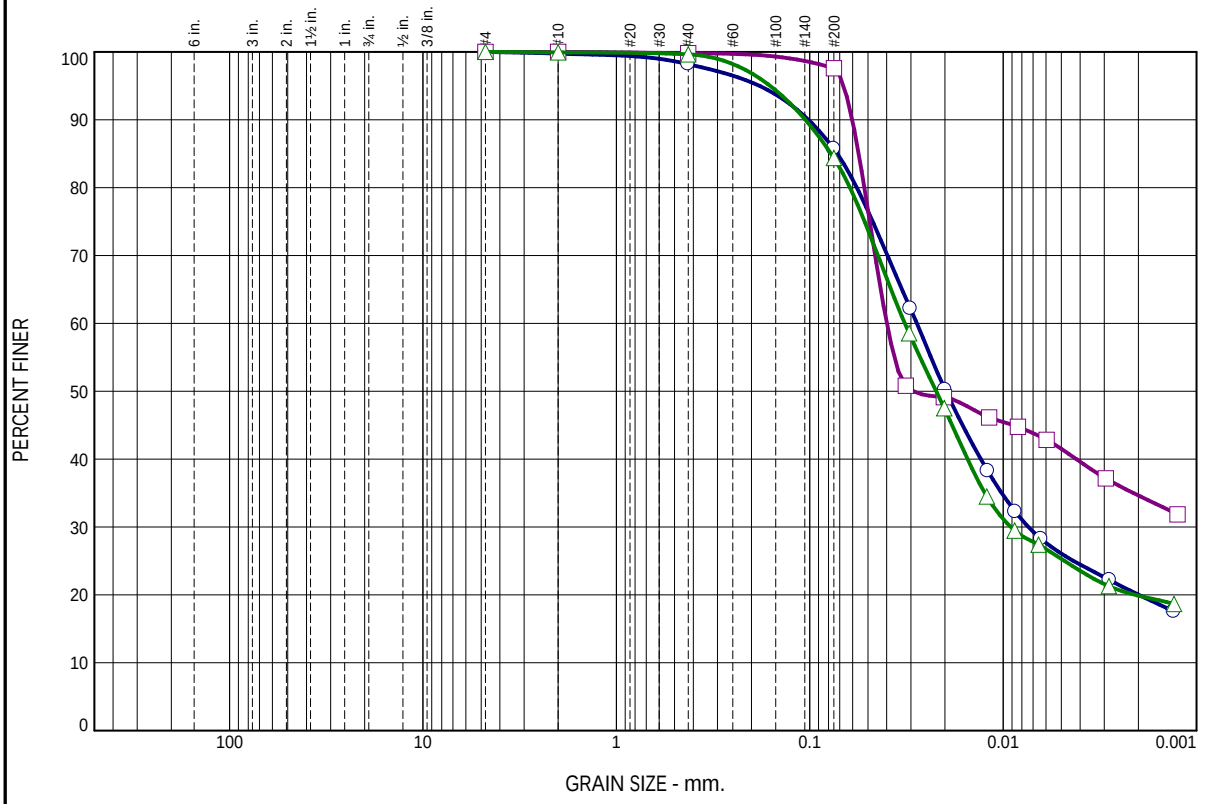
Remarks:
● Natural Moisture = 32.3%
■ Natural Moisture = 26.7%
▲ Natural Moisture = 28.1%
◆ Natural Moisture = 28.6%
▼ Natural Moisture = 28.3%

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Figure A-8

Tested By: DAW Checked By: NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	14.3	65.7	20.0	CL	30	17	13
□	0.0	0.0	2.4	63.0	34.6	CL	43	21	22
△	0.0	0.0	15.6	64.5	19.9	CL	39	21	18

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0279	0.0399	0.0322
D_{30}	0.0074		0.0091
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	100.0	100.0
#10	99.7	100.0	99.9
#40	98.2	99.8	99.6
#200	85.7	97.6	84.4

Material Description

○ Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist

□ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist

△ Lean Clay with Sand (CL), Gray, Silty, Medium, Moist

REMARKS:

○ Natural Moisture = 27.9%

□ Natural Moisture = 30.7%

△ Natural Moisture = 24.7%

○ Location: Boring 1 Depth: 24½-26½ ft. Sample Number:

□ Location: Boring 1L Depth: 22-24 ft. Sample Number: 18

△ Location: Boring 1 LL Depth: 14½-16½ ft. Sample Number: 12

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

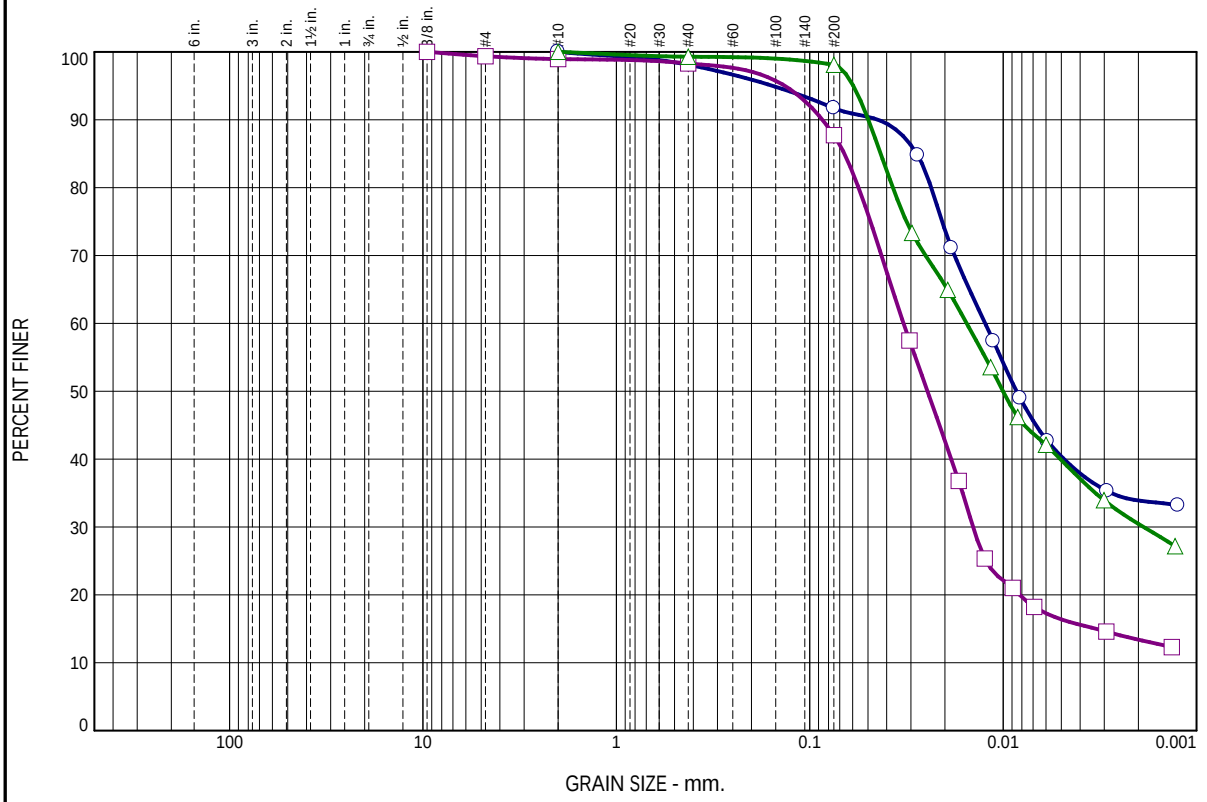
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-1

Tested By: DAW / DJS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	8.3	57.8	33.9	CH	57	21	36
□	0.0	0.6	11.7	74.3	13.4	CL-ML	27	21	6
△	0.0	0.0	1.9	67.6	30.5	CH	60	24	36

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
GRAIN SIZE			
D_{60}	0.0124	0.0328	0.0154
D_{30}		0.0143	0.0019
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4		99.4	
#10	100.0	98.9	100.0
#40	98.1	98.3	99.3
#200	91.7	87.7	98.1

Material Description

○ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

□ Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist

△ Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 26.8%

□ Natural Moisture = 25.5%

△ Natural Moisture = 25.8%

○ Location: Boring 2 Depth: 22-24 ft. Sample Number: 8

□ Location: Boring 2L Depth: 7-9 ft. Sample Number: 6

△ Location: Boring 3 ST8 Depth: 9½-11½ ft. Sample Number: 8

GEOTECHNICS
Soil & Material Testing
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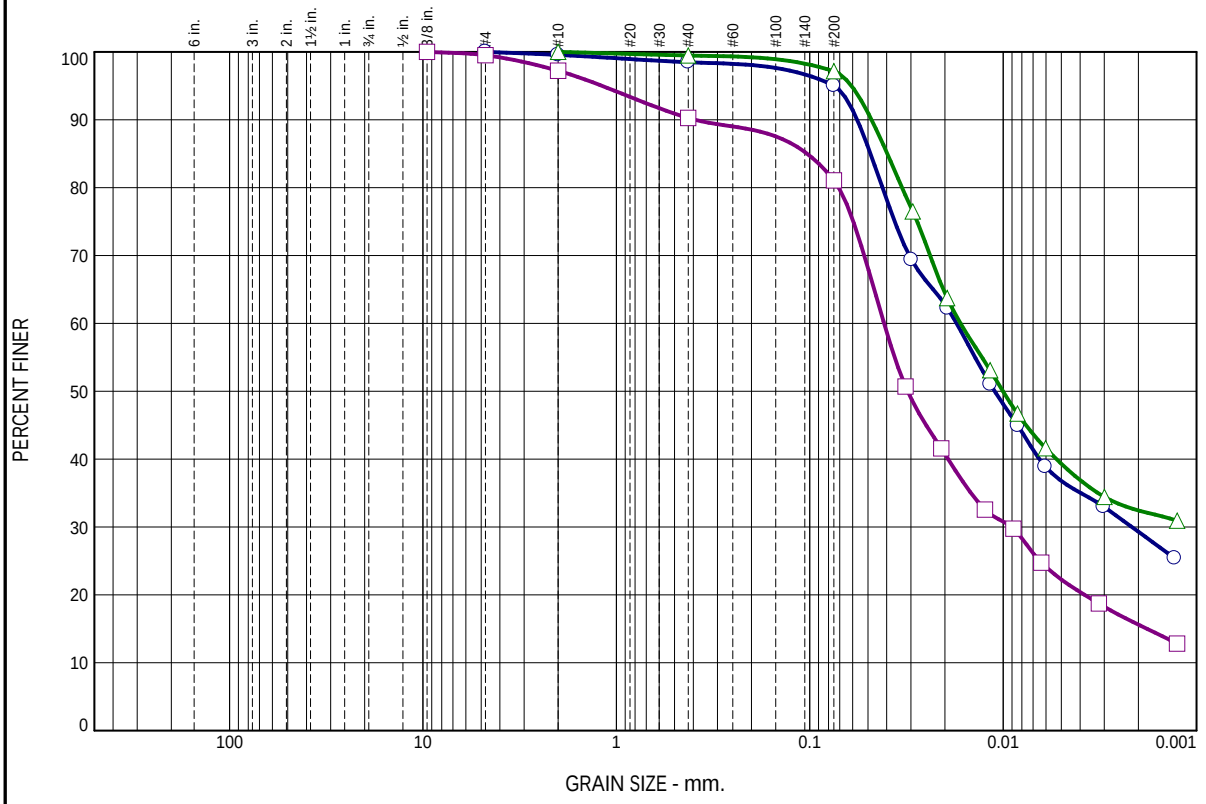
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-2

Tested By: ○ DAW □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.0	65.7	29.3	CL	43	20	23
□	0.0	0.5	18.4	65.5	15.6	CL	38	22	16
△	0.0	0.0	2.8	64.8	32.4	CL	49	22	27

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	
GRAIN SIZE			
D_{60}	0.0174	0.0413	0.0166
D_{30}	0.0022	0.0090	
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.5	
#10	99.6	97.2	100.0
#40	98.5	90.3	99.5
#200	95.0	81.1	97.2

Material Description

○ Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist

△ Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 21.3%

△ Natural Moisture = 28.3%

○ Location: Boring 3 ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 3U ST8 Depth: 9½-11 ft. Sample Number: 8

△ Location: Boring 4 Depth: 19½-21½ ft. Sample Number:

GEOTECHNICS
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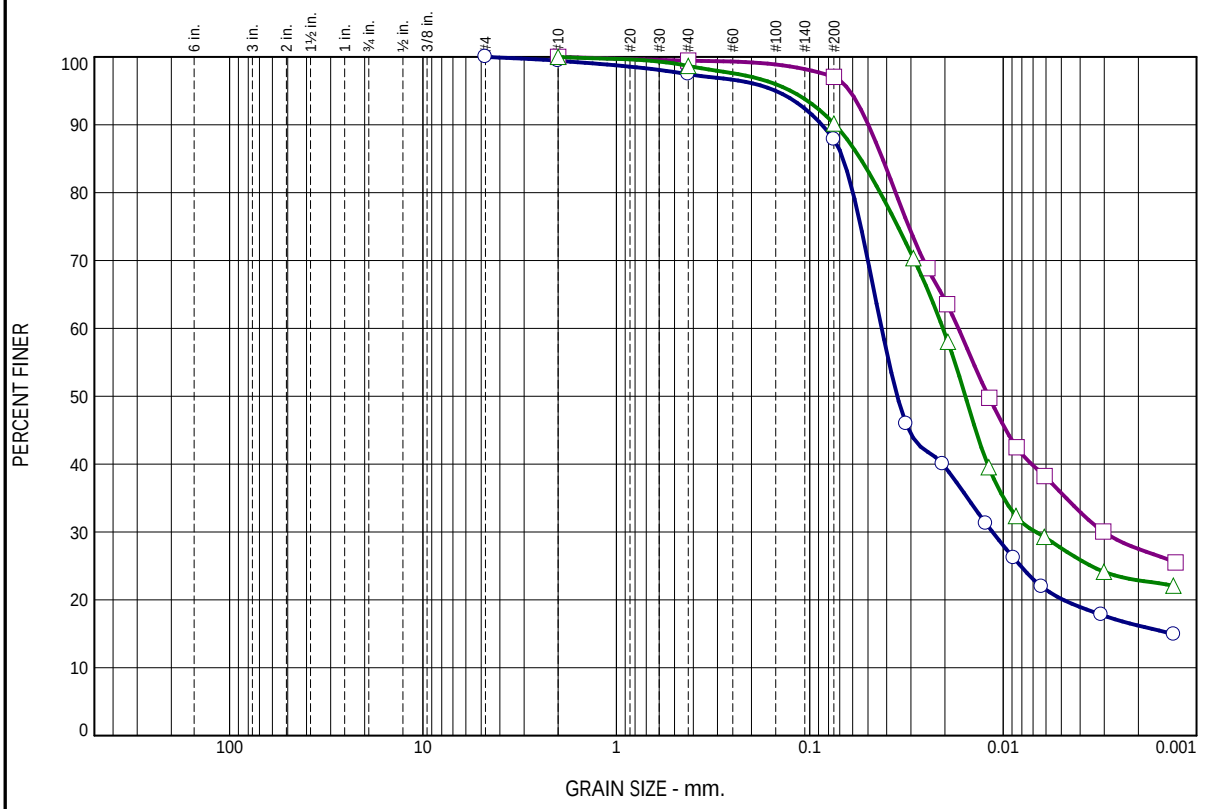
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-3

Tested By: ○ DAW □ DAW △ DAW / MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.1	71.7	16.2	CL	32	20	12
□	0.0	0.0	2.9	69.6	27.5	CH	62	24	38
△	0.0	0.0	9.8	67.3	22.9	CL	43	22	21

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0425	0.0170	0.0205
D_{30}	0.0114	0.0030	0.0068
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		
#10	99.4	100.0	100.0
#40	97.4	99.4	98.7
#200	87.9	97.1	90.2

Material Description

○ Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist

□ Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Gray/ Yellow Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 27.4%

□ Natural Moisture = 26.9%

△ Natural Moisture = 24.3%

○ Location: Boring 4L Depth: 12-14 ft. Sample Number: 10

□ Location: Boring 4U Depth: 27-29 ft. Sample Number: 22

△ Location: Boring 5 Depth: 24½-26½ ft. Sample Number: 10

GEOTECHNICS
Soil & Material Testing
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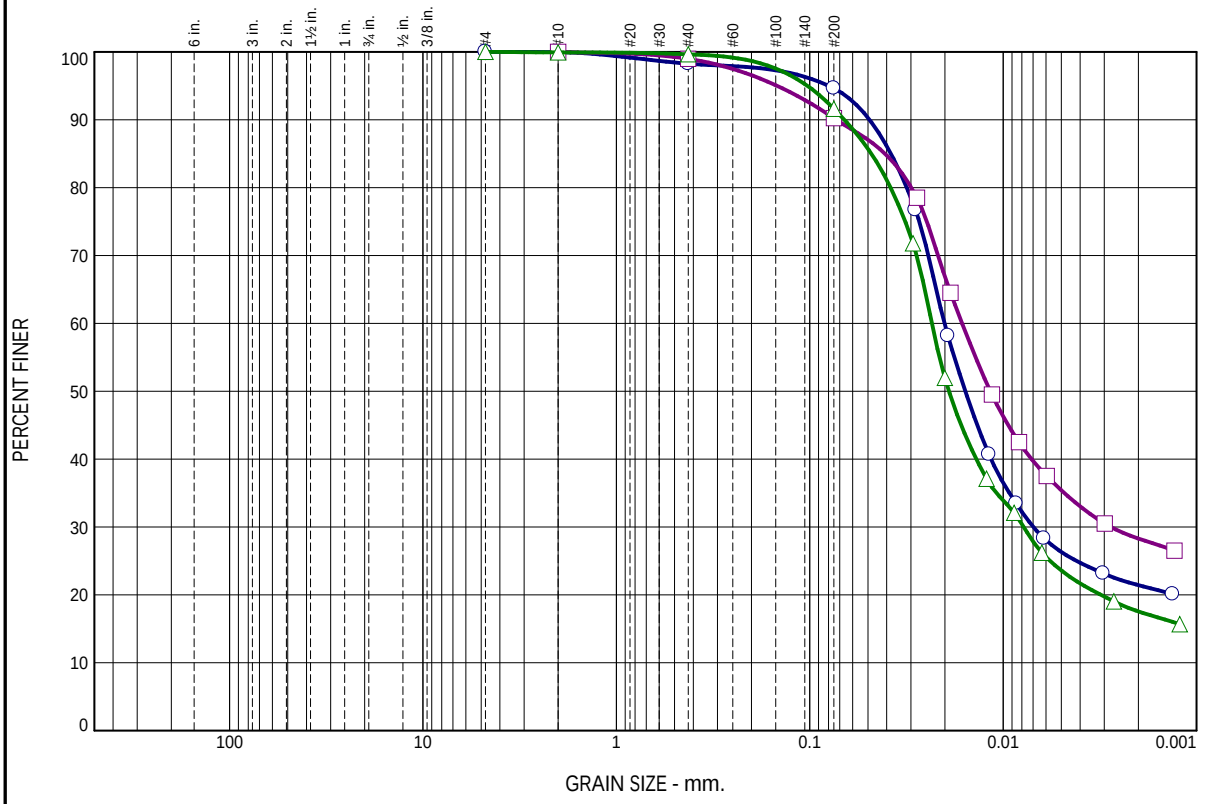
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-4

Tested By: ○ DAW / DJS □ DAW / DJS △ DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.4	73.2	21.4	CL	46	24	22
□	0.0	0.0	9.8	61.9	28.3	CL	34	19	15
△	0.0	0.0	8.4	74.1	17.5	CL	41	23	18

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0201	0.0163	0.0234
D_{30}	0.0070	0.0028	0.0078
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	100.0	100.0	99.9
#40	98.3	99.0	99.6
#200	94.6	90.2	91.6

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist

REMARKS:

○ Natural Moisture = 28.8%

□ Natural Moisture = 21.9%

△ Natural Moisture = 26.6%

○ Location: Boring 5L Depth: 9½-11 ft. Sample Number:

□ Location: Boring 6 Depth: 17-19 ft. Sample Number: 8

△ Location: Boring 6L Depth: 7½-9 ft. Sample Number: ST1

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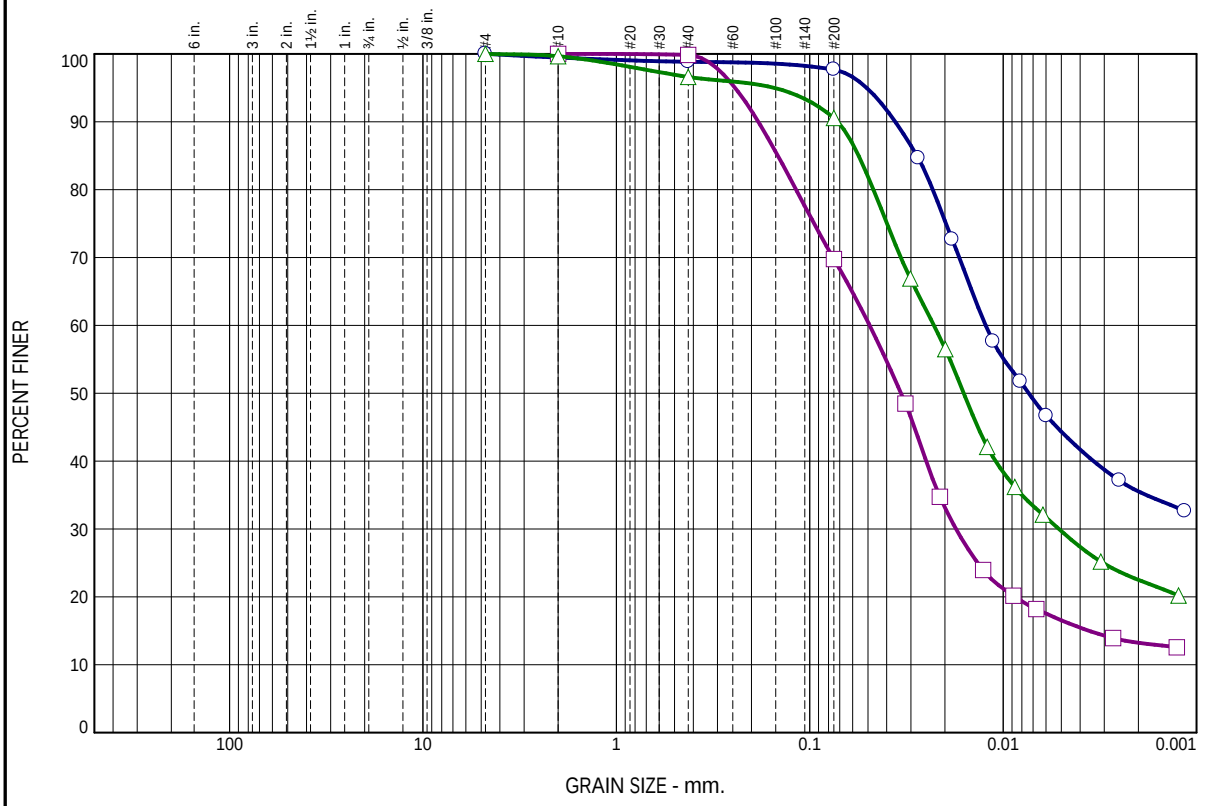
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-5

Tested By: DAW Checked By: NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	2.3	62.2	35.5	CH	63	20	43
□	0.0	0.0	30.2	56.6	13.2	CL-ML	26	19	7
△	0.0	0.0	9.4	68.1	22.5	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0123	0.0491	0.0228
D_{30}		0.0175	0.0052
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.5	100.0	99.6
#40	98.8	99.8	96.6
#200	97.7	69.8	90.6

Material Description

○ Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist

□ Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.8%

□ Natural Moisture = 23.8%

△ Natural Moisture = 24.0%

○ Location: Boring 7 Depth: 19½-21½ ft. Sample Number: 7

□ Location: Boring 8L Depth: 12-14 ft. Sample Number: 5

△ Location: Boring 8U ST8 Depth: 9½-11½ ft. Sample Number: 8

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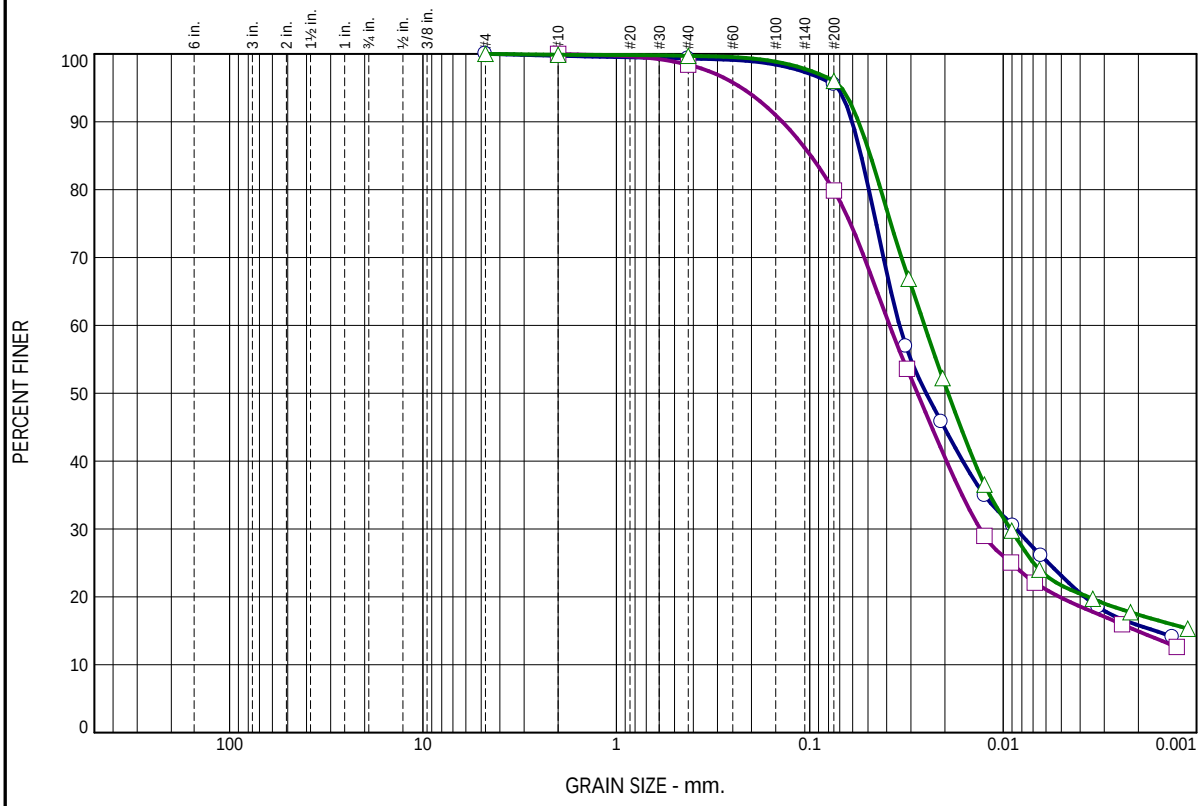
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-6

Tested By: DAW Checked By: NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	4.5	79.7	15.8	CL	45	19	26
□	0.0	0.0	20.1	65.0	14.9	CL	26	17	9
△	0.0	0.0	4.0	78.6	17.4	CL	46	22	24

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0343	0.0386	0.0255
D_{30}	0.0086	0.0131	0.0091
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0		100.0
#10	99.7	100.0	99.9
#40	99.3	98.4	99.7
#200	95.5	79.9	96.0

Material Description

○ Lean Clay (CL), Light Gray Mottled Yellow Brown, Silty, Stiff, Moist

□ Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist

△ Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 25.7%

□ Natural Moisture = 28.0%

△ Natural Moisture = 22.4%

○ Location: Boring 8U ST16 Depth: 19½-21½ ft. Sample Number: 16

□ Location: Boring 9L Depth: 7½-9 ft. Sample Number:

△ Location: Boring 9U ST16 Depth: 19½-21½ ft. Sample Number: 16

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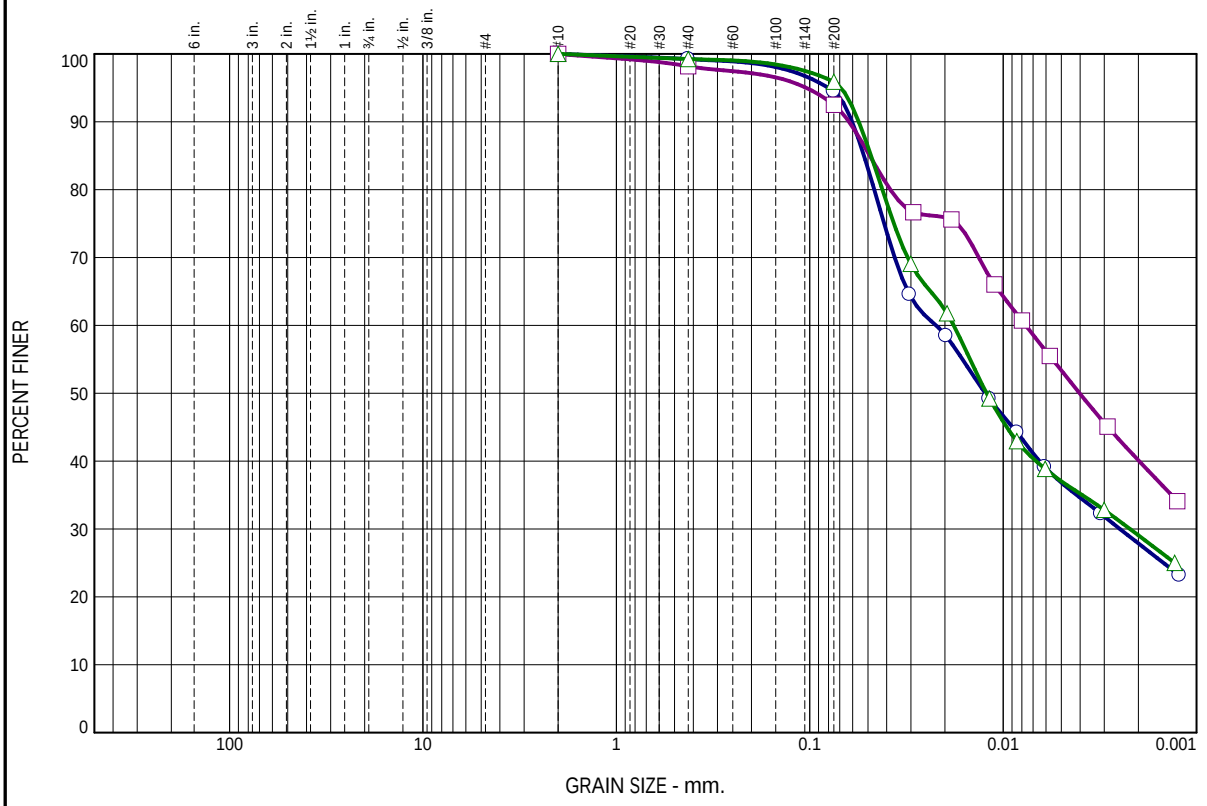
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-7

Tested By: ○ DAW □ DAW △ MAS Checked By: NAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	5.5	66.6	27.9	CL	46	21	25
□	0.0	0.0	7.5	52.4	40.1	CL	36	20	16
△	0.0	0.0	4.1	66.8	29.1	CL	48	21	27

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0222	0.0077	0.0180
D_{30}	0.0025		0.0022
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.2	98.2	99.2
#200	94.5	92.5	95.9

Material Description

○ Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist

△ Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 25.7%

○ Location: Boring 9 CCR ST8 Depth: 9½-11½ ft. Sample Number: 8

□ Location: Boring 11U ST8 Depth: 9½-11½ ft. Sample Number:

△ Location: Boring 11U ST16 Depth: 19½-21½ ft. Sample Number:

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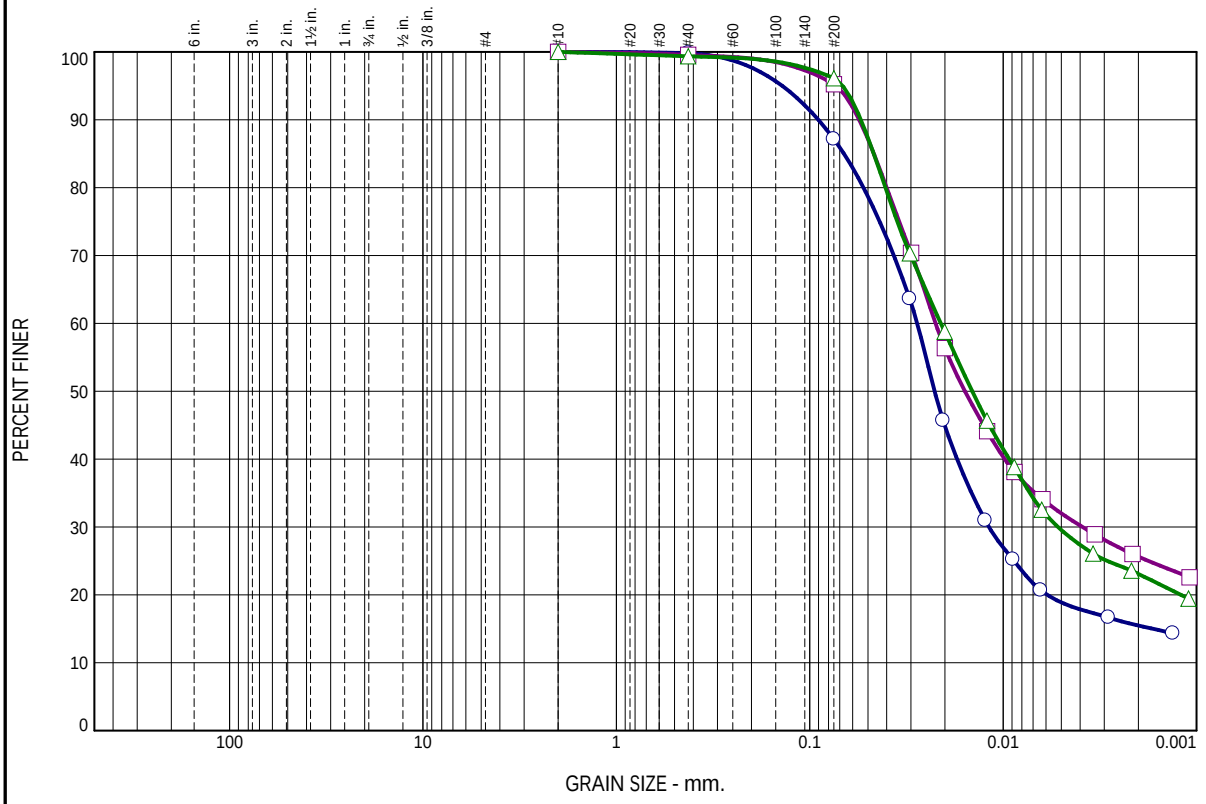
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-8

Tested By: DAW

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	12.9	71.6	15.5	CL	30	19	11
□	0.0	0.0	4.8	69.6	25.6	CL	45	22	23
△	0.0	0.0	3.9	73.0	23.1	CL	42	22	20

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.0278	0.0224	0.0210
D_{30}	0.0119	0.0039	0.0052
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#10	100.0	100.0	100.0
#40	99.8	99.6	99.3
#200	87.1	95.2	96.1

Material Description

○ Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

△ Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist

REMARKS:

○ Natural Moisture = 23.2%

□ Natural Moisture = 21.8%

△ Natural Moisture = 21.6%

○ Location: Boring 12L Depth: 14½-16 ft. Sample Number:

□ Location: Boring 12U ST8 Depth: 9½-11½ ft. Sample Number: 8

△ Location: Boring 12U ST16 Depth: 19½-21½ ft. Sample Number: 16

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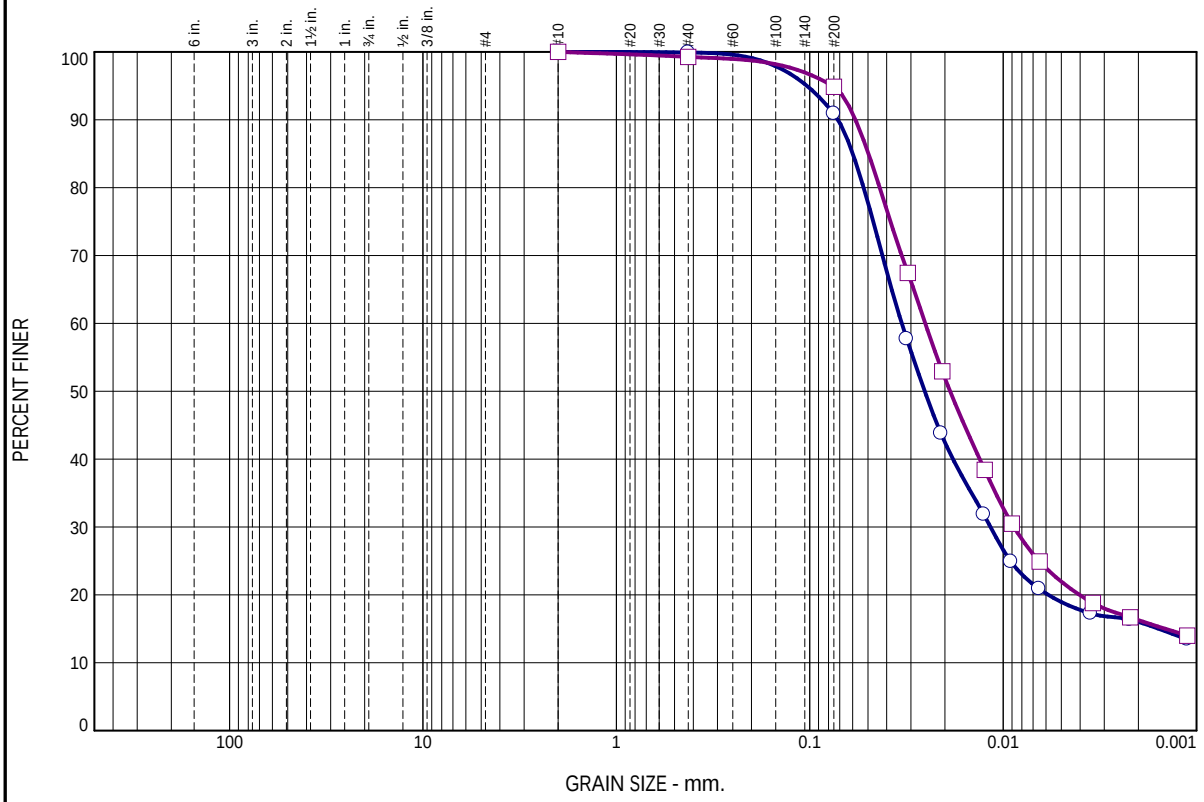
Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-9

Tested By: ○ DAW □ MAS △ MAS

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	0.0	9.1	74.9	16.0	CL	34	20	14
□	0.0	0.0	5.1	78.6	16.3	CH	52	25	27

SIEVE inches size	○ PERCENT FINER	□ PERCENT FINER
GRAIN SIZE		
D_{60}	0.0335	0.0253
D_{30}	0.0116	0.0088
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	○ PERCENT FINER	□ PERCENT FINER
#10	100.0	100.0
#40	99.9	99.3
#200	90.9	94.9

Material Description

○ Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist

□ Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist

REMARKS:

○ Natural Moisture = 18.4%

□ Natural Moisture = 21.1%

○ Location: Boring 13 BN ST7 Depth: 8½-10½ ft. Sample Number: 7

□ Location: Boring 13 BS ST7 Depth: 8½-10½ ft. Sample Number: 7

GEOTECHNICS
Soil & Material Testing
4510 Paris Gravel Road - Hannibal, MO

Client: Andrews Engineering

Project: Springfield, IL Ash Ponds

Project No.: 23-1071 Figure S-10

Tested By: MAS

Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **17** P.I. **13**

BORING NO. **Boring 1** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **26.2%** INITIAL DRY DENSITY **100.8 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:12:00 PM		0.200	7.214	40.438		2.89	7.04	20.750	210.9		231.650		
3:12:00 PM	3:33:00 PM	0.200	7.214	40.438	1260	5.00	4.94	-0.300	210.9	1.00	210.600	1.35E-06	1.27E-06
3:33:00 PM	3:53:00 PM	0.200	7.214	40.438	1200	6.77	3.17	-18.000	210.9	1.00	192.900	1.31E-06	1.23E-06
3:53:00 PM	4:34:00 PM	0.200	7.214	40.438	2460	9.89	0.04	-49.250	210.9	1.00	161.650	1.28E-06	1.21E-06
													1.23E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.23 E-06 CM/SEC

REMARKS: Testing Completed 11/2/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **21** P.I. **22**

BORING NO. **Boring 1L** SAMPLE NO. **ST 18**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.4%** INITIAL DRY DENSITY **114.0 P.C.F.**

FINAL WATER CONTENT **16.1%** FINAL DRY DENSITY **117.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:42:00 PM		0.200	7.330	41.980		4.60	5.36	3.800	70.3		74.100		
12:42:00 PM	12:50:00 PM	0.200	7.330	41.980	480	5.82	4.15	-8.350	70.3	0.99	61.950	6.51E-06	6.14E-06
12:50:00 PM	1:32:00 PM	0.200	7.330	41.980	2520	9.50	0.50	-45.000	70.3	0.99	25.300	6.21E-06	5.85E-06
1:32:00 PM	1:42:30 PM	0.200	7.330	41.980	630	9.99	0.01	-49.900	70.3	1.00	20.400	5.97E-06	5.62E-06
													5.84E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.84 E-06 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Gray, Silty, Medium, Moist**

LIQUID LIMIT **39** PLASTIC LIMIT **21** P.I. **18**

BORING NO. **Boring 1LL** SAMPLE NO. **ST 12**

SAMPLE TYPE **ST** DEPTH **14½-16½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.8%** INITIAL DRY DENSITY **102.1 P.C.F.**

FINAL WATER CONTENT **22.8%** FINAL DRY DENSITY **103.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:32:00 PM		0.200	7.391	41.543		0.14	10.00	49.300	70.3		119.600		
2:32:00 PM	2:46:00 PM	0.200	7.391	41.543	840	3.35	6.78	17.150	70.3	1.00	87.450	6.63E-06	6.25E-06
2:46:00 PM	2:54:00 PM	0.200	7.391	41.543	480	4.75	5.38	3.150	70.3	1.00	73.450	6.47E-06	6.09E-06
2:54:00 PM	3:10:00 PM	0.200	7.391	41.543	960	6.82	3.31	-17.550	70.3	1.00	52.750	6.14E-06	5.78E-06
													6.02E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.02 E-06 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **57** PLASTIC LIMIT **21** P.I. **36**

BORING NO. **Boring 2** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **22-24 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.5%** INITIAL DRY DENSITY **101.8 P.C.F.**

FINAL WATER CONTENT **23.0%** FINAL DRY DENSITY **102.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:39:00 AM		0.200	6.980	41.931		4.53	4.63	0.500	210.9		211.400		
6:39:00 AM	6:52:00 AM	0.200	6.980	41.931	780	4.60	4.56	-0.200	210.9	1.00	210.700	7.08E-08	6.67E-08
6:52:00 AM	7:30:00 AM	0.200	6.980	41.931	2280	4.81	4.34	-2.350	210.9	1.05	208.550	7.49E-08	7.05E-08
7:30:00 AM	7:48:00 AM	0.200	6.980	41.931	1080	4.90	4.24	-3.300	210.9	1.11	207.600	7.04E-08	6.63E-08
													6.87E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.87 E-08 CM/SEC

REMARKS: Testing Completed 10/14/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Silty Clay (CL-ML), Yellow Brown mottled Light Gray, Trace Sand, Medium, Moist**

LIQUID LIMIT **27** PLASTIC LIMIT **21** P.I. **6**

BORING NO. **Boring 2L** SAMPLE NO. **6**

SAMPLE TYPE **ST** DEPTH **7.0-9.0 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **101.9 P.C.F.**

FINAL WATER CONTENT **23.5%** FINAL DRY DENSITY **103.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:28:00 PM		0.200	7.005	41.254		3.97	6.85	14.400	70.3		84.700		
3:28:00 PM	3:40:00 PM	0.200	7.005	41.254	720	6.71	4.10	-13.050	70.3	1.00	57.250	9.24E-06	8.70E-06
3:40:00 PM	3:50:00 PM	0.200	7.005	41.254	600	8.30	2.50	-29.000	70.3	1.01	41.300	9.24E-06	8.71E-06
3:50:00 PM	4:02:00 PM	0.200	7.005	41.254	720	9.47	1.33	-40.700	70.3	1.00	29.600	7.86E-06	7.40E-06
													8.24E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.24 E-06 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Light Gray mottled Yellow Brown, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **60** PLASTIC LIMIT **24** P.I. **36**

BORING NO. **Boring 3** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.7%** INITIAL DRY DENSITY **100.2 P.C.F.**

FINAL WATER CONTENT **26.1%** FINAL DRY DENSITY **99.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:53:00 AM		0.200	7.163	42.028		1.50	7.88	31.900	210.9		242.800		
5:53:00 AM	7:13:00 AM	0.200	7.163	42.028	4800	1.56	7.82	31.300	210.9	1.00	242.200	8.79E-09	8.28E-09
7:13:00 AM	7:38:00 AM	0.200	7.163	42.028	1500	1.58	7.80	31.100	210.9	1.00	242.000	9.39E-09	8.84E-09
7:38:00 AM	8:29:00 AM	0.200	7.163	42.028	3060	1.62	7.76	30.700	210.9	1.00	241.600	9.21E-09	8.68E-09
													8.50E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.50 E-09 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **20** P.I. **23**

BORING NO. **Boring 3** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.8%** INITIAL DRY DENSITY **95.1 P.C.F.**

FINAL WATER CONTENT **29.5%** FINAL DRY DENSITY **93.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:10:00 PM		0.200	7.432	42.077		5.34	4.67	-3.350	210.9		207.550		
12:10:00 PM	12:30:00 PM	0.200	7.432	42.077	1200	6.00	4.01	-9.950	210.9	1.00	200.950	4.76E-07	4.48E-07
12:30:00 PM	12:54:00 PM	0.200	7.432	42.077	1440	6.72	3.29	-17.150	210.9	1.00	193.750	4.48E-07	4.22E-07
12:54:00 PM	1:25:00 PM	0.200	7.432	42.077	1860	7.60	2.40	-26.000	210.9	1.01	184.900	4.44E-07	4.18E-07
													4.27E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.27 E-07 CM/SEC

REMARKS: Testing Completed 11/15/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray/Gray, Silty, Stiff, Moist**

LIQUID LIMIT **38** PLASTIC LIMIT **22** P.I. **16**

BORING NO. **Boring 3U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **21.4%** INITIAL DRY DENSITY **101.2 P.C.F.**

FINAL WATER CONTENT **21.4%** FINAL DRY DENSITY **102.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:55:00 PM		0.200	7.483	41.834		2.21	6.92	23.550	351.5		375.050		
8:55:00 PM	7:04:00 AM	0.200	7.483	41.834	42180	3.58	5.53	9.750	351.5	1.01	361.250	1.59E-08	1.50E-08
7:04:00 AM	8:38:00 AM	0.200	7.483	41.834	5640	3.78	5.33	7.750	351.5	1.00	359.250	1.76E-08	1.66E-08
8:38:00 AM	12:03:00 PM	0.200	7.483	41.834	12300	4.18	4.92	3.700	351.5	1.03	355.200	1.65E-08	1.55E-08
													1.52E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.52 E-08 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL/CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **49** PLASTIC LIMIT **22** P.I. **27**

BORING NO. **Boring 4** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.5%** INITIAL DRY DENSITY **96.4 P.C.F.**

FINAL WATER CONTENT **23.8%** FINAL DRY DENSITY **100.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:09:00 PM		0.200	7.437	41.205		3.74	5.94	11.000	210.9		221.900		
7:09:00 PM	8:29:00 PM	0.200	7.437	41.205	4800	4.13	5.51	6.900	210.9	1.10	217.800	7.01E-08	6.61E-08
8:29:00 PM	9:00:00 PM	0.200	7.437	41.205	1860	4.30	5.34	5.200	210.9	1.00	216.100	7.60E-08	7.16E-08
9:00:00 PM	9:28:00 PM	0.200	7.437	41.205	1680	4.42	5.22	4.000	210.9	1.00	214.900	5.98E-08	5.64E-08
													6.53E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 6.53 E-08 CM/SEC

REMARKS: Testing Completed 11/5/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown/Light Gray, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **32** PLASTIC LIMIT **20** P.I. **12**

BORING NO. **Boring 4L** SAMPLE NO. **ST 10**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.7%** INITIAL DRY DENSITY **100.7 P.C.F.**

FINAL WATER CONTENT **24.6%** FINAL DRY DENSITY **101.8 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:16:00 PM		0.200	7.397	41.013		1.20	8.82	38.100	140.6		178.700		
12:16:00 PM	1:03:00 PM	0.200	7.397	41.013	2820	3.75	6.23	12.400	140.6	1.02	153.000	9.93E-07	9.35E-07
1:03:00 PM	2:23:00 PM	0.200	7.397	41.013	4800	7.39	2.55	-24.200	140.6	1.01	116.400	1.03E-06	9.68E-07
2:23:00 PM	3:26:00 PM	0.200	7.397	41.013	3780	9.59	0.32	-46.350	140.6	1.01	94.250	1.01E-06	9.49E-07
													9.53E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.53 E-07 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS**

COMPUTED BY: **BJS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **62** PLASTIC LIMIT **24** P.I. **38**

BORING NO. **Boring 4U** SAMPLE NO. **ST 22**

SAMPLE TYPE **ST** DEPTH **27-29 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.8%** INITIAL DRY DENSITY **94.6 P.C.F.**

FINAL WATER CONTENT **28.1%** FINAL DRY DENSITY **95.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:47:00 PM		0.200	7.706	42.077		2.33	6.84	22.550	210.9		233.450		
12:47:00 PM	1:08:00 PM	0.200	7.706	42.077	1260	2.35	6.82	22.350	210.9	1.00	233.250	1.25E-08	1.17E-08
1:08:00 PM	2:20:00 PM	0.200	7.706	42.077	4320	2.42	6.74	21.600	210.9	1.14	232.500	1.37E-08	1.29E-08
2:20:00 PM	4:43:00 PM	0.200	7.706	42.077	8580	2.50	6.66	20.800	210.9	1.00	231.700	7.36E-09	6.93E-09
													9.17E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.17 E-09 CM/SEC

REMARKS: Testing Completed 11/10/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Gray/Yellow Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **43** PLASTIC LIMIT **22** P.I. **21**

BORING NO. **Boring 5** SAMPLE NO. **10**

SAMPLE TYPE **ST** DEPTH **24½-26½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.5%** INITIAL DRY DENSITY **99.8 P.C.F.**

FINAL WATER CONTENT **23.7%** FINAL DRY DENSITY **100.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:59:00 PM		0.200	6.904	41.883		2.62	6.29	18.350	210.9		229.250		
1:59:00 PM	2:35:00 PM	0.200	6.904	41.883	2160	3.48	5.40	9.600	210.9	1.03	220.500	2.97E-07	2.80E-07
2:35:00 PM	3:06:00 PM	0.200	6.904	41.883	1860	4.16	4.69	2.650	210.9	1.04	213.550	2.84E-07	2.67E-07
3:06:00 PM	3:47:00 PM	0.200	6.904	41.883	2460	5.00	3.84	-5.800	210.9	1.01	205.100	2.71E-07	2.55E-07
													2.67E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.67 E-07 CM/SEC

REMARKS: Testing Completed 10/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **24** P.I. **22**

BORING NO. **Boring 5L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **9½-11 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **29.0%** INITIAL DRY DENSITY **94.4 P.C.F.**

FINAL WATER CONTENT **28.4%** FINAL DRY DENSITY **94.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:33:00 PM		0.200	7.696	40.869		0.08	9.97	49.450	210.9		260.350		
12:33:00 PM	2:12:00 PM	0.200	7.696	40.869	5940	4.13	5.77	8.200	210.9	1.04	219.100	5.47E-07	5.15E-07
2:12:00 PM	2:38:00 PM	0.200	7.696	40.869	1560	5.12	4.77	-1.750	210.9	1.01	209.150	5.61E-07	5.28E-07
2:38:00 PM	3:21:00 PM	0.200	7.696	40.869	2580	6.62	3.24	-16.900	210.9	1.02	194.000	5.49E-07	5.17E-07
													5.18E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.18 E-07 CM/SEC

REMARKS: Testing Completed 10/16/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray/Greenish Gray mottled Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **19** P.I. **15**

BORING NO. **Boring 6** SAMPLE NO. **8**

SAMPLE TYPE **ST** DEPTH **17-19 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.5%** INITIAL DRY DENSITY **106.8 P.C.F.**

FINAL WATER CONTENT **20.7%** FINAL DRY DENSITY **106.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:10:00 AM		0.200	8.199	42.418		3.33	6.20	14.350	210.9		225.250		
7:10:00 AM	8:01:00 AM	0.200	8.199	42.418	3060	3.49	6.04	12.750	210.9	1.00	223.650	4.50E-08	4.24E-08
8:01:00 AM	9:31:00 AM	0.200	8.199	42.418	5400	3.76	5.76	10.000	210.9	1.04	220.900	4.43E-08	4.17E-08
9:31:00 AM	10:31:00 AM	0.200	8.199	42.418	3600	3.95	5.57	8.100	210.9	1.00	219.000	4.64E-08	4.37E-08
													4.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 4.25 E-08 CM/SEC

REMARKS: Testing Completed 10/23/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Reddish Brown, Silty, Trace Sand, Medium, Moist**

LIQUID LIMIT **41** PLASTIC LIMIT **23** P.I. **18**

BORING NO. **Boring 6L-ST1** SAMPLE NO. **ST1**

SAMPLE TYPE **ST** DEPTH **7½-9ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **27.5%** INITIAL DRY DENSITY **95.2 P.C.F.**

FINAL WATER CONTENT **26.0%** FINAL DRY DENSITY **96.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:42:00 AM		0.200	7.625	39.301		1.80	7.77	29.850	210.9		240.750		
10:42:00 AM	11:10:00 AM	0.200	7.625	39.301	1680	2.98	6.56	17.900	210.9	1.03	228.800	5.88E-07	5.54E-07
11:10:00 AM	11:59:00 AM	0.200	7.625	39.301	2940	4.88	4.61	-1.350	210.9	1.03	209.550	5.80E-07	5.46E-07
11:59:00 AM	12:16:00 PM	0.200	7.625	39.301	1020	5.49	3.98	-7.550	210.9	1.03	203.350	5.71E-07	5.38E-07
													5.47E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 5.47 E-07 CM/SEC

REMARKS: Testing Completed 10/20/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Brown/Yellow Brown mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **63** PLASTIC LIMIT **20** P.I. **43**

BORING NO. **Boring 7** SAMPLE NO. **7**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **28.4%** INITIAL DRY DENSITY **95.5 P.C.F.**

FINAL WATER CONTENT **27.4%** FINAL DRY DENSITY **94.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
1:32:00 PM		0.200	7.478	40.869		0.20	9.40	46.000	210.9		256.900		
1:32:00 PM	3:08:00 PM	0.200	7.478	40.869	5760	0.35	9.25	44.500	210.9	1.00	255.400	1.86E-08	1.75E-08
3:08:00 PM	3:45:00 PM	0.200	7.478	40.869	2220	0.40	9.20	44.000	210.9	1.00	254.900	1.62E-08	1.52E-08
3:45:00 PM	4:16:00 PM	0.200	7.478	40.869	1860	0.45	9.15	43.500	210.9	1.00	254.400	1.93E-08	1.82E-08
													1.71E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.71 E-08 CM/SEC

REMARKS: Testing Completed 10/26/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Sandy Silty Clay (CL-ML), Yellow Brown mottled Reddish Brown/Light Gray, Medium, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **19** P.I. **7**

BORING NO. **Boring 8L** SAMPLE NO. **5**

SAMPLE TYPE **ST** DEPTH **12-14 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.0%** INITIAL DRY DENSITY **101.1 P.C.F.**

FINAL WATER CONTENT **24.7%** FINAL DRY DENSITY **101.0 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
2:24:00 PM		0.200	7.620	41.302		4.90	5.01	0.550	70.3		70.850		
2:24:00 PM	3:27:00 PM	0.200	7.620	41.302	3780	8.66	1.24	-37.100	70.3	1.00	33.200	3.70E-06	3.49E-06
3:27:00 PM	3:48:00 PM	0.200	7.620	41.302	1260	9.36	0.54	-44.100	70.3	1.00	26.200	3.47E-06	3.27E-06
3:48:00 PM	4:08:00 PM	0.200	7.620	41.302	1200	9.90	0.00	-49.500	70.3	1.00	20.800	3.55E-06	3.34E-06
													3.41E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.41 E-06 CM/SEC

REMARKS: Testing Completed 11/7/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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Geotechnics Form No. 17-FW

PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yelllow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 8U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.0%** INITIAL DRY DENSITY **102.4 P.C.F.**

FINAL WATER CONTENT **23.3%** FINAL DRY DENSITY **102.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
10:58:00 AM		0.200	7.280	41.398		5.13	4.40	-3.650	210.9		207.250		
10:58:00 AM	12:10:00 PM	0.200	7.280	41.398	4320	5.25	4.27	-4.900	210.9	1.08	206.000	2.46E-08	2.32E-08
12:10:00 PM	3:07:00 PM	0.200	7.280	41.398	10620	5.54	3.96	-7.900	210.9	1.07	203.000	2.43E-08	2.29E-08
3:07:00 PM	3:54:00 PM	0.200	7.280	41.398	2820	5.61	3.89	-8.600	210.9	1.00	202.300	2.15E-08	2.03E-08
													2.25E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.25 E-08 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **19** P.I. **26**

BORING NO. **Boring 8U** SAMPLE NO. **ST16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **100.9 P.C.F.**

FINAL WATER CONTENT **25.4%** FINAL DRY DENSITY **100.2 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:39:00 AM		0.200	7.732	41.398		1.13	7.78	33.250	210.9		244.150		
8:39:00 AM	9:05:00 AM	0.200	7.732	41.398	1560	1.15	7.76	33.050	210.9	1.00	243.950	9.81E-09	9.24E-09
9:05:00 AM	10:02:00 AM	0.200	7.732	41.398	3420	1.19	7.72	32.650	210.9	1.00	243.550	8.96E-09	8.44E-09
10:02:00 AM	12:04:00 PM	0.200	7.732	41.398	7320	1.29	7.62	31.650	210.9	1.00	242.550	1.05E-08	9.89E-09
													9.40E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.40 E-09 CM/SEC

REMARKS: Testing Completed 11/21/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray/Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **21** P.I. **25**

BORING NO. **Boring 9CCR** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.9%** INITIAL DRY DENSITY **102.9 P.C.F.**

FINAL WATER CONTENT **23.2%** FINAL DRY DENSITY **103.4 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:05:00 AM		0.200	7.336	41.350		2.15	7.14	24.950	210.9		235.850		
9:05:00 AM	10:59:00 AM	0.200	7.336	41.350	6840	2.24	7.05	24.050	210.9	1.00	234.950	9.92E-09	9.34E-09
10:59:00 AM	12:10:00 PM	0.200	7.336	41.350	4260	2.30	6.99	23.450	210.9	1.00	234.350	1.06E-08	1.00E-08
12:10:00 PM	3:06:00 PM	0.200	7.336	41.350	10560	2.44	6.85	22.050	210.9	1.00	232.950	1.01E-08	9.48E-09
													9.55E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.55 E-09 CM/SEC

REMARKS: Testing Completed 11/17/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay with Sand (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Soft, Moist**

LIQUID LIMIT **26** PLASTIC LIMIT **17** P.I. **9**

BORING NO. **Boring 9L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **7½-9 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **24.3%** INITIAL DRY DENSITY **101.3 P.C.F.**

FINAL WATER CONTENT **20.1%** FINAL DRY DENSITY **106.5 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:24:00 PM		0.200	7.112	40.391		4.13	5.83	8.500	70.3		78.800		
5:24:00 PM	6:08:00 PM	0.200	7.112	40.391	2640	6.89	3.06	-19.150	70.3	1.00	51.150	2.88E-06	2.72E-06
6:08:00 PM	6:26:00 PM	0.200	7.112	40.391	1080	7.63	2.30	-26.650	70.3	1.03	43.650	2.59E-06	2.44E-06
6:26:00 PM	6:40:00 PM	0.200	7.112	40.391	840	8.09	1.85	-31.200	70.3	0.98	39.100	2.31E-06	2.17E-06
													2.55E-06

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.55 E-06 CM/SEC

REMARKS: Testing Completed 11/9/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Gray mottled Light Gray, Silty, Stiff, Moist**

LIQUID LIMIT **46** PLASTIC LIMIT **22** P.I. **24**

BORING NO. **Boring 9U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.4%** INITIAL DRY DENSITY **102.5 P.C.F.**

FINAL WATER CONTENT **23.1%** FINAL DRY DENSITY **102.7 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
3:13:00 PM		0.200	7.681	42.077		0.88	8.68	39.000	210.9		249.900		
3:13:00 PM	3:58:00 PM	0.200	7.681	42.077	2700	0.99	8.57	37.900	210.9	1.00	248.800	2.98E-08	2.81E-08
3:58:00 PM	4:25:00 PM	0.200	7.681	42.077	1620	1.06	8.50	37.200	210.9	1.00	248.100	3.17E-08	2.99E-08
4:25:00 PM	4:58:00 PM	0.200	7.681	42.077	1980	1.12	8.44	36.600	210.9	1.00	247.500	2.23E-08	2.10E-08
													2.63E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.63 E-08 CM/SEC

REMARKS: Testing Completed 11/22/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **36** PLASTIC LIMIT **20** P.I. **16**

BORING NO. **Boring 11U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **23.1%** INITIAL DRY DENSITY **104.4 P.C.F.**

FINAL WATER CONTENT **22.3%** FINAL DRY DENSITY **105.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
7:46:00 AM		0.200	7.244	41.834		2.04	7.38	26.700	210.9		237.600		
7:46:00 AM	8:57:00 AM	0.200	7.244	41.834	4260	2.12	7.30	25.900	210.9	1.00	236.800	1.37E-08	1.29E-08
8:57:00 AM	9:30:00 AM	0.200	7.244	41.834	1980	2.16	7.26	25.500	210.9	1.00	236.400	1.48E-08	1.39E-08
9:30:00 AM	10:41:00 AM	0.200	7.244	41.834	4260	2.25	7.17	24.600	210.9	1.00	235.500	1.55E-08	1.46E-08
													1.38E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.38 E-08 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Brown mottled Yellow Brown, Silty, Stiff, Moist**

LIQUID LIMIT **48** PLASTIC LIMIT **21** P.I. **27**

BORING NO. **Boring 11U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **25.2%** INITIAL DRY DENSITY **97.4 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:17:00 PM		0.200	7.498	42.028		0.50	9.38	44.400	210.9		255.300		
12:17:00 PM	12:30:00 PM	0.200	7.498	42.028	780	0.84	9.02	40.900	210.9	1.06	251.800	3.16E-07	2.97E-07
12:30:00 PM	12:40:00 PM	0.200	7.498	42.028	600	1.10	8.77	38.350	210.9	0.96	249.250	3.03E-07	2.85E-07
12:40:00 PM	1:03:00 PM	0.200	7.498	42.028	1380	1.73	8.12	31.950	210.9	1.03	242.850	3.36E-07	3.17E-07
													3.04E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.04 E-07 CM/SEC

REMARKS: Testing Completed 11/13/2023

TESTED BY: **NAS**

COMPUTED BY: **NAS**

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ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Light Gray mottled Yelllow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **30** PLASTIC LIMIT **19** P.I. **11**

BORING NO. **Boring 12L** SAMPLE NO.

SAMPLE TYPE **ST** DEPTH **14½-16 ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **104.3 P.C.F.**

FINAL WATER CONTENT **22.0%** FINAL DRY DENSITY **105.1 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
5:25:00 PM		0.200	7.203	41.447		5.54	3.60	-9.700	70.3		60.600		
5:25:00 PM	5:40:00 PM	0.200	7.203	41.447	900	5.83	3.30	-12.650	70.3	1.03	57.650	9.64E-07	9.08E-07
5:40:00 PM	5:52:00 PM	0.200	7.203	41.447	720	6.09	3.02	-15.350	70.3	1.08	54.950	1.16E-06	1.09E-06
5:52:00 PM	5:58:00 PM	0.200	7.203	41.447	360	6.20	2.92	-16.400	70.3	0.91	53.900	9.31E-07	8.77E-07
													9.69E-07

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 9.69 E-07 CM/SEC

REMARKS: Testing Completed 11/3/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **45** PLASTIC LIMIT **22** P.I. **23**

BORING NO. **Boring 12U** SAMPLE NO. **ST 8**

SAMPLE TYPE **ST** DEPTH **9½-11½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **20.7%** INITIAL DRY DENSITY **107.5 P.C.F.**

FINAL WATER CONTENT **21.6%** FINAL DRY DENSITY **106.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
8:14:00 AM		0.200	7.457	41.785		1.48	7.91	32.150	210.9		243.050		
8:14:00 AM	9:34:00 AM	0.200	7.457	41.785	4800	1.50	7.89	31.950	210.9	1.00	242.850	3.06E-09	2.88E-09
9:34:00 AM	11:39:00 AM	0.200	7.457	41.785	7500	1.54	7.85	31.550	210.9	1.00	242.450	3.92E-09	3.70E-09
11:39:00 AM	1:09:00 PM	0.200	7.457	41.785	5400	1.56	7.83	31.350	210.9	1.00	242.250	2.73E-09	2.57E-09
													3.13E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 3.13 E-09 CM/SEC

REMARKS: Testing Completed 11/24/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown mottled Light Gray, Silty, Black Oxidation, Silty, Stiff, Moist**

LIQUID LIMIT **42** PLASTIC LIMIT **22** P.I. **20**

BORING NO. **Boring 12U** SAMPLE NO. **ST 16**

SAMPLE TYPE **ST** DEPTH **19½-21½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **22.2%** INITIAL DRY DENSITY **100.1 P.C.F.**

FINAL WATER CONTENT **26.8%** FINAL DRY DENSITY **97.3 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
6:31:00 AM		0.200	7.366	42.126		1.62	8.07	32.250	210.9		243.150		
6:31:00 AM	8:42:00 AM	0.200	7.366	42.126	7860	1.74	7.96	31.100	210.9	0.92	242.000	1.05E-08	9.93E-09
8:42:00 AM	10:53:00 AM	0.200	7.366	42.126	7860	1.86	7.84	29.900	210.9	1.00	240.800	1.11E-08	1.04E-08
10:53:00 AM	4:03:00 PM	0.200	7.366	42.126	18600	2.13	7.55	27.100	210.9	1.07	238.000	1.10E-08	1.04E-08
													1.03E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 1.03 E-08 CM/SEC

REMARKS: Testing Completed 11/25/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Lean Clay (CL), Yellow Brown, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **34** PLASTIC LIMIT **20** P.I. **14**

BORING NO. **Boring 13BN** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.0%** INITIAL DRY DENSITY **109.7 P.C.F.**

FINAL WATER CONTENT **18.8%** FINAL DRY DENSITY **110.9 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
9:06:00 AM		0.200	7.219	41.785		5.27	4.64	-3.150	210.9		207.750		
9:06:00 AM	10:18:00 AM	0.200	7.219	41.785	4320	5.32	4.59	-3.650	210.9	1.00	207.250	9.64E-09	9.08E-09
10:18:00 AM	12:22:00 PM	0.200	7.219	41.785	7440	5.40	4.51	-4.450	210.9	1.00	206.450	8.98E-09	8.46E-09
12:22:00 PM	1:18:00 PM	0.200	7.219	41.785	3360	5.44	4.47	-4.850	210.9	1.00	206.050	9.97E-09	9.39E-09
													8.84E-09

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 8.84 E-09 CM/SEC

REMARKS: Testing Completed 11/27/2023

TESTED BY: **BJS/NAS**

COMPUTED BY: **NAS**

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PERMEABILITY TEST REPORT
ASTM D 5084-10

PROJECT No. **23-1071**

PROJECT **Andrews - Springfield, IL Ash Ponds** LOCATION **Springfield, IL**
CLIENT **Andrews Engineering** SAMPLING DATE

SAMPLE DESCRIPTION **Fat Clay (CH), Gray mottled Light Gray, Silty, Trace Sand, Stiff, Moist**

LIQUID LIMIT **52** PLASTIC LIMIT **25** P.I. **27**

BORING NO. **Boring 13BS** SAMPLE NO. **ST 7**

SAMPLE TYPE **ST** DEPTH **8½-9½ ft.**

SPECIFIC GRAVITY, Gs TEST METHOD **ASTM D 5084-10**

INITIAL WATER CONTENT **19.1%** INITIAL DRY DENSITY **109.6 P.C.F.**

FINAL WATER CONTENT **18.2%** FINAL DRY DENSITY **110.6 P.C.F.**

t_1	t_2	a	L	A	t	head	tail	h_w	h_a	dt/dh	h_a+h_w	k	k_{20}
12:54:00 PM		0.200	5.476	41.013		1.24	8.79	37.750	210.9		248.650		
12:54:00 PM	2:26:00 PM	0.200	5.476	41.013	5520	1.51	8.52	35.050	210.9	1.00	245.950	2.64E-08	2.49E-08
2:26:00 PM	4:58:00 PM	0.200	5.476	41.013	9120	1.90	8.12	31.100	210.9	1.03	242.000	2.37E-08	2.23E-08
4:58:00 PM	6:40:00 PM	0.200	5.476	41.013	6120	2.18	7.86	28.400	210.9	0.93	239.300	2.45E-08	2.31E-08
													2.32E-08

COEFFICIENT OF VERTICAL PERMEABILITY
K_{20} = 2.32 E-08 CM/SEC

REMARKS: Testing Completed 11/27/2023

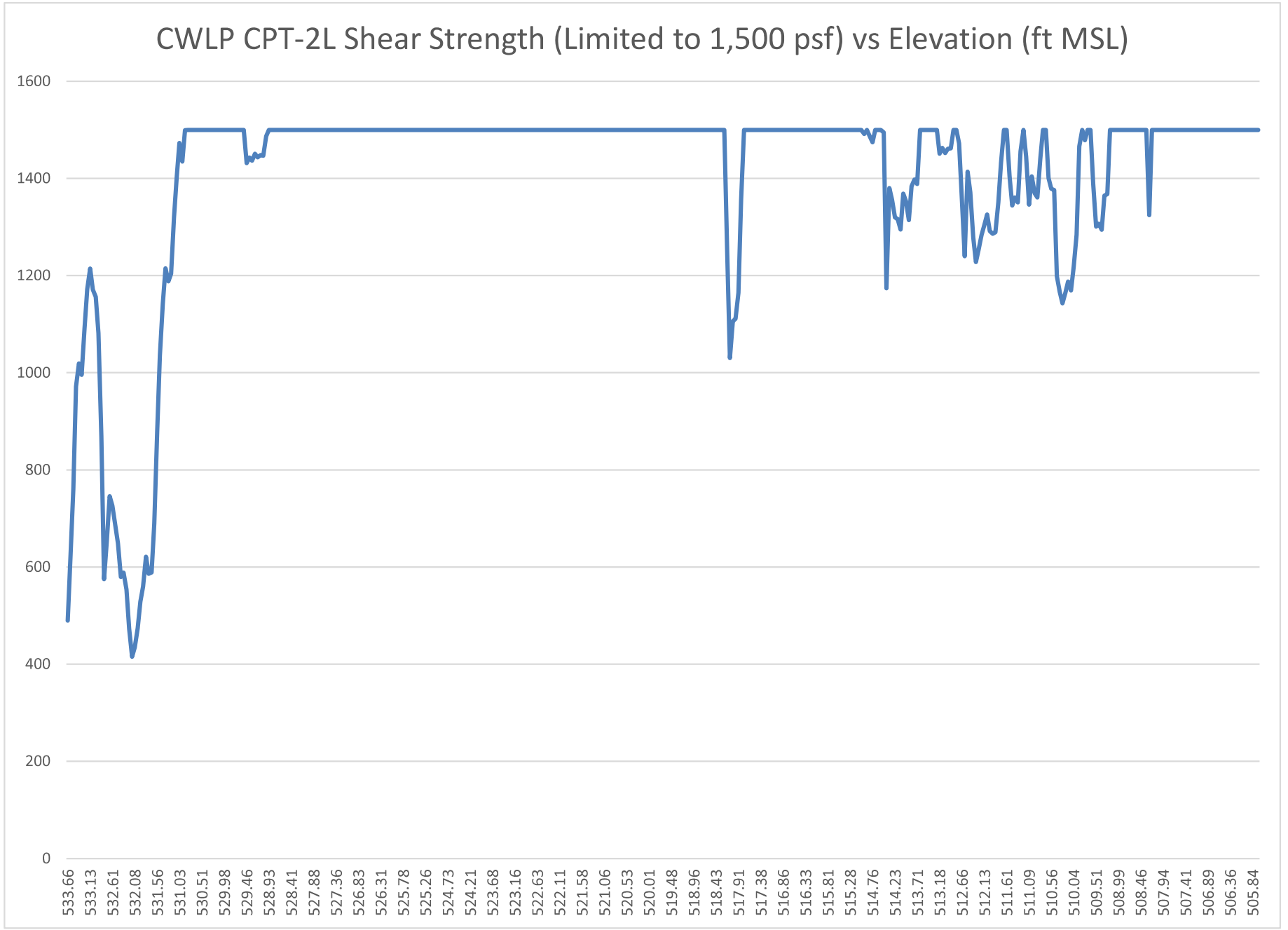
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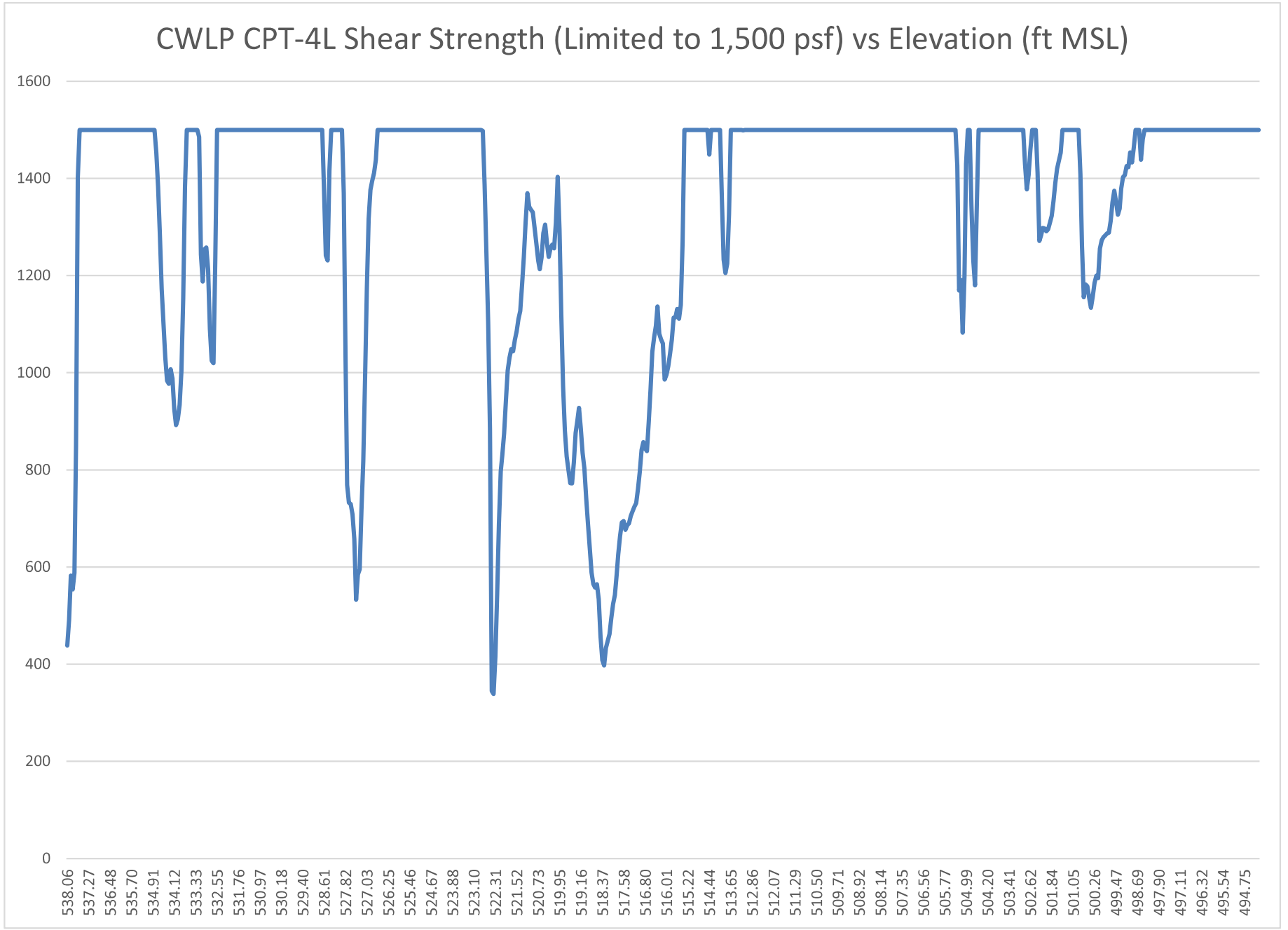
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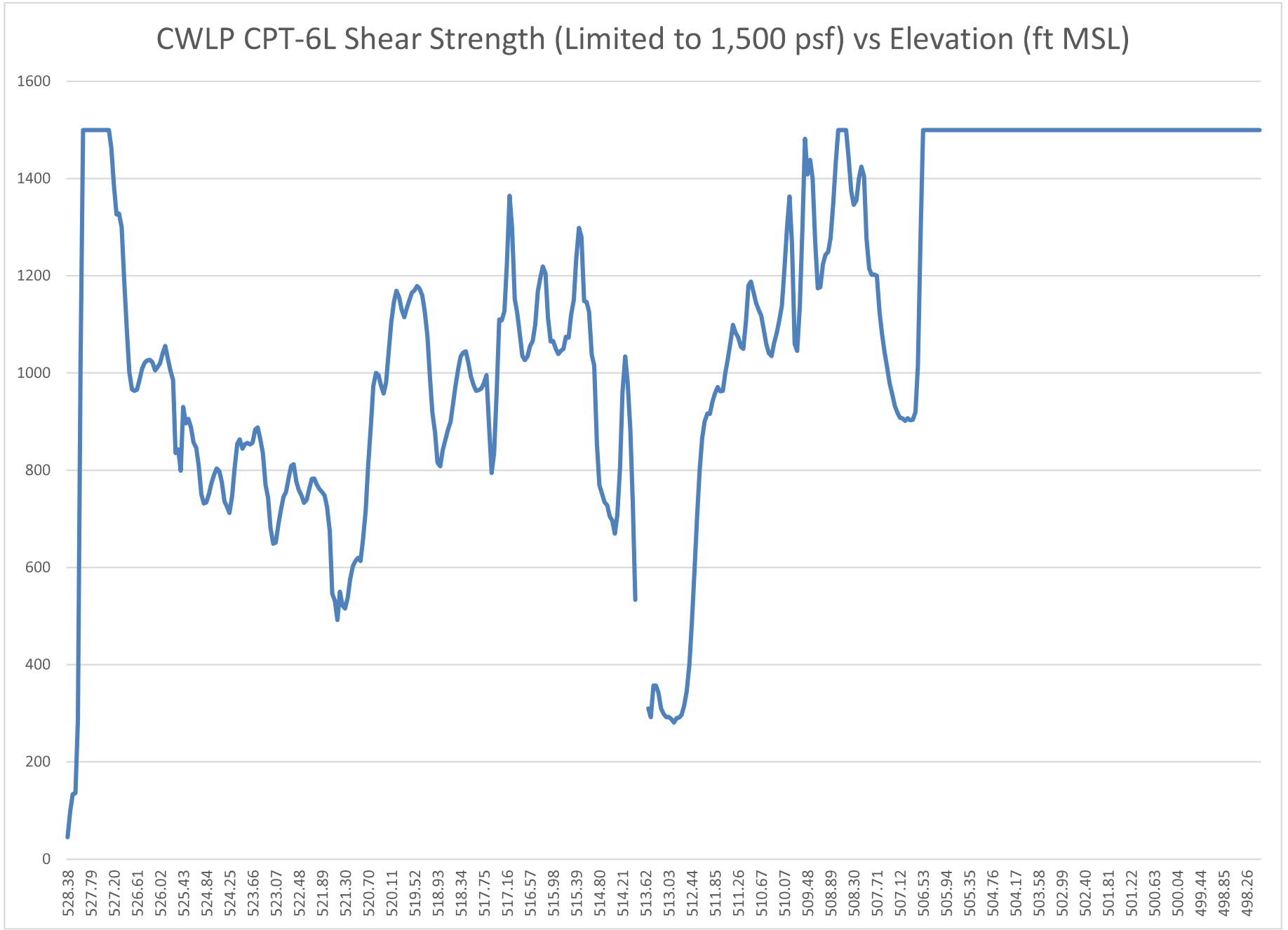
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Soil & Material Testing
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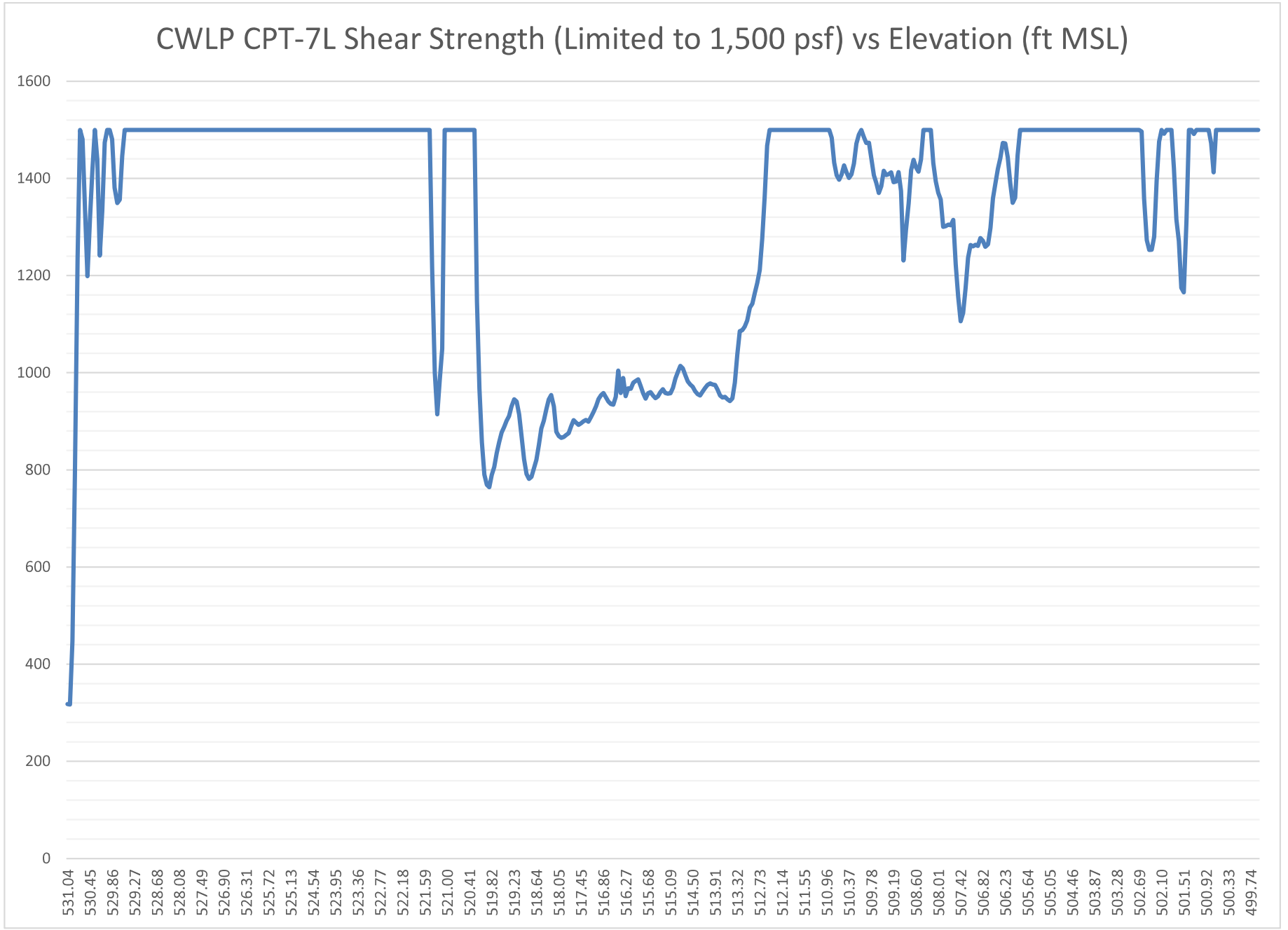
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Quincy, IL • Galesburg, IL • Burlington, IA • Pella, IA • Columbia, MO • Hannibal, MO


CWLP CPT-2L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
533.66
533.13
532.61
532.08
531.56
531.03
530.51
529.98
529.46
528.93
528.41
527.88
527.36
526.83
526.31
525.78
525.26
524.73
524.21
523.68
523.16
522.63
522.11
521.58
521.06
520.53
520.01
519.48
518.96
518.43
517.91
517.38
516.86
516.33
515.81
515.28
514.76
514.23
513.71
513.18
512.66
512.13
511.61
511.09
510.56
510.04
509.51
508.99
508.46
507.94
507.41
506.89
506.36
505.84


CWLP CPT-4L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
538.06
537.27
536.48
535.70
534.91
534.12
533.33
532.55
531.76
530.97
530.18
529.40
528.61
527.82
527.03
526.25
525.46
524.67
523.88
523.10
522.31
521.52
520.73
519.95
519.16
518.37
517.58
516.80
516.01
515.22
514.44
513.65
512.86
512.07
511.29
510.50
509.71
508.92
508.14
507.35
506.56
505.77
504.99
504.20
503.41
502.62
501.84
501.05
500.26
499.47
498.69
497.90
497.11
496.32
495.54
494.75


CWLP CPT-6L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
528.38
527.79
527.20
526.61
526.02
525.43
524.84
524.25
523.66
523.07
522.48
521.89
521.30
520.70
520.11
519.52
518.93
518.34
517.75
517.16
516.57
515.98
515.39
514.80
514.21
513.62
513.03
512.44
511.85
511.26
510.67
510.07
509.48
508.89
508.30
507.71
507.12
506.53
505.94
505.35
504.76
504.17
503.58
502.99
502.40
501.81
501.22
500.63
500.04
499.44
498.85
498.26


CWLP CPT-7L Shear Strength (Limited to 1,500 psf) vs Elevation (ft MSL)
1600
1400
1200
1000
800
600
400
200
0
531.04
530.45
529.86
529.27
528.68
528.08
527.49
526.90
526.31
525.72
525.13
524.54
523.95
523.36
522.77
522.18
521.59
521.00
520.41
519.82
519.23
518.64
518.05
517.45
516.86
516.27
515.68
515.09
514.50
513.91
513.32
512.73
512.14
511.55
510.96
510.37
509.78
509.19
508.60
508.01
507.42
506.82
506.23
505.64
505.05
504.46
503.87
503.28
502.69
502.10
501.51
500.92
500.33
499.74

SUMMARIZED SOIL DATA

Soil Description	Density (pcf)	Field Vane Shear*	Sample ID UU Laboratory Result (ave)		Total Strengths (Short Term)		Sample ID CU Laboratory Result (ave)			Effective Strengths (Long Term)		Permeability	Ky'/Kx'^	Laboratory Samples
		c (psf)		c (psf)	ϕ (degrees)	c (psf)		ϕ' (degrees)	c (psf)	ϕ' (degrees)	c (psf)	ft/sec		
CCR Wet Ash	100				15	0				25	0	2.56E-05	2.0	Tech. Paper & Interim Measures Report, Sept. 2025
CCR Moist Ash	95				30	0				30	0	2.56E-05	1.0	Tech. Paper & Interim Measures Report, Sept. 2026
Clay Fill	125	2930	B-4-1	1613	0	1600	B-6-1, B-6-2	27	518	27	500	1.39E-09	3.0	B-4-1, B-6-1, B-6-2, SP-1, SP-2, B-6 (17'-19')
Scrubber Sludge	125				0	750				30	0	2.14E-09	1.0	Conservative Values
Bottom Ash	115				35	0				35	0	7.55E-08	1.0	Conservative Values
Silty Clay	121	1223.5	B-4-2,B-2L-1	1159	0	1100	B-7L-2, B-4-3	30	317	27	180	2.14E-09	1.3	B-4-2, B-2L-1, B-7L-2, B-4-3, B-4 (19.5'-21.5')
Former Creek Bottom Clay	119	1440			0	300				19	0	1.70E-08	1.2	CPT-6L, B-6L (17.5'-19')
Soft Clay/Clayey Silt	120		B-6/4	806	0	400				20	0	8.76E-09	1.3	B-6/4, B-5 (24.5'-26.5')
Upper Cohesive Clayey Silt	125	1635	B-6-3	691	0	690				26	0	2.70E-08	1.5	B-6-3. B-2L (7'-9')
Lower Cohesive Clayey Silt	125	1292			0	1200				28	0	2.00E-07	1.5	Conservative Values
Sand	125				34	0				34	0	8.20E-04	1.0	Conservative Values
Shale	Bedrock (Impenetrable)													

*Field Vane Shear Lower Bound Confidence
^Conservative Averages Based Upon Depositional History

Soil Strength Parameters Rationale

An investigation of some of the softest soil horizons onsite and the embankment soils were conducted with a supplemental geotechnical drilling investigation. Boring logs, laboratory testing and field vane shear data were evaluated. Statistical analysis of the field vane shear data is included at the bottom of the field vane shear data sheet.

Clay Fill (Ash Pond Embankments)

The clay fill for both ponds were compiled to provide uniform strength parameters site wide. Sample B-4-1 (10'-12') from boring B-4E in 2025 was analyzed via the unconsolidated-undrained triaxial compression test that resulted in a total shear strength of 1,613 psf. A field vane shear was conducted near this sample in boring B-4 at an approximately elevation of 545.7 feet MSL with a maximum shear strength of 1,760 psf which correlates well with the unconsolidated-undrained triaxial compression test result (minimal sample disturbance). This sample came from Lakeside Ash Pond, which had lower compaction compared to that of Dallman Ash Pond so this is very conservative for the site. The field vane shear results for the clay fill provided a lower bound confidence ranging from 2,045 psf at Lakeside Ash Pond to 3,117 psf for Dallman Ash Pond as provided in the attached field vane shear table. The composite of both ash pond's lower bound confidence from the field vane shear was 2,930 psf. The total shear strength used for the clay fill is conservatively 1,600 psf. The drained shear strength determined by the consolidated-undrained triaxial compression test provided an effective friction angle of 22.5 degrees to 32.0 degrees and 5.5 psi to 1.7 psi effective cohesion from Samples B-6-1 and B-6-2 from boring B-6E 2025. The conservative effective strength used for modeling is 27 degrees with 500 psf which is below the mean of the effective friction angle and the mean of the effective cohesion.

These embankment soils were also analyzed based on standard proctor analyses for the softer soils within each impoundment embankment determined from the 2023 through 2024 geotechnical site investigations. Sample B-4-1 was collected from boring B-4E drilled in 2025 (near boring B-4) at a depth of 10 to 12 feet within the Lakeside Dike with the dry density and percent saturation provided within the initial properties of the UU Triaxial Compression data. Cuttings were collected from the boring at a depth of approximately 10 feet for the remolded standard proctor analysis that was included with the sample labeled SP-1. Sample B-6-2 (8'-9') was collected from boring B-6E drilled in 2025 (near boring B-6) at a depth of 8 to 9 feet within the Dallman Dike with the multiple dry density and percent saturation provided within the initial properties of the CU Triaxial Compression data and averaged within the narrative. Cuttings were collected from the boring at a depth of approximately 5 feet for the remolded standard proctor analysis that was included with the sample labeled SP-2. These locations within the borings were targeted, as this elevation in the previous borings had the lowest SPT blow counts and pocket penetrometers to provide the most conservative results.

Silty Clay

After reviewing the gray silty clay and the brown silty clay laboratory analysis and the boring logs, it was determined that they are the same soils with varying degrees of oxidation thus they are lumped together. The unconsolidated-undrained triaxial compression test provided a total shear strength of between 1,123 psf (Sample B-4-2 (24'-26') collected from boring B-4E 2025) and 1,195

psf (Sample B-2L-1 (5'-7') collected from boring B-2LE 2025). Sample recovery for both of these Shelby tube samples were 100% so no soil disturbance is anticipated. The field vane shear results for the silty clays provided a lower bound confidence ranging from 1,111 psf (Brown Silty Clay) to 1,336 psf (Gray Silty Clay), in good general agreement with the unconsolidated-undrained triaxial compression test results. The total shear strength used for the silty clays is conservatively 1,100 psf. The drained shear strength determined by the consolidated-undrained triaxial compression test provided an effective friction angle of 27.1 degrees to 32.6 degrees and 1.3 psi to 3.1 psi effective cohesion (Samples B-7L-2 from boring B-7LE 2025 and B-4-3 from boring B-4E 2025). Sample recovery for both of these Shelby tube samples were 100% so no soil disturbance is anticipated. The conservative effective strength used for modeling is 27 degrees with 180 psf. These locations within the borings were targeted, as this elevation in the previous borings had the lowest SPT blow counts and pocket penetrometers to provide the most conservative results.

Upper Cohesive Clayey Silt

Sample B-6-3 (29' to 31') from boring B-6E in 2025 was analyzed via the (upper cohesive clayey silt) unconsolidated-undrained triaxial compression test resulted in a total shear strength of 691 psf. The field vane shear results for the upper cohesive clayey silt provided a lower bound confidence of 1,635 psf, as provided in the attached field vane shear table. The conservative total shear strength used for the upper cohesive clayey silt is 691 psf (results from the unconsolidated-undrained triaxial compression test were significantly lower than the field vane shear results). The additional investigation did not get enough samples to provide a consolidated-undrained triaxial compression test so a conservative effective friction angle of 26 degrees with no effective cohesion was selected. This was developed by using the Kenny (1959) empirical linear relationship between plasticity index and friction angle. This method is much more conservative than the values derived using Terzaghi correlation of effective friction angle vs plasticity index. The greatest plasticity index onsite associated with a clayey silt and silt is PI = 21 in the upper cohesive clayey silts. The conservatively estimated friction angle is 32 degrees – (0.25 x PI) resulting in a value of 26.75 degrees. The location within the boring was targeted, as this elevation in the previous borings had some of the lowest SPT blow counts and pocket penetrometers to provide the most conservative results.

Lower Cohesive Clayey Silt

The lower cohesive clayey silt was inadvertently not sampled during the supplemental geotechnical drilling investigation. The field vane shear results for the lower cohesive clayey silt provided a lower bound confidence of 1,292 psf. The plasticity index for the lower cohesive clayey silt is typically in the range of the lower 20's or lower. The Bjerrum Correction Factor for low to medium plasticity clayey silts is approximately one (1) which requires no reduction. The conservative total shear strength used for the lower cohesive clayey silt is 1,200 psf. If the plasticity index (PI) were 25, which no samples of clayey silt exceeded this PI, the correction would be a reduction of approximately 5.5% resulting in a reduction of the 1,292 psf lower bound field vane shear resultant reduced to 1,220 psf, still in excess of the 1,200 psf conservatively used in the analyses. A conservative effective friction angle of 28 degrees with no effective cohesion was selected using engineering judgement.

Soft Clay/Clayey Silt

An undisturbed sample of soft sediment under the Dallman Ash Pond embankment was collected and analyzed. The unconsolidated-undrained triaxial compression test on Sample B-6/4 (35'-37') from boring B-6E 2025 resulted in a total shear strength of 806 psf. Sample recovery for this Shelby tube sample was 100% so no soil disturbance is anticipated. The conservative total shear strength used for the soft clay/clayey silt is 400 psf, approximately half of the unconsolidated-undrained triaxial compression test results and in agreement with the lowest strength found in the CPT-4. The additional investigation did not get enough samples to provide a consolidated-undrained triaxial compression test so a highly conservative effective friction angle of 20 degrees with no effective cohesion was used. This was developed by using the Kenny (1959) empirical linear relationship between plasticity index and friction angle. The plasticity index of this soil is 15. The conservatively estimated friction angle is 32 degrees – (0.25 x PI) resulting in a value of 28.25 degrees. This soil appears to be the same as the soil under Lakeside Ash Pond embankment at a slightly higher elevation, which would be expected as it is upstream.

Former Creek Bottom Clay

The Former Creek Bottom Clay was inadvertently not sampled during the supplemental geotechnical drilling investigation. It was previously assumed to be similar to the Soft Clay/Clayey Silt sample collected from beneath the Dallman Ash Pond embankment. It appears that these are different soils so very conservative soil strengths were selected. During the 2023 geotechnical investigation, a field vane shear was performed in boring B-6L at an elevation of approximately 511.2 feet MSL resulting in 1,440 psf and in 2024 a CPT sounding resulted in 300 psf in CPT-6L at an elevation of approximately 513 feet MSL. The conservative total shear strength used for the former creek bottom clay is 300 psf. Atterberg limits were performed on this sample in 2023 resulting in a PI of 12. A highly conservative effective friction angle of 19 degrees with no effective cohesion was used. This was developed by using the Kenny (1959) empirical linear relationship between plasticity index and friction angle. The plasticity index of this soil is 12. The conservatively estimated friction angle is 32 degrees – (0.25 x PI) resulting in a value of 29 degrees.

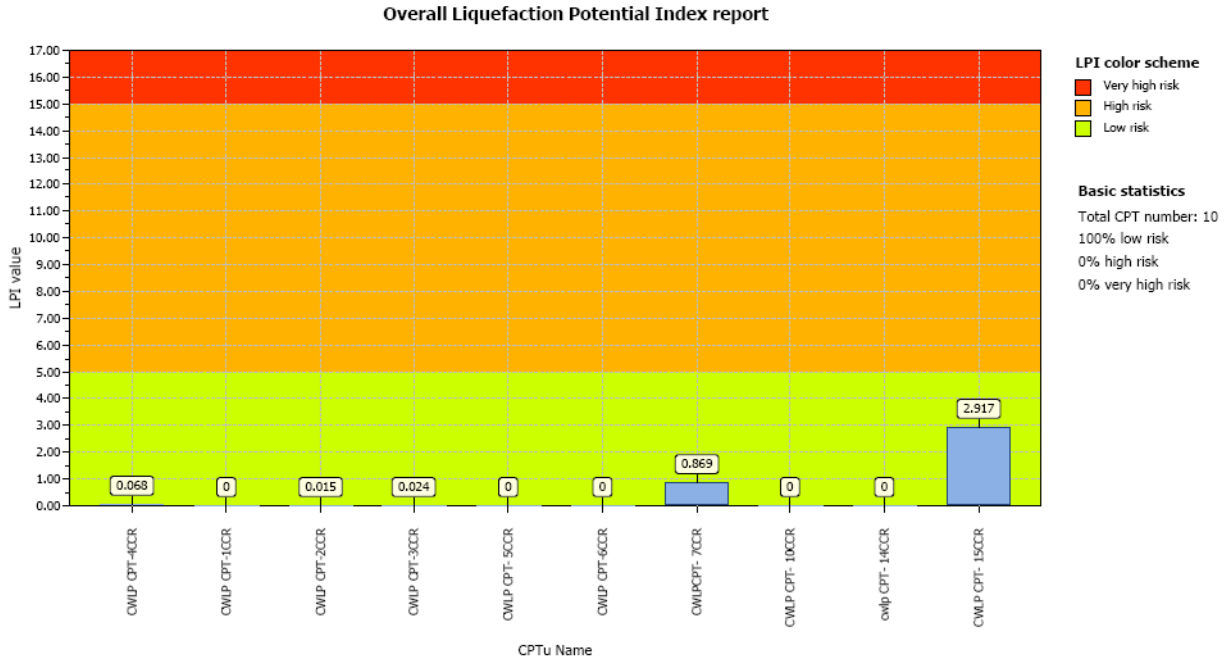
Sand

Poorly graded to well-graded sand typically has an effective friction angle of 37 degrees or greater. Using an effective friction angle of 34 degrees for sand is conservative.

CCR

Reviewing the "Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Techniques for Triaxial Samples" by Nicholas A. Lacour, 2012, on page 28 within Chapter 2 Engineering Characterization of CCRs, 2.4 Shear Strength, Table 6 provides a slurry impoundment within the United States, undisturbed sample at Site 5 with a range of friction angles from 23.4 to 35.4 degrees from direct shear analysis. Table 8 provides consolidated undrained triaxial testing with undisturbed samples from United States slurry impoundments with total friction angles of 11.1 to 45.5 with cohesions from 0 to 2,580 psf. This same table provides the effective friction angles ranging from 25.2 to 33.0 with cohesions ranging from 90 to 190 psf at Site 1; effective friction angles ranging from 31.8 to 32.1 with cohesions ranging from 0 to 140 psf at Site

2; effective friction angle of 39.6 with no cohesions at Site 3; and effective friction angles ranging from 29.5 to 38.6 with cohesions ranging from 0 to 740 psf at Site 4. The CCR Wet Ash was determined to have a conservative total shear strength of 15 degrees and an effective shear strength of 25 degrees with the CCR Moist Ash having a conservative total and effective shear strength of 30 degrees, all with no cohesion. The CCR Moist Ash has a higher shear strength due primarily to matric suction. The CPT analysis of the CCR resulted in a low liquefaction potential index (LPI) thus justifying the conservative shear strength values provided. Below is the LPI Chart for the CCR CPTs.



APPENDIX D:
Fly Ash Technical Papers

Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples

Nicholas A. Lacour

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Master of Science

In

Civil Engineering

Adrián Rodriguez-Marek, Chair

Joseph Dove

James Martin

19 June, 2012

Blacksburg, Virginia

Keywords: coal combustion residuals, fly ash, bottom ash, surface impoundments

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Engineering Characteristics of Coal Combustion Residuals and a Reconstitution Technique for Triaxial Samples

Nicholas Alexander Lacour

ABSTRACT

Traditionally, coal combustion residuals (CCRs) were disposed of with little engineering consideration. Initially, common practice was to use a wet-scrubbing system to cut down on emissions of fly ash from the combustion facilities, where the ash materials were sluiced to the disposal facility and allowed to sediment out, forming deep deposits of meta-stable ash. As the life of the disposal facility progressed, new phases of the impoundment were constructed, often using the upstream method. One such facility experienced a massive slope stability failure on December 22, 2008 in Kingston, Tennessee, releasing millions of cubic yards of impounded ash material into the Watts Bar reservoir and damaging surrounding property. This failure led to the call for new federal regulations on CCR disposal areas and led coal burning facilities to seek out geotechnical consultants to review and help in the future design of their disposal facilities. CCRs are not a natural soil, nor a material that many geotechnical engineers deal with on a regular basis, so this thesis focuses on compiling engineering characteristics of CCRs determined by different researchers, while also reviewing current engineering practice when dealing with CCR disposal facilities. Since the majority of coal-burning facilities used the sluicing method to dispose of CCRs at one point, many times it is desirable to construct new "dry-disposal" phases above the retired ash impoundments; since in-situ sampling of CCRs is difficult and likely produces highly disturbed samples, a sample reconstitution technique is also presented for use in triaxial testing of surface impounded CCRs.

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I would like to thank Dr. Adrián Rodriguez-Marek, my advisor, for his guidance throughout my thesis work and throughout my academic career at Virginia Tech. I would also like to thank my parents for their encouragement and support throughout my entire academic career. Lastly, I would like to thank my grandmother for passing on my great-grandparents' rock collection that first sparked my interest in geology and undoubtedly led to my interest in geotechnical engineering.

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Chapter 1

Introduction and Background

Ever since the promulgation of the Resource Conservation and Recovery Act in 1976, there has been debate on the proper waste classification of coal combustion by-products. They have traditionally been disposed of in a fashion similar to that of mine tailings wastes. However, the failure of the Kingston Fossil Plant's main disposal cell on December 22, 2008 has once again led to discussions on how to properly regulate the disposal of these materials. From an engineering standpoint, geotechnical engineers have very little experience with coal combustion wastes, which have some unique engineering properties that set them apart from naturally occurring soils. A comprehensive literature review and compilation of engineering properties of coal combustion residual materials is consolidated and compared between researchers from different nations. Additionally, a triaxial sample reconstitution technique is proposed for surface impounded coal combustion residuals (different types of coal combustion residuals are addressed in section 1.1) which minimizes particle segregation and ensures constant density across the height of the sample. This chapter presents an introduction to the thesis and presents a brief summary of the December 22, 2008 slope stability failure at the Tennessee Valley Authority's (TVA's) Kingston power plant, which served as an inspiration for this thesis.

1.1 Introduction

Coal is the most commonly used fuel in generating electrical energy in the United States. In 2009, coal-powered steam turbines produced 45% of the almost 4 trillion kilowatt-hours of

consumed energy in the US (Energy Information Administration 2010). With the burning of such large quantities of coal, there is naturally also a large amount of ash and other byproducts. The four main types of byproducts of burnt coal as described by the Environmental Protection Agency (EPA 2011) are:

Fly Ash: mostly spherical silt to clay-sized particles composed mostly of silica removed from plant exhaust gases through the use of electrostatic precipitators or bag-houses with secondary scrubber systems.

Bottom Ash: coarse, porous, angular fine sand to fine gravel-sized particles of agglomerated ash formed in pulverized ash furnaces.

Boiler Slag: molten bottom ash collected at the base of slag tap and cyclone type furnaces that is quenched with water, causing it to fracture, crystallize, and form pellets. It is composed of hard, black, angular particles that have a smooth, glassy appearance.

Flue Gas Desulfurization (FGD) Material: product of a process used for reducing SO_2 emissions from the gas system of a coal-fired boiler. Depending on the scrubbing process, the material is either predominantly calcium sulfite ($CaSO_3$), calcium sulfate ($CaSO_4$), or a mixture of the two. It consists of small, fine, particles. Calcium Sulfate FGD material can be used in place of gypsum ($CaSO_4 \cdot 2H_2O$) in wallboard manufacturing or in cement production, while calcium sulfite can be used as embankment and road base material.

There are beneficial reuses for each of these byproducts, though generation almost always outweighs demand. In order to avoid confusion, when referring to these byproducts, the definitions outlined by EPA (*Federal Register* 2010) will be used. When referring to burnt-coal byproducts being beneficially used, the term Coal Combustion Products (CCPs) will be used, while Coal Combustion Residuals (CCRs) will be used when referring to byproducts that are destined for disposal.

Use of CCPs are unique to the application in which they are being utilized. Therefore, the focus of this thesis is on the geotechnical engineering properties and design and monitoring considerations for CCR landfills and surface impoundments.

Depending on the type of system used to remove fly ash from and/or to desulfurize the exhaust gases of boilers used in electricity generation, CCRs have traditionally been disposed of using either a dry (or, more accurately, a moisture conditioned) placement method or a hydraulic sluicing method . Again referring to EPA definitions (*Federal Register* 2010), any disposal area where CCRs are disposed of using a dry method will be referred to as a CCR landfill, while any area that CCRs are disposed of hydraulically will be referred to as a CCR surface impoundment. A CCR surface impoundment is a disposal area much akin to a mine tailings dam disposal area, or to a dredge spoil area. While CCR landfill wastes are placed using backhoes or other heavy equipment and compacted in a moist condition, CCR surface impoundment wastes are simply the result of a wet-scrubbing removal system for fly ashes; the effluent from these wet-scrubbing processes is then often mixed with bottom ashes and hydraulically placed in a disposal area contained by some sort of dike system.

As a result of the Kingston Fossil Plant failure, EPA found it necessary to reexamine regulatory policies regarding the disposal of CCRs:

With the promulgation of 42 U.S.C. §6901 (1976), commonly known as the Resource Conservation and Recovery Act (RCRA), CCRs were not initially specified as hazardous (subtitle C) or solid wastes (subtitle D). In 1980, the Solid Waste Disposal Act amendments to RCRA were enacted, one of which was the “Bevill Amendment”, 42 U.S.C. §6921 (b)(3)(A)(i). This amendment temporarily exempted CCRs from subtitle C regulation, classifying them as subtitle D, which is subject to state regulation. In 1988, EPA released a report entitled *Wastes from the Combustion of Coal by Electric Utility Power Plants* in which they concluded that the four above-mentioned CCRs did not exhibit hazardous characteristics according to RCRA regulations and would therefore not be regulated under Subtitle C. However, it was not until August 9, 1993 that EPA issued the final regulatory determination applicable to these CCRs (*Federal Register* 1993), stating that regulation of them as hazardous wastes was unwarranted (Dockter and Jagiella 2005).

Most recently, on June 21, 2010, EPA announced their intent to regulate CCRs generated from the combustion of coal at electric utilities under the RCRA. The EPA announcement introduced two options:

- EPA would reverse the 1993 and 2000 exemptions of CCRs under the Bevill Amendment and list them as special wastes subject to regulation under subtitle C of RCRA when they are destined for disposal in landfills or surface impoundments.
- EPA would leave the Bevill determination in place while regulating the disposal of CCRs under subtitle D of RCRA by issuing national minimum criteria.

Regardless of the chosen alternative, EPA is also proposing to establish dam safety requirements in order to address the stability of CCR surface impoundments to prevent catastrophic releases like that at the TVA Kingston plant. EPA has suggested the adoption of the Hazard Potential Classification System for Dams, developed by the U.S. Army Corps of Engineers, since it would be relatively straightforward in its application to surface impoundments.

The main purpose of this thesis is to consolidate current published material on the properties of CCRs and to quantify the variability within the engineering properties of CCRs between countries, individual power plants, and CCR types. Furthermore, CCR impoundment areas are plentiful across the U.S. and power generating companies would prefer to begin dry disposal of CCRs directly over retired CCR surface impoundments. In order to do this, a geotechnical site investigation must be performed, in which the static and dynamic shear strengths of the surface impounded materials are analyzed. Since CCRs tend to be non-plastic in nature, undisturbed sampling is often difficult, time consuming, costly, and anything but "undisturbed." Therefore, a second objective of this thesis is to analyze a slurry deposition specimen reconstitution technique that is easier and less costly than undisturbed sampling, in order to determine if this specimen reconstitution technique forms samples of uniform relative density without particle segregation.

1.2 Kingston Fossil Plant Failure

The Kingston Fossil Plant is a coal-fired electrical power plant constructed and operated by the Tennessee Valley Authority (TVA). Construction on the facility began in 1951 and the first coal-fired electrical unit began in 1954. Ash slurries were initially released into a slack water area created by a two dikes with a gap in-between to allow water from the Watts Bar Reservoir to enter. The ash slurries and the waters of the reservoir were then allowed to commingle until the two dikes were connected in 1958, separating the reservoir and the ash disposal area. This slack water area collected silt and clay sediments from the period of 1942 to 1954; after 1954, disposed ash was added to the silts and clays being deposited and with the construction of the closure dike, additional clay runoff sediment was deposited along with the runoff silts, reservoir clays, and disposed ash. This formed a slick, weak layer found by AECOM to be a major contribution to the ash disposal area's failure in December of 2008 (Walter and Butler 2009).

The AECOM Root Cause Analysis report attributed the failure as most likely due to creep in the aforementioned weak layer due to active loading in a dredge cell contained within the disposal area. This creep caused an initial failure of various disposal phase dikes founded on older disposed ash deposits, which, in turn, caused progressive failure of upstream ashes, leading to undrained loading and subsequent failure of the downstream ash material and disposal area perimeter dike. The upstream progressive failure stopped upon reaching a former divider dike within the disposal area. The estimated ash released in the failure was 5.4 million cubic yards. Figure 1 provides an aerial photograph of the disposal area before and after the slope failure.



Figure 1: Aerial photographs comparing the Kingston Fossil Plant ash disposal area before and after the massive slope failure on December 22, 2008.

While this failure may have occurred because of a very unique site condition, AECOM did note in their Root Cause Analysis report that "extensive void ratio data in un-failed areas of the Dredge Cells showed a lack of significant consolidation of the wet ash with depth," which would indicate that strength would not increase significantly with depth in the disposed ash material. This property also raises the question of stability of these sort of disposal areas under dynamic loading. If surface-impounded coal ashes do not tend to increase in density with depth, this could leave a very deep, potentially liquefiable layer of CCRs at a given site, rather than just a single liquefaction-prone layer (which is usually the case in naturally-deposited soils).

The entire Root Cause Analysis report and other investigatory data for the Kingston Fossil Plant failure can be accessed on the TVA website at http://www.tva.gov/kingston/rca/.

1.3 Outline

This thesis is composed of eight chapters. The first chapter introduces the background as well as inspiration for the thesis topic. Chapters two and three provide consolidated research results on the static and dynamic engineering properties of CCRs, respectively. Chapter four discusses

similarities between mine tailings disposal areas and CCR disposal areas and provides some guidance on how monitoring techniques developed for mine tailings disposal areas can be directly applied or slightly modified so that they can be applied to CCR disposal areas. Chapters five and six address how slope stability and settlement analyses can differ for CCR materials as opposed to naturally occurring soils. Chapter seven provides a review of common triaxial reconstitution techniques used on granular materials, while also analyzing a reconstitution technique to determine if it produces homogenous samples in terms of grain size distribution and relative density with height. Finally, chapter eight provides some final observations for each chapter, as well as a summary of topics that require further research in the future.

Chapter 2

Engineering Characterization of CCRs

Index and mechanical properties of soils provide the basic information required to design earth retaining structures, foundations, and earthen embankments and to perform slope stability analyses; determining the index properties and running field and laboratory tests to determine these properties is the first step in any geotechnical engineering application. In any given region, there is a large body of literature from past projects describing the local soils that engineers can use as a resource to accelerate this initial process. CCRs, however, are not a natural soil and have characteristics that make their behavior in certain situations markedly different than natural soils of similar grain size; additionally, coal ashes can vary considerably from one site to another based on differences in the coal source, coal preparation methods, type of power plant unit, and combustion temperatures (Yudbhir and Honjo 1991). This chapter outlines some of the major differences in the properties of CCRs as compared to other soils and compiles some CCR characteristics obtained from published technical literature. Additionally, test data from engineering reports for five specific coal combustion plants in the U.S. are included; however, information identifying the specific plants has been omitted at the request of the plant operators. These five plants are referred to as Site 1 through Site 5 consistently throughout this thesis.

2.1 Specific Gravity

Perhaps one of the most unusual characteristics of CCRs is their wide range of specific gravities. While some CCRs may have specific gravities of around 2.7 or even 2.8, some have been reported to have specific gravities as low as 1.47. Table 1 provides some values of specific gravity (G_s) determined for CCRs by researchers in different countries.

Table 1: Reported specific gravities of CCRs from different countries

Reference	Type of CCR	Country	G_s
Martin et al. (1990)	Fly Ash	USA	2.03-2.49
Tu et al. (2007)		USA	2.10-2.40
Kim and Prezzi (2008)		USA	2.30-2.81
Site 3		USA	2.42-2.71
Site 4		USA	2.21-2.73
Sridharan et al. (1998)		India	1.95-2.31
Pandian and Balasubramonian (1999)		India	1.97-2.55
Prashanth et al. (1999)		India	2.03-2.67
Sridharan et al. (2001)		India	2.07-2.55
Trivedi and Sud (2004)		India	1.72-2.03
Pandian (2004)		India	1.95-2.55
Das and Yudhbir (2005)		India	2.14-2.62
Prakash and Sridharan (2006)		India	1.95-2.55
Prakash and Sridharan (2009)		India	1.66-2.55
Jakka et al. (2010)		India	2.18-2.27
Raymond (1961)		UK	2.05-2.26
Sherwood (1975)		UK	1.90-2.37
Indraratna and Nutalaya (1991)		Canada	1.90-2.90
		Thailand	2.27-2.45
Kolay and Kismoor (2009)		Malaysia	2.11-2.31
Muhardi et al. (2010)		Malaysia	2.50-2.70
Site 1	Surface Imp.	USA	2.13-2.30
Site 2		USA	2.16-2.26
Site 3		USA	2.55-2.62
Site 4		USA	2.20-2.47
Site 5		USA	2.29-2.61

Reference	Type of CCR	Country	G_s
Sridharan et al. (1998)		India	1.91-2.15
Sridharan et al. (2001)		India	1.96-2.66
Trivedi and Sud (2002)		India	1.60-2.10
Trivedi and Sud (2004)		India	1.98-2.00
Pandian (2004)		India	1.91-2.50
Prakash and Sridharan (2006)		India	1.91-2.50
Bera et al. (2007)		India	2.16-2.23
Prakash and Sridharan (2009)		India	1.64-2.66
Skarzynska et al. (1989)		UK	2.10-2.24
		Poland	1.90-2.31
Seals et al. (1972)	Bottom Ash	USA	2.28-2.78
Sridharan et al. (1998)		India	1.82-2.15
Sridharan et al. (2001)		India	1.98-2.19
Pandian (2004)		India	1.82-2.15
Prakash and Sridharan (2006)		India	1.66-2.17
Prakash and Sridharan (2009)		India	1.47-2.19
Jakka et al. (2010)		India	2.50-2.59
Kolay and Kismoor (2009)		Malaysia	2.09-2.32

Despite the wide range of specific gravities observed for CCRs, most researchers recognize that they usually have a specific gravity lower than that of natural soils (Prakash and Sridharan 2009, Trivedi and Singh 2004b, Tu et al. 2007). It logically follows that since the unit weight of CCRs is less than that of natural soils, horizontal earth pressures in CCRs will be less than that of natural soils as well. Prakash and Sridharan (2009) cite this as a property that makes them ideal for use as backfill material for retaining structures or as a lightweight fill in other construction applications.

Many factors contribute to variability in the specific gravity of coal ashes, such as the parent coal and the combustion and cooling processes. Figure 1 compares variability of the specific gravity of different coal ashes from different countries. Additionally, some of the research studies done on ash from several different plants have a much higher variability than studies done on specific sites, indicating that variability in the specific gravity of CCRs within a given plant is lower than the specific gravity of CCRs within the country where that plant is in. Examining Figure 2, it is interesting to note the clear difference in the mean values of specific gravity between US coal ashes and Indian coal ashes; this may be due to higher iron contents in

US coals. Table 2 provides percentages of major constituent oxides in CCRs from different countries by weight, which shows how much the mineralogy of CCRs can vary between countries, another factor that can account for high variability in the specific gravity of CCRs from different countries (Yudbhir and Honjo 1991). Loss on ignition (LOI) for the CCRs is also reported in Table 2, that is, the loss in mass of the samples upon strong heating.

Table 2: Percentages by weight of major oxide constituents of CCRs from different countries (after Yudbhir and Honjo 1991).

Constituents	USA	UK	Canada	India	Thailand	Japan	Hong Kong	China	Australia	S. Africa	Poland	Germany
SiO_2	28-59	37-54	37-59	13-64	27-34	50-62	38-77	44-55	44-73	40-53	43-52	48
Al_2O_3	7-38	17-33	12-24	14-31	19-28	22-30	14-46	20-32	16-33	24-35	19-34	25
Fe_2O_2	4-42	6-22	3-39	3-24	20-24	4-7	1-18	1-17	3-6	5-11	1-13	7
CaO	0-13	1-27	1-13	1-34	11-16	3-7	0-16	5-9	0-9	5-10	2-9	3
LOI	0-48	0-27	0-10	0-16	0-2	1-6	4-8	3-9	1-9	2-11	2-10	-
Glass Content	54-87	54-87	54-95	-	-	56-58	-	29-40	49-60	29-43	-	-

Note: LOI = loss on ignition

2.2 Consolidation Properties and Volume Stability

CCRs have historically been disposed of in two major ways: collected from boilers hydraulically and diverted to a surface impoundment or collected through electrostatic precipitators or flue gas desulfurization systems and dry-placed into CCR landfills. In either of these disposal alternatives, there is traditionally no defined level of compactive effort used and depending on future uses of the disposal sites, the consolidation characteristics of CCRs can be of interest to geotechnical engineers. Again, since CCRs are not naturally occurring soils, there has been little testing on their consolidation properties and volume stability. Table 3 provides compression and recompression indices and coefficients of consolidation determined by different researchers.

Few researchers report a value for the recompression index; in a disposal area, there would not necessarily be an unloading-reloading process during normal operations. Whenever recompression indices are reported, it is usually in reference to reuse of CCRs in construction applications. Furthermore, the recompression indices reported are extraordinarily low. The reported values of coefficient of consolidation, c_v, are highly variable, as might be expected for materials that have non-typical stress histories. Furthermore, it is important to note that values of

c_v cannot be determined using the traditional Taylor or Casagrande methods, since the majority of deformation for laboratory consolidation tests is complete within one minute; therefore, it is necessary to take deformation readings at very small time intervals (Yudbhir & Honjo 1991). It is also important to note that reported values of c_v mean little independent of the vertical effective stress at which that value was recorded, since the coefficient of consolidation is dependent on both the compressibility of the material and the permeability of the material, based on Terzaghi's original one-dimensional consolidation equation:

$$c_v = \frac{1}{\gamma_w}\frac{k_v}{m_v} \tag{1}$$

where c_v = coefficient of consolidation
γ_w = unit weight of water
k_v = vertical coefficient of permeability
m_v = coefficient of compressibility

Since both k_v and m_v generally decrease with increasing overburden stress, but not necessarily at the same rate, it is hard to relate the coefficient of consolidation to the compression and recompression indices in a general manner. Consequently, the values of c_v reported in Table 3 should not be taken as "typical" values, because of how c_v is mathematically defined.

Some of the variability of compression and recompression indices and coefficient of consolidation of CCRs can be attributed to the type of CCR. For example, it is logical to assume that bottom ash would have a higher coefficient of consolidation, since it has a higher hydraulic conductivity and a lower compressibility than fly ash. For this reason, variability plots for fly ash and surface impounded ash have been presented separately from those for bottom ash. Figures 3 through 5 present variability plots for the compression and recompression indices for different types of CCRs. Since the recompression index of bottom ash is rarely determined by researchers, the variability plot for recompression index includes fly ash, surface impounded ash, and bottom ash. Figure 6 presents a variability plot for the coefficient of consolidation for CCRs at different placement conditions.

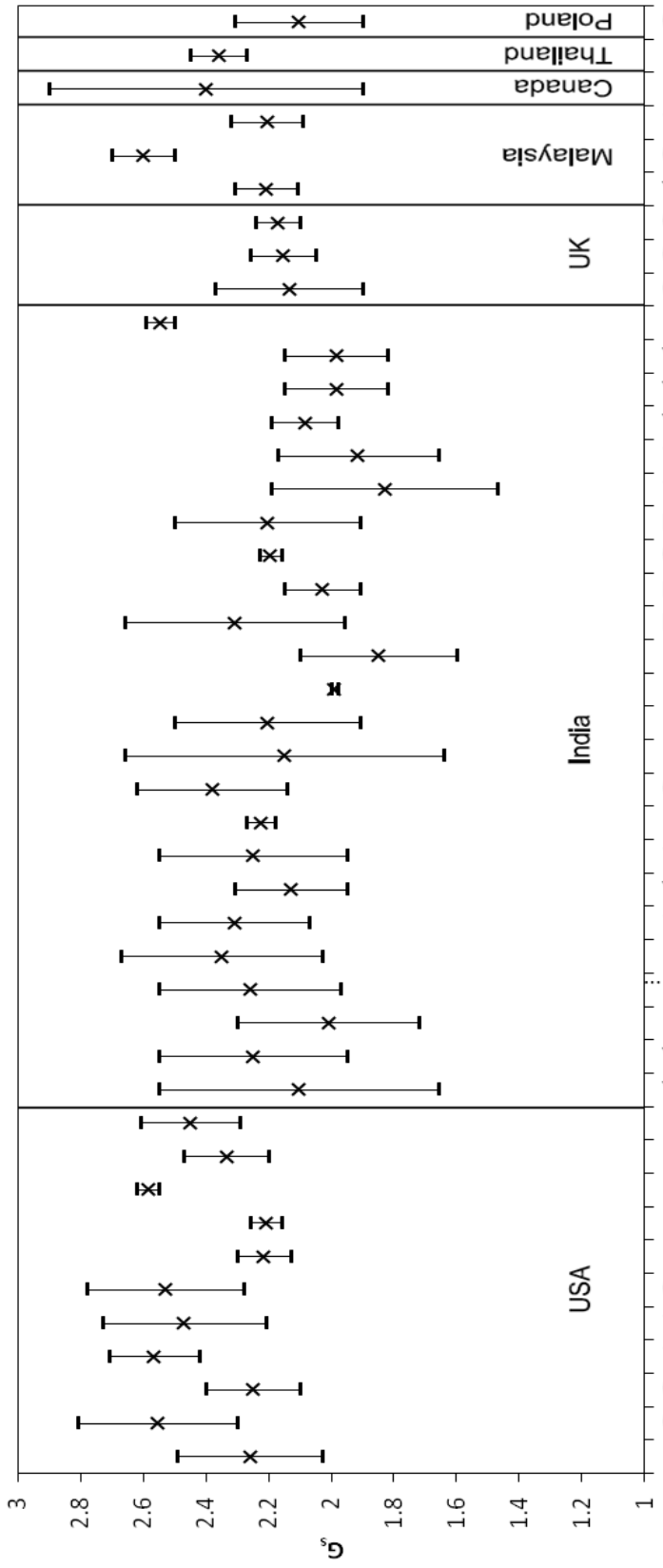


Figure 2: Variability plot for the specific gravities determined by studies performed in different countries.

Table 3: Compression and recompression indices and coefficients of consolidation for CCRs reported by different researchers.

Reference	Type of CCR	Country	C_c	C_r	C_v (cm^2/s)	Vertical Stress (psi)
Tu et al. (2007)	FA Resed.	USA	0.0390-0.0640	0.0035-0.0072	2.00-70.0	0.203-150
Site 1	SI	USA	0.080-0.710	0.0100-0.0300	-	0.694-111
Pandian and Balasubramonian (1999)	FA	India	-	-	0.00200-0.0802	0.73-116
Trivedi and Sud (2002)	SI/MH	India	0.00600-0.0100	0.000300-0.00300	-	3.34-116
Kaniraj and Gayathri (2004)	FA Comp.	India	0.0410-0.0840	0.00800	0.080-2.00	1.42-182
Pandian (2004)	FA	India	0.0490-0.284	-	1.16×10^{-5}-1.27×10^{-4}	7.12-113
	SI	India	0.0520-0.300	-	2.93×10^{-7}-8.17×10^{-4}	0.00-56.9
	BA	India	0.0570-0.484	-	7.57×10^{-7}-3.35×10^{-5}	0.00-56.9
Madhyannapu et al. (2008)	FA Resed.	India	0.100-0.167	0.00400-0.00800	-	
Prakash and Sridharan (2009)	FA Comp.	India	-	-	0.140-3.25	-
	SI Comp.	India	-	-	0.960-10.0	-
	BA Comp.	India	-	-	1.43-10.15	-
Jakka et al. (2010)	FA Comp.	India	0.079-0.246	0.018-0.023	-	7.26-29.0
	BA Comp.	India	0.051-0.059	0.013-0.024	-	7.26-29.0
Kolay and Kismoor (2009)	FA Comp.	Malaysia	0.0490-0.0510	-	-	319-2467
	SI Comp.	Malaysia	0.0780	-	-	319-2468
	BA Comp.	Malaysia	0.103-0.113	-	-	319-2469
Muhardi et al. (2010)	FA Comp.	Malaysia	0.150	-	3.00×10^{-5}-1.53×10^{-4}	-
	BA Comp.	Malaysia	1.54	-	-	-
Yudhbir and Honjo (1991)	FA Comp.	-	0.0300-0.375	-	-	-
	FA SI	-	0.0650-0.610	-	-	-
	FA SID	-	0.610-0.885	-	-	-
CAPCO (1990)	FA Comp.	Hong Kong	-	-	9.51×10^{-3}-1.90^{-2}	-
Haws et al. (1985)	FA Comp.	UK	-	-	9.51×10^{-4}-6.34×10^{-3}	-
Koo (1991)	FA Comp.	Thailand	-	-	3.17×10^{-4}-7.61×10^{-3}	-

FA = fly ash
BA = bottom ash
SI = surface impoundment ash
SID = surface impoundment/loose dry dump ash
MH = mixed hopper ash
Comp. = compacted
Resed. = resedimented

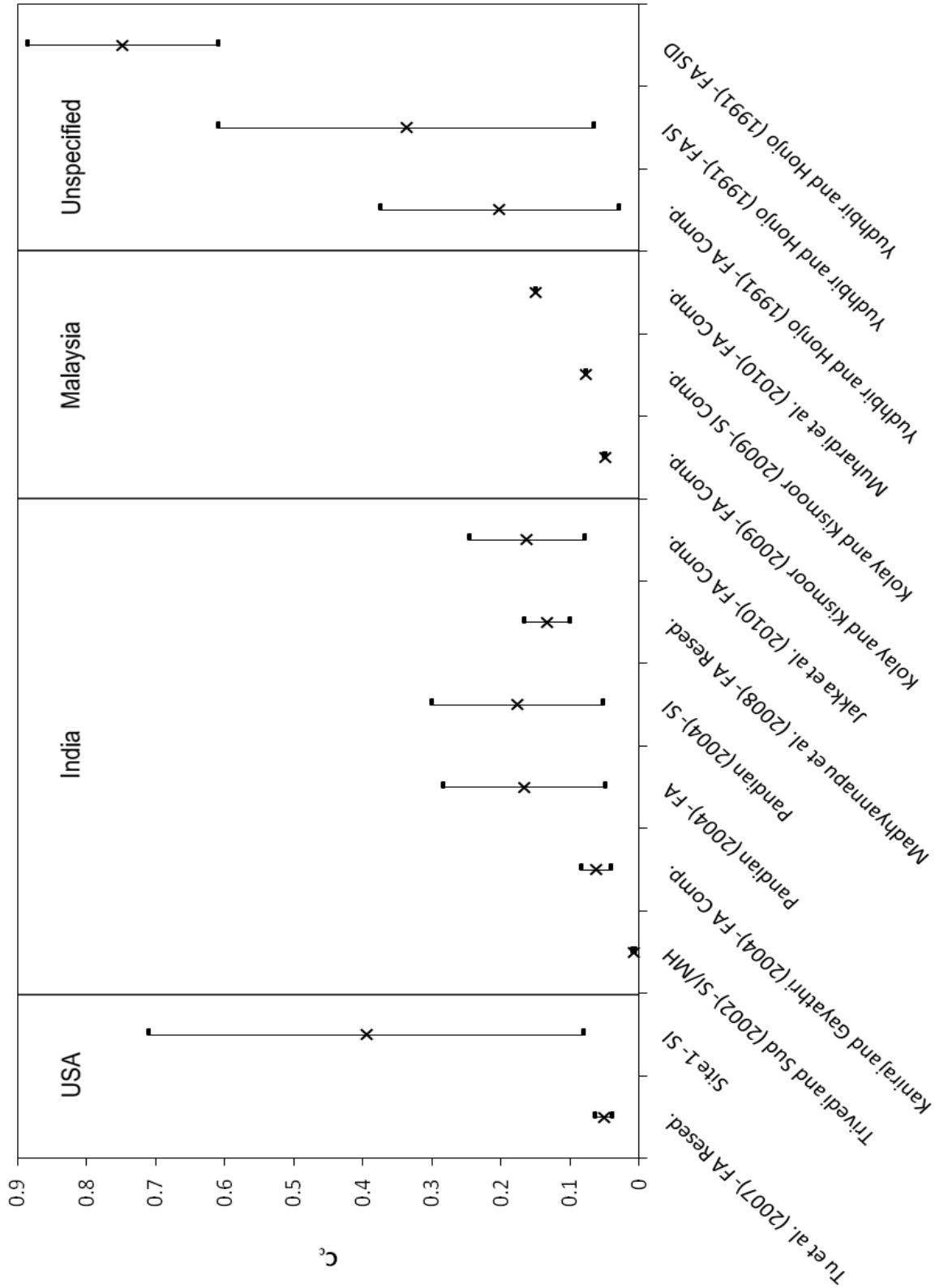


Figure 3: Variability plot for the compression indices of studies done on fly ashes and surface impounded ashes.

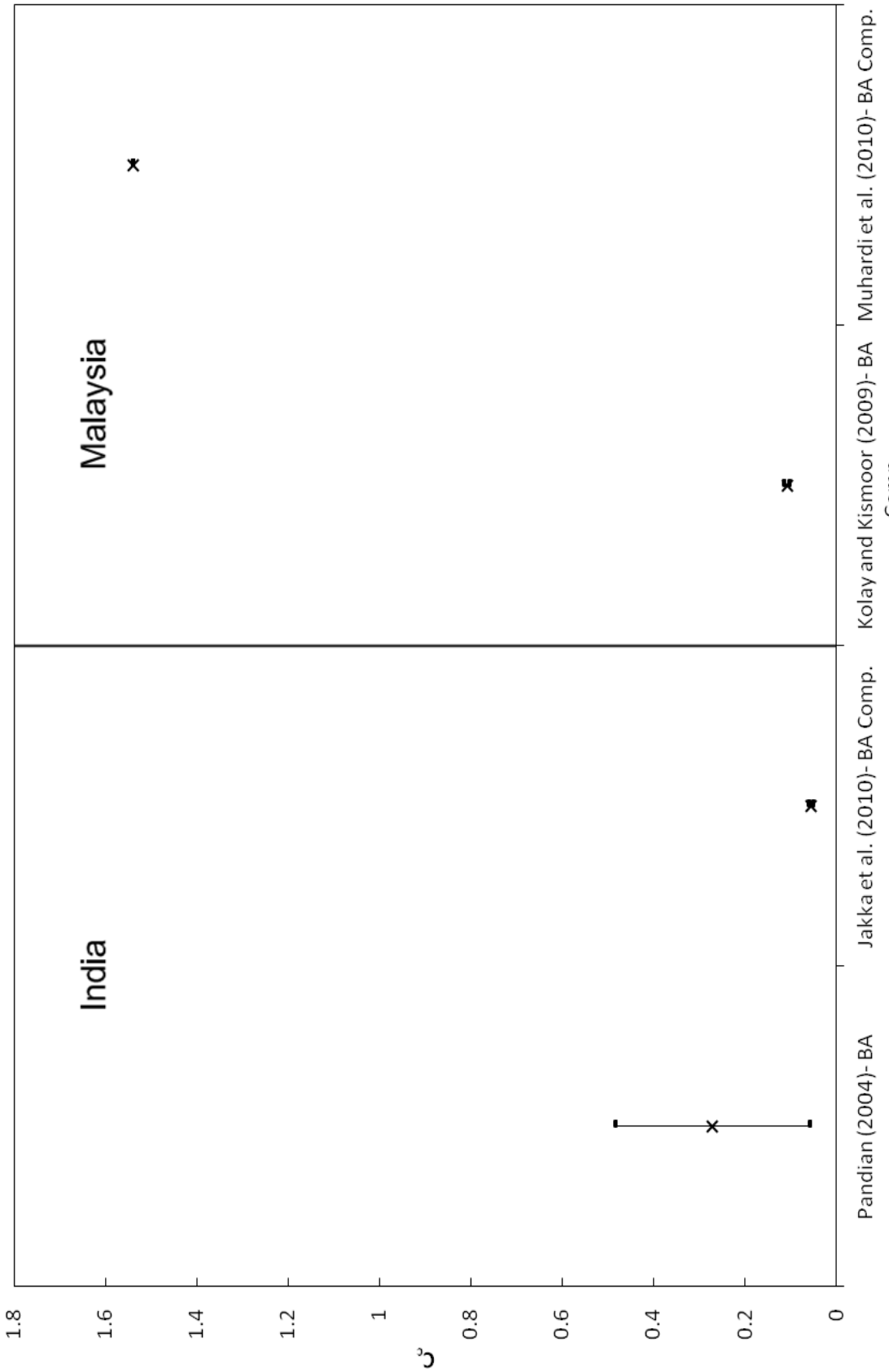


Figure 4: Variability plot of the compression indices for studies done on bottom ashes.

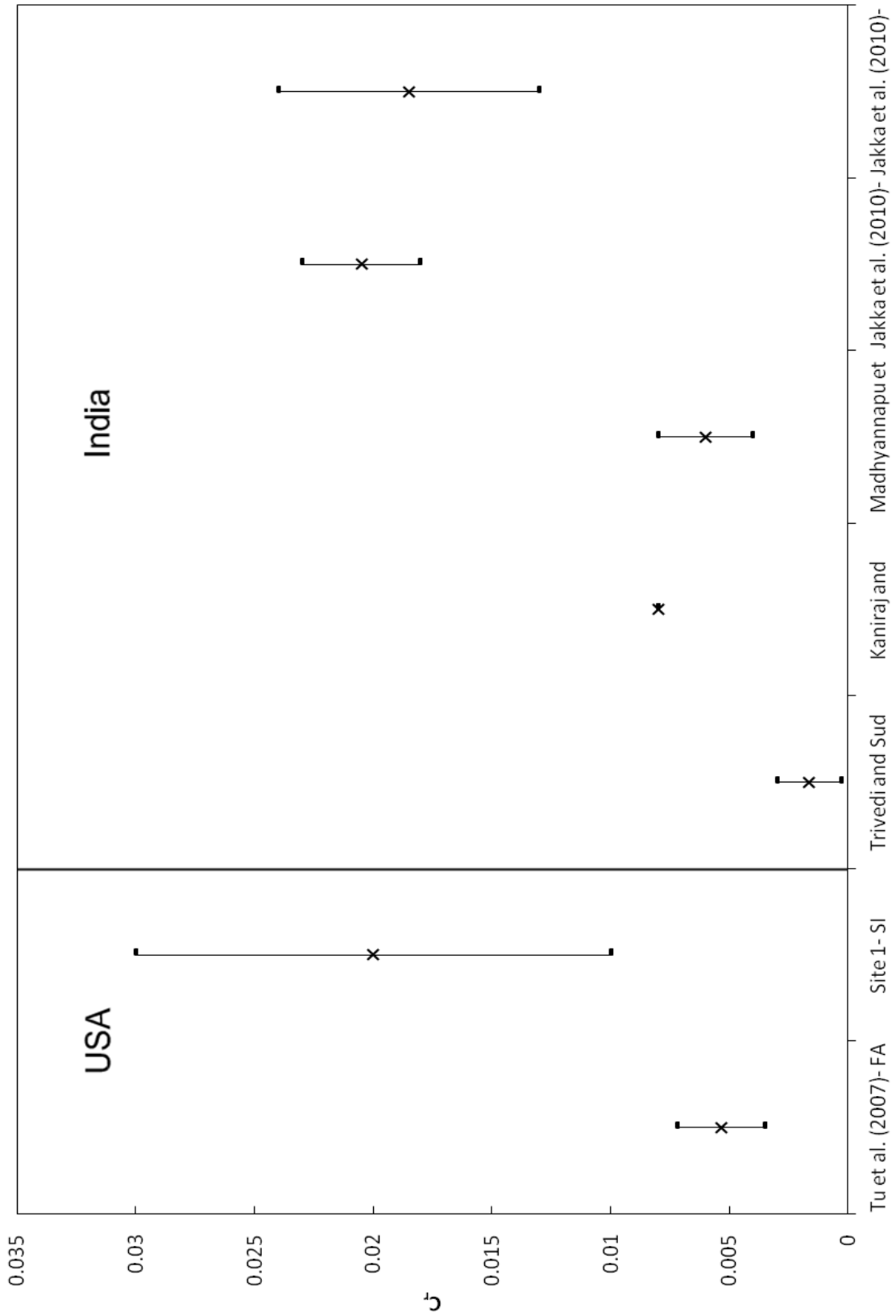


Figure 5: Variability plot of the recompression indices for studies done on fly ashes, bottom ashes, and surface impounded ashes

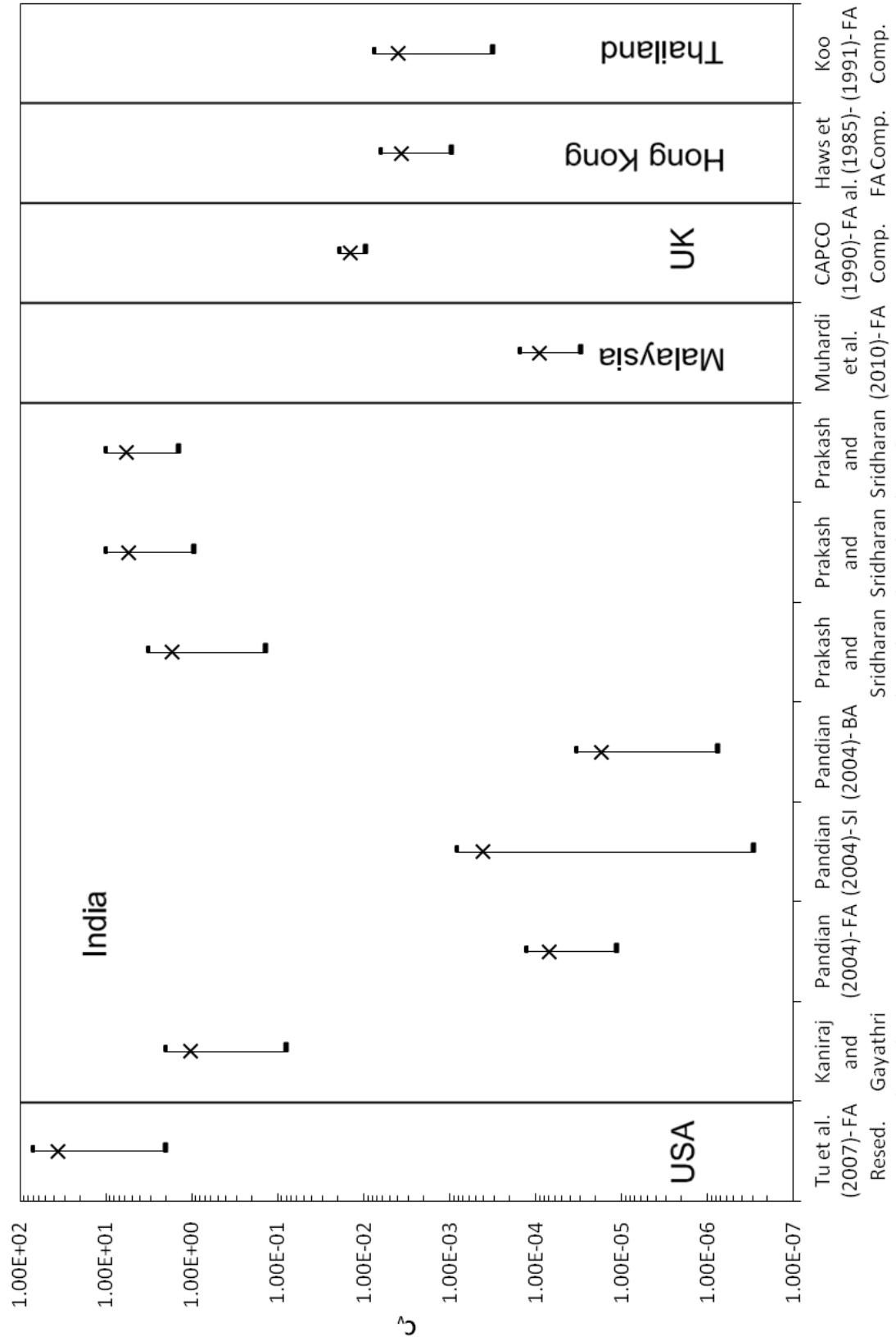


Figure 6: Variability plot for the coefficient of consolidation of studies done on fly ash, bottom ash, and surface impounded ash.

If structures are to be built on former CCR disposal areas or dry-disposed ashes are to be placed on hydraulically-placed deposits, volume stability of CCRs can also be of engineering concern. Swell, shrink, and collapse potentials are the three main types of volume instability examined for soils.

According to Sridharan and Prakash (2009), the swell potential of a soil can be examined through the use of the free swell ratio (FSR) which is defined as

$$FSR = \frac{V_d}{V_k} \tag{2}$$

where V_d = sediment volume of 10 g of oven-dried soil that passes a 425 μm sieve placed in a 100 ml jar which is then filled with de-aired water.

V_k = a sample identical to V_d except the solute is carbon tetrachloride or kerosene.

Note: a fume hood is required if there are any hazardous materials associated with the samples being tested

The swell potential can be determined based on the ranges of FSR as outlined in Table 4:

Table 4: Classification of Soils based on FSR (adapted from Sridharan and Prakash 2000)

FSR	Soil Type	Swell Potential
≤1.0	Nonswelling	Negligible
1.0-1.5	Mixture of swelling and nonswelling	Low
1.5-2.0	Swelling	Moderate
2.0-4.0	Swelling	High
>4.0	Swelling	Very High

Additionally, ASTM D4829 (2003), "Standard Test Method for Expansion Index of Soils," provides a standardized method of determining the swell potential of soils based on the expansion index (EI_{50}). In order to determine the EI_{50} of a soil, a dried soil sample must first be mixed with distilled water to the approximate optimum moisture content and allowed to sit in an air-tight container for at least 16 hours. Then, the conditioned soil is compacted in a 4.01 inch diameter mold in two two-inch lifts using 15 well-distributed blows of a 5.5 lb, 2.00 inch diameter rammer dropped from a height of 12 inches. Once the sample degree of saturation (S) is measured to be within 40% to 60%, the sample is loaded into a consolidometer and consolidated

for 10 minutes under a load of 1.0 psi before the initial reading on the dial indicator is taken. The specimen is then inundated with distilled water while periodic readings of the dial indicator are made in accordance with test D2435 (2003) for 24 hours or until the rate of expansion becomes less than 0.0002 inches per hour. The EI of a soil is then defined as

$$EI_{50} = EI_{meas} - (50 - S_{meas}) \cdot \frac{65 + EI_{meas}}{220 - S_{meas}} \tag{3}$$

where S_{meas} = the degree of saturation measured in the test

and

$$EI_{meas} = \frac{\Delta H}{H_1} \cdot 1000 \tag{4}$$

where ΔH = the change in height ($D_2 - D_1$) of the sample, mm
H_1 = initial height, mm
D_1 = initial dial reading, mm
D_2 = final dial reading, mm

The shrink potential of soils is usually assessed based on that soil's shrinkage limit, which is outlined in ASTM D4943 (2002) and calculated according to equation 5:

$$SL = w - \left[\frac{(V - V_d) \cdot \rho_w}{m_s}\right] \cdot 100 \tag{5}$$

where w = moisture content of the soil at the time it was placed in the dish (%)
V = the volume of the wet soil pat = volume of the dish
V_d = volume of the dry soil pat
ρ_w = density of water
m_s = mass of the dry soil pat

However, CCRs are generally non-plastic and ASTM D4943 is only applicable when the soil is cohesive in nature. Based on the fact that CCRs generally have a uniform gradation it can be assumed that they would have a high shrinkage limit (Prakash and Sridharan, 2009).

The collapse potential of a soil is the percent change in volume of a specimen after inundation. It is usually determined using oedometer tests and, as a result, can either be expressed mathematically in terms of height or void ratio, according to equation 6.

$$C_p = \frac{\Delta h}{h_0} = \frac{\Delta e}{(1 + e_0)} \tag{6}$$

where Δh = change in height of the specimen upon inundation
h_0 = the height of the specimen prior to inundation
Δe = change in void ratio of the specimen upon inundation
e_0 = void ratio of the specimen prior to inundation

Since collapse potential can change given different applied stress levels and overconsolidation states, there are any number of typical collapse potential values for a given soil, depending on the in-situ stress and the preconsolidation pressure of the soil. Generally, if the collapse potential is below 1%, there is no danger of collapse of soil structure (Mudhyannapu et al. 2008, Trivedi and Sud 2004).

It is important to note that collapse potential increases dramatically for some dry-disposed coal ashes when tested in a moist condition as opposed to a dry condition; even soils that classify as non-collapsible in a dry condition can become collapsible in a moist condition. This is due to the presence of soluble substances not present in the coal ashes disposed of using wet disposal methods (Trivedi and Sud 2004).

2.3 Hydraulic Conductivity

An important soil property for seepage calculations for earthen embankments is hydraulic conductivity. This is an especially important property for CCR surface impoundments, since they tend to be deposited in a meta-stable structure. In addition, the CCRs are often used to construct embankments as the surface impoundments are raised. Hydraulic conductivity of CCRs deposited in surface impoundments can display anisotropy as a result of its cyclic, lacustrine-style deposition. For engineering purposes, the hydraulic conductivity of both the compacted embankment material and the disposed CCR material will be of interest, as these values are used in erosion analyses. Table 5

presents hydraulic conductivities of different types of CCRs from different countries as determined by various researchers. Due to the fact that there are different disposal methods for CCRs and different types of CCRs that are often co-disposed of, there is a wide variety of placement conditions, each of which can potentially create a different soil fabric and therefore a different range of hydraulic conductivities.

The CCRs were divided into two groups in order to assess variability in hydraulic conductivity: fly ash and surface impounded ash/bottom ash. This was done because oftentimes surface impounded ash is made up of both fly ash and bottom ash; this fact, coupled with its loose placement condition ensures hydraulic conductivity will be at the material's naturally highest value. Figures 7 and 8 are variability plots hydraulic conductivity of fly ashes and surface impounded ash/bottom ash from different countries, as determined by different researchers. It is important to note that not all researchers specified whether it fly ash tested was class c or class f (class c exhibits self-cementing properties); this fact could be a further contributor to the variability in values of hydraulic conductivity of fly ashes.

Table 5: Values of hydraulic conductivity for different CCRs for different countries as determined by different researchers (adapted from Prakash Sridharan 2009)

Reference	Country	CCR Type	Testing Condition	k (cm/s)
Seals et al. (1972)	USA	BA	Relative density = 50%	5.0×10^{-3} to 0.094
McLaren and DiGioia (1987)		Class F FA	$\gamma_{d\,max_SP}$, $\gamma_{d\,max_MP}$	1.3×10^{-5}
		Class F FA	SI or poorly compacted	1.8×10^{-5}
		Class C FA	$\gamma_{d\,max_SP}$, $\gamma_{d\,max_MP}$	1.1×10^{-5}
Martin et al. (1990)		FA	$\gamma_{d\,max_SP}$	1.8×10^{-5} to 1.2×10^{-4}
		BA	$\gamma_{d\,max_SP}$	1.2×10^{-3}
Yudbhir and Honjo (1991)		Class C FA	$\gamma_{d\,max}$	1.0×10^{-7} to 2.0×10^{-7}
		Class F FA	$\gamma_{d\,max}$	2.0×10^{-6} to 6.0×10^{-5}
Glogowski et al. (1992)		Eastern US FA	-	1.9×10^{-5}
		Western US FA	-	3.1×10^{-5}
Site 1		SI	Undisturbed	1.1×10^{-3} to 1.7×10^{-2}
Site 3		FA-SI	Undisturbed	7.0×10^{-7} to 6.5×10^{-7}
		BA	Bulk Recompacted	2.3×10^{-6}
Site 4		FA-Comp.	Undisturbed	1.3×10^{-7} to 8.2×10^{-5}
		SI	Undisturbed	1.6×10^{-5} to 6.3×10^{-5}
Site 5		FA-Comp.	Undisturbed	1.5×10^{-5} to 8.0×10^{-4}
		SI	Undisturbed	4.8×10^{-6} to 4.0×10^{-4}
Pandian and Balasubramonian (1999)	India	FA	Compacted to 0.95 $\gamma_{d\,max}$ and saturated	1.4×10^{-5} to 4.2×10^{-4}
Kaniraj and Gayathri (2004)		FA	$\gamma_{d\,max}$	4.7×10^{-6} to 6.0×10^{-6}
Prakash and Sridharan (2009)		FA	Compacted at $\gamma_{d\,max}$ and saturated	8.0×10^{-6} to 1.9×10^{-4}
		SI	-	5.0×10^{-5} to 9.6×10^{-4}
		BA	-	9.9×10^{-5} to 7.1×10^{-4}
Jakka et al. (2010)		FA	loose	7.0×10^{-7} to 2.1×10^{-6}
		FA	dense	3.5×10^{-7} to 9.4×10^{-7}
		BA	loose	6.0×10^{-6} to 1.3×10^{-5}
		BA	dense	1.4×10^{-6} to 3.7×10^{-6}
Indraratna et al. (1991)	Thailand	Class C FA	$\gamma_{d\,max_SP}$	4.0×10^{-7} to 7.0×10^{-7}
		Class C FA	$\gamma_{d\,max_SP}$, 2 weeks curing	$<10^{-7}$
Gray and Lin (1972)	UK	FA	$\gamma_{d\,max}$	5.0×10^{-7} to 8.0×10^{-5}
Porbaha et al. (2000)	Japan	FA	Slurry (e_i = 0.85 to 1.02)	10^{-5} to 10^{-4}
Skarzynska et al. (1989)	Poland	SI	-	1.5×10^{-5} to 5×10^{-5}
Chan et al. (1986)	Canada	FA	in situ	10^{-7} to 10^{-4}
		BA	-	4.8×10^{-4} to 3.4×10^{-3}
Gitari et al. (2009)	South Africa	FA	Air flush core samples, constant head	4.6×10^{-5} to 6.9×10^{-5}
		BA	Air flush core samples, constant head	8.1×10^{-5} to 4.9×10^{-4}
		FA/BA Dry Dump	Field Slug Tests	2.3×10^{-5} to 9.6×10^{-3}

Note: FA = fly ash; SI = surface impoundment ash; BA = bottom ash; OMC = optimum moisture content; e_i = initial void ratio; FA-SI = surface impounded fly ash; FA-DS = dry-stacked fly ash; FA Comp. = field-compacted fly ash

Figure 7: Variability plot of the hydraulic conductivity of fly ashes from different countries, as determined by different researchers.

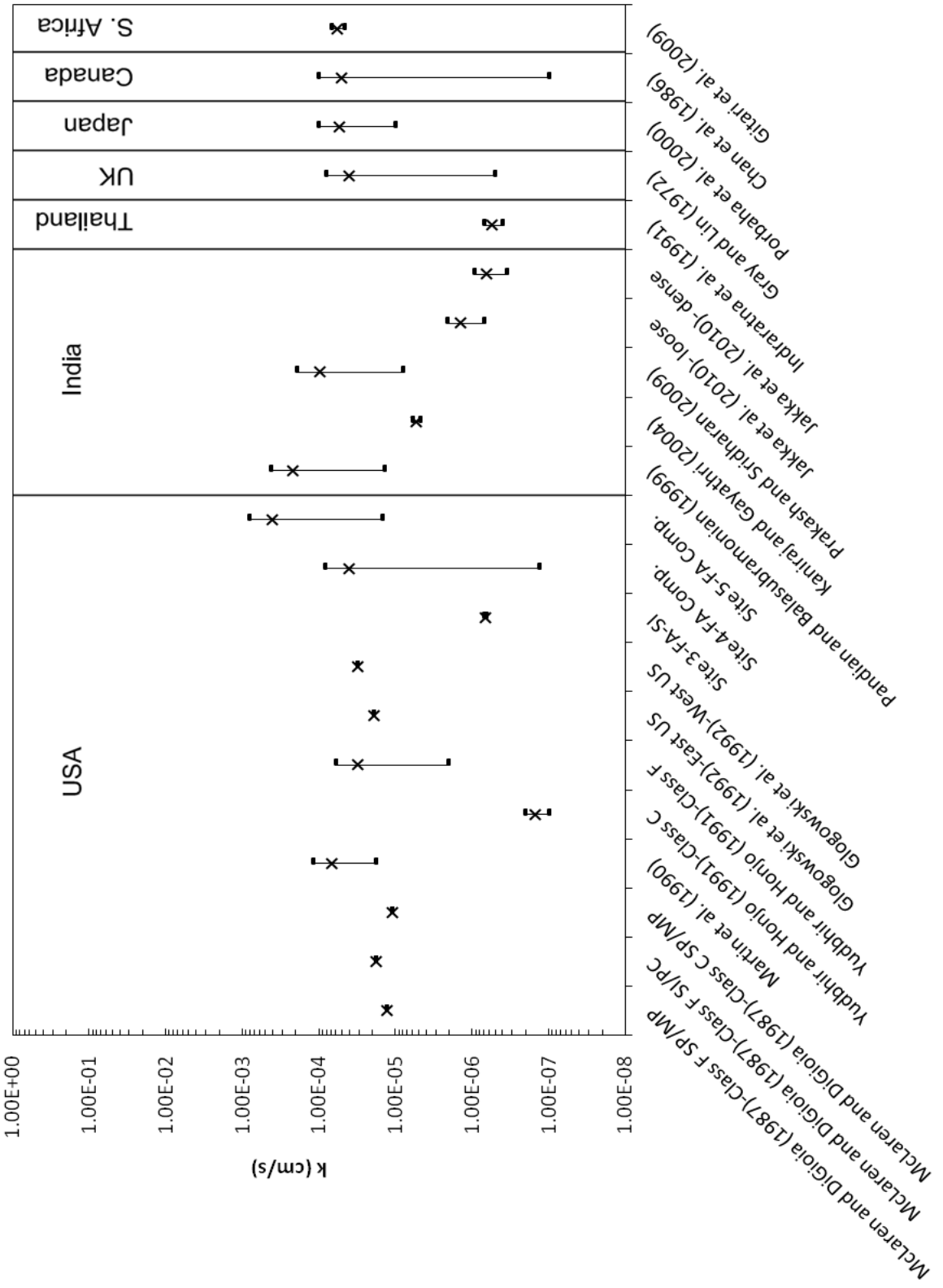


Figure 7: Variability plot of the hydraulic conductivity of fly ashes from different countries, as determined by different researchers.

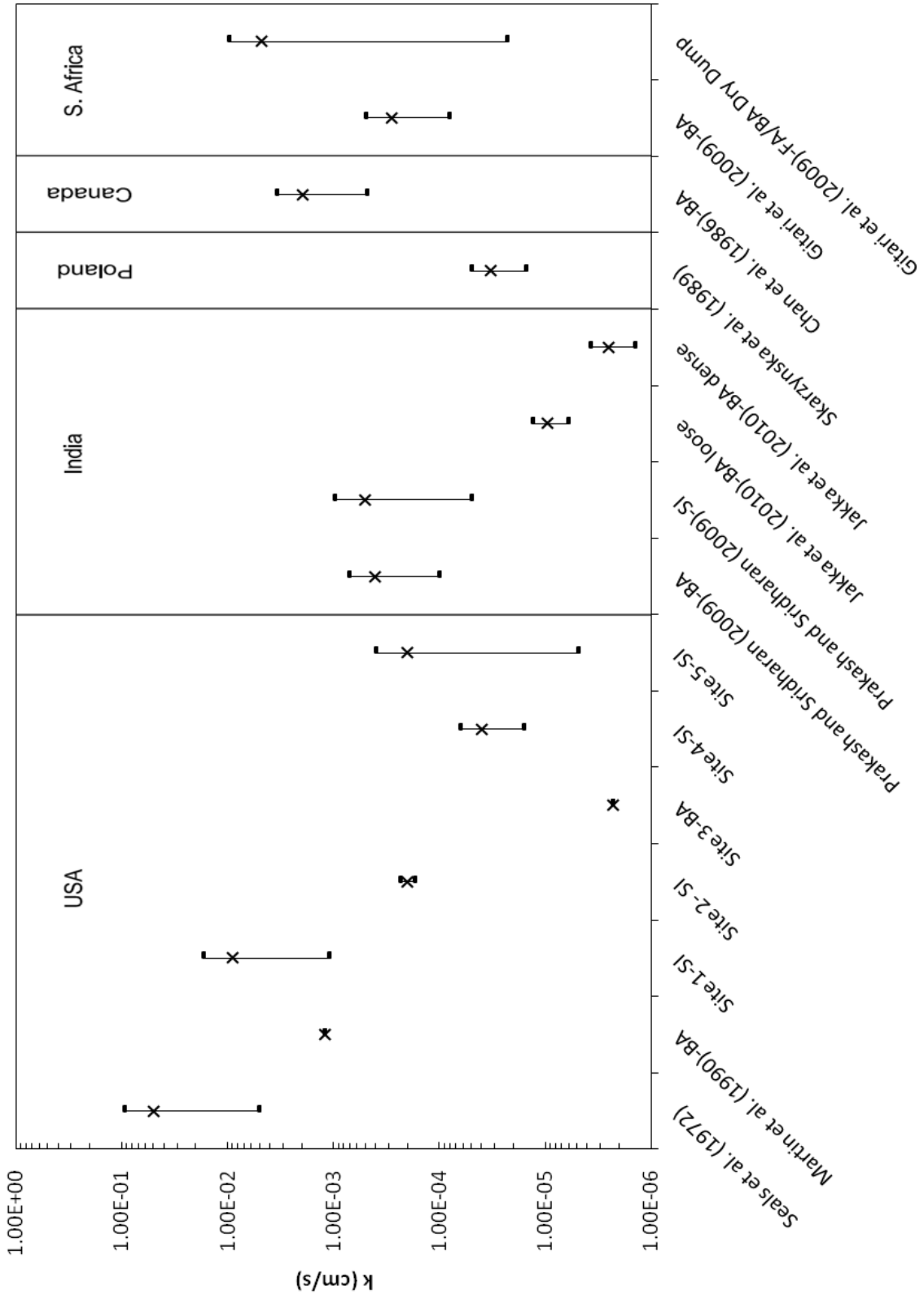


Figure 8: Variability plot of the hydraulic conductivity of surface impounded ashes and bottom ashes from different countries, as determined by different researchers.

2.4 Shear Strength

X-ray diffraction studies indicate that CCRs do not contain any of the clay minerals responsible for the cohesive portion of shear strength in soils (Trivedi and Singh 2004a, Trivedi and Singh 2004b, Ward and French 2005), which means that CCRs must derive their strength entirely from the frictional interaction between ash particles. Through the use of a scanning electron microscope (SEM), it is possible to study the morphological characteristics of coal ash particles and get an idea of their angularity, which would in turn offer clues as to the source of their frictional strength. As shown in Figures 9 and 10, bottom ash is much more angular than fly ash. In general, this can be associated with higher friction angles than fly ash at low confining stresses, which is usually the case. At high confining stresses, the higher angularity could lead to more particle breakage for bottom ash, and consequently to a larger degradation of their frictional resistance.

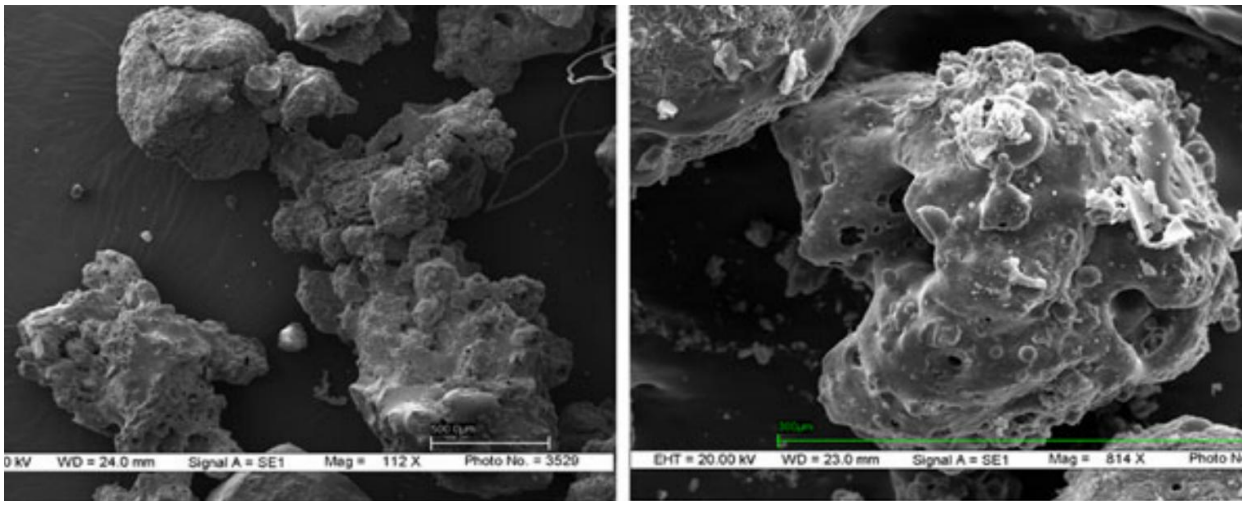


Figure 9: Micrographs of bottom ash particles magnified 112 and 373 times (Jakka et al. 2010)

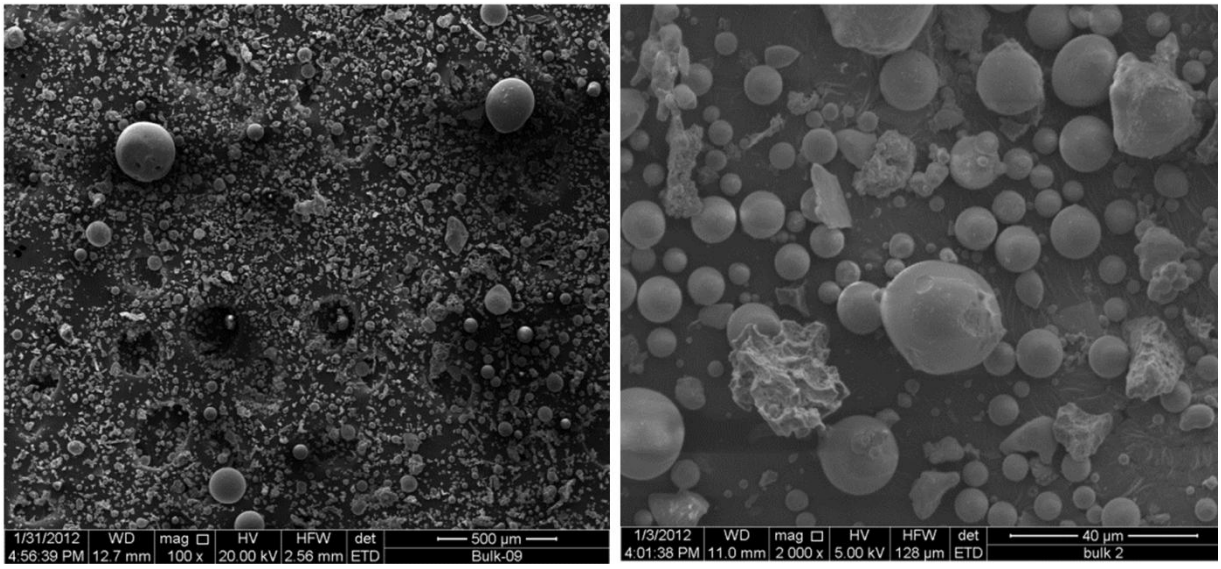


Figure 10: Micrographs of fly ash magnified 100 and 2,000 times (courtesy of Kevin Foster).

Shear strength parameters can be determined using several different laboratory test procedures. For CCRs, the most commonly performed tests are the direct shear test, consolidated drained triaxial test, and the consolidated undrained triaxial test. While the consolidated undrained triaxial test provides both effective and total stess strength parameters, most researchers only report effective strength parameters. This is undoubtedly because the rate of loading because of disposal is usually small enough that pore pressure dissipations are able to complete prior to the next disposal cycle; additionally, total strength parameters from CU tests can be misleading because of their dependence on the value of backpressure at which the specimen is sheared. Tables 6 through 8 report shear strength parameters of different CCRs from direct shear, consolidated drained, and consolidated undrained tests, respectively, reported in different studies. Figures 11 through 13 provide variability plots for the effective stress friction angles determined by various studies, compared on the basis of test type. Figures 14 through 16 provide variability plots on the basis of CCR type, while Figure 17 is a variability plot for the total stress parameters for all types of CCRs, since these parameters are not always reported. Variability plots were not made for values of cohesion since CCRs are usually reported to be non-plastic and the cohesions reported were either apparent cohesions of compacted, unsaturated samples or of samples that may have had self-cementing properties that would not be common to

all disposed CCR materials. All acronymns used with the variability plots are consistent with those used in the Tables; for the Figures 14 through 16, DS, CD, and CU designate "direct shear test," "consolidated drained triaxial test," and "consolidated undrained triaxial test," respectively.

Table 6: Shear strength parameters determined by different researchers using the direct shear test.

Reference	Country	CCR Type	Condition	ϕ'_p (°)	c'_p (psf)
Kim & Prezzi (2008)	USA	FA	Comp. DoO	32.9-35.8	100-403
		FA	Comp. WoO	31.7-34.4	104-380
		FA	Comp. Sat.	30.2-34.5	58-276
Site 5		SI	Comp. Sat.	26.8-42.2	0
		SI	Undisturbed	23.4-35.4	0
Pandian (2004)	India	FA	Loose Dry	29.0-36.0	-
		SI	Loose Dry	29.0-34.0	-
		BA	Loose Dry	32.0-34.0	-
		FA	Loose Sat.	27.0-37.0	-
		SI	Loose Sat.	25.0-40.0	-
		BA	Loose Sat.	30.0-37.0	-
		FA	Comp.	28.0-42.0	205-819
		SI	Comp.	29.0-38.0	328-1024
		BA	Comp.	30.0-37.0	205-410
		FA	Comp. Sat.	28.0-41.0	-
		SI	Comp. Sat.	29.0-36.0	-
		BA	Comp. Sat.	30.0-37.0	-
Prakash &Sridharan (2009)		FA	Loose	29.0-33.0	-
		SI	Loose	30.0-33.0	-
		BA	Loose	31.0-34.0	-
		FA	Comp.	32.0-37.0	334-543
		SI	Comp.	30.0-33.0	272-334
		BA	Comp.	31.0-34.0	209-397
		FA	Comp. Sat.	32.0-35.0	0
		SI	Comp. Sat.	29.0-32.0	0
		BA	Comp. Sat.	30.0-33.0	0
Kolay & Kismoor (2009)	Malaysia	FA	Comp. Sat.	30.6-34.9	162-168
		SI	Comp. Sat.	26.2	70
		BA	Comp. Sat.	26.6	3.0-14
Muhardi et al. (2010)		FA	Comp.	23.0	251
		FA	Comp. Sat.	26.0	63
		BA	Comp.	32.0	79
		BA	Comp. Sat.	31.0	0

Note: ϕ'_p = peak effective friction angle; c'_p = peak effective cohesion; Comp. = compacted; Sat. = saturated; DoO = Dry of Optimum; WoO = Wet of Optimum

Table 7: Shear strength parameters determined by different researchers using the consolidated drained triaxial test.

Reference	Country	CCR Type	Condition	RC (%)	ϕ' (°)	c' (psf)
Kim & Prezzi (2008)	USA	FA	Reconst.	95	33.5-47.1	0
		FA	Reconst.	90	27.9-37.9	0
Site 5		SI	Reconst.	-	27.1-31.0	0
Pandian (2004)	India	FA	Reconst.	100	33.0-37.0	418-1942
		FA	Reconst.	100	33.0-43.0	0
Prakash &Sridharan (2009)		FA	Reconst.	95	33.0-43.0	0
Jakka et al. (2010)		FA	Reconst.	-	32.9-37.0	0
		BA	Reconst.	-	33.7-41.7	0
Muhardi et al. (2010)	Malaysia	FA	Reconst.	-	41.0	522
		BA	Reconst.	-	46.0	0
Indraratna et al. (1991)	Thailand	FA	Reconst.	-	26.0	731
		FA	Reconst. Pozz.	-	36.0	37594

Note: Reconst. = reconstituted; Pozz. = pozzolanic curing allowed to occur

Table 8: Shear strength parameters determined by different researchers using the consolidated undrained triaxial test.

Reference	Country	CCR Type	Condition	RC (%)	ϕ (°)	c (psf)	ϕ' (°)	c' (psf)
Site 1	USA	SI	Undist.	-	11.1-19.5	0-950	25.2-33.0	90-190
Site 2		SI	Undist.	-	12.0-45.5	640-2580	31.8-32.1	0-140
Site 3		FA	Reconst.		-	-	36.0	14.3
		SI	Undist.	-	-	-	39.6	0
		BA	Reconst.		-	-	41.0-44.0	0-261
Site 4		FA	DS, Undist.	-	3.4-37.7	200-1900	28.7-36.7	0-400
		SI	Undist.	-	18.3-27.4	400-1600	29.5-38.6	0-740
Prakash &Sridharan (2009)	India	FA	Reconst.	95	20.0-41.0	0	26.0-39.0	334-2005
		SI	Reconst.	95	25.0-34.0	0-1170	28.0-36.0	585-2109
		BA	Reconst.	95	24.0-35.0	0-564	24.0-35.0	585-1149
Jakka et al. (2010)		FA	Reconst.	-	-	-	22.3-38.5	0
		BA	Reconst.	-	-	-	32.2-42.6	0
Muhardi et al. (2010)	Malaysia	FA	Reconst.	-	41.0	710	-	-
		BA	Reconst.	-	44.0	0	-	-
Indraratna et al. (1991)	Thailand	FA	Reconst.	-	20.0	0	26.0	0

Note: Undist. = undisturbed; Reconst. = reconstituted; DS = dry-stacked in field

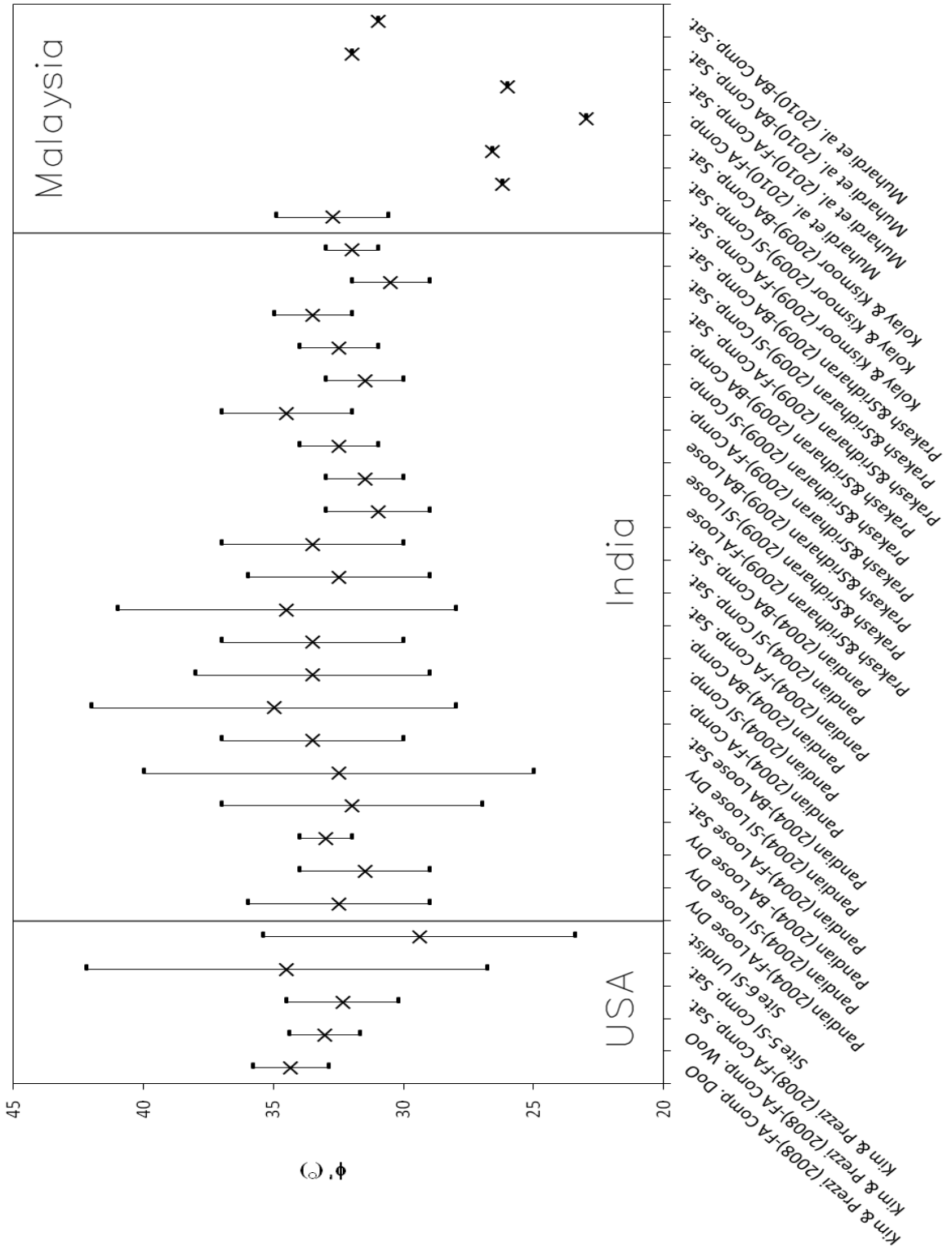


Figure 11: Variability plot of effective stress friction angle of various CCRs as determined by different researchers using the direct shear test.

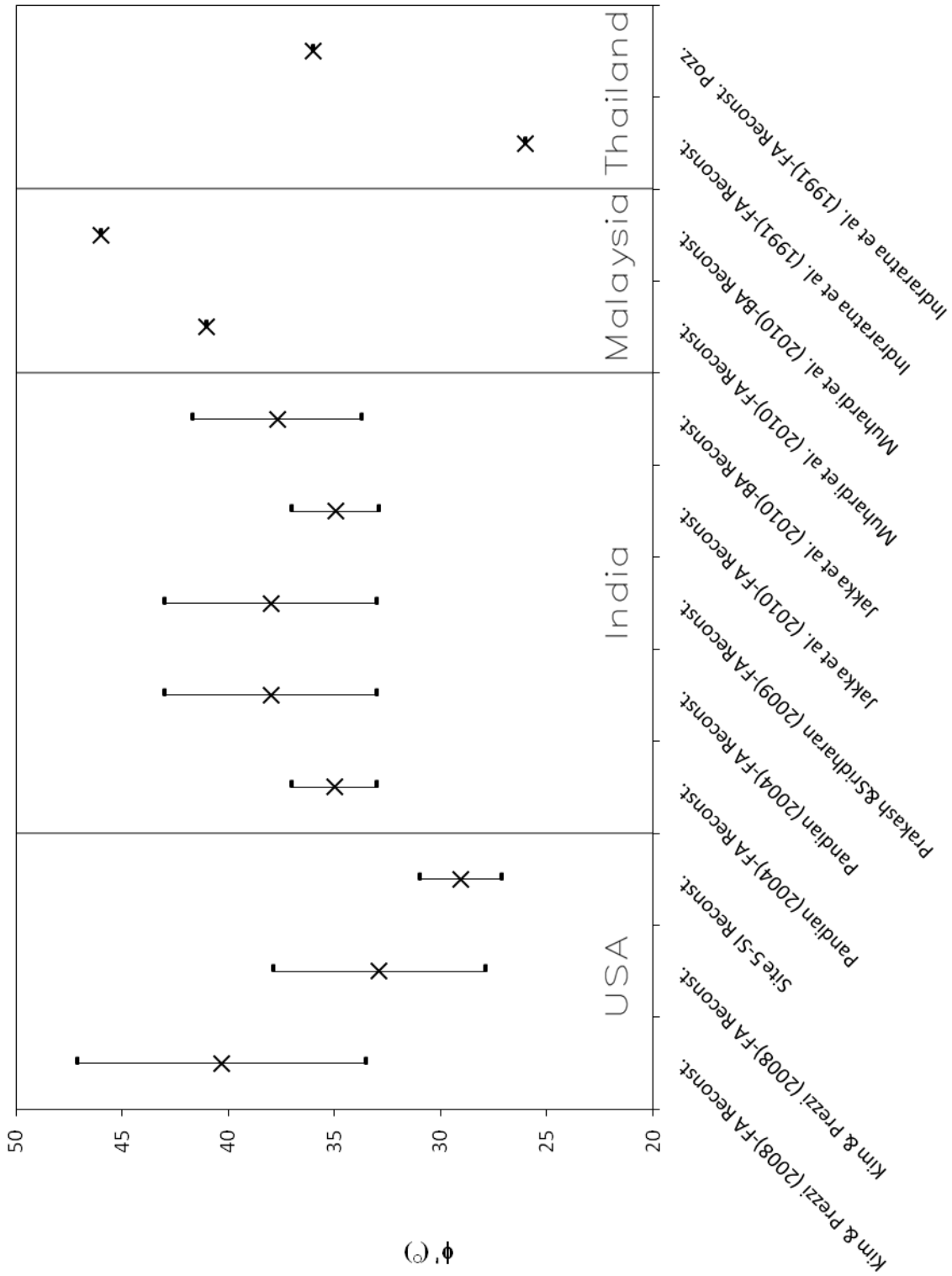


Figure 12: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated drained triaxial test.

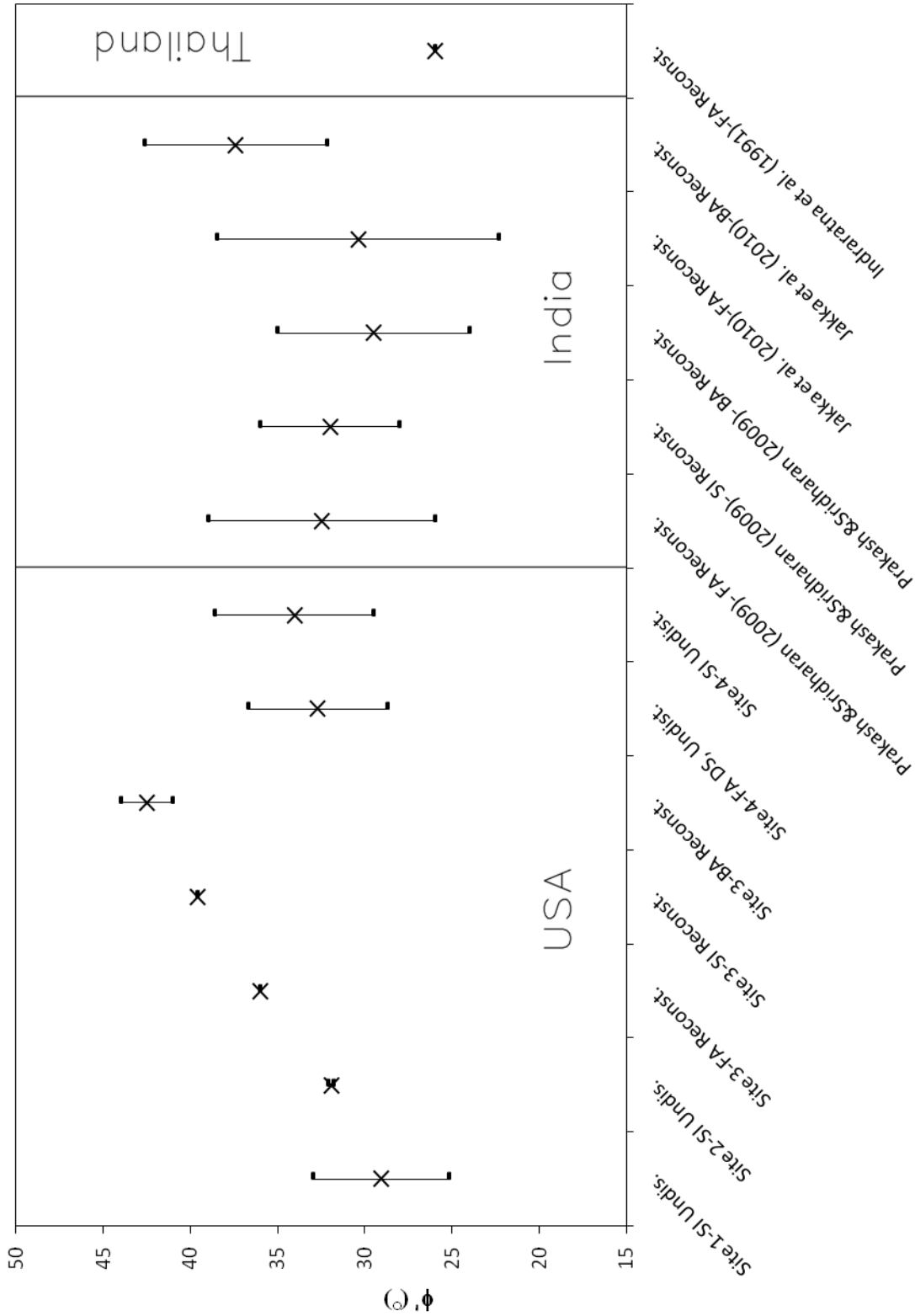


Figure 13: Variability plot of the effective stress friction angle of various CCRs as determined by different researchers using the consolidated undrained triaxial test.

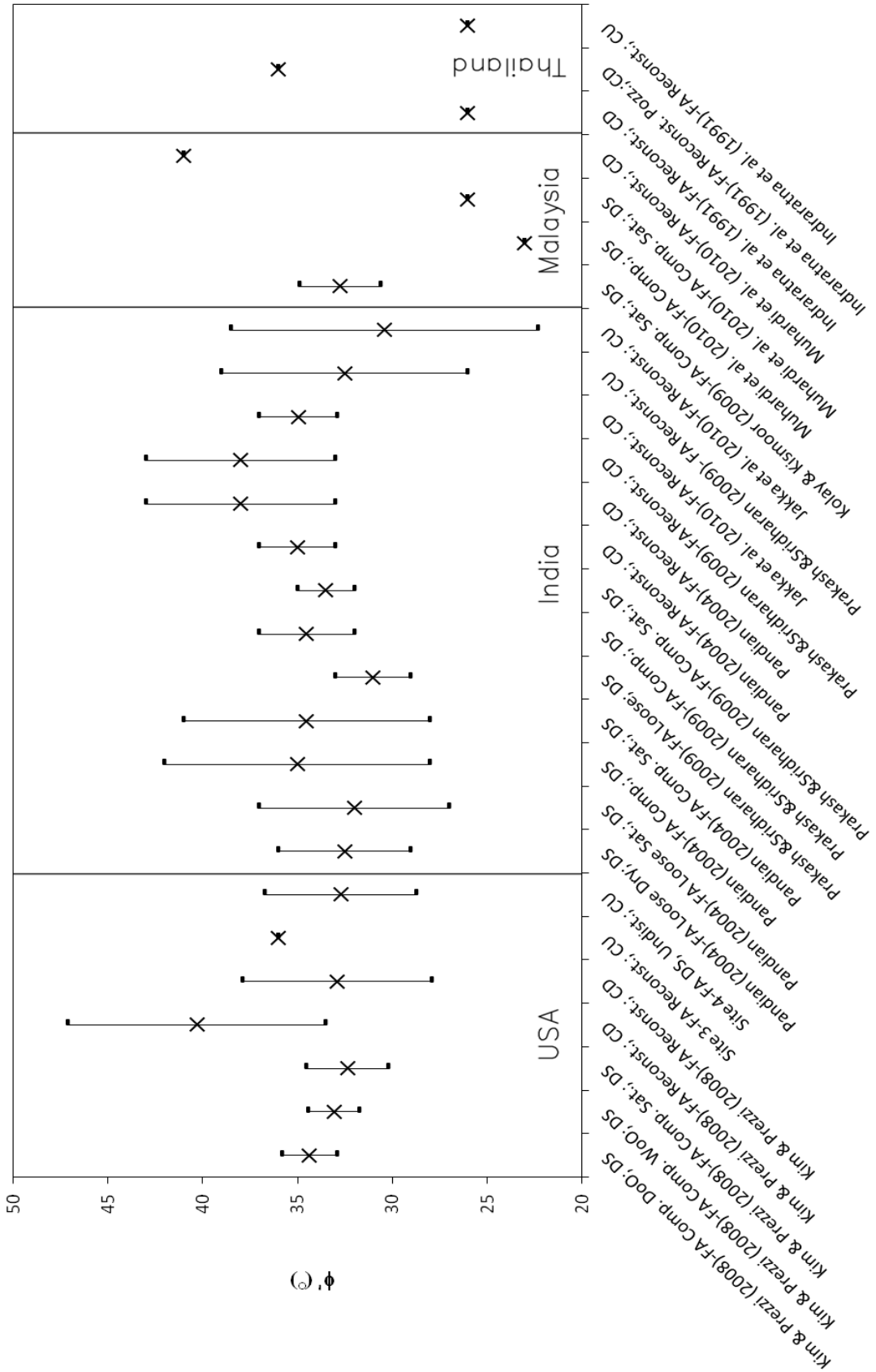


Figure 14: Variability plot of the effective stress friction angle of fly ashes for all shear strength tests performed by various researchers.

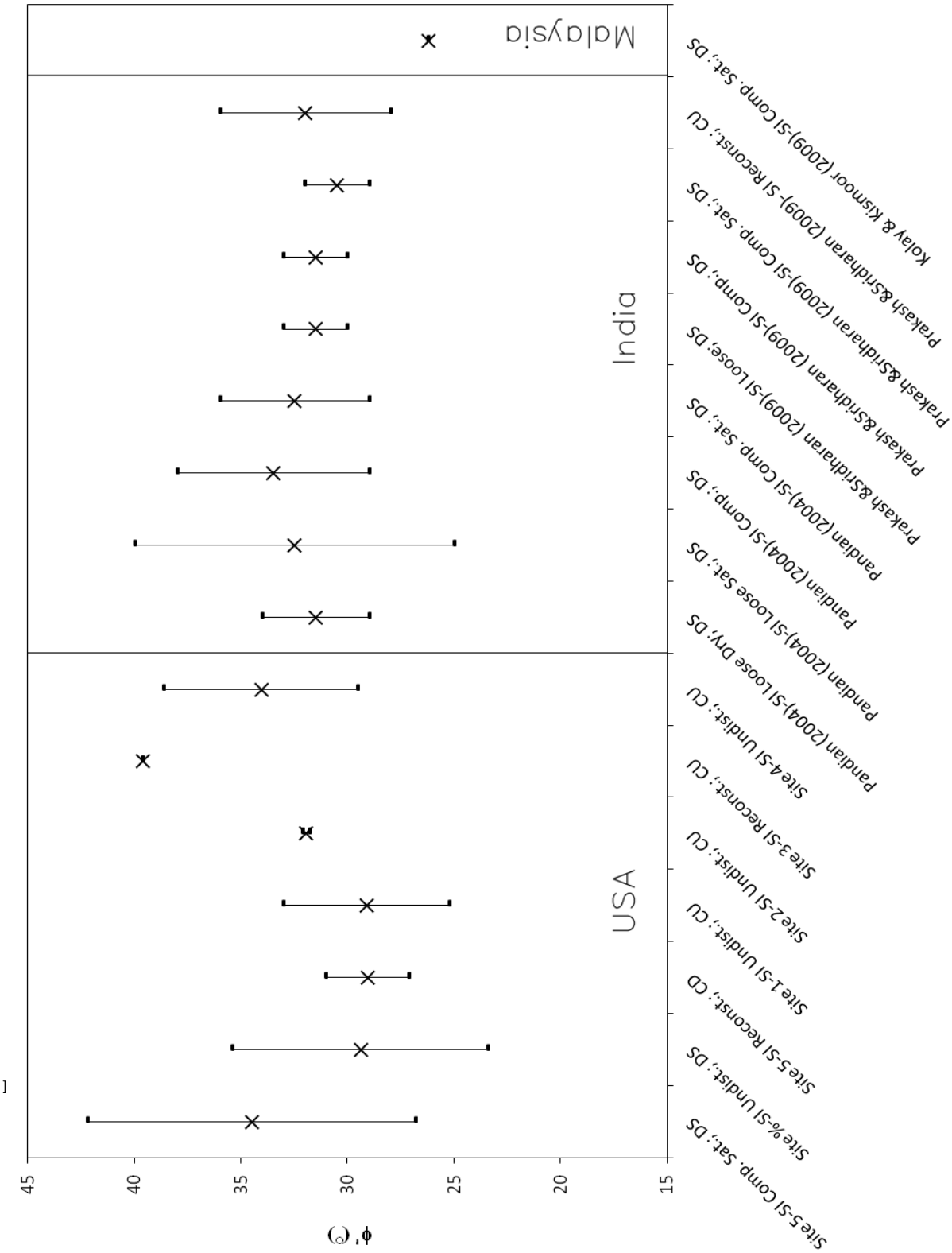


Figure 15: Variability plot of the effective stress friction angle of surface impounded ashes for all shear strength tests performed by various researchers.

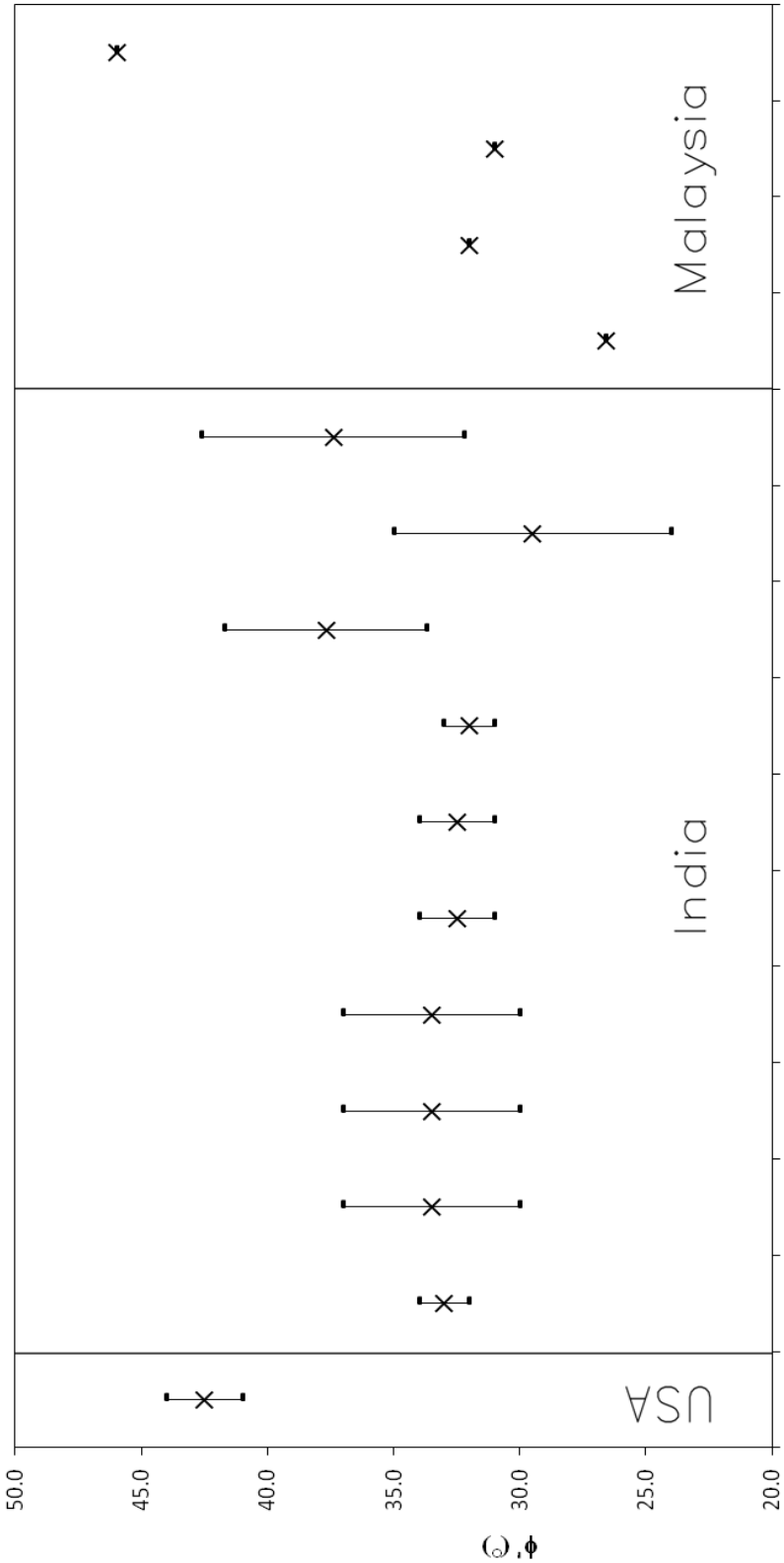


Figure 16: Variability plot of the effective stress friction angle of bottom ashes for all shear strength tests performed by various researchers.

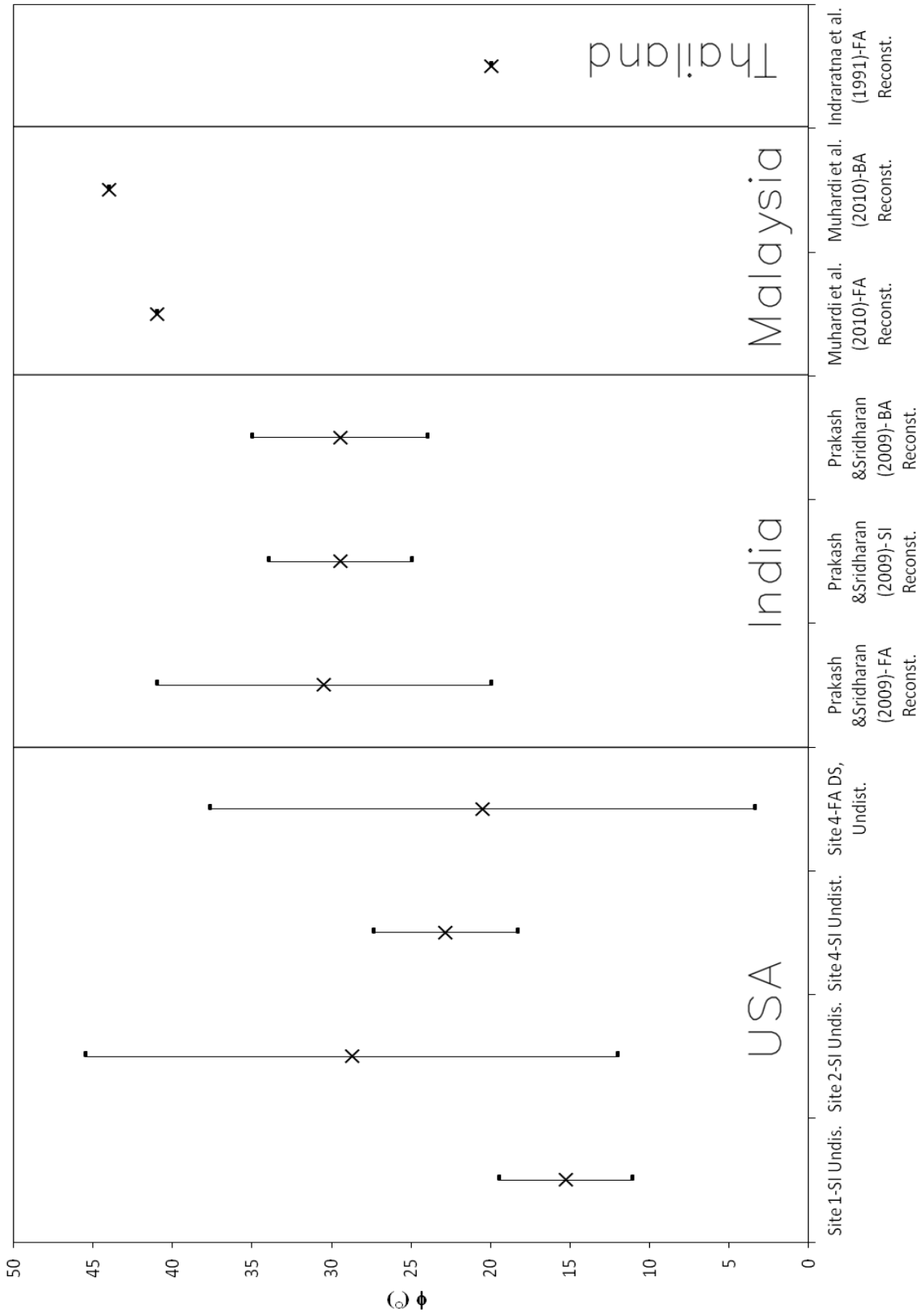


Figure 17: Variability plot of the total stress friction angle of all CCRs as determined by consolidated undrained triaxial tests performed by various researchers.

2.5 Compaction Characteristics

Since CCRs are often used in the construction of embankments for CCR disposal areas, an understanding of their compaction characteristics is necessary to control stability and seepage of the CCR disposal areas. A unique consideration when studying the compaction characteristics of CCRs is their generally low specific gravity. Since CCRs tend to have lower specific gravities and higher air voids than natural soils, their maximum dry density tends to be lower and their optimum moisture content higher than most natural soils (Bera et al. 2007, Prashanth et al. 1999, Trivedi and Singh 2004a). Trivedi and Singh (2004a) associate the high optimum water content of CCRs with the porous nature of the particles; most of the water is absorbed by the particles at lower water contents such that the particles are not workable until higher moisture contents. The lower dry density and higher corresponding water contents of CCRs results in a compaction curve that appears "flatter" than those of most natural fine-grained soils, as shown in Figure 18. The "A-Z soils" included in the plots for comparison are for natural soils from Ohio, as published by J. G. Joslin in the proceedings of the 1958 ASTM Symposium on Soil Testing in Highway Design and Construction.

Bera et al. (2007) also developed empirical models to predict the maximum dry density and optimum moisture content of a specific surface impounded ash, as long as both of these values are known for the standard proctor test:

$$MDD_E = 1.60783 \cdot MDD_{proc} + 1.85727\left(\frac{E}{E_{proc}}\right) - 6.89047 \quad (7)$$

$$OMC_E = 1.73090 \cdot OMC_{proc} - 9.01750\left(\frac{E}{E_{proc}}\right) - 25.33520 \quad (8)$$

where MDD_E = maximum dry density at a given applied energy
MDD_E = maximum dry density for a proctor test
E = amount of energy input for given condition
E_{proc} = amount of energy input for a proctor test
OMC_E = optimum moisture content for a given applied energy
OMC_{proc} = optimum moisture content for a proctor test

It should be noted, however, that these relationships were developed using test data from Indian CCRs. Therefore, before using these relationships, it should be verified that they apply to the specific CCRs in question.

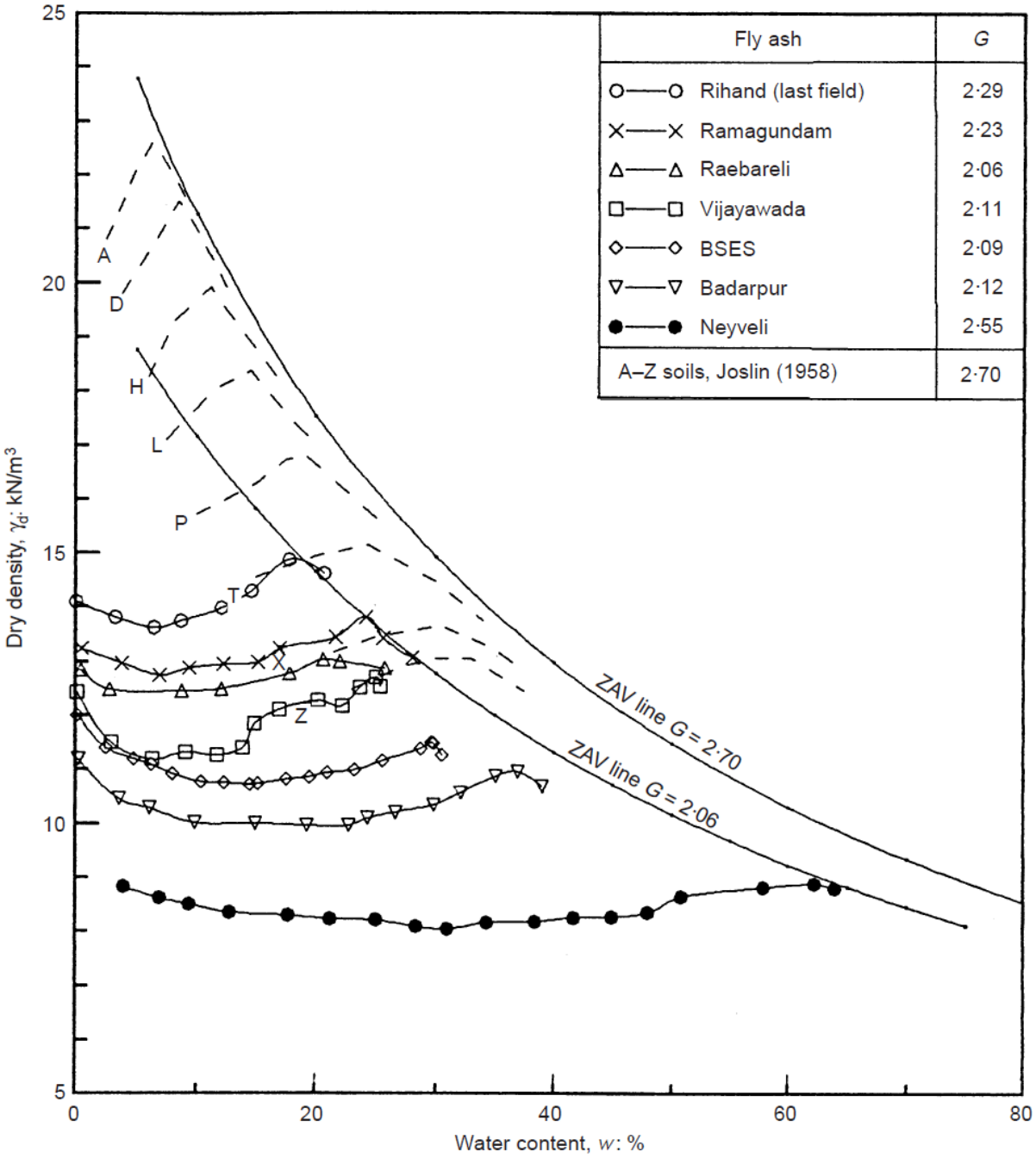


Figure 18(a): Compaction curves for different Indian fly ashes compared to those for several natural soils (Sridharan et al. 2001)

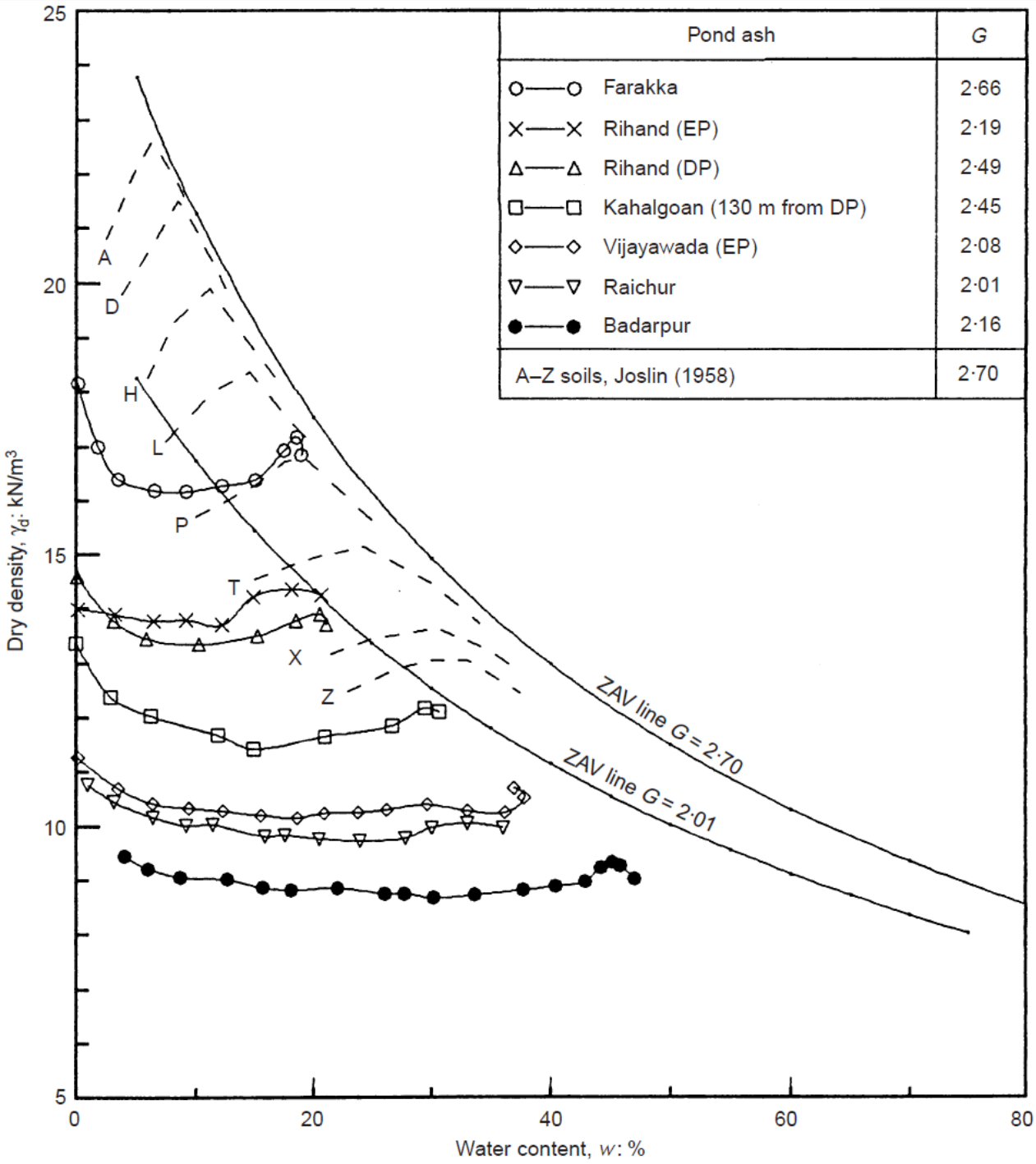


Figure 18(b): Compaction curves for different Indian surface impoundment ashes compared to those for several natural soils (Sridharan et al. 2001)

In Figures 17(a) and 17(b), the CCRs sometimes have a higher dry density at a dry condition (w = 0%). This is not a practical condition to use in construction or disposal situations, however, as there would be considerable dust pollution during placement (Sridharan et al. 2001).

Chapter 3

Dynamic Properties of CCRs

Regardless of the fact that CCRs are often composed of mostly fine-grained particles, they are still granular, non-plastic particles that exhibit no cohesion other than apparent cohesion in the moist state (Kaniraj and Gayathri 2004, Prakash and Sridharan 2009). Based on their grain-size, many CCRs could be classified as fine-grained soils, (which are commonly considered to have a lower liquefaction potential), but since these CCRs are also generally non-plastic, they have the potential of being liquefaction-prone. Liquefaction potential of CCRs is higher in the case of impounded CCRs, since these tend to exist at a saturated or nearly saturated state in-situ (and saturation is a necessary condition for liquefaction). In addition, the high moisture contents imply that impounded CCRs will have no negative pore pressures to help stabilize the soil mass under dynamic loading. Furthermore, the generally metastable structure of impounded CCRs makes their dynamic properties of great importance, even at low intensities of shaking. There have been a limited number of publications on the dynamic properties of CCRs; while this section presents and discusses currently published information on the dynamic properties of CCRs, there is still a need for further research in this area.

3.1 Cyclic Shear Strength Properties of CCRs

The most common laboratory test used to assess the dynamic properties of soils is the cyclic triaxial shear test. Cyclic triaxial testing apparatuses are expensive and provide very specific results, so very few commercial consultant firms own or even have access to them. Therefore,

cyclic triaxial testing has traditionally been done at the academic level and has seen little use in commercial consulting. Given the specialized nature of the cyclic triaxial test, there is limited research published on the cyclic triaxial properties of CCRs. Since the cyclic shear strength properties of CCRs is a very specific topic, the research available on this topic is from academics of varied nationalities, all of whom have slightly different methods of analyzing the raw data; as a result, comparing results can be difficult.

Despite differences in how to analyze and present cyclic triaxial test results between researchers, it is useful to compare results using fundamental parameters of cyclic response, such as plots of excess pore pressure (usually excess pore pressure ratio) versus number of loading cycles, or plots of the cyclic stress ratio (CSR=$\sigma_d/2\sigma_{3c}$') versus number of loading cycles, which represents a measure of how the shear strength of the material in question degrades with cyclic loading. Figures 19 and 20 present some typical plots comparing excess pore pressures to the number of cycles to initial liquefaction, and Figures 21 through 23 present plots of CSR versus number of loading cycles to liquefaction (generally defined as 5% double-amplitude axial strain) for different surface impounded CCRs at different confining stresses and relative densities.

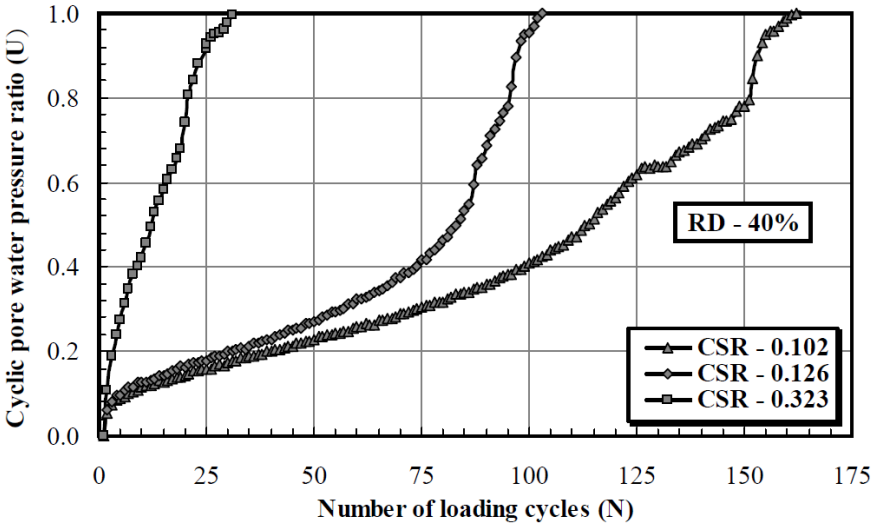


Figure 19: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at different cyclic stress ratios and 1 Hz loading frequency (Mohanty et al. 2010).

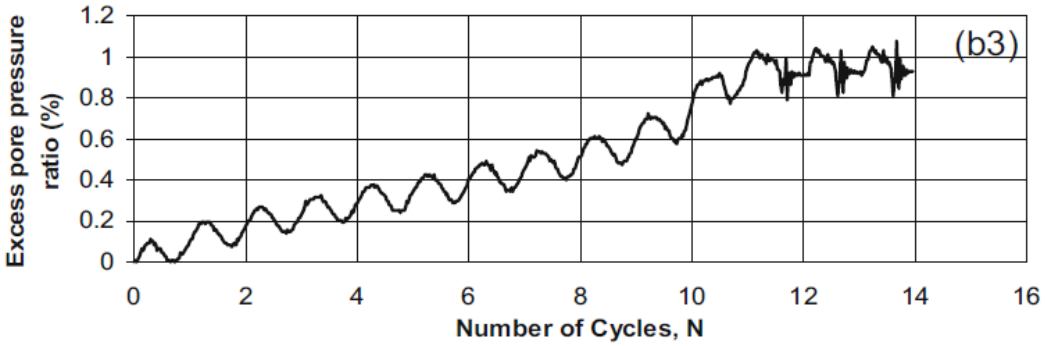


Figure 20: Plot of excess pore pressure ratio versus number of loading cycles for compacted Indian surface impoundment ash at a cyclic stress ratio of 0.10 and confining pressure of 2214 psf and 0.1 Hz loading frequency (Jakka et al. 2010)

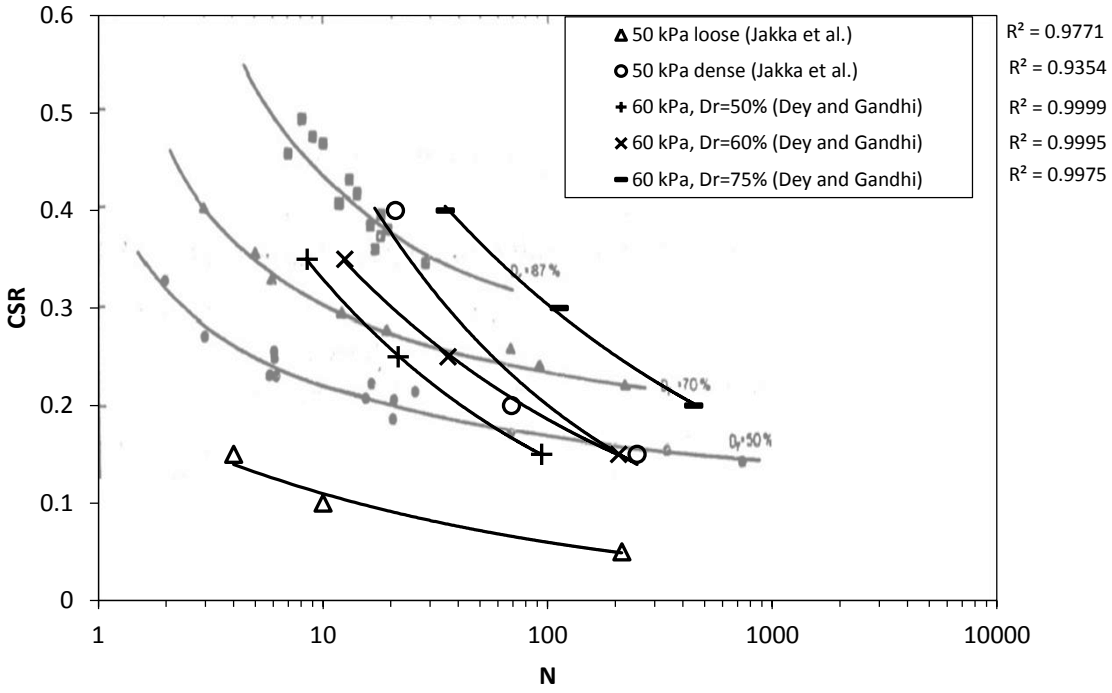


Figure 21: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at confining stresses close to 50 kPa. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Dey and Gandhi loaded specimens at 1 Hz. For comparison, curves for sands tested at the same confining pressure are superimposed (Mulilis et al 1976).

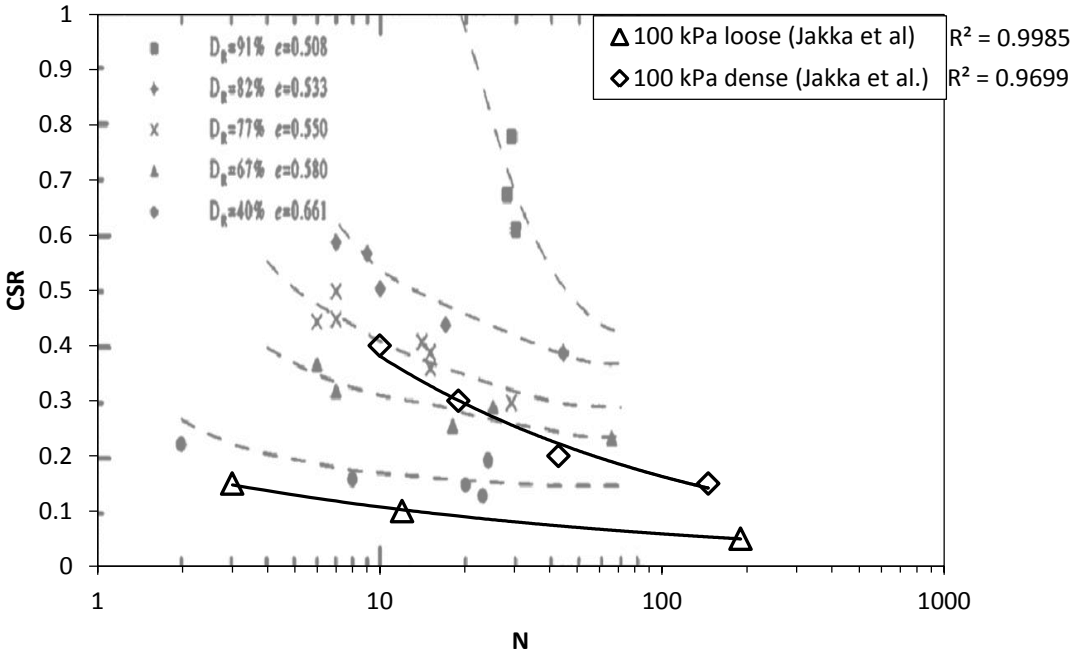


Figure 22: Plot of CSR versus number of loading cycles to liquefaction for surface impounded CCRs tested by Jakka et al (2010) at a confining pressure of 100 kPa. For comparison, curves for C778 sand at the same confining pressure are superimposed (Carraro et al 2003).

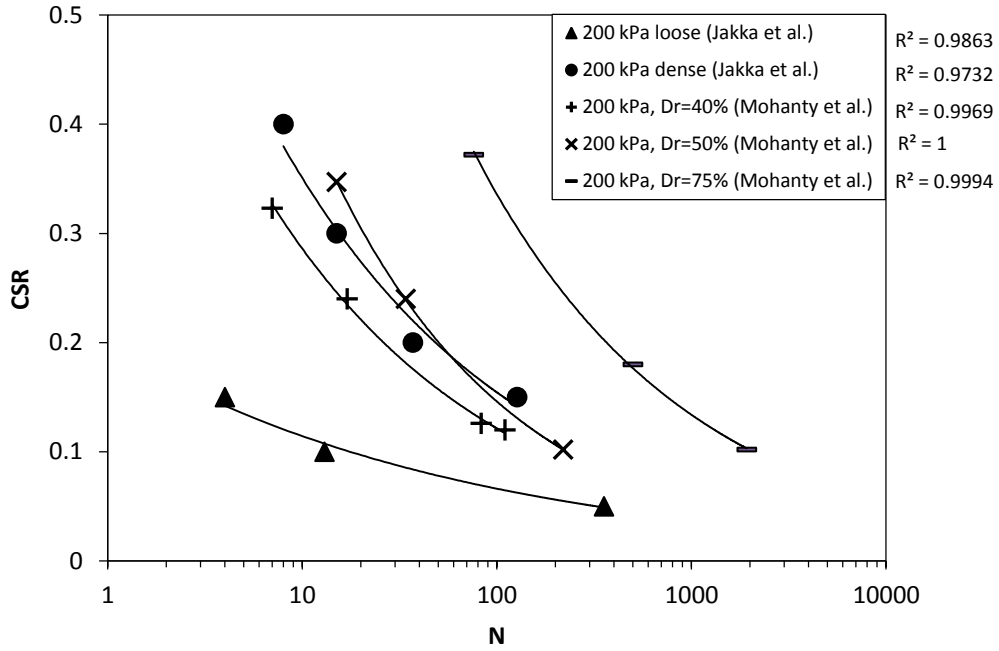


Figure 23: Plot of CSR versus number of loading cycles to liquefaction for different surface impounded CCRs tested by different researchers at 200 kPa confining stress. Jakka et al. loaded specimens at 0.1 Hz to 1 Hz and Mohanty et al. loaded specimens at 1 Hz.

For the two plots of CSR versus number of cycles to initial liquefaction where results for surface impounded CCRs are compared to tests done on sands, it is apparent that the CCRs tested tend to be more resistant to liquefaction than natural sands at higher CSRs, but less resistant to liquefaction at lower CSRs. As more cyclic triaxial tests are run on surface impounded CCRs, it will be more apparent as to whether this is an actual trend, or just an apparent trend in these three studies.

Lastly, many researchers include a plot of the hysteresis loops for a cyclically-tested triaxial sample. This is simply a plot of the deviator stress versus the axial strain through a single load cycle, at which point the plot begins again, creating a nearly-symmetrical shape about the origin of the plot. The area contained within all of these loops represents the cumulative energy dissipated by the soil being tested (Yoshimoto et al. 2006). The cumulative dissipated energy method was used by Towhata and Ishihara (1985) in order to analyze cyclic shear behavior and liquefaction strength of soils. Figure 24 shows a diagram illustrating the dissipation energy contained within a hysteresis loop.

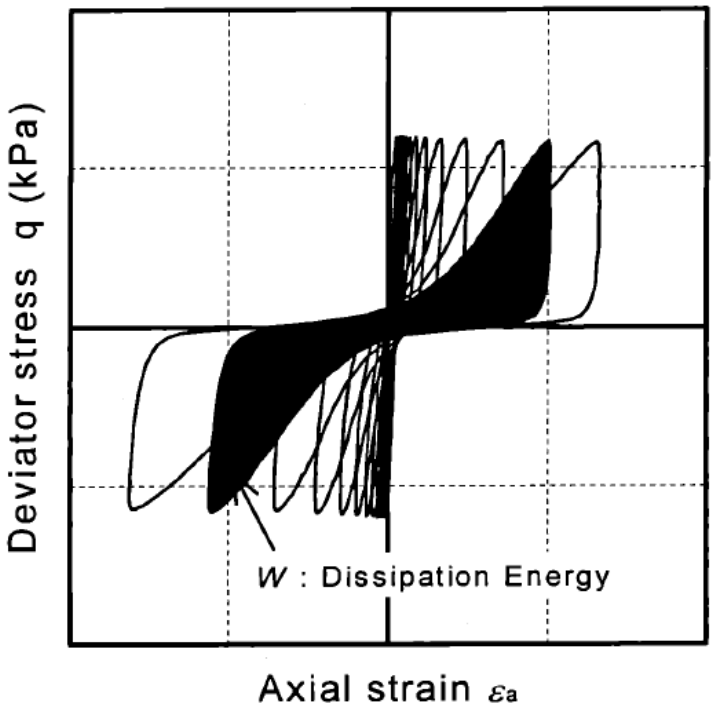


Figure 24: Example of how to determine the energy dissipated by a soil throughout a single loading cycle (Yoshimoto et al. 2006).

Chapter 4

CCR Failure Modes and Monitoring Practices

The critical failure mode for a CCR impoundment is not necessarily the same as for a CCR landfill, since differences in placement techniques for each have a significant effect on the fabric and shear strength properties of the CCRs. Determining the failure modes and developing monitoring practices for CCR impoundments can be done using the same methods as for mine tailings dams because of their similar structure. CCR landfills can be monitored much like any other earthen embankment (with material properties being the major difference), except that unlike most embankments, there is no end of construction until the landfill is retired.

4.1 Surface Impoundments

The observational method is a method of risk management outlined by Dr. Ralph Peck as the process of making design adjustments based on observed behavior in a given structure. The design can be adjusted to be either more or less conservative in order to optimize design (Martin and Davies 2000). This method of risk management is ideal for use with tailings dams since tailings dams are continuously constructed until they are retired; the same is true of CCR surface impoundments, which indicates that such methods could easily be applied to CCR surface impoundment monitoring programs. Figure 25 is a flow chart illustrating the risk management process utilizing the observational method, as applied to tailings dam design; however, the

process is general enough that the same or a slightly modified flow chart could be used for surface impounding ash structures.

Another important consideration when developing a monitoring plan for surface impoundments is whether the dikes were constructed using the upstream or downstream methods, since use of the upstream method can lead to weaker dike foundations and an increased probability of sudden or catastrophic failure (Martin and Davies 2000). The upstream construction method consists of constructing the dike of a new phase of a disposal area partly on the top of the previous phase dike and partly on the upstream disposed material; contrarily, the downstream construction method consists of constructing the new phase dike partially on the previous phase dike and partially on land downstream of the disposal area. Figure 26 illustrates that the weaker foundations of mine tailings constructed using the upstream method is evident based on the prevalence of certain failure modes for upstream tailings dams as compared to other types of tailings dams (slope failure and earthquake failure constitute 59% of failure modes for upstream tailings dams, compared to 24% for other types of tailings dams).

Taking all of these factors into consideration, a sample surveillance plan schedule for a mine tailings impoundment is provided in Figure 27. As with the risk management chart presented in Figure 25, this flowchart is general enough that it could be used in its current form, or slightly modified in developing a surveillance plan for CCR surface impoundments.

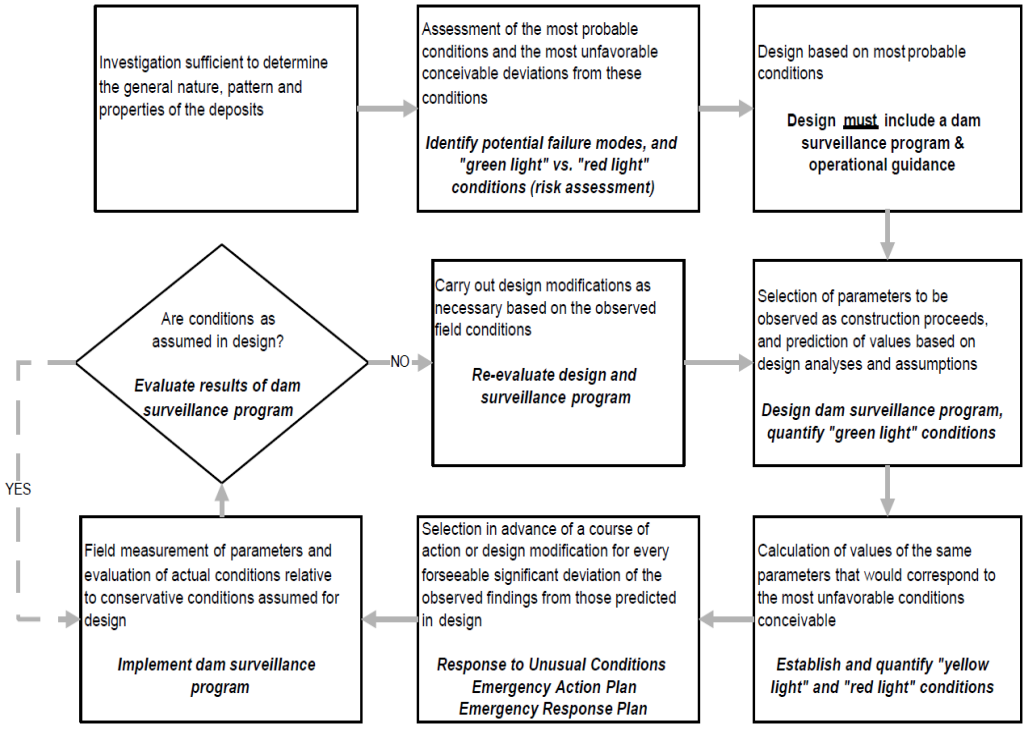


Figure 25: Flow chart illustrating risk management utilizing the observational method (after Martin and Davies 2000)

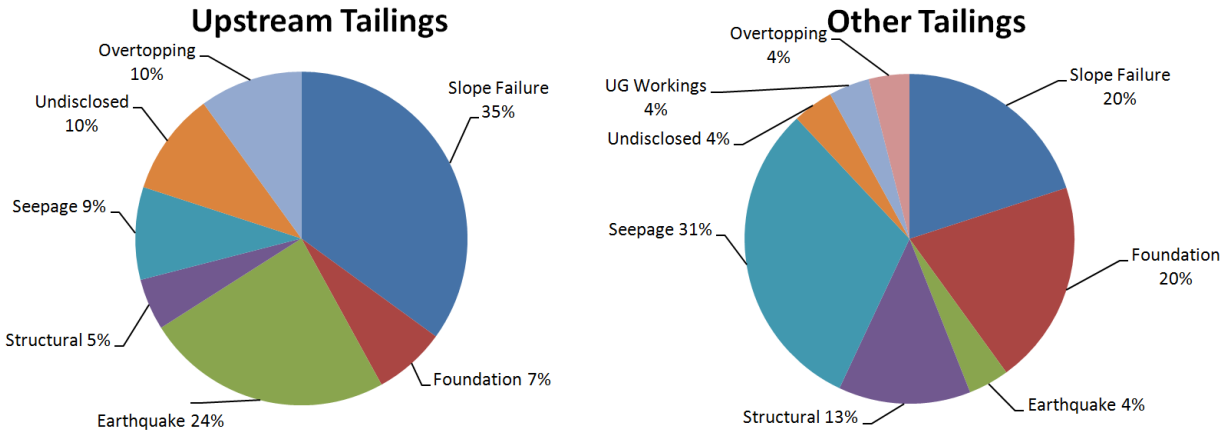


Figure 26: Comparison of failure modes of upstream mine tailings dams as compared to other types of mine tailings dams (modified from Martin and Davies 2000)

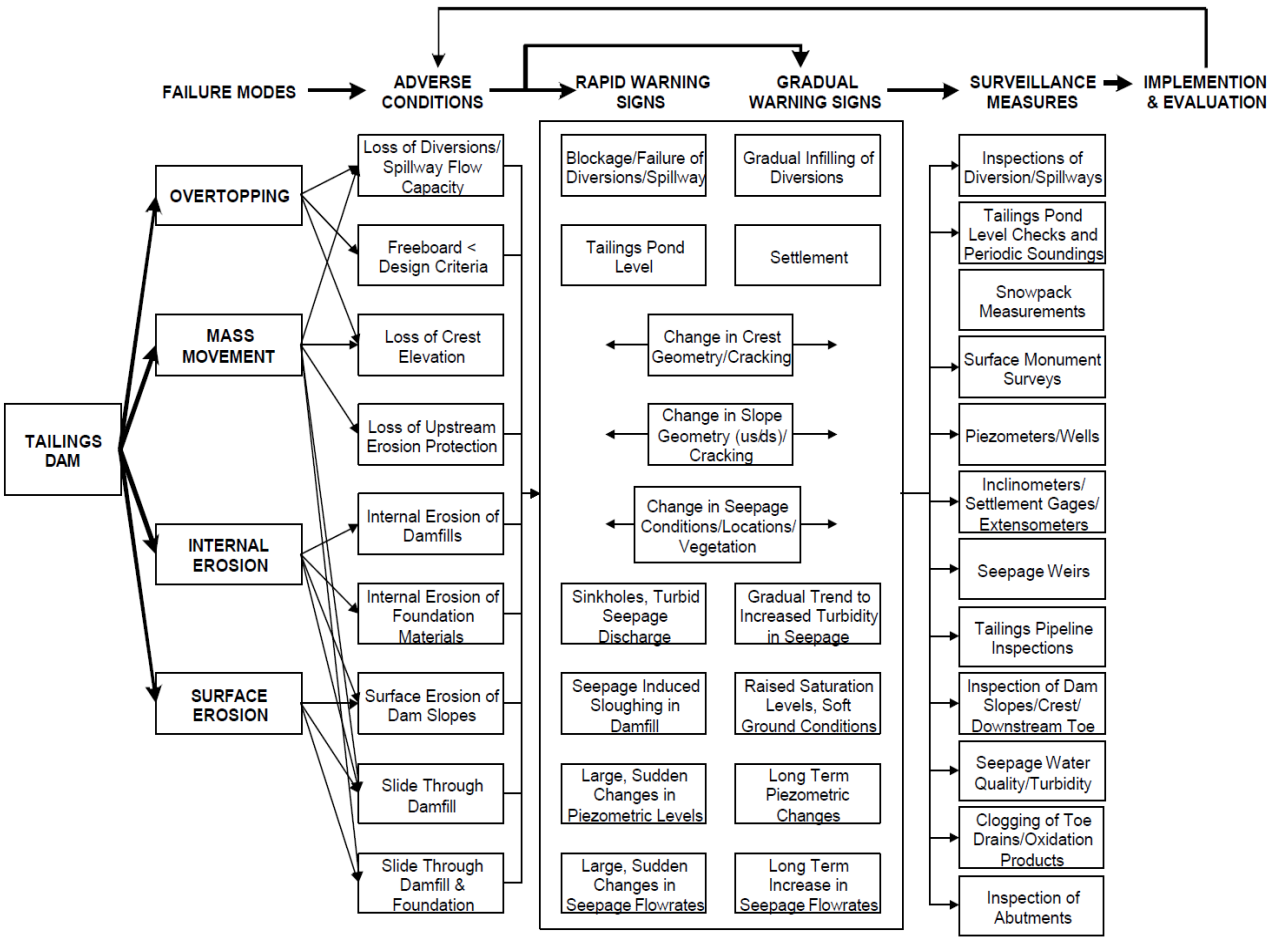


Figure 27: Sample surveillance plan schedule for a mine tailings impoundment (after Martin and Davies 2000)

Since CCR surface impoundments can have containment dikes constructed out of CCR material, natural soils, or a combination of both and these landfills have the potential to collect precipitation. An analysis procedure that can be used alongside the observational method is to treat them as earthen dams according to recommendations of the Bureau of Reclamation and the Army Corps of Engineers.

The Bureau of Reclamation's *Dam Safety Risk Analysis Best Practices Training Manual* (Scott et al. 2010) provides an overview in Chapter 1 of their recommended method for determining potential failure modes of dams for use in conducting risk analyses of dams. In Chapter 1, the authors identify determination of potential failure modes of dams as the basis for risk evaluations, making it one of the most important steps in risk analysis of a dam. They recommend a comprehensive and thorough review of all relevant background information such

as, but not limited to, geology, design, analysis and construction documentation, flood and seismic loadings, operations, dam safety evaluations, and performance and monitoring documentation. Additionally, they recommend a site examination, including questioning of the operations personnel as to how unusual events are handled and what they consider to be the vulnerabilities of the structure. The data review process should include several qualified professionals from different disciplines to ensure a thorough investigation. Lastly, the authors outline three major parts in describing a potential failure mode:

- **The initiator**, or what causes the initiation or onset of the failure mode
- **Failure progression**, a step-by-step outline of mechanisms that lead to failure
- **The resulting impacts**, a description of the expected method and magnitude of a failure if it were to occur

For more in-depth guidance on determining failure modes and developing a risk analysis program for a specific structure, the U.S. Bureau of Reclamation's *Dam Safety Risk Analysis Best Practices Training Manual* can be accessed online at http://www.usbr.gov/ssle/damsafety/Risk/methodology.html, entitled "Complete Best Practices Document."

4.2 CCR Landfills

CCR landfills are generally placed at a moist state and compacted to some degree, being constructed in a similar manner to regular earthen embankments. As a result, they can be analyzed like any other earthen embankment, with special attention paid to the engineering properties and placement conditions of the CCR materials used in the embankment. The placement method for CCR materials in CCR landfills results in less uncertainty in their fabric and relative density, generally resulting in an overall more stable structure than with surface impoundments.

Ideally these compacted CCR embankments would remain well-drained, but depending on the geology of the site and variability in the hydraulic conductivity of the CCR materials, monitoring

the groundwater table within these areas and how it is affected by rainfall patterns is good practice, unless it is clearly apparent that such monitoring is unnecessary. An additional consideration with CCR landfills is the need to continually condition the landfill surface with water in order to cut down on dust pollution and surface erosion. Ideally, slopes of CCR landfills should be seeded as soon as is feasible, in order to manage surface erosion and eliminate the need to continually condition the moisture of the slopes.

One unique case would be for sites where a CCR landfill is constructed over a retired surface impoundment. This is an appealing option to most CCR disposers, since land area can be reused, negating or delaying the need to purchase new land to construct a disposal area. Since the foundation material cannot be as well-characterized as the material being placed, a more rigorous design and monitoring procedure would be necessary, perhaps the same as or similar to those discussed in section 4.1.

4.3 Failure Modes

Failure modes for CCR surface impoundments and landfills include all of the usual failure modes for a dam or embankment. However, since disposal operations continue for years or decades, the need to continually monitor disposal areas for signs indicating the initiation of a particular failure mode is very important. Since surface impounded CCRs generally have a less stable structure than CCR landfills, they will generally tend to require more vigorous monitoring. Because of the differences in disposal methods between CCR surface impoundments and CCR landfills, the most likely failure modes will not be the same for each structure.

The most common failure modes for earthen dams and embankments include internal erosion or piping (of embankment or foundation materials), surface erosion leading to global instability, excessive seepage leading to an embankment breach, overtopping during a storm event, loss of freeboard due to excessive embankment settlements or subsidence, lateral movement of the embankment, and failure as a result of a seismic event (MSHA 2009; Martin and Davies 2000). Many of these failure modes are included in Figure 27, with common warning signs indicating the initiation of these failure modes.

The majority of these failure modes can be recognized with good monitoring practices, with the exception of failures due to seismic events, for obvious reasons. There is little data on the performance of CCR disposal areas during seismic events and also very little data on the dynamic properties of CCR materials. As a result, dynamic properties of CCRs is an area where further research and laboratory testing is required.

The overall uncertainty in the engineering properties of CCR materials make it necessary to be more vigilant with monitoring practices in order to recognize when different failure modes are initiated so that remedial actions can be taken to prevent costly failures, both on an economic and life scale. Since surface impoundments often most closely resemble tailings dams in their design, a good reference for monitoring practices and identifying failure modes for surface impoundments is the MSHA 2009 "Engineering and Design Manual: Coal Refuse Facilities," which can be accessed at:

http://www.msha.gov/Impoundments/DesignManual/ImpoundmentDesignManual.asp.

Chapter 5

Slope Stability of CCRs

The basic principles of slope stability and methods of assessing slope stability of CCR surface impoundments and landfills are the same as for naturally occurring soils; however, the results of these analyses can be very different based on the unique properties of CCR materials. For example, while an ash might have a high percentage of clay-sized particles, they rarely have any cohesion at all and may be very prone to erosion; many naturally occurring soils with clay-sized particles have a cohesive component of strength and are usually considered erosion resistant. In most instances, CCR disposal areas will not be loaded enough to incur excess pore pressures that will not be fully dissipated by the next loading cycle (the next workday). For this reason, it is generally only necessary to perform effective-stress steady-state shear strength slope stability analyses for CCR disposal areas. Special analyses, such as rapid draw-down analyses may be necessary as dictated by site geometry and design rainfall events.

5.1 Limit Equilibrium and Finite Element Analyses

The majority of slope stability analyses today are performed using commercial software programs that utilize limiting equilibrium analyses and/or finite element analyses of slope stability and seepage through slopes. It is good practice and the recommendation of the United

States Army Corps of Engineers (USACE) that some sort of check be done on the results of these software programs. In their Slope Stability Manual (EM 1110-2-1902), the USACE states that, "verification should be commensurate with the level of risk associated with the structure," and that one or more of the following methods should be used in verification of the initial analyses:

- Graphical (force polygon) method
- Spreadsheet calculations
- A second slope stability program
- Slope stability charts

The following example is of a slope stability analysis of a CCR surface impoundment using a limit equilibrium-based software program that also has a built-in finite element groundwater seepage option. The premise of this example is that a client wants to construct a dry-stacked CCR landfill on top of a retired surface impoundment. A thin layer with increased cohesion was included at the surface of all slopes in order to eliminate infinite slope failures that are solved with vegetation; this layer is not included in the table of strata properties, presented in Table 9.

Table 9: Summary of shear strength and hydraulic parameters used in CCR surface impoundment slope stability example.

Strata	γ (pcf)	N	σ_0' (tsf)	ϕ' (°)	c' (psf)	k (ft/s)	Sources
SI CCRs	92.0	N/A	N/A	25.2	0	2.55×10^{-6}	LT
Compacted CCRs	103.5	N/A	N/A	33.0	0	3.61×10^{-7}	Tables 6-8, Table 5
Embankment Fill	112.7	N/A	N/A	33.8	0	1.79×10^{-8}	LT
RR Embankment Fill	122.0	4.0	0.34	33.7	0	3.00×10^{-8}	Kulhawy and Mayne (1990)/LT
Alluvium	110.0	11.0	0.88	40.6	100	3.28×10^{-8}	Kulhawy and Mayne (1990)/LT
Saprolite	110.0	35.0	1.2	29.6	420	9.35×10^{-7}	LT
Partially Weathered Rock	120.0	N/A	N/A	30.0	500	3.28×10^{-9}	Assumed based on parent material
Bedrock	170.0	N/A	N/A	30.0	1.4×10^{5}	3.28×10^{-10}	Barton and Choubey (1977)

Note: LT = laboratory testing

Analyses were performed for six different conditions: three geometries, each with an in-situ water table and a hypothetical high water table. Figure 28 shows the in-situ subsurface conditions, while Figures 29 through 31 provide the output results with slip surfaces below specified factors of safety shown for the six geometries considered. All slip surfaces shown with a factor of safety value are the lowest factor of safety for that slope geometry.

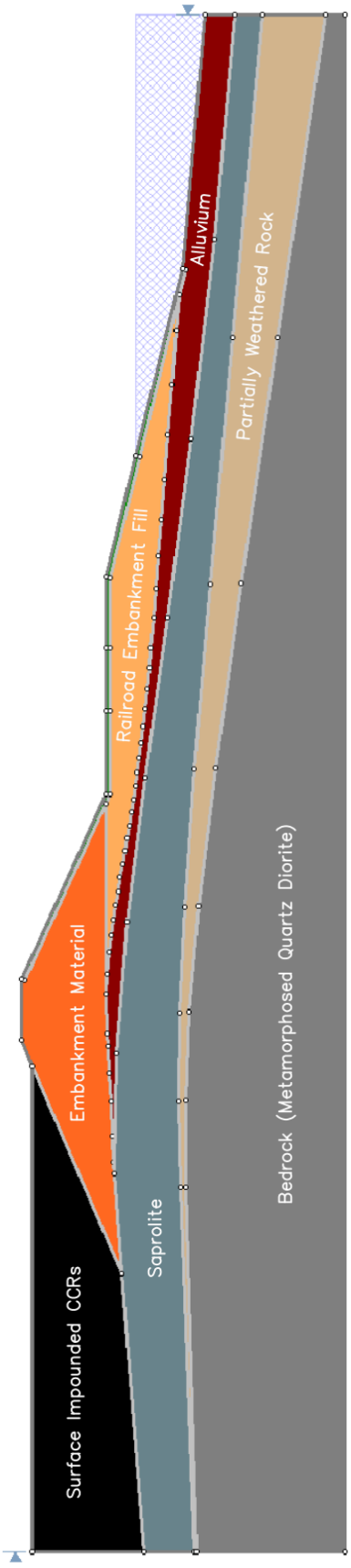


Figure 28: Subsurface profile of a slope stability example for an SI CCR embankment.

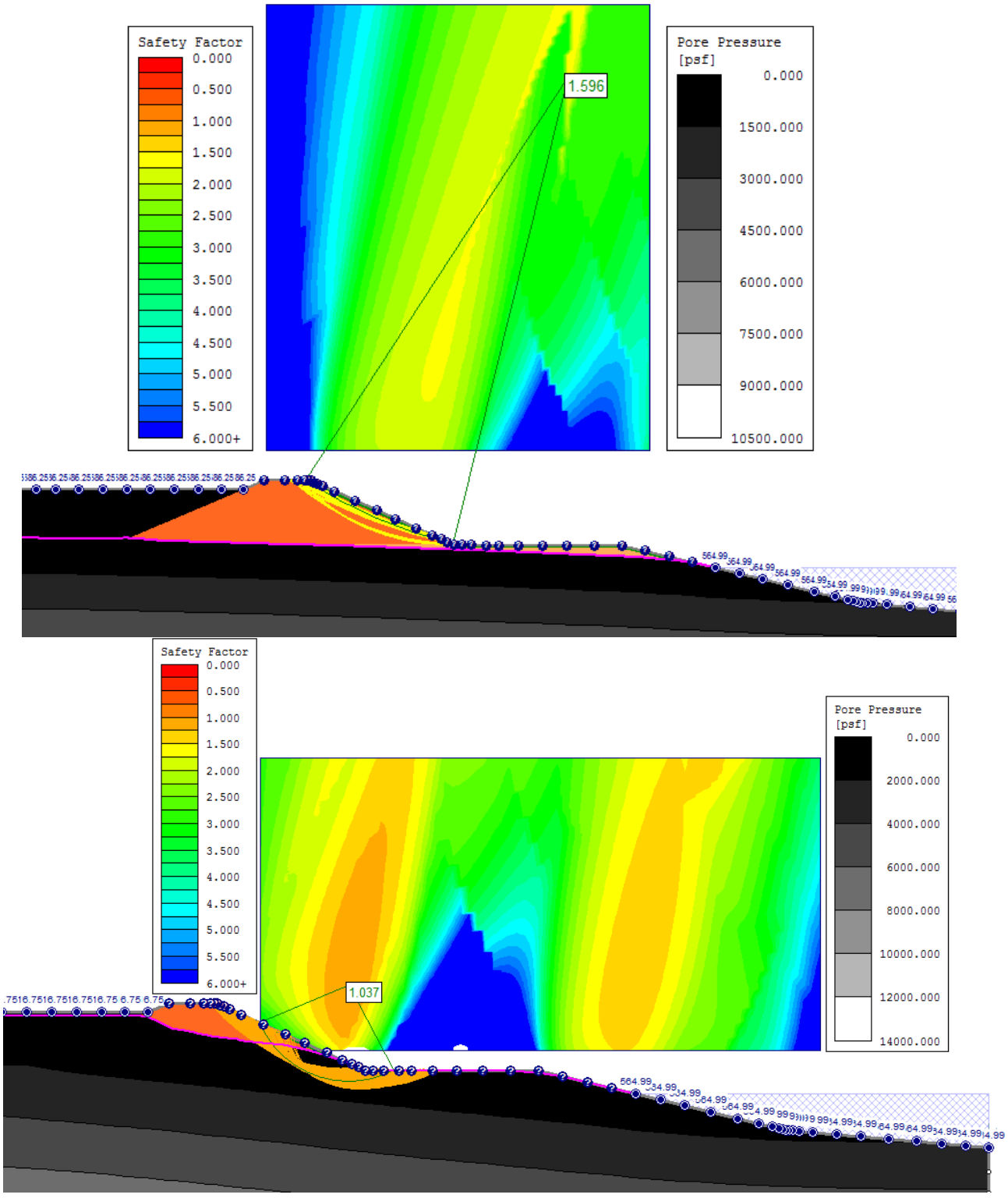


Figure 29: Analyses for the in-situ condition, first with the in-situ measured water table (above) and then with a hypothetical higher water table (below). Slip surfaces are shown for factors of safety below 1.7 for the above case and between 1.0 and 1.2 for the below case.

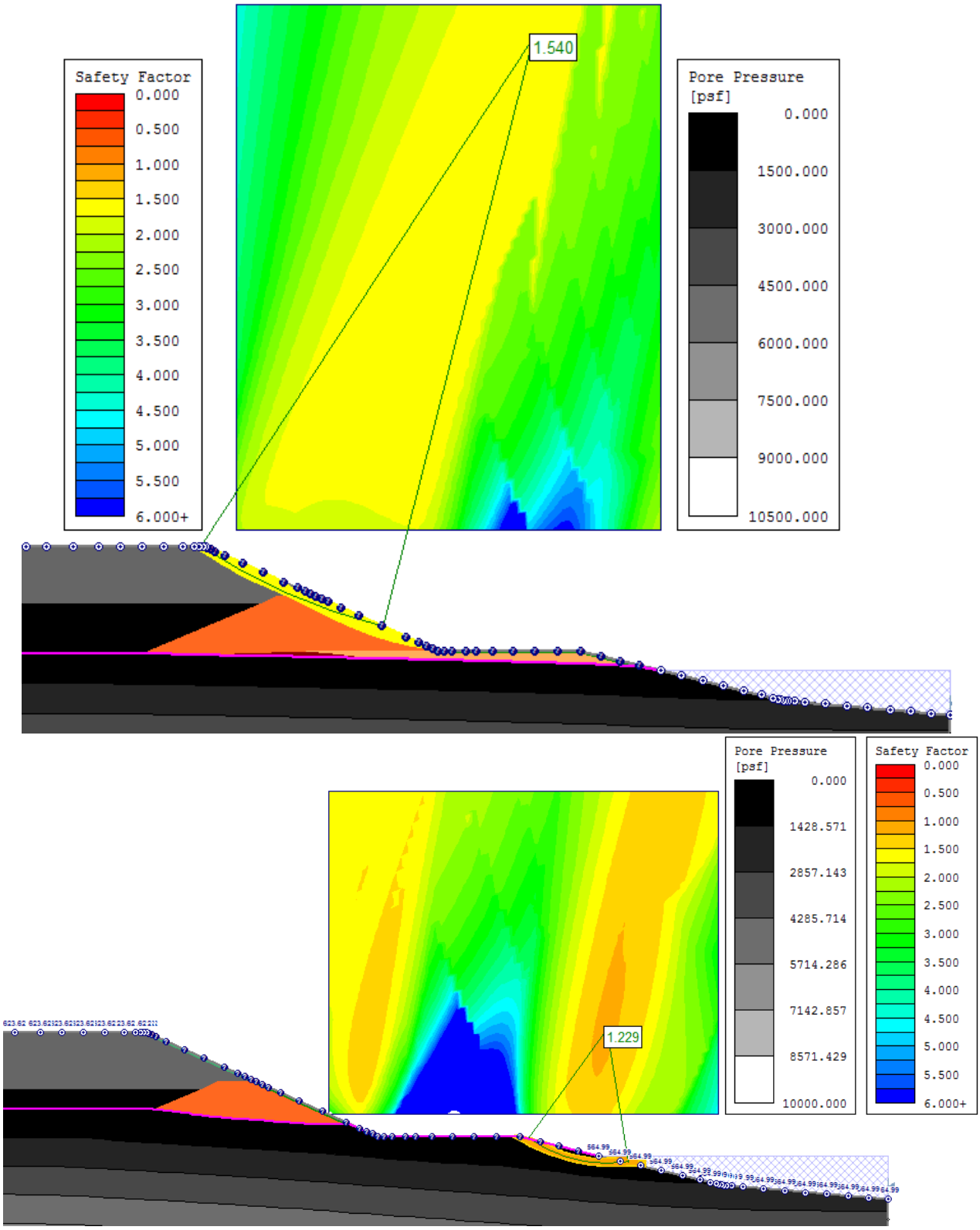


Figure 30: Analyses for an added upstream dry-disposed cell over the surface impoundment, for the in-situ water table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.6 are shown in the above case and between 1.2 and 1.3 for the below case.

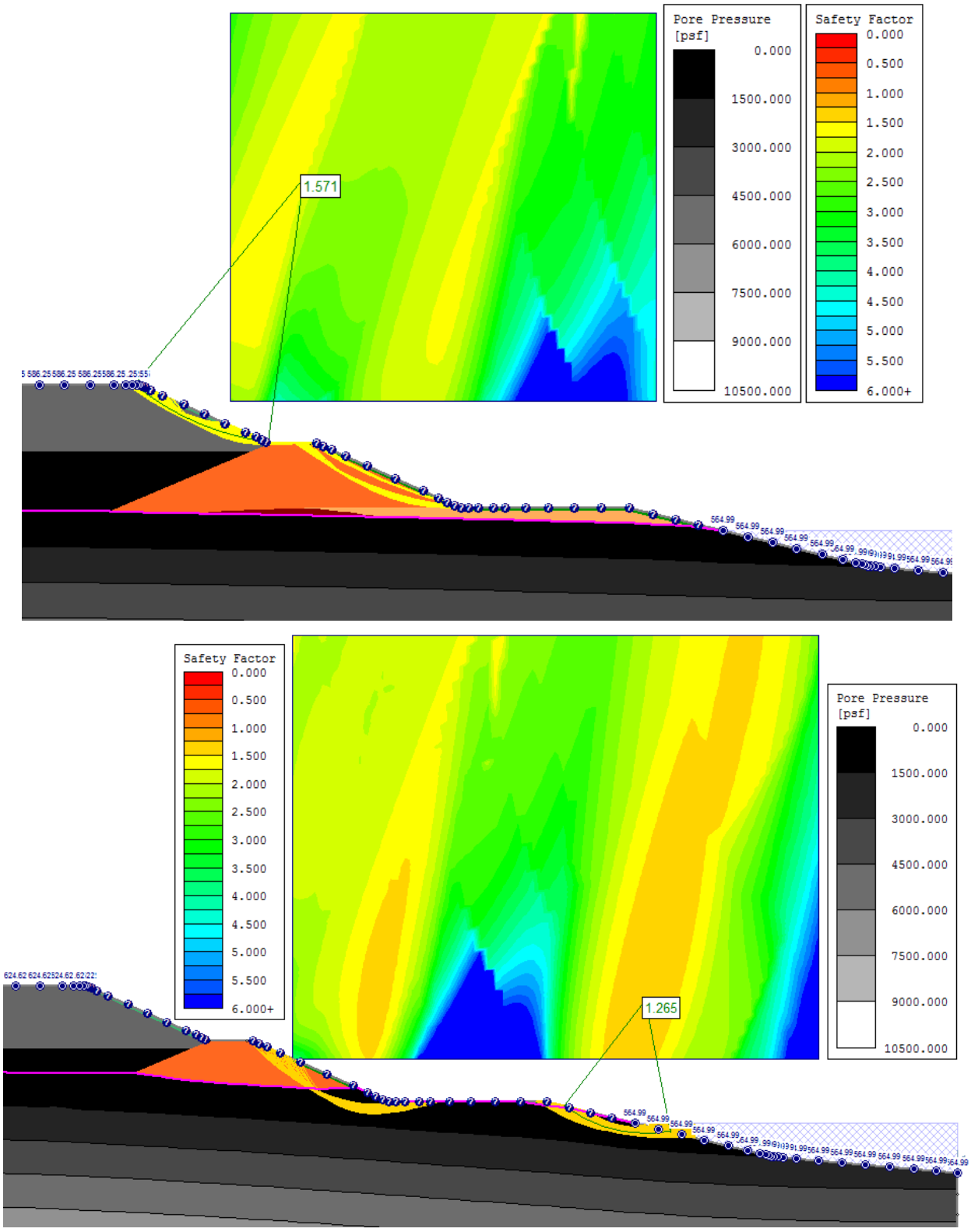


Figure 31: Analyses for an added upstream dry-disposed cell above the surface-impoundment for the in-situ groundwater table (above) and for a hypothetical higher groundwater table (below). Slip surfaces with factors of safety between 1.5 and 1.7 are shown for the above case and between 1.2 and 1.4 for the below case.

In all of the geometries considered in these analyses, a thin layer with a low cohesion was included in order to eliminate infinite slope failures that are easily remediated by keeping the slopes moist or vegetated. In addition, all of the geometries analyzed for the in-situ phreatic surface resulted in acceptable factors of safety, since the in-situ water table is so low compared to the site geometry. However, with a slight rise in the water level (perhaps as the result of a 100-year storm event), the factors of safety drop dramatically. This is the result of the fact that the embankment is constructed out of nonplastic soils that completely derive their strength from the frictional component of shear strength. As the water table rises, buoyancy effects decrease the effective overburden pressures in the geometry, thereby decreasing the slope shear strength and decreasing the factors of safety of all surfaces considered. Furthermore, the very low permeability of the embankment material makes this water table condition a real possibility, if no form of drainage through the slope is provided.

Chapter 6

Settlement Calculations for CCRs

It is common to see consolidation data reported for CCRs in research publications. However, given that CCRs often tend to be fairly free-draining, it would seem odd to use these values to determine settlement of CCRs, given that a structure or embankment were constructed over previously disposed CCRs. However, any methods developed to calculate settlements in sands are not necessarily applicable to CCRs or to silt-sized materials either. In this chapter, a comparison of common methods of calculating settlements will be made for CCRs at a specific site where a test fill was performed and actual CCR settlements monitored.

6.1 Test Fill Results

The results of a test fill of compacted, dry-placed fly ash performed over an approximately uniform 50 ft deep deposit of surface impounded ash was provided by S&ME. The test fill was 20 ft high and had lateral dimensions of 250 ft by 250 ft. The side-slopes all-around were 3H to 1V, making the entire footprint of the fill about 370 ft by 370 ft, or 136,900 ft^2. For the purposes of these analyses and the sake of simplicity this load will be characterized as a constant 20 ft load over the 250 ft square footprint of the test fill. The recorded settlements at the center of the test fill area were between 18.0 and 19.5 inches.

6.2 Settlement Calculation by Consolidation Theory

For increased accuracy, the surface impounded layer is divided into sub-layers and the settlements calculated for each layer and added together for the overall settlement. It is assumed that since the CCR material has not been loaded in the past that it is in the normally consolidated condition and that they unit weights of the surface impounded CCRs and dry-placed CCRs are 95 pcf and 100 pcf, respectively. Four sets of consolidation tests were performed on the impounded CCR material that made up the foundation for the test fill; the compression ratio for the test closest to the depth of the layer being considered is used in calculating the settlement in that layer. The water table is located 8 ft below the ground surface:

Table 10: Consolidation settlements calculated for test fill placed over a CCR surface impoundment.

Layer	T_L (ft)	D_{CL} (ft)	P_0 (psf)	ΔP (psf)	P_f (psf)	c_{ec}	S_i (in)
1	5	2.5	237.5	2000	2237.5	0.20225	11.82
2	10	10	587.7	2000	2587.7	0.20225	15.62
3	15	22.5	832.2	2000	2832.2	0.07299	6.99
4	20	40	1158.2	2000	3158.2	0.07299	7.63
						Σ	42.07

Note: T_L = layer thickness, D_{CL} = depth to center of layer, P_0 = initial stress condition, D_P = change in stress, P_f = final stress condition, and S_i = settlement for a specific layer

As displayed in Table 10, the settlements estimated using consolidation theory are just over twice the amount observed in the test fill. This is not really surprising since CCR materials do not tend to behave like soils where consolidation theory is used to calculate settlements; generally, plots of volumetric strain vs. normal stress from consolidation tests performed on CCRs do not have clearly log-linear portions corresponding to a recompression and compression ratio. As a result, depending on what values are assumed for $c_{\varepsilon c}$ and $c_{\varepsilon c}$, the settlement could either be greatly overestimated or underestimated, depending on different individuals' interpretations of the plot.

6.3 Settlement Calculation by D'Appolonia Method

The D'Appolonia (D'Appolonia et al. 1970) method of calculating settlements in sand is based on elasticity theory and can be applied to this sort of example with some moderate assumptions. Equation 8 is the equation developed by D'Appalonia et al. (1970):

$$\rho = \mu_0 \mu_1 \frac{qB}{M} \tag{9}$$

where ρ = settlement
μ_0, μ_1 = geometry factors from Figure 36
q = applied bearing pressure
B = footing width
M = 1-dimensional compression modulus

Figure 32 provides plots used to determine the geometry factors, while the applied bearing pressure and footing width are the same as determined in section 6.2. From logs of CPT tests performed at the test fill location, the average M measured over the depth of the CCR deposit was about 45 tsf (based on CPT correlations).

Given the dimensions of the test fill given in section 6.1 and Figure 32, μ_0 is estimated as 1.0 (since the fill is at the ground surface) and μ_1 would likely be around 0.14. The settlement can now be calculated as:

$$\rho = 1.0 \cdot 0.14 \cdot \frac{1 \text{ tsf} \cdot 250 \text{ ft}}{45 \text{ tsf}} = 0.777 \text{ ft} = 9.33 \text{ in}$$

The most obvious problems with applying this method to placement of a fill is that it was developed for shallow foundations, which are a rigid structure and it was developed for sands, while CCRs are usually classified as silts according to the USCS. Tan and Duncan (1991) cite that this method tends to underestimate settlements around 50% of the time, as it certainly does in this case.

Since this method underestimates the settlements observed at this site by about 50 percent, it may be useful to determine what value of compressibility modulus actually give an accurate settlement:

$$M = \mu_0 \mu_1 \frac{qB}{\rho} = 1.0 \cdot 0.14 \cdot \frac{1 \text{ tsf} \cdot 250 \text{ ft}}{1.5833 \text{ ft}} = 22.1 \text{ tsf}$$

This value for the compressibility modulus is equivalent to an average modulus calibrated to the observed settlements. While one data point is not sufficient to develop a correlation, if enough settlement tests were conducted for CCR materials, it would be possible to develop a CPT-*M* correlation that better predicts settlements than the one used in this investigation.

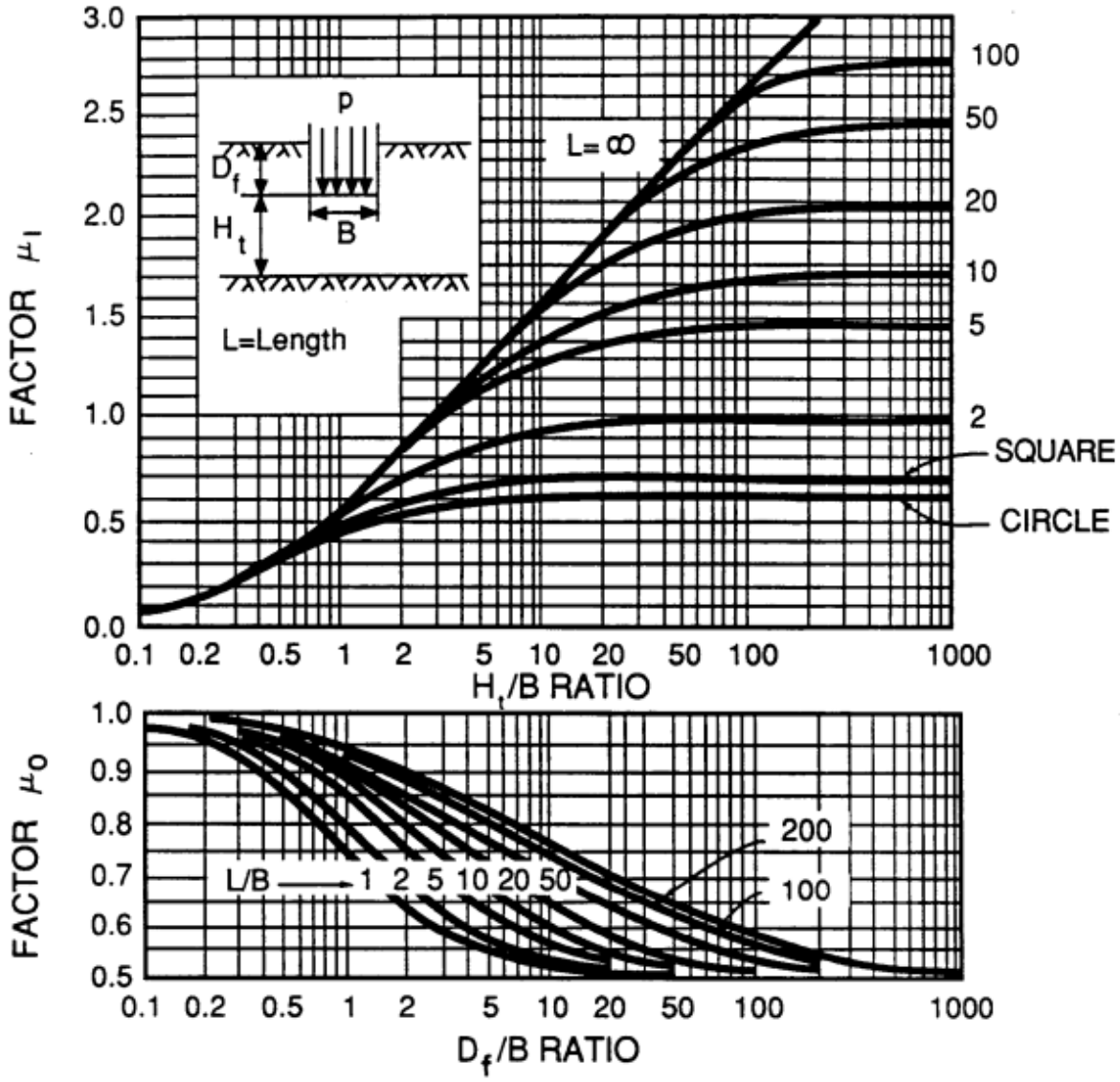


Figure 32: Plots published by D'Appolonia et al. (1970) to determine the values of the geometry factors to be used in footing settlement analyses.

6.4 Other Observations

As an alternative to specific methods of settlement calculations, if it is assumed that the fill is of large lateral extent, a basic calculation of settlement can be made using *M*, the pressure applied by the fill, and the depth of the soil strata being filled:

$$S = \frac{PZ}{M} \tag{10}$$

where P = the pressure applied as a result of the fill
Z = the depth of the soil where settlements are being considered

Again using a value of M = 45 tsf, the settlement is calculated as 13.33 inches. This is still an under-estimate of settlement for this test fill, but given that a CPT correlation for *M* in CCR materials was developed, it may be possible to calculate more precise estimates of settlement. Reduction factors could then be applied to equation 10 in order to attain an acceptable level of reliability.

A comparison of Young's modulus of soil (E_s) can also be made using Hooke's Law and the observed settlement:

$$E_s = \frac{PZ}{S} \tag{10}$$

where P = the pressure applied as a result of the fill
Z = the depth of the soil where settlements are being considered
S = the observed settlements after fill placement

versus the correlation of CPT tip resistance (q_t) to E_s used in Schmertmann's CPT settlement calculation method:

$$E_s \approx 2.5 \cdot q_t \tag{11}$$

Using Hooke's Law with a settlement of 19 inches and an applied fill pressure of 1 tsf, the E_s calculated is 31.6 tsf. Using the CPT correlation given in equation 11, the average CPT tip resistance over the depth of the CCR deposit below the test fill was about 17 tsf, which would return an E_s value of 42.5 tsf.

The accuracy of these values of E_s are questionable, however, Hooke's law assumes a linear-elastic stress-strain condition and the CPT correlation was developed for use with sandy soils. Ideally, CPT correlations should be developed specifically for CCR materials and E_s, which would require a large volume of CPT tests and data analysis.

Chapter 7

Reconstitution Technique for Surface Impounded CCRs

Sample reconstitution techniques try to balance process simplicity with matching the in-situ fabric of the soil as closely as possible. Some reconstitution techniques commonly used on sand and non-plastic silt materials include moist tamping methods, air and water-pluviated methods, and slurry deposited methods. In this chapter, a brief overview of these various methods is given and a technique not yet applied to coal ash materials is analyzed when used with surface impounded CCR materials (will be referred to as SI CCRs throughout this chapter).

7.1 Moist Tamping

The first moist tamping method was proposed by Ladd (1978) in a paper entitled "Preparing Test Specimens Using Undercompaction." In this method, specimens are formed by hand-tamping of moist soil (w% = 20% to 70%) in equal lifts within a triaxial sample split mold, while increasing the dry mass of soil in each subsequent lift. The soil samples should be mixed with water at least 16 hours prior to use and the lift thickness should not exceed 1 inch for specimens with a diameter of less than 4 inches. Ladd provided an equation to calculate the percent under-compaction for each layer placed:

$$U_n = U_{ni} - \left[\frac{(U_{ni} - U_{nt})}{n_t - 1} \times (n - 1)\right] \tag{11}$$

where U_{ni} = percent under-compaction selected for first layer
U_{nt} = percent under-compaction selected for final layer (normally zero)
n = number of layer being considered
n_i = first (initial) layer
n_t = total number of layers (final layer)

The U_{ni} of the first layer is usually between 0% for very dense specimens and 15% for very loose specimens. In order to determine the correct U_{ni}, a series of cyclic triaxial tests must be run with the same effective consolidation stresses and CSR, but with different values of U_{ni}. The specimen then observed during testing and the following observations indicate an inappropriate value of U_{ni}:

- Excessive necking or bulging in any part of the specimen during cyclic loading.
- Non-uniform vertical strains during unconsolidated-undrained loading.
- A honeycomb soil fabric structure at either end of the specimen.
- A non-uniform dry unit weight along the height of the specimen.

Other moist tamping techniques modify this method slightly, usually by either changing the method in which under-compaction is addressed or by defining a specific compaction energy to be used in compacting the sample. This method can be laborious if the correct value of U_{ni} must be determined, since a whole test regime must be completed. Additionally, with regards to hydraulically-placed soils, the fabric of the sample does not match in-situ conditions well.

7.2 Air/Water Pluviation

"Pluviation" or "raining" of soil is a technique first published by Kolbuszweski in 1948. In this technique, the soil is pluviated from a separate apparatus into the soil mold, either in a dry state, or in water. These apparatuses vary in complexity and have various opening sizes and diffuser designs. By controlling the flow rate of the soil through the diffuser and the fall height of the sand, it is possible to place the soil at varying relative densities (Rad and Tumay 1987).

While air-pluviated samples can provide relatively uniform specimens and is a good technique for modeling Aeolian deposits of poorly graded sands and silts, well-graded sands or sands with

high fines content have a tendency to segregate. Furthermore, the fabric of the sample can be disturbed during the saturation phase of triaxial testing due to fines washing out of their original placement (Keurbis and Vaid 1988). Air-pluviation would not likely model the fabric of surface-impounded CCRs well, since these CCRs are deposited in a hydraulic environment. Furthermore, the high content of non-plastic fines in CCRs would make loss of soil due to dust very high.

Similarly, water-pluviated specimens form uniform samples of poorly graded soils, though usually at lower relative densities than air-pluviated specimens, since soils fall at a slower velocity through water than through air. However, with well-graded soils, or soils with high fines contents, particle segregation can be a problem with this technique (Keurbis and Vaid 1988). Particle segregation would also be an issue with surface impounded CCRs, since these tend to be a mixture of bottom ash and fly ash.

7.3 Slurry Deposition Techniques

Like the previous two methods, there are several different slurry deposition methods. The first slurry deposition method was first developed by Keurbis and Vaid (1988), which is the technique that is being assessed for use on surface impounded CCRs in this thesis, with some slight modifications. For the sake of avoiding any redundancy, the procedure for this technique will be outlined with specific reference to its use on SI CCRs, with departures from the original procedure of Keurbis and Vaid noted.

7.4 Slurry Deposition Technique Applied to SI CCRs

The basic premise of the slurry deposition technique is to form a lean (just enough water to allow for effective soil mixing), saturated slurry of soil that can then be deposited directly from a mixing tube into a triaxial split-mold, with minimal disturbance to the mixture. The slurry should be lean enough to avoid the development of sedimentation currents during the transfer from the mixing tube to the split-mold, but not so lean that mixing becomes difficult. In addition, the procedure ensures that the sample will be fully or very close to fully saturated upon completion. The samples are deposited very loosely initially and can be densified to higher relative densities

by vibration. In their original slurry deposition method, Keurbis and Vaid recommend de-airing the soil-water mixture and then pluviating it into the mixing tube in order to better ensure saturation. However, CCRs can be fine enough that a considerable amount of the sample (of a specific grain-size) can be lost in the pluviation process. Therefore, the CCR samples prepared using this method are simply added to de-aired water directly into the mixing tube in order to minimize sample loss during the preparation process; if saturation ratios using this method are unacceptable, a soil-water mixture can de-aired under a vacuum or by boiling and then transferred directly to the mixing tube. The apparatus required for the CCR slurry deposition technique are as follows:

- Acrylic mixing tube, with an outer diameter slightly smaller than the target diameter of the sample being formed and a plug to seal off one end. The end opposite of the mixing tube will have rubber gasket seal glued around the rim. The other dimensions of this tube will be discussed later.



Figure 33: Acrylic mixing tube with a rubber stopper on one end and rubber gasket seal glued to the opposite end.

- A thin metal disk approximately the same diameter as the bottom porous disk used in testing.

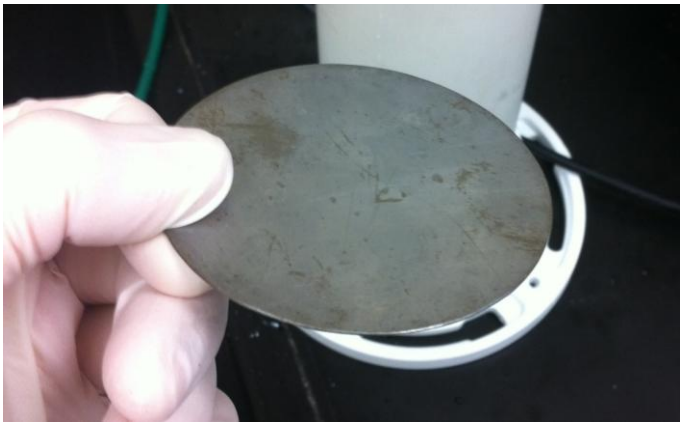


Figure 34: Thin metal disk approximately the same diameter of the bottom porous disk.

- A rubber or latex membrane with a smaller diameter than the mixing tube. Standard store-bought balloons can be cut to fit and are a cheap, readily available alternative.
- Water bath container for the acrylic mixing tube, large enough to completely submerge the mixing tube.

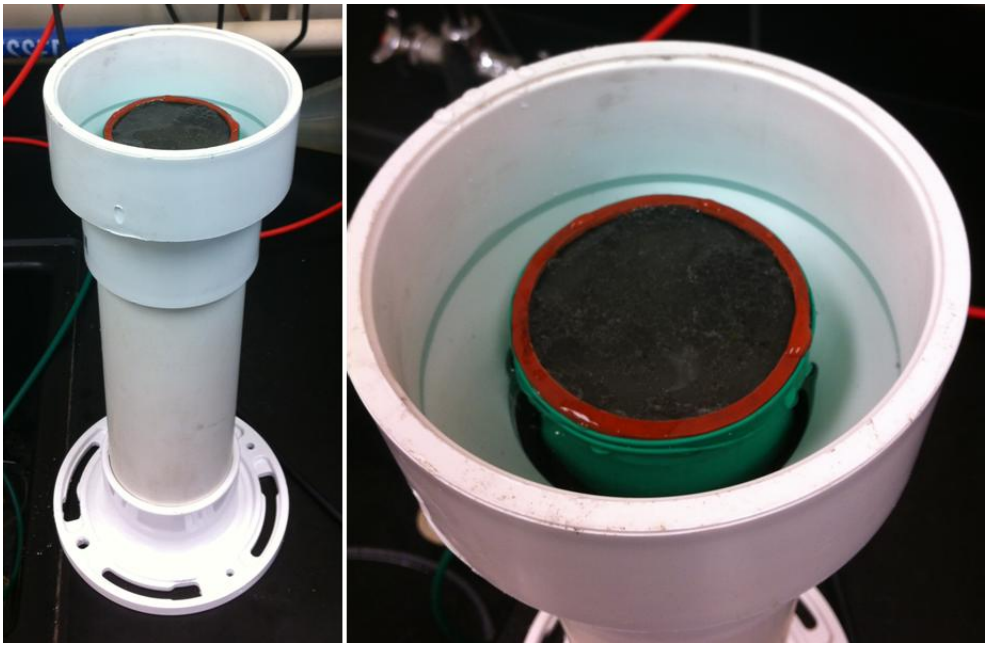


Figure 35: Water bath large enough to completely submerge the mixing tube and allow for easy placement of the porous disk and metal plate. The rubber membrane can also be seen rolled down around the mixing tube.

- Water bath container for the triaxial cell base-platen that can at least submerge the bottom drainage line and the porous disk when the mixing tube is placed on it.

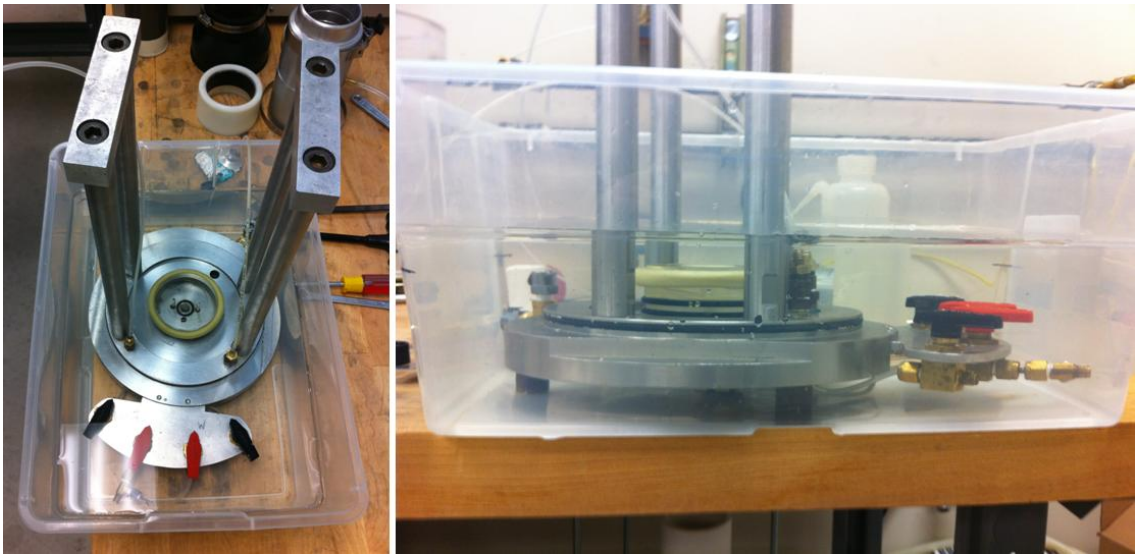


Figure 36: Water bath large enough to accommodate the bottom of the triaxial cell and submerge the bottom platen.

- A split-mold triaxial sample former.
- A collar that fits over the split-mold to accommodate the temporary increased volume of the sample when it is first placed.

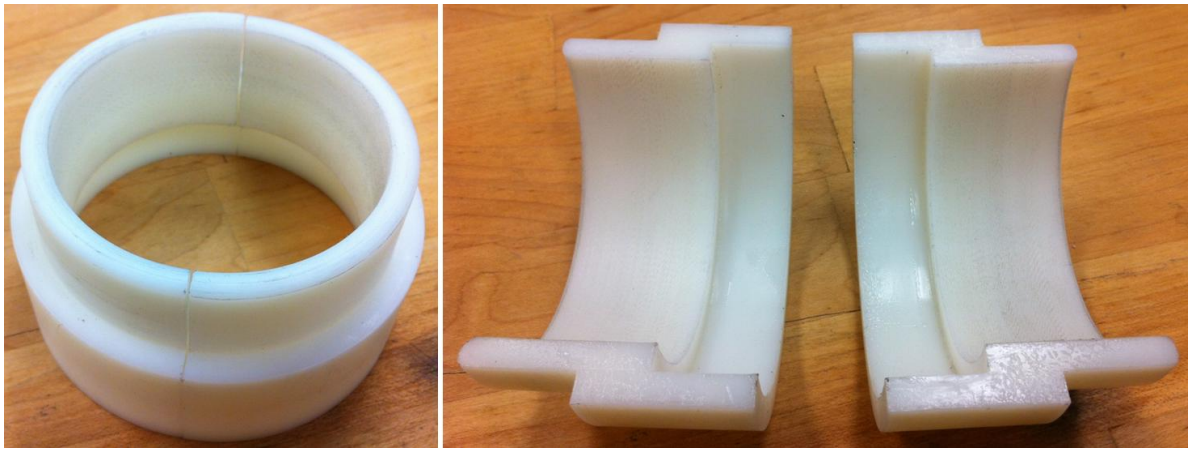


Figure 37: A custom-made split-collar to accommodate the additional volume of soil when the slurry is first placed in the specimen split-mold. This collar was machined out of nylon to fit the dimensions of the split-mold being used and the flexible collar used to accommodate the extra water volume when the slurry was placed.

- A small mechanical shaker or mallet to densify the sample once it is placed. If a mallet is used, a heavier mallet is best, as it transfers more energy than a standard rubber mallet.

In their original slurry-deposition method, Keurbis and Vaid made their soil-water mixtures using dried soil; for SI CCRs, this would be impractical because of the dust that would be lost in handling it in a dry state. Thus, it is recommended that the SI CCRs be mixed at a target water content in order to make it more workable. Once the soil is well-mixed, several small samples should be oven-dried to verify that the moisture content of the soil is homogenous.

The mixing tube should have the thin rubber membrane rolled down over the end with the rubber gasket seal and the other end plugged with the stopper. The moist CCR specimen is placed in the mixing tube, which should then be filled with de-aired water (some water can be in the tube prior to adding the moist soil in order to help collapse the structure of the moist CCRs and decrease their volume during placement in the tube). The mixing tube is now placed into the de-aired-water bath. Once the mixing tube is in the water-bath, a saturated, de-aired porous disk with a filter paper attached is placed on the open end, such that it is completely submerged in the water bath; some fines will escape the mixing tube while it is submerged and before the porous disk is placed over the opening (see Figure 38), so these fines should be put into a container to be oven-dried and weighed in order to adjust the dry mass of the sample.

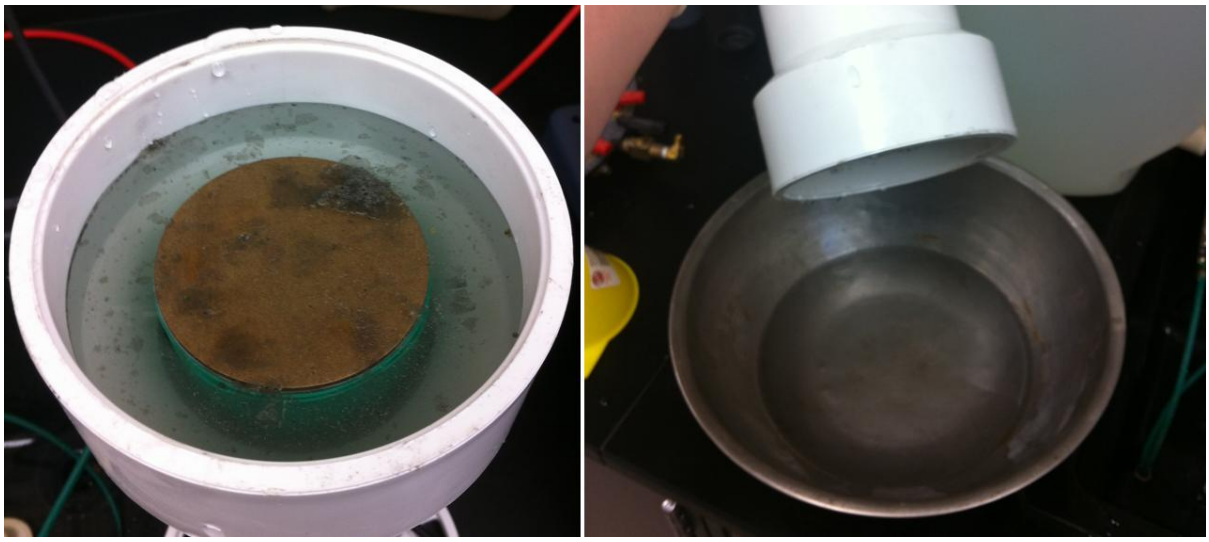


Figure 38: Placement of the porous disk and transferring of the fines lost in the water bath to a container to be oven-dried and weighed.

At this point, the thin rubber membrane is rolled over the porous disk, such that a small portion of the center of the disk is exposed. The thin, metal disk is now placed over the porous disk and membrane and the mixing tube is withdrawn from the water bath, while keeping firm pressure on the metal disk. The securing of the porous disk with the thin rubber membrane and placement of the metal disk are shown in Figure 39.

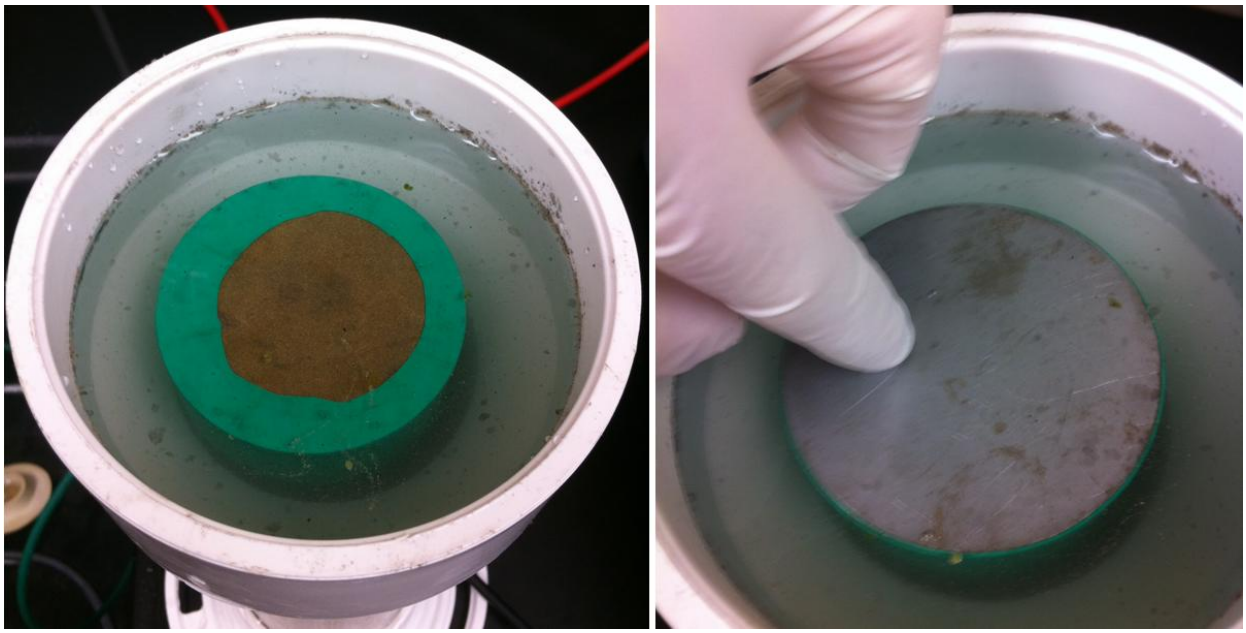


Figure 39: Securing of the porous disk with the thin rubber membrane and placement of the thin metal disk over the opening in the membrane.

Now the mixing tube is removed from the water bath while maintaining firm pressure on the thin metal disk and the soil slurry mixed vigorously, end-over-end for the next twenty minutes, to ensure homogeneity of the slurry. After twenty minutes has passed, the mixing tube is placed disk-end down and the mixture is allowed to settle to its loosest stable state. When the mixture has stabilized, the metal disk is removed (it should be held in place by suction when the mixing tube is lifted), the membrane rolled back to the edges of the porous stone, and the entire apparatus placed porous-disk-down onto the base platen, which is submerged in another de-aired water-bath. The rubber membrane around the mixing tube is now rolled up and off of the mixing tube. The sample membrane has been rolled down around and attached to the bottom platen with two o-rings prior to submerging the base platen in the de-aired water-bath and it is now rolled up and over the outside of the mixing tube. The entire bottom platen can now be removed from the water bath and the split mold formed around the mixing tube and sample membrane. Rolling of

the membrane over the mixing tube and placement of the split mold and collars after removal of the triaxial cell base from the water bath is illustrated in Figure 40.

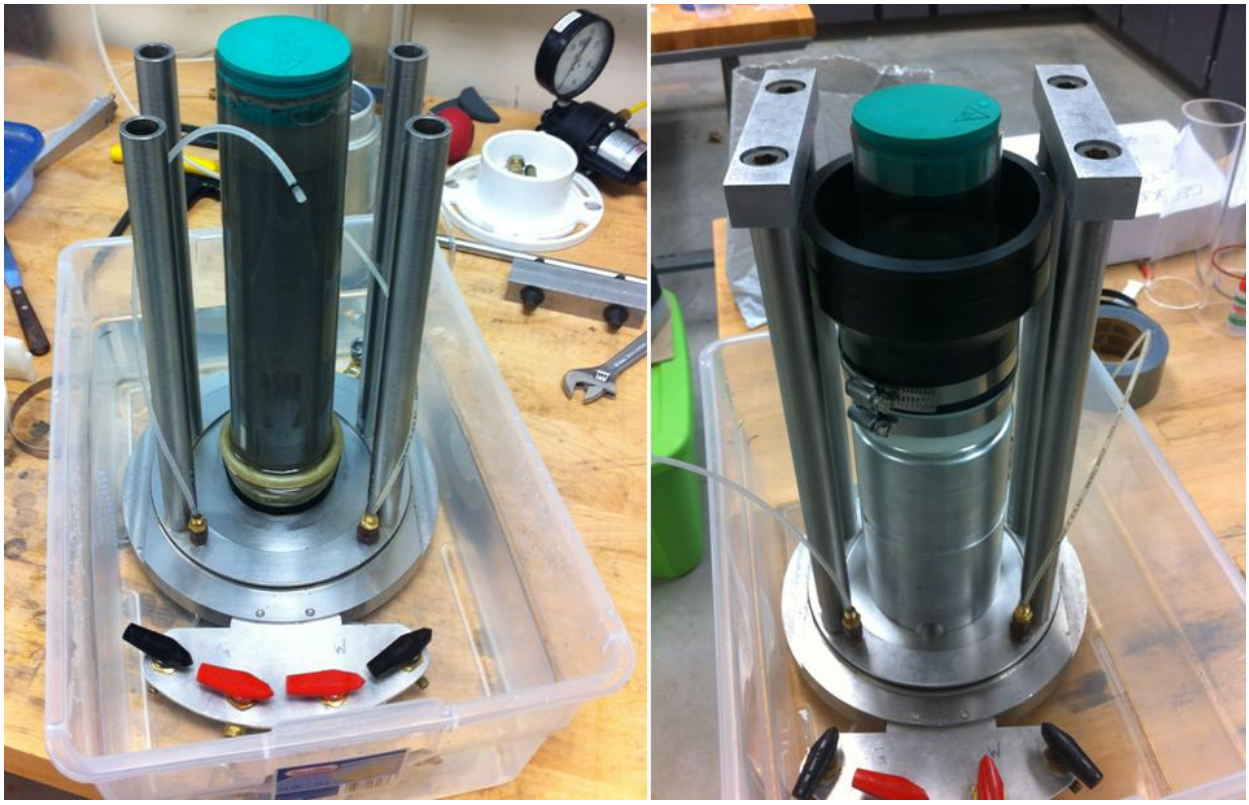


Figure 40: Rolling up the membrane around the mixing tube and placement of the specimen split-mold, the slurry extension collar, and the water extension collar after removal of the triaxial cell base from the water bath.

Once the extension collars for the split-mold is attached, a vacuum is applied between the split mold and the membrane; then, if additional volume is required to accommodate water volume, either a larger membrane can be secured using a hose clamp, or a flexible rubber PVC connection can be used (the flexible PVC connection was used in this experiment, as shown in the right-hand photograph in Figure 40). The last step before transferring the slurry to the split mold is to add a de-aired water bath to the split mold, outside of the mixing tube; this ensures minimal disturbance of the CCR material as it is transferred from the mixing tube to the split-mold. The rubber plug on the mixing tube can now be removed and the mixing tube slowly extruded, such that disturbance to the slurry is minimized as it is deposited in the split-mold. When the mixing tube has been fully extruded, the water level can be adjusted by allowing drainage through the drainage lines on the bottom platen (alternatively, some of the water and fines mixture at the top can be basted off and put into the same container as the fines from the

mixing tube water bath and oven-dried and later weighed to save time). Once the water level has dropped enough to allow removal of the extra membrane or flexible PVC connection, the slurry can be densified by attaching the top platen (which also has a filter-paper applied), applying a small pressure, and vibrating the sample if necessary, while allowing excess pore pressures to dissipate through top and bottom drainage lines, as shown in Figure 41. This should be done such that the piezometric pressure is the same across the sample, which was postulated to form specimens of sand at uniform densities with height by Vaid and Negussey (1988).



Figure 41: Setup used to densify SI CCR slurry-deposition samples. Notice that the short-circuit between the top and bottom drainage is being used to drain the sample as it is densified with the top platen applied. The top platen fits snugly enough into the extension collar to keep a water-proof seal. The white piece on the top of the triaxial base is simply a part to keep the piston plumb as the slight pressure is applied to the top of the sample during densification.

This vibrating can be accomplished with either a mechanical shaker or by tapping the side of the split mold gently with a mallet. However compaction of specimens to high relative densities can take quite a long time using a mallet, so a mechanical shaker would be preferable for SI CCR specimens. Once the target sample height is reached (and thereby the target sample volume reached), the extension collar is removed, the membrane is secured to the top platen with two o-

rings, and a small vacuum pressure is applied to the sample to allow removal of the split mold. The dimensions of the sample are then measured and the sample is placed into the triaxial testing apparatus.

The dimensions of the acrylic mixing tube are determined based on the minimum density of the largest volume of soil that will be used in making a sample. That is, the length of the tube is determined based on the amount of soil required in forming the densest sample to be tested, placed at a zero percent relative density. Keurbis and Vaid found that this volume, increased by five to ten percent is sufficient to allow for adequate slurry mixing, while avoiding large particle sedimentation distances. A sample calculation determining the appropriate length for a mixing tube is included in the appendix.

7.5 Analysis of Slurry Deposition Technique with SI CCRs

In order to assess the slurry deposition technique as applied to SI CCRs, relative density and gradation were determined for the top, middle, and bottom portions of the sample. Since CCRs tend to be non-plastic and negative pore water pressures in a moist sample are not high enough to ensure no disturbance of fabric during the verification process, a gelatin solidification technique developed by Emery et al. (1973) for use with sand specimens was modified for use in this experiment. Gelatin was chosen as the solidifying agent because it is easily dissolved using heat after the volume of each individual slice of the specimen is determined. Then, by adding bromelain, a proteolytic enzyme, the gelatin is broken down, leaving a brittle crystal that can then be avoided when selecting a sample to run a hydrometer test on, and that can be washed out when the gradation is analyzed above the #200 sieve.

SI CCRs have a wide range of hydraulic conductivities (a result of how they are generated and placed), sometimes being similar to sands and other times being more similar to silts. For this reason, the time required to permeate these samples with a gelatin solution is much longer than for clean sand samples. As a result, it was determined that a lower concentration should be used than recommended by Emery et al., such that the solution remains a liquid at room temperature, but is solidified by surrounding the sample in the split mold with an ice-bath; this is explained in more detail in the following paragraphs.

Once the compaction of the slurry deposited sample was complete, height measurements were made at four locations (front, back, right, and left sides of the top platen) using the frame of the triaxial cell and a Mitutoyo micrometer. The height of the sample was determined by subtracting the thicknesses of all the component parts that are not soil from the heights measured from the bottom platen to the triaxial cell frame at four points (front, back, right, and left sides). This was done as a quality-control measure to ensure that the overall relative density across the sample was close to the target relative density. A 0.75% by-mass gelatin solution is then permeated through the specimen by applying an elevation head between the gelatin reservoir and bottom drainage lines of the specimen and allowing drainage through the top drainage lines (not more than 18 inches). About two specimen pore volumes were permeated through the specimen to ensure complete replacement of the pore fluid. After the gelatin flushing of the specimen was complete, the drainage lines were all closed and an ice-bath was packed around the specimen, as shown in Figure 42. For this experiment, the ice bath was maintained over the height of the sample for a period of four hours, which was found to be adequate to solidify the specimen.

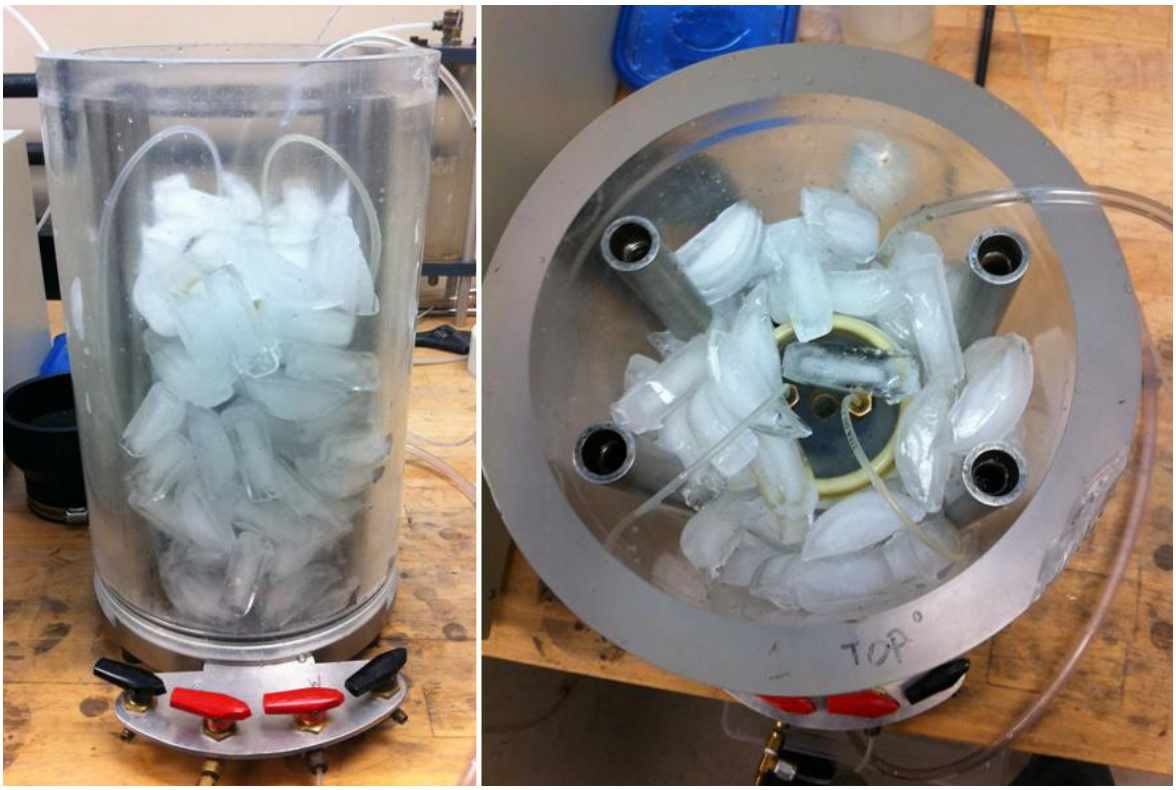


Figure 42: Ice bath placed around the compacted specimen for a period of four hours to set the gelatin.

After the four hours, the ice bath was removed and the specimen was removed from the split mold and taken out of the membrane, as shown in Figure 43, and cut into three approximately even-sized portions.

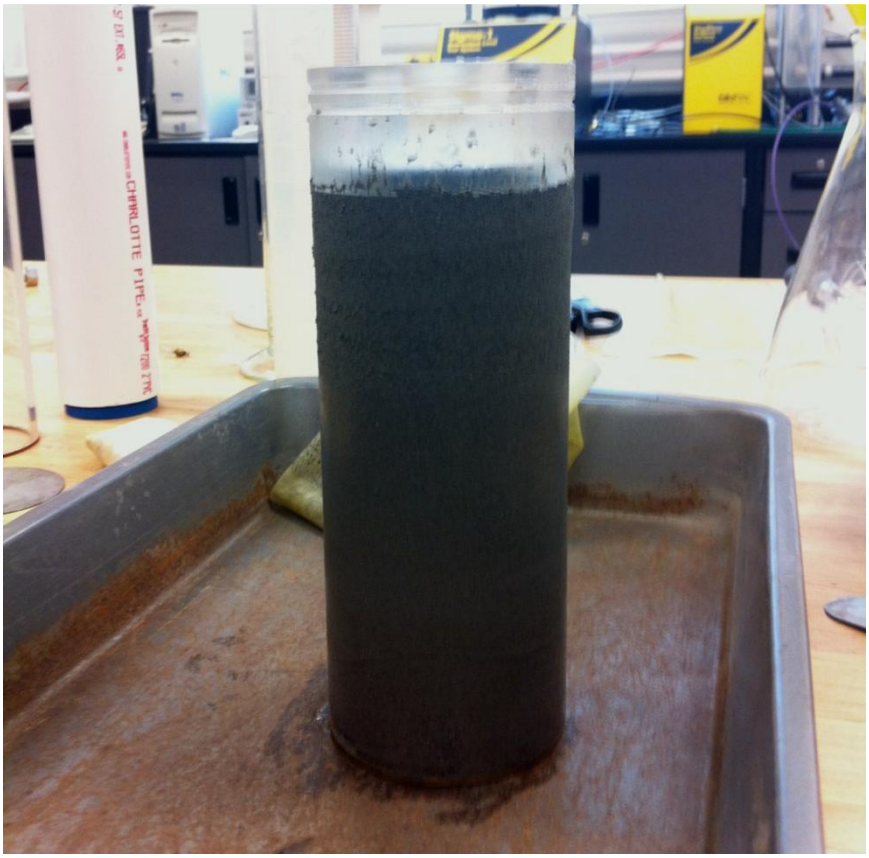


Figure 43: Specimen removed from the split mold and membrane following gelatin curing period.

The mass of these portions was taken and the volume determined using water displacement, as shown in Figure 44. These two measurements allow for the calculation of the density of each slice. It can be assumed that each of the slices is composed only of a mixture of gelatin and CCR material for the purposes of determining the relative density of each slice. The specific gravity of the gelatin solution was determined by permeating a portion of the solution through a piece of filter paper into a graduated cylinder and also placing this in an ice-bath for four hours, after which the mass and volume of the gelatin were measured and used to calculate the specific gravity at that temperature (ranged from 1.000 to 1.008). The specific gravity of the CCR material was determined according to ASTM D854, courtesy of Kevin Foster. Since the overall

density of each slice is known, and the density of both component materials is known, it is possible to calculate the volume of each component according to equations 12 and 13.

$$V_{s_slice} = \frac{\rho_{slice} \cdot V_{Slice} \frac{G_G M_{slice}}{\rho_{slice}}}{G_S - G_G} \tag{12}$$

where V_{s_slice} = volume of solids of the specimen slice
ρ_{slice} = density of the specimen slice
V_{slice} = volume of the specimen slice
G_G = specific gravity of the gelatin solution after ice-bath
M_{slice} = mass of the specimen slice
G_S = specific gravity of the CCR material

$$V_{g_slice} = \frac{M_{slice}}{\rho_{slice}} - V_{s_slice} \tag{13}$$

where V_{g_slice} = volume of gelatin of the specimen slice

Since it is assumed that the gelatin completely permeated the pore space of the sample, the volume of the gelatin is equal to the volume of voids in the slice and the void ratio can be calculated, which can then be used to calculate the relative density.

Once the densities of the slices has been determined, each slice is placed in its own container and allowed to dissolve (which will occur at room temperature), after which the Bromelain is added (a mass ratio of 1:10 of Bromelain to gelatin was found to be sufficient) and allowed to sit for two hours before placing it in an oven maintained at 110° C until it dried completely. ASTM D422-63 was followed in the particle-size analyses performed on each of the three slices for each sample, except for a few changes based on the properties of the CCR materials:

- The soil was not separated at the #10 sieve, since the material retained on the #10 sieve represented such a small portion of the sample. Additionally, in separating the samples at this sieve, there was the potential to lose specific particle sizes due to dust losses. Each of the hydrometer tests were separated on the #10 sieve following the test and the mass was adjusted accordingly for the hydrometer analysis calculations. This also

eliminates the need to perform the calculation given in section 16 of the ASTM specification.

- A dry sample was used in each hydrometer test, since there would have been considerable time delays waiting for the specimen to dry at room-temperature (especially considering the presence of gelatin and bromelain in the specimens.

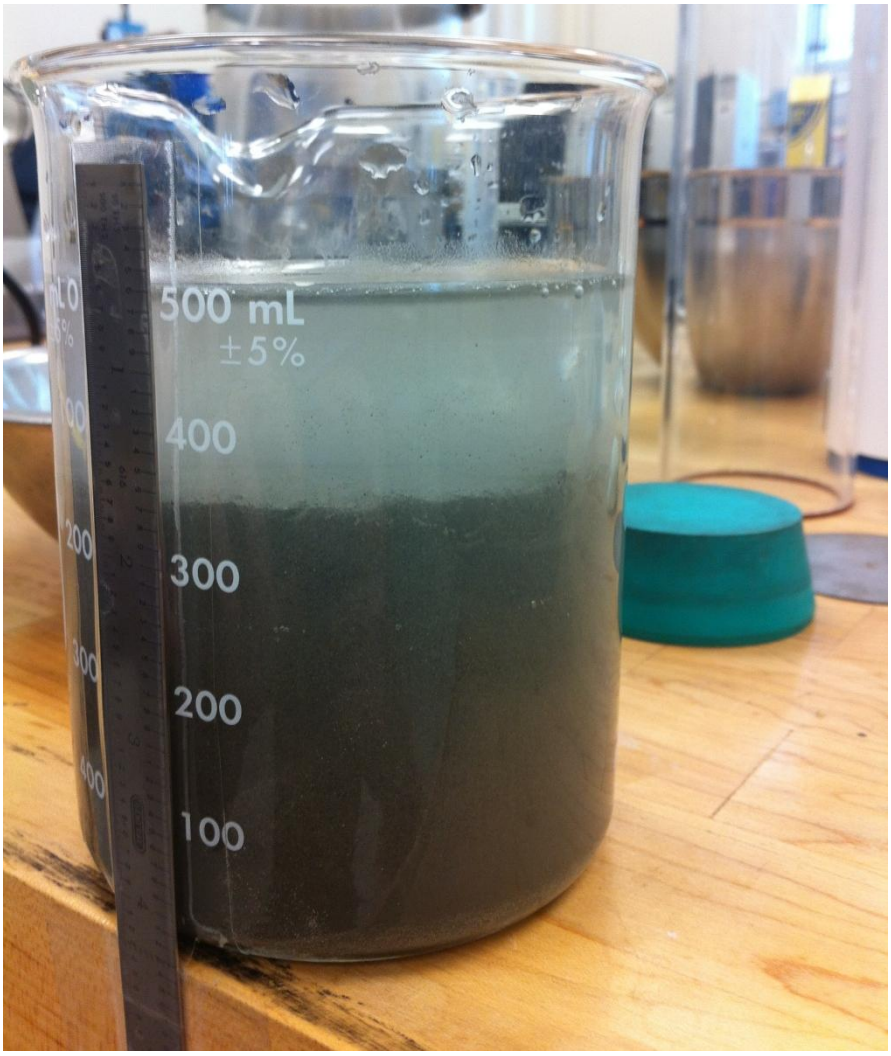


Figure 44: Each specimen slice volume was determined using water displacement. A 500 mL capacity beaker and a ruler incremented at 1/100" were used to do this. The vertical distance between a 100 mL addition of water to the beaker and the equation for the volume of a cylinder was used to calculate the diameter of the beaker; with the diameter known, it was determined that volumes could be measured accurately to ± 1.4 cm^3.

A dry sample of each of the slices could then be chosen to use in a hydrometer test (Bromelain-gelatin crystals were avoided in order to ensure they did not affect the results) to determine the

grain size distribution for soil passing the #200 sieve. This soil was then added back to the rest of the dried specimen slice and washed on a #200 sieve to be included in a grain-size analysis for the particles with diameters greater than 75 μm.

Three different specimens were prepared, all at a target relative density of 70%. The first two specimens were deposited without a water bath within the split mold, while the last one was deposited with a water bath within the split mold. Table 11 makes a comparison of overall specimen slice densities and relative densities for the three specimens showing that, with or without a water bath inside the split mold, all three specimens had an increase in relative density down the height of the specimen. The top slice on the last specimen had not fully cured and as a result deformed some during the mass and volume measurements, undoubtedly resulting in the negative value of relative density. However, the bottom two slices of all three specimens are very consistent and the overall increase in relative density down the height of the specimen indicates that the densification technique that Vaid and Negussey (1988) cite as producing specimens of uniform density does not apply to SI CCR materials. Additionally, the very high values of relative density for all of the bottom slices indicate that the maximum and minimum void ratios determined for the material do not necessarily reflect the actual minimum and maximum void ratios; this could be the result of an inaccurate calculation of the specific gravity of the material, since that is a direct parameter for determining void ratio or an indication that the standards ASTM D4253 and D4254 are not appropriate methods for determining the minimum and maximum densities of CCR materials.

Table 11: Specimen relative density and density summary. The bottom two rows summarize relative density and density data for the entire specimen.

	Specimen 1		Specimen 2		Specimen 3	
	D_r	ρ (g/cm^3)	D_r	ρ (g/cm^3)	D_r	ρ (g/cm^3)
Top Slice	45%	1.63	27%	1.60	-13%	1.54
Middle Slice	93%	1.72	79%	1.69	76%	1.69
Bottom Slice	117%	1.78	113%	1.77	112%	1.77
Average	85%	1.71	73%	1.69	58%	1.67
From Dimensions	73%	-	70%	-	70%	-

The gradation curves presented for each specimen in Figures 45 through 47 show little segregation of particle size, with the most notable trend being that the bottom slice did tend to

have a higher percentage of coarser particles within it; whether this phenomenon is solely the result of the placement method or the densification technique or whether both factors contribute is unclear and would require further study to determine. A comparison of the different slice gradations across specimens, presented in Figures 48 through 50, shows a very consistent gradation across the height of the sample between trials, indicating that this slight gradation difference is caused by a either the placement technique or the densification technique, though which of the one responsible cannot be stated with any certainty at this time. However, the effect of the placement technique and densification technique could be investigated easily through further testing. It is also interesting to note for specimen three, where a water-bath was used in the split-mold during slurry placement, that the gradations vary slightly more than for the two specimens, where a water-bath was not included. This may indicate that a water-bath allows sedimentation currents to form, while direct transfer without a water-bath minimizes the development of such currents. More reconstitutions would need to be made in order to perform meaningful statistical analyses on variation in gradation between samples made with and without water-baths to verify this claim. Lastly, Figure 51 plots all gradations on a single plot to make the extent of variation in the grain size distributions of the three specimens clear.

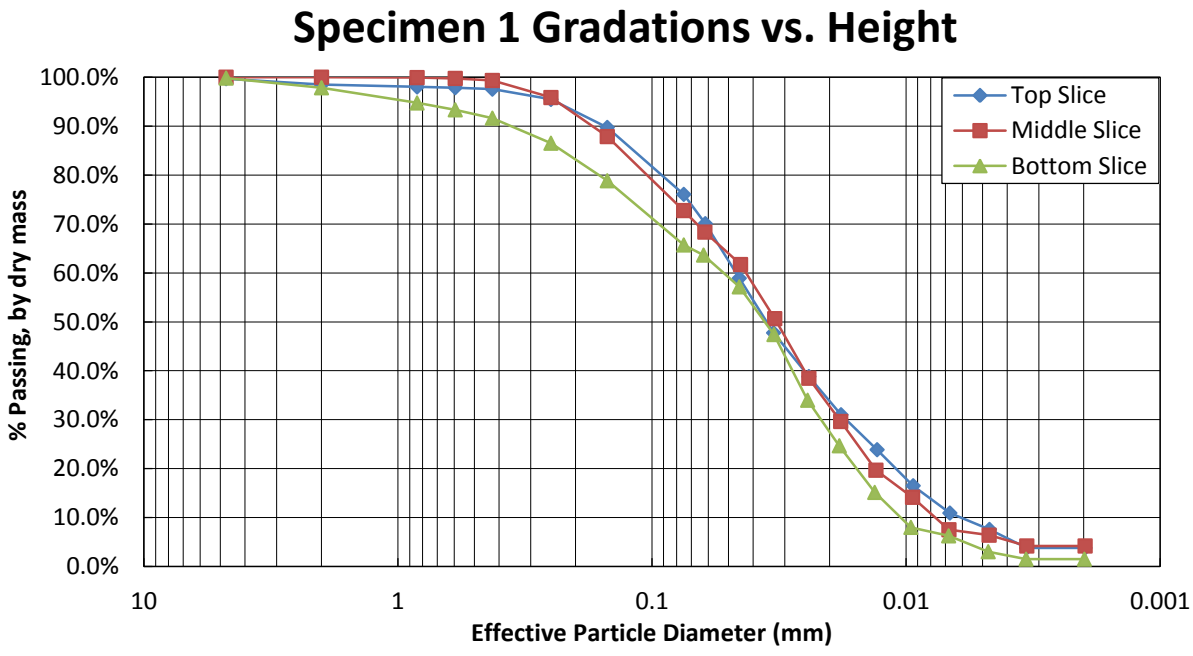


Figure 45: Plot comparing grain-size distributions across the height of specimen one.

While the results of the three reconstitutions performed for this thesis provide some insight, a statement cannot be made about the suitability of the slurry deposition method for use with SI CCRs at this time. However, it can be said that the densification technique used in this investigation is unsuitable for SI CCR materials; if an alternative densification method could be developed, a simple investigation could be undertaken to determine if the slight particle segregation observed in this investigation was due to the vibratory compaction technique used, or if it was the result of the slurry deposition technique itself.

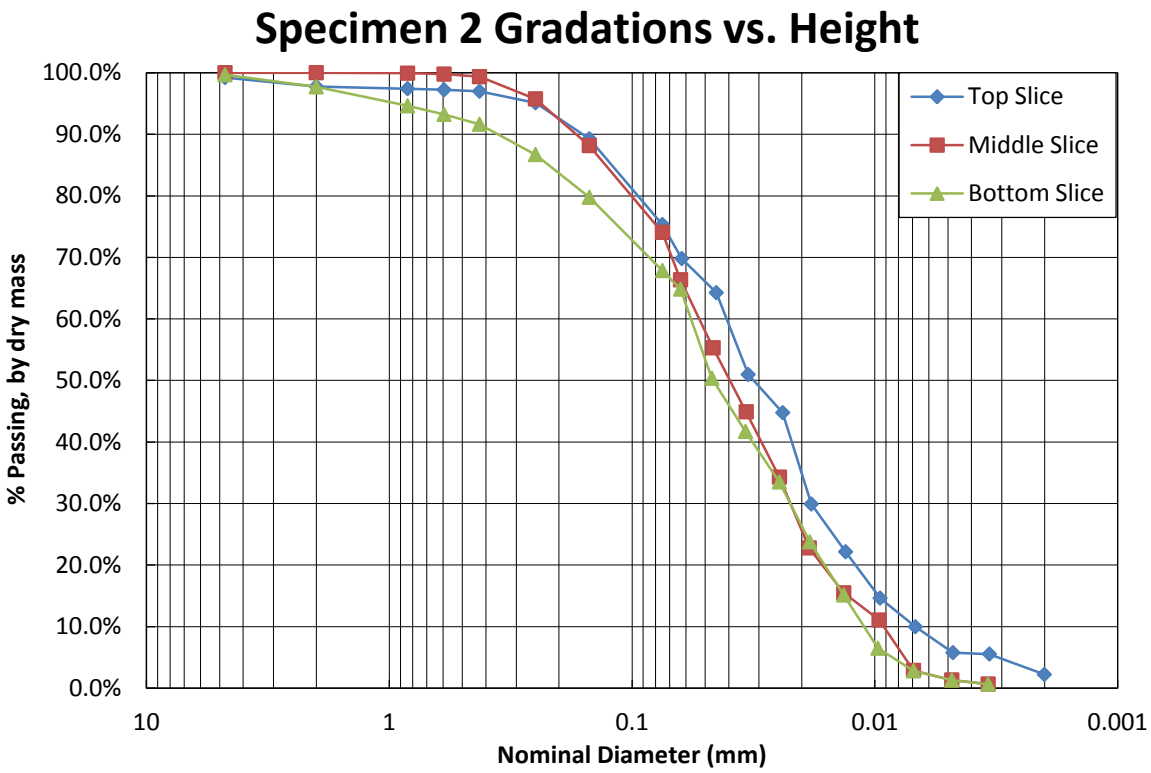


Figure 46: Plot comparing grain-size distribution across the height of specimen two.

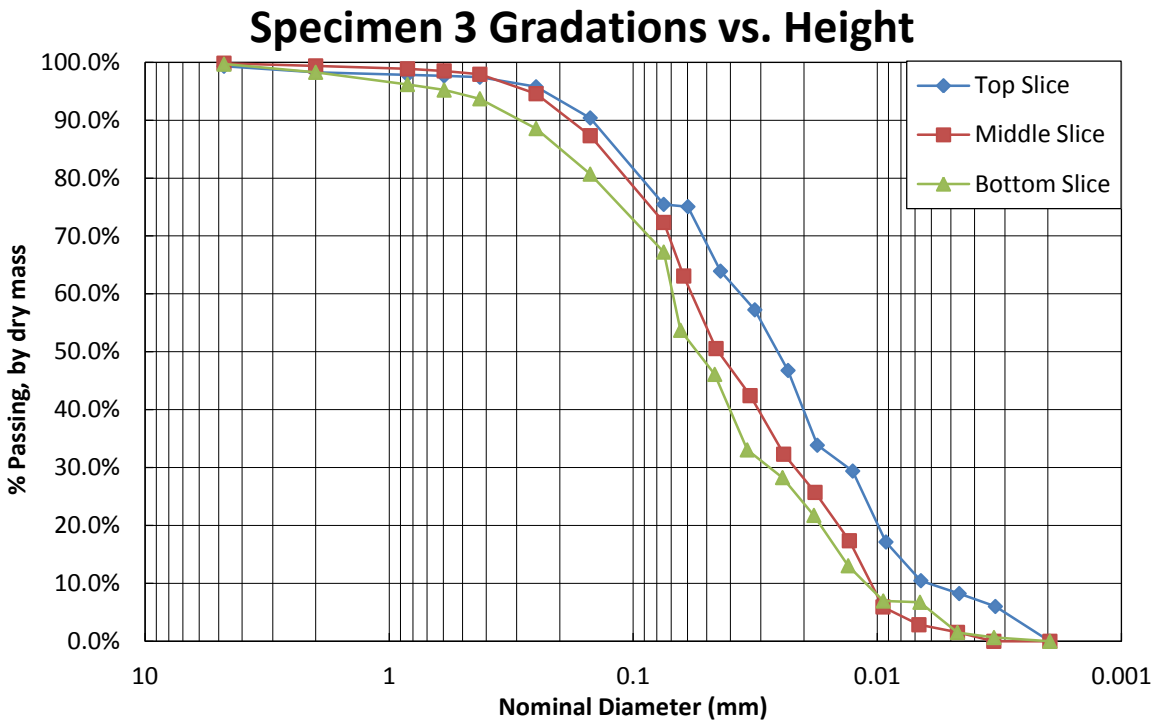


Figure 47: Plot comparing grain-size distribution across the height of specimen three.

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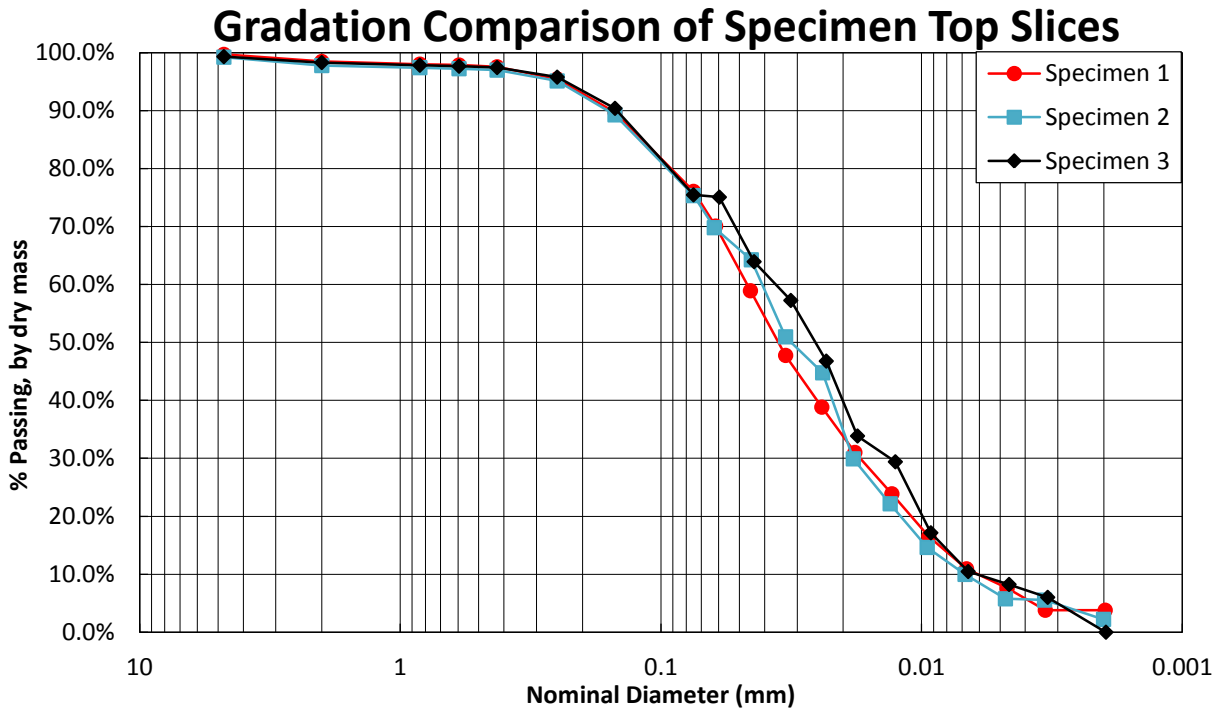


Figure 48: Plot comparing grain-size distributions of the top slices of all three specimens.

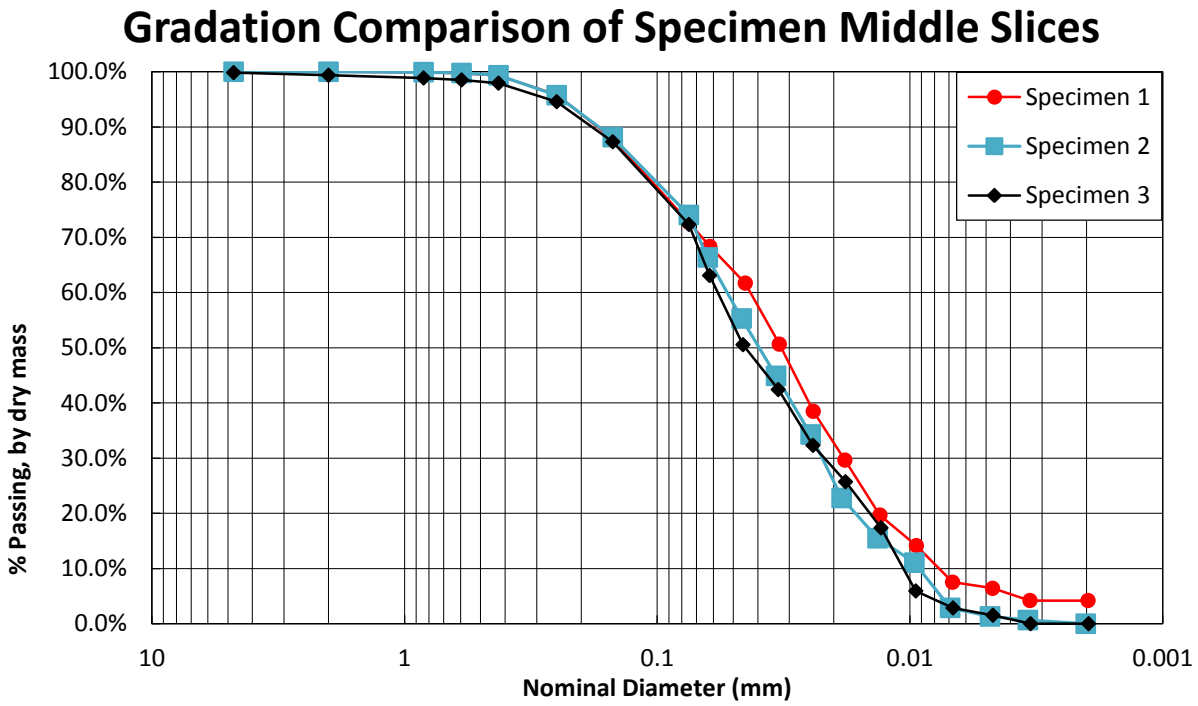


Figure 49: Plot comparing grain-size distribution of the middle slices of all three specimens.

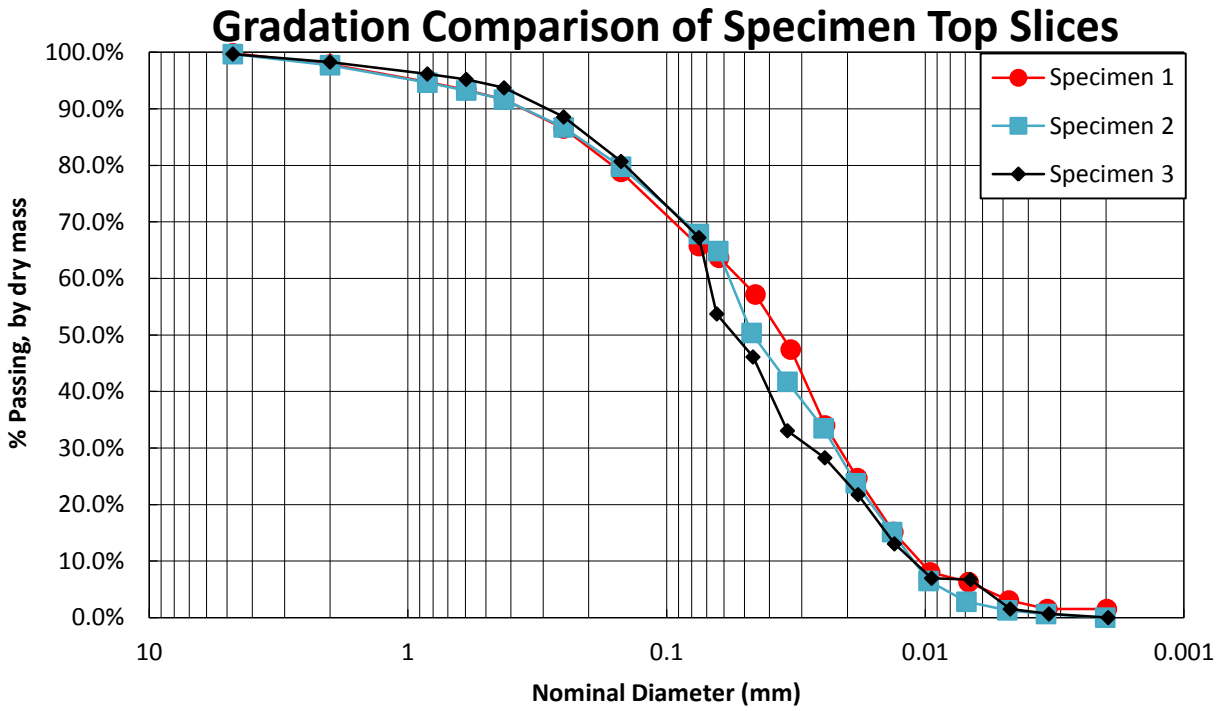


Figure 50: Plot comparing grain-size distribution for the bottom slices of all three specimens.

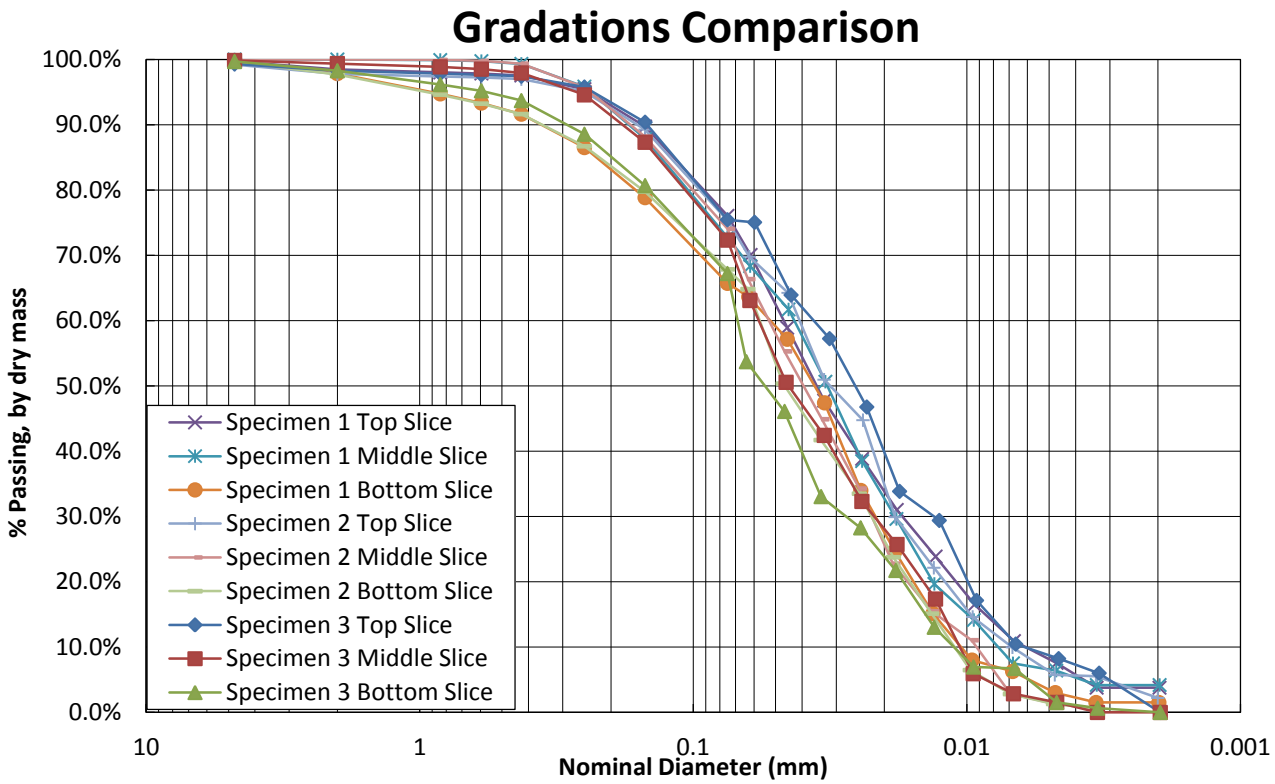


Figure 51: Comparison of all gradations for all three samples.

Examining Figure 51, it is obvious that a considerable amount of variability entered into gradation data with the portion of the graph that was determined using the hydrometer test. This may be the result of slight variations in temperature over the course of the test, regardless of the fact that the room temperature was thermostat-regulated. If temperature readings of the soil suspension had been take at each reading and used in calculating the values derived from Stokes' Law, this variability may have been reduced considerably. The maximum variability in the sieve analysis data for a given nominal diameter was about 10% by mass, while the maximum variability in the hydrometer analysis data for a given nominal diameter was about 25%.

Chapter 8

Conclusions

8.1 Engineering Characterization of CCRs

Geotechnical designs and analyses when working with CCRs are similar to those for natural soils in many respects. The physical and engineering properties of CCRs are what differentiate them from natural soils of similar grain size. Consequently, the single most important aspect of working with CCRs is determining their physical and engineering characteristics. As a result of current and past CCR disposal methods, determining variability in their properties across a given site is also important. As evidenced by the variability plots of the different engineering properties of CCRs, variability can vary greatly to very little within a specific site. However, since the coal source for a given site will inevitable vary, so will the engineering properties of the resulting ash. Because of the differences in properties of CCRs between given sites and from that of natural soils of similar grain size, a more thorough site investigation and laboratory testing schedule will almost always be necessary than for natural soils.

8.2 Dynamic Properties of CCRs

Being a mostly granular and non-plastic material, the characterization of the dynamic properties of CCRs is important to ensure that current and future CCR disposal areas are designed in order to withstand seismic events. Currently there is very little data on the dynamic

properties of CCRs and the data that is available is usually from different countries, whose CCRs may not be similar enough in makeup to merit comparison with CCRs in the U. S.; more dynamic laboratory testing is required before such a conclusion can be made.

8.3 CCR Failure Modes and Monitoring Practices

The two main types of CCR disposal areas, surface impoundments and landfills, are very different in their construction and therefore are prone to different failure modes. As a result, monitoring practices should be tailored to the type of disposal area it applies to. Despite the fact that there is a lack of literature and precedence regarding monitoring of CCR disposal areas, their design tends to be similar enough to mine tailings dams that monitoring practices for tailings dams could easily be adapted and applied to CCR disposal areas. The flowcharts developed by Martin and Davies (2000) provide an excellent template that could be adapted to develop a site monitoring program for CCR disposal areas, especially for surface impoundments.

8.4 Slope Stability of CCRs

Slope stability analyses with CCRs are basically the same as for natural soils, except that there is usually an inherently higher degree of uncertainty in the CCR material. For that reason, analyses involving CCRs should have a degree of conservatism built into every step, unless there is evidence to indicate that such a measure is unnecessary. If the dikes containing surface impounded CCRs are built CCR materials, or other non-plastic soils that have the potential to have low hydraulic conductivity, then a sudden rise in the water table has a deleterious effect on the impoundment's performance. For this reason, if such conditions do exist, it is good practice to install drainage (if not already installed) to ensure a steady-state water table can be maintained.

8.5 Settlement Calculations for CCRs

Many researchers report compression and recompression indices for CCR materials. However, since CCRs generally do not have clearly log-linear values of compression and recompression indices, calculating settlements using consolidation theory can yield variable settlements, depending on different individuals' interpretation of standard consolidation tests.

The two methods for settlement of foundations in sand provide very similar results, underestimating settlement considerably. This is possibly the result of scale effects and differences in the mechanics of the materials (silt-sized particles that are the result of an industrial process rather than natural sands). In order to accurately say that none of these settlement calculation methods works well in CCR surface impounded materials, however, more test fills would need to be performed and analyzed in a similar fashion.

8.6 Slurry Deposition Technique Applied to SI CCRs

While it was not verified that the slurry deposition technique can be applied to SI CCR materials, the method shows promise based on the low variability of grain-size distribution across specimen height for the three specimens tested. However, a major drawback to this method is that the original densification method suggested by Keurbis and Vaid (1988), which was for sands and silty sands, does not appear to work for SI CCR material. Furthermore, more investigations would be required to determine whether the gradation differences observed in these three samples are due to particle migration during vibratory densification or to the actual deposition technique; if it is due to the former, a different densification method may make the slurry deposition method a very attractive reconstitution technique because it is relatively easy and has excellent repeatability, as evidenced in the results presented in Chapter 7. All spreadsheets used in specimen preparation and specimen analysis are provided in the appendix.

8.7 Recommendations for Further Study

As discussed in Chapter two, since CCR materials are the result of an industrial process and not a naturally occurring soil, there is a variety of factors that can affect their engineering properties. Not being a naturally occurring soil, there is a comparatively small body of literature available that reports engineering properties of CCRs. Furthermore, these properties will not necessarily be comparable between different regions. It is therefore necessary to continue research in CCRs, especially with regards to the following:

- Effects of placement condition on the engineering properties of CCRs (i.e. surface impounded vs. moist-compacted).
- Variability in engineering properties of CCRs between disposal sites and within disposal sites (and how to best quantify variability for different properties).
- Dynamic properties of CCRs, to ensure that seismic design of CCR disposal areas is adequate and determine if some disposal areas are higher risk in the event of an earthquake.
- CPT correlations to determine engineering characteristics of CCR materials in-situ.
- The effect of time on the engineering properties of CCRs.
- Determining the most appropriate method to determine c_v of CCR materials, in order to determine if disposal loading rates may be cause for engineering concern.
- "Smarter" technologies that can be adapted to aid in monitoring CCR disposal areas that would better identify gradual changes that may not be readily apparent to daily inspectors.
- Further testing on slurry deposition reconstituted SI CCR samples to analyze soil fabric (a large enough body of tests to analyze statistically). The same method as used in this thesis could be used or methods to determine shear wave velocity across the height of the sample could be used.

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Appendix A

Sample Preparation and Fabric Analysis Spreadsheets

Sample Dimensions:

Note: Sample mold has bevelled top portion, so volume is calculated as two separate cylinders added together

H_{TC} =	0.72	inches	D_{TC} =	2.851	inches
H_{BC} =	5.465	inches	D_{BC} =	2.826	inches
T_{BS} =	0.112	inches	T_M =	0.012	inches
T_{TP} =	1.229	inches	T_{FP} =	0.007	inches

Where
- H_{TC} = height of top cylinder
- H_{BC} = height of bottom cylinder
- D_{TC} = diameter of top cylinder
- D_{BC} = diameter of bottom cylinder
- T_M = latex membrane thickness
- T_{BS} = thickness of bottom porous stone
- T_{TP} = thickness of top platen
- T_{FP} = thickness of filter paper

Measurements of Sample Height (Datum: cell frame):

Reading Loc.	Bottom Platen (in)	Top of Top Platen (in)	Sample Height (in)
Front	**12.247**	4.724	6.182
Back	**12.253**	4.724	6.188
Right	**12.249**	4.724	6.184
Left	**12.251**	4.724	6.186
		AVG:	6.185

So target volume, V_{TAR}, is:

V_{TAR} =	38.13	in^3
	624.9	cm^3

Minimum and maximum void ratios and specific gravity of solids are:

e_{min} =	0.65
e_{max} =	1.2
G_S =	2.22

Mixing Tube Dimensions Calculation Sheet:

D_r =	100%					
			Where	$\%\ V_T$ Voids =	percent of sample volume occupied by void space	
e =	0.65					
				$\%\ V_T$ Solids =	percent of sample volume occupied by solids	
$\%\ V_T$ Voids =	39%					
				$V_{S_100\%Dr}$ =	Volume of solids to prepare a sample at 100% relative density	
$\%\ V_T$ Solids =	61%					
				$V_{V_0\%Dr}$ =	Volume of voids at a placement relative density of 0%	
Mass solids =	840.72	g				
				V_{TOT} =	Volume of soil to prepare a sample with a target relative density of 100% at an initial relative density of 0%	
$V_{S_100\%Dr}$ =	378.70	cm^3				
$V_{V_0\%Dr}$ =	454.44	cm^3				
V_{TOT} =	833.14	cm^3		V_{TUBE} =	Volume of specimen mixing tube	
				D_{TUBE} =	Inner diameter of mixing tube	
V_{TUBE} =	874.80	cm^3		H_{TUBE_req} =	Height of mixing tube of specified diameter	
	53.384	in^3				
D_{TUBE} =	2.5	inches				
H_{TUBE_req} =	10.88	inches				

Specimen 1 Preparation Sheet:

D_{rTAR} =	70%	
M_{ash} =	764.3	g
w (%) =	29.2%	
M_{moist} =	987.9	g

Location	Target H_{TP} (in)	H_{BP} (in)	H_S (in)
Front	4.724	**12.247**	6.168
Back	4.724	**12.253**	6.174
Right	4.724	**12.249**	6.170
Left	4.724	**12.251**	6.172

Location	Initial H_{TP} (in)	Final H_{TP} (in)	H_{BP} (in)	H_{SI} (in)	H_{SF} (in)
Front	N/A	4.732	**12.247**	N/A	6.160
Back	N/A	4.7265	**12.253**	N/A	6.171
Right	N/A	4.728	**12.249**	N/A	6.166
Left	N/A	4.728	**12.251**	N/A	6.168

Fines Lost:		
Tare Name:	Cindy	
Tare:	475.0	g
Gross:	477.24	g
Net:	2.2	g
% Loss:	0.23%	

$G_{gelatin}$:		
Concentration :	0.75 % by mass	
Tare:	126.8	g
Gross:	224.5	g
Net:	97.7	g
Volume:	97.7	cm^3
$G_{gelatin}$:	1.000	

Approximate Placement D_r:		
D_{COLLAR} =	2.822	in
H_{SI_AVG} =	N/A	in
V_{CYL1} =	33.32	in^3
V_{CYL2} =	4.47	in^3
V_{CYL3} =	N/A	in^3
V_{TOT} =	N/A	in^3
V_{SOLIDS} =	N/A	in^3
V_{VOIDS} =	N/A	in^3
e =	N/A	
D_r =	N/A	

Approximate Densified D_r:		
V_{CYL2} =	4.315	in^3
V_{TOT} =	37.64	in^3
	616.74	cm^3
V_{SOLIDS} =	20.95	in^3
	343.29	cm^3
V_{VOIDS} =	16.69	in^3
	273.45	cm^3
e =	0.80	
D_r =	73.35%	

Specimen 1 Fabric Testing Sheet:

Volume Calculation Information:

D_{beaker} =	3.33162	in
$V_{1/100''}$ =	0.0872	in^3
	1.43	cm^3

Top Slice

Mass =	278.67	g
Weight =	0.614	lb
Volume =	10.46	in^3
	171.43	cm^3
Density =	0.059	lb/in^3
	1.63	g/cm^3
$Mass_{Ovendry}$ =	195.87	g
$Mass_{Ovenwash}$ =	46.9	g
$\%Pass_{\#200}$ =	76%	

Sieve Analysis

Tare Name:	Tare 1
Tare Mass (g):	329.2
Tare + Dry Soil Mass (g):	525.1
Tare + Dry Soil Mass After Washing (g):	360.3

Subtract this from $Mass_{Ovenwash}$ =>

Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing
#4	4.75	0.6	0.3%	99.7%
#10	2	2.4	1.5%	98.5%
#20	0.841	0.9	2.0%	98.0%
#30	0.595	0.3	2.1%	97.9%
#40	0.425	0.6	2.5%	97.5%
#60	0.25	4.1	4.5%	95.5%
#100	0.15	11.2	10.3%	89.7%
#200	0.075	26.8	23.9%	76.1%
Pan		1.9	100.0%	0.0%
	% lost:	0.00%		

Hydrometer Analysis

Time readings begin:	6/14/2012 8:23
Hydrometer Type:	152H
Composite Correction:	5.6
Dry mass of soil tested (g):	50.0
$M_{retained\ on\ \#10\ seive}$ (g):	1.2
Dry mass of soil past #10 (g):	48.8
W (dry mass of soil represented) (g):	49.6
Temperature (° F):	69
G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11
K (ASTM eq. 4, based on temp and G_s):	0.0193
% Passing #10 Sieve:	98.5%

Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
1	37	31.4	10.2	70%	0.0617
2	32	26.4	11.0	59%	0.0453
4	27	21.4	11.9	48%	0.0332
8	23	17.4	12.5	39%	0.0241
15	19.5	13.9	13.1	31%	0.0180
30	16.3	10.7	13.6	24%	0.0130
60	13	7.4	14.2	17%	0.0094
120	10.5	4.9	14.6	11%	0.0067
250	9	3.4	14.8	8%	0.0047
500	7.3	1.7	15.1	4%	0.0034
1440	7.3	1.7	15.1	4%	0.0020

Middle Slice											
						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing	
Mass =	327.5	g	Sieve Analysis			#4	4.75	0	0.0%	100.0%	
Weight =	0.722	lb				#10	2	0	0.0%	100.0%	
Volume =	11.59	in^3	Tare Name:	Tare 2		#20	0.841	0.2	0.1%	99.9%	
	190.00	cm^3	Tare Mass (g):	332.6		#30	0.595	0.4	0.3%	99.7%	
Density =	0.062	lb/in^3	Tare + Dry Soil Mass (g):	570.7		#40	0.425	1	0.7%	99.3%	
	1.72	g/cm^3	Tare + Dry Soil Mass After Washing (g):	386.6		#60	0.25	8.3	4.2%	95.8%	
						#100	0.15	19	12.1%	87.9%	
$Mass_{Ovendry}$ =	238.12	g				#200	0.075	36	27.3%	72.7%	
$Mass_{Ovenwash}$ =	64.9	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		2.5	100.0%	0.0%	
$\%Pass_{\#200}$ =	73%										
							% lost:	0.00%			

						Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
			Hydrometer Analysis			1	36.5	30.9	10.3	68%	0.0619
			Time readings begin:	152H		2	33.5	27.9	10.8	62%	0.0448
			Hydrometer Type:	6/14/2012 10:05		4	28.5	22.9	11.6	51%	0.0329
			Composite Correction:	5.6		8	23	17.4	12.5	38%	0.0241
			Dry mass of soil tested (g):	50		15	19	13.4	13.2	30%	0.0181
			$M_{retained\ on\ \#10\ seive}$ (g):	0		30	14.5	8.9	13.9	20%	0.0131
			Dry mass of soil past #10 (g):	50		60	12	6.4	14.3	14%	0.0094
			W (dry mass of soil represented) (g):	50		120	9	3.4	14.8	8%	0.0068
			Temperature (° F):	69		250	8.5	2.9	14.9	6%	0.0047
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	7.5	1.9	15.1	4%	0.0033
			K (ASTM eq. 4, based on temp and G_s):	0.0193		1440	7.5	1.9	15.1	4%	0.0020
			% Passing #10 Sieve:	100.0%							

Bottom Slice

						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing	
			Sieve Analysis			#4	4.75	0.6	0.2%	99.8%	
Mass =	428.1	g				#10	2	6.5	2.2%	97.8%	
Weight =	0.944	lb	Tare Name:	Tare 3		#20	0.841	10.2	5.3%	94.7%	
Volume =	14.65	in^3	Tare Mass (g):	333.7		#30	0.595	4.6	6.7%	93.3%	
	240.00	cm^3	Tare + Dry Soil Mass (g):	662.1		#40	0.425	5.6	8.4%	91.6%	
Density =	0.064	lb/in^3	Tare + Dry Soil Mass After Washing (g):	436.2		#60	0.25	16.8	13.5%	86.5%	
	1.78	g/cm^3				#100	0.15	25.2	21.2%	78.8%	
						#200	0.075	43.1	34.3%	65.7%	
$Mass_{Ovendry}$ =	328.44	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		4.5	35.7%	64.3%	
$Mass_{Ovenwash}$ =	113.6	g									
$\%Pass_{\#200}$ =	65%						% lost:	0.30%			

						Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
			Hydrometer Analysis			1	35	29.4	10.6	64%	0.0627
			Time readings begin:	152H		2	32	26.4	11.0	57%	0.0453
			Hydrometer Type:	6/14/2012 11:43		4	27.5	21.9	11.8	47%	0.0331
			Composite Correction:	5.6		8	21.3	15.7	12.8	34%	0.0244
			Dry mass of soil tested (g):	50		15	17	11.4	13.5	25%	0.0183
			$M_{retained\ on\ \#10\ seive}$ (g):	0.02		30	12.6	7	14.2	15%	0.0133
			Dry mass of soil past #10 (g):	49.98		60	9.3	3.7	14.8	8%	0.0096
			W (dry mass of soil represented) (g):	51.1		120	8.5	2.9	14.9	6%	0.0068
			Temperature (° F):	69		250	7	1.4	15.1	3%	0.0047
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	6.3	0.7	15.3	2%	0.0034
			K (ASTM eq. 4, based on temp and G_s):	0.0193		1440	6.3	0.7	15.3	2%	0.0020
			% Passing #10 Sieve:	97.8%							

| Summary | | |

Specimen 2 Preparation Sheet:

D_{rTAR} =	70%	
M_{ash} =	764.3	g
w (%) =	29.2%	
M_{moist} =	987.8	g

Location	Target H_{TP} (in)	H_{BP} (in)	H_S (in)
Front	4.724	**12.247**	6.168
Back	4.724	**12.253**	6.174
Right	4.724	**12.249**	6.170
Left	4.724	**12.251**	6.172

Location	Initial H_{TP} (in)	Final H_{TP} (in)	H_{BP} (in)	H_{SI} (in)	H_{SF} (in)
Front	4.245	4.729	**12.247**	6.648	6.163
Back	4.245	4.728	**12.253**	6.653	6.170
Right	4.245	4.731	**12.249**	6.649	6.163
Left	4.246	4.725	**12.251**	6.650	6.171

Fines Lost:		
Tare Name:	Cindy	
Tare:	475.0	g
Gross:	476.3	g
Net:	1.3	g
% Loss:	0.13%	

$G_{gelatin}$:		
Concentration :	0.75 % by mass	
Tare:	126.8	g
Gross:	224.8	g
Net:	98	g
Volume:	98	cm^3
$G_{gelatin}$:	1.000	

Approximate Placement D_r:		
D_{COLLAR} =	2.825	
H_{IS_AVG} =	0.465	
V_{CYL1} =	33.66	in^3
V_{CYL2} =	4.52	in^3
V_{CYL3} =	2.86	in^3
V_{TOT} =	41.04	in^3
V_{SOLIDS} =	20.97	in^3
V_{VOIDS} =	20.07	in^3
e =	0.96	
D_r =	44%	

Approximate Densified D_r:		
V_{CYL2} =	4.36	in^3
V_{TOT} =	38.02	in^3
	622.98	cm^3
V_{SOLIDS} =	20.97	in^3
	343.69	cm^3
V_{VOIDS} =	17.04	in^3
	279.29	cm^3
e =	0.81	
D_r =	70.43%	

Specimen 2 Fabric Testing Sheet:

Volume Calculation Information:

D_{beaker} =	3.33162	in
$V_{1/100"}$ =	0.087	in^3
	1.43	cm^3

Top Slice

Mass =	237	g
Weight =	0.522	lb
Volume =	9.07	in^3
	148.57	cm^3
Density =	0.058	lb/in^3
	1.60	g/cm^3
$Mass_{Ovendry}$ =	165.8	g
$Mass_{Ovenwash}$ =	41.1	g
$\%Pass_{\#200}$ =	75%	

Sieve Analysis

Tare Name:	Tare 4
Tare Mass (g):	329.8
Tare + Dry Soil Mass (g):	495.6
Tare + Dry Soil Mass After Washing (g):	371.9

Subtract this from $Mass_{Ovenwash}$ =>

Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing
#4	4.75	1.3	0.8%	99.2%
#10	2	2.4	2.2%	97.8%
#20	0.841	0.6	2.6%	97.4%
#30	0.595	0.3	2.8%	97.2%
#40	0.425	0.4	3.0%	97.0%
#60	0.25	3.1	4.9%	95.1%
#100	0.15	9.7	10.7%	89.3%
#200	0.075	23.1	24.7%	75.3%
Pan		1	100.0%	0.0%
	% lost:	0.12%		

Hydrometer Analysis

Time readings begin:	6/15/2012 17:13
Hydrometer Type:	152H
Composite Correction:	5
Dry mass of soil tested (g):	50.0
$M_{retained\ on\ \#10\ seive}$ (g):	1.2
Dry mass of soil past #10 (g):	48.8
W (dry mass of soil represented) (g):	49.9
Temperature (° F):	68
G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11
K (ASTM eq. 4, based on temp and G_s):	0.0194
% Passing #10 Sieve:	97.8%

Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
1	36.5	31.5	10.3	70%	0.0624
2	34	29	10.7	64%	0.0450
4	28	23	11.7	51%	0.0332
8	25.2	20.2	12.2	45%	0.0240
15	18.5	13.5	13.3	30%	0.0183
30	15	10	13.8	22%	0.0132
60	11.6	6.6	14.4	15%	0.0095
120	9.5	4.5	14.7	10%	0.0068
250	7.6	2.6	15.0	6%	0.0048
500	7.5	2.5	15.1	6%	0.0034
1440	6	1	15.3	2%	0.0020

Middle Slice												
						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing	
Mass =	367.1	g	Sieve Analysis			#4	4.75	0	0.0%	100.0%	
Weight =	0.809	lb				#10	2	0	0.0%	100.0%	
Volume =	13.25	in^3	Tare Name:	Tare 6		#20	0.841	0.2	0.1%	99.9%	
	217.14	cm^3	Tare Mass (g):	329.8		#30	0.595	0.4	0.2%	99.8%	
Density =	0.061	lb/in^3	Tare + Dry Soil Mass (g):	595.8		#40	0.425	1.1	0.6%	99.4%	
	1.69	g/cm^3	Tare + Dry Soil Mass After Washing (g):	400.0		#60	0.25	9.6	4.2%	95.8%	
						#100	0.15	20.2	11.8%	88.2%	
$Mass_{Ovendry}$ =	265.97	g				#200	0.075	37.5	25.9%	74.1%	
$Mass_{Ovenwash}$ =	69	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		1.7	100.0%	0.0%	
$\%Pass_{\#200}$ =	74%										
							% lost:	0.00%			

						Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
			Hydrometer Analysis			1	35	30	10.6	66%	0.0631
			Time readings begin:	152H		2	30	25	11.4	55%	0.0463
			Hydrometer Type:	6/15/2012 14:54		4	25.3	20.3	12.1	45%	0.0339
			Composite Correction:	5		8	20.5	15.5	12.9	34%	0.0247
			Dry mass of soil tested (g):	50		15	15.3	10.3	13.8	23%	0.0186
			$M_{retained\ on\ \#10\ seive}$ (g):	0		30	12	7	14.3	15%	0.0134
			Dry mass of soil past #10 (g):	50		60	10	5	14.7	11%	0.0096
			W (dry mass of soil represented) (g):	50		120	6.3	1.3	15.3	3%	0.0069
			Temperature (° F):	68		250	5.6	0.6	15.4	1%	0.0048
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	5.3	0.3	15.4	1%	0.0034
			K (ASTM eq. 4, based on temp and G_s):	0.0194		1440	5	0	15.5	0%	0.0020
			% Passing #10 Sieve:	100.0%							

Bottom Slice

						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing		
Mass =	435.44	g	Sieve Analysis			#4	4.75	1.1	0.3%	99.7%		
Weight =	0.960	lb				#10	2	6.5	2.3%	97.7%		
Volume =	14.99	in^3	Tare Name:	Tare 5		#20	0.841	10.2	5.4%	94.6%		
	245.71	cm^3	Tare Mass (g):	335.8		#30	0.595	4.6	6.8%	93.2%		
Density =	0.064	lb/in^3	Tare + Dry Soil Mass (g):	666.8		#40	0.425	5.3	8.4%	91.6%		
	1.77	g/cm^3	Tare + Dry Soil Mass After Washing (g):	444.1		#60	0.25	16.3	13.3%	86.7%		
						#100	0.15	23	20.2%	79.8%		
$Mass_{Ovendry}$ =	331	g				#200	0.075	39.4	32.1%	67.9%		
$Mass_{Ovenwash}$ =	106.2	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		2.7	100.0%	0.0%		
$\%Pass_{\#200}$ =	68%											
							% lost:	-0.06%				
						Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)	
			Hydrometer Analysis			1	35	30	10.6	65%	0.0631	
			Time readings begin:	152H		2	28.3	23.3	11.7	50%	0.0469	
			Hydrometer Type:	6/15/2012 15:19		4	24.3	19.3	12.3	42%	0.0341	
			Composite Correction:	5		8	20.5	15.5	12.9	33%	0.0247	
			Dry mass of soil tested (g):	50		15	16	11	13.7	24%	0.0186	
			$M_{retained\ on\ \#10\ seive}$ (g):	0		30	12	7	14.3	15%	0.0134	
			Dry mass of soil past #10 (g):	50		60	8	3	15.0	6%	0.0097	
			W (dry mass of soil represented) (g):	51.2		120	6.3	1.3	15.3	3%	0.0069	
			Temperature (° F):	68		250	5.6	0.6	15.4	1%	0.0048	
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	5.3	0.3	15.4	1%	0.0034	
			K (ASTM eq. 4, based on temp and G_s):	0.0194		1440	5	0	15.5	0%	0.0020	
			% Passing #10 Sieve:	97.7%								

Summary												
$\Sigma Mass_{Ovendry}$ =	762.77	g										
				Checks on Relative Density of Individual Slices:								
Mass =	1039.5	g										
Weight =	2.292	lb		Knowns:								
Volume =	37.31	in^3		V_{s1} =	148.57	cm^3	Slice 1:					
	611.43	cm^3		V_{s2} =	217.14	cm^3	V_{S_S1} =	72.48	cm^3	e_{S1} =	1.05	
Density =	0.061	lb/in^3		V_{s3} =	245.71	cm^3	V_{G_S1} =	76.09	cm^3	D_{rS1} =	27%	
	1.70	g/cm^3		m_{s1} =	237.0	g						
				m_{s2} =	367.1	g	Slice 2:					
M_{DRIED_FINES} =	1.3	g		m_{s3} =	435.4	g	V_{S_S2} =	122.88	cm^3	e_{S2} =	0.77	
M_{DRY_SAMPLE} =	763.0	g		ρ_{S1} =	1.60	g/cm^3	V_{G_S2} =	94.26	cm^3	D_{rS2} =	79%	
V_{SOLIDS} =	343.69	cm^3		ρ_{S2} =	1.69	g/cm^3						
	20.97	in^3		ρ_{S3} =	1.77	g/cm^3	Slice 3:					
V_{VOIDS} =	267.74	cm^3		G_s =	2.22		V_{S_S3} =	155.51	cm^3	e_{S3} =	0.58	
	16.34	in^3		G_{gel} =	1.000		V_{G_S3} =	90.20	cm^3	D_{rS3} =	113%	
e =	0.78									e_{avg} =	0.80	
				M_{DRY_SAMPLE} =	778.9496685		V_{TOT} =	611.43	cm^3	D_{r_avg} =	73%	
D_r =	76.5%											

Specimen 3 Preparation Sheet:

D_{rTAR} =	70%	
M_{ash} =	764.3	g
w (%) =	29.2%	
M_{moist} =	987.8	g

Location	Target H_{TP} (in)	H_{BP} (in)	H_S (in)
Front	4.724	**12.247**	6.168
Back	4.724	**12.253**	6.174
Right	4.724	**12.249**	6.170
Left	4.724	**12.251**	6.172

Location	Initial H_{TP} (in)	Final H_{TP} (in)	H_{BP} (in)	H_{SI} (in)	H_{SF} (in)
Front	4.447	4.735	**12.247**	6.446	6.157
Back	4.449	4.734	**12.253**	6.449	6.164
Right	4.451	4.734	**12.249**	6.443	6.160
Left	4.446	4.735	**12.251**	6.450	6.161

Fines Lost:		
Tare Name:	Cindy	
Tare:	475.0	g
Gross:	477.3	g
Net:	2.3	g
% Loss:	0.23%	

$G_{gelatin}$:		
Concentration:	0.75% by mass	
Tare:	126.8	g
Gross:	225.55	g
Net:	98.75	g
Volume:	98	cm^3
$G_{gelatin}$:	1.008	

Approximate Placement D_r:		
D_{COLLAR} =	2.825	
H_{IS_AVG} =	0.262	in
V_{CYL1} =	33.66	in^3
V_{CYL2} =	4.52	in^3
V_{CYL3} =	1.61	in^3
V_{TOT} =	39.79	in^3
V_{SOLIDS} =	20.95	in^3
V_{VOIDS} =	18.84	in^3
e =	0.90	
D_r =	55%	

Approximate Densified D_r:		
V_{CYL2} =	4.32	in^3
V_{TOT} =	37.98	in^3
	622.34	cm^3
V_{SOLIDS} =	20.95	in^3
	343.24	cm^3
V_{VOIDS} =	17.03	in^3
	279.10	cm^3
e =	0.81	
D_r =	70.34%	

Specimen 3 Fabric Testing Sheet:

Volume Calculation Information:

D_{beaker} =	3.33162	in
$V_{1/100"}$ =	0.087	in^3
	1.43	cm^3

Top Slice

Mass =	257.6	g
Weight =	0.568	lb
Volume =	10.20	in^3
	167.14	cm^3
Density =	0.056	lb/in^3
	1.54	g/cm^3
$Mass_{Ovendry}$ =	174.8	g
$Mass_{Ovenwash}$ =	42.7	g
$\%Pass_{\#200}$ =	76%	

Sieve Analysis

Tare Name:	Tare 1
Tare Mass (g):	329.2
Tare + Dry Soil Mass (g):	504.0
Tare + Dry Soil Mass After Washing (g):	374.0

Subtract this from $Mass_{Ovenwash}$ =>

Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing
#4	4.75	1.2	0.7%	99.3%
#10	2	1.8	1.7%	98.3%
#20	0.841	0.8	2.2%	97.8%
#30	0.595	0.3	2.3%	97.7%
#40	0.425	0.4	2.6%	97.4%
#60	0.25	2.9	4.2%	95.8%
#100	0.15	9.4	9.6%	90.4%
#200	0.075	26.1	24.5%	75.5%
Pan		2.6	100.0%	0.0%
	% lost:	-0.11%		

Hydrometer Analysis

Time readings begin:	6/16/2012 12:57
Hydrometer Type:	152H
Composite Correction:	5.3
Dry mass of soil tested (g):	50.0
$M_{retained\ on\ \#10\ seive}$ (g):	1.2
Dry mass of soil past #10 (g):	48.8
W (dry mass of soil represented) (g):	49.7
Temperature (° F):	71.6
G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11
K (ASTM eq. 4, based on temp and G_s):	0.0190
% Passing #10 Sieve:	98.3%

Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
1	39	33.7	9.9	75%	0.0597
2	34	28.7	10.7	64%	0.0439
4	31	25.7	11.2	57%	0.0317
8	26.3	21	12.0	47%	0.0232
15	20.5	15.2	12.9	34%	0.0176
30	18.5	13.2	13.3	29%	0.0126
60	13	7.7	14.2	17%	0.0092
120	10	4.7	14.7	10%	0.0066
250	9	3.7	14.8	8%	0.0046
500	8	2.7	15.0	6%	0.0033
1440	5.3	0	15.4	0%	0.0020

Middle Slice											
						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing	
			Sieve Analysis			#4	4.75	0.4	0.2%	99.8%	
Mass =	349.9	g				#10	2	1.2	0.6%	99.4%	
Weight =	0.771	lb	Tare Name:	Tare 2		#20	0.841	1.3	1.1%	98.9%	
Volume =	12.64	in^3	Tare Mass (g):	332.5		#30	0.595	0.9	1.5%	98.5%	
	207.14	cm^3	Tare + Dry Soil Mass (g):	588.8		#40	0.425	1.5	2.1%	97.9%	
Density =	0.061	lb/in^3	Tare + Dry Soil Mass After Washing (g):	406.4		#60	0.25	8.6	5.4%	94.6%	
	1.69	g/cm^3				#100	0.15	18.6	12.7%	87.3%	
						#200	0.075	38.4	27.7%	72.3%	
$Mass_{Ovendry}$ =	256.3	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		2.9	100.0%	0.0%	
$Mass_{Ovenwash}$ =	71.3	g									
$\%Pass_{\#200}$ =	72%						% lost:	0.16%			
						Elapsed time (min)	Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
			Hydrometer Analysis			1	34	28.7	10.7	63%	0.0621
			Time readings begin:	152H		2	28.3	23	11.7	51%	0.0458
			Hydrometer Type:	6/16/2012 13:30		4	24.6	19.3	12.3	42%	0.0332
			Composite Correction:	5.3		8	20	14.7	13.0	32%	0.0242
			Dry mass of soil tested (g):	50		15	17	11.7	13.5	26%	0.0180
			$M_{retained\ on\ \#10\ seive}$ (g):	0		30	13.2	7.9	14.1	17%	0.0130
			Dry mass of soil past #10 (g):	50		60	8	2.7	15.0	6%	0.0095
			W (dry mass of soil represented) (g):	50.31409501		120	6.6	1.3	15.2	3%	0.0068
			Temperature (° F):	71.6		250	6	0.7	15.3	2%	0.0047
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	5.3	0	15.4	0%	0.0033
			K (ASTM eq. 4, based on temp and G_s):	0.0190		1440	5.3	0	15.4	0%	0.0020
			% Passing #10 Sieve:	99.4%							

Bottom Slice											
						Sieve No.	Nominal diameter, mm	wt. retained (g)	% retained	% passing	
Mass =	410.1	g	Sieve Analysis			#4	4.75	1	0.3%	99.7%	
Weight =	0.904	lb				#10	2	4.4	1.7%	98.3%	
Volume =	14.12	in^3	Tare Name:	Tare 3		#20	0.841	6.6	3.8%	96.2%	
	231.43	cm^3	Tare Mass (g):	333.6		#30	0.595	3	4.8%	95.2%	
Density =	0.064	lb/in^3	Tare + Dry Soil Mass (g):	646.3		#40	0.425	4.7	6.3%	93.7%	
	1.77	g/cm^3	Tare + Dry Soil Mass After Washing (g):	441.7		#60	0.25	16.1	11.4%	88.6%	
						#100	0.15	24.6	19.3%	80.7%	
$Mass_{Ovendry}$ =	312.7	g				#200	0.075	42.1	32.8%	67.2%	
$Mass_{Ovenwash}$ =	103.1	g		Subtract this from $Mass_{Ovenwash}$ =>		Pan		5.4	100.0%	0.0%	
$\%Pass_{\#200}$ =	67%										
							% lost:	0.19%			
					Elapsed time (mi		Reading	Comp. Reading	L (cm) (ASTM table 2)	P (ASTM eqn. 2)	D (mm) (ASTM eqn. 4)
			Hydrometer Analysis			1	30	24.7	11.4	54%	0.0640
			Time readings begin:	152H		2	26.5	21.2	11.9	46%	0.0463
			Hydrometer Type:	6/16/2012 14:03		4	20.5	15.2	12.9	33%	0.0341
			Composite Correction:	5.3		8	18.3	13	13.3	28%	0.0244
			Dry mass of soil tested (g):	50		15	15.3	10	13.8	22%	0.0182
			$M_{retained\ on\ \#10\ seive}$ (g):	0.02		30	11.3	6	14.4	13%	0.0132
			Dry mass of soil past #10 (g):	49.98		60	8.5	3.2	14.9	7%	0.0094
			W (dry mass of soil represented) (g):	50.9		120	8.4	3.1	14.9	7%	0.0067
			Temperature (° F):	71.6		250	6	0.7	15.3	2%	0.0047
			G_s correction factor (ASTM D 422, Table 1); Interpolated!:	1.11		500	5.6	0.3	15.4	1%	0.0033
						1440	5.3	0	15.4	0%	0.0020
			K (ASTM eq. 4, based on temp and G_s):	0.0190							
			% Passing #10 Sieve:	98.3%							

Summary											
$\Sigma Mass_{Ovendry}$ =	743.8	g									
				Checks on Relative Density of Individual Slices:							
Mass =	1017.6	g									
Weight =	2.243	lb		Knowns:							
Volume =	36.96	in^3		V_{s1} =	167.14	cm^3	Slice 1:				
	605.71	cm^3		V_{s2} =	207.14	cm^3	V_{S_S1} =	73.56	cm^3	e_{S1} =	1.27
Density =	0.061	lb/in^3		V_{s3} =	231.43	cm^3	V_{G_S1} =	93.58	cm^3	D_{rS1} =	-13%
	1.68	g/cm^3		m_{s1} =	257.6	g					
				m_{s2} =	349.9	g	Slice 2:				
M_{DRIED_FINES} =	2.3	g		m_{s3} =	410.1	g	V_{S_S2} =	116.40	cm^3	e_{S2} =	0.78
M_{DRY_SAMPLE} =	762.0	g		ρ_{S1} =	1.54	g/cm^3	V_{G_S2} =	90.74	cm^3	D_{rS2} =	76%
V_{SOLIDS} =	343.24	cm^3		ρ_{S2} =	1.69	g/cm^3					
	20.95	in^3		ρ_{S3} =	1.77	g/cm^3	Slice 3:				
V_{VOIDS} =	262.48	cm^3		G_s =	2.22		V_{S_S3} =	145.92	cm^3	e_{S3} =	0.59
	16.02	in^3		G_{gel} =	1.008		V_{G_S3} =	85.51	cm^3	D_{rS3} =	112%
e =	0.76									e_{avg} =	0.88
				M_{DRY_SAMPLE} =	745.65		V_{TOT} =	605.71	cm^3	D_{r_avg} =	58%
D_r =	79.1%										
Note: Top Slice not cured; bottom two slices were											

APPENDIX E:
Vibrating Wire Water Levels

Boring	Impdmt.	6-Dec-23	14-Dec-23	11-Jan-24	15-May-24	23-Jul-24	28-Oct-24	21-Feb-25	27-Mar-25	22-Apr-25	26-Jun-25	21-Jul-25	22-Aug-25	12-Nov-25	10-Feb-26	30-Mar-26	20-Apr-26	27-May-26	24-Jun-26	22-Jul-26	12-Aug-26
B-1	Lakeside	547.790	547.573	547.556	547.680	546.119	544.146	544.720	544.724	546.120	545.534	545.404	544.726	543.010	542.180	544.066	544.072	544.751	545.621	546.697	545.588
B-1CCR	Lakeside	551.163	551.015	551.398	552.449	552.820	553.722	553.993	554.044	554.144	551.991	552.042	552.012	553.898	555.258	556.412	555.867	556.103	556.017	556.048	555.687
B-1L	Lakeside	540.257	540.120	540.211	541.038	539.723	538.273	539.041	539.119	540.421	539.813	539.658	539.188	537.785	537.136	538.746	538.702	539.088	539.909	540.379	539.406
B-1LL	Lakeside	525.961	525.906	525.952	525.873	525.975	525.616	525.700	525.737	528.243	525.809	525.925	525.831	525.689	525.410	526.528	526.594	526.595	529.125	526.629	525.909
B1-U	Lakeside	549.336	549.112	549.062	550.016	548.891	546.703	546.677	546.984	548.163	547.687	547.544	547.254	544.491	542.426	544.563	544.503	545.823	545.974	546.793	546.760
B-2	Lakeside	537.885	538.083	539.298	540.478	539.565	539.360	539.627	534.565	535.466	536.678	537.159	536.017	534.234	534.251	536.176	537.194	536.728	537.687	537.586	536.301
B-2CCR	Lakeside	552.715	552.374	552.438	552.787	550.810	549.020	549.981	550.194	552.045	551.132	551.111	550.215	548.563	547.795	549.489	549.601	550.379	551.160	552.962	551.221
B-2L	Lakeside	537.191	537.024	537.572	537.466	536.633	535.668	536.946	537.087	538.417	536.812	537.348	536.156	535.565	535.710	537.673	537.687	537.365	538.360	538.192	536.925
B-2U	Lakeside	545.192	545.059	546.180	547.096	545.928	544.488	543.850	546.056	547.508	544.688	544.718	544.692	544.108	543.310	543.811	543.246	543.604	543.600	543.970	543.823
B-3	Lakeside	545.913	545.355	545.927	545.867	544.475	543.349	544.428	544.597	546.302	545.146	545.117	543.902	542.983	543.032	544.842	544.717	545.152	545.829	546.520	545.319
B-3CCR	Lakeside	552.600	552.284	552.672	552.520		547.960	548.942	549.220	551.123	549.901	549.991	548.707	546.943	546.157	548.076	548.192	549.142	549.593	552.015	550.004
B-3U	Lakeside	552.352	552.189	553.014	553.323		548.564	550.084	551.034	553.323	551.220	550.534	549.659	547.521	546.781	549.751	549.498	550.316	551.111	553.372	550.838
B-4	Lakeside	537.980	538.192	539.210	540.727	540.225	539.882	541.452	541.946	543.170	542.379	542.420	541.933	542.167	542.314	544.671	544.369	544.936	545.142	545.767	545.252
B-5	Dallman	527.439	527.394	528.980	529.242	527.514	526.795	528.155	528.942	530.433	528.664	529.083	527.787	527.107	527.001	530.010	529.679	529.460	532.560	529.878	528.163
B-5CCR	Dallman	541.756	541.867	542.501	543.700	544.107	543.991	543.384	543.589	544.381	544.081	544.282	544.655	544.982	Destroyed						
B-5L	Dallman	526.596	526.299	528.096	527.554	526.098	525.545	527.032	527.701	529.692	527.273	528.634	526.385	526.118	526.275	529.472	529.302	528.927	532.247	529.368	527.724
B-6	Dallman	526.291	526.243	527.439	528.732		525.000	527.127	527.810	529.704	527.827	528.488	525.596	524.533	524.511	528.190	528.378	528.330	532.096	528.500	526.312
B-6CCR	Dallman	543.411	543.352	545.475	547.431	543.100	539.858	549.251	545.933	548.059	545.655	545.198	543.442	538.440	539.705	544.498	544.142	544.567	544.615	545.659	544.208
B-6L	Dallman	524.869	524.887	525.519	527.382	525.515	523.994	524.673	525.214	528.765	525.064	525.419	524.137	523.662	523.482	525.540	526.532	526.494	531.529	525.769	524.183
B-7	Dallman	529.861	529.796	531.820	532.017	529.650	528.327	534.627	531.276	533.432	530.870	531.770	529.566	527.794	527.887	531.718	531.879	530.995	533.557	532.164	529.815
B-7CCR	Dallman	546.418	546.524	550.119	555.256	552.834	552.579	555.148	554.878	554.999	553.459	552.763	552.883	550.899	549.864	549.918	549.635	550.253	549.543	549.803	549.608
B-7L	Dallman	527.769	527.509	529.436	528.525	527.426	526.835	528.020	528.599	531.490	528.319	530.164	527.683	527.085	527.341	530.623	530.819	529.754	532.958	530.782	528.720
B-8L	Dallman	525.522	525.428	526.922	527.687	524.924	524.336	526.732	527.020	528.864	526.147	526.540	524.932	523.450	524.546	527.669	527.668	526.899	527.894	527.628	526.251
B-9CCR	Dallman	549.743	548.216	551.327	550.939	546.734	546.052	549.160	550.077	550.816	550.133	549.233	548.096	545.407	545.878	549.525	548.919	549.260	547.419	548.352	548.253
B-9L	Dallman	523.120	522.923	523.603	523.435	521.825	521.381	523.247	522.837	524.646	522.416	523.836	521.145	520.923	522.618	524.234	524.271	523.867	524.903	524.837	523.767
B-9U	Dallman	538.856	538.884	540.560	541.549	538.364	536.202	540.493	540.595	541.687	540.328	539.547	538.457	534.960	536.145	540.060	539.751	539.770	539.962		539.723
B-10CCR	Dallman	546.909	545.850	548.938	548.930	545.739	541.677	546.754	546.545	549.009	546.340	548.198	544.148	540.939	No Reading	546.586	546.157	545.012	548.239	549.341	
B-12L	Dallman	525.734	525.624	526.544	526.965	526.035	525.497	525.884	526.193	529.691	526.392	526.804	525.868	525.671	525.526	527.040	527.648	527.645	532.425	527.289	526.287
B-12U	Dallman	532.136	531.873	533.383	532.061	531.182	530.585	531.511	531.857	534.071	531.242	532.514	530.658	530.514	530.653	532.883	532.833	532.073	535.230	532.638	531.194

APPENDIX F:

USGS Earthquake Hazards Program Probabilistic Seismic Hazard Analysis

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Please also see the new USGS Earthquake Hazard Toolbox for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

Input

Edition

Dynamic: Conterminous U.S. 2014…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

39.766

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitu…

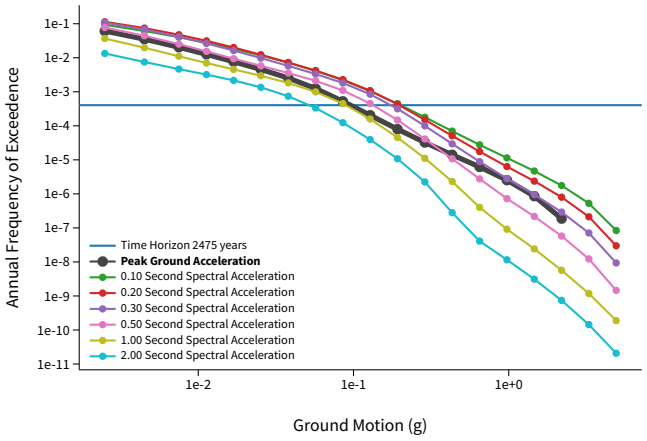
-89.596

Site Class

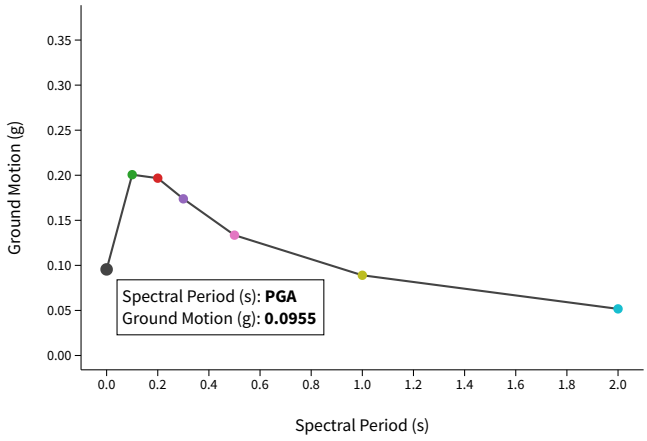
760 m/s (B/C boundary)

Hazard Curve

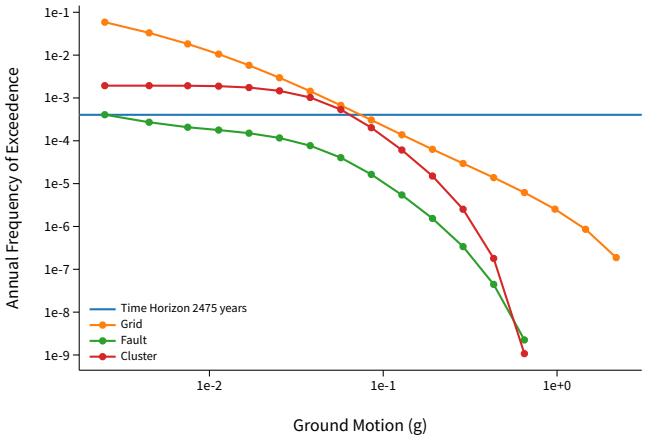
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration

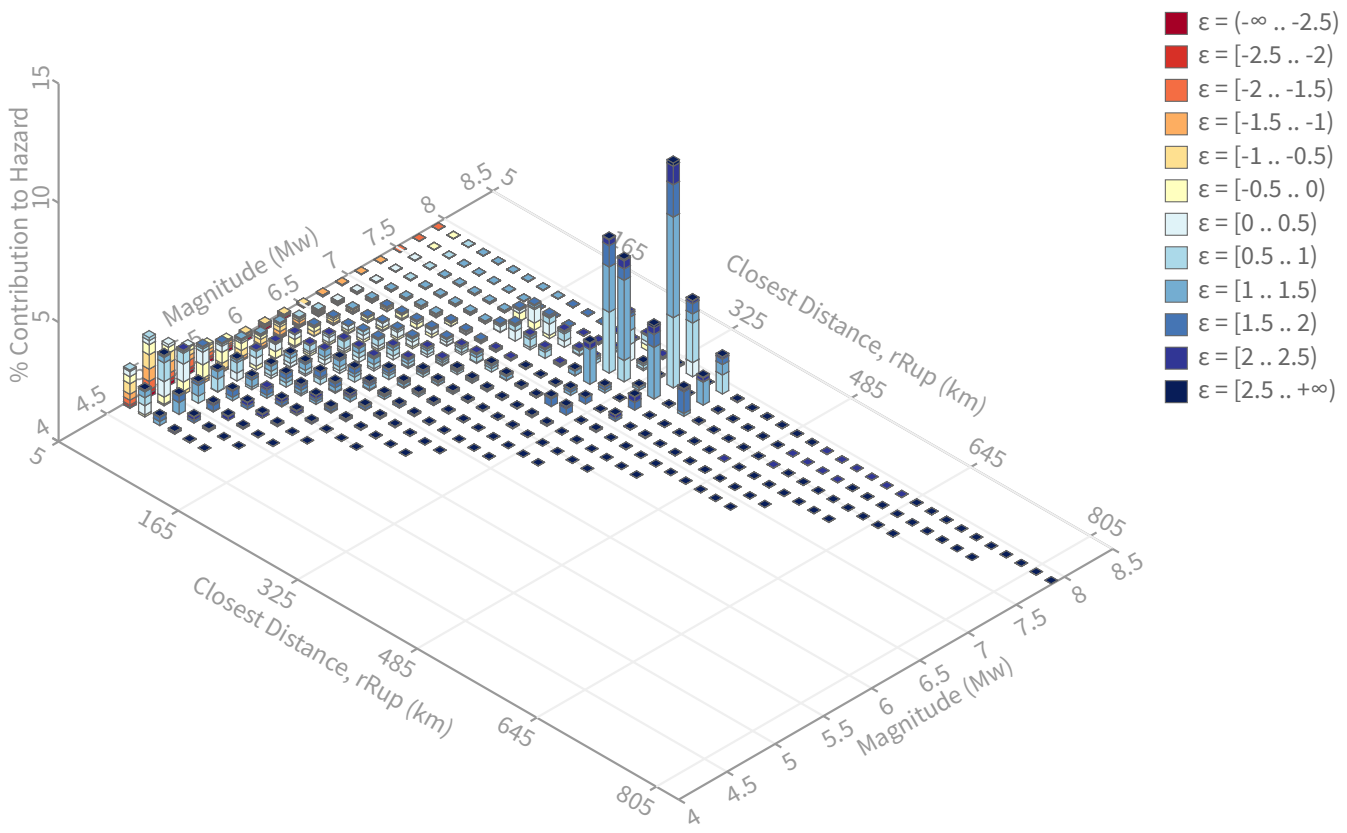


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.095534665 g

Recovered targets

Return period: 2519.0273 yrs
Exceedance rate: 0.00039697863 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 1.65 %

Mean (over all sources)

m: 6.62
r: 184 km
ε_0: 0.72 σ

Mode (largest m-r bin)

m: 7.77
r: 354.04 km
ε_0: 1.24 σ
Contribution: 9.42 %

Mode (largest m-r-ε_0 bin)

m: 7.76
r: 354.21 km
ε_0: 1.09 σ
Contribution: 4.21 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

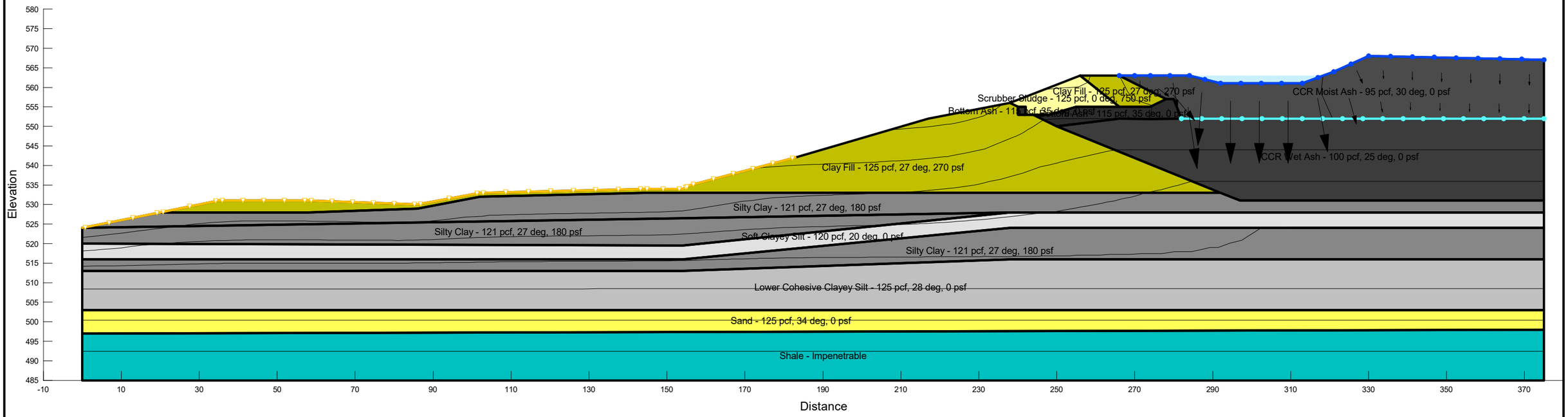
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
SSCn New Madrid	Cluster							22.46
NMFS RLME 1		339.73	7.65	1.30	89.288°W	36.995°N	174.93	6.45
NMFS RLME 5		344.20	7.64	1.34	89.288°W	36.995°N	174.93	3.83
NMFS RLME 4		321.67	7.62	1.24	89.020°W	37.270°N	169.58	3.37
NMFS RLME 2		339.72	7.65	1.30	89.288°W	36.995°N	174.93	2.77
NMFS RLME 7		323.37	7.60	1.26	89.020°W	37.270°N	169.58	2.06
NMFS RLME 6		344.19	7.64	1.34	89.288°W	36.995°N	174.93	1.64
NMFS RLME 3		321.66	7.62	1.24	89.020°W	37.270°N	169.58	1.45
USGS Fixed Smoothing Zone 1 (opt)	Grid							19.12
PointSourceFinite: -89.596, 39.923		17.95	5.21	-0.76	89.596°W	39.923°N	0.00	1.55
PointSourceFinite: -89.596, 40.058		32.29	5.39	0.07	89.596°W	40.058°N	0.00	1.32
PointSourceFinite: -89.596, 40.013		27.49	5.33	-0.14	89.596°W	40.013°N	0.00	1.27
PointSourceFinite: -89.596, 40.148		41.86	5.52	0.38	89.596°W	40.148°N	0.00	1.06
PointSourceFinite: -89.596, 39.968		22.70	5.27	-0.41	89.596°W	39.968°N	0.00	1.00
SSCn Fixed Smoothing Zone 8 (opt)	Grid							14.87
PointSourceFinite: -89.596, 39.923		17.92	5.22	-0.78	89.596°W	39.923°N	0.00	1.11
USGS Adaptive Smoothing Zone 1 (opt)	Grid							7.44
USGS New Madrid 500-year	Cluster							6.61
NMSZ: Center Model		327.85	7.62	1.28	89.070°W	37.165°N	170.84	4.65
Wabash Valley	Grid							5.87
SSCn Adaptive Smoothing Zone 8 (opt)	Grid							5.39
SSCn Fixed Smoothing Zone 1 (opt)	Grid							5.03
USGS New Madrid 750-year	Cluster							4.41
NMSZ: Center Model		327.85	7.62	1.28	89.070°W	37.165°N	170.84	3.10
USGS New Madrid 500-year	Fault							2.93
New Madrid central		292.99	7.68	0.96	89.070°W	37.165°N	170.84	2.07
SSCn Adaptive Smoothing Zone 1 (opt)	Grid							2.43
USGS New Madrid 1500-year	Cluster							1.23

Appendix G:
Lakeside Ash Pond Slope Stability

APPENDIX G-1:
Seepage Analysis



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Steady-State Seepage	
CWLP Long Term D-D' Full Pool rev2.gsz	
10/20/2026	1:300

Steady-State Seepage

Report generated using GeoStudio 2023.1.2. Copyright © 2023 Bentley Systems, Incorporated.

File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 521
Date: 10/20/2026
Time: 12:49:57 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:50:08 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d
- Duration: 0 d
- Ending Time: 0 d

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Shale - Impenetrable

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 5
Rotation: 0 °
Volumetric Water Content: 0.2
Compressibility: 0 /psf

Sand - 125 pcf, 34 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 0.00082 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.3
Rotation: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silt)
K-Function: Fly Ash (Silt)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 8.76e-09 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2e-07 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 7.55e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Seepage Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

Slurry Impoundment Total Head

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Slurry Impoundment Full Pool

Category: Hydraulic
Kind: Water Total Head 563 ft
Review: No

Water K Functions

Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1391132e-09)
Data Point: (0.3864664, 2.1381837e-09)
Data Point: (0.71512174, 2.1365386e-09)
Data Point: (1.3232692, 2.1334316e-09)
Data Point: (2.4485922, 2.1275313e-09)
Data Point: (4.5309023, 2.1161865e-09)
Data Point: (8.384032, 2.0943426e-09)
Data Point: (15.513906, 2.0528424e-09)
Data Point: (28.707105, 1.9747801e-09)
Data Point: (53.119948, 1.8332692e-09)
Data Point: (98.293744, 1.5909354e-09)
Data Point: (181.88384, 1.2148953e-09)
Data Point: (336.55989, 7.3430105e-10)
Data Point: (622.77416, 2.9955885e-10)
Data Point: (1,152.3883, 7.2310082e-11)
Data Point: (2,132.3921, 1.1079367e-11)
Data Point: (3,945.8021, 1.3860484e-12)
Data Point: (7,301.3562, 1.729314e-13)
Data Point: (13,510.511, 2.1839356e-14)
Data Point: (25,000, 1.4341505e-15)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 1.39e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 1.39e-09)
Data Point: (0.20885434, 1.389424e-09)
Data Point: (0.3864664, 1.3888202e-09)
Data Point: (0.71512174, 1.3877516e-09)
Data Point: (1.3232692, 1.3857336e-09)
Data Point: (2.4485922, 1.3819011e-09)
Data Point: (4.5309023, 1.3745322e-09)
Data Point: (8.384032, 1.3603439e-09)

Data Point: (15.513906, 1.3333882e-09)
Data Point: (28.707105, 1.2826842e-09)
Data Point: (53.119948, 1.1907683e-09)
Data Point: (98.293744, 1.0333646e-09)
Data Point: (181.88384, 7.891143e-10)
Data Point: (336.55989, 4.769526e-10)
Data Point: (622.77416, 1.9457329e-10)
Data Point: (1,152.3883, 4.6967769e-11)
Data Point: (2,132.3921, 7.1964108e-12)
Data Point: (3,945.8021, 9.0028384e-13)
Data Point: (7,301.3562, 1.1232461e-13)
Data Point: (13,510.511, 1.418538e-14)
Data Point: (25,000, 9.3152911e-16)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Fly Ash (Silt)

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.3864664, 2.5573948e-05)
Data Point: (0.71512174, 2.5546723e-05)
Data Point: (1.3232692, 2.5491435e-05)
Data Point: (2.4485922, 2.5380193e-05)
Data Point: (4.5309023, 2.5156329e-05)
Data Point: (8.384032, 2.4710464e-05)
Data Point: (15.513906, 2.3846489e-05)
Data Point: (28.707105, 2.2216354e-05)
Data Point: (53.119948, 1.9335256e-05)
Data Point: (98.293744, 1.4758027e-05)
Data Point: (181.88384, 8.8022586e-06)
Data Point: (336.55989, 3.4311782e-06)
Data Point: (622.77416, 7.5651642e-07)
Data Point: (1,152.3883, 1.0237451e-07)
Data Point: (2,132.3921, 1.1379726e-08)
Data Point: (3,945.8021, 1.3068497e-09)
Data Point: (7,301.3562, 1.6528043e-10)
Data Point: (13,510.511, 2.1533388e-11)
Data Point: (25,000, 1.4511011e-12)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash (Silt)
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)

Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.28000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.28000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.28)
Data Point: (0.20885434, 0.27999953)
Data Point: (0.38282598, 0.27999889)
Data Point: (0.70171264, 0.27999732)
Data Point: (1.2862257, 0.27999341)
Data Point: (2.357627, 0.2799835)
Data Point: (4.3214847, 0.2799582)
Data Point: (7.9211981, 0.2798931)
Data Point: (14.519403, 0.27972487)
Data Point: (26.613786, 0.27928928)
Data Point: (48.782557, 0.27816395)
Data Point: (89.417486, 0.27528759)
Data Point: (163.90053, 0.26815749)
Data Point: (300.42651, 0.25178107)
Data Point: (550.67599, 0.21992827)
Data Point: (1,009.3785, 0.17361166)

Data Point: (1,850.1713, 0.12683641)
Data Point: (3,391.3282, 0.091653001)
Data Point: (6,216.2392, 0.068462184)
Data Point: (11,394.247, 0.05321804)
Data Point: (20,885.434, 0.042621227)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.28
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.28000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.28000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.28)
Data Point: (0.20885434, 0.27999953)
Data Point: (0.38282598, 0.27999889)
Data Point: (0.70171264, 0.27999732)
Data Point: (1.2862257, 0.27999341)
Data Point: (2.357627, 0.2799835)
Data Point: (4.3214847, 0.2799582)
Data Point: (7.9211981, 0.2798931)
Data Point: (14.519403, 0.27972487)
Data Point: (26.613786, 0.27928928)
Data Point: (48.782557, 0.27816395)
Data Point: (89.417486, 0.27528759)
Data Point: (163.90053, 0.26815749)
Data Point: (300.42651, 0.25178107)
Data Point: (550.67599, 0.21992827)
Data Point: (1,009.3785, 0.17361166)
Data Point: (1,850.1713, 0.12683641)
Data Point: (3,391.3282, 0.091653001)
Data Point: (6,216.2392, 0.068462184)
Data Point: (11,394.247, 0.05321804)
Data Point: (20,885.434, 0.042621227)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.28
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft

Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	24	26	12 ft	90 °	
Line 2	26	27	375 ft	0 °	
Line 3	27	25	13 ft	90 °	
Line 4	25	24	375 ft	0.153 °	
Line 5	11	12	19.313 ft	21.3 °	
Line 6	11	10	21.378 ft	10.8 °	
Line 7	9	8	27.893 ft	14.5 °	Seepage Face
Line 8	35	13	8 ft	0 °	Slurry Impoundment Full Pool
Line 9	13	14	10 ft	0 °	Slurry Impoundment Full Pool
Line 10	14	15	8.2462 ft	-14 °	Slurry Impoundment Full Pool
Line 11	15	16	21 ft	0 °	Slurry Impoundment Full Pool
Line 12	17	18	45.011 ft	-1.27 °	Slurry Impoundment Full Pool
Line 13	19	33	78 ft	0 °	
Line 14	8	7	2.2361 ft	26.6 °	Seepage Face
Line 15	38	36	4.4721 ft	26.6 °	
Line 16	36	37	4.4721 ft	-26.6 °	
Line 17	37	35	8.9443 ft	-26.6 °	
Line 18	42	43	8.0006 ft	0.716 °	
Line 19	43	44	5.3852 ft	-68.2 °	
Line 20	44	36	2 ft	0 °	
Line 21	40	39	7.2801 ft	15.9 °	
Line 22	39	34	4 ft	0 °	
Line 23	41	34	6.7082 ft	-26.6 °	
Line 24	34	48	2 ft	0 °	
Line 25	48	45	2 ft	0 °	
Line 26	45	46	2 ft	90 °	

Line 27	46	11	2.2361 ft	-26.6 °	
Line 28	48	47	2 ft	90 °	
Line 29	47	46	2 ft	0 °	
Line 30	16	49	8.544 ft	20.6 °	Slurry Impoundment Full Pool
Line 31	49	17	9.8489 ft	24 °	Slurry Impoundment Full Pool
Line 32	23	24	6 ft	90 °	
Line 33	25	21	5 ft	90 °	
Line 34	21	23	375 ft	0 °	
Line 35	7	6	10 ft	0 °	Seepage Face
Line 36	6	5	42.012 ft	1.36 °	Seepage Face
Line 37	5	4	16.279 ft	10.6 °	Seepage Face
Line 38	4	3	28.018 ft	-2.05 °	Seepage Face
Line 39	3	2	23 ft	0 °	Seepage Face
Line 40	56	55	23 ft	0 °	
Line 41	54	53	16.279 ft	10.6 °	
Line 42	53	52	42.012 ft	1.36 °	
Line 43	52	51	10 ft	0 °	
Line 44	2	58	15.297 ft	11.3 °	Seepage Face
Line 45	58	56	15 ft	0 °	
Line 46	1	58	20.396 ft	11.3 °	Seepage Face
Line 47	55	54	28.018 ft	2.05 °	
Line 48	50	1	154.02 ft	0.93 °	
Line 49	31	57	137 ft	0 °	
Line 50	32	59	137 ft	0 °	
Line 51	28	22	154 ft	-0.186 °	
Line 52	1	22	4 ft	90 °	
Line 53	60	29	154 ft	0 °	
Line 54	61	60	3 ft	90 °	
Line 55	59	20	8 ft	90 °	
Line 56	20	63	137 ft	0 °	
Line 57	63	62	84.054 ft	2.05 °	
Line 58	62	61	154 ft	0 °	
Line 59	61	23	10 ft	90 °	
Line 60	21	20	13 ft	90 °	
Line 61	38	64	8 ft	0 °	
Line 62	64	40	11 ft	0 °	
Line 63	12	64	12.806 ft	-38.7 °	
Line 64	35	12	10 ft	0 °	
Line 65	65	30	54 ft	0 °	
Line 66	65	33	5.3852 ft	-21.8 °	
Line 67	41	66	16.125 ft	7.13 °	
Line 68	66	42	8.0006 ft	-0.716 °	
Line 69	18	67	15 ft	90 °	
Line 70	67	19	21 ft	90 °	
Line 71	65	41	45.31 ft	-22 °	
Line 72	10	9	35.44 ft	16.4 °	
Line 73	29	32	84.38 ft	5.44 °	
Line 74	31	28	84.429 ft	5.78 °	
Line 75	31	50	84.013 ft	1.02 °	

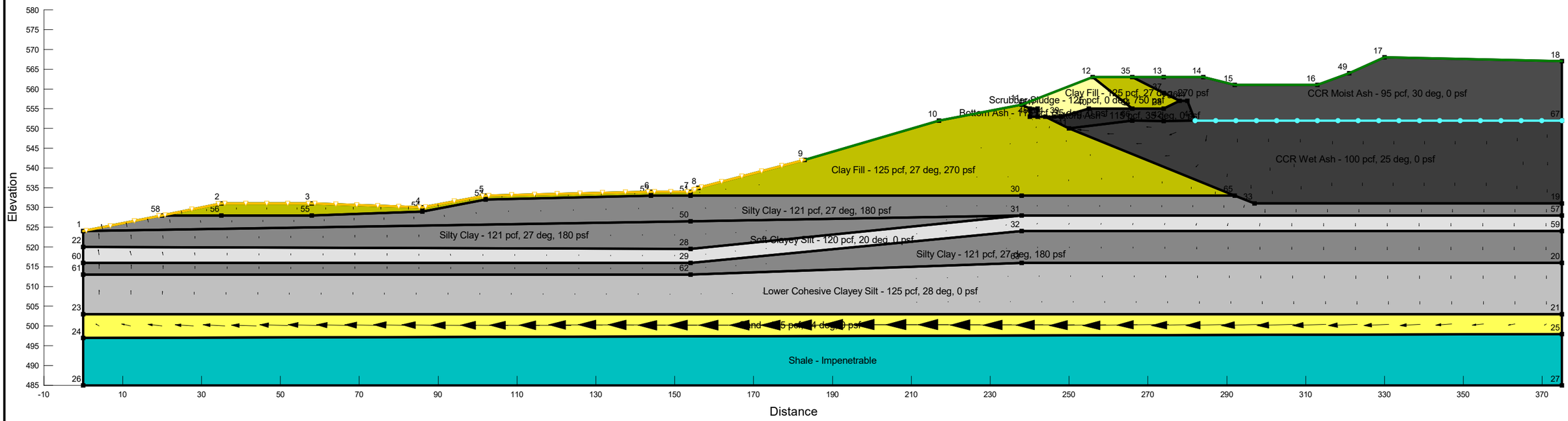
Line 76	30	51	84 ft	0 °	
Line 77	57	59	4 ft	90 °	
Line 78	60	22	4 ft	90 °	
Line 79	67	43	93 ft	0 °	Slurry Impoundment Total Head
Line 80	19	57	3 ft	90 °	

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Mesh Properties

Global Element Size: 8 ft



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Steady-State Seepage	
CWLP Long Term D-D' Current Conditions rev2.gsz	
10/20/2026	1:300

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 520
Date: 10/20/2026
Time: 12:45:58 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:46:06 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d
- Duration: 0 d
- Ending Time: 0 d

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Shale - Impenetrable

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 5
Rotation: 0 °
Volumetric Water Content: 0.2
Compressibility: 0 /psf

Sand - 125 pcf, 34 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 0.00082 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.3
Rotation: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash (Silt)
K-Function: Fly Ash (Silt)
Ky'/Kx' Ratio: 1
Rotation: 0 °

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 8.76e-09 ft/sec
Ky'/Kx' Ratio: 1.2
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2e-07 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 7.55e-08 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Scrubber Sludge
K-Function: Scrubber Sludge
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Boundary Conditions

Seepage Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

Slurry Impoundment Total Head

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Water K Functions

Silty Clay

Model: Hyd K Data Point Function

Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1391132e-09)
Data Point: (0.3864664, 2.1381837e-09)
Data Point: (0.71512174, 2.1365386e-09)
Data Point: (1.3232692, 2.1334316e-09)
Data Point: (2.4485922, 2.1275313e-09)
Data Point: (4.5309023, 2.1161865e-09)
Data Point: (8.384032, 2.0943426e-09)
Data Point: (15.513906, 2.0528424e-09)
Data Point: (28.707105, 1.9747801e-09)
Data Point: (53.119948, 1.8332692e-09)
Data Point: (98.293744, 1.5909354e-09)
Data Point: (181.88384, 1.2148953e-09)
Data Point: (336.55989, 7.3430105e-10)
Data Point: (622.77416, 2.9955885e-10)
Data Point: (1,152.3883, 7.2310082e-11)
Data Point: (2,132.3921, 1.1079367e-11)
Data Point: (3,945.8021, 1.3860484e-12)
Data Point: (7,301.3562, 1.729314e-13)
Data Point: (13,510.511, 2.1839356e-14)
Data Point: (25,000, 1.4341505e-15)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 1.39e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 1.39e-09)
Data Point: (0.20885434, 1.389424e-09)
Data Point: (0.3864664, 1.3888202e-09)
Data Point: (0.71512174, 1.3877516e-09)
Data Point: (1.3232692, 1.3857336e-09)
Data Point: (2.4485922, 1.3819011e-09)
Data Point: (4.5309023, 1.3745322e-09)
Data Point: (8.384032, 1.3603439e-09)
Data Point: (15.513906, 1.3333882e-09)
Data Point: (28.707105, 1.2826842e-09)
Data Point: (53.119948, 1.1907683e-09)
Data Point: (98.293744, 1.0333646e-09)
Data Point: (181.88384, 7.891143e-10)

Data Point: (336.55989, 4.769526e-10)
Data Point: (622.77416, 1.9457329e-10)
Data Point: (1,152.3883, 4.6967769e-11)
Data Point: (2,132.3921, 7.1964108e-12)
Data Point: (3,945.8021, 9.0028384e-13)
Data Point: (7,301.3562, 1.1232461e-13)
Data Point: (13,510.511, 1.418538e-14)
Data Point: (25,000, 9.3152911e-16)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.1379392e-09)
Data Point: (0.3864664, 2.1361148e-09)
Data Point: (0.71512174, 2.1333362e-09)
Data Point: (1.3232692, 2.1288243e-09)
Data Point: (2.4485922, 2.1213981e-09)
Data Point: (4.5309023, 2.1089345e-09)
Data Point: (8.384032, 2.0877966e-09)
Data Point: (15.513906, 2.0519898e-09)
Data Point: (28.707105, 1.9912131e-09)
Data Point: (53.119948, 1.8898574e-09)
Data Point: (98.293744, 1.7254197e-09)
Data Point: (181.88384, 1.4708567e-09)
Data Point: (336.55989, 1.112878e-09)
Data Point: (622.77416, 6.8537708e-10)
Data Point: (1,152.3883, 3.0409882e-10)
Data Point: (2,132.3921, 8.7522022e-11)
Data Point: (3,945.8021, 1.6870534e-11)
Data Point: (7,301.3562, 2.5839874e-12)
Data Point: (13,510.511, 3.5542308e-13)
Data Point: (25,000, 2.7181567e-14)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Scrubber Sludge
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Fly Ash (Silt)

Model: Hyd K Data Point Function

Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.3864664, 2.5573948e-05)
Data Point: (0.71512174, 2.5546723e-05)
Data Point: (1.3232692, 2.5491435e-05)
Data Point: (2.4485922, 2.5380193e-05)
Data Point: (4.5309023, 2.5156329e-05)
Data Point: (8.384032, 2.4710464e-05)
Data Point: (15.513906, 2.3846489e-05)
Data Point: (28.707105, 2.2216354e-05)
Data Point: (53.119948, 1.9335256e-05)
Data Point: (98.293744, 1.4758027e-05)
Data Point: (181.88384, 8.8022586e-06)
Data Point: (336.55989, 3.4311782e-06)
Data Point: (622.77416, 7.5651642e-07)
Data Point: (1,152.3883, 1.0237451e-07)
Data Point: (2,132.3921, 1.1379726e-08)
Data Point: (3,945.8021, 1.3068497e-09)
Data Point: (7,301.3562, 1.6528043e-10)
Data Point: (13,510.511, 2.1533388e-11)
Data Point: (25,000, 1.4511011e-12)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash (Silt)
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)

Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.28000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.28000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.28)
Data Point: (0.20885434, 0.27999953)
Data Point: (0.38282598, 0.27999889)
Data Point: (0.70171264, 0.27999732)
Data Point: (1.2862257, 0.27999341)
Data Point: (2.357627, 0.2799835)
Data Point: (4.3214847, 0.2799582)
Data Point: (7.9211981, 0.2798931)
Data Point: (14.519403, 0.27972487)
Data Point: (26.613786, 0.27928928)
Data Point: (48.782557, 0.27816395)
Data Point: (89.417486, 0.27528759)
Data Point: (163.90053, 0.26815749)
Data Point: (300.42651, 0.25178107)
Data Point: (550.67599, 0.21992827)
Data Point: (1,009.3785, 0.17361166)
Data Point: (1,850.1713, 0.12683641)
Data Point: (3,391.3282, 0.091653001)
Data Point: (6,216.2392, 0.068462184)
Data Point: (11,394.247, 0.05321804)
Data Point: (20,885.434, 0.042621227)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.28
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.28000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.28000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.28)
Data Point: (0.20885434, 0.27999953)
Data Point: (0.38282598, 0.27999889)
Data Point: (0.70171264, 0.27999732)
Data Point: (1.2862257, 0.27999341)
Data Point: (2.357627, 0.2799835)
Data Point: (4.3214847, 0.2799582)
Data Point: (7.9211981, 0.2798931)
Data Point: (14.519403, 0.27972487)
Data Point: (26.613786, 0.27928928)
Data Point: (48.782557, 0.27816395)
Data Point: (89.417486, 0.27528759)
Data Point: (163.90053, 0.26815749)
Data Point: (300.42651, 0.25178107)
Data Point: (550.67599, 0.21992827)
Data Point: (1,009.3785, 0.17361166)
Data Point: (1,850.1713, 0.12683641)
Data Point: (3,391.3282, 0.091653001)
Data Point: (6,216.2392, 0.068462184)
Data Point: (11,394.247, 0.05321804)
Data Point: (20,885.434, 0.042621227)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.28
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Scrubber Sludge

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.4
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.4
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.4)
Data Point: (0.20885434, 0.39999949)
Data Point: (0.38282598, 0.39999888)
Data Point: (0.70171264, 0.39999749)
Data Point: (1.2862257, 0.3999943)
Data Point: (2.357627, 0.39998685)
Data Point: (4.3214847, 0.3999692)
Data Point: (7.9211981, 0.39992705)
Data Point: (14.519403, 0.39982564)
Data Point: (26.613786, 0.39958042)
Data Point: (48.782557, 0.398986)
Data Point: (89.417486, 0.39754731)
Data Point: (163.90053, 0.39409838)
Data Point: (300.42651, 0.38605161)
Data Point: (550.67599, 0.36845642)
Data Point: (1,009.3785, 0.33486985)
Data Point: (1,850.1713, 0.2841431)
Data Point: (3,391.3282, 0.22747211)
Data Point: (6,216.2392, 0.17887623)
Data Point: (11,394.247, 0.14268261)
Data Point: (20,885.434, 0.11631128)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.4
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft

Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft

Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	24	26	12 ft	90 °	
Line 2	26	27	375 ft	0 °	
Line 3	27	25	13 ft	90 °	
Line 4	25	24	375 ft	0.153 °	
Line 5	11	12	19.313 ft	21.3 °	
Line 6	11	10	21.378 ft	10.8 °	
Line 7	9	8	27.893 ft	14.5 °	Seepage Face
Line 8	35	13	8 ft	0 °	
Line 9	13	14	10 ft	0 °	
Line 10	14	15	8.2462 ft	-14 °	
Line 11	15	16	21 ft	0 °	
Line 12	17	18	45.011 ft	-1.27 °	
Line 13	19	33	78 ft	0 °	
Line 14	8	7	2.2361 ft	26.6 °	Seepage Face
Line 15	38	36	4.4721 ft	26.6 °	
Line 16	36	37	4.4721 ft	-26.6 °	
Line 17	37	35	8.9443 ft	-26.6 °	
Line 18	42	43	8.0006 ft	0.716 °	
Line 19	43	44	5.3852 ft	-68.2 °	
Line 20	44	36	2 ft	0 °	
Line 21	40	39	7.2801 ft	15.9 °	
Line 22	39	34	4 ft	0 °	
Line 23	41	34	6.7082 ft	-26.6 °	
Line 24	34	48	2 ft	0 °	
Line 25	48	45	2 ft	0 °	
Line 26	45	46	2 ft	90 °	
Line 27	46	11	2.2361 ft	-26.6 °	
Line 28	48	47	2 ft	90 °	
Line 29	47	46	2 ft	0 °	
Line 30	16	49	8.544 ft	20.6 °	
Line 31	49	17	9.8489 ft	24 °	
Line 32	23	24	6 ft	90 °	

Line 33	25	21	5 ft	90 °	
Line 34	21	23	375 ft	0 °	
Line 35	7	6	10 ft	0 °	Seepage Face
Line 36	6	5	42.012 ft	1.36 °	Seepage Face
Line 37	5	4	16.279 ft	10.6 °	Seepage Face
Line 38	4	3	28.018 ft	-2.05 °	Seepage Face
Line 39	3	2	23 ft	0 °	Seepage Face
Line 40	56	55	23 ft	0 °	
Line 41	54	53	16.279 ft	10.6 °	
Line 42	53	52	42.012 ft	1.36 °	
Line 43	52	51	10 ft	0 °	
Line 44	2	58	15.297 ft	11.3 °	Seepage Face
Line 45	58	56	15 ft	0 °	
Line 46	1	58	20.396 ft	11.3 °	Seepage Face
Line 47	55	54	28.018 ft	2.05 °	
Line 48	50	1	154.02 ft	0.93 °	
Line 49	31	57	137 ft	0 °	
Line 50	32	59	137 ft	0 °	
Line 51	28	22	154 ft	-0.186 °	
Line 52	1	22	4 ft	90 °	
Line 53	60	29	154 ft	0 °	
Line 54	61	60	3 ft	90 °	
Line 55	59	20	8 ft	90 °	
Line 56	20	63	137 ft	0 °	
Line 57	63	62	84.054 ft	2.05 °	
Line 58	62	61	154 ft	0 °	
Line 59	61	23	10 ft	90 °	
Line 60	21	20	13 ft	90 °	
Line 61	38	64	8 ft	0 °	
Line 62	64	40	11 ft	0 °	
Line 63	12	64	12.806 ft	-38.7 °	
Line 64	35	12	10 ft	0 °	
Line 65	65	30	54 ft	0 °	
Line 66	65	33	5.3852 ft	-21.8 °	
Line 67	41	66	16.125 ft	7.13 °	
Line 68	66	42	8.0006 ft	-0.716 °	
Line 69	18	67	15 ft	90 °	
Line 70	67	19	21 ft	90 °	
Line 71	65	41	45.31 ft	-22 °	
Line 72	10	9	35.44 ft	16.4 °	
Line 73	29	32	84.38 ft	5.44 °	
Line 74	31	28	84.429 ft	5.78 °	
Line 75	31	50	84.013 ft	1.02 °	
Line 76	30	51	84 ft	0 °	
Line 77	57	59	4 ft	90 °	
Line 78	60	22	4 ft	90 °	
Line 79	67	43	93 ft	0 °	Slurry Impoundment Total Head
Line 80	19	57	3 ft	90 °	

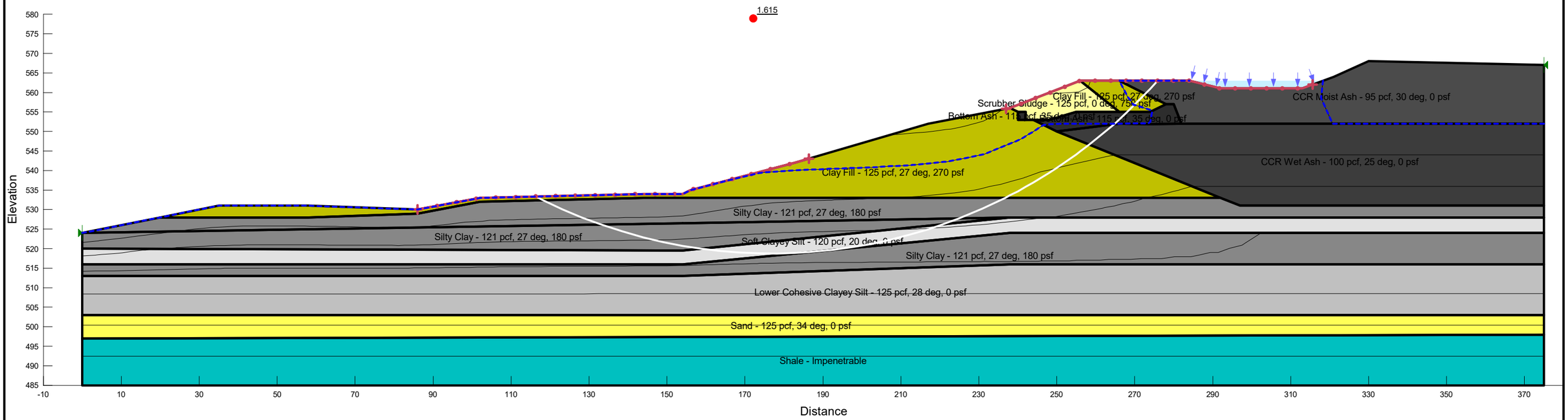
Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Mesh Properties

Global Element Size: 8 ft

APPENDIX G-2:
Long-Term Static Full Pool



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Circular Slope Stability	
CWLP Long Term D-D' Full Pool rev2.gsz	
10/20/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 521
Date: 10/20/2026
Time: 12:49:57 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:50:08 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft

Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft

Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8836 of 9261 converged

Current Slip Surface

Slip Surface: 2,865
Factor of Safety: 1.615

Volume: 2,808.0497 ft³
Weight: 344,227.09 lbf
Resisting Moment: 14,842,417 lbf·ft
Activating Moment: 9,190,909.4 lbf·ft
Resisting Force: 102,112.49 lbf
Activating Force: 63,246.453 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (275.88151, 563) ft
Entry: (116.30616, 533.34062) ft
Radius: 132.88748 ft
Center: (176.86488, 651.62724) ft

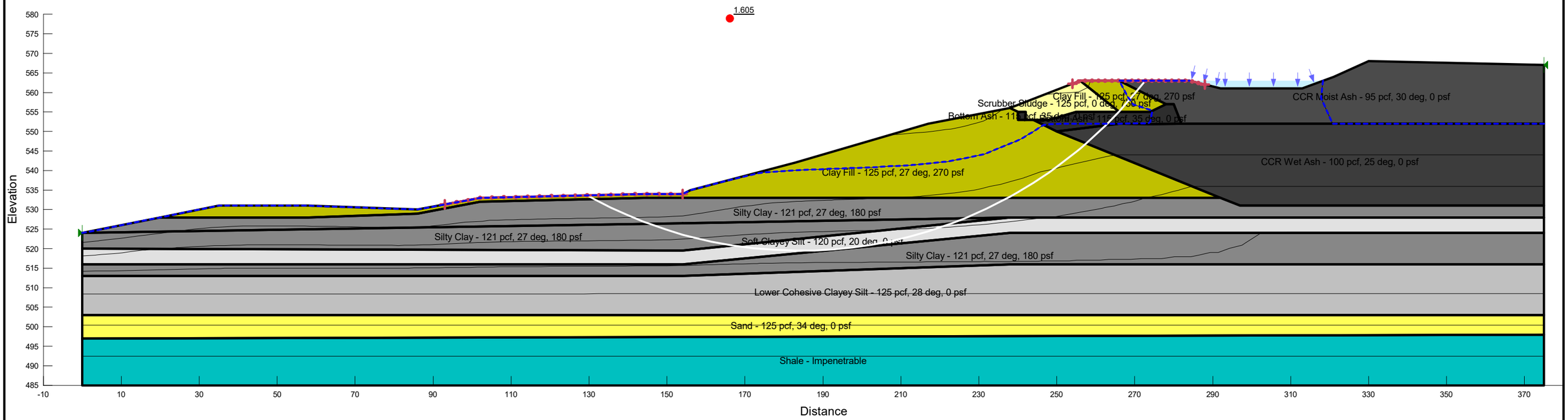
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.94076 ft	561.97090 ft	46.275342 psf	82.918406 psf	21.155883 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	273.37626 ft	560.28277 ft	153.33501 psf	227.30196 psf	42.704838 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	270.42190 ft	557.31187 ft	40.179862 psf	371.19907 psf	168.66271 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	267.04565 ft	554.03378 ft	-117.82753 psf	770.54673 psf	539.54263 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	265.30380 ft	552.44675 ft	-28.331884 psf	916.7742 psf	641.9322 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	261.46425 ft	549.22898 ft	173.85649 psf	1,306.6025 psf	528.20812 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 7	257.16045 ft	545.75193 ft	359.51525 psf	1,543.4456 psf	603.24267 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	255.50000 ft	544.50481 ft	393.5173 psf	1,676.5061 psf	653.71544 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf

Column 9	252.50000 ft	542.40653 ft	450.27204 psf	1,827.0531 psf	701.50497 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.00000 ft	540.02891 ft	516.57693 psf	1,993.8631 psf	752.71488 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	246.00000 ft	538.16389 ft	569.30984 psf	2,103.855 psf	781.8898 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	243.00000 ft	536.37144 ft	607.32773 psf	2,199.855 psf	811.43318 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 13	241.00000 ft	535.24655 ft	634.4204 psf	2,235.6972 psf	815.89128 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 14	239.00000 ft	534.16649 ft	663.28574 psf	2,301.0963 psf	834.50616 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 15	237.37680 ft	533.31875 ft	688.03463 psf	2,351.2843 psf	847.46801 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 16	233.81778 ft	531.60687 ft	735.61468 psf	2,504.7061 psf	901.39708 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 17	227.94612 ft	528.99089 ft	828.72144 psf	2,713.2869 psf	960.23406 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 18	222.99865 ft	527.02324 ft	912.22098 psf	2,871.237 psf	998.16849 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 19	218.99350 ft	525.61199 ft	981.40551 psf	3,028.1196 psf	744.94302 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	214.56638 ft	524.22537 ft	1,051.6372 psf	3,094.0691 psf	743.3844 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	209.69914 ft	522.88453 ft	1,123.3469 psf	3,122.5275 psf	727.64224 psf	0 psf	0 psf	Soft Clayey Silt - 120

								pcf, 20 deg, 0 psf
Column 22	204.83191 ft	521.73986 ft	1,185.3157 psf	3,130.2287 psf	707.89045 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	199.96467 ft	520.78621 ft	1,237.3412 psf	3,116.2083 psf	683.85169 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	195.09743 ft	520.01941 ft	1,279.4739 psf	3,079.2761 psf	655.07445 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	189.46012 ft	519.37715 ft	1,313.11 psf	3,004.0852 psf	615.46463 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	184.62822 ft	518.97675 ft	1,332.5702 psf	2,917.376 psf	576.82215 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	180.57483 ft	518.81372 ft	1,336.9212 psf	2,830.3162 psf	543.55131 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	175.72448 ft	518.76679 ft	1,332.1001 psf	2,711.1554 psf	501.93511 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 29	170.87413 ft	518.89706 ft	1,314.163 psf	2,563.1384 psf	454.58985 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	166.02378 ft	519.20507 ft	1,283.8092 psf	2,385.1854 psf	400.86814 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20

								deg, 0 psf
Column 31	161.17343 ft	519.69204 ft	1,240.6407 psf	2,176.5477 psf	340.6423 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	157.37413 ft	520.18424 ft	1,196.1545 psf	2,049.8084 psf	434.95835 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 33	155.00000 ft	520.55481 ft	1,157.1172 psf	1,889.8509 psf	373.34645 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 34	151.50000 ft	521.20785 ft	1,094.0579 psf	1,743.4911 psf	330.90276 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 35	146.50000 ft	522.28095 ft	992.46447 psf	1,612.1373 psf	315.73907 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	141.26990 ft	523.62705 ft	871.3685 psf	1,430.2562 psf	284.7675 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	135.80971 ft	525.27331 ft	724.30269 psf	1,195.2356 psf	239.95232 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	130.60107 ft	527.08106 ft	562.04853 psf	937.65332 psf	191.3802 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 39	125.64398 ft	529.03733 ft	384.8165 psf	662.38917 psf	141.43034 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 40	120.68689 ft	531.22942 ft	185.09024 psf	359.94279 psf	89.091825 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 41	117.25726 ft	532.86327 ft	39.69292 psf	168.80851 psf	65.787677 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Circular Slope Stability	
CWLP Long Term D-D' Full Pool rev2 Optimized2.gsz	
10/28/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 527
Date: 10/28/2026
Time: 10:06:41 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:06:50 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (93, 531.3125) ft
Left-Zone Right Coordinate: (154, 534) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (254, 562.22222) ft
Right-Zone Right Coordinate: (288, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft

Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft

Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8175 of 9261 converged

Current Slip Surface

Slip Surface: 5,533
Factor of Safety: 1.605

Volume: 2,585.0642 ft³
Weight: 317,559.98 lbf
Resisting Moment: 11,879,117 lbf·ft
Activating Moment: 7,401,389.2 lbf·ft
Resisting Force: 95,839.863 lbf
Activating Force: 59,736.238 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (272.70205, 563) ft
Entry: (129.5366, 533.65563) ft
Radius: 111.98749 ft
Center: (184.07924, 631.4631) ft

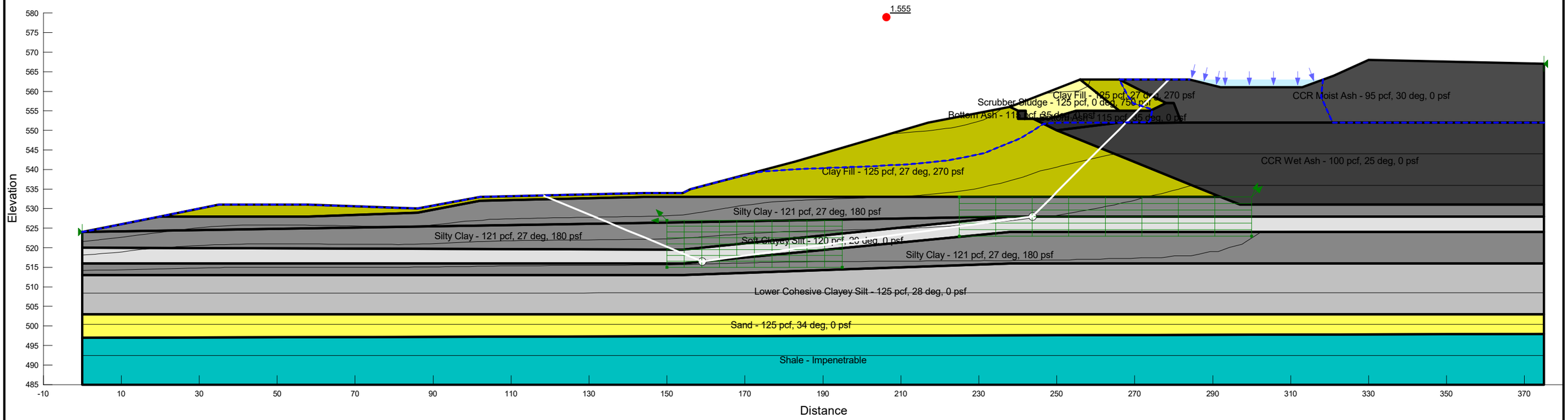
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	271.74924 ft	561.80089 ft	67.66644 psf	98.863715 psf	18.011755 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	268.39822 ft	557.85461 ft	-21.363931 psf	301.62575 psf	153.68599 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 3	264.27657 ft	553.33829 ft	-85.815435 psf	806.28857 psf	564.56934 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	260.05105 ft	549.25681 ft	172.09716 psf	1,271.0956 psf	512.4714 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 5	256.77448 ft	546.28350 ft	334.74283 psf	1,439.052 psf	562.67362 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 6	255.50000 ft	545.20852 ft	365.01404 psf	1,547.8311 psf	602.67538 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 7	252.50000 ft	542.86389 ft	431.04153 psf	1,723.7879 psf	658.68715 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	249.00000 ft	540.22173 ft	508.12293 psf	1,919.1518 psf	718.95514 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	246.00000 ft	538.18258 ft	568.48396 psf	2,049.5117 psf	754.62132 psf	270 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 270 psf
Column 10	243.00000 ft	536.23621 ft	613.68171 psf	2,164.6768 psf	790.27146 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	241.00000 ft	535.02723 ft	645.10241 psf	2,212.3222 psf	798.53836 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	239.00000 ft	533.87421 ft	677.99468 psf	2,288.2007 psf	820.44097 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 13	237.71459 ft	533.15572 ft	700.06341 psf	2,330.6103 psf	830.80512 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 14	234.68002 ft	531.60690 ft	743.58843 psf	2,477.6195 psf	883.53299 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 15	229.18168 ft	529.00362 ft	835.09382 psf	2,698.1277 psf	949.26318 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 16	224.76364 ft	527.14258 ft	914.01424 psf	2,859.7197 psf	991.38645 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 17	220.04738 ft	525.45774 ft	994.39068 psf	3,047.5584 psf	747.29195 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 18	214.57143 ft	523.73634 ft	1,081.6258 psf	3,151.5955 psf	753.40736 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 19	209.71429 ft	522.47769 ft	1,148.4494 psf	3,185.8709 psf	741.56078 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	204.85714 ft	521.44778 ft	1,203.4297 psf	3,195.7032 psf	725.12826 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Column 21	200.00000 ft	520.64023 ft	1,246.4613 psf	3,179.2743 psf	703.48639 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	195.14286 ft	520.05018 ft	1,277.6087 psf	3,134.4242 psf	675.82558 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	190.28571 ft	519.67418 ft	1,295.4899 psf	3,058.8241 psf	641.80115 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	185.42857 ft	519.51007 ft	1,300.0478 psf	2,950.0794 psf	600.5624 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	180.31392 ft	519.57119 ft	1,288.7392 psf	2,808.8549 psf	553.27686 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	174.94175 ft	519.88155 ft	1,259.6929 psf	2,628.866 psf	498.33826 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	169.56958 ft	520.45260 ft	1,211.4516 psf	2,401.7106 psf	433.21885 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	164.16262 ft	521.29558 ft	1,136.2012 psf	2,194.3458 psf	539.1516 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 29	158.72087 ft	522.42022 ft	1,025.1165 psf	1,861.075 psf	425.94216 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 30	155.00000 ft	523.32187 ft	932.21814 psf	1,572.8835 psf	326.43529 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 31	151.85453 ft	524.23554 ft	844.28178 psf	1,380.9124 psf	273.42694 psf	180 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 32	147.56359 ft	525.62050 ft	713.46227 psf	1,197.319 psf	246.53731 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 33	144.70906 ft	526.62697 ft	619.85083 psf	1,062.1994 psf	225.38784 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 34	141.88193 ft	527.75506 ft	519.54297 psf	902.93792 psf	195.34948 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 35	137.64578 ft	529.58221 ft	357.26375 psf	643.16149 psf	145.67217 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	133.40963 ft	531.62248 ft	175.21733 psf	359.17841 psf	93.732854 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	130.41408 ft	533.17653 ft	39.314735 psf	181.2945 psf	72.342306 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Block Slope Stability	
CWLP Long Term D-D' Full Pool rev2.gsz	
10/20/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 521
Date: 10/20/2026
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Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:50:18 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (150, 527) ft
- Lower Left: (150, 515) ft
- Lower Right: (195, 515) ft
- X Increments: 10
- Y Increments: 8
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (225, 533) ft
- Lower Left: (225, 523) ft
- Lower Right: (300, 523) ft
- X Increments: 8
- Y Increments: 6
- Angle Increments: 2

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y

Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft

Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 43435 of 56133 converged

Current Slip Surface

Slip Surface: 7,648
Factor of Safety: 1.555
Volume: 3,057.8802 ft³
Weight: 374,089.35 lbf
Resisting Moment: 6,130,762.2 lbf·ft
Activating Moment: 3,944,023.5 lbf·ft
Resisting Force: 97,385.237 lbf
Activating Force: 62,626.721 lbf
Slip Rank: 1 of 56,133 slip surfaces
Exit: (278.75, 563) ft
Entry: (118.23242, 533.38649) ft
Radius: 72.692795 ft
Center: (194.39371, 570.40338) ft

Slip Columns

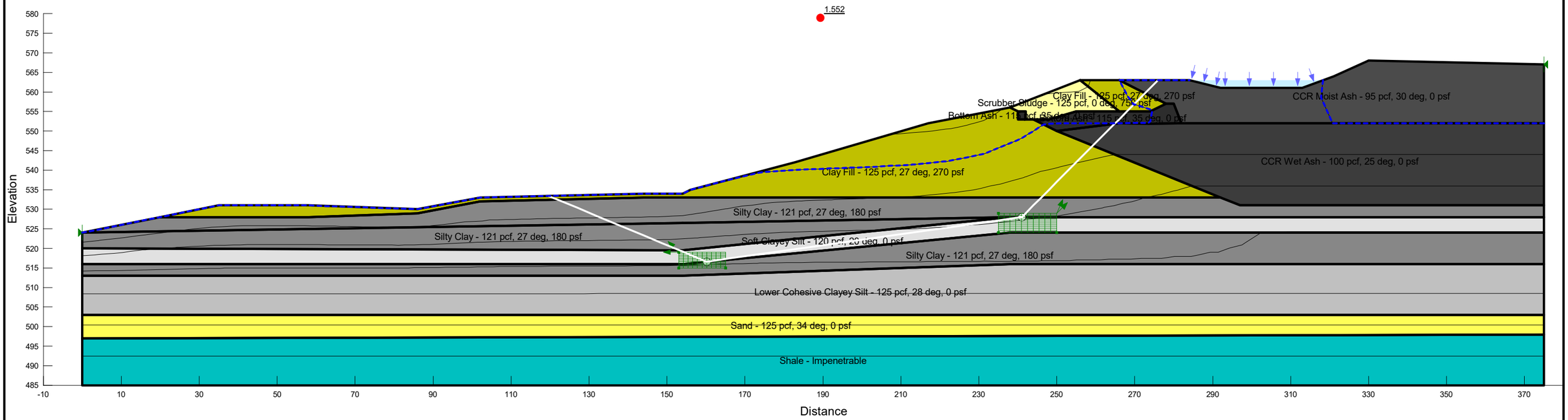
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	276.62500 ft	560.87500 ft	88.008822 psf	169.42393 psf	47.005037 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	274.25000 ft	558.50000 ft	204.01993 psf	247.585 psf	22.197514 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 3	272.37500 ft	556.62500 ft	38.931166 psf	402.80944 psf	185.40524 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	269.23920 ft	553.48920 ft	-63.573457 psf	761.4522 psf	533.17457 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	266.86420 ft	551.11420 ft	56.235808 psf	1,071.6206 psf	473.4817 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 6	263.60593 ft	547.85593 ft	259.60459 psf	1,355.7865 psf	511.15801 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 7	258.60593 ft	542.85593 ft	491.96839 psf	1,679.8359 psf	605.24874 psf	270 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 270 psf
Column 8	255.50000 ft	539.75000 ft	594.99945 psf	1,975.234 psf	703.26463 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	252.50000 ft	536.75000 ft	694.09561 psf	2,173.0894 psf	753.58496 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.37500 ft	533.62500 ft	800.30385 psf	2,375.8496 psf	802.78066 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	248.37500 ft	532.62500 ft	832.25033 psf	2,471.528 psf	835.25371 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 12	246.00000 ft	530.25000 ft	902.00259 psf	2,600.3018 psf	865.32664 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	243.87500 ft	528.12500 ft	969.65356 psf	2,715.1408 psf	889.37018 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 14	242.87500 ft	527.88127 ft	975.18018 psf	3,564.0227 psf	942.26163 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 15	241.00000 ft	527.62684 ft	978.06474 psf	3,489.2758 psf	914.00608 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 16	239.00000 ft	527.35546 ft	981.32034 psf	3,450.0805 psf	898.5552 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 17	235.37500 ft	526.86357 ft	987.64969 psf	3,407.6666 psf	880.81412 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 18	230.12500 ft	526.15118 ft	997.51179 psf	3,381.8067 psf	867.81239 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Column 19	224.87500 ft	525.43879 ft	1,014.9817 psf	3,355.9952 psf	852.05924 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	219.62500 ft	524.72640 ft	1,037.4294 psf	3,330.0968 psf	834.46268 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	214.16667 ft	523.98574 ft	1,065.4479 psf	3,266.748 psf	801.20771 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	208.50000 ft	523.21681 ft	1,100.215 psf	3,165.7743 psf	751.80211 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	202.83333 ft	522.44789 ft	1,138.4908 psf	3,064.4456 psf	700.99019 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	197.16667 ft	521.67896 ft	1,178.536 psf	2,962.8713 psf	649.44493 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	191.50000 ft	520.91003 ft	1,219.697 psf	2,861.1691 psf	597.44698 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	185.83333 ft	520.14110 ft	1,260.9506 psf	2,759.468 psf	545.41575 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	180.00000 ft	519.34956 ft	1,302.2429 psf	2,667.7924 psf	497.01939 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	174.00000 ft	518.53540 ft	1,343.5045 psf	2,586.2001 psf	452.30424 psf	0 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 20 deg, 0 psf
Column 29	168.00000 ft	517.72124 ft	1,384.0299 psf	2,504.8191 psf	407.9339 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	162.00000 ft	516.90708 ft	1,425.131 psf	2,423.6659 psf	363.437 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 31	157.50000 ft	517.12132 ft	1,404.0676 psf	2,598.6014 psf	434.77474 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	155.00000 ft	518.15685 ft	1,330.9643 psf	2,305.6357 psf	354.75136 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 33	152.86982 ft	519.03920 ft	1,268.4518 psf	2,097.1778 psf	301.6316 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 34	147.86982 ft	521.11027 ft	1,094.5558 psf	1,907.3703 psf	414.14966 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 35	141.89495 ft	523.58515 ft	875.64095 psf	1,520.1366 psf	328.38695 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	137.68484 ft	525.32903 ft	721.61338 psf	1,244.3209 psf	266.33281 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	133.06905 ft	527.24095 ft	551.58371 psf	949.78428 psf	202.89333 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	128.04759 ft	529.32091 ft	364.11173 psf	639.22095 psf	140.17515 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 39	123.02613 ft	531.40086 ft	174.54076 psf	339.21469 psf	83.905559 psf	180 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 40	119.37391 ft	532.91366 ft	39.556732 psf	152.02474 psf	57.305311 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Block Slope Stability
CWLP Long Term D-D' Full Pool rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 527
Date: 10/28/2026
Time: 10:06:41 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Full Pool rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:07:06 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (153, 519) ft
- Lower Left: (153, 515) ft
- Lower Right: (165, 515) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (235, 529) ft
- Lower Left: (235, 524) ft
- Lower Right: (250, 524) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y

Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft

Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 87502 of 131769 converged

Current Slip Surface

Slip Surface: 55,090
Factor of Safety: 1.552
Volume: 2,924.3259 ft³
Weight: 358,427.31 lbf
Resisting Moment: 5,930,923.8 lbf·ft
Activating Moment: 3,820,915.4 lbf·ft
Resisting Force: 94,351.168 lbf
Activating Force: 60,785.602 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (276, 563) ft
Entry: (119.59549, 533.41894) ft
Radius: 71.376942 ft
Center: (193.60171, 570.39526) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	275.00000 ft	562.00000 ft	43.999925 psf	80.799727 psf	21.246376 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	273.33333 ft	560.33333 ft	150.48165 psf	223.23627 psf	42.004902 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	270.33333 ft	557.33333 ft	37.372958 psf	359.73371 psf	164.25101 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	267.00000 ft	554.00000 ft	-116.47239 psf	745.30549 psf	521.86852 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	265.42857 ft	552.42857 ft	-27.147417 psf	874.76261 psf	612.51537 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	262.05569 ft	549.05569 ft	184.68395 psf	1,257.3141 psf	500.17566 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf

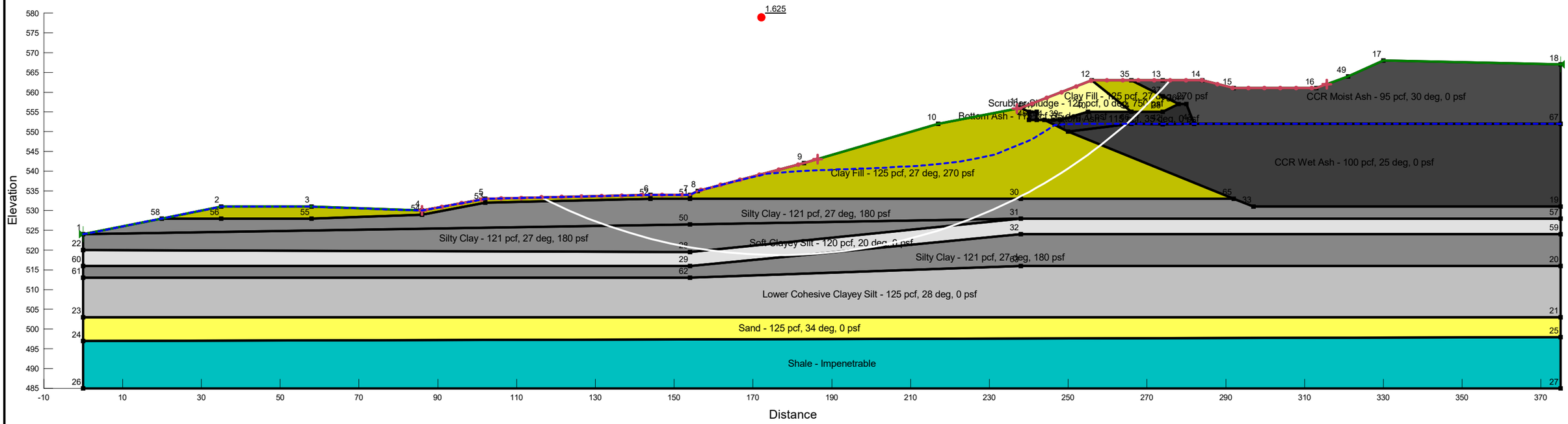
Column 7	257.62712 ft	544.62712 ft	409.2976 psf	1,517.2854 psf	564.54797 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	255.50000 ft	542.50000 ft	476.7189 psf	1,715.054 psf	630.96325 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	252.50000 ft	539.50000 ft	575.1907 psf	1,915.4489 psf	682.89564 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.00000 ft	536.00000 ft	693.04926 psf	2,143.3064 psf	738.94292 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	247.00000 ft	534.00000 ft	762.3281 psf	2,263.2308 psf	764.74813 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	245.00000 ft	532.00000 ft	825.80694 psf	2,412.7772 psf	808.60172 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	243.00000 ft	530.00000 ft	887.4165 psf	2,517.8408 psf	830.74266 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 14	241.50000 ft	528.50000 ft	938.60266 psf	2,580.6228 psf	836.65105 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 15	240.50000 ft	527.92946 ft	957.50111 psf	3,422.2114 psf	897.08118 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 16	239.00000 ft	527.71782 ft	960.33441 psf	3,398.6086 psf	887.45923 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 17	235.37500 ft	527.20637 ft	967.58743 psf	3,358.3499 psf	870.16638 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 18	230.12500 ft	526.46566 ft	978.82912 psf	3,335.6402 psf	857.80906 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Column 19	224.87500 ft	525.72494 ft	997.75894 psf	3,313.1303 psf	842.72625 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	219.62500 ft	524.98422 ft	1,021.75 psf	3,290.6727 psf	825.82033 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	214.57143 ft	524.27122 ft	1,048.8377 psf	3,238.0332 psf	796.80201 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	209.71429 ft	523.58593 ft	1,080.16 psf	3,155.0799 psf	755.20905 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	204.85714 ft	522.90064 ft	1,113.5108 psf	3,071.9564 psf	712.8159 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	200.00000 ft	522.21535 ft	1,148.6148 psf	2,988.7118 psf	669.74057 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	195.14286 ft	521.53006 ft	1,185.392 psf	2,905.4057 psf	626.03376 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	190.28571 ft	520.84477 ft	1,222.3065 psf	2,822.1225 psf	582.2854 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	185.42857 ft	520.15948 ft	1,259.3027 psf	2,738.9293 psf	538.54003 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	180.15000 ft	519.41473 ft	1,298.36 psf	2,660.9211 psf	495.93168 psf	0 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 20 deg, 0 psf
Column 29	174.45000 ft	518.61052 ft	1,339.5873 psf	2,588.1554 psf	454.44163 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	168.75000 ft	517.80631 ft	1,380.0034 psf	2,515.6361 psf	413.33652 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 31	163.05000 ft	517.00210 ft	1,421.0061 psf	2,443.3584 psf	372.1058 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	158.10000 ft	517.46985 ft	1,381.9282 psf	2,576.1691 psf	434.66812 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 33	155.00000 ft	518.75391 ft	1,291.1398 psf	2,221.4811 psf	338.61655 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 34	153.59623 ft	519.33537 ft	1,249.7251 psf	2,058.219 psf	294.26771 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 35	150.89434 ft	520.45453 ft	1,155.3727 psf	2,015.1499 psf	438.07837 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	146.29811 ft	522.35835 ft	985.38566 psf	1,720.0319 psf	374.32094 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	140.48342 ft	524.76687 ft	773.13231 psf	1,341.9088 psf	289.80607 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	134.45212 ft	527.26512 ft	551.38478 psf	953.33542 psf	204.80408 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf

Column 39	129.42266 ft	529.34839 ft	364.00639 psf	641.20863 psf	141.24159 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 40	124.39320 ft	531.43166 ft	174.4349 psf	339.98226 psf	84.35059 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 41	120.73698 ft	532.94612 ft	39.507078 psf	152.25752 psf	57.449218 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf

APPENDIX G-3:
Long-Term Static Current Conditions



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Circular Slope Stability	
CWLP Long Term D-D' Current Conditions rev2.gsz	
10/20/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 520
Date: 10/20/2026
Time: 12:45:58 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:46:08 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft

Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft

Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8844 of 9261 converged

Current Slip Surface

Slip Surface: 2,865
Factor of Safety: 1.625

Volume: 2,808.0497 ft³
Weight: 344,227.09 lbf
Resisting Moment: 14,934,685 lbf·ft
Activating Moment: 9,190,909.4 lbf·ft
Resisting Force: 102,589.54 lbf
Activating Force: 63,147.98 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (275.88151, 563) ft
Entry: (116.30616, 533.34062) ft
Radius: 132.88748 ft
Center: (176.86488, 651.62724) ft

Slip Columns

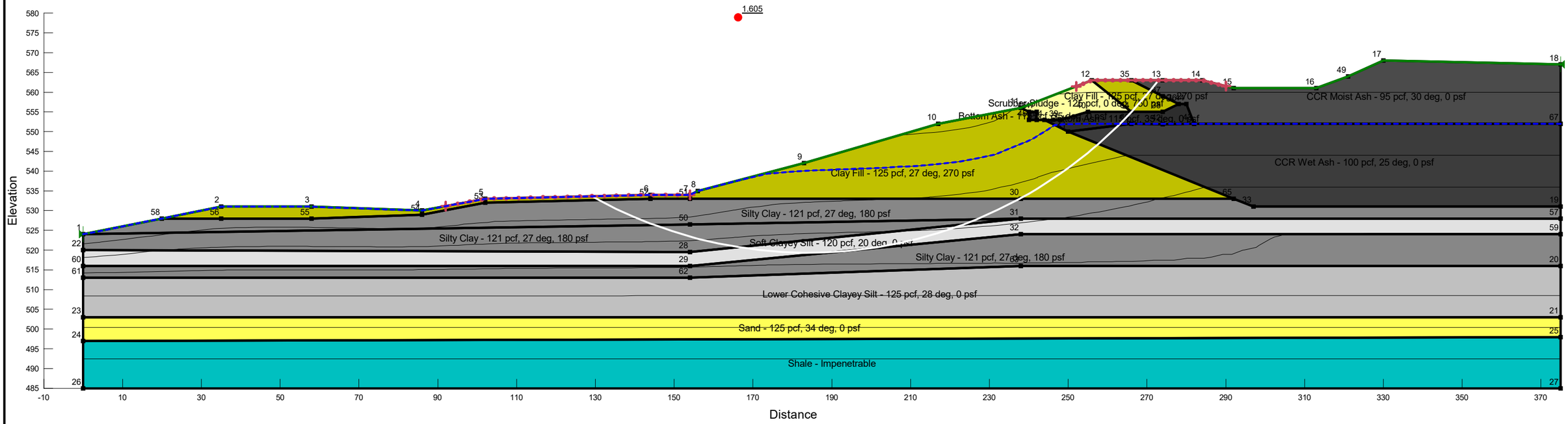
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	274.94076 ft	561.97090 ft	-622.48678 psf	21.954908 psf	12.675672 psf	0 psf	100.42076 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	273.37626 ft	560.28277 ft	-517.09669 psf	135.60169 psf	78.289671 psf	0 psf	110.2366 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	270.42190 ft	557.31187 ft	-331.77147 psf	364.56435 psf	185.75482 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	267.04565 ft	554.03378 ft	-127.24751 psf	773.44765 psf	541.57387 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	265.30380 ft	552.44675 ft	-28.138419 psf	919.97725 psf	644.175 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	261.46425 ft	549.22898 ft	172.70402 psf	1,310.1217 psf	530.38658 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 7	257.16045 ft	545.75193 ft	358.49721 psf	1,547.7678 psf	605.96366 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf

Column 8	255.50000 ft	544.50481 ft	392.68152 psf	1,681.057 psf	656.46008 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	252.50000 ft	542.40653 ft	449.74879 psf	1,831.8408 psf	704.21107 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.00000 ft	540.02891 ft	516.38122 psf	1,998.8568 psf	755.35903 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	246.00000 ft	538.16389 ft	569.32144 psf	2,108.9138 psf	784.46148 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	243.00000 ft	536.37144 ft	607.52034 psf	2,204.9098 psf	813.91058 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 13	241.00000 ft	535.24655 ft	634.7067 psf	2,240.6783 psf	818.2834 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 14	239.00000 ft	534.16649 ft	663.64718 psf	2,306.0184 psf	836.82994 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 15	237.37680 ft	533.31875 ft	688.43843 psf	2,356.1362 psf	849.73443 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 16	233.81778 ft	531.60687 ft	736.07986 psf	2,509.4633 psf	903.58397 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 17	227.94612 ft	528.99089 ft	829.15686 psf	2,717.5898 psf	962.20466 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 18	222.99865 ft	527.02324 ft	912.56587 psf	2,874.9725 psf	999.89611 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf

Column 19	218.99350 ft	525.61199 ft	981.61523 psf	3,032.2381 psf	746.36569 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	214.56638 ft	524.22537 ft	1,051.6916 psf	3,097.5809 psf	744.64282 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	209.69914 ft	522.88453 ft	1,123.3053 psf	3,125.2479 psf	728.6475 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	204.83191 ft	521.73986 ft	1,185.2249 psf	3,132.0649 psf	708.59181 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	199.96467 ft	520.78621 ft	1,237.2287 psf	3,117.1005 psf	684.21738 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	195.09743 ft	520.01941 ft	1,279.3513 psf	3,079.2025 psf	655.09227 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	189.46012 ft	519.37715 ft	1,312.9859 psf	3,002.9213 psf	615.08616 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	184.62822 ft	518.97675 ft	1,332.4443 psf	2,915.3436 psf	576.12824 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	180.57483 ft	518.81372 ft	1,336.7934 psf	2,827.6313 psf	542.62064 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	175.72448 ft	518.76679 ft	1,331.9476 psf	2,707.806 psf	500.77152 psf	0 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 20 deg, 0 psf
Column 29	170.87413 ft	518.89706 ft	1,313.9394 psf	2,559.2961 psf	453.2728 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	166.02378 ft	519.20507 ft	1,283.4197 psf	2,381.0529 psf	399.50582 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 31	161.17343 ft	519.69204 ft	1,239.9435 psf	2,172.3458 psf	339.36667 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	157.37413 ft	520.18424 ft	1,195.2509 psf	2,044.4357 psf	432.68123 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 33	155.00000 ft	520.55481 ft	1,156.1988 psf	1,884.7681 psf	371.22457 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 34	151.50000 ft	521.20785 ft	1,093.106 psf	1,738.6863 psf	328.93964 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 35	146.50000 ft	522.28095 ft	991.48414 psf	1,607.6626 psf	313.95863 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	141.26990 ft	523.62705 ft	870.44933 psf	1,426.3667 psf	283.25403 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	135.80971 ft	525.27331 ft	723.49849 psf	1,192.1419 psf	238.78575 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	130.60107 ft	527.08106 ft	561.40541 psf	935.38562 psf	190.55244 psf	180 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 39	125.64398 ft	529.03733 ft	384.36966 psf	660.87188 psf	140.88492 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 40	120.68689 ft	531.22942 ft	184.88182 psf	359.03899 psf	88.737507 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 41	117.25726 ft	532.86327 ft	39.654226 psf	167.97184 psf	65.381087 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Circular Slope Stability
CWLP Long Term D-D' Current Conditions rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 527
Date: 10/28/2026
Time: 10:04:12 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:04:26 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (92, 531.125) ft
Left-Zone Right Coordinate: (154, 534) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (252, 561.44444) ft
Right-Zone Right Coordinate: (290, 561.5) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft

Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft

Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8167 of 9261 converged

Current Slip Surface

Slip Surface: 5,533
Factor of Safety: 1.605

Volume: 2,605.2838 ft³
Weight: 319,984.57 lbf
Resisting Moment: 11,988,295 lbf·ft
Activating Moment: 7,465,898.5 lbf·ft
Resisting Force: 96,295.198 lbf
Activating Force: 59,990.604 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (272.87024, 563) ft
Entry: (129.12975, 533.64595) ft
Radius: 112.35791 ft
Center: (183.97086, 631.71099) ft

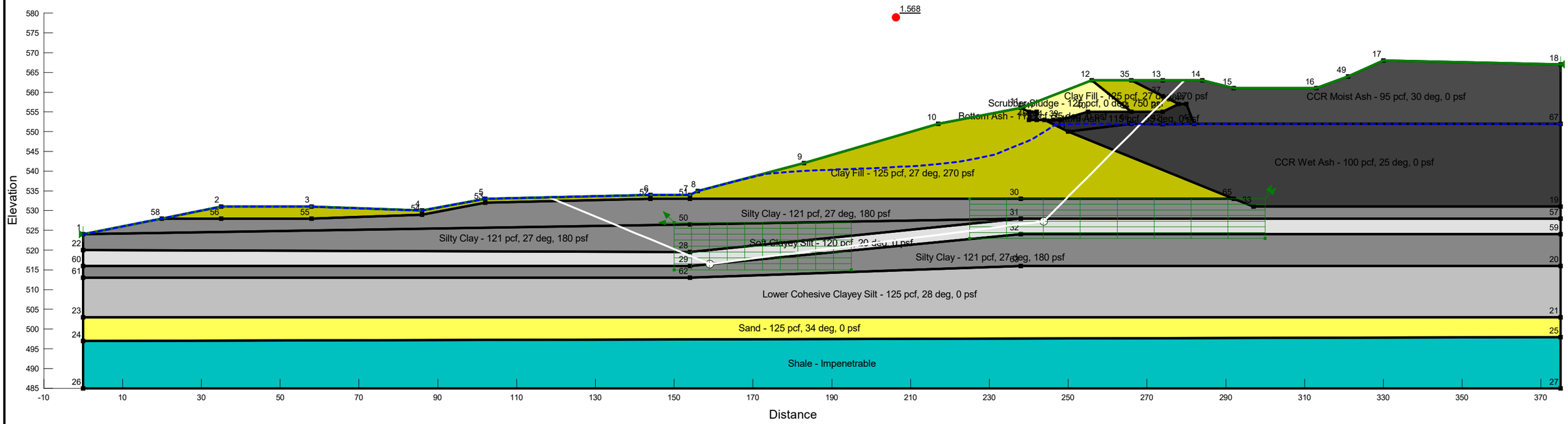
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	271.89275 ft	561.77119 ft	-610.01898 psf	25.750794 psf	14.867228 psf	0 psf	101.8171 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	268.45763 ft	557.73554 ft	-358.28508 psf	313.04191 psf	159.50282 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 3	264.37273 ft	553.26094 ft	-78.965124 psf	814.34698 psf	570.21189 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	260.20557 ft	549.24520 ft	171.67368 psf	1,273.7637 psf	513.913 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 5	256.83284 ft	546.18769 ft	338.03438 psf	1,450.9828 psf	567.07556 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 6	255.50000 ft	545.06538 ft	369.89094 psf	1,565.6366 psf	609.26285 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 7	252.50000 ft	542.72728 ft	436.2176 psf	1,741.3478 psf	664.99704 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	249.00000 ft	540.09217 ft	513.60267 psf	1,936.4121 psf	724.9576 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	246.00000 ft	538.05774 ft	574.01952 psf	2,066.5229 psf	760.46848 psf	270 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 270 psf
Column 10	243.00000 ft	536.11559 ft	619.55573 psf	2,181.4527 psf	795.82624 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	241.00000 ft	534.90897 ft	651.16408 psf	2,228.912 psf	803.90269 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	239.00000 ft	533.75805 ft	684.21801 psf	2,304.6266 psf	825.63944 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 13	237.82030 ft	533.09813 ft	704.56315 psf	2,341.9003 psf	834.26496 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 14	234.90745 ft	531.60924 ft	746.05608 psf	2,483.7516 psf	885.40011 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 15	229.44117 ft	529.00842 ft	836.78376 psf	2,703.5639 psf	951.17197 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 16	225.09780 ft	527.16492 ft	914.76622 psf	2,863.1361 psf	992.74403 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 17	220.24379 ft	525.42446 ft	997.26687 psf	3,056.5614 psf	749.52192 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 18	214.38610 ft	523.58218 ft	1,090.6694 psf	3,166.9381 psf	755.70001 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 19	209.15831 ft	522.24548 ft	1,161.4843 psf	3,201.1078 psf	742.36226 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	203.93052 ft	521.17205 ft	1,219.0506 psf	3,206.7398 psf	723.4597 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20

								deg, 0 psf
Column 21	198.70273 ft	520.35426 ft	1,262.5924 psf	3,181.57 psf	698.45074 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	194.62250 ft	519.86881 ft	1,288.1962 psf	3,141.4181 psf	674.51762 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	190.61712 ft	519.57867 ft	1,301.7192 psf	3,075.9326 psf	645.76088 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	185.53904 ft	519.39272 ft	1,307.408 psf	2,963.7864 psf	602.87243 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	180.22096 ft	519.45010 ft	1,296.0724 psf	2,817.2991 psf	553.68124 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	174.66289 ft	519.77402 ft	1,265.6972 psf	2,630.193 psf	496.63586 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 27	169.10481 ft	520.37618 ft	1,214.8052 psf	2,393.0292 psf	428.83849 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	163.74433 ft	521.21981 ft	1,139.3949 psf	2,186.0887 psf	533.31713 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 29	158.58144 ft	522.29136 ft	1,033.7937 psf	1,869.6997 psf	425.91534 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 30	155.00000 ft	523.15723 ft	944.85273 psf	1,592.0588 psf	329.76794 psf	180 psf	0 psf	Silty Clay - 121

								pcf, 27 deg, 180 psf
Column 31	151.73325 ft	524.10319 ft	854.11232 psf	1,396.5161 psf	276.36855 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 32	147.19975 ft	525.56754 ft	715.87177 psf	1,202.9935 psf	248.20091 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 33	144.46650 ft	526.52802 ft	627.3664 psf	1,074.2282 psf	227.68748 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 34	141.81328 ft	527.58859 ft	533.14905 psf	924.19697 psf	199.24887 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 35	137.43985 ft	529.46915 ft	366.26899 psf	657.17812 psf	148.2256 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 36	133.06642 ft	531.57598 ft	178.36612 psf	364.22395 psf	94.699296 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	130.00473 ft	533.16678 ft	39.274756 psf	181.58068 psf	72.508489 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Block Slope Stability
CWLP Long Term D-D' Current Conditions rev2.gsz
10/20/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
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Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:46:18 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (150, 527) ft
- Lower Left: (150, 515) ft
- Lower Right: (195, 515) ft
- X Increments: 10
- Y Increments: 8
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (225, 533) ft
- Lower Left: (225, 523) ft
- Lower Right: (300, 523) ft
- X Increments: 8
- Y Increments: 7
- Angle Increments: 2

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y

Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft

Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 49644 of 64152 converged

Current Slip Surface

Slip Surface: 8,728
Factor of Safety: 1.568
Volume: 3,113.4032 ft³
Weight: 380,629.46 lbf
Resisting Moment: 6,298,111.8 lbf·ft
Activating Moment: 4,017,186.2 lbf·ft
Resisting Force: 99,305.495 lbf
Activating Force: 63,319.323 lbf
Slip Rank: 1 of 64,152 slip surfaces
Exit: (279.46429, 563) ft
Entry: (118.23242, 533.38649) ft
Radius: 73.012879 ft
Center: (194.76901, 570.40338) ft

Slip Columns

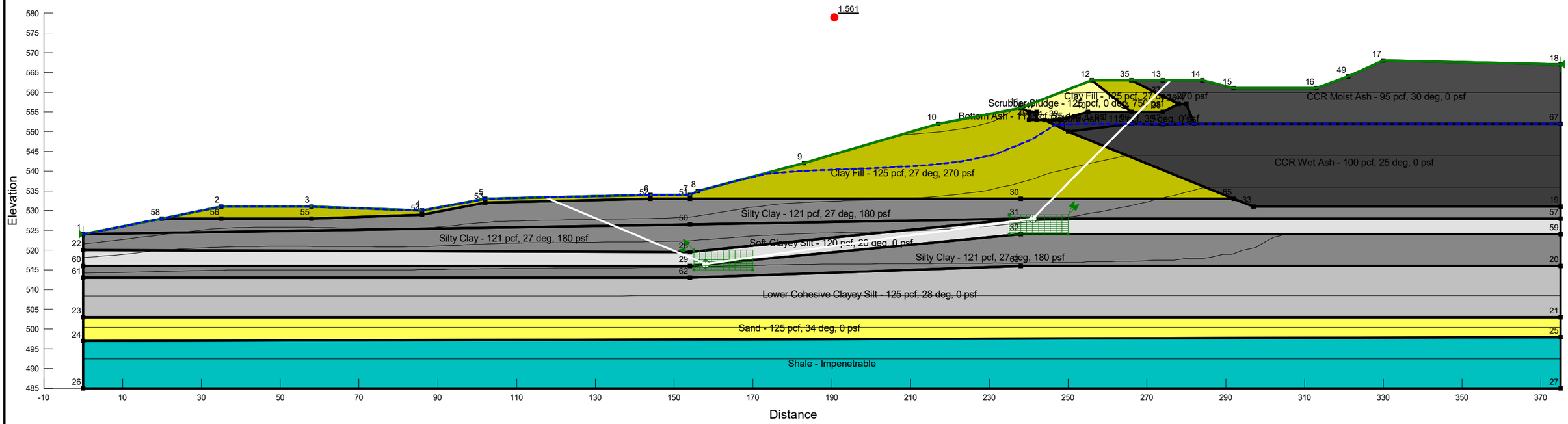
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	277.22024 ft	560.75595 ft	-546.63725 psf	105.53799 psf	60.932389 psf	0 psf	107.97584 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	274.48810 ft	558.02381 ft	-376.08738 psf	243.62449 psf	124.13288 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 3	272.73214 ft	556.26786 ft	-266.54979 psf	426.55917 psf	217.34275 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	269.94907 ft	553.48479 ft	-92.898742 psf	758.66838 psf	531.22532 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	267.21693 ft	550.75265 ft	77.657146 psf	1,102.8875 psf	478.07277 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25 deg, 0 psf
Column 6	263.86017 ft	547.39588 ft	287.17879 psf	1,399.2392 psf	518.56226 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25

								deg, 0 psf
Column 7	258.86017 ft	542.39588 ft	513.04158 psf	1,729.4371 psf	619.78446 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	255.50000 ft	539.03571 ft	624.94062 psf	2,051.1036 psf	726.66632 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	252.50000 ft	536.03571 ft	724.94741 psf	2,249.4416 psf	776.76858 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.73214 ft	533.26786 ft	819.4068 psf	2,431.0544 psf	821.17547 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	248.73214 ft	532.26786 ft	848.67846 psf	2,525.2135 psf	854.23729 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 12	246.23214 ft	529.76786 ft	922.69531 psf	2,662.2051 psf	886.3245 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	244.23214 ft	527.76786 ft	990.92298 psf	2,958.4352 psf	716.1159 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 14	243.87500 ft	527.41071 ft	1,008.923 psf	2,978.0014 psf	716.68591 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 15	242.87500 ft	527.17436 ft	1,016.1603 psf	3,656.1367 psf	960.87283 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 16	241.00000 ft	526.93574 ft	1,018.2651 psf	3,579.549 psf	932.23108 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Column 17	239.00000 ft	526.68121 ft	1,020.6909 psf	3,538.4863 psf	916.40256 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 18	235.37500 ft	526.21987 ft	1,025.5493 psf	3,492.7245 psf	897.97836 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 19	230.12500 ft	525.55173 ft	1,033.2582 psf	3,462.0303 psf	884.00075 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	224.87500 ft	524.88359 ft	1,048.4713 psf	3,431.2691 psf	867.26746 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	219.62500 ft	524.21544 ft	1,068.5308 psf	3,400.3047 psf	848.69628 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	214.16667 ft	523.52079 ft	1,093.9527 psf	3,331.4593 psf	814.38579 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	208.50000 ft	522.79962 ft	1,125.9125 psf	3,224.5411 psf	763.83834 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	202.83333 ft	522.07845 ft	1,161.3157 psf	3,117.1233 psf	711.85576 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	197.16667 ft	521.35728 ft	1,198.452 psf	3,009.3159 psf	659.10053 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	191.50000 ft	520.63611 ft	1,236.6795 psf	2,901.2384 psf	605.84989 psf	0 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 20 deg, 0 psf
Column 27	185.83333 ft	519.91495 ft	1,274.99 psf	2,793.0245 psf	552.51934 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	180.00000 ft	519.17257 ft	1,313.2639 psf	2,694.5429 psf	502.74444 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 29	174.00000 ft	518.40898 ft	1,351.4312 psf	2,605.851 psf	456.57149 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	168.00000 ft	517.64539 ft	1,388.8569 psf	2,517.2493 psf	410.70124 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 31	162.00000 ft	516.88180 ft	1,426.8277 psf	2,428.7724 psf	364.67804 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	157.50000 ft	517.12132 ft	1,403.9735 psf	2,584.8806 psf	429.81503 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 33	155.00000 ft	518.15685 ft	1,330.4648 psf	2,293.9036 psf	350.66305 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 34	152.86982 ft	519.03920 ft	1,267.5788 psf	2,086.862 psf	298.19468 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 35	147.86982 ft	521.11027 ft	1,093.5059 psf	1,896.4686 psf	409.12993 psf	180 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 36	141.89495 ft	523.58515 ft	874.72425 psf	1,512.5143 psf	324.97024 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	137.68484 ft	525.32903 ft	720.82458 psf	1,238.707 psf	263.87429 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	133.06905 ft	527.24095 ft	550.96572 psf	945.99127 psf	201.27557 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 39	128.04759 ft	529.32091 ft	363.69784 psf	636.95397 psf	139.23095 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 40	123.02613 ft	531.40086 ft	174.34888 psf	338.00216 psf	83.38551 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 41	119.37391 ft	532.91366 ft	39.518995 psf	151.05165 psf	56.828724 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 270 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Block Slope Stability
CWLP Long Term D-D' Current Conditions rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 527
Date: 10/28/2026
Time: 10:04:12 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term D-D' Current Conditions rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:04:44 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 270 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 270 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (155, 520) ft
- Lower Left: (155, 515) ft
- Lower Right: (170, 515) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (235, 529) ft
- Lower Left: (235, 524) ft
- Lower Right: (250, 524) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y

Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft

Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 27 deg, 270 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 27 deg, 180 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 27 deg, 180 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 27 deg, 270 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 87441 of 131769 converged

Current Slip Surface

Slip Surface: 38,755
Factor of Safety: 1.561
Volume: 2,956.9429 ft³
Weight: 362,384.49 lbf
Resisting Moment: 6,027,530.7 lbf·ft
Activating Moment: 3,860,329.1 lbf·ft
Resisting Force: 95,162.607 lbf
Activating Force: 60,947.544 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (276, 563) ft
Entry: (117.28677, 533.36397) ft
Radius: 72.133973 ft
Center: (192.493, 570.40901) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	275.00000 ft	562.00000 ft	-624.30365 psf	22.797852 psf	13.162346 psf	0 psf	100.21265 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	273.33333 ft	560.33333 ft	-520.25342 psf	133.70206 psf	77.192922 psf	0 psf	110.01583 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	270.33333 ft	557.33333 ft	-333.11385 psf	353.57958 psf	180.15779 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 4	267.00000 ft	554.00000 ft	-125.13892 psf	748.57133 psf	524.15529 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	265.42857 ft	552.42857 ft	-27.002958 psf	878.47305 psf	615.11345 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	262.05569 ft	549.05569 ft	183.5309 psf	1,262.2194 psf	503.00072 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 25

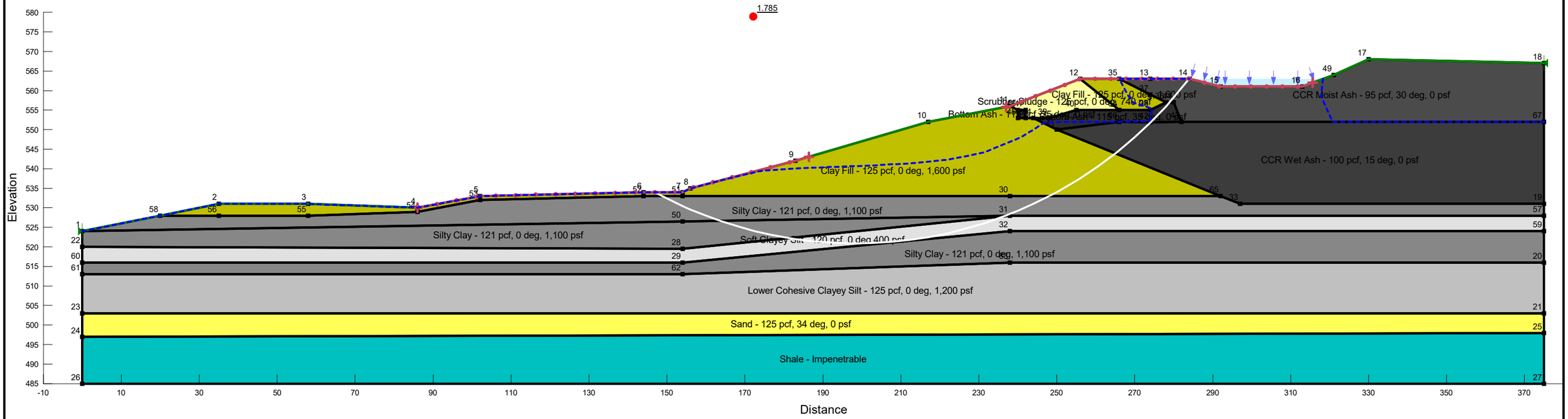
								deg, 0 psf
Column 7	257.62712 ft	544.62712 ft	408.37074 psf	1,523.951 psf	568.41651 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 8	255.50000 ft	542.50000 ft	476.07364 psf	1,722.7424 psf	635.20948 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 9	252.50000 ft	539.50000 ft	574.93219 psf	1,924.4446 psf	687.61093 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 10	249.00000 ft	536.00000 ft	693.15909 psf	2,153.856 psf	744.26226 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 11	247.00000 ft	534.00000 ft	762.61815 psf	2,274.652 psf	770.41974 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf
Column 12	245.00000 ft	532.00000 ft	826.28596 psf	2,425.1928 psf	814.68374 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	243.00000 ft	530.00000 ft	888.0804 psf	2,531.1006 psf	837.16062 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 14	241.50000 ft	528.50000 ft	939.38513 psf	2,594.4371 psf	843.29112 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 15	240.50000 ft	527.93072 ft	958.21385 psf	3,428.7577 psf	899.20441 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 16	239.00000 ft	527.72289 ft	960.7346 psf	3,404.5057 psf	889.45992 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 17	235.37500 ft	527.22063 ft	967.29059 psf	3,362.6636 psf	871.84449 psf	0 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 20 deg, 0 psf
Column 18	230.12500 ft	526.49322 ft	977.55203 psf	3,337.6289 psf	858.99774 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 19	224.87500 ft	525.76581 ft	995.53126 psf	3,312.752 psf	843.39939 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 20	219.62500 ft	525.03840 ft	1,018.5905 psf	3,287.8925 psf	825.95835 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 21	214.16667 ft	524.28213 ft	1,047.3314 psf	3,225.8062 psf	792.89996 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 22	208.50000 ft	523.49699 ft	1,082.9266 psf	3,126.3247 psf	743.73607 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 23	202.83333 ft	522.71185 ft	1,122.0773 psf	3,026.5886 psf	693.18542 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 24	197.16667 ft	521.92671 ft	1,163.0243 psf	2,926.6957 psf	641.92392 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 25	191.50000 ft	521.14157 ft	1,205.1059 psf	2,826.7552 psf	590.23204 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 26	185.83333 ft	520.35643 ft	1,247.2879 psf	2,726.8867 psf	538.5299 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf,

								20 deg, 0 psf
Column 27	180.50000 ft	519.61747 ft	1,285.9362 psf	2,643.7821 psf	494.21548 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 28	175.50000 ft	518.92470 ft	1,321.4694 psf	2,577.4473 psf	457.13857 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 29	170.50000 ft	518.23193 ft	1,355.9392 psf	2,511.3044 psf	420.51854 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 30	165.50000 ft	517.53916 ft	1,390.8093 psf	2,445.3582 psf	383.82441 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 31	160.50000 ft	516.84639 ft	1,426.7943 psf	2,379.6154 psf	346.79853 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 32	157.00000 ft	516.91421 ft	1,416.9851 psf	2,599.9219 psf	430.55377 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 33	155.00000 ft	517.74264 ft	1,358.2316 psf	2,359.352 psf	364.37802 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 34	152.36587 ft	518.83373 ft	1,280.6594 psf	2,120.5596 psf	305.69868 psf	0 psf	0 psf	Soft Clayey Silt - 120 pcf, 20 deg, 0 psf
Column 35	147.36587 ft	520.90480 ft	1,109.7687 psf	1,931.9095 psf	418.90164 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf

Column 36	141.65437 ft	523.27058 ft	901.26312 psf	1,561.8942 psf	336.60833 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 37	136.96312 ft	525.21376 ft	729.88543 psf	1,255.3125 psf	267.71845 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 38	132.10954 ft	527.22418 ft	551.09869 psf	946.59581 psf	201.51584 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 39	127.09363 ft	529.30184 ft	363.78169 psf	637.37088 psf	139.40066 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 40	122.07771 ft	531.37950 ft	174.42093 psf	338.35933 psf	83.530785 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 41	118.42827 ft	532.89115 ft	39.567313 psf	151.49692 psf	57.030983 psf	270 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 270 psf

APPENDIX G-4:
Short-Term Static Full Pool Conditions



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Circular Slope Stability	
CWLP Short Term Full Pool rev2.gsz	
10/20/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 552
Date: 10/20/2026
Time: 12:44:50 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:44:56 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)
    Data Point: (0.20885434, 0.299999)
    Data Point: (0.38282598, 0.29999749)
    Data Point: (0.70171264, 0.29999356)
    Data Point: (1.2862257, 0.2999833)

Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft

Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft

Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8483 of 9261 converged

Current Slip Surface

Slip Surface: 5,554
Factor of Safety: 1.785
Volume: 2,739.6674 ft³
Weight: 333,869.67 lbf
Resisting Moment: 12,639,593 lbf·ft
Activating Moment: 7,080,231.2 lbf·ft
Resisting Force: 105,953.92 lbf
Activating Force: 59,355.539 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (283.92405, 563) ft

Entry: (146.88735, 534) ft
Radius: 107.86806 ft
Center: (198.42046, 628.7621) ft

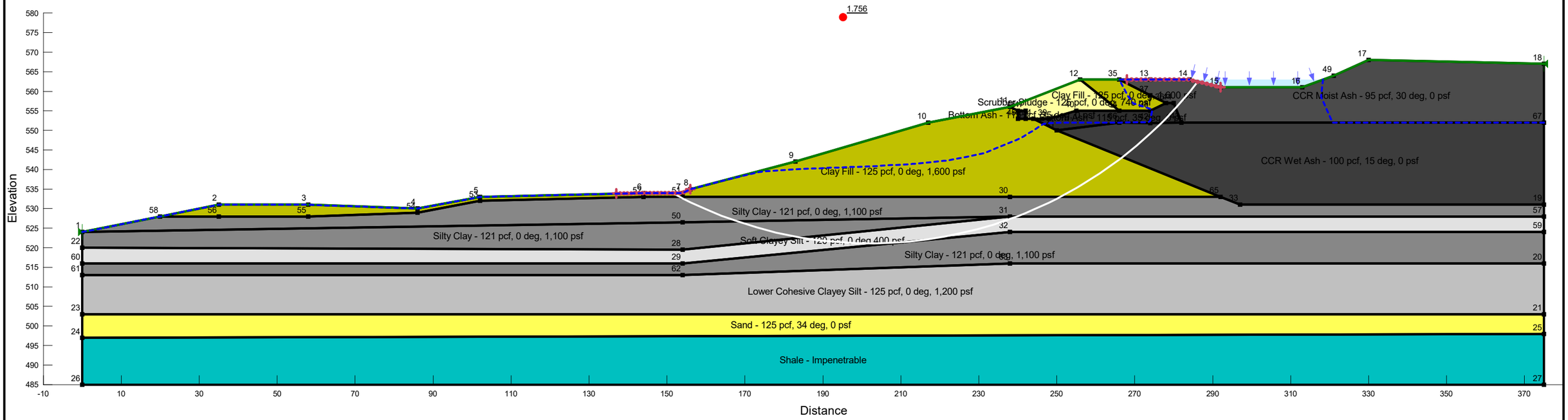
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	281.43924 ft	560.00000 ft	72.798505 psf	222.68225 psf	86.535423 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	278.47721 ft	556.47152 ft	211.65757 psf	494.97702 psf	198.38242 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 3	276.00000 ft	553.87124 ft	104.32411 psf	703.3553 psf	419.44616 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	272.00000 ft	549.93263 ft	130.05732 psf	1,247.315 psf	299.36828 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	268.00000 ft	546.37671 ft	351.94138 psf	1,621.254 psf	340.1113 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	265.51475 ft	544.30211 ft	481.44872 psf	1,835.8111 psf	362.90031 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	262.77213 ft	542.23773 ft	554.8584 psf	1,658.2902 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	258.25738 ft	539.05313 ft	648.37837 psf	2,154.5192 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	255.50000 ft	537.23562 ft	701.23849 psf	2,416.4746 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	252.50000 ft	535.47453 ft	749.1001 psf	2,568.2914 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

Column 11	249.00000 ft	533.49434 ft	802.62006 psf	2,731.7814 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	246.00000 ft	531.98019 ft	836.11558 psf	2,926.2325 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 13	243.00000 ft	530.54308 ft	865.2713 psf	2,991.5597 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 14	241.00000 ft	529.65955 ft	885.78026 psf	3,002.4527 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	239.00000 ft	528.82385 ft	907.37885 psf	3,046.6459 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	237.43557 ft	528.19882 ft	925.49565 psf	3,076.9194 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	236.70219 ft	527.91571 ft	934.80407 psf	3,101.2066 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 18	234.09160 ft	526.99573 ft	971.95193 psf	3,256.2609 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 19	229.20828 ft	525.41251 ft	1,037.1174 psf	3,363.9111 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	224.32497 ft	524.08093 ft	1,094.17 psf	3,449.1608 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	219.44166 ft	522.99145 ft	1,142.3605 psf	3,511.4282 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	214.57143 ft	522.13832 ft	1,179.5848 psf	3,518.78 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 23	209.71429 ft	521.51470 ft	1,207.7887 psf	3,469.1152 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	204.85714 ft	521.11375 ft	1,224.1038 psf	3,391.2716 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	200.00000 ft	520.93296 ft	1,228.2769 psf	3,283.2823 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	195.14286 ft	520.97123 ft	1,220.2145 psf	3,143.239 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	190.28571 ft	521.22879 ft	1,198.2976 psf	2,969.4331 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	185.42857 ft	521.70724 ft	1,162.1923 psf	2,760.4919 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	182.14783 ft	522.13201 ft	1,130.3202 psf	2,606.0292 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	179.08276 ft	522.66539 ft	1,090.0696 psf	2,561.5866 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 31	174.65698 ft	523.56862 ft	1,017.8583 psf	2,322.2439 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 32	170.23120 ft	524.66778 ft	924.4811 psf	2,051.9252 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf

Column 33	165.80542 ft	525.96917 ft	802.11715 psf	1,751.5653 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	161.69439 ft	527.35876 ft	664.45944 psf	1,447.7267 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	157.89813 ft	528.81580 ft	509.74913 psf	1,145.6026 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	155.00000 ft	530.02514 ft	369.4081 psf	873.72464 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 37	151.38515 ft	531.73245 ft	198.49699 psf	607.165 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	147.82883 ft	533.50000 ft	40.599715 psf	546.23215 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Circular Slope Stability
CWLP Short Term Full Pool rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 566
Date: 10/28/2026
Time: 10:30:37 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Full Pool rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:30:42 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (137, 533.83333) ft
Left-Zone Right Coordinate: (156, 535) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (268, 563) ft
Right-Zone Right Coordinate: (292, 561) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)
    Data Point: (0.20885434, 0.299999)
    Data Point: (0.38282598, 0.29999749)
    Data Point: (0.70171264, 0.29999356)
    Data Point: (1.2862257, 0.2999833)

Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft

Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft

Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8810 of 9261 converged

Current Slip Surface

Slip Surface: 6,940
Factor of Safety: 1.756
Volume: 2,789.3783 ft³
Weight: 338,998.63 lbf
Resisting Moment: 12,017,896 lbf·ft
Activating Moment: 6,844,059.4 lbf·ft
Resisting Force: 102,579.73 lbf
Activating Force: 58,422.353 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (286.11943, 562.47014) ft

Entry: (151.42656, 534) ft
Radius: 105.9979 ft
Center: (202.10348, 627.09889) ft

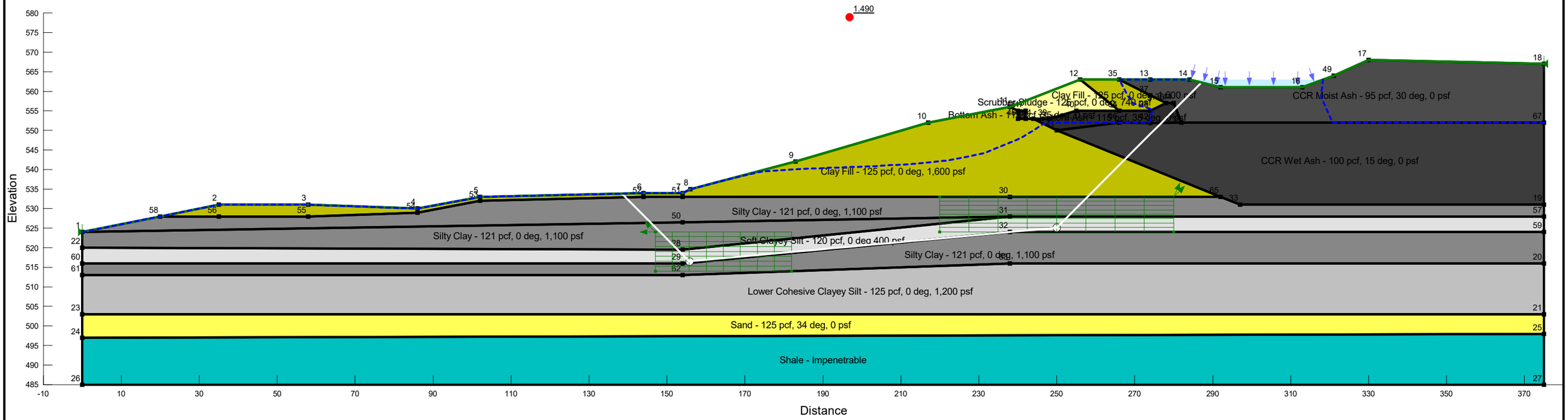
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	285.05971 ft	561.13740 ft	34.195444 psf	128.37742 psf	54.375989 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	282.24891 ft	557.78006 ft	103.46205 psf	382.11344 psf	160.87945 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	280.24891 ft	555.48387 ft	128.12035 psf	538.89688 psf	287.62882 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	279.00000 ft	554.15803 ft	93.79603 psf	645.82771 psf	386.53674 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	277.42160 ft	552.51967 ft	30.181888 psf	773.02199 psf	520.14224 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	275.42160 ft	550.57352 ft	89.898658 psf	1,137.5561 psf	280.71895 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	272.21380 ft	547.63554 ft	273.3672 psf	1,452.241 psf	315.87829 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 8	268.64139 ft	544.61862 ft	461.6745 psf	1,771.3854 psf	350.93597 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 9	266.42759 ft	542.85119 ft	561.01464 psf	1,509.6115 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

Column 10	263.50000 ft	540.74721 ft	621.58917 psf	1,845.2481 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	258.50000 ft	537.39791 ft	718.86875 psf	2,373.4419 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	255.50000 ft	535.53453 ft	772.65515 psf	2,647.6764 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 13	252.94925 ft	534.12148 ft	811.48234 psf	2,767.8315 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 14	250.44925 ft	532.76975 ft	845.20235 psf	2,990.5183 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	249.00000 ft	532.04613 ft	858.48711 psf	3,034.3358 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	246.00000 ft	530.64257 ft	887.02902 psf	3,104.3081 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	243.00000 ft	529.31416 ft	915.41658 psf	3,160.1821 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 18	241.00000 ft	528.50143 ft	935.17524 psf	3,164.9145 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 19	239.85975 ft	528.05346 ft	947.06756 psf	3,196.066 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 20	238.85975 ft	527.68214 ft	961.52597 psf	3,293.2682 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	235.90000 ft	526.65766 ft	1,002.9119 psf	3,344.0121 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	231.70000 ft	525.34027 ft	1,054.8774 psf	3,433.9182 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120

								pcf, 0 deg 400 psf
Column 23	227.50000 ft	524.21112 ft	1,100.9199 psf	3,507.0473 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	223.30000 ft	523.26408 ft	1,138.7729 psf	3,562.9605 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	219.10000 ft	522.49418 ft	1,171.5446 psf	3,600.8966 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	214.67504 ft	521.87519 ft	1,195.9278 psf	3,590.1231 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	210.02511 ft	521.42313 ft	1,214.0799 psf	3,526.386 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	205.37518 ft	521.17703 ft	1,220.9286 psf	3,435.126 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	200.72525 ft	521.13546 ft	1,216.7656 psf	3,314.5175 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	196.07532 ft	521.29817 ft	1,200.9478 psf	3,162.864 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	191.42539 ft	521.66611 ft	1,172.3775 psf	2,978.719 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 32	186.77546 ft	522.24144 ft	1,130.4477 psf	2,760.9988 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 33	183.72525 ft	522.70898 ft	1,096.5218 psf	2,714.8754 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	180.49395 ft	523.35869 ft	1,048.0612 psf	2,540.1086 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	175.48185 ft	524.53116 ft	956.89113 psf	2,246.1365 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	170.46975 ft	525.96548 ft	835.83573 psf	1,912.1053 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 37	165.96975 ft	527.47254 ft	695.60103 psf	1,581.2293 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	161.98185 ft	529.01134 ft	544.58381 psf	1,262.4103 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	157.99395 ft	530.73969 ft	354.97678 psf	922.45116 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	155.00000 ft	532.14853 ft	185.93458 psf	626.25789 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	153.65424 ft	532.82231 ft	107.54024 psf	484.21802 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 42	152.36751 ft	533.50000 ft	44.764674 psf	554.60101 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Block Slope Stability	
CWLP Short Term Full Pool rev2.gsz	
10/20/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 551
Date: 10/20/2026
Time: 12:40:36 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:41:22 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (147, 524) ft
- Lower Left: (147, 514) ft
- Lower Right: (182, 514) ft
- X Increments: 8
- Y Increments: 8
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (220, 533) ft
- Lower Left: (220, 524) ft
- Lower Right: (280, 524) ft
- X Increments: 8
- Y Increments: 8
- Angle Increments: 5

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.30000006
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft

Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft

Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 190848 of 236196 converged

Current Slip Surface

Slip Surface: 58,399
Factor of Safety: 1.490
Volume: 3,380.9187 ft³
Weight: 410,389.57 lbf

Resisting Moment: 6,009,367.6 lbf·ft
Activating Moment: 4,032,929.5 lbf·ft
Resisting Force: 82,689.633 lbf
Activating Force: 55,497.649 lbf
Slip Rank: 1 of 236,196 slip surfaces
Exit: (287.1, 562.225) ft
Entry: (138.38372, 533.86628) ft
Radius: 68.413097 ft
Center: (208.68607, 569.31468) ft

Slip Columns

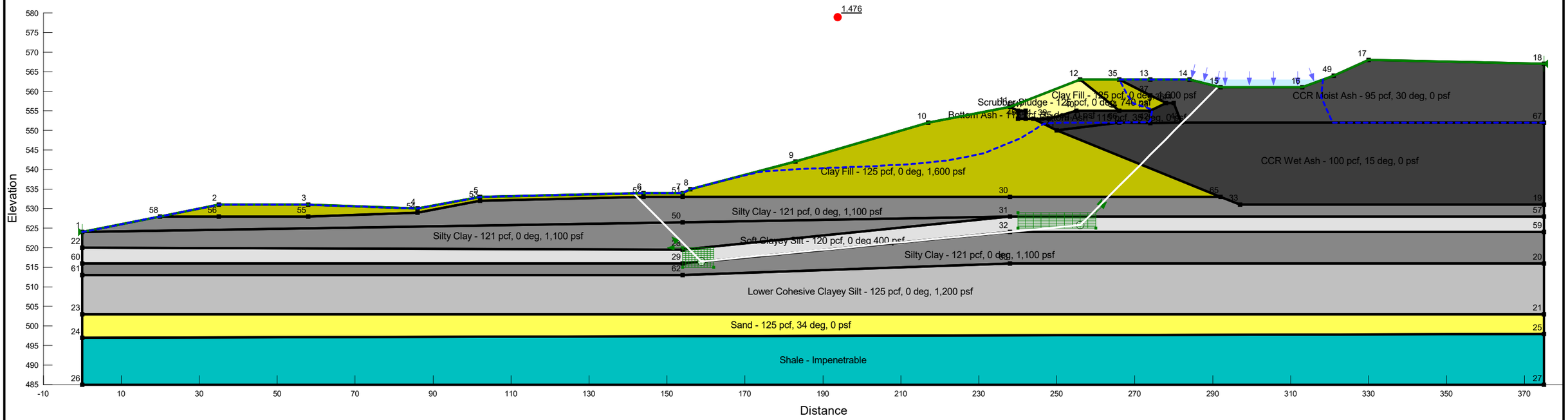
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	285.55000 ft	560.67500 ft	39.826345 psf	160.47913 psf	69.65892 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	282.26786 ft	557.39286 ft	103.74483 psf	408.2958 psf	175.83259 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	280.26786 ft	555.39286 ft	124.92173 psf	537.0827 psf	288.59822 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	279.00000 ft	554.12500 ft	92.409103 psf	632.74822 psf	378.34952 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	277.40506 ft	552.53006 ft	30.702487 psf	743.07813 psf	498.8108 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	275.40506 ft	550.53006 ft	92.611331 psf	1,118.6377 psf	274.92295 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	270.85381 ft	545.97881 ft	376.76676 psf	1,572.9009 psf	320.50318 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 8	266.85381 ft	541.97881 ft	599.91356 psf	1,245.2801 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

Column 9	263.96875 ft	539.09375 ft	692.42606 psf	1,624.2981 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	259.90625 ft	535.03125 ft	826.72669 psf	2,132.3317 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	256.93750 ft	532.06250 ft	918.21728 psf	2,777.267 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 12	255.50000 ft	530.62500 ft	955.28378 psf	2,920.0709 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 13	253.93750 ft	529.06250 ft	997.779 psf	3,031.6531 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 14	251.43750 ft	526.56250 ft	1,099.2951 psf	3,598.1376 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 15	249.00000 ft	525.03349 ft	1,172.0078 psf	4,225.2491 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 16	246.00000 ft	524.75895 ft	1,171.897 psf	4,135.3229 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 17	243.00000 ft	524.48442 ft	1,170.3799 psf	4,038.1282 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 18	241.00000 ft	524.30139 ft	1,169.5241 psf	3,947.2665 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 19	239.00000 ft	524.11837 ft	1,168.7926 psf	3,896.2377 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Column 20	235.37500 ft	523.78664 ft	1,167.7238 psf	3,833.1093 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	230.12500 ft	523.30620 ft	1,166.5289 psf	3,778.2648 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	224.87500 ft	522.82576 ft	1,172.2552 psf	3,724.3881 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	219.62500 ft	522.34532 ft	1,182.2357 psf	3,671.2906 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	214.57143 ft	521.88286 ft	1,195.2442 psf	3,589.6466 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	209.71429 ft	521.43838 ft	1,212.4919 psf	3,479.2122 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	204.85714 ft	520.99389 ft	1,231.5219 psf	3,368.877 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	200.00000 ft	520.54940 ft	1,252.1034 psf	3,258.4197 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	195.14286 ft	520.10492 ft	1,274.1977 psf	3,147.6207 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	190.28571 ft	519.66043 ft	1,296.3495 psf	3,036.2647 psf	0 psf	400 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 0 deg 400 psf
Column 30	185.42857 ft	519.21594 ft	1,318.5023 psf	2,924.1446 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	180.30000 ft	518.74662 ft	1,340.7461 psf	2,816.3602 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 32	174.90000 ft	518.25245 ft	1,363.2273 psf	2,712.5781 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 33	169.50000 ft	517.75829 ft	1,384.5444 psf	2,607.2298 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 34	164.10000 ft	517.26412 ft	1,405.985 psf	2,500.1347 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 35	158.70000 ft	516.76996 ft	1,429.17 psf	2,391.1438 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 36	155.87500 ft	516.51144 ft	1,442.065 psf	2,329.6709 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 37	154.87500 ft	517.37500 ft	1,382.9036 psf	2,578.9237 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 38	153.37296 ft	518.87704 ft	1,280.058 psf	2,311.4999 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 39	149.31386 ft	522.93614 ft	944.76352 psf	2,243.5347 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	144.94089 ft	527.30911 ft	561.84439 psf	1,633.0056 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	141.68023 ft	530.56977 ft	278.50521 psf	1,186.967 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 42	138.87209 ft	533.37791 ft	38.489073 psf	1,141.755 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Block Slope Stability
CWLP Short Term Full Pool rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
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Revision Number: 566
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Tool Version: 23.1.2.11
File Name: CWLP Short Term Full Pool rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:31:08 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (154, 520) ft
- Lower Left: (154, 515) ft
- Lower Right: (162, 515) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (240, 529) ft
- Lower Left: (240, 525) ft
- Lower Right: (260, 525) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.30000006
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft

Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft

Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 73768 of 131769 converged

Current Slip Surface

Slip Surface: 42,562
Factor of Safety: 1.476
Volume: 3,529.0162 ft³
Weight: 426,215.34 lbf

Resisting Moment: 5,763,314.5 lbf·ft
Activating Moment: 3,905,454.7 lbf·ft
Resisting Force: 81,176.926 lbf
Activating Force: 55,017.259 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (291.36, 561.16) ft
Entry: (141.36279, 533.93721) ft
Radius: 68.034325 ft
Center: (212.65592, 567.9657) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	287.68000 ft	557.48000 ft	47.312366 psf	364.91551 psf	183.36826 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	283.10000 ft	552.90000 ft	25.787969 psf	685.30519 psf	380.77244 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	282.10000 ft	551.90000 ft	6.2485515 psf	871.76635 psf	231.91479 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 4	281.00000 ft	550.80000 ft	75.068287 psf	1,010.8772 psf	250.74923 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	279.00000 ft	548.80000 ft	200.17974 psf	1,227.9824 psf	275.39888 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	276.00000 ft	545.80000 ft	387.70741 psf	1,519.9788 psf	303.39121 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	272.74915 ft	542.54915 ft	590.76612 psf	1,843.7226 psf	335.72868 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 8	268.74915 ft	538.54915 ft	752.68482 psf	1,587.6472 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

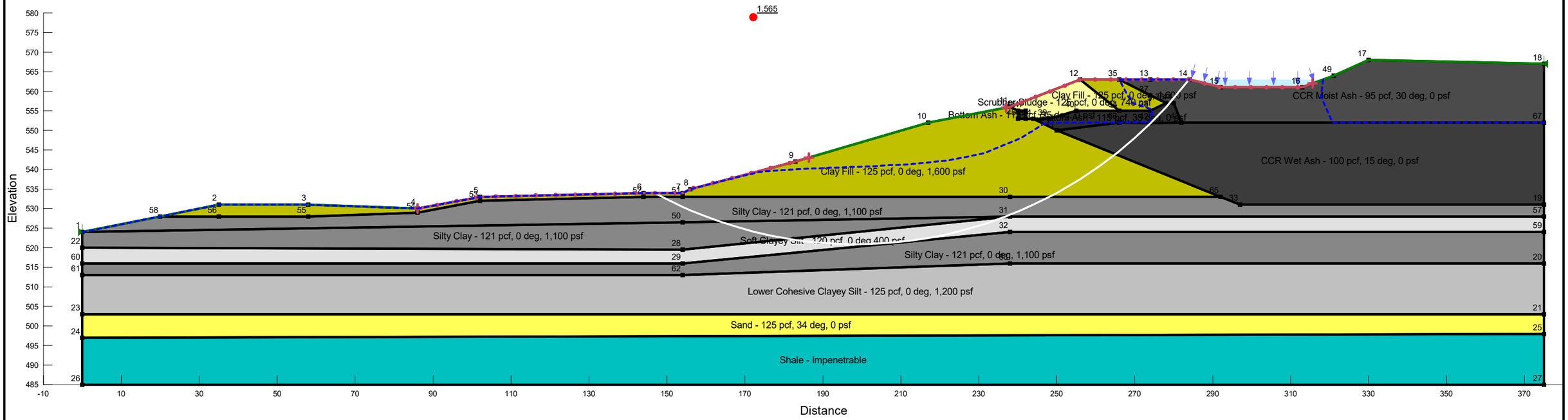
Column 9	264.60000 ft	534.40000 ft	885.73714 psf	2,141.9659 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	260.70000 ft	530.50000 ft	990.52461 psf	2,894.5985 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 11	257.10000 ft	526.90000 ft	1,109.6816 psf	3,700.0441 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 12	255.50000 ft	525.75216 ft	1,165.3777 psf	4,362.631 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 13	252.50000 ft	525.46512 ft	1,166.2217 psf	4,298.3209 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 14	249.00000 ft	525.13025 ft	1,166.5648 psf	4,218.6108 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 15	246.00000 ft	524.84321 ft	1,167.1176 psf	4,130.4824 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 16	243.00000 ft	524.55617 ft	1,166.273 psf	4,035.0689 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 17	241.00000 ft	524.36481 ft	1,165.8726 psf	3,945.4034 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 18	239.00000 ft	524.17346 ft	1,165.6023 psf	3,895.516 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Column 19	235.37500 ft	523.82662 ft	1,165.3838 psf	3,834.3926 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	230.12500 ft	523.32431 ft	1,165.4533 psf	3,782.3547 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	224.87500 ft	522.82199 ft	1,172.4822 psf	3,731.2074 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	219.62500 ft	522.31968 ft	1,183.7955 psf	3,680.7631 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	214.57143 ft	521.83616 ft	1,198.1074 psf	3,601.6193 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	209.71429 ft	521.37143 ft	1,216.6173 psf	3,493.5292 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	204.85714 ft	520.90670 ft	1,236.918 psf	3,385.4604 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	200.00000 ft	520.44198 ft	1,258.7768 psf	3,277.1945 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	195.14286 ft	519.97725 ft	1,282.1531 psf	3,168.5157 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	190.28571 ft	519.51252 ft	1,305.5965 psf	3,059.2135 psf	0 psf	400 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 0 deg 400 psf
Column 29	185.42857 ft	519.04780 ft	1,329.0524 psf	2,949.0864 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	180.58000 ft	518.58389 ft	1,351.4255 psf	2,848.5928 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	175.74000 ft	518.12080 ft	1,373.1495 psf	2,757.6044 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 32	170.90000 ft	517.65772 ft	1,393.6846 psf	2,665.3478 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 33	166.06000 ft	517.19463 ft	1,414.3543 psf	2,571.6959 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 34	161.22000 ft	516.73154 ft	1,435.3436 psf	2,476.5413 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 35	157.40000 ft	517.90000 ft	1,352.2624 psf	2,629.608 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 36	155.81730 ft	519.48270 ft	1,244.1689 psf	2,348.4741 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 37	154.81730 ft	520.48270 ft	1,162.2233 psf	2,653.3687 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf

Column 38	151.44153 ft	523.85847 ft	874.2001 psf	2,120.913 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	146.44153 ft	528.85847 ft	433.70465 psf	1,431.7278 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	143.16977 ft	532.13023 ft	147.26417 psf	992.26206 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	141.85116 ft	533.44884 ft	37.674048 psf	1,152.7517 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

APPENDIX G-5:
Seismic Full Pool Conditions



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Circular Slope Stability	
CWLP Seismic D-D' Full Pool rev2.gsz	
10/20/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 543
Date: 10/20/2026
Time: 12:52:14 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:52:30 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft

Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft

Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8477 of 9261 converged

Current Slip Surface

Slip Surface: 5,554
Factor of Safety: 1.565
Volume: 2,739.6674 ft³
Weight: 333,869.67 lbf
Resisting Moment: 12,612,243 lbf·ft

Activating Moment: 8,059,452.3 lbf·ft
Resisting Force: 105,773.24 lbf
Activating Force: 67,597.427 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (283.92405, 563) ft
Entry: (146.88735, 534) ft
Radius: 107.86806 ft
Center: (198.42046, 628.7621) ft

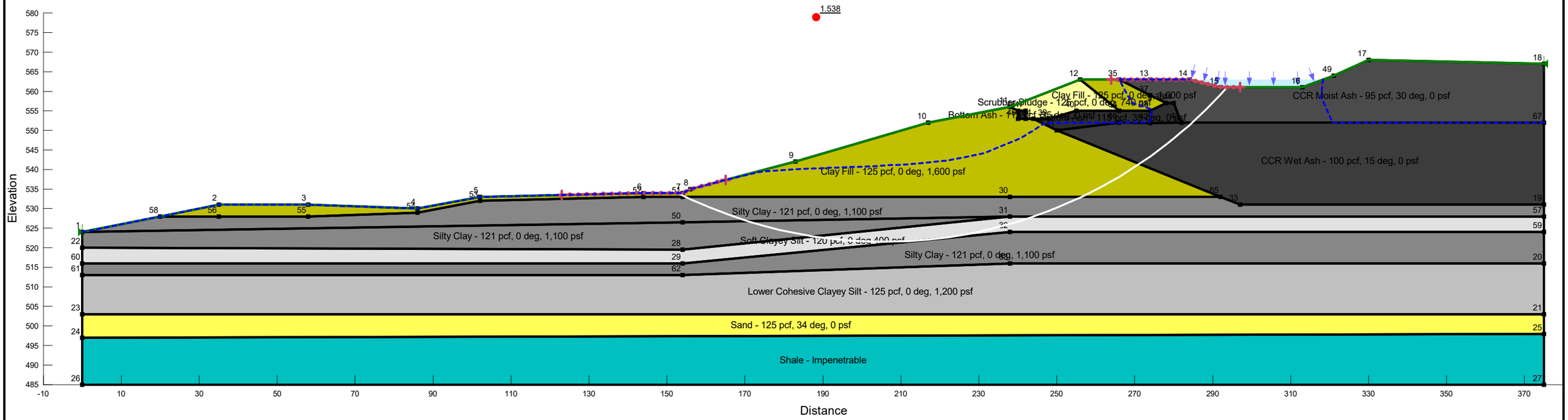
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	281.43924 ft	560.00000 ft	72.798505 psf	216.4953 psf	82.963381 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	278.47721 ft	556.47152 ft	211.65757 psf	481.7854 psf	189.14554 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 3	276.00000 ft	553.87124 ft	104.32411 psf	677.44025 psf	401.30024 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	272.00000 ft	549.93263 ft	130.05732 psf	1,218.3047 psf	291.595 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	268.00000 ft	546.37671 ft	351.94138 psf	1,584.373 psf	330.22904 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	265.51475 ft	544.30211 ft	481.44872 psf	1,794.0545 psf	351.71166 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	262.77213 ft	542.23773 ft	554.8584 psf	1,562.1237 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	258.25738 ft	539.05313 ft	648.37837 psf	2,063.9698 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	255.50000 ft	537.23562 ft	701.23849 psf	2,328.9162 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf,

								0 deg, 1,600 psf
Column 10	252.50000 ft	535.47453 ft	749.1001 psf	2,485.2677 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	249.00000 ft	533.49434 ft	802.62006 psf	2,654.1448 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	246.00000 ft	531.98019 ft	836.11558 psf	2,859.2378 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 13	243.00000 ft	530.54308 ft	865.2713 psf	2,927.6507 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 14	241.00000 ft	529.65955 ft	885.78026 psf	2,941.3174 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	239.00000 ft	528.82385 ft	907.37885 psf	2,987.9533 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	237.43557 ft	528.19882 ft	925.49565 psf	3,020.3163 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	236.70219 ft	527.91571 ft	934.80407 psf	3,045.4689 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 18	234.09160 ft	526.99573 ft	971.95193 psf	3,202.2339 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 19	229.20828 ft	525.41251 ft	1,037.1174 psf	3,313.2692 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	224.32497 ft	524.08093 ft	1,094.17 psf	3,403.9876 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	219.44166 ft	522.99145 ft	1,142.3605 psf	3,473.6182 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 22	214.57143 ft	522.13832 ft	1,179.5848 psf	3,490.2381 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	209.71429 ft	521.51470 ft	1,207.7887 psf	3,451.233 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	204.85714 ft	521.11375 ft	1,224.1038 psf	3,384.6216 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	200.00000 ft	520.93296 ft	1,228.2769 psf	3,287.9064 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	195.14286 ft	520.97123 ft	1,220.2145 psf	3,158.6303 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	190.28571 ft	521.22879 ft	1,198.2976 psf	2,994.5534 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	185.42857 ft	521.70724 ft	1,162.1923 psf	2,793.8312 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	182.14783 ft	522.13201 ft	1,130.3202 psf	2,643.9284 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	179.08276 ft	522.66539 ft	1,090.0696 psf	2,627.6734 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 31	174.65698 ft	523.56862 ft	1,017.8583 psf	2,390.5008 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf,

								0 deg, 1,100 psf
Column 32	170.23120 ft	524.66778 ft	924.4811 psf	2,120.1781 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 33	165.80542 ft	525.96917 ft	802.11715 psf	1,817.8736 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	161.69439 ft	527.35876 ft	664.45944 psf	1,510.8425 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	157.89813 ft	528.81580 ft	509.74913 psf	1,204.9464 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	155.00000 ft	530.02514 ft	369.4081 psf	929.88752 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 37	151.38515 ft	531.73245 ft	198.49699 psf	659.52205 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	147.82883 ft	533.50000 ft	40.599715 psf	616.0494 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Circular Slope Stability	
CWLP Seismic D-D' Full Pool rev2 Optimized2.gsz	
10/28/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 553
Date: 10/28/2026
Time: 10:15:39 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Full Pool rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:15:46 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (123, 533.5) ft
Left-Zone Right Coordinate: (165, 537.33333) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (264, 563) ft
Right-Zone Right Coordinate: (297, 561) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft

Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft

Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8898 of 9261 converged

Current Slip Surface

Slip Surface: 6,561
Factor of Safety: 1.538
Volume: 2,997.8193 ft³
Weight: 361,065.31 lbf
Resisting Moment: 13,475,913 lbf·ft

Activating Moment: 8,760,670.4 lbf·ft
Resisting Force: 105,209.2 lbf
Activating Force: 68,401.315 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (293.67538, 561) ft
Entry: (152.77175, 534) ft
Radius: 117.9896 ft
Center: (205.59344, 639.50552) ft

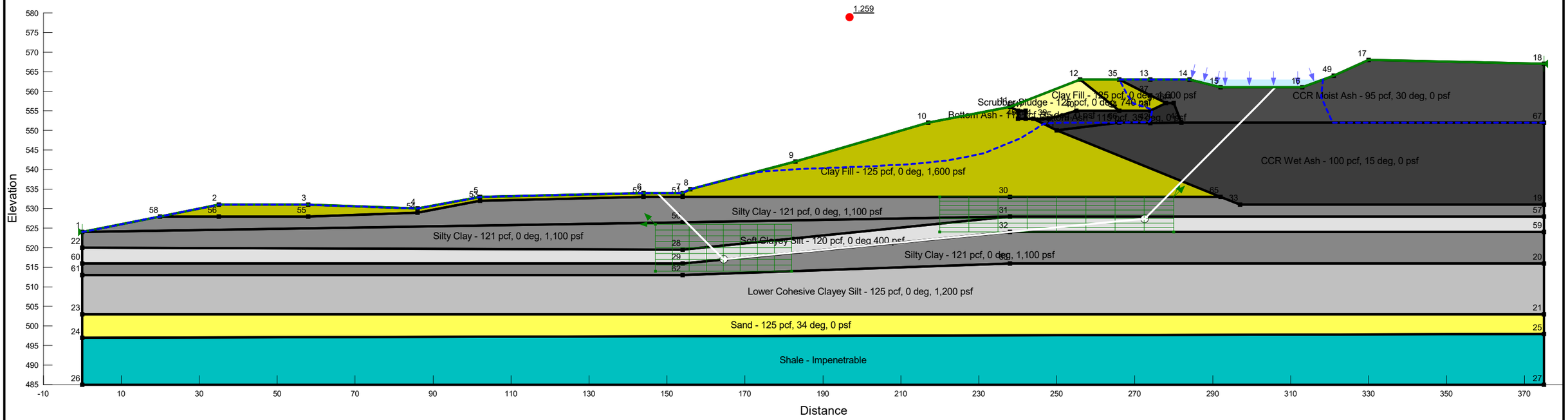
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	292.83769 ft	560.07985 ft	112.09368 psf	182.20468 psf	40.478606 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	290.18524 ft	557.29243 ft	63.870243 psf	367.26177 psf	175.16318 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	286.55571 ft	553.71258 ft	25.645302 psf	628.48581 psf	348.05013 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 4	284.37048 ft	551.66774 ft	20.756055 psf	900.67195 psf	235.77275 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	283.00000 ft	550.46613 ft	95.830552 psf	1,012.2557 psf	245.55539 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	281.00000 ft	548.76576 ft	202.10502 psf	1,208.1756 psf	269.57581 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	279.00000 ft	547.14000 ft	303.82995 psf	1,396.7641 psf	292.85082 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 8	276.00000 ft	544.85750 ft	446.5305 psf	1,634.9426 psf	318.43406 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15

								deg, 0 psf
Column 9	272.59138 ft	542.39789 ft	600.21359 psf	1,906.9963 psf	350.15137 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 10	268.59138 ft	539.78887 ft	702.35376 psf	1,861.4109 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	263.59216 ft	536.79210 ft	782.49561 psf	2,375.4229 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	258.77647 ft	534.21623 ft	851.76747 psf	2,799.9478 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 13	256.18431 ft	532.91252 ft	886.01446 psf	3,123.6165 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 14	255.50000 ft	532.59165 ft	891.56303 psf	3,151.2077 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	252.50000 ft	531.27477 ft	913.51685 psf	3,233.5231 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	249.00000 ft	529.79563 ft	939.803 psf	3,320.7915 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	246.00000 ft	528.67085 ft	962.36447 psf	3,362.3339 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 18	243.00000 ft	527.60743 ft	991.63733 psf	3,466.676 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 19	241.00000 ft	526.95854 ft	1,016.5414 psf	3,443.769 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	239.00000 ft	526.34873 ft	1,039.624 psf	3,455.566 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 21	235.37500 ft	525.36857 ft	1,075.1431 psf	3,493.7234 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	230.12500 ft	524.12551 ft	1,117.8544 psf	3,569.1642 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	224.87500 ft	523.13247 ft	1,153.7951 psf	3,621.7145 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	219.62500 ft	522.38306 ft	1,179.9409 psf	3,649.4387 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	214.54869 ft	521.88195 ft	1,195.2536 psf	3,619.6549 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	209.64608 ft	521.61105 ft	1,201.7084 psf	3,531.0268 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	204.74347 ft	521.54445 ft	1,197.2819 psf	3,413.1173 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 28	199.84085 ft	521.68180 ft	1,181.5199 psf	3,263.7934 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	194.93824 ft	522.02380 ft	1,154.3754 psf	3,081.2125 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Column 30	190.03563 ft	522.57227 ft	1,113.9818 psf	2,863.9661 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	185.29216 ft	523.29885 ft	1,061.6146 psf	2,751.8976 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 32	180.94761 ft	524.13774 ft	998.66729 psf	2,512.6238 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 33	176.84284 ft	525.09193 ft	925.71579 psf	2,268.8804 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	172.73807 ft	526.20281 ft	831.40722 psf	2,000.0439 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	168.23807 ft	527.61511 ft	706.61478 psf	1,676.8212 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	163.34284 ft	529.37124 ft	532.7586 psf	1,296.1647 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 37	158.44761 ft	531.37741 ft	310.95576 psf	887.05739 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	155.40912 ft	532.72231 ft	144.27174 psf	605.97732 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	154.40912 ft	533.19698 ft	83.024219 psf	643.91337 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 40	153.38587 ft	533.69698 ft	27.695486 psf	557.44428 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Block Slope Stability	
CWLP Seismic D-D' Full Pool rev2.gsz	
10/20/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 543
Date: 10/20/2026
Time: 12:52:14 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Full Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:53:12 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (147, 526) ft
- Lower Left: (147, 514) ft
- Lower Right: (182, 514) ft
- X Increments: 8
- Y Increments: 8
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (220, 533) ft
- Lower Left: (220, 524) ft
- Lower Right: (280, 524) ft
- X Increments: 8
- Y Increments: 8
- Angle Increments: 5

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft

Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft

Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 196468 of 236196 converged

Current Slip Surface

Slip Surface: 64,357
Factor of Safety: 1.259
Volume: 3,938.5703 ft³
Weight: 468,595.28 lbf
Resisting Moment: 5,394,538.7 lbf·ft
Activating Moment: 4,284,342 lbf·ft
Resisting Force: 77,898.213 lbf
Activating Force: 61,868.532 lbf
Slip Rank: 1 of 236,196 slip surfaces
Exit: (306.125, 561) ft
Entry: (147.5, 534) ft
Radius: 70.321571 ft
Center: (223.36569, 567.75) ft

Slip Columns

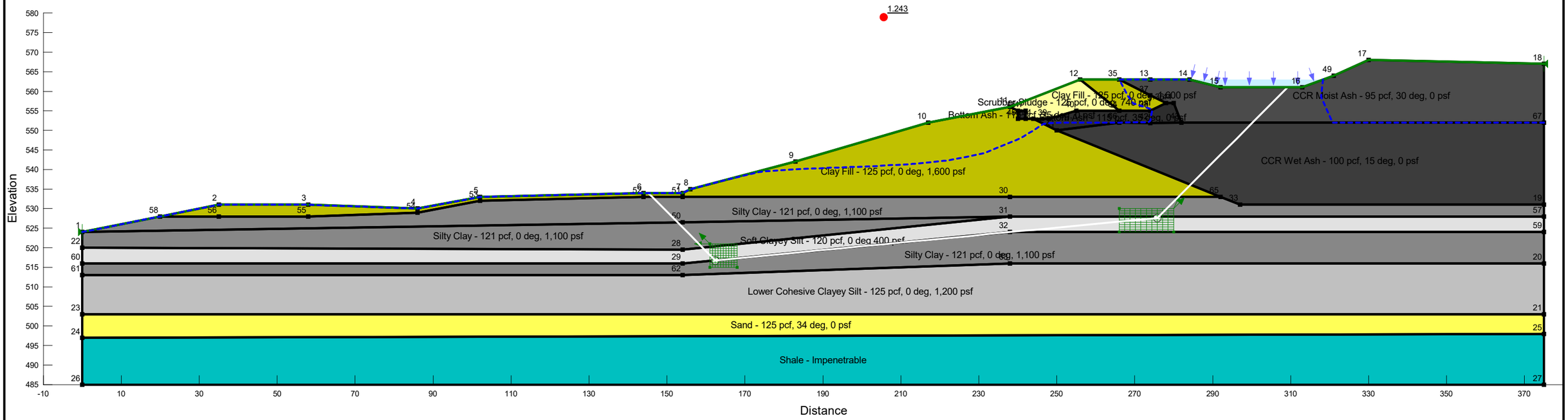
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	303.87500 ft	558.75000 ft	93.644437 psf	259.58741 psf	95.807221 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	299.37500 ft	554.25000 ft	31.214812 psf	526.33299 psf	285.85661 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	294.56250 ft	549.43750 ft	159.98482 psf	1,006.8156 psf	226.90762 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 4	290.00000 ft	544.87500 ft	444.86359 psf	1,404.5445 psf	257.14572 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	286.00000 ft	540.87500 ft	694.67062 psf	1,758.6499 psf	285.09239 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	283.06144 ft	537.93644 ft	878.23317 psf	2,007.6556 psf	302.62784 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Column 7	282.06144 ft	536.93644 ft	938.37949 psf	1,214.3147 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	281.00000 ft	535.87500 ft	965.11679 psf	1,392.607 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	279.06250 ft	533.93750 ft	1,016.0862 psf	1,676.7914 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	276.06250 ft	530.93750 ft	1,072.9746 psf	2,389.795 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 11	273.56250 ft	528.43750 ft	1,120.0575 psf	2,708.6491 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 12	272.81250 ft	527.68750 ft	1,143.9605 psf	3,248.5279 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 13	269.25000 ft	527.06279 ft	1,159.0541 psf	4,003.0177 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 14	263.50000 ft	526.51042 ft	1,161.7649 psf	4,181.1234 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 15	258.50000 ft	526.03009 ft	1,164.2686 psf	4,301.1548 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 16	255.50000 ft	525.74190 ft	1,165.9451 psf	4,349.8583 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 17	252.50000 ft	525.45370 ft	1,166.8578 psf	4,287.0741 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Column 18	249.00000 ft	525.11748 ft	1,167.2831 psf	4,209.3533 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 19	246.00000 ft	524.82928 ft	1,167.9076 psf	4,123.3086 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	243.00000 ft	524.54109 ft	1,167.1364 psf	4,030.1679 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	241.00000 ft	524.34896 ft	1,166.7855 psf	3,942.3508 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	239.00000 ft	524.15683 ft	1,166.5653 psf	3,893.9474 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	235.37500 ft	523.80859 ft	1,166.4388 psf	3,835.3211 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	230.12500 ft	523.30425 ft	1,166.6445 psf	3,786.7168 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	224.87500 ft	522.79991 ft	1,173.811 psf	3,739.1933 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	219.62500 ft	522.29557 ft	1,185.2614 psf	3,692.5153 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	214.16667 ft	521.77122 ft	1,201.2571 psf	3,608.6822 psf	0 psf	400 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 0 deg 400 psf
Column 28	208.50000 ft	521.22685 ft	1,222.9969 psf	3,487.3244 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	202.83333 ft	520.68248 ft	1,247.9214 psf	3,365.7358 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	197.16667 ft	520.13812 ft	1,274.4276 psf	3,243.4717 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	191.50000 ft	519.59375 ft	1,301.916 psf	3,120.0999 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 32	185.83333 ft	519.04938 ft	1,329.4273 psf	2,995.2093 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 33	179.91667 ft	518.48100 ft	1,356.9433 psf	2,876.0283 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 34	173.75000 ft	517.88860 ft	1,384.2574 psf	2,762.0351 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 35	167.58333 ft	517.29620 ft	1,410.6827 psf	2,645.1912 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 36	162.88243 ft	518.61757 ft	1,314.9357 psf	2,833.8878 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 37	158.63243 ft	522.86757 ft	989.47557 psf	2,667.2741 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	155.49123 ft	526.00877 ft	717.71996 psf	2,082.6274 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	154.49123 ft	527.00877 ft	625.33636 psf	1,874.9229 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	151.25000 ft	530.25000 ft	327.58386 psf	1,390.3237 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	148.00000 ft	533.50000 ft	40.756792 psf	1,341.9578 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 740 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Block Slope Stability	
CWLP Seismic D-D' Full Pool rev2 Optimized2.gsz	
10/28/2026	1:300

Block Slope Stability

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File Information

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Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 553
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Tool Version: 23.1.2.11
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Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 10:16:12 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 740 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (161, 521) ft
- Lower Left: (161, 515) ft
- Lower Right: (168, 515) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (266, 530) ft
- Lower Left: (266, 524) ft
- Lower Right: (280, 524) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft

Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft

Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 740 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 87845 of 131769 converged

Current Slip Surface

Slip Surface: 38,335
Factor of Safety: 1.243
Volume: 4,085.92 ft³
Weight: 484,737.26 lbf
Resisting Moment: 5,456,471.3 lbf·ft
Activating Moment: 4,390,823.4 lbf·ft
Resisting Force: 78,610.691 lbf
Activating Force: 63,260.78 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (309.2, 561) ft
Entry: (145.2, 534) ft
Radius: 72.034429 ft
Center: (223.86616, 567.75) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	306.95000 ft	558.75000 ft	93.644412 psf	258.99893 psf	95.467477 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	302.45000 ft	554.25000 ft	31.214812 psf	524.73826 psf	284.93589 psf	0 psf	0 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	298.15000 ft	549.95000 ft	127.98253 psf	962.63216 psf	223.6437 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 4	294.05000 ft	545.85000 ft	383.96292 psf	1,312.2868 psf	248.74362 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	288.00000 ft	539.80000 ft	761.73996 psf	1,834.5764 psf	287.46566 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	283.00000 ft	534.80000 ft	1,023.0166 psf	1,434.1653 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 7	281.60000 ft	533.40000 ft	1,058.2371 psf	1,625.1199 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

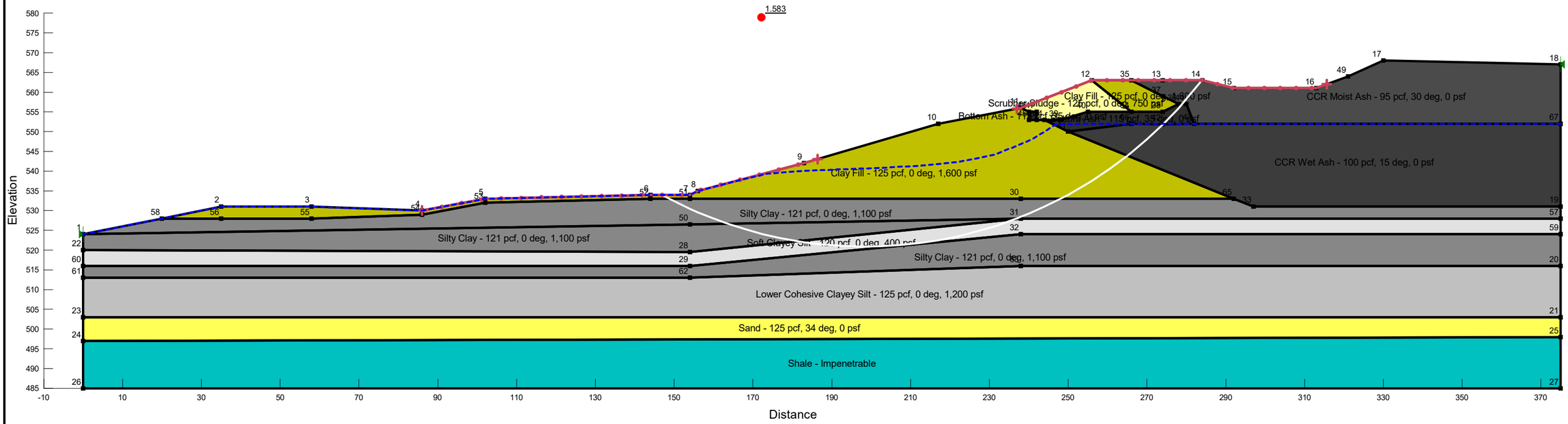
Column 8	280.60000 ft	532.40000 ft	1,075.8022 psf	2,125.5615 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 9	279.00000 ft	530.80000 ft	1,097.3978 psf	2,334.1112 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 10	277.10000 ft	528.90000 ft	1,128.4483 psf	2,563.1607 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 11	276.00000 ft	527.80000 ft	1,154.9717 psf	3,163.0833 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 12	274.90000 ft	527.51429 ft	1,164.2373 psf	3,807.0817 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 13	270.00000 ft	527.04762 ft	1,163.4303 psf	3,989.9487 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 14	263.50000 ft	526.42857 ft	1,166.2138 psf	4,195.1549 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 15	258.50000 ft	525.95238 ft	1,168.5379 psf	4,314.9341 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 16	255.50000 ft	525.66667 ft	1,170.1046 psf	4,363.4349 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 17	252.50000 ft	525.38095 ft	1,170.9104 psf	4,300.3768 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 18	249.00000 ft	525.04762 ft	1,171.2128 psf	4,222.2639 psf	0 psf	400 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 0 deg 400 psf
Column 19	246.00000 ft	524.76190 ft	1,171.7295 psf	4,135.796 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 20	243.00000 ft	524.47619 ft	1,170.8507 psf	4,042.1702 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 21	241.00000 ft	524.28571 ft	1,170.4267 psf	3,953.9846 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 22	239.00000 ft	524.09524 ft	1,170.1322 psf	3,905.1937 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 23	235.37500 ft	523.75000 ft	1,169.868 psf	3,845.8054 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 24	230.12500 ft	523.25000 ft	1,169.8677 psf	3,795.9921 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 25	224.87500 ft	522.75000 ft	1,176.8152 psf	3,747.133 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 26	219.62500 ft	522.25000 ft	1,188.0329 psf	3,699.0152 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 27	214.16667 ft	521.73016 ft	1,203.7752 psf	3,613.5901 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0

								deg 400 psf
Column 28	208.50000 ft	521.19048 ft	1,225.2413 psf	3,490.5184 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 29	202.83333 ft	520.65079 ft	1,249.8858 psf	3,367.2091 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 30	197.16667 ft	520.11111 ft	1,276.1082 psf	3,243.2622 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 31	191.50000 ft	519.57143 ft	1,303.3103 psf	3,118.289 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 32	185.83333 ft	519.03175 ft	1,330.5335 psf	2,991.9197 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 33	180.42500 ft	518.51667 ft	1,355.4387 psf	2,880.784 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 34	175.27500 ft	518.02619 ft	1,378.3079 psf	2,784.9077 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 35	170.12500 ft	517.53571 ft	1,400.0461 psf	2,687.2709 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 36	164.97500 ft	517.04524 ft	1,421.9698 psf	2,587.7073 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf

Column 37	160.78811 ft	518.41189 ft	1,324.1607 psf	2,783.9239 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg 400 psf
Column 38	157.58811 ft	521.61189 ft	1,083.506 psf	2,820.1138 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	155.00000 ft	524.20000 ft	860.84633 psf	2,319.0599 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	153.36038 ft	525.83962 ft	717.32009 psf	2,017.6237 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	149.46038 ft	529.73962 ft	366.98128 psf	1,470.9957 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 42	145.70000 ft	533.50000 ft	38.646179 psf	1,358.446 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

APPENDIX G-6:
Seismic Current Conditions



Materials

- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Circular Slope Stability	
CWLP Seismic D-D' Current Conditions rev2.gsz	
10/20/2026	1:300

Circular Slope Stability

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Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:54:38 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (86, 530) ft
Left-Zone Right Coordinate: (186.4, 543) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (237, 555.80952) ft
Right-Zone Right Coordinate: (315.66667, 562) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft

Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft

Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8476 of 9261 converged

Current Slip Surface

Slip Surface: 5,554
Factor of Safety: 1.583
Volume: 2,739.6674 ft³
Weight: 333,869.67 lbf
Resisting Moment: 12,756,454 lbf·ft

Activating Moment: 8,059,452.3 lbf·ft
Resisting Force: 106,652.84 lbf
Activating Force: 67,388.174 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (283.92405, 563) ft
Entry: (146.88735, 534) ft
Radius: 107.86806 ft
Center: (198.42046, 628.7621) ft

Slip Columns

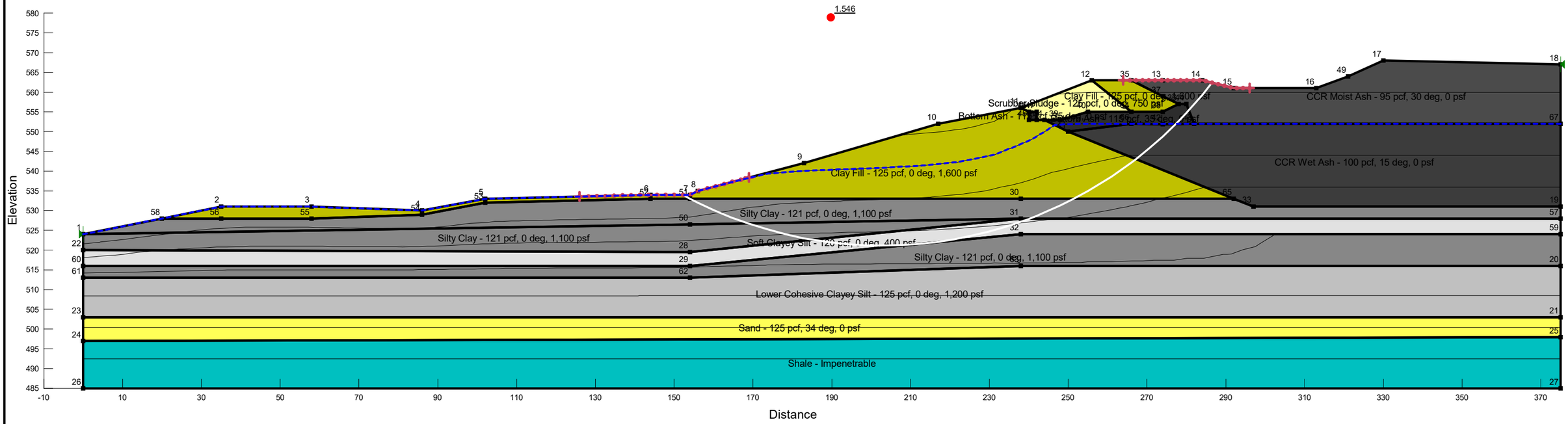
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	281.43924 ft	560.00000 ft	-499.44233 psf	138.12645 psf	79.747342 psf	0 psf	111.37304 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	278.47721 ft	556.47152 ft	-279.17133 psf	417.91845 psf	292.62965 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 3	276.00000 ft	553.87124 ft	-116.91768 psf	651.57246 psf	456.23595 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	272.00000 ft	549.93263 ft	128.87581 psf	1,225.997 psf	293.97273 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	268.00000 ft	546.37671 ft	350.82585 psf	1,593.5617 psf	332.99006 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	265.51475 ft	544.30211 ft	480.31439 psf	1,804.154 psf	354.72174 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	262.77213 ft	542.23773 ft	553.784 psf	1,575.6851 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	258.25738 ft	539.05313 ft	647.46138 psf	2,077.1477 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125

								pcf, 0 deg, 1,600 psf
Column 9	255.50000 ft	537.23562 ft	700.40988 psf	2,341.835 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	252.50000 ft	535.47453 ft	748.36132 psf	2,497.5409 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	249.00000 ft	533.49434 ft	801.9787 psf	2,665.5641 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	246.00000 ft	531.98019 ft	835.55601 psf	2,870.7006 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 13	243.00000 ft	530.54308 ft	864.7913 psf	2,938.3999 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 14	241.00000 ft	529.65955 ft	885.34598 psf	2,951.4319 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	239.00000 ft	528.82385 ft	906.98513 psf	2,997.4798 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	237.43557 ft	528.19882 ft	925.13004 psf	3,029.3396 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	236.70219 ft	527.91571 ft	934.44996 psf	3,054.2739 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg,

								1,100 psf
Column 18	234.09160 ft	526.99573 ft	971.62438 psf	3,212.5699 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 19	229.20828 ft	525.41251 ft	1,036.8343 psf	3,322.2646 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 20	224.32497 ft	524.08093 ft	1,093.923 psf	3,411.2295 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 21	219.44166 ft	522.99145 ft	1,142.1419 psf	3,478.7619 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 22	214.57143 ft	522.13832 ft	1,179.3897 psf	3,492.9891 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 23	209.71429 ft	521.51470 ft	1,207.6097 psf	3,451.4353 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 24	204.85714 ft	521.11375 ft	1,223.9377 psf	3,382.2881 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 25	200.00000 ft	520.93296 ft	1,228.121 psf	3,283.1775 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 26	195.14286 ft	520.97123 ft	1,220.0658 psf	3,151.7724 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Column 27	190.28571 ft	521.22879 ft	1,198.1554 psf	2,985.9476 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 28	185.42857 ft	521.70724 ft	1,162.0559 psf	2,783.9521 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 29	182.14783 ft	522.13201 ft	1,130.1879 psf	2,633.4702 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 30	179.08276 ft	522.66539 ft	1,089.9421 psf	2,613.005 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 31	174.65698 ft	523.56862 ft	1,017.7406 psf	2,376.2899 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 32	170.23120 ft	524.66778 ft	924.37795 psf	2,106.9446 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 33	165.80542 ft	525.96917 ft	802.03175 psf	1,806.0502 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	161.69439 ft	527.35876 ft	664.39519 psf	1,500.6041 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	157.89813 ft	528.81580 ft	509.70248 psf	1,196.2961 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	155.00000 ft	530.02514 ft	369.37596 psf	922.47265 psf	0 psf	1,100 psf	0 psf	Silty Clay -

								121 pcf, 0 deg, 1,100 psf
Column 37	151.38515 ft	531.73245 ft	198.48092 psf	653.49473 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	147.82883 ft	533.50000 ft	40.597004 psf	609.3336 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Circular Slope Stability
CWLP Seismic D-D' Current Conditions rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 522
Date: 10/28/2026
Time: 08:55:33 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 08:55:42 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (126, 533.57143) ft
Left-Zone Right Coordinate: (169, 538.37037) ft
Left-Zone Increment: 20
Right Type: Range
Right-Zone Left Coordinate: (264, 563) ft
Right-Zone Right Coordinate: (296, 561) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft
Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft

Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft
Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft

Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 8936 of 9261 converged

Current Slip Surface

Slip Surface: 5,596
Factor of Safety: 1.546
Volume: 2,798.158 ft³
Weight: 339,897.77 lbf
Resisting Moment: 12,008,533 lbf·ft

Activating Moment: 7,764,703.1 lbf·ft
Resisting Force: 102,579.78 lbf
Activating Force: 66,334.185 lbf
Slip Rank: 1 of 9,261 slip surfaces
Exit: (286.49554, 562.37611) ft
Entry: (152.19748, 534) ft
Radius: 105.67932 ft
Center: (202.73374, 626.81274) ft

Slip Columns

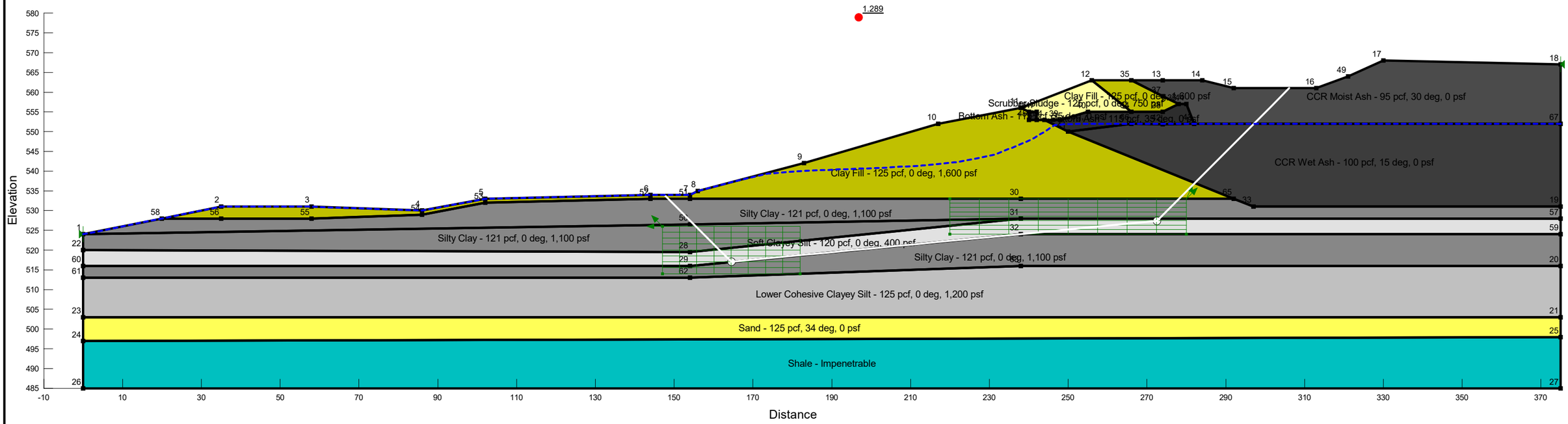
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	285.24777 ft	560.81606 ft	-550.38836 psf	61.977957 psf	35.78299 psf	0 psf	107.65888 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	282.31898 ft	557.33055 ft	-332.78774 psf	316.48226 psf	182.72112 psf	0 psf	111.19371 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	280.31898 ft	555.06019 ft	-191.05591 psf	513.85936 psf	359.8082 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 4	279.00000 ft	553.67254 ft	-104.46077 psf	635.33141 psf	444.86384 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 5	277.65764 ft	552.28562 ft	-17.91824 psf	752.86068 psf	527.15873 psf	0 psf	0 psf	Bottom Ash - 115 pcf, 35 deg, 0 psf
Column 6	275.65764 ft	550.36030 ft	102.23137 psf	1,131.5181 psf	275.79655 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 7	272.29241 ft	547.28562 ft	294.1344 psf	1,455.7547 psf	311.25521 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 8	268.87723 ft	544.42123 ft	472.91705 psf	1,752.9768 psf	342.99097 psf	0 psf	0 psf	CCR Wet Ash - 100

								pcf, 15 deg, 0 psf
Column 9	266.58482 ft	542.60693 ft	571.1812 psf	1,448.6537 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	263.50000 ft	540.40534 ft	634.48448 psf	1,806.315 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	258.50000 ft	537.09330 ft	730.58808 psf	2,335.4244 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 12	255.50000 ft	535.25125 ft	783.74864 psf	2,610.246 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 13	253.19426 ft	533.98155 ft	819.03425 psf	2,721.2907 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 14	250.69426 ft	532.64640 ft	851.0077 psf	2,951.8207 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 15	249.00000 ft	531.80582 ft	866.55655 psf	3,004.9784 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 16	246.00000 ft	530.42113 ft	894.96807 psf	3,076.0177 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 17	243.00000 ft	529.11127 ft	923.27115 psf	3,133.5088 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg,

								1,100 psf
Column 18	241.10294 ft	528.34957 ft	941.93913 psf	3,138.9022 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 19	240.10294 ft	527.96109 ft	952.8014 psf	3,245.9131 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 20	239.00000 ft	527.55679 ft	969.29158 psf	3,267.6245 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 21	235.90000 ft	526.49711 ft	1,011.955 psf	3,318.944 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 22	231.70000 ft	525.20415 ft	1,062.6286 psf	3,409.7003 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 23	227.50000 ft	524.09914 ft	1,107.3496 psf	3,485.0001 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 24	223.30000 ft	523.17605 ft	1,143.8544 psf	3,544.2412 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 25	219.10000 ft	522.43005 ft	1,175.2321 psf	3,586.4558 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 26	214.71299 ft	521.83980 ft	1,197.9796 psf	3,581.6345 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Column 27	210.13896 ft	521.41813 ft	1,214.4452 psf	3,525.602 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 28	205.56494 ft	521.19613 ft	1,219.8508 psf	3,442.8991 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 29	200.99091 ft	521.17255 ft	1,214.6951 psf	3,331.3557 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 30	196.41689 ft	521.34726 ft	1,198.1437 psf	3,188.9344 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 31	191.84286 ft	521.72125 ft	1,169.3068 psf	3,013.8705 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 32	187.26884 ft	522.29666 ft	1,127.4938 psf	2,804.8068 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 33	183.99091 ft	522.81365 ft	1,090.2031 psf	2,772.7169 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 34	180.61720 ft	523.50234 ft	1,038.9003 psf	2,589.6455 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 35	175.85159 ft	524.63937 ft	951.15385 psf	2,307.9737 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 36	171.08598 ft	526.01443 ft	835.5633 psf	1,987.8738 psf	0 psf	1,100 psf	0 psf	Silty Clay -

								121 pcf, 0 deg, 1,100 psf
Column 37	166.58598 ft	527.53343 ft	696.91764 psf	1,653.0292 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	162.35159 ft	529.18001 ft	536.00529 psf	1,309.6691 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	158.11720 ft	531.04204 ft	332.44958 psf	942.0685 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	155.00000 ft	532.53468 ft	152.55729 psf	629.72121 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	153.09874 ft	533.52049 ft	43.570322 psf	620.38718 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Block Slope Stability	
CWLP Seismic D-D' Current Conditions rev2.gsz	
10/20/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 519
Date: 10/20/2026
Time: 12:54:28 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/20/2026
Last Solved Time: 12:55:26 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (147, 526) ft
- Lower Left: (147, 514) ft
- Lower Right: (182, 514) ft
- X Increments: 8
- Y Increments: 8
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (220, 533) ft
- Lower Left: (220, 524) ft
- Lower Right: (280, 524) ft
- X Increments: 8
- Y Increments: 8
- Angle Increments: 5

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft

Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft

Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 196457 of 236196 converged

Current Slip Surface

Slip Surface: 64,357
Factor of Safety: 1.289
Volume: 3,938.5703 ft³
Weight: 468,595.28 lbf
Resisting Moment: 5,411,686.6 lbf·ft
Activating Moment: 4,198,460.6 lbf·ft
Resisting Force: 78,091.132 lbf
Activating Force: 60,585.557 lbf
Slip Rank: 1 of 236,196 slip surfaces
Exit: (306.125, 561) ft
Entry: (147.5, 534) ft
Radius: 70.321571 ft
Center: (223.36569, 567.75) ft

Slip Columns

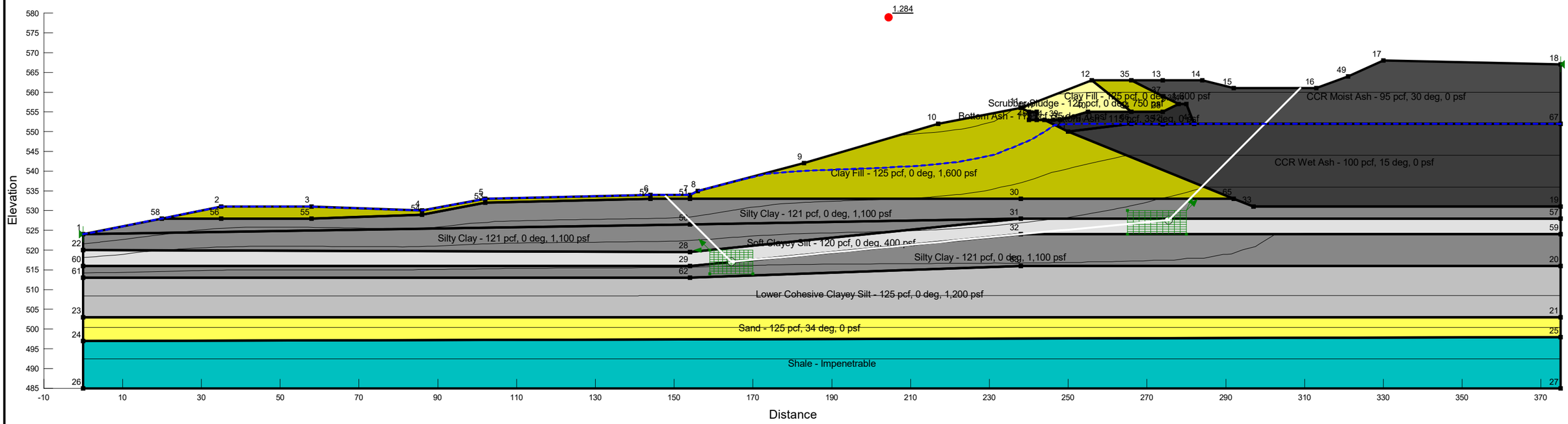
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	303.87500 ft	558.75000 ft	-421.40377 psf	86.850856 psf	50.143365 psf	0 psf	114.08832 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	299.37500 ft	554.25000 ft	-140.46792 psf	402.17431 psf	232.19544 psf	0 psf	69.586891 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	294.56250 ft	549.43750 ft	159.95675 psf	916.0195 psf	202.5864 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 4	290.00000 ft	544.87500 ft	444.75282 psf	1,343.9679 psf	240.94396 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	286.00000 ft	540.87500 ft	694.43571 psf	1,750.7991 psf	283.05173 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 6	283.06144 ft	537.93644 ft	877.8602 psf	2,026.4041 psf	307.7514 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Column 7	282.06144 ft	536.93644 ft	937.96013 psf	1,249.423 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	281.00000 ft	535.87500 ft	964.6719 psf	1,428.1439 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	279.06250 ft	533.93750 ft	1,015.6048 psf	1,713.113 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	276.06250 ft	530.93750 ft	1,072.4912 psf	2,424.0457 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 11	273.56250 ft	528.43750 ft	1,119.6347 psf	2,745.1085 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 12	272.81250 ft	527.68750 ft	1,143.5504 psf	3,280.9784 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 13	269.25000 ft	527.06279 ft	1,158.6165 psf	4,013.3338 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 14	263.50000 ft	526.51042 ft	1,161.3071 psf	4,190.7536 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 15	258.50000 ft	526.03009 ft	1,163.8149 psf	4,310.086 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 16	255.50000 ft	525.74190 ft	1,165.4982 psf	4,358.3139 psf	0 psf	400 psf	0 psf	Soft Clayey

								Silt - 120 pcf, 0 deg, 400 psf
Column 17	252.50000 ft	525.45370 ft	1,166.4235 psf	4,294.8881 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 18	249.00000 ft	525.11748 ft	1,166.869 psf	4,216.374 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 19	246.00000 ft	524.82928 ft	1,167.5104 psf	4,129.5825 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 20	243.00000 ft	524.54109 ft	1,166.7612 psf	4,035.6572 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 21	241.00000 ft	524.34896 ft	1,166.4248 psf	3,947.2668 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 22	239.00000 ft	524.15683 ft	1,166.2189 psf	3,898.3289 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 23	235.37500 ft	523.80859 ft	1,166.1197 psf	3,838.7478 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 24	230.12500 ft	523.30425 ft	1,166.3655 psf	3,788.7748 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 25	224.87500 ft	522.79991 ft	1,173.5652 psf	3,739.8577 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf,

								0 deg, 400 psf
Column 26	219.62500 ft	522.29557 ft	1,185.0438 psf	3,691.7784 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 27	214.16667 ft	521.77122 ft	1,201.064 psf	3,606.4532 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 28	208.50000 ft	521.22685 ft	1,222.8221 psf	3,483.5412 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 29	202.83333 ft	520.68248 ft	1,247.7599 psf	3,360.4671 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 30	197.16667 ft	520.13812 ft	1,274.2764 psf	3,236.8129 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 31	191.50000 ft	519.59375 ft	1,301.7728 psf	3,112.1719 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 32	185.83333 ft	519.04938 ft	1,329.2905 psf	2,986.1563 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 33	179.91667 ft	518.48100 ft	1,356.8127 psf	2,865.9886 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 34	173.75000 ft	517.88860 ft	1,384.1326 psf	2,751.1825 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Column 35	167.58333 ft	517.29620 ft	1,410.5625 psf	2,633.7521 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 36	162.88243 ft	518.61757 ft	1,314.8204 psf	2,804.117 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 37	158.63243 ft	522.86757 ft	989.38436 psf	2,629.3088 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	155.49123 ft	526.00877 ft	717.65512 psf	2,051.183 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	154.49123 ft	527.00877 ft	625.28068 psf	1,845.2891 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	151.25000 ft	530.25000 ft	327.556 psf	1,365.4235 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 41	148.00000 ft	533.50000 ft	40.754069 psf	1,311.7959 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf



Materials

- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Bottom Ash - 115 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 15 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Scrubber Sludge - 125 pcf, 0 deg, 750 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,100 psf
- Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Block Slope Stability	
CWLP Seismic D-D' Current Conditions rev2 Optimized2.gsz	
10/28/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 522
Date: 10/28/2026
Time: 08:55:33 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic D-D' Current Conditions rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Lakeside\Revised CCR\Revised Seepage\Sept 2026\
Last Solved Date: 10/28/2026
Last Solved Time: 08:56:02 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °

Silty Clay - 121 pcf, 0 deg, 1,100 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash (Silt)
Residual Water Content (% of Sat WC): 35 %

Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

Bottom Ash - 115 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 115 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 0 deg, 750 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 750 psf

CCR Wet Ash - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 524) ft
Right Coordinate: (375, 567) ft

Slip Surface Block

Left Grid
- Upper Left: (159, 520) ft
- Lower Left: (159, 514) ft
- Lower Right: (170, 514) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (265, 530) ft
- Lower Left: (265, 524) ft
- Lower Right: (280, 524) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

Fly Ash (Silt)

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	524 ft
Point 2	35 ft	531 ft
Point 3	58 ft	531 ft
Point 4	86 ft	530 ft

Point 5	102 ft	533 ft
Point 6	144 ft	534 ft
Point 7	154 ft	534 ft
Point 8	156 ft	535 ft
Point 9	183 ft	542 ft
Point 10	217 ft	552 ft
Point 11	238 ft	556 ft
Point 12	256 ft	563 ft
Point 13	274 ft	563 ft
Point 14	284 ft	563 ft
Point 15	292 ft	561 ft
Point 16	313 ft	561 ft
Point 17	330 ft	568 ft
Point 18	375 ft	567 ft
Point 19	375 ft	531 ft
Point 20	375 ft	516 ft
Point 21	375 ft	503 ft
Point 22	0 ft	520 ft
Point 23	0 ft	503 ft
Point 24	0 ft	497 ft
Point 25	375 ft	498 ft
Point 26	0 ft	485 ft
Point 27	375 ft	485 ft
Point 28	154 ft	519.5 ft
Point 29	154 ft	516 ft
Point 30	238 ft	533 ft
Point 31	238 ft	528 ft
Point 32	238 ft	524 ft
Point 33	297 ft	531 ft
Point 34	244 ft	553 ft
Point 35	266 ft	563 ft
Point 36	278 ft	557 ft
Point 37	274 ft	559 ft
Point 38	274 ft	555 ft
Point 39	248 ft	553 ft
Point 40	255 ft	555 ft
Point 41	250 ft	550 ft
Point 42	274 ft	551.9 ft
Point 43	282 ft	552 ft
Point 44	280 ft	557 ft
Point 45	240 ft	553 ft
Point 46	240 ft	555 ft
Point 47	242 ft	555 ft
Point 48	242 ft	553 ft
Point 49	321 ft	564 ft
Point 50	154 ft	526.5 ft
Point 51	154 ft	533 ft
Point 52	144 ft	533 ft
Point 53	102 ft	532 ft

Point 54	86 ft	529 ft
Point 55	58 ft	528 ft
Point 56	35 ft	528 ft
Point 57	375 ft	528 ft
Point 58	20 ft	528 ft
Point 59	375 ft	524 ft
Point 60	0 ft	516 ft
Point 61	0 ft	513 ft
Point 62	154 ft	513 ft
Point 63	238 ft	516 ft
Point 64	266 ft	555 ft
Point 65	292 ft	533 ft
Point 66	266 ft	552 ft
Point 67	375 ft	552 ft

Regions

	Material	Points	Area
Region 1	Shale - Impenetrable	24,26,27,25	4,687.5 ft²
Region 2	Scrubber Sludge - 125 pcf, 0 deg, 750 psf	64,40,39,34,48,47,46,11,12	139 ft²
Region 3	Clay Fill - 125 pcf, 0 deg, 1,600 psf	65,41,34,48,45,46,11,10,9,8,7,6,5,4,3,2,58,56,55,54,53,52,51,30	1,877 ft²
Region 4	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	35,13,14,15,16,49,17,18,67,43,44,36,37	1,263.5 ft²
Region 5	Bottom Ash - 115 pcf, 35 deg, 0 psf	34,41,66,42,43,44,36,38,64,40,39	125.8 ft²
Region 6	Bottom Ash - 115 pcf, 35 deg, 0 psf	46,47,48,45	4 ft²
Region 7	Sand - 125 pcf, 34 deg, 0 psf	23,24,25,21	2,062.5 ft²
Region 8	Silty Clay - 121 pcf, 0 deg, 1,100 psf	50,1,58,56,55,54,53,52,51,30,65,33,19,57,31	1,683.5 ft²
Region 9	Silty Clay - 121 pcf, 0 deg, 1,100 psf	1,22,28,31,50	1,141 ft²
Region 10	Silty Clay - 121 pcf, 0 deg, 1,100 psf	61,60,29,32,59,20,63,62	2,020 ft²
Region 11	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	61,23,21,20,63,62	4,287 ft²
Region 12	Clay Fill - 125 pcf, 0 deg, 1,600 psf	12,64,38,36,37,35	96 ft²
Region 13	CCR Wet Ash - 100 pcf, 15 deg, 0 psf	41,66,42,43,67,19,33,65	2,162.2 ft²
Region 14	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf	57,59,32,29,60,22,28,31	1,440.5 ft²

Slip Results

Slip Surfaces Analysed: 87840 of 131769 converged

Current Slip Surface

Slip Surface: 65,560
Factor of Safety: 1.284
Volume: 4,034.98 ft³
Weight: 478,741.23 lbf
Resisting Moment: 5,386,300.2 lbf·ft
Activating Moment: 4,195,378 lbf·ft
Resisting Force: 77,933.592 lbf
Activating Force: 60,703.848 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (308.9, 561) ft
Entry: (147.5, 534) ft
Radius: 71.170426 ft
Center: (224.81245, 567.75) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	306.65000 ft	558.75000 ft	-421.40377 psf	86.5065 psf	49.944551 psf	0 psf	114.08832 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 2	302.15000 ft	554.25000 ft	-140.46792 psf	401.61192 psf	231.87075 psf	0 psf	69.586891 psf	CCR Moist Ash - 95 pcf, 30 deg, 0 psf
Column 3	295.95000 ft	548.05000 ft	246.56855 psf	1,035.0012 psf	211.25989 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 4	288.00000 ft	540.10000 ft	742.81994 psf	1,776.4179 psf	276.95174 psf	0 psf	0 psf	CCR Wet Ash - 100 pcf, 15 deg, 0 psf
Column 5	283.00000 ft	535.10000 ft	1,012.3023 psf	1,445.1671 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 6	281.45000 ft	533.55000 ft	1,051.2414 psf	1,661.6343 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

Column 7	280.45000 ft	532.55000 ft	1,070.9696 psf	2,154.6075 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 8	279.00000 ft	531.10000 ft	1,090.3002 psf	2,339.8506 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 9	276.95000 ft	529.05000 ft	1,123.5548 psf	2,589.2521 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 10	275.70000 ft	527.80000 ft	1,152.9931 psf	3,197.4551 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 11	274.75000 ft	527.52838 ft	1,162.3093 psf	3,819.2694 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 12	270.00000 ft	527.07477 ft	1,161.5399 psf	3,995.5308 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 13	263.50000 ft	526.45405 ft	1,164.3713 psf	4,200.2239 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 14	258.50000 ft	525.97658 ft	1,166.7554 psf	4,319.5946 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 15	255.50000 ft	525.69009 ft	1,168.3632 psf	4,367.8377 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 16	252.50000 ft	525.40360 ft	1,169.2148 psf	4,304.4385 psf	0 psf	400 psf	0 psf	Soft Clayey

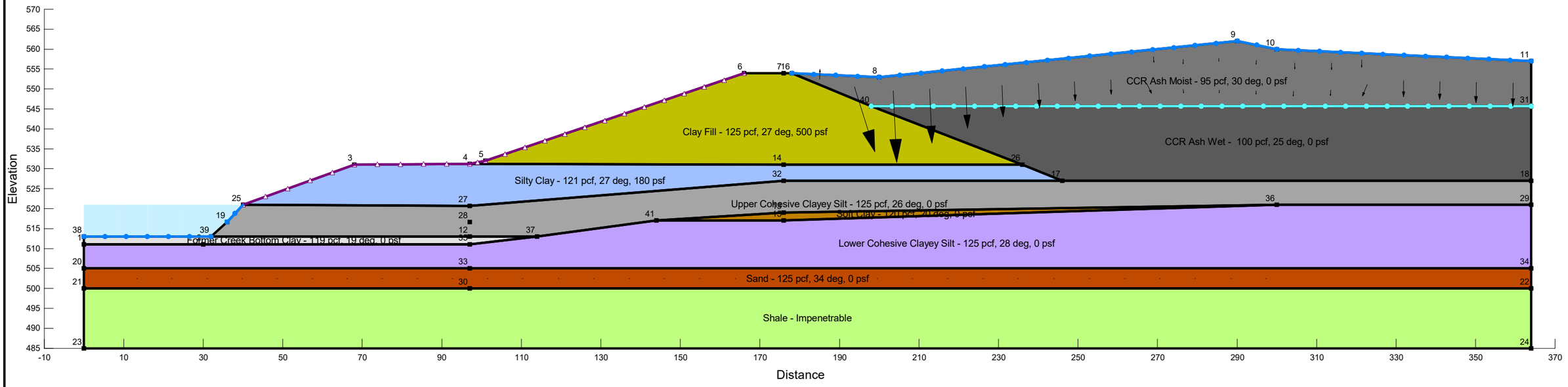
								Silt - 120 pcf, 0 deg, 400 psf
Column 17	249.00000 ft	525.06937 ft	1,169.5756 psf	4,225.9179 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 18	246.00000 ft	524.78288 ft	1,170.1428 psf	4,139.078 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 19	243.00000 ft	524.49640 ft	1,169.3194 psf	4,045.069 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 20	241.00000 ft	524.30541 ft	1,168.9327 psf	3,956.6022 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 21	239.00000 ft	524.11441 ft	1,168.6756 psf	3,907.5618 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 22	235.37500 ft	523.76824 ft	1,168.4815 psf	3,847.746 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 23	230.12500 ft	523.26689 ft	1,168.5853 psf	3,797.3508 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 24	224.87500 ft	522.76554 ft	1,175.6342 psf	3,747.9196 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 25	219.62500 ft	522.26419 ft	1,186.9525 psf	3,699.2414 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf,

								0 deg, 400 psf
Column 26	214.16667 ft	521.74294 ft	1,202.7982 psf	3,613.2077 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 27	208.50000 ft	521.20180 ft	1,224.3677 psf	3,489.4768 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 28	202.83333 ft	520.66066 ft	1,249.1127 psf	3,365.5185 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 29	197.16667 ft	520.11952 ft	1,275.4338 psf	3,240.9349 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 30	191.50000 ft	519.57838 ft	1,302.733 psf	3,115.3401 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 31	185.83333 ft	519.03724 ft	1,330.0523 psf	2,988.3672 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 32	179.91667 ft	518.47222 ft	1,357.3668 psf	2,867.2213 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 33	173.75000 ft	517.88333 ft	1,384.4683 psf	2,751.4401 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 34	167.58333 ft	517.29444 ft	1,410.6759 psf	2,633.099 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf

Column 35	162.88243 ft	518.61757 ft	1,314.8204 psf	2,802.3212 psf	0 psf	400 psf	0 psf	Soft Clayey Silt - 120 pcf, 0 deg, 400 psf
Column 36	158.63243 ft	522.86757 ft	989.38436 psf	2,630.4789 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 37	155.49123 ft	526.00877 ft	717.65512 psf	2,053.2167 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 38	154.49123 ft	527.00877 ft	625.28068 psf	1,847.5614 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 39	151.25000 ft	530.25000 ft	327.556 psf	1,368.2785 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,100 psf
Column 40	148.00000 ft	533.50000 ft	40.754069 psf	1,316.632 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf

APPENDIX H:
Dallman Ash Pond Slope Stability

Appendix H-1:
Seepage Analysis



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Steady-State Seepage	
CWLP Long Term F-F' rev2.gsz	
10/21/2026	1:300

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 434
Date: 10/21/2026
Time: 12:06:40 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/21/2026
Last Solved Time: 12:06:52 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d
- Duration: 0 d
- Ending Time: 0 d

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Lean Clay Fill
K-Function: Lean Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Shale - Impenetrable

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 5
Rotation: 0 °
Volumetric Water Content: 0.12
Compressibility: 0 /psf

Sand - 125 pcf, 34 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 0.00082 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.3
Rotation: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2e-07 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: CCR Ash Moist
K-Function: CCR Ash Moist
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.7e-08 ft/sec
Ky'/Kx' Ratio: 1.2
Rotation: 0 °
Volumetric Water Content: 0.29
Compressibility: 0 /psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Clayey Silt
K-Function: Clayey Silt
Ky'/Kx' Ratio: 1.5
Rotation: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.12e-08 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 25
Compressibility: 0 /psf

Boundary Conditions

Drainage

Category: Hydraulic
Kind: Water Rate 0 ft^3/sec
Review: Yes

Impoundment Head

Category: Hydraulic
Kind: Water Total Head 545.7 ft
Review: No

Sugar Creek Head

Category: Hydraulic
Kind: Water Total Head 521 ft
Review: No

Impoundment Head Full Pool

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Water K Functions

Lean Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2e-09)
Data Point: (0.20885434, 2e-09)
Data Point: (0.38282598, 2e-09)
Data Point: (0.70171264, 2e-09)
Data Point: (1.2862257, 2e-09)
Data Point: (2.357627, 2e-09)
Data Point: (4.3214847, 2e-09)
Data Point: (7.9211981, 2e-09)
Data Point: (14.519403, 2e-09)
Data Point: (26.613786, 2e-09)
Data Point: (48.782557, 2e-09)
Data Point: (89.417486, 2e-09)
Data Point: (163.90053, 2e-09)
Data Point: (300.42651, 2e-09)
Data Point: (550.67599, 2.0000001e-09)
Data Point: (1,009.3785, 2.000003e-09)
Data Point: (1,850.1713, 2.0000143e-09)
Data Point: (3,391.3282, 1.9998708e-09)
Data Point: (6,216.2392, 1.9982736e-09)
Data Point: (11,394.247, 1.9993577e-09)
Data Point: (20,885.434, 2.1163694e-09)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Lean Clay Fill
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)

Data Point: (0.38282598, 2.5574235e-05)
Data Point: (0.70171264, 2.5547878e-05)
Data Point: (1.2862257, 2.5494921e-05)
Data Point: (2.357627, 2.5389554e-05)
Data Point: (4.3214847, 2.5179451e-05)
Data Point: (7.9211981, 2.4765444e-05)
Data Point: (14.519403, 2.3968761e-05)
Data Point: (26.613786, 2.2472385e-05)
Data Point: (48.782557, 1.983058e-05)
Data Point: (89.417486, 1.5576575e-05)
Data Point: (163.90053, 9.846373e-06)
Data Point: (300.42651, 4.2480427e-06)
Data Point: (550.67599, 1.0700211e-06)
Data Point: (1,009.3785, 1.6220707e-07)
Data Point: (1,850.1713, 1.8952377e-08)
Data Point: (3,391.3282, 2.2062546e-09)
Data Point: (6,216.2392, 2.8237788e-10)
Data Point: (11,394.247, 3.7062315e-11)
Data Point: (20,885.434, 3.1015424e-12)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 8e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 8e-10)
Data Point: (0.20885434, 7.9966849e-10)
Data Point: (0.38282598, 7.9932777e-10)
Data Point: (0.70171264, 7.9873121e-10)
Data Point: (1.2862257, 7.9761579e-10)
Data Point: (2.357627, 7.9552046e-10)
Data Point: (4.3214847, 7.9152905e-10)
Data Point: (7.9211981, 7.8392824e-10)
Data Point: (14.519403, 7.6960293e-10)
Data Point: (26.613786, 7.428421e-10)
Data Point: (48.782557, 6.9460105e-10)
Data Point: (89.417486, 6.1170097e-10)
Data Point: (163.90053, 4.8145482e-10)
Data Point: (300.42651, 3.0878277e-10)
Data Point: (550.67599, 1.3943917e-10)
Data Point: (1,009.3785, 3.8363853e-11)
Data Point: (1,850.1713, 6.5720641e-12)
Data Point: (3,391.3282, 8.6857975e-13)
Data Point: (6,216.2392, 1.1129221e-13)
Data Point: (11,394.247, 1.415415e-14)

Data Point: (20,885.434, 1.1527289e-15)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7e-10)
Data Point: (0.20885434, 6.99674e-10)
Data Point: (0.38282598, 6.9929548e-10)
Data Point: (0.70171264, 6.9857479e-10)
Data Point: (1.2862257, 6.9712676e-10)
Data Point: (2.357627, 6.9424562e-10)
Data Point: (4.3214847, 6.8850058e-10)
Data Point: (7.9211981, 6.7718006e-10)
Data Point: (14.519403, 6.5539575e-10)
Data Point: (26.613786, 6.1447924e-10)
Data Point: (48.782557, 5.4224242e-10)
Data Point: (89.417486, 4.2592199e-10)
Data Point: (163.90053, 2.6923677e-10)
Data Point: (300.42651, 1.1615742e-10)
Data Point: (550.67599, 2.9258388e-11)
Data Point: (1,009.3785, 4.4353493e-12)
Data Point: (1,850.1713, 5.1822895e-13)
Data Point: (3,391.3282, 6.0327252e-14)
Data Point: (6,216.2392, 7.7212665e-15)
Data Point: (11,394.247, 1.0134225e-15)
Data Point: (20,885.434, 8.480791e-17)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Clayey Silt
Saturated Kx: 8.76e-09 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Lean Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.25761403
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.25761403
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.258)
Data Point: (0.20885434, 0.25761403)
Data Point: (0.38282598, 0.25761403)
Data Point: (0.70171264, 0.25761403)
Data Point: (1.2862257, 0.25761403)
Data Point: (2.357627, 0.25761403)
Data Point: (4.3214847, 0.25761403)
Data Point: (7.9211981, 0.25761403)
Data Point: (14.519403, 0.25761403)
Data Point: (26.613786, 0.25761403)
Data Point: (48.782557, 0.25761403)
Data Point: (89.417486, 0.25761403)
Data Point: (163.90053, 0.25761403)
Data Point: (300.42651, 0.25761403)
Data Point: (550.67599, 0.25761403)
Data Point: (1,009.3785, 0.25761403)
Data Point: (1,850.1713, 0.25761403)
Data Point: (3,391.3282, 0.25761403)
Data Point: (6,216.2392, 0.25761403)
Data Point: (11,394.247, 0.25761403)
Data Point: (20,885.434, 0.25761403)
Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.258
Sample Material: Clay
Liquid Limit: 63 %
Diameter at 10% passing: 0.0001
Diameter at 60% passing: 0.0123
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)

Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.26000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.26000001
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999956)
Data Point: (0.38282598, 0.25999897)
Data Point: (0.70171264, 0.25999751)
Data Point: (1.2862257, 0.25999388)
Data Point: (2.357627, 0.25998468)
Data Point: (4.3214847, 0.25996118)
Data Point: (7.9211981, 0.25990074)
Data Point: (14.519403, 0.25974452)
Data Point: (26.613786, 0.25934005)
Data Point: (48.782557, 0.25829509)
Data Point: (89.417486, 0.25562419)
Data Point: (163.90053, 0.24900338)
Data Point: (300.42651, 0.23379671)
Data Point: (550.67599, 0.20421911)
Data Point: (1,009.3785, 0.16121083)
Data Point: (1,850.1713, 0.11777666)
Data Point: (3,391.3282, 0.085106358)
Data Point: (6,216.2392, 0.063572028)
Data Point: (11,394.247, 0.049416751)
Data Point: (20,885.434, 0.039576854)

Estimation Properties
Vol. WC Estimation Method: Sample functions

Saturated Water Content: 0.26
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.26000005
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.26000005
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999914)
Data Point: (0.38282598, 0.25999782)
Data Point: (0.70171264, 0.25999442)
Data Point: (1.2862257, 0.25998552)
Data Point: (2.357627, 0.25996214)
Data Point: (4.3214847, 0.25990038)
Data Point: (7.9211981, 0.25973694)
Data Point: (14.519403, 0.25930416)
Data Point: (26.613786, 0.25816211)
Data Point: (48.782557, 0.25518411)
Data Point: (89.417486, 0.24766912)
Data Point: (163.90053, 0.23019519)
Data Point: (300.42651, 0.19625882)
Data Point: (550.67599, 0.14821398)
Data Point: (1,009.3785, 0.10226739)
Data Point: (1,850.1713, 0.069975374)
Data Point: (3,391.3282, 0.050016484)
Data Point: (6,216.2392, 0.03761922)
Data Point: (11,394.247, 0.029447626)
Data Point: (20,885.434, 0.023658736)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.26
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D

Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Lines

	Start Point	End Point	Hydraulic Boundary	Length	Angle
Line 1	4	5	Drainage	4.0792 ft	11.3 °
Line 2	5	6	Drainage	68.622 ft	18.7 °
Line 3	6	7		10 ft	0 °
Line 4	8	9	Impoundment Head Full Pool	90.449 ft	5.71 °
Line 5	9	10	Impoundment Head Full Pool	10.198 ft	-11.3 °
Line 6	18	17		118 ft	0 °
Line 7	21	23		15 ft	90 °
Line 8	23	24		364 ft	0 °
Line 9	24	22		15 ft	90 °
Line 10	14	4		79 ft	-0.145 °
Line 11	27	25		57.001 ft	-0.302 °
Line 12	22	30		267 ft	0 °
Line 13	30	21		97 ft	0 °
Line 14	14	26		60 ft	0 °
Line 15	26	17		10.77 ft	-21.8 °
Line 16	4	3	Drainage	29.001 ft	0.395 °
Line 17	3	25	Drainage	29.732 ft	19.7 °
Line 18	8	16	Impoundment Head Full Pool	22.023 ft	-2.6 °
Line 19	16	7		2 ft	0 °
Line 20	31	11		11.3 ft	90 °
Line 21	18	31		18.7 ft	90 °
Line 22	2	1		30 ft	0 °
Line 23	20	33		97 ft	0 °
Line 24	33	34		267 ft	0 °
Line 25	34	22		5 ft	90 °
Line 26	21	20		5 ft	90 °
Line 27	27	32		79.251 ft	4.56 °
Line 28	32	17		70 ft	0 °
Line 29	35	2		67 ft	0 °
Line 30	1	38		2 ft	90 °
Line 31	38	39	Sugar Creek Head	32 ft	0 °
Line 32	39	12		65 ft	0 °
Line 33	13	36		124.02 ft	0.924 °
Line 34	35	37		17.117 ft	6.71 °
Line 35	34	29		16 ft	90 °
Line 36	1	20		6 ft	90 °
Line 37	11	10	Impoundment Head Full Pool	64.07 ft	-2.68 °
Line 38	26	40		40.744 ft	-21.1 °
Line 39	40	16		21.654 ft	-22.5 °
Line 40	31	40	Impoundment Head	166 ft	0 °
Line 41	29	36		64 ft	0 °
Line 42	39	19		5.4489 ft	42.8 °
Line 43	19	25	Sugar Creek Head	5.8728 ft	47.1 °
Line 44	18	29		6 ft	90 °
Line 45	15	36		124.06 ft	1.85 °
Line 46	37	12		17 ft	0 °
Line 47	13	41		32.062 ft	3.58 °

Line 48	41	37		30.265 ft	7.59 °
Line 49	15	41		32 ft	0 °

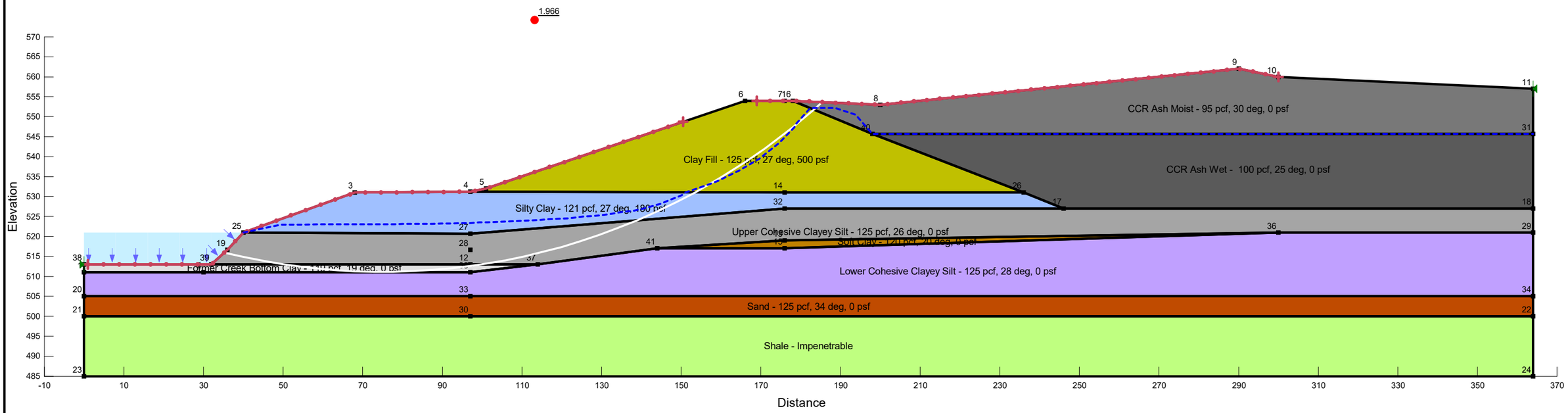
Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Mesh Properties

Global Element Size: 9 ft

Appendix H-2:
Long-Term Static Full Pool



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability
CWLP Long Term F-F' rev2.gsz
10/21/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 434
Date: 10/21/2026
Time: 12:06:40 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/21/2026
Last Solved Time: 12:06:58 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (169, 554) ft
Right-Zone Right Coordinate: (300, 560) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf

Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)

Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft

Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 17629 of 18491 converged

Current Slip Surface

Slip Surface: 4,118
Factor of Safety: 1.966
Volume: 2,475.6986 ft³
Weight: 305,415.34 lbf
Resisting Moment: 21,212,293 lbf·ft
Activating Moment: 10,787,040 lbf·ft
Resisting Force: 118,327.87 lbf
Activating Force: 60,174.839 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (185.45101, 553.66132) ft
Entry: (35.226907, 515.98489) ft
Radius: 164.75759 ft
Center: (74.961875, 675.87922) ft

Slip Columns

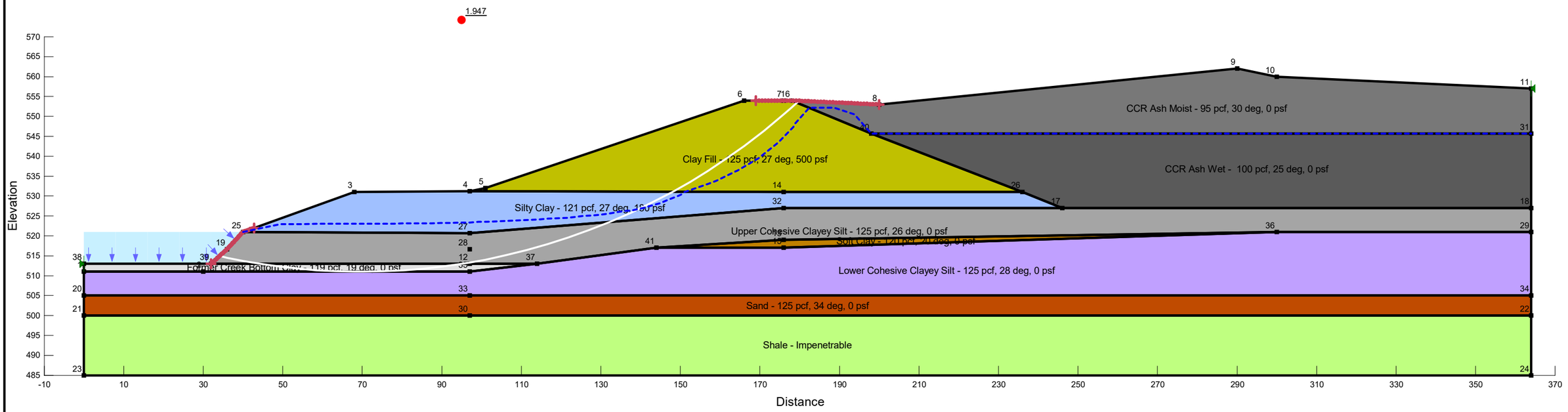
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	184.39488 ft	552.72287 ft	-38.8907 psf	73.470441 psf	42.418179 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	180.66937 ft	549.55078 ft	12.702154 psf	249.65643 psf	120.73423 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	177.00000 ft	546.52829 ft	-32.532813 psf	608.30073 psf	309.9447 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	173.50000 ft	543.87327 ft	-65.234682 psf	893.09258 psf	455.0534 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	168.50000 ft	540.28254 ft	-77.037306 psf	1,282.0685 psf	653.24654 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	162.88029 ft	536.58885 ft	-49.248889 psf	1,580.0246 psf	805.06276 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	156.64088 ft	532.83832 ft	7.6784172 psf	1,784.6247 psf	905.39933 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	151.08793 ft	529.78897 ft	34.280132 psf	1,991.2865 psf	997.14456 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 9	146.22146 ft	527.35362 ft	43.841621 psf	2,091.7385 psf	1,043.4556 psf	180 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 10	141.35499 ft	525.11467 ft	75.710771 psf	2,178.2165 psf	1,071.2802 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 11	136.55164 ft	523.08774 ft	130.95056 psf	2,273.7911 psf	1,045.1332 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	131.81142 ft	521.26093 ft	196.89492 psf	2,328.7953 psf	1,039.7973 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	127.07120 ft	519.59921 ft	271.89127 psf	2,368.2009 psf	1,022.4385 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	122.33098 ft	518.09738 ft	345.99567 psf	2,391.0773 psf	997.45298 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	117.59077 ft	516.75090 ft	417.7189 psf	2,396.7422 psf	965.23415 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	112.85055 ft	515.55585 ft	483.22276 psf	2,384.3719 psf	927.25237 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	108.11033 ft	514.50887 ft	541.23987 psf	2,353.1117 psf	883.70892 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 18	103.37011 ft	513.60708 ft	592.53625 psf	2,302.0284 psf	833.77505 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	100.38481 ft	513.09608 ft	623.22451 psf	2,271.7471 psf	804.03818 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	98.38481 ft	512.80110 ft	641.36257 psf	2,263.0934 psf	558.40672 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 21	94.58333 ft	512.31230 ft	671.76086 psf	2,307.7261 psf	563.30801 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 22	89.75000 ft	511.80458 ft	703.33865 psf	2,393.2569 psf	581.88552 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	84.91667 ft	511.44046 ft	725.99121 psf	2,460.2338 psf	597.1476 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	80.08333 ft	511.21900 ft	739.75468 psf	2,507.2959 psf	608.61325 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	75.25000 ft	511.13960 ft	744.66022 psf	2,533.15 psf	615.8264 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 26	70.41667 ft	511.20208 ft	740.71238 psf	2,536.6577 psf	618.39357 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	65.76927 ft	511.39345 ft	728.72146 psf	2,420.2161 psf	582.42832 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	61.30780 ft	511.70364 ft	709.46397 psf	2,184.4765 psf	507.88755 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	56.84633 ft	512.13596 ft	681.98722 psf	1,928.4193 psf	429.18099 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	52.38486 ft	512.69138 ft	644.87115 psf	1,653.2297 psf	347.20571 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	47.61559 ft	513.42732 ft	601.67689 psf	1,348.0862 psf	364.04812 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 32	42.53853 ft	514.36424 ft	536.52951 psf	982.13041 psf	217.33408 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 33	38.00000 ft	515.33430 ft	408.81396 psf	592.52464 psf	89.601688 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 34	35.61345 ft	515.88982 ft	326.77849 psf	350.03904 psf	11.344925 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability	
CWLP Long Term F-F' rev2 Optimized2.gsz	
10/28/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 446
Date: 10/28/2026
Time: 09:10:38 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:10:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (32, 513) ft
Left-Zone Right Coordinate: (42.8, 522) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (169, 554) ft
Right-Zone Right Coordinate: (200, 553) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf

Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)

Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft

Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18064 of 18491 converged

Current Slip Surface

Slip Surface: 3,766
Factor of Safety: 1.947
Volume: 2,271.1406 ft³
Weight: 280,181.78 lbf
Resisting Moment: 19,399,596 lbf·ft
Activating Moment: 9,963,886.4 lbf·ft
Resisting Force: 108,911.15 lbf
Activating Force: 55,910.555 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (179.85603, 553.91563) ft
Entry: (34.098773, 514.94137) ft
Radius: 162.79975 ft
Center: (69.71109, 673.79829) ft

Slip Columns

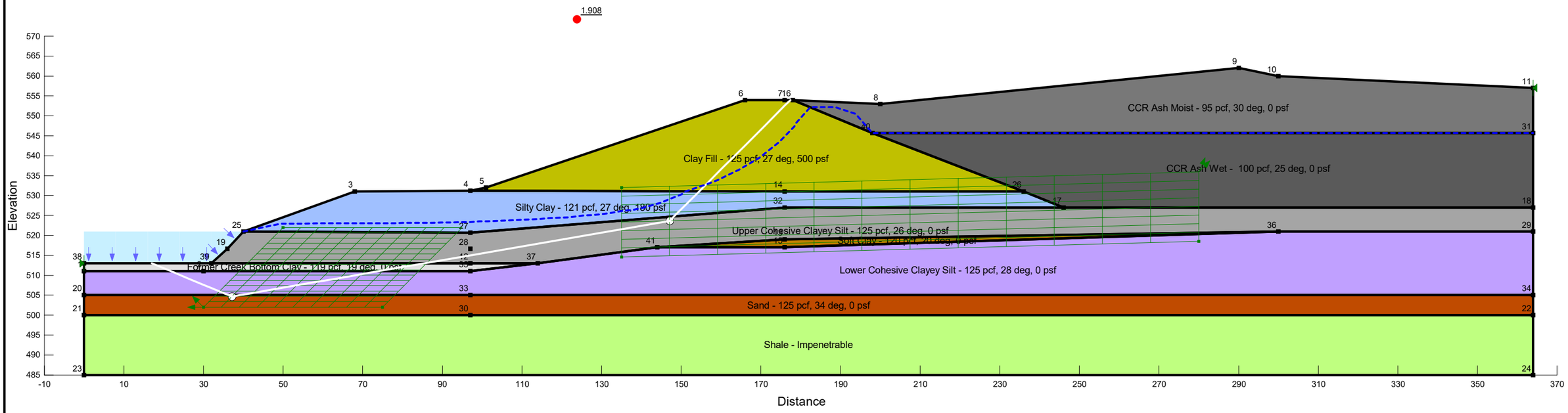
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	179.59815 ft	553.67971 ft	-103.29878 psf	18.243042 psf	10.532625 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	178.67013 ft	552.84014 ft	-89.527841 psf	-77.090905 psf	-39.279778 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	177.00000 ft	551.36022 ft	-185.56557 psf	89.859599 psf	45.785752 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	173.50000 ft	548.41452 ft	-291.1568 psf	403.18277 psf	205.43188 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	168.50000 ft	544.43595 ft	-286.17189 psf	828.0631 psf	421.91922 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	163.75278 ft	540.93618 ft	-262.76528 psf	1,127.3872 psf	574.43245 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	159.25833 ft	537.86518 ft	-216.92395 psf	1,306.3377 psf	665.61231 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	154.76388 ft	535.00767 ft	-150.72226 psf	1,466.4279 psf	747.18234 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	150.26944 ft	532.35069 ft	-88.595577 psf	1,609.3235 psf	819.99127 psf	500 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 500 psf
Column 10	145.40405 ft	529.69559 ft	-41.359587 psf	1,792.1198 psf	913.13063 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 11	140.16772 ft	527.06320 ft	-6.0635684 psf	1,900.0785 psf	968.13833 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 12	134.93140 ft	524.66109 ft	57.013807 psf	1,993.2595 psf	986.56648 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	129.70380 ft	522.48155 ft	133.60783 psf	2,091.0246 psf	954.69597 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	124.48493 ft	520.51454 ft	220.40369 psf	2,146.0116 psf	939.18173 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	119.26605 ft	518.74810 ft	308.60057 psf	2,180.7394 psf	913.1031 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	114.04718 ft	517.17544 ft	391.88392 psf	2,194.3346 psf	879.11396 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	108.82831 ft	515.79077 ft	467.07684 psf	2,185.8831 psf	838.31782 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	103.60944 ft	514.58917 ft	534.20914 psf	2,154.3388 psf	790.19001 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 19	99.00000 ft	513.66776 ft	588.79681 psf	2,140.983 psf	757.05178 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	96.08022 ft	513.15098 ft	619.78696 psf	2,173.3374 psf	757.71719 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	92.68452 ft	512.64704 ft	650.84718 psf	2,245.6676 psf	549.14069 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 22	87.73269 ft	512.01827 ft	689.97194 psf	2,345.5196 psf	570.05078 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	82.78085 ft	511.54303 ft	719.56759 psf	2,426.2862 psf	587.67033 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	77.82901 ft	511.21996 ft	739.66903 psf	2,486.4463 psf	601.46366 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	72.87718 ft	511.04817 ft	750.35151 psf	2,524.5231 psf	610.89627 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	69.71109 ft	511.00000 ft	753.33942 psf	2,539.0077 psf	614.85488 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 27	68.51046 ft	511.00376 ft	753.09602 psf	2,541.1459 psf	615.67496 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	65.62617 ft	511.06712 ft	749.07316 psf	2,434.2121 psf	580.23986 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	60.87852 ft	511.25570 ft	737.26387 psf	2,205.6174 psf	505.59468 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	56.13087 ft	511.58342 ft	716.59299 psf	1,953.5315 psf	425.91208 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	51.38322 ft	512.05114 ft	685.84539 psf	1,679.1795 psf	342.03235 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	46.63556 ft	512.66006 ft	653.083 psf	1,383.8202 psf	251.61299 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	42.13087 ft	513.36632 ft	615.3266 psf	1,091.3662 psf	232.18 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 34	38.00000 ft	514.12986 ft	504.57791 psf	749.8734 psf	119.6386 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 35	35.04939 ft	514.73422 ft	409.77448 psf	465.90187 psf	27.375154 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability	
CWLP Long Term F-F' rev2.gsz	
10/21/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 437
Date: 10/21/2026
Time: 01:02:52 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/21/2026
Last Solved Time: 01:04:16 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (50, 522) ft
- Lower Left: (30, 502) ft
- Lower Right: (75, 502) ft
- X Increments: 10
- Y Increments: 15
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (135, 532) ft
- Lower Left: (135, 514.6) ft
- Lower Right: (280, 518.5) ft
- X Increments: 12
- Y Increments: 8
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
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Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 150226 of 185328 converged

Current Slip Surface

Slip Surface: 24,730
Factor of Safety: 1.908
Volume: 2,587.7177 ft³
Weight: 319,177.33 lbf
Resisting Moment: 7,656,557.4 lbf·ft
Activating Moment: 4,012,458.7 lbf·ft
Resisting Force: 122,385.96 lbf
Activating Force: 64,166.189 lbf
Slip Rank: 1 of 185,328 slip surfaces
Exit: (177.45833, 554) ft
Entry: (17.04822, 513) ft
Radius: 75.720471 ft
Center: (89.393735, 564.25) ft

Slip Columns

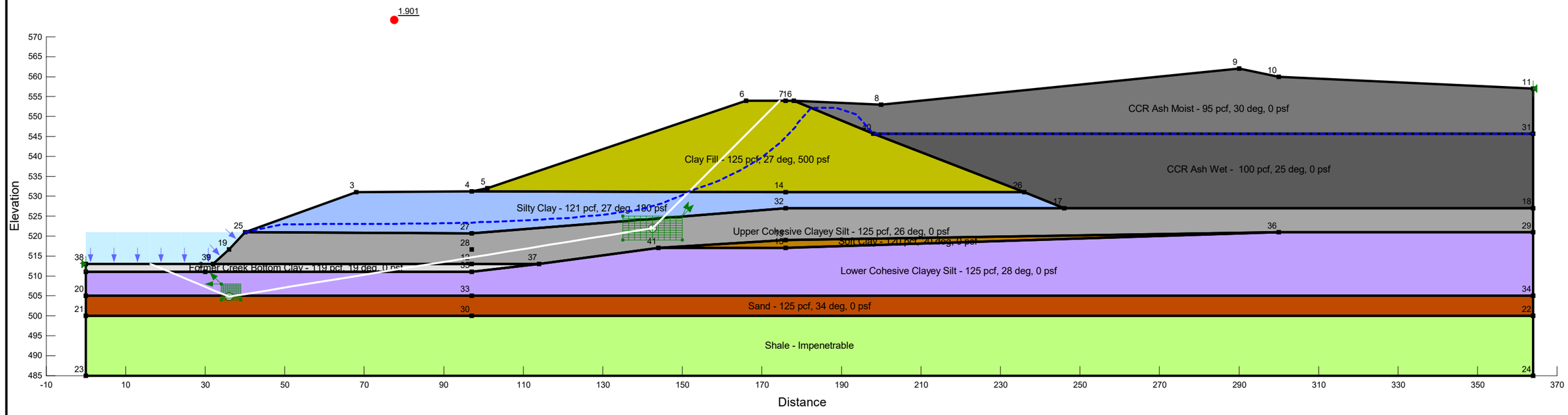
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	176.72917 ft	553.27083 ft	-292.95538 psf	-132.7897 psf	-67.659732 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 2	173.50000 ft	550.04167 ft	-373.62641 psf	188.91399 psf	96.256484 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	168.50000 ft	545.04167 ft	-318.59478 psf	671.25529 psf	342.02165 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	163.12818 ft	539.66985 ft	-211.55396 psf	1,076.3849 psf	548.44548 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	157.38455 ft	533.92622 ft	-37.841545 psf	1,408.3387 psf	717.58439 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	151.37884 ft	527.92051 ft	87.195428 psf	1,854.2275 psf	900.34783 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 7	147.66414 ft	524.20581 ft	152.63617 psf	2,125.2326 psf	962.09956 psf	0 psf	0 psf	Upper Cohesive Clayey

								Silt - 125 pcf, 26 deg, 0 psf
Column 8	144.52315 ft	523.18342 ft	164.12551 psf	2,764.0887 psf	1,268.0868 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 9	139.40278 ft	522.30026 ft	172.62224 psf	2,671.3804 psf	1,218.7258 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	134.28241 ft	521.41711 ft	195.82876 psf	2,577.7178 psf	1,161.7249 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	129.16204 ft	520.53395 ft	227.91039 psf	2,482.8673 psf	1,099.816 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	124.04167 ft	519.65079 ft	264.88183 psf	2,386.7693 psf	1,034.9137 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	118.92130 ft	518.76764 ft	307.18905 psf	2,289.4291 psf	966.80309 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	113.80093 ft	517.88448 ft	351.28658 psf	2,190.9811 psf	897.27898 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	108.68056 ft	517.00132 ft	396.59952 psf	2,091.5908 psf	826.7025 psf	0 psf	0 psf	Upper Cohesive Clayey

								Silt - 125 pcf, 26 deg, 0 psf
Column 16	103.56019 ft	516.11816 ft	443.67399 psf	1,991.4415 psf	754.89666 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	99.00000 ft	515.33163 ft	488.67773 psf	1,935.5977 psf	705.71001 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	94.12042 ft	514.49000 ft	538.08834 psf	1,990.8873 psf	708.5774 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	88.36126 ft	513.49667 ft	598.09663 psf	2,112.4234 psf	738.58652 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	82.58278 ft	512.50000 ft	659.85527 psf	2,223.6102 psf	538.444 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 21	76.78498 ft	511.50000 ft	722.18042 psf	2,341.969 psf	557.73793 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 22	70.94304 ft	510.49239 ft	785.03683 psf	2,471.685 psf	896.80675 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 23	65.20000 ft	509.50183 ft	846.77782 psf	2,475.968 psf	866.2558 psf	0 psf	0 psf	Lower Cohesive Clayey

								Silt - 125 pcf, 28 deg, 0 psf
Column 24	59.60000 ft	508.53595 ft	906.98737 psf	2,362.144 psf	773.72051 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 25	54.00000 ft	507.57007 ft	967.43949 psf	2,249.429 psf	681.6459 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	48.40000 ft	506.60418 ft	1,027.2662 psf	2,138.098 psf	590.6397 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 27	42.80000 ft	505.63830 ft	1,087.4196 psf	2,028.3574 psf	500.30554 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 28	39.54963 ft	505.07768 ft	1,122.7181 psf	1,958.2433 psf	444.25662 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 29	38.13297 ft	504.83333 ft	1,138.005 psf	1,903.1755 psf	516.11403 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 30	36.76430 ft	504.83333 ft	1,137.9922 psf	2,133.2145 psf	671.28595 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 31	36.18096 ft	505.07496 ft	1,122.8579 psf	2,000.7452 psf	466.78097 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 32	34.00000 ft	505.97834 ft	1,065.3017 psf	1,696.2648 psf	335.48905 psf	0 psf	0 psf	Lower Cohesive

								Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 33	31.00000 ft	507.22098 ft	983.54297 psf	1,319.0621 psf	178.39866 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 34	27.96916 ft	508.47640 ft	898.59509 psf	1,126.5803 psf	121.22189 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 35	23.90749 ft	510.15880 ft	787.1425 psf	876.01986 psf	47.256928 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 36	19.46243 ft	512.00000 ft	615.21622 psf	625.43773 psf	3.5195459 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability
CWLP Long Term F-F' rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 446
Date: 10/28/2026
Time: 09:10:38 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:11:00 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (34, 508) ft
- Lower Left: (34, 504) ft
- Lower Right: (39, 504) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (135, 525) ft
- Lower Left: (135, 519) ft
- Lower Right: (150, 519) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 87846 of 131769 converged

Current Slip Surface

Slip Surface: 28,858
Factor of Safety: 1.901
Volume: 2,531.1659 ft³
Weight: 312,163.17 lbf
Resisting Moment: 7,492,939.1 lbf·ft
Activating Moment: 3,941,600.2 lbf·ft
Resisting Force: 118,293.8 lbf
Activating Force: 62,227.896 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (174.5, 554) ft
Entry: (16.203449, 513) ft
Radius: 75.308008 ft
Center: (87.387243, 564.25) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	172.37500 ft	551.87500 ft	-524.53427 psf	6.3530947 psf	3.2370634 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 2	168.12500 ft	547.62500 ft	-481.15804 psf	423.74589 psf	215.90931 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	163.59364 ft	543.09364 ft	-384.72974 psf	775.30967 psf	395.04001 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	158.78093 ft	538.28093 ft	-249.99105 psf	1,063.6866 psf	541.9754 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	153.96822 ft	533.46822 ft	-79.925327 psf	1,342.3448 psf	683.95882 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	148.29607 ft	527.79607 ft	51.640271 psf	1,765.4352 psf	873.22215 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 7	143.76513 ft	523.26513 ft	156.98078 psf	2,086.657 psf	941.16598 psf	0 psf	0 psf	Upper Cohesive Clayey

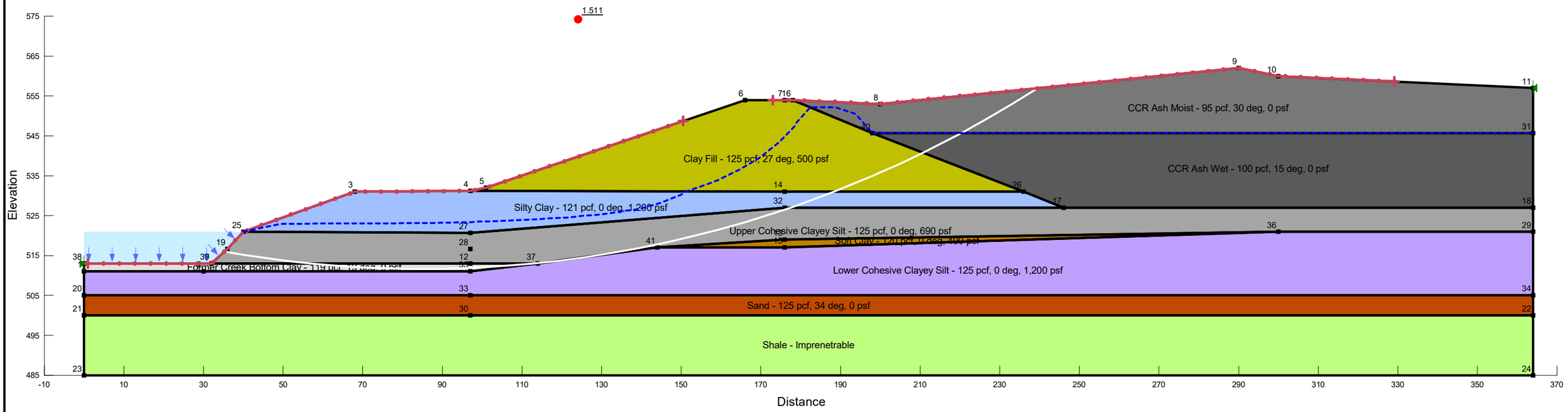
								Silt - 125 pcf, 26 deg, 0 psf
Column 8	139.90625 ft	521.58110 ft	202.23311 psf	2,778.916 psf	1,256.7322 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 9	134.71875 ft	520.74331 ft	227.25634 psf	2,678.6372 psf	1,195.6183 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	129.53125 ft	519.90552 ft	259.42074 psf	2,576.9782 psf	1,130.3483 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	124.34375 ft	519.06772 ft	295.96829 psf	2,473.8553 psf	1,062.2265 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	119.15625 ft	518.22993 ft	336.92743 psf	2,369.2631 psf	991.23632 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	113.96875 ft	517.39214 ft	379.48365 psf	2,263.3186 psf	918.80768 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	108.78125 ft	516.55434 ft	422.67816 psf	2,156.193 psf	845.49167 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	103.59375 ft	515.71655 ft	467.47371 psf	2,048.0671 psf	770.90692 psf	0 psf	0 psf	Upper Cohesive Clayey

								Silt - 125 pcf, 26 deg, 0 psf
Column 16	99.00000 ft	514.97465 ft	510.15813 psf	1,985.649 psf	719.64499 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	94.44331 ft	514.23873 ft	553.48493 psf	2,028.6309 psf	719.47678 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	89.32994 ft	513.41291 ft	603.32252 psf	2,130.5269 psf	744.86735 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	83.67733 ft	512.50000 ft	659.8676 psf	2,230.8363 psf	540.92792 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 20	77.48547 ft	511.50000 ft	722.19052 psf	2,349.4568 psf	560.31272 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 21	71.19477 ft	510.48404 ft	785.55979 psf	2,482.2165 psf	902.12837 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 22	65.20000 ft	509.51587 ft	845.90152 psf	2,482.9788 psf	870.44944 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 23	59.60000 ft	508.61146 ft	902.27047 psf	2,360.0521 psf	775.11623 psf	0 psf	0 psf	Lower Cohesive Clayey

								Silt - 125 pcf, 28 deg, 0 psf
Column 24	54.00000 ft	507.70704 ft	958.89284 psf	2,238.0774 psf	680.15448 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 25	48.40000 ft	506.80263 ft	1,014.8604 psf	2,117.3892 psf	586.22494 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	42.80000 ft	505.89822 ft	1,071.0401 psf	1,998.2436 psf	493.00284 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 27	38.61919 ft	505.22300 ft	1,113.5512 psf	1,887.9108 psf	411.73429 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 28	36.61919 ft	504.90000 ft	1,133.8288 psf	1,808.0071 psf	454.73904 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 29	35.75858 ft	504.90000 ft	1,133.8207 psf	2,037.4621 psf	609.51381 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 30	33.75858 ft	505.72843 ft	1,081.1882 psf	1,721.1945 psf	340.29738 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 31	31.00000 ft	506.87107 ft	1,006.359 psf	1,373.601 psf	195.26603 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 32	27.75797 ft	508.21396 ft	915.86998 psf	1,166.4586 psf	133.24031 psf	0 psf	0 psf	Lower Cohesive

								Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 33	23.27391 ft	510.07132 ft	792.83542 psf	888.8391 psf	51.046065 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 34	18.61766 ft	512.00000 ft	615.21622 psf	625.41018 psf	3.5100609 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Appendix H-3:
Short-Term Static Full Pool



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Circular Slope Stability
CWLP Short Term F-F' rev2.gsz
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Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 439
Date: 10/23/2026
Time: 03:46:32 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 03:46:48 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (173, 554) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)

Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)

Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft

Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 17807 of 18491 converged

Current Slip Surface

Slip Surface: 4,249
Factor of Safety: 1.511
Volume: 3,926.6634 ft³
Weight: 474,178.52 lbf
Resisting Moment: 35,690,462 lbf·ft
Activating Moment: 23,619,796 lbf·ft
Resisting Force: 119,555.31 lbf
Activating Force: 79,117.46 lbf

Slip Rank: 1 of 18,491 slip surfaces
Exit: (239.4313, 556.94313) ft
Entry: (35.226907, 515.98489) ft
Radius: 286.10948 ft
Center: (84.922662, 797.74537) ft

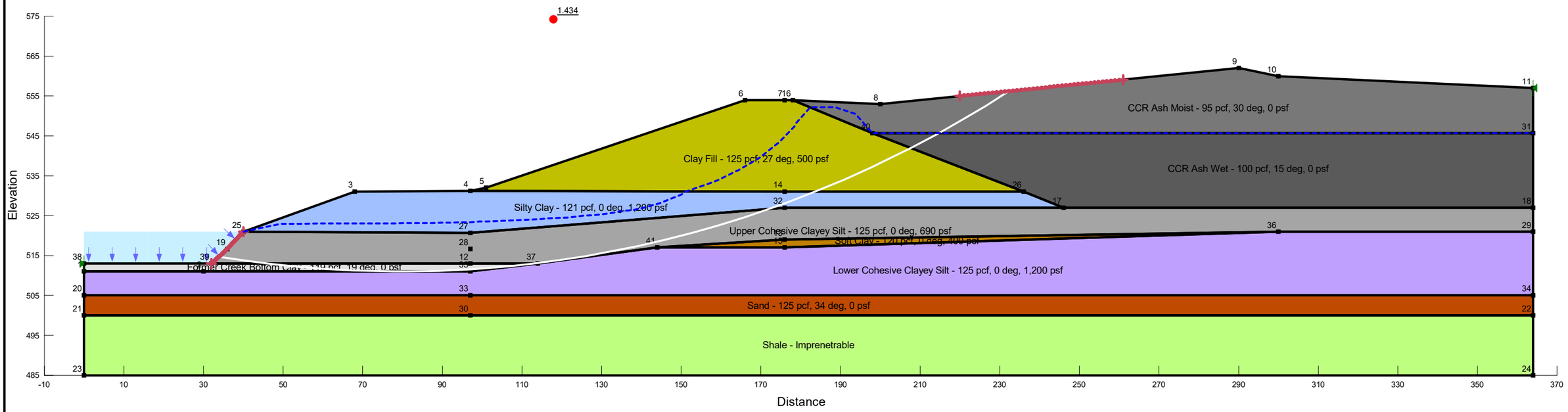
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	236.24567 ft	554.95761 ft	-245.17498 psf	122.15124 psf	70.52405 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	229.87441 ft	551.09993 ft	-131.85845 psf	366.504 psf	211.60118 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	223.50315 ft	547.46388 ft	-39.06977 psf	603.61233 psf	348.49574 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	215.52114 ft	543.23876 ft	153.64974 psf	978.73532 psf	221.08102 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	208.04356 ft	539.49925 ft	349.36849 psf	1,151.3111 psf	408.61016 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	202.68119 ft	537.01004 ft	443.51442 psf	1,447.9086 psf	511.76441 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	199.00000 ft	535.36433 ft	535.00464 psf	1,660.5439 psf	573.49091 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	193.19513 ft	532.96478 ft	679.65253 psf	2,038.767 psf	692.5034 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	185.79270 ft	530.02132 ft	706.68207 psf	2,536.9042 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 10	180.59757 ft	528.12090 ft	568.65028 psf	2,862.2089 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 11	177.70952 ft	527.09959 ft	499.04433 psf	3,035.3491 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf

Column 12	176.70952 ft	526.75967 ft	478.65025 psf	3,149.2649 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	171.00000 ft	524.94170 ft	370.06189 psf	3,378.759 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	162.66652 ft	522.42278 ft	286.49267 psf	3,566.4999 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	155.99957 ft	520.62650 ft	279.88453 psf	3,531.6983 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	149.33262 ft	519.00124 ft	309.47606 psf	3,478.9022 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	142.66567 ft	517.54402 ft	362.50014 psf	3,407.4485 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	135.99871 ft	516.25222 ft	432.00789 psf	3,316.5533 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	129.33176 ft	515.12357 ft	497.91723 psf	3,205.3597 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 20	122.73345 ft	514.16446 ft	556.58189 psf	3,074.5643 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	116.14834 ft	513.36457 ft	606.84487 psf	2,922.3434 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	109.87104 ft	512.74115 ft	645.1781 psf	2,743.7177 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	103.95701 ft	512.28513 ft	673.57931 psf	2,563.9756 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	99.00000 ft	511.98943 ft	691.95856 psf	2,435.5125 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	93.37500 ft	511.78376 ft	704.69702 psf	2,418.4124 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	86.12500 ft	511.66138 ft	712.22085 psf	2,439.8916 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	78.87500 ft	511.72279 ft	708.307 psf	2,436.1632 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	71.62500 ft	511.96811 ft	692.84976 psf	2,406.694 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 29	65.25432 ft	512.32600 ft	670.62056 psf	2,243.6829 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	59.76295 ft	512.75760 ft	644.23711 psf	1,952.9555 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	54.18106 ft	513.30653 ft	606.73081 psf	1,678.2442 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 32	48.50863 ft	513.97702 ft	563.52812 psf	1,342.7529 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	42.83621 ft	514.76278 ft	505.79562 psf	992.51218 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 34	38.00000 ft	515.51711 ft	394.53544 psf	635.96926 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 35	35.61345 ft	515.91726 ft	324.59581 psf	425.23286 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

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Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 446
Date: 10/28/2026
Time: 09:35:07 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:35:28 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (32, 513) ft
Left-Zone Right Coordinate: (40, 521) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (220, 555) ft
Right-Zone Right Coordinate: (261, 559.1) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)

Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)

Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft

Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18491 of 18491 converged

Current Slip Surface

Slip Surface: 4,194
Factor of Safety: 1.434
Volume: 3,783.7136 ft³
Weight: 458,763.29 lbf
Resisting Moment: 33,375,089 lbf·ft
Activating Moment: 23,276,987 lbf·ft
Resisting Force: 113,470.32 lbf
Activating Force: 79,135.312 lbf

Slip Rank: 1 of 18,491 slip surfaces
Exit: (232.3, 556.23) ft
Entry: (33.870027, 514.72978) ft
Radius: 280.6748 ft
Center: (79.50469, 791.66988) ft

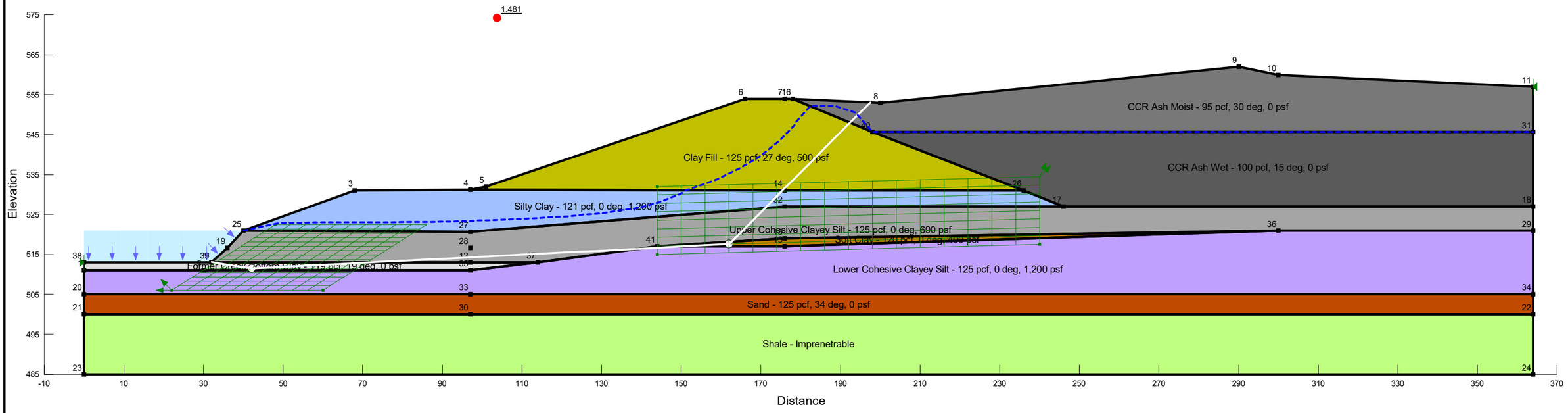
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	229.36629 ft	554.37722 ft	-208.96166 psf	113.70909 psf	65.649976 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	223.49887 ft	550.77086 ft	-111.3239 psf	341.11882 psf	196.94504 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	217.63145 ft	547.35864 ft	-32.554311 psf	561.93049 psf	324.43072 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	211.18008 ft	543.83108 ft	116.67278 psf	883.78993 psf	205.54842 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	203.83121 ft	540.06901 ft	302.54135 psf	1,067.7211 psf	389.87854 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	199.00000 ft	537.70533 ft	422.17325 psf	1,362.5315 psf	479.13647 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	194.39246 ft	535.61616 ft	559.43456 psf	1,681.2866 psf	571.61214 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	187.17739 ft	532.49875 ft	693.62457 psf	2,163.6545 psf	749.01766 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	180.78493 ft	529.92240 ft	639.18758 psf	2,609.7151 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 10	177.00000 ft	528.47438 ft	534.25085 psf	2,839.5931 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 11	174.01353 ft	527.39356 ft	457.15778 psf	2,977.9384 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf

Column 12	169.01353 ft	525.66912 ft	353.09412 psf	3,273.2257 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	162.68704 ft	523.62696 ft	281.09928 psf	3,397.9091 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	156.06112 ft	521.65951 ft	261.2094 psf	3,383.4816 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	149.43520 ft	519.86781 ft	283.77496 psf	3,351.0787 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	142.80927 ft	518.24839 ft	334.15835 psf	3,300.1789 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	136.18335 ft	516.79822 ft	406.63789 psf	3,230.0932 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	129.55743 ft	515.51461 ft	477.93461 psf	3,140.0148 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	122.93151 ft	514.39527 ft	543.99971 psf	3,029.0717 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 20	116.30559 ft	513.43820 ft	602.60029 psf	2,896.3815 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	109.99447 ft	512.67235 ft	649.45742 psf	2,739.7021 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 22	103.99816 ft	512.08205 ft	686.22167 psf	2,574.1752 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	99.00000 ft	511.68013 ft	711.23466 psf	2,458.0327 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	93.04169 ft	511.34973 ft	731.75896 psf	2,457.4991 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	85.12506 ft	511.07929 ft	748.52899 psf	2,498.8775 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	79.50469 ft	511.00000 ft	753.4122 psf	2,512.7131 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	72.92131 ft	511.11548 ft	746.1466 psf	2,500.764 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	64.33613 ft	511.42928 ft	726.48874 psf	2,305.2166 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 29	57.00838 ft	511.92223 ft	695.45844 psf	1,927.886 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	49.68063 ft	512.60843 ft	650.42192 psf	1,524.2884 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	43.00838 ft	513.39455 ft	611.61939 psf	1,173.583 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 32	38.00000 ft	514.08815 ft	507.89548 psf	816.80828 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	34.93501 ft	514.55849 ft	421.94268 psf	556.34998 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability	
CWLP Short Term F-F' rev2.gsz	
10/23/2026	1:300

Block Slope Stability

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File Information

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Created By: Karl Finke
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Revision Number: 439
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Time: 03:46:32 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 03:49:59 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (48, 522.5) ft
- Lower Left: (22, 506) ft
- Lower Right: (60, 506) ft
- X Increments: 10
- Y Increments: 15
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (144, 532) ft
- Lower Left: (144, 515) ft
- Lower Right: (240, 517.5) ft
- X Increments: 16
- Y Increments: 8
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure

Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
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Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)

Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft

Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 443518 of 484704 converged

Current Slip Surface

Slip Surface: 161,629
Factor of Safety: 1.481
Volume: 3,255.3121 ft³
Weight: 401,118.59 lbf
Resisting Moment: 6,372,563.3 lbf·ft
Activating Moment: 4,302,094.8 lbf·ft
Resisting Force: 102,711.57 lbf
Activating Force: 69,375.996 lbf
Slip Rank: 1 of 484,704 slip surfaces
Exit: (197.51902, 553.11277) ft
Entry: (32.087137, 513.0806) ft
Radius: 76.51504 ft
Center: (107.53767, 563.12081) ft

Slip Columns

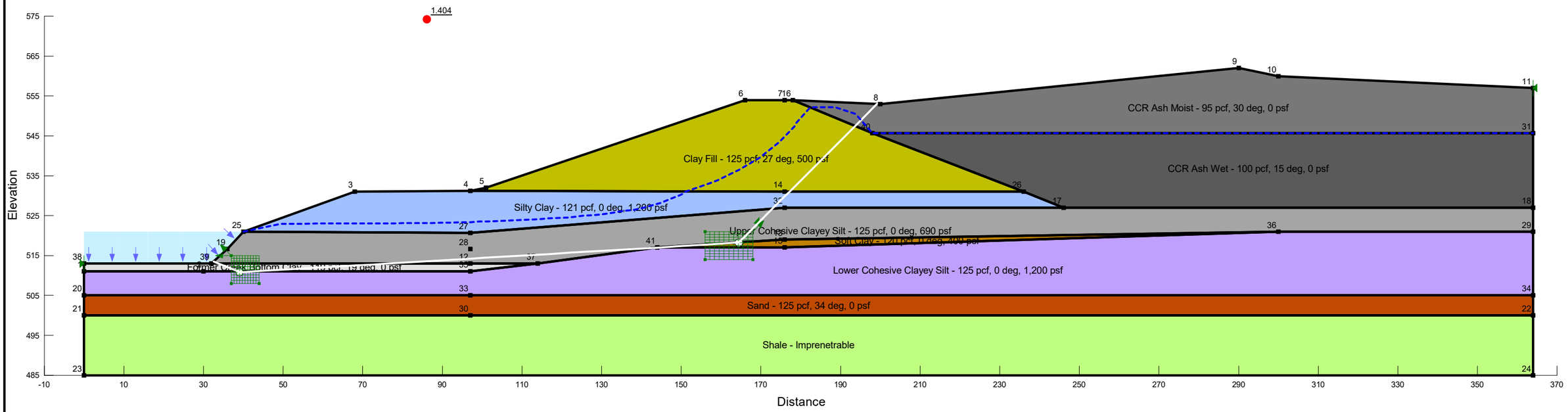
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	194.97020 ft	550.56395 ft	-13.509147 psf	179.98846 psf	103.91638 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	190.01782 ft	545.61157 ft	221.947 psf	433.26566 psf	107.67224 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	185.21069 ft	540.80444 ft	364.23183 psf	959.52094 psf	303.31495 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	180.40356 ft	535.99731 ft	463.34757 psf	1,460.9057 psf	508.28126 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	177.00000 ft	532.59375 ft	546.65196 psf	1,800.0728 psf	638.6498 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	175.70387 ft	531.29762 ft	574.34985 psf	1,915.5035 psf	683.35189 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	173.20796 ft	528.80171 ft	473.02002 psf	2,165.0777 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 8	168.50408 ft	524.09783 ft	332.65538 psf	2,919.9132 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 9	164.28333 ft	519.87708 ft	302.54972 psf	3,267.1073 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 10	162.28333 ft	517.87708 ft	330.85709 psf	3,535.0636 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 11	159.07855 ft	517.44531 ft	355.51868 psf	4,134.7398 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 12	153.23564 ft	517.14844 ft	372.40716 psf	3,938.3532 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 13	147.15709 ft	516.83959 ft	390.8389 psf	3,802.3964 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 14	142.05619 ft	516.58042 ft	406.69448 psf	3,643.9845 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 15	137.31865 ft	516.33970 ft	425.43316 psf	3,445.9757 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	131.73116 ft	516.05581 ft	448.14346 psf	3,261.2924 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	126.14368 ft	515.77191 ft	468.41144 psf	3,075.2512 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	120.55619 ft	515.48801 ft	486.88241 psf	2,887.525 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	114.96871 ft	515.20411 ft	503.9558 psf	2,697.8159 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	109.38123 ft	514.92022 ft	517.89801 psf	2,505.8612 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	103.79374 ft	514.63632 ft	531.52658 psf	2,311.4372 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	99.00000 ft	514.39275 ft	545.17229 psf	2,176.8617 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	94.45887 ft	514.16202 ft	558.15767 psf	2,154.5377 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	89.37662 ft	513.90379 ft	573.09474 psf	2,181.961 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	84.29436 ft	513.64557 ft	588.69403 psf	2,207.3852 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 26	79.21210 ft	513.38734 ft	604.51514 psf	2,230.9074 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 27	74.12985 ft	513.12911 ft	620.39817 psf	2,252.6508 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 28	69.79436 ft	512.90883 ft	633.98096 psf	2,248.8435 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	65.40667 ft	512.68589 ft	648.20006 psf	2,161.7487 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	60.22000 ft	512.42236 ft	664.95421 psf	1,968.5925 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	55.03333 ft	512.15883 ft	679.99698 psf	1,774.3665 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	49.84667 ft	511.89530 ft	695.56836 psf	1,579.0736 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	44.66000 ft	511.63177 ft	714.89699 psf	1,382.7405 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 34	41.03333 ft	511.66366 ft	714.87587 psf	1,269.6526 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 35	38.00000 ft	512.14410 ft	665.78532 psf	1,025.6277 psf	0 psf	300 psf	0 psf	Former Creek

								Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 36	34.29802 ft	512.73043 ft	566.52164 psf	708.53961 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 37	32.34159 ft	513.04030 ft	501.64499 psf	589.9294 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability
CWLP Short Term F-F' rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 446
Date: 10/28/2026
Time: 09:35:07 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:35:48 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (37, 515) ft
- Lower Left: (37, 508) ft
- Lower Right: (44, 508) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (156, 521) ft
- Lower Left: (156, 514) ft
- Lower Right: (168, 514) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure

Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)

Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft

Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 99825 of 131769 converged

Current Slip Surface

Slip Surface: 51,766
Factor of Safety: 1.404
Volume: 3,325.8496 ft³
Weight: 409,544.1 lbf
Resisting Moment: 6,108,268.2 lbf·ft
Activating Moment: 4,349,992.7 lbf·ft
Resisting Force: 97,477.957 lbf
Activating Force: 69,462.7 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (199.23478, 553.03478) ft
Entry: (32.553247, 513.51175) ft
Radius: 76.637534 ft
Center: (108.86533, 562.91554) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	196.46191 ft	550.26191 ft	-21.063634 psf	192.92972 psf	111.38802 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	191.07420 ft	544.87420 ft	222.6741 psf	471.48031 psf	126.77309 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	185.84452 ft	539.64452 ft	409.20646 psf	1,046.8063 psf	324.87336 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	180.61484 ft	534.41484 ft	533.38285 psf	1,591.2036 psf	538.98659 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	177.60000 ft	531.40000 ft	607.06279 psf	1,895.8303 psf	656.65983 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	176.60000 ft	530.40000 ft	587.78313 psf	1,976.894 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 7	174.47868 ft	528.27868 ft	486.61371 psf	2,199.2742 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 8	169.47868 ft	523.27868 ft	334.49572 psf	3,012.4154 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

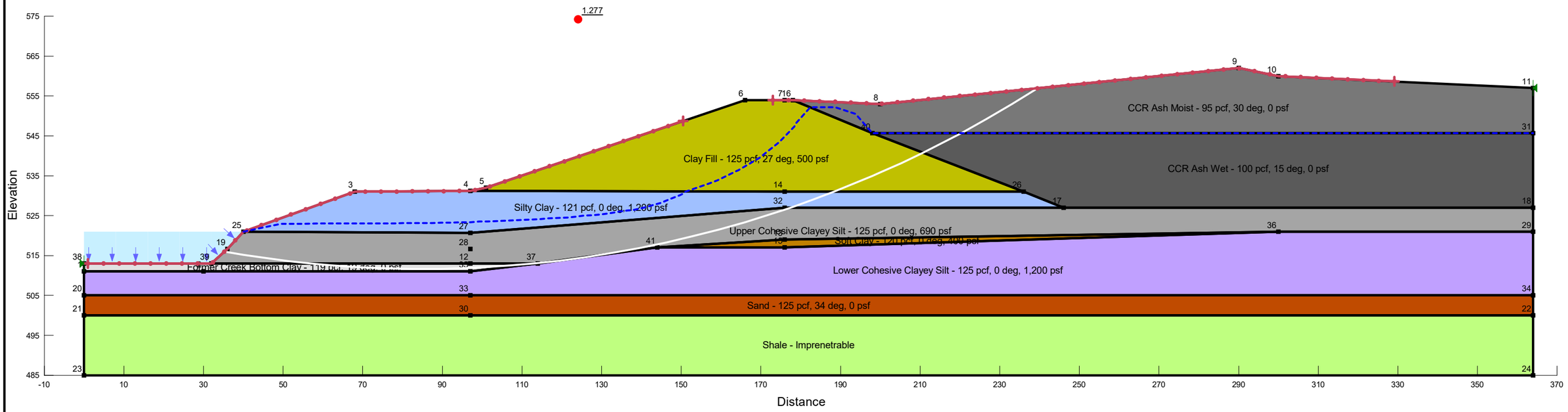
Column 9	165.24000 ft	519.04000 ft	304.08104 psf	3,405.5433 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 10	161.90014 ft	518.09000 ft	318.3267 psf	4,174.1602 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 11	156.78041 ft	517.75000 ft	337.23757 psf	4,020.0489 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 12	151.70068 ft	517.45000 ft	354.17234 psf	3,852.734 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 13	146.58041 ft	517.14761 ft	371.95872 psf	3,684.9056 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 14	141.28429 ft	516.83483 ft	394.84494 psf	3,534.7437 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	135.88512 ft	516.51596 ft	420.05309 psf	3,361.6544 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	130.51818 ft	516.19900 ft	442.61338 psf	3,188.6773 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	125.15124 ft	515.88204 ft	463.33018 psf	3,014.5014 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	119.78429 ft	515.56507 ft	482.98682 psf	2,838.8547 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0

								deg, 690 psf
Column 19	114.41735 ft	515.24811 ft	501.47116 psf	2,661.4888 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	109.05041 ft	514.93115 ft	517.10496 psf	2,482.1822 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	103.68347 ft	514.61419 ft	532.77122 psf	2,300.7445 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	99.00000 ft	514.33759 ft	548.4916 psf	2,174.8531 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	94.41892 ft	514.06704 ft	563.92807 psf	2,157.5464 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	89.25676 ft	513.76217 ft	581.80466 psf	2,190.8998 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	84.09459 ft	513.45730 ft	600.3464 psf	2,222.3601 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 26	78.93243 ft	513.15243 ft	619.12812 psf	2,252.0247 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0

								deg, 690 psf
Column 27	74.26351 ft	512.87670 ft	636.15374 psf	2,257.8707 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	70.08784 ft	512.63009 ft	651.42321 psf	2,284.1872 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	65.44865 ft	512.35611 ft	668.7336 psf	2,205.5585 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	60.34595 ft	512.05475 ft	687.72075 psf	2,021.5093 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	55.24324 ft	511.75339 ft	705.73906 psf	1,836.3983 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	50.14054 ft	511.45204 ft	724.36834 psf	1,650.2132 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	45.03784 ft	511.15068 ft	742.93031 psf	1,462.964 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 34	41.24324 ft	510.92658 ft	754.82439 psf	1,302.5132 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 35	39.55000 ft	510.82658 ft	760.43464 psf	1,222.8311 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0

								deg, 1,200 psf
Column 36	38.85858 ft	510.90000 ft	754.68633 psf	1,584.2296 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 37	37.30858 ft	511.54203 ft	706.58024 psf	1,111.4127 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 38	34.89437 ft	512.54203 ft	594.85189 psf	825.6562 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 39	33.17099 ft	513.25588 ft	497.63037 psf	743.95905 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Appendix H-4:
Seismic Full Pool



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Circular Slope Stability
CWLP Seismic Term F-F' rev2.gsz
10/23/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 438
Date: 10/23/2026
Time: 03:39:06 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 03:39:22 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (173, 554) ft
Right-Zone Right Coordinate: (329.12351, 558.63484) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.3)
- Data Point: (0.20885434, 0.299999)
- Data Point: (0.38282598, 0.29999749)
- Data Point: (0.70171264, 0.29999356)
- Data Point: (1.2862257, 0.2999833)
- Data Point: (2.357627, 0.29995631)
- Data Point: (4.3214847, 0.29988506)
- Data Point: (7.9211981, 0.29969647)
- Data Point: (14.519403, 0.2991971)
- Data Point: (26.613786, 0.29787936)
- Data Point: (48.782557, 0.29444321)
- Data Point: (89.417486, 0.28577206)
- Data Point: (163.90053, 0.26560983)
- Data Point: (300.42651, 0.22645249)
- Data Point: (550.67599, 0.17101613)
- Data Point: (1,009.3785, 0.11800084)
- Data Point: (1,850.1713, 0.080740817)
- Data Point: (3,391.3282, 0.057711328)
- Data Point: (6,216.2392, 0.043406793)
- Data Point: (11,394.247, 0.033978031)
- Data Point: (20,885.434, 0.027298541)

Estimation Properties
- Vol. WC Estimation Method: Sample functions
- Saturated Water Content: 0.3
- Sample Material: Silt
- Liquid Limit: 26 %
- Diameter at 10% passing: 0.0008
- Diameter at 60% passing: 0.022
- Maximum Suction: 20,885.434 psf
- Minimum Suction: 0.20885434 psf
- Num. Points: 20

Sand

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.3000003
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.3000003

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.3)
- Data Point: (0.20885434, 0.29999621)
- Data Point: (0.38282598, 0.29999025)
- Data Point: (0.70171264, 0.29997486)
- Data Point: (1.2862257, 0.29993496)
- Data Point: (2.357627, 0.29983146)
- Data Point: (4.3214847, 0.29956292)
- Data Point: (7.9211981, 0.29886732)
- Data Point: (14.519403, 0.29707538)
- Data Point: (26.613786, 0.29252873)
- Data Point: (48.782557, 0.28143152)
- Data Point: (89.417486, 0.25674265)

Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft

Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18276 of 18491 converged

Current Slip Surface

Slip Surface: 4,249
Factor of Safety: 1.277

Volume: 3,926.6634 ft³
Weight: 474,178.52 lbf
Resisting Moment: 35,475,251 lbf·ft
Activating Moment: 27,785,462 lbf·ft
Resisting Force: 118,874.09 lbf
Activating Force: 93,087.15 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (239.4313, 556.94313) ft
Entry: (35.226907, 515.98489) ft
Radius: 286.10948 ft
Center: (84.922662, 797.74537) ft

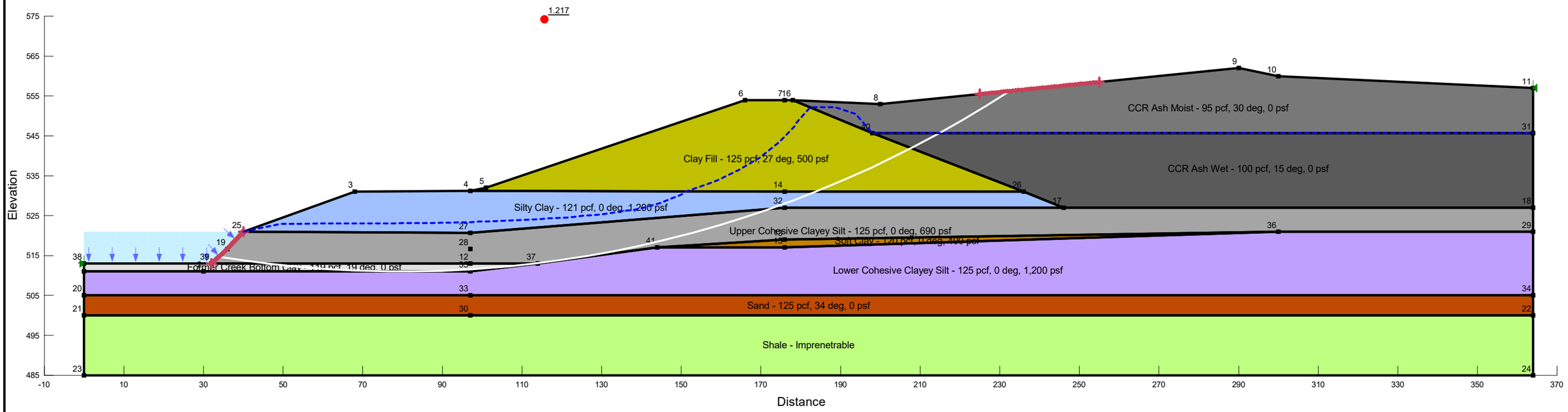
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	236.24567 ft	554.95761 ft	-245.17498 psf	117.89182 psf	68.064872 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	229.87441 ft	551.09993 ft	-131.85845 psf	354.04079 psf	204.40555 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	223.50315 ft	547.46388 ft	-39.06977 psf	583.81828 psf	337.06764 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	215.52114 ft	543.23876 ft	153.64974 psf	955.56433 psf	214.87237 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	208.04356 ft	539.49925 ft	349.36849 psf	1,111.1887 psf	388.16677 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	202.68119 ft	537.01004 ft	443.51442 psf	1,406.2224 psf	490.52421 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	199.00000 ft	535.36433 ft	535.00464 psf	1,617.9493 psf	551.78784 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	193.19513 ft	532.96478 ft	679.65253 psf	1,994.0194 psf	669.70337 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	185.79270 ft	530.02132 ft	706.68207 psf	2,484.4295 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 10	180.59757 ft	528.12090 ft	568.65028 psf	2,808.0828 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf,

								0 deg, 1,200 psf
Column 11	177.70952 ft	527.09959 ft	499.04433 psf	2,980.4228 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 12	176.70952 ft	526.75967 ft	478.65025 psf	3,083.911 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	171.00000 ft	524.94170 ft	370.06189 psf	3,310.0762 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	162.66652 ft	522.42278 ft	286.49267 psf	3,498.6446 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	155.99957 ft	520.62650 ft	279.88453 psf	3,470.968 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	149.33262 ft	519.00124 ft	309.47606 psf	3,427.1236 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	142.66567 ft	517.54402 ft	362.50014 psf	3,366.0467 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	135.99871 ft	516.25222 ft	432.00789 psf	3,286.5047 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 19	129.33176 ft	515.12357 ft	497.91723 psf	3,187.1482 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	122.73345 ft	514.16446 ft	556.58189 psf	3,068.0286 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	116.14834 ft	513.36457 ft	606.84487 psf	2,926.8973 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	109.87104 ft	512.74115 ft	645.1781 psf	2,736.7424 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	103.95701 ft	512.28513 ft	673.57931 psf	2,566.2213 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	99.00000 ft	511.98943 ft	691.95856 psf	2,444.4805 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	93.37500 ft	511.78376 ft	704.69702 psf	2,433.0665 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	86.12500 ft	511.66138 ft	712.22085 psf	2,460.6247 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	78.87500 ft	511.72279 ft	708.307 psf	2,461.7675 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 19 deg, 0 psf
Column 28	71.62500 ft	511.96811 ft	692.84976 psf	2,435.5632 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	65.25432 ft	512.32600 ft	670.62056 psf	2,274.0133 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	59.76295 ft	512.75760 ft	644.23711 psf	1,983.1425 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	54.18106 ft	513.30653 ft	606.73081 psf	1,719.1545 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 32	48.50863 ft	513.97702 ft	563.52812 psf	1,376.9157 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	42.83621 ft	514.76278 ft	505.79562 psf	1,019.019 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 34	38.00000 ft	515.51711 ft	394.53544 psf	655.74 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 35	35.61345 ft	515.91726 ft	324.59581 psf	440.7965 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Circular Slope Stability
CWLP Seismic Term F-F' rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

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Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 449
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Tool Version: 23.1.2.11
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Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:37:56 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb

Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (32, 513) ft
Left-Zone Right Coordinate: (40, 521) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (225, 555.5) ft
Right-Zone Right Coordinate: (255, 558.5) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.3)
- Data Point: (0.20885434, 0.299999)
- Data Point: (0.38282598, 0.29999749)
- Data Point: (0.70171264, 0.29999356)
- Data Point: (1.2862257, 0.2999833)
- Data Point: (2.357627, 0.29995631)
- Data Point: (4.3214847, 0.29988506)
- Data Point: (7.9211981, 0.29969647)
- Data Point: (14.519403, 0.2991971)
- Data Point: (26.613786, 0.29787936)
- Data Point: (48.782557, 0.29444321)
- Data Point: (89.417486, 0.28577206)
- Data Point: (163.90053, 0.26560983)
- Data Point: (300.42651, 0.22645249)
- Data Point: (550.67599, 0.17101613)
- Data Point: (1,009.3785, 0.11800084)
- Data Point: (1,850.1713, 0.080740817)
- Data Point: (3,391.3282, 0.057711328)
- Data Point: (6,216.2392, 0.043406793)
- Data Point: (11,394.247, 0.033978031)
- Data Point: (20,885.434, 0.027298541)

Estimation Properties
- Vol. WC Estimation Method: Sample functions
- Saturated Water Content: 0.3
- Sample Material: Silt
- Liquid Limit: 26 %
- Diameter at 10% passing: 0.0008
- Diameter at 60% passing: 0.022
- Maximum Suction: 20,885.434 psf
- Minimum Suction: 0.20885434 psf
- Num. Points: 20

Sand

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.3000003
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.3000003

Data Points: Matric Suction (psf), Volumetric Water Content
- Data Point: (0, 0.3)
- Data Point: (0.20885434, 0.29999621)
- Data Point: (0.38282598, 0.29999025)
- Data Point: (0.70171264, 0.29997486)
- Data Point: (1.2862257, 0.29993496)
- Data Point: (2.357627, 0.29983146)
- Data Point: (4.3214847, 0.29956292)
- Data Point: (7.9211981, 0.29886732)
- Data Point: (14.519403, 0.29707538)
- Data Point: (26.613786, 0.29252873)
- Data Point: (48.782557, 0.28143152)
- Data Point: (89.417486, 0.25674265)

Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft

Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18491 of 18491 converged

Current Slip Surface

Slip Surface: 4,172
Factor of Safety: 1.217

Volume: 3,791.3452 ft³
Weight: 459,639.74 lbf
Resisting Moment: 33,184,514 lbf·ft
Activating Moment: 27,280,447 lbf·ft
Resisting Force: 112,766.43 lbf
Activating Force: 92,685.4 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (232.5, 556.25) ft
Entry: (33.870027, 514.72978) ft
Radius: 280.92333 ft
Center: (79.585052, 791.90852) ft

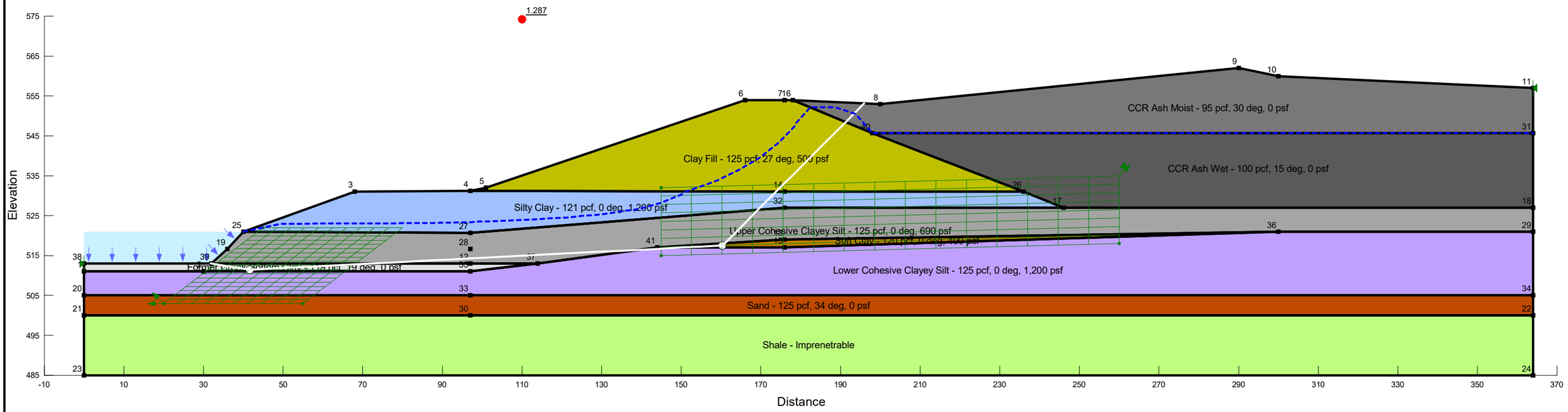
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	229.55998 ft	554.39357 ft	-209.98147 psf	109.83368 psf	63.412504 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	223.67995 ft	550.78024 ft	-111.90773 psf	329.76486 psf	190.38983 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	217.79992 ft	547.36166 ft	-32.741234 psf	543.87794 psf	314.00808 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	211.30667 ft	543.81348 ft	117.77192 psf	864.23211 psf	200.01341 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	203.87672 ft	540.01407 ft	305.21791 psf	1,035.3338 psf	372.01263 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	199.00000 ft	537.63157 ft	425.78959 psf	1,330.8863 psf	461.16981 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	194.43069 ft	535.56285 ft	561.62326 psf	1,644.2226 psf	551.61192 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	187.29208 ft	532.48188 ft	694.46121 psf	2,118.5752 psf	725.62232 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	180.86138 ft	529.89399 ft	639.31217 psf	2,557.3241 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 10	177.00000 ft	528.41827 ft	532.49842 psf	2,790.5356 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf,

								0 deg, 1,200 psf
Column 11	174.11126 ft	527.37366 ft	458.30284 psf	2,924.2211 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 12	169.11126 ft	525.65262 ft	354.30778 psf	3,202.1676 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	162.69813 ft	523.58374 ft	281.37607 psf	3,330.5466 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	156.09440 ft	521.62633 ft	261.93264 psf	3,321.7569 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	149.49067 ft	519.84327 ft	284.56765 psf	3,297.3945 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	142.88693 ft	518.23114 ft	334.70474 psf	3,256.5261 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	136.28320 ft	516.78696 ft	407.00336 psf	3,197.9986 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	129.67946 ft	515.50807 ft	478.09608 psf	3,120.4865 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 19	123.07573 ft	514.39219 ft	544.00648 psf	3,022.5538 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	116.47200 ft	513.43737 ft	602.51251 psf	2,902.7184 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	110.12760 ft	512.66722 ft	649.77579 psf	2,731.2294 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 22	104.04253 ft	512.06852 ft	687.06358 psf	2,574.0404 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 23	99.00000 ft	511.66405 ft	712.23682 psf	2,464.3383 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	93.36752 ft	511.34705 ft	731.93016 psf	2,468.3569 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	86.10255 ft	511.08430 ft	748.22704 psf	2,515.5187 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	79.58505 ft	511.00000 ft	753.41311 psf	2,536.2343 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	72.35002 ft	511.11208 ft	746.35412 psf	2,529.268 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 28	64.33333 ft	511.42355 ft	726.84565 psf	2,336.4577 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	56.99999 ft	511.91869 ft	695.67832 psf	1,958.1489 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	49.66665 ft	512.60723 ft	650.52315 psf	1,550.7614 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	42.99999 ft	513.39407 ft	611.67084 psf	1,205.2488 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 32	38.00000 ft	514.08751 ft	507.94664 psf	840.59535 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	34.93501 ft	514.55833 ft	421.9555 psf	573.4091 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability	
CWLP Seismic Term F-F' rev2.gsz	
10/23/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
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Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 438
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Time: 03:39:06 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Term F-F' rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 03:43:07 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (45, 522) ft
- Lower Left: (20, 503) ft
- Lower Right: (55, 503) ft
- X Increments: 10
- Y Increments: 18
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (145, 532) ft
- Lower Left: (145, 515) ft
- Lower Right: (260, 518) ft
- X Increments: 15
- Y Increments: 8
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 473276 of 541728 converged

Current Slip Surface

Slip Surface: 237,655
Factor of Safety: 1.287
Volume: 3,200.6585 ft³
Weight: 394,544.52 lbf
Resisting Moment: 6,299,713.3 lbf·ft
Activating Moment: 4,894,724.5 lbf·ft
Resisting Force: 101,415.93 lbf
Activating Force: 78,854.3 lbf
Slip Rank: 1 of 541,728 slip surfaces
Exit: (195.99058, 553.18225) ft
Entry: (31.78972, 513) ft
Radius: 76.239557 ft
Center: (106.51528, 563.22781) ft

Slip Columns

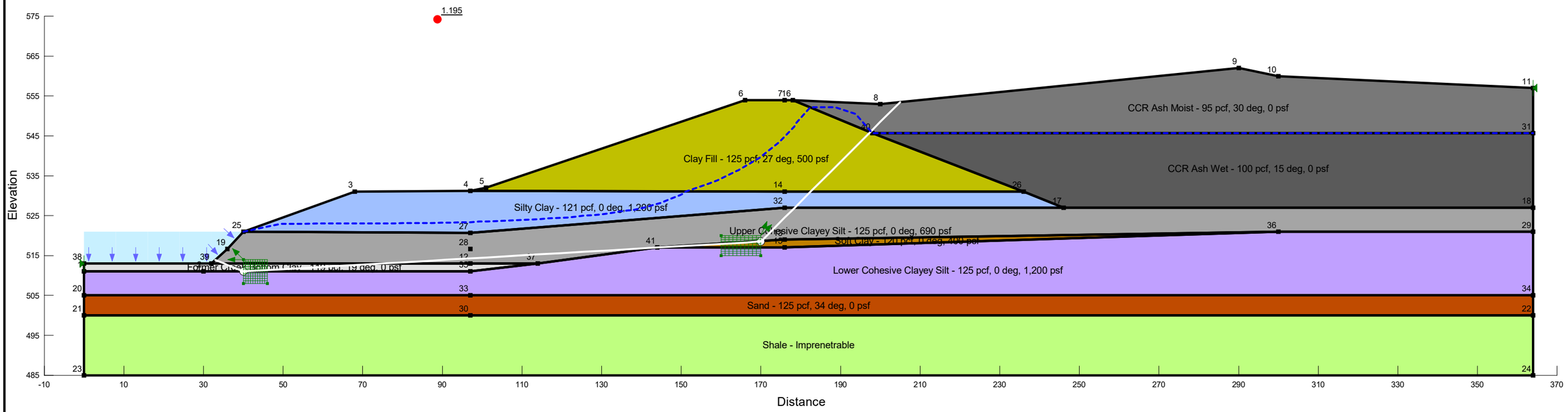
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	193.64134 ft	550.83301 ft	-6.7794238 psf	158.9472 psf	91.768207 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	187.96908 ft	545.16075 ft	272.50363 psf	467.43222 psf	99.321077 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	181.32303 ft	538.51469 ft	373.55198 psf	1,138.0382 psf	389.52518 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	177.00000 ft	534.19167 ft	480.04832 psf	1,557.642 psf	549.06142 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	174.90693 ft	532.09860 ft	516.62487 psf	1,733.4444 psf	620.00054 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	171.54282 ft	528.73449 ft	436.6583 psf	2,021.6443 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 7	167.63589 ft	524.82756 ft	327.77222 psf	2,695.6139 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey

								Silt - 125 pcf, 0 deg, 690 psf
Column 8	163.43111 ft	520.62278 ft	298.43248 psf	2,982.0368 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 9	160.59778 ft	517.78944 ft	335.55345 psf	3,290.4166 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 10	157.77069 ft	517.39375 ft	358.4029 psf	4,042.7734 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 11	152.64541 ft	517.13125 ft	373.36659 psf	3,871.9982 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 12	147.04138 ft	516.84423 ft	390.54221 psf	3,797.6052 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 13	142.10307 ft	516.59131 ft	406.01785 psf	3,653.6583 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 14	137.40571 ft	516.35072 ft	424.75691 psf	3,434.8083 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	131.80483 ft	516.06387 ft	447.64766 psf	3,256.1482 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	126.20395 ft	515.77701 ft	468.1009 psf	3,076.2118 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0

								deg, 690 psf
Column 17	120.60307 ft	515.49015 ft	486.74525 psf	2,894.4555 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	115.00219 ft	515.20329 ft	504.00097 psf	2,710.3655 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	109.40132 ft	514.91643 ft	518.12686 psf	2,523.4672 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	103.80044 ft	514.62957 ft	531.92963 psf	2,333.3354 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	99.00000 ft	514.38371 ft	545.71633 psf	2,201.4729 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	94.49832 ft	514.15315 ft	558.70792 psf	2,179.767 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	89.49495 ft	513.89689 ft	573.5329 psf	2,206.4647 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	84.49159 ft	513.64064 ft	589.00884 psf	2,230.6051 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0

								deg, 690 psf
Column 25	79.48822 ft	513.38438 ft	604.70842 psf	2,252.3214 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 26	74.48486 ft	513.12813 ft	620.47383 psf	2,271.7784 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 27	69.99159 ft	512.89800 ft	634.66569 psf	2,249.942 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	65.36111 ft	512.66084 ft	649.76364 psf	2,164.2622 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	60.08333 ft	512.39053 ft	666.9344 psf	1,970.4023 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	54.80556 ft	512.12022 ft	682.38121 psf	1,774.7694 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	49.52778 ft	511.84991 ft	698.66898 psf	1,577.2837 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	44.25000 ft	511.57960 ft	718.05907 psf	1,377.9138 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	40.80556 ft	511.57203 ft	719.76679 psf	1,287.0579 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 19 deg, 0 psf
Column 34	38.00000 ft	512.01639 ft	675.62454 psf	1,056.154 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 35	34.00000 ft	512.64993 ft	571.52413 psf	709.28987 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 36	31.89486 ft	512.98335 ft	501.382 psf	538.68396 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Imprenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability
CWLP Seismic Term F-F' rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 449
Date: 10/28/2026
Time: 09:37:42 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic Term F-F' rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 09:38:16 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Imprenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (40, 514) ft
- Lower Left: (40, 508) ft
- Lower Right: (46, 508) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (160, 520) ft
- Lower Left: (160, 515) ft
- Lower Right: (170, 515) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	200 ft	553 ft
Point 9	290 ft	562 ft
Point 10	300 ft	560 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,122.8 ft²
Region 3	Shale - Imprenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 95832 of 131769 converged

Current Slip Surface

Slip Surface: 60,520
Factor of Safety: 1.195
Volume: 3,498.9882 ft³
Weight: 430,096.31 lbf
Resisting Moment: 5,976,507.1 lbf·ft
Activating Moment: 4,998,409.6 lbf·ft
Resisting Force: 95,171.738 lbf
Activating Force: 79,649.954 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (205, 553.5) ft
Entry: (32.980955, 513.90738) ft
Radius: 78.355751 ft
Center: (112.15588, 563.39815) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	202.50000 ft	551.00000 ft	-56.900124 psf	142.09447 psf	82.038282 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	198.71731 ft	547.21731 ft	-13.308133 psf	367.48748 psf	212.169 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	194.94552 ft	543.44552 ft	187.83079 psf	486.39808 psf	152.12763 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	189.96731 ft	538.46731 ft	454.98805 psf	1,038.176 psf	297.14911 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	184.98910 ft	533.48910 ft	648.47843 psf	1,551.8405 psf	460.28598 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	180.50000 ft	529.00000 ft	600.2146 psf	1,928.8704 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 7	178.25000 ft	526.75000 ft	494.29583 psf	2,531.8755 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey

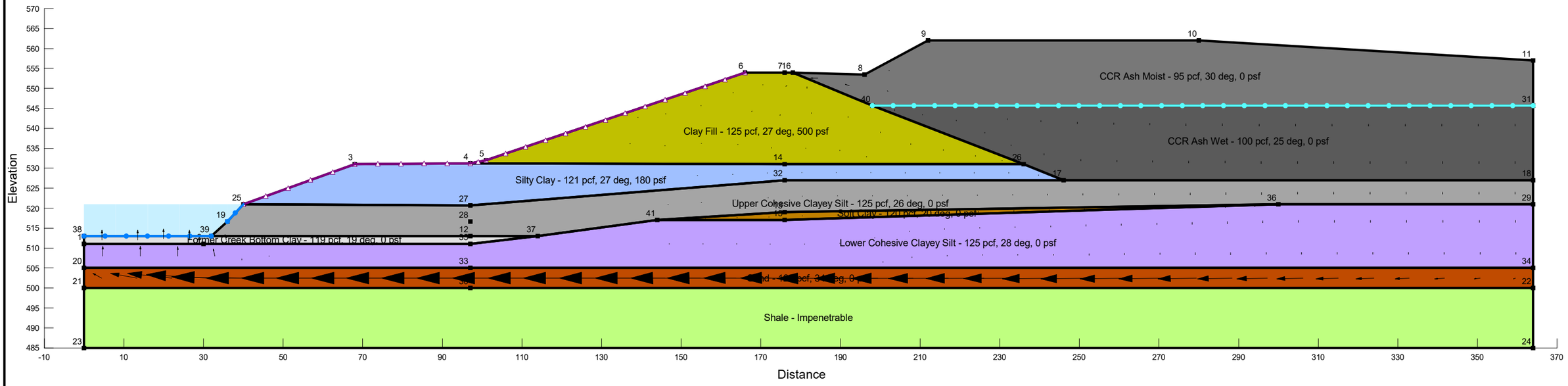
								Silt - 125 pcf, 0 deg, 690 psf
Column 8	177.00000 ft	525.50000 ft	447.24351 psf	2,657.4723 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 9	173.06667 ft	521.56667 ft	330.35339 psf	3,031.6183 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 10	168.06667 ft	518.45128 ft	299.03991 psf	4,257.6853 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 11	163.25000 ft	518.11058 ft	317.50711 psf	4,218.036 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 12	157.75000 ft	517.79327 ft	334.83922 psf	4,035.282 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 13	152.25000 ft	517.47596 ft	352.68909 psf	3,854.4335 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 14	146.75000 ft	517.15865 ft	371.30775 psf	3,675.1955 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 15	140.92857 ft	516.82280 ft	396.23608 psf	3,526.9686 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	134.78571 ft	516.46841 ft	423.95418 psf	3,332.8267 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	128.64286 ft	516.11401 ft	448.78788 psf	3,137.2276 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf
Column 18	122.50000 ft	515.75962 ft	471.2719 psf	2,939.5914 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	116.35714 ft	515.40522 ft	492.56628 psf	2,739.3749 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	110.21429 ft	515.05082 ft	510.75584 psf	2,536.0838 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	104.07143 ft	514.69643 ft	528.14263 psf	2,329.2837 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	99.00000 ft	514.40385 ft	544.50478 psf	2,189.6802 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	94.20833 ft	514.12740 ft	560.20076 psf	2,171.5668 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	88.62500 ft	513.80529 ft	579.08646 psf	2,203.9317 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	83.04167 ft	513.48317 ft	598.70225 psf	2,233.6755 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf
Column 26	77.45833 ft	513.16106 ft	618.54183 psf	2,260.9889 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 27	71.33333 ft	512.80769 ft	640.3607 psf	2,259.6756 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	65.20000 ft	512.45385 ft	662.66323 psf	2,179.7883 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	59.60000 ft	512.13077 ft	683.04528 psf	1,978.0018 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	54.00000 ft	511.80769 ft	702.06392 psf	1,774.4236 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	48.40000 ft	511.48462 ft	722.46844 psf	1,568.9873 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	42.80000 ft	511.16154 ft	741.825 psf	1,361.6769 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	38.00000 ft	511.82843 ft	689.73315 psf	1,149.6855 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 34	35.58579 ft	512.82843 ft	574.27874 psf	854.69748 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 19 deg, 0 psf
Column 35	34.07626 ft	513.45369 ft	496.2302 psf	813.93237 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Appendix H-5:
Slope Stability Analysis for Stockpile



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Steady-State Seepage	
CWLP Long Term F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Steady-State Seepage

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 483
Date: 10/23/2026
Time: 11:26:07 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 11:26:14 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Steady-State Seepage

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d
- Duration: 0 d
- Ending Time: 0 d

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Lean Clay Fill
K-Function: Lean Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Shale - Impenetrable

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1e-11 ft/sec
Ky'/Kx' Ratio: 5
Rotation: 0 °
Volumetric Water Content: 0.12
Compressibility: 0 /psf

Sand - 125 pcf, 34 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 0.00082 ft/sec
Ky'/Kx' Ratio: 1
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay
K-Function: Silty Clay
Ky'/Kx' Ratio: 1.3
Rotation: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2e-07 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.25
Compressibility: 0 /psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: CCR Ash Moist
K-Function: CCR Ash Moist
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0.3
Compressibility: 0 /psf

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.7e-08 ft/sec
Ky'/Kx' Ratio: 1.2
Rotation: 0 °
Volumetric Water Content: 0.29
Compressibility: 0 /psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Clayey Silt
K-Function: Clayey Silt
Ky'/Kx' Ratio: 1.5
Rotation: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 1.12e-08 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 25
Compressibility: 0 /psf

Boundary Conditions

Drainage

Category: Hydraulic
Kind: Water Rate 0 ft^3/sec
Review: Yes

Impoundment Head

Category: Hydraulic
Kind: Water Total Head 545.7 ft
Review: No

Sugar Creek Head

Category: Hydraulic
Kind: Water Total Head 521 ft
Review: No

Water K Functions

Lean Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2e-09)
Data Point: (0.20885434, 2e-09)
Data Point: (0.38282598, 2e-09)
Data Point: (0.70171264, 2e-09)
Data Point: (1.2862257, 2e-09)
Data Point: (2.357627, 2e-09)
Data Point: (4.3214847, 2e-09)
Data Point: (7.9211981, 2e-09)
Data Point: (14.519403, 2e-09)
Data Point: (26.613786, 2e-09)
Data Point: (48.782557, 2e-09)
Data Point: (89.417486, 2e-09)
Data Point: (163.90053, 2e-09)
Data Point: (300.42651, 2e-09)
Data Point: (550.67599, 2.0000001e-09)
Data Point: (1,009.3785, 2.000003e-09)
Data Point: (1,850.1713, 2.0000143e-09)
Data Point: (3,391.3282, 1.9998708e-09)
Data Point: (6,216.2392, 1.9982736e-09)
Data Point: (11,394.247, 1.9993577e-09)
Data Point: (20,885.434, 2.1163694e-09)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Lean Clay Fill
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.38282598, 2.5574235e-05)
Data Point: (0.70171264, 2.5547878e-05)
Data Point: (1.2862257, 2.5494921e-05)
Data Point: (2.357627, 2.5389554e-05)
Data Point: (4.3214847, 2.5179451e-05)
Data Point: (7.9211981, 2.4765444e-05)

Data Point: (14.519403, 2.3968761e-05)
Data Point: (26.613786, 2.2472385e-05)
Data Point: (48.782557, 1.983058e-05)
Data Point: (89.417486, 1.5576575e-05)
Data Point: (163.90053, 9.846373e-06)
Data Point: (300.42651, 4.2480427e-06)
Data Point: (550.67599, 1.0700211e-06)
Data Point: (1,009.3785, 1.6220707e-07)
Data Point: (1,850.1713, 1.8952377e-08)
Data Point: (3,391.3282, 2.2062546e-09)
Data Point: (6,216.2392, 2.8237788e-10)
Data Point: (11,394.247, 3.7062315e-11)
Data Point: (20,885.434, 3.1015424e-12)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: CCR Ash Moist
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 8e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 8e-10)
Data Point: (0.20885434, 7.9966849e-10)
Data Point: (0.38282598, 7.9932777e-10)
Data Point: (0.70171264, 7.9873121e-10)
Data Point: (1.2862257, 7.9761579e-10)
Data Point: (2.357627, 7.9552046e-10)
Data Point: (4.3214847, 7.9152905e-10)
Data Point: (7.9211981, 7.8392824e-10)
Data Point: (14.519403, 7.6960293e-10)
Data Point: (26.613786, 7.428421e-10)
Data Point: (48.782557, 6.9460105e-10)
Data Point: (89.417486, 6.1170097e-10)
Data Point: (163.90053, 4.8145482e-10)
Data Point: (300.42651, 3.0878277e-10)
Data Point: (550.67599, 1.3943917e-10)
Data Point: (1,009.3785, 3.8363853e-11)
Data Point: (1,850.1713, 6.5720641e-12)
Data Point: (3,391.3282, 8.6857975e-13)
Data Point: (6,216.2392, 1.1129221e-13)
Data Point: (11,394.247, 1.415415e-14)
Data Point: (20,885.434, 1.1527289e-15)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay
Saturated Kx: 5.61e-10 ft/sec
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 7e-10 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 7e-10)
Data Point: (0.20885434, 6.99674e-10)
Data Point: (0.38282598, 6.9929548e-10)
Data Point: (0.70171264, 6.9857479e-10)
Data Point: (1.2862257, 6.9712676e-10)
Data Point: (2.357627, 6.9424562e-10)
Data Point: (4.3214847, 6.8850058e-10)
Data Point: (7.9211981, 6.7718006e-10)
Data Point: (14.519403, 6.5539575e-10)
Data Point: (26.613786, 6.1447924e-10)
Data Point: (48.782557, 5.4224242e-10)
Data Point: (89.417486, 4.2592199e-10)
Data Point: (163.90053, 2.6923677e-10)
Data Point: (300.42651, 1.1615742e-10)
Data Point: (550.67599, 2.9258388e-11)
Data Point: (1,009.3785, 4.4353493e-12)
Data Point: (1,850.1713, 5.1822895e-13)
Data Point: (3,391.3282, 6.0327252e-14)
Data Point: (6,216.2392, 7.7212665e-15)
Data Point: (11,394.247, 1.0134225e-15)
Data Point: (20,885.434, 8.480791e-17)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Clayey Silt
Saturated Kx: 8.76e-09 ft/sec
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Lean Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.25761403
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.25761403
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.258)
Data Point: (0.20885434, 0.25761403)
Data Point: (0.38282598, 0.25761403)

Data Point: (0.70171264, 0.25761403)
Data Point: (1.2862257, 0.25761403)
Data Point: (2.357627, 0.25761403)
Data Point: (4.3214847, 0.25761403)
Data Point: (7.9211981, 0.25761403)
Data Point: (14.519403, 0.25761403)
Data Point: (26.613786, 0.25761403)
Data Point: (48.782557, 0.25761403)
Data Point: (89.417486, 0.25761403)
Data Point: (163.90053, 0.25761403)
Data Point: (300.42651, 0.25761403)
Data Point: (550.67599, 0.25761403)
Data Point: (1,009.3785, 0.25761403)
Data Point: (1,850.1713, 0.25761403)
Data Point: (3,391.3282, 0.25761403)
Data Point: (6,216.2392, 0.25761403)
Data Point: (11,394.247, 0.25761403)
Data Point: (20,885.434, 0.25761403)

Estimation Properties
Vol. WC Estimation Method: Grain Size Function
Saturated Water Content: 0.258
Sample Material: Clay
Liquid Limit: 63 %
Diameter at 10% passing: 0.0001
Diameter at 60% passing: 0.0123
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)

Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure

Compressibility: 0 /psf
Saturated Water Content: 0.26000001
Curve Fit to Data: 100 %
Segment Curvature: 100 %

Porosity: 0.26000001
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999956)
Data Point: (0.38282598, 0.25999897)
Data Point: (0.70171264, 0.25999751)
Data Point: (1.2862257, 0.25999388)
Data Point: (2.357627, 0.25998468)
Data Point: (4.3214847, 0.25996118)
Data Point: (7.9211981, 0.25990074)
Data Point: (14.519403, 0.25974452)
Data Point: (26.613786, 0.25934005)
Data Point: (48.782557, 0.25829509)
Data Point: (89.417486, 0.25562419)
Data Point: (163.90053, 0.24900338)
Data Point: (300.42651, 0.23379671)
Data Point: (550.67599, 0.20421911)
Data Point: (1,009.3785, 0.16121083)
Data Point: (1,850.1713, 0.11777666)
Data Point: (3,391.3282, 0.085106358)
Data Point: (6,216.2392, 0.063572028)
Data Point: (11,394.247, 0.049416751)
Data Point: (20,885.434, 0.039576854)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.26
Sample Material: Silty Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Clayey Silt

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.26000005
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.26000005
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.26)
Data Point: (0.20885434, 0.25999914)
Data Point: (0.38282598, 0.25999782)
Data Point: (0.70171264, 0.25999442)
Data Point: (1.2862257, 0.25998552)
Data Point: (2.357627, 0.25996214)
Data Point: (4.3214847, 0.25990038)
Data Point: (7.9211981, 0.25973694)
Data Point: (14.519403, 0.25930416)
Data Point: (26.613786, 0.25816211)
Data Point: (48.782557, 0.25518411)
Data Point: (89.417486, 0.24766912)
Data Point: (163.90053, 0.23019519)
Data Point: (300.42651, 0.19625882)
Data Point: (550.67599, 0.14821398)
Data Point: (1,009.3785, 0.10226739)
Data Point: (1,850.1713, 0.069975374)
Data Point: (3,391.3282, 0.050016484)
Data Point: (6,216.2392, 0.03761922)
Data Point: (11,394.247, 0.029447626)
Data Point: (20,885.434, 0.023658736)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.26
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Lines

	Start Point	End Point	Hydraulic Boundary	Length	Angle
Line 1	4	5	Drainage	4.0792 ft	11.3 °
Line 2	5	6	Drainage	68.622 ft	18.7 °
Line 3	6	7		10 ft	0 °

Line 4	8	9		18.118 ft	28 °
Line 5	9	10		68 ft	0 °
Line 6	18	17		118 ft	0 °
Line 7	21	23		15 ft	90 °
Line 8	23	24		364 ft	0 °
Line 9	24	22		15 ft	90 °
Line 10	14	4		79 ft	-0.145 °
Line 11	27	25		57.001 ft	-0.302 °
Line 12	22	30		267 ft	0 °
Line 13	30	21		97 ft	0 °
Line 14	14	26		60 ft	0 °
Line 15	26	17		10.77 ft	-21.8 °
Line 16	4	3	Drainage	29.001 ft	0.395 °
Line 17	3	25	Drainage	29.732 ft	19.7 °
Line 18	8	16		18.007 ft	-1.59 °
Line 19	16	7		2 ft	0 °
Line 20	31	11		11.3 ft	90 °
Line 21	18	31		18.7 ft	90 °
Line 22	2	1		30 ft	0 °
Line 23	20	33		97 ft	0 °
Line 24	33	34		267 ft	0 °
Line 25	34	22		5 ft	90 °
Line 26	21	20		5 ft	90 °
Line 27	27	32		79.251 ft	4.56 °
Line 28	32	17		70 ft	0 °
Line 29	35	2		67 ft	0 °
Line 30	1	38		2 ft	90 °
Line 31	38	39	Sugar Creek Head	32 ft	0 °
Line 32	39	12		65 ft	0 °
Line 33	13	36		124.02 ft	0.924 °
Line 34	35	37		17.117 ft	6.71 °
Line 35	34	29		16 ft	90 °
Line 36	1	20		6 ft	90 °
Line 37	11	10		84.149 ft	-3.41 °
Line 38	26	40		40.744 ft	-21.1 °
Line 39	40	16		21.654 ft	-22.5 °
Line 40	31	40	Impoundment Head	166 ft	0 °
Line 41	29	36		64 ft	0 °
Line 42	39	19		5.4489 ft	42.8 °
Line 43	19	25	Sugar Creek Head	5.8728 ft	47.1 °
Line 44	18	29		6 ft	90 °
Line 45	15	36		124.06 ft	1.85 °
Line 46	37	12		17 ft	0 °
Line 47	13	41		32.062 ft	3.58 °
Line 48	41	37		30.265 ft	7.59 °
Line 49	15	41		32 ft	0 °

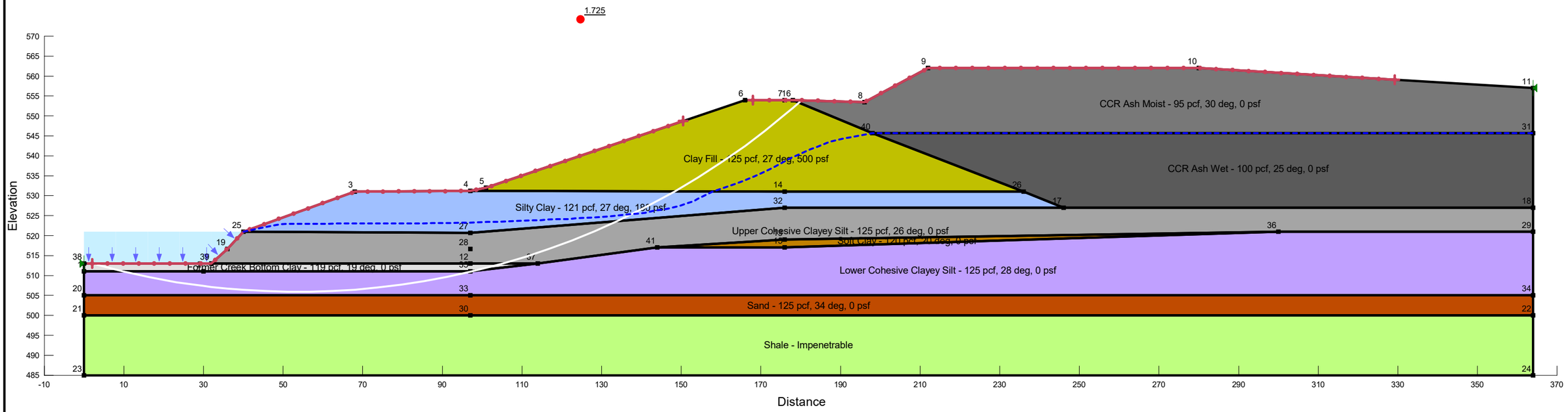
Regions

	Material	Points	Area

Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Mesh Properties

Global Element Size: 9 ft



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability
CWLP Long Term F-F' Stockpile rev2.gsz
10/23/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 483
Date: 10/23/2026
Time: 11:26:07 AM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 11:26:24 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (2, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (168, 554) ft
Right-Zone Right Coordinate: (329.2128, 559.07067) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 17711 of 18491 converged

Current Slip Surface

Slip Surface: 37
Factor of Safety: 1.725
Volume: 2,754.7591 ft³
Weight: 339,859.33 lbf
Resisting Moment: 27,519,321 lbf·ft
Activating Moment: 15,952,570 lbf·ft
Resisting Force: 133,005.22 lbf
Activating Force: 77,109.05 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (180.25597, 553.93733) ft
Entry: (2, 513) ft
Radius: 191.07456 ft
Center: (53.576373, 696.98197) ft

Slip Columns

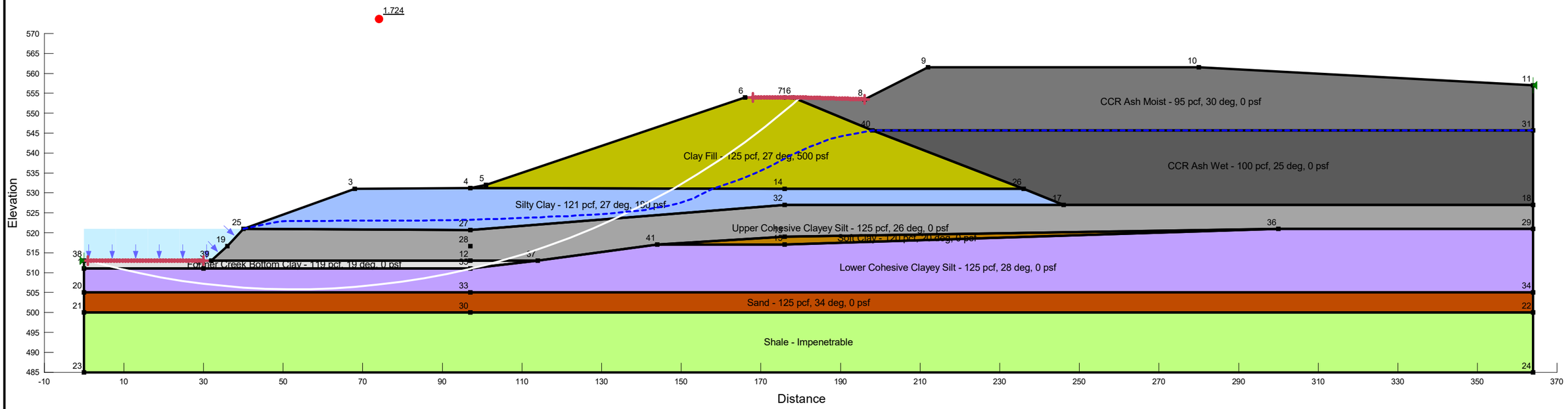
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	179.91905 ft	553.64037 ft	-499.99056 psf	20.64818 psf	11.921232 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	178.79107 ft	552.65709 ft	-471.19969 psf	-75.327264 psf	-38.381158 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	177.00000 ft	551.12457 ft	-517.06822 psf	96.522083 psf	49.180458 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	173.50000 ft	548.26244 ft	-556.72809 psf	395.97807 psf	201.7609 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	168.50000 ft	544.36397 ft	-502.08766 psf	805.30768 psf	410.32476 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	163.05892 ft	540.42470 ft	-427.80865 psf	1,122.1857 psf	571.78216 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	157.17675 ft	536.46968 ft	-317.8205 psf	1,345.3996 psf	685.51535 psf	500 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 500 psf
Column 8	151.29458 ft	532.82069 ft	-199.18125 psf	1,542.012 psf	785.69435 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	144.76095 ft	529.11849 ft	-101.9344 psf	1,783.4971 psf	908.73716 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 10	137.57585 ft	525.40815 ft	-1.0231368 psf	1,933.9422 psf	985.39279 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 11	131.10024 ft	522.36929 ft	118.30788 psf	2,084.9144 psf	959.17806 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	125.33413 ft	519.92087 ft	238.10645 psf	2,168.3511 psf	941.44322 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	119.56802 ft	517.69128 ft	357.54308 psf	2,230.7704 psf	913.63399 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	113.80191 ft	515.67245 ft	471.38512 psf	2,272.0071 psf	878.222 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	108.03580 ft	513.85739 ft	575.7223 psf	2,291.776 psf	836.97532 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	103.07637 ft	512.44304 ft	661.04145 psf	2,292.2478 psf	561.66941 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 17	99.39401 ft	511.48940 ft	720.44866 psf	2,298.9791 psf	543.5316 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 18	97.39401 ft	510.99988 ft	750.96117 psf	2,320.4986 psf	834.53787 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 19	94.10000 ft	510.27761 ft	796.01113 psf	2,417.9517 psf	862.40112 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 20	88.30000 ft	509.11218 ft	868.70274 psf	2,597.42 psf	919.17526 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 21	82.50000 ft	508.13202 ft	929.83238 psf	2,758.6371 psf	972.39271 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 22	76.70000 ft	507.33427 ft	979.5814 psf	2,899.8101 psf	1,021.0037 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 23	70.90000 ft	506.71663 ft	1,018.0917 psf	3,018.8197 psf	1,063.8059 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 24	65.20000 ft	506.28192 ft	1,045.1587 psf	2,990.0184 psf	1,034.1002 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Column 25	59.60000 ft	506.02293 ft	1,061.2856 psf	2,807.6527 psf	928.55987 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	54.00000 ft	505.92840 ft	1,067.1985 psf	2,593.735 psf	811.67387 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 27	48.40000 ft	505.99808 ft	1,062.5347 psf	2,348.1443 psf	683.57072 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 28	42.80000 ft	506.23215 ft	1,047.3617 psf	2,071.3063 psf	544.44096 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 29	38.00000 ft	506.55393 ft	1,027.0436 psf	1,781.9031 psf	401.3659 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 30	34.00000 ft	506.92353 ft	1,002.1694 psf	1,489.0126 psf	258.85912 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 31	31.00000 ft	507.24852 ft	979.20968 psf	1,265.5459 psf	152.24769 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 32	26.62606 ft	507.84828 ft	937.43077 psf	1,185.1351 psf	131.70675 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Column 33	19.87818 ft	508.93365 ft	865.24968 psf	1,036.2497 psf	90.922347 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 34	13.13029 ft	510.26913 ft	777.0797 psf	851.54932 psf	39.596202 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 35	5.87818 ft	512.00000 ft	614.15536 psf	624.39561 psf	3.5260027 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability
CWLP Long Term F-F' Stockpile rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 498
Date: 10/28/2026
Time: 01:36:57 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 01:37:06 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (30, 513) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (168, 554) ft
Right-Zone Right Coordinate: (196, 553.5) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)

Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	561.5 ft
Point 10	280 ft	561.5 ft
Point 11	364 ft	557 ft

Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,463.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²

Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 15054 of 18491 converged

Current Slip Surface

Slip Surface: 191
Factor of Safety: 1.724
Volume: 2,748.4675 ft³
Weight: 339,082.71 lbf
Resisting Moment: 27,482,617 lbf·ft
Activating Moment: 15,941,444 lbf·ft
Resisting Force: 132,431.5 lbf
Activating Force: 76,825.238 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (179.90222, 553.94716) ft
Entry: (1, 513) ft
Radius: 191.60787 ft
Center: (52.922773, 697.43861) ft

Slip Columns

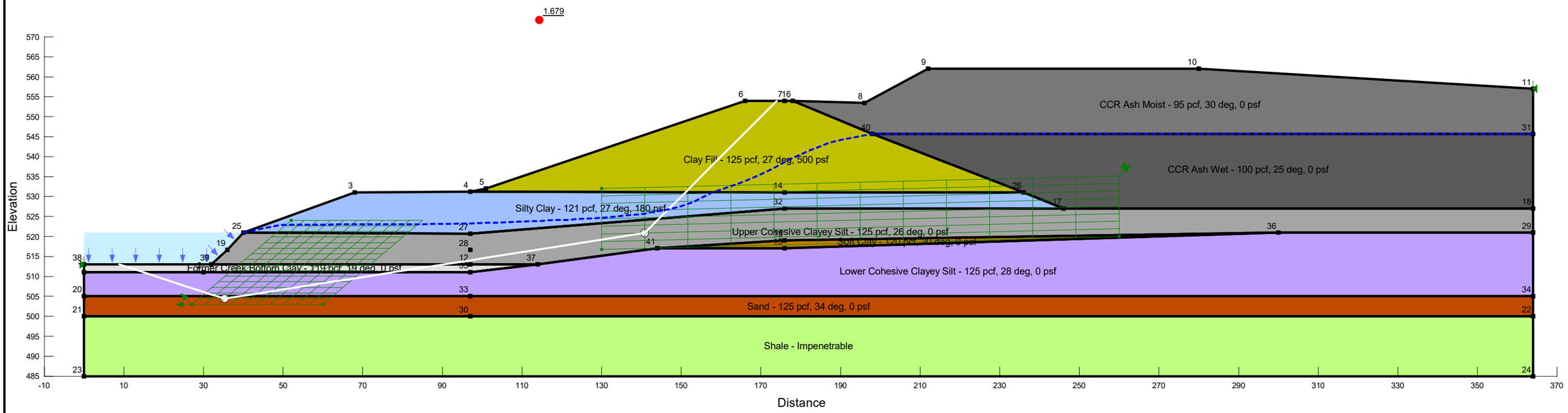
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	179.61813 ft	553.69677 ft	-503.65991 psf	17.406795 psf	10.049818 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	178.66702 ft	552.86622 ft	-479.33797 psf	-95.271781 psf	-48.543397 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	177.00000 ft	551.43623 ft	-529.74835 psf	64.023587 psf	32.621647 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	173.50000 ft	548.56162 ft	-572.58124 psf	364.74622 psf	185.84748 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	168.50000 ft	544.64576 ft	-517.6775 psf	775.81147 psf	395.29569 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	162.99623 ft	540.64594 ft	-441.9571 psf	1,096.8134 psf	558.85435 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	156.98868 ft	536.59377 ft	-327.95192 psf	1,325.9765 psf	675.61876 psf	500 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 500 psf
Column 8	150.98113 ft	532.86064 ft	-206.28077 psf	1,527.2983 psf	778.19736 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	144.36694 ft	529.10960 ft	-105.3929 psf	1,771.5649 psf	902.65739 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 10	137.14611 ft	525.38093 ft	-1.7728893 psf	1,922.5532 psf	979.58979 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 11	130.66668 ft	522.33976 ft	118.98602 psf	2,073.6713 psf	953.36372 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	124.92865 ft	519.90229 ft	238.60315 psf	2,156.5471 psf	935.44376 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	119.19062 ft	517.68100 ft	357.97668 psf	2,218.5631 psf	907.46864 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	113.45259 ft	515.66795 ft	471.477 psf	2,259.5502 psf	872.10156 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	107.71456 ft	513.85628 ft	575.73295 psf	2,279.2641 psf	830.86767 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	102.92277 ft	512.48021 ft	658.72374 psf	2,281.0925 psf	558.62635 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 17	99.12816 ft	511.49529 ft	720.07933 psf	2,291.3604 psf	541.03547 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 18	97.12816 ft	510.99977 ft	750.96418 psf	2,312.4597 psf	830.26187 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 19	94.10000 ft	510.33117 ft	792.66753 psf	2,407.7513 psf	858.75529 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 20	88.30000 ft	509.14809 ft	866.46047 psf	2,588.4665 psf	915.60687 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 21	82.50000 ft	508.15008 ft	928.70461 psf	2,751.1096 psf	968.98992 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 22	76.70000 ft	507.33423 ft	979.58393 psf	2,893.9591 psf	1,017.8913 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 23	70.90000 ft	506.69818 ft	1,019.2429 psf	3,014.9626 psf	1,061.143 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 24	65.20000 ft	506.24506 ft	1,047.4597 psf	2,988.7087 psf	1,032.1804 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Column 25	59.60000 ft	505.96762 ft	1,064.7388 psf	2,809.4216 psf	927.66427 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	54.00000 ft	505.85423 ft	1,071.8241 psf	2,598.8732 psf	811.94641 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 27	48.40000 ft	505.90460 ft	1,068.3847 psf	2,356.8814 psf	685.10585 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 28	42.80000 ft	506.11887 ft	1,054.4991 psf	2,083.7914 psf	547.28446 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 29	38.00000 ft	506.42327 ft	1,035.2762 psf	1,797.9733 psf	405.53325 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 30	34.00000 ft	506.77801 ft	1,011.509 psf	1,508.4344 psf	264.21993 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 31	31.00000 ft	507.09168 ft	989.43474 psf	1,286.2533 psf	157.82125 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 32	27.33953 ft	507.56532 ft	956.11149 psf	1,223.2248 psf	142.02666 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Column 33	22.01858 ft	508.35863 ft	903.40673 psf	1,115.1488 psf	112.58527 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 34	16.69763 ft	509.30575 ft	840.63239 psf	984.4756 psf	76.482788 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 35	11.37669 ft	510.40901 ft	767.86167 psf	831.91683 psf	34.058736 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 36	4.85811 ft	512.00000 ft	614.15391 psf	624.32405 psf	3.5018591 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability	
CWLP Long Term F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 487
Date: 10/23/2026
Time: 12:50:36 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 12:56:10 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (52, 524) ft
- Lower Left: (27, 503) ft
- Lower Right: (60, 503) ft
- X Increments: 10
- Y Increments: 15
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (130, 532) ft
- Lower Left: (130, 516.8) ft
- Lower Right: (260, 520) ft
- X Increments: 12
- Y Increments: 8
- Angle Increments: 5

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft

Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²

Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 658366 of 741312 converged

Current Slip Surface

Slip Surface: 57,025
Factor of Safety: 1.679
Volume: 2,613.6961 ft³
Weight: 322,371.64 lbf
Resisting Moment: 7,798,509.6 lbf·ft
Activating Moment: 4,645,832.1 lbf·ft
Resisting Force: 120,051.91 lbf
Activating Force: 71,492.559 lbf
Slip Rank: 1 of 741,312 slip surfaces
Exit: (173.96667, 554) ft
Entry: (8.7985882, 513) ft
Radius: 77.752996 ft
Center: (83.749494, 564.25) ft

Slip Columns

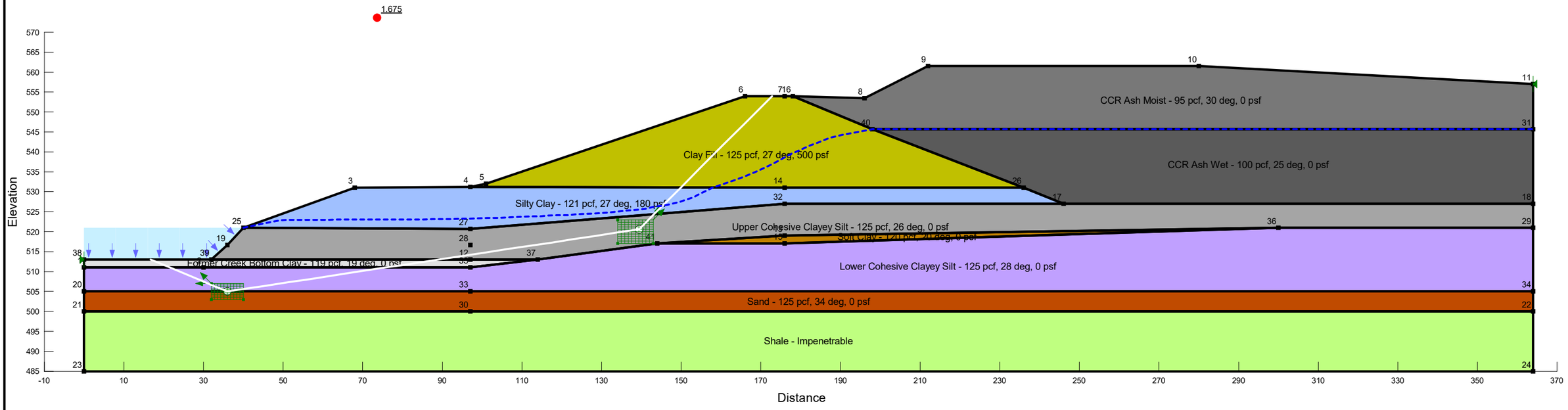
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	169.98333 ft	550.01667 ft	-778.91595 psf	159.46621 psf	81.252094 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 2	163.50498 ft	543.53831 ft	-592.91 psf	687.20811 psf	350.15002 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	158.51494 ft	538.54827 ft	-414.41788 psf	977.67061 psf	498.14806 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	153.52490 ft	533.55824 ft	-208.06167 psf	1,256.2097 psf	640.0708 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	147.74030 ft	527.77363 ft	-25.967563 psf	1,670.1149 psf	850.96605 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 6	142.64202 ft	522.67536 ft	134.64186 psf	2,016.0567 psf	917.62735 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 7	137.98810 ft	520.42286 ft	225.79509 psf	2,828.2684 psf	1,269.3111 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 8	132.29762 ft	519.53524 ft	264.06687 psf	2,716.0055 psf	1,195.8904 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 9	126.60714 ft	518.64761 ft	307.88951 psf	2,601.446 psf	1,118.6423 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	120.91667 ft	517.75999 ft	354.14112 psf	2,484.6267 psf	1,039.1072 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	115.22619 ft	516.87237 ft	402.50712 psf	2,365.6806 psf	957.5037 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	109.53571 ft	515.98475 ft	450.87867 psf	2,244.9154 psf	875.01019 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	103.84524 ft	515.09713 ft	500.37527 psf	2,122.6216 psf	791.22241 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	99.00000 ft	514.34135 ft	544.96795 psf	2,051.6285 psf	734.84746 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 15	93.70034 ft	513.51469 ft	594.62244 psf	2,106.1056 psf	737.19961 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	87.19521 ft	512.50000 ft	657.23459 psf	2,210.001 psf	534.66034 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 17	80.78428 ft	511.50000 ft	719.56914 psf	2,328.7229 psf	554.07606 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 18	75.18411 ft	510.62647 ft	774.0391 psf	2,459.1673 psf	895.99855 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 19	70.39470 ft	509.87940 ft	820.6453 psf	2,550.7732 psf	919.92532 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 20	65.20000 ft	509.06911 ft	871.14021 psf	2,532.7595 psf	883.49863 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 21	59.60000 ft	508.19560 ft	925.59679 psf	2,406.0795 psf	787.1866 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 22	54.00000 ft	507.32209 ft	980.25707 psf	2,280.6149 psf	691.41251 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28

								deg, 0 psf
Column 23	48.40000 ft	506.44858 ft	1,034.3513 psf	2,156.8194 psf	596.82691 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 24	42.80000 ft	505.57508 ft	1,088.7615 psf	2,035.0242 psf	503.13683 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 25	39.55661 ft	505.06916 ft	1,120.6072 psf	1,960.328 psf	446.48744 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	37.55661 ft	504.75719 ft	1,140.1048 psf	1,891.731 psf	506.97824 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 27	35.63333 ft	504.45719 ft	1,158.8163 psf	1,818.6867 psf	445.08823 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 28	34.34336 ft	504.70000 ft	1,143.6471 psf	2,016.8032 psf	588.95123 psf	0 psf	0 psf	Sand - 125 pcf, 34 deg, 0 psf
Column 29	32.71003 ft	505.23070 ft	1,110.1731 psf	1,773.4109 psf	352.64977 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 30	31.00000 ft	505.78632 ft	1,074.1716 psf	1,560.024 psf	258.33233 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 31	27.49233 ft	506.92604 ft	998.19124 psf	1,375.72 psf	200.73562 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Column 32	22.47698 ft	508.55562 ft	890.45549 psf	1,120.1457 psf	122.12846 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 33	17.46163 ft	510.18521 ft	782.58832 psf	875.05112 psf	49.163343 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 34	11.87627 ft	512.00000 ft	614.14646 psf	626.36992 psf	4.2088766 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability	
CWLP Long Term F-F' Stockpile rev2 Optimized2.gsz	
10/28/2026	1:300

Block Slope Stability

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File Information

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Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 498
Date: 10/28/2026
Time: 01:36:57 PM
Tool Version: 23.1.2.11
File Name: CWLP Long Term F-F' Stockpile rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 01:37:18 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 28 °
Phi-B: 0 °

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °

Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 119 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 19 °
Phi-B: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 120 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 20 °
Phi-B: 0 °

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (32, 507) ft
- Lower Left: (32, 503) ft
- Lower Right: (40, 503) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (134, 523) ft
- Lower Left: (134, 517) ft
- Lower Right: (143, 517) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %

Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft

Point 9	212 ft	561.5 ft
Point 10	280 ft	561.5 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,463.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²

Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 87846 of 131769 converged

Current Slip Surface

Slip Surface: 65,920
Factor of Safety: 1.675
Volume: 2,509.2148 ft³
Weight: 309,448.23 lbf
Resisting Moment: 7,356,256.9 lbf·ft
Activating Moment: 4,393,556.5 lbf·ft
Resisting Force: 115,546.27 lbf
Activating Force: 68,980.575 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (172.8, 554) ft
Entry: (16.686292, 513) ft
Radius: 74.837119 ft
Center: (86.667301, 564.25) ft

Slip Columns

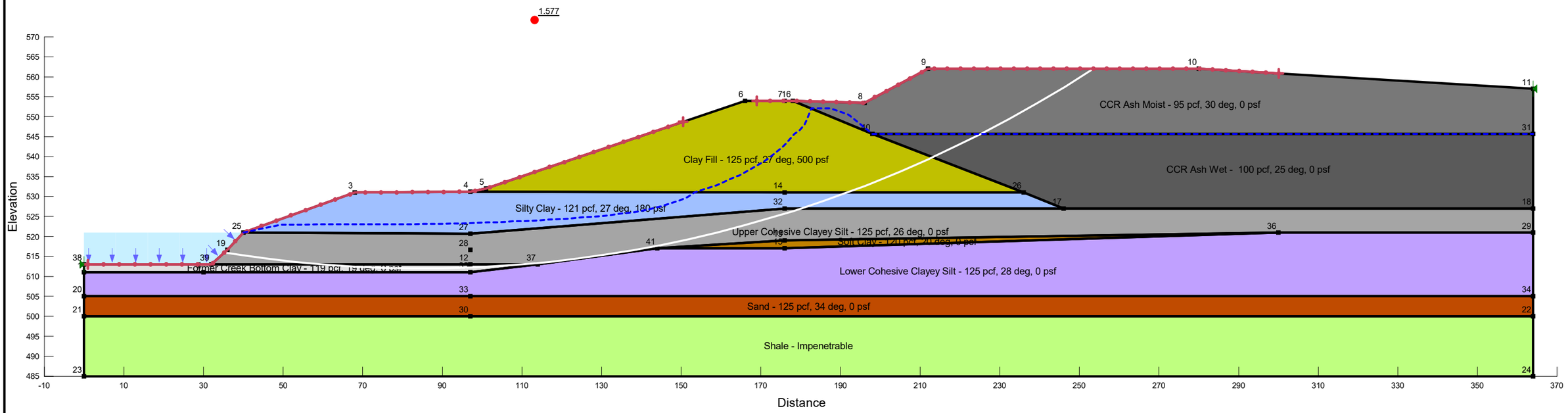
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	169.40000 ft	550.60000 ft	-834.07184 psf	103.85803 psf	52.918309 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 2	163.31103 ft	544.51103 ft	-654.88853 psf	591.48418 psf	301.37624 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	157.93308 ft	539.13308 ft	-457.5186 psf	905.64664 psf	461.45001 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	152.55513 ft	533.75513 ft	-234.4221 psf	1,204.6719 psf	613.81101 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	146.52455 ft	527.72455 ft	-34.260079 psf	1,626.2273 psf	828.60422 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 6	141.29147 ft	522.49147 ft	137.16318 psf	1,972.77 psf	895.28525 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 7	136.65714 ft	520.18618 ft	235.79655 psf	2,809.7802 psf	1,255.4157 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 8	131.17143 ft	519.35855 ft	272.67481 psf	2,699.6821 psf	1,183.7306 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 9	125.68571 ft	518.53092 ft	313.65384 psf	2,587.0419 psf	1,108.8055 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	120.20000 ft	517.70329 ft	357.09045 psf	2,471.8967 psf	1,031.4599 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	114.71429 ft	516.87566 ft	402.09325 psf	2,354.4172 psf	952.21201 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	109.22857 ft	516.04802 ft	446.97335 psf	2,234.9347 psf	872.04704 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 13	103.74286 ft	515.22039 ft	492.94871 psf	2,113.7559 psf	790.52047 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	99.00000 ft	514.50484 ft	535.0586 psf	2,042.1386 psf	735.05204 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 15	95.00641 ft	513.90232 ft	571.08944 psf	2,069.2152 psf	730.68475 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	91.01923 ft	513.30077 ft	607.57864 psf	2,144.3269 psf	749.5222 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	86.81624 ft	512.66667 ft	646.83021 psf	2,200.6123 psf	535.01007 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 18	82.39744 ft	512.00000 ft	688.38623 psf	2,280.4551 psf	548.19328 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 19	77.97863 ft	511.33333 ft	729.93864 psf	2,360.9544 psf	561.60376 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 20	71.88462 ft	510.41393 ft	787.28561 psf	2,498.5673 psf	909.9046 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 21	65.20000 ft	509.40542 ft	850.14385 psf	2,503.7049 psf	879.214 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 22	59.60000 ft	508.56054 ft	902.79972 psf	2,372.2715 psf	781.33199 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28

								deg, 0 psf
Column 23	54.00000 ft	507.71567 ft	955.70009 psf	2,242.2857 psf	684.08968 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 24	48.40000 ft	506.87079 ft	1,007.9558 psf	2,114.25 psf	588.22705 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 25	42.80000 ft	506.02592 ft	1,060.3556 psf	1,988.5138 psf	493.51049 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 26	38.00000 ft	505.30174 ft	1,105.9388 psf	1,853.1692 psf	397.30944 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 27	34.00000 ft	505.82843 ft	1,072.2415 psf	1,783.4087 psf	378.13429 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 28	31.00000 ft	507.07107 ft	990.77782 psf	1,373.2956 psf	203.38832 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 29	27.87868 ft	508.36396 ft	903.58613 psf	1,164.0487 psf	138.49041 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 30	23.63604 ft	510.12132 ft	787.30915 psf	890.73223 psf	54.991026 psf	0 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28

								deg, 0 psf
Column 31	19.10051 ft	512.00000 ft	614.11859 psf	627.39829 psf	4.5725667 psf	0 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability	
CWLP Short Term F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 444
Date: 10/23/2026
Time: 10:43:34 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 10:43:50 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (169, 554) ft
Right-Zone Right Coordinate: (300.11197, 560.80286) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)
    Data Point: (0.20885434, 0.299999)
    Data Point: (0.38282598, 0.29999749)
    Data Point: (0.70171264, 0.29999356)
    Data Point: (1.2862257, 0.2999833)
    Data Point: (2.357627, 0.29995631)

Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)

Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft

Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 16978 of 18491 converged

Current Slip Surface

Slip Surface: 4,348
Factor of Safety: 1.577
Volume: 4,353.711 ft³
Weight: 512,911.85 lbf
Resisting Moment: 45,984,733 lbf·ft
Activating Moment: 29,153,309 lbf·ft
Resisting Force: 141,982.72 lbf
Activating Force: 90,014.314 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (253.5023, 562) ft

Entry: (35.226907, 515.98489) ft
Radius: 309.32028 ft
Center: (84.851023, 821.29864) ft

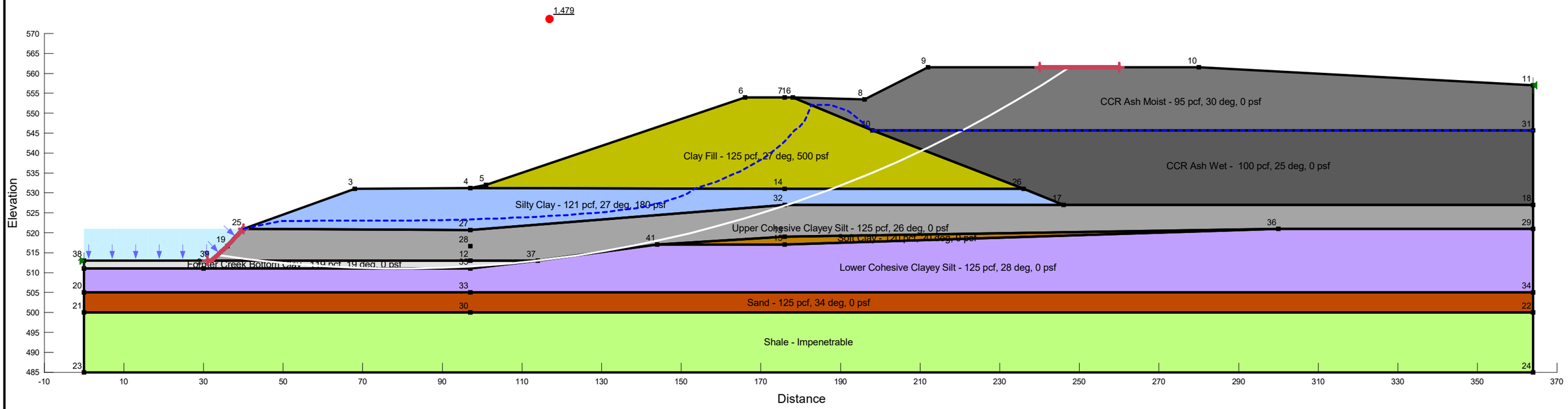
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	249.97635 ft	559.77374 ft	-580.09029 psf	155.71135 psf	89.899989 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	242.92446 ft	555.45094 ft	-492.25818 psf	463.77959 psf	267.76327 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	235.87256 ft	551.38159 ft	-323.41512 psf	763.13409 psf	440.59567 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	228.82066 ft	547.55439 ft	-105.59509 psf	1,060.9201 psf	612.52248 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 5	222.25804 ft	544.19422 ft	94.002744 psf	1,446.9616 psf	362.52423 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 6	216.18472 ft	541.26427 ft	276.91379 psf	1,720.2174 psf	386.73203 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 7	212.57403 ft	539.57985 ft	369.97427 psf	1,630.6076 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	208.50000 ft	537.79310 ft	403.32374 psf	1,759.3468 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	201.50000 ft	534.84136 ft	481.51586 psf	1,922.2196 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 10	197.00000 ft	533.02708 ft	559.79407 psf	2,008.2656 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 11	193.82434 ft	531.81902 ft	607.8958 psf	2,167.4711 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 12	188.75492 ft	529.96793 ft	579.70648 psf	2,551.7369 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 13	182.96741 ft	527.96793 ft	480.13715 psf	2,886.086 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 14	179.03683 ft	526.66855 ft	409.82387 psf	3,151.1937 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	177.00000 ft	526.02502 ft	380.96804 psf	3,248.0606 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	171.00000 ft	524.26280 ft	309.1017 psf	3,472.7553 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	162.49816 ft	521.90446 ft	265.60545 psf	3,637.1853 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	155.49447 ft	520.17474 ft	276.49313 psf	3,583.6692 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	148.49078 ft	518.61693 ft	315.76326 psf	3,511.4096 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	141.48709 ft	517.22841 ft	375.01407 psf	3,419.5333 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	134.48341 ft	516.00685 ft	443.82535 psf	3,307.0912 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 22	127.47972 ft	514.95025 ft	507.2265 psf	3,173.1105 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 23	120.47603 ft	514.05693 ft	562.63948 psf	3,016.6491 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 24	113.47234 ft	513.32544 ft	608.39396 psf	2,836.85 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 25	105.48525 ft	512.70010 ft	645.71269 psf	2,581.9664 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	99.00000 ft	512.30861 ft	670.01813 psf	2,403.0038 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	93.37500 ft	512.11709 ft	681.8653 psf	2,383.0664 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	86.12500 ft	512.00222 ft	688.91278 psf	2,402.1843 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	78.87500 ft	512.05734 ft	685.39376 psf	2,397.8458 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	71.62500 ft	512.28254 ft	671.16087 psf	2,369.6035 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	63.86577 ft	512.71885 ft	644.2402 psf	2,135.8953 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 19 deg, 0 psf
Column 32	56.44296 ft	513.30332 ft	606.22172 psf	1,772.8336 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 33	49.86577 ft	513.98102 ft	560.5877 psf	1,395.5572 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 34	43.28859 ft	514.80135 ft	501.45481 psf	999.77004 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 35	38.00000 ft	515.55377 ft	390.85695 psf	622.53018 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 36	35.61345 ft	515.92256 ft	324.06025 psf	415.2314 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Circular Slope Stability
CWLP Short Term F-F' Stockpile rev2 Optimized2.gsz
10/28/2026 1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 458
Date: 10/28/2026
Time: 01:13:36 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 01:13:52 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (31, 513) ft
Left-Zone Right Coordinate: (40, 521) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (240, 561.5) ft
Right-Zone Right Coordinate: (260, 561.5) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)
    Data Point: (0.20885434, 0.299999)
    Data Point: (0.38282598, 0.29999749)
    Data Point: (0.70171264, 0.29999356)
    Data Point: (1.2862257, 0.2999833)
    Data Point: (2.357627, 0.29995631)

Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)

Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	561.5 ft
Point 10	280 ft	561.5 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft

Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,463.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18491 of 18491 converged

Current Slip Surface

Slip Surface: 4,678
Factor of Safety: 1.479
Volume: 4,237.1604 ft³
Weight: 502,601.55 lbf
Resisting Moment: 42,939,155 lbf·ft
Activating Moment: 29,032,341 lbf·ft
Resisting Force: 133,159.78 lbf
Activating Force: 90,035.729 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (247.5, 561.5) ft

Entry: (33.527234, 514.41269) ft
Radius: 306.37574 ft
Center: (79.020401, 817.39201) ft

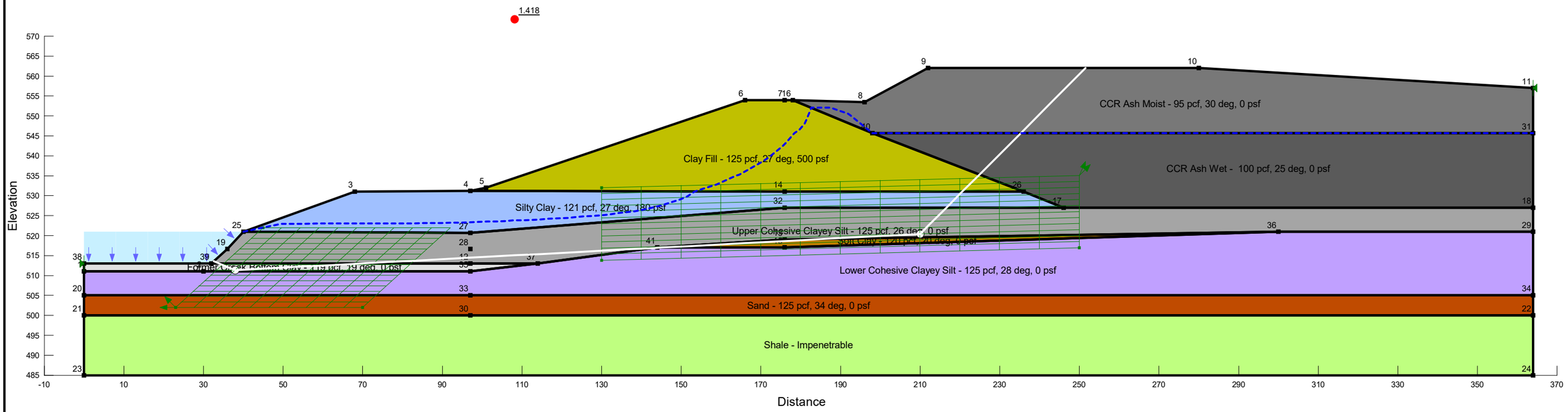
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	244.13960 ft	559.34971 ft	-549.29373 psf	148.75692 psf	85.88485 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	237.41881 ft	555.16953 ft	-462.99283 psf	443.86696 psf	256.26671 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	230.69802 ft	551.22470 ft	-314.18207 psf	731.44115 psf	422.29774 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	223.97722 ft	547.50487 ft	-102.2141 psf	1,017.8193 psf	587.63824 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 5	216.30841 ft	543.54010 ft	134.83836 psf	1,468.4664 psf	357.34457 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 6	211.36708 ft	541.07704 ft	288.60236 psf	1,680.8211 psf	373.04388 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 7	207.55062 ft	539.30249 ft	337.42382 psf	1,474.4391 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	201.18354 ft	536.44680 ft	418.03588 psf	1,656.3072 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	197.00000 ft	534.64524 ft	500.92582 psf	1,760.7725 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 10	191.92921 ft	532.61399 ft	571.61353 psf	2,061.9212 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 11	182.92921 ft	529.22262 ft	514.65034 psf	2,714.4008 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 12	177.34302 ft	527.22262 ft	404.56268 psf	3,037.6781 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf,

								27 deg, 180 psf
Column 13	176.34302 ft	526.88509 ft	388.96099 psf	3,132.6528 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 14	171.00000 ft	525.19623 ft	314.14597 psf	3,345.1009 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 15	162.48484 ft	522.62696 ft	257.57389 psf	3,531.0881 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	155.45452 ft	520.72596 ft	263.56721 psf	3,494.8561 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	148.42419 ft	519.00269 ft	302.69343 psf	3,439.6685 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	141.39387 ft	517.45409 ft	365.53254 psf	3,364.7756 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	134.36355 ft	516.07746 ft	440.60271 psf	3,269.3146 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	127.33322 ft	514.87045 ft	511.56682 psf	3,152.3621 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	119.50808 ft	513.73441 ft	581.28355 psf	2,994.4637 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 22	114.51327 ft	513.07987 ft	622.08138 psf	2,883.2938 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 23	110.62134 ft	512.66741 ft	647.70963 psf	2,771.3037 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 24	104.20711 ft	512.07026 ft	684.90757 psf	2,588.3799 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 25	99.00000 ft	511.67499 ft	709.50962 psf	2,461.5894 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 26	93.37500 ft	511.37425 ft	728.19182 psf	2,455.4158 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 27	86.12500 ft	511.12012 ft	743.95289 psf	2,492.3046 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 28	78.87500 ft	511.03775 ft	749.01158 psf	2,505.8747 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	71.62500 ft	511.12700 ft	743.37866 psf	2,495.5877 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 30	64.03539 ft	511.40869 ft	725.73429 psf	2,289.8075 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	56.10618 ft	511.90023 ft	694.60942 psf	1,885.8722 psf	0 psf	300 psf	0 psf	Former Creek

								Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	48.17696 ft	512.59880 ft	651.75969 psf	1,454.1056 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	42.10618 ft	513.25563 ft	621.94012 psf	1,142.617 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 34	38.00000 ft	513.78149 ft	531.00215 psf	846.9063 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 35	34.76362 ft	514.23220 ft	444.82695 psf	578.51571 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability	
CWLP Short Term F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 444
Date: 10/23/2026
Time: 10:43:34 AM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 10:45:40 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf

Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (45, 522) ft
- Lower Left: (23, 502) ft
- Lower Right: (70, 502) ft
- X Increments: 10
- Y Increments: 15
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (130, 532) ft
- Lower Left: (130, 513.8) ft
- Lower Right: (250, 516.9) ft
- X Increments: 12
- Y Increments: 12
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.30000006
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)

Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft

Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 209590 of 267696 converged

Current Slip Surface

Slip Surface: 119,287

Factor of Safety: 1.418
Volume: 5,160.404 ft³
Weight: 608,464.7 lbf
Resisting Moment: 8,859,251.2 lbf·ft
Activating Moment: 6,247,082.7 lbf·ft
Resisting Force: 121,820.61 lbf
Activating Force: 85,908.364 lbf
Slip Rank: 1 of 267,696 slip surfaces
Exit: (251.58333, 562) ft
Entry: (32.600955, 513.55588) ft
Radius: 98.047887 ft
Center: (134.0544, 574.11103) ft

Slip Columns

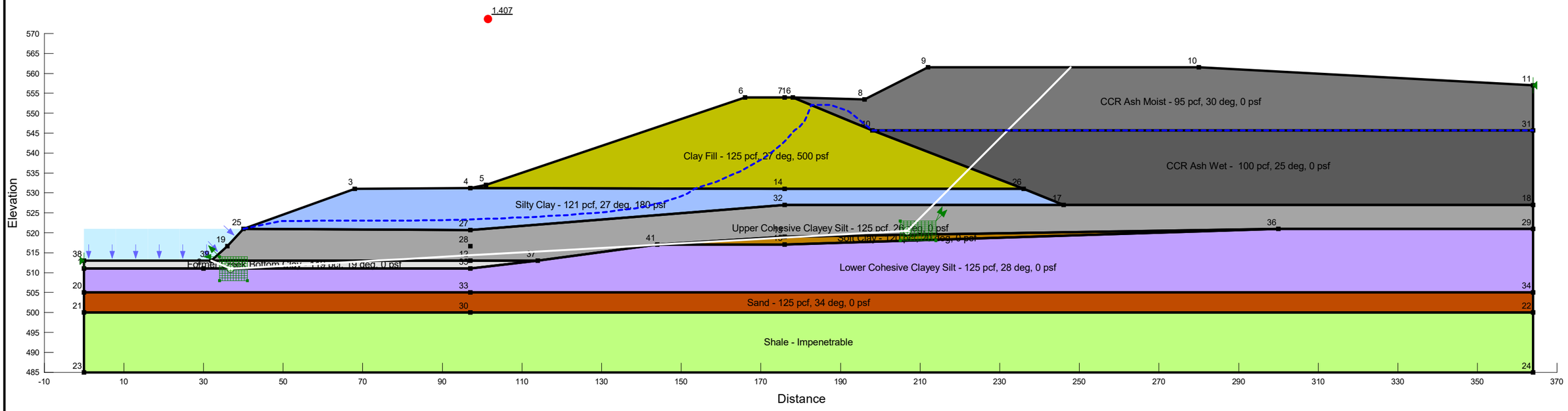
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	247.50833 ft	557.92500 ft	-542.96782 psf	248.37357 psf	143.39855 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	239.35833 ft	549.77500 ft	-232.00055 psf	746.94271 psf	431.24758 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	230.08348 ft	540.50014 ft	324.61376 psf	1,615.907 psf	346.00097 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 4	222.73348 ft	533.15014 ft	698.69819 psf	1,569.184 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	218.58333 ft	529.00000 ft	640.51368 psf	2,354.1083 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 6	214.29167 ft	524.70833 ft	437.42041 psf	3,073.2622 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 7	211.00000 ft	521.41667 ft	303.38691 psf	3,399.6006 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 8	207.00000 ft	520.25827 ft	264.33533 psf	4,220.197 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 9	201.00000 ft	519.94147 ft	261.23625 psf	4,068.0042 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	197.00000 ft	519.73027 ft	260.22632 psf	3,958.7992 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	191.16116 ft	519.42198 ft	258.78176 psf	4,047.9291 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	182.16116 ft	518.94678 ft	270.4325 psf	4,235.909 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 13	177.00000 ft	518.67427 ft	285.65723 psf	4,339.6851 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 14	171.00000 ft	518.35747 ft	302.31429 psf	4,386.4999 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 15	162.54837 ft	517.91123 ft	326.26133 psf	4,307.8531 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 16	155.64511 ft	517.54674 ft	346.69887 psf	4,072.7141 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 17	148.74185 ft	517.18225 ft	367.81637 psf	3,837.5316 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 18	144.64511 ft	516.96594 ft	380.65472 psf	3,781.0256 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 19	143.57705 ft	516.90955 ft	384.11281 psf	3,744.8059 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
Column 20	139.64126 ft	516.70174 ft	401.92185 psf	3,556.9593 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	132.61558 ft	516.33078 ft	430.72312 psf	3,314.7303 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 22	125.58989 ft	515.95983 ft	456.1186 psf	3,070.4006 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 23	118.56421 ft	515.58887 ft	479.2061 psf	2,823.7755 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 24	111.53853 ft	515.21792 ft	499.22077 psf	2,574.6983 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 25	104.51284 ft	514.84696 ft	517.22077 psf	2,323.0537 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 26	99.00000 ft	514.55588 ft	533.147 psf	2,158.1493 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 27	93.56655 ft	514.26900 ft	549.28177 psf	2,136.9086 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 28	86.69966 ft	513.90643 ft	570.62545 psf	2,169.8495 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 29	79.83276 ft	513.54386 ft	592.75541 psf	2,201.041 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 26 deg, 0 psf
Column 30	72.96586 ft	513.18129 ft	615.06193 psf	2,230.6769 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 31	68.76621 ft	512.95954 ft	628.78634 psf	2,235.5578 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	64.50000 ft	512.73429 ft	643.22591 psf	2,109.7681 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	57.50000 ft	512.36469 ft	665.80093 psf	1,849.4637 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 34	50.50000 ft	511.99509 ft	687.23674 psf	1,587.9274 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 35	43.50000 ft	511.62549 ft	713.71513 psf	1,325.1908 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 36	38.98333 ft	511.38701 ft	723.51822 psf	1,131.7818 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 37	36.98333 ft	511.74064 ft	687.4192 psf	1,057.7002 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 38	34.97149 ft	512.57398 ft	591.42286 psf	822.75075 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Column 39	33.27197 ft	513.27794 ft	497.23133 psf	744.43248 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
- Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Soft Clay - 120 pcf, 20 deg, 0 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Block Slope Stability	
CWLP Short Term F-F' Stockpile rev2 Optimized2.gsz	
10/28/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 458
Date: 10/28/2026
Time: 01:13:36 PM
Tool Version: 23.1.2.11
File Name: CWLP Short Term F-F' Stockpile rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 01:14:54 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,100 psf

Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf

Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 20 deg, 0 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (34, 514) ft
- Lower Left: (34, 508) ft
- Lower Right: (41, 508) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (205, 523) ft
- Lower Left: (205, 518) ft
- Lower Right: (214, 518) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
- Compressibility: 0 /psf
- Saturated Water Content: 0.30000006
- Curve Fit to Data: 100 %
- Segment Curvature: 100 %

Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)

Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	561.5 ft
Point 10	280 ft	561.5 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft

Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 27 deg, 500 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,463.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 27 deg, 180 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 25 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 28 deg, 0 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 20 deg, 0 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 95832 of 131769 converged

Current Slip Surface

Slip Surface: 64,786

Factor of Safety: 1.407
Volume: 5,007.2284 ft³
Weight: 593,101 lbf
Resisting Moment: 8,629,862.1 lbf·ft
Activating Moment: 6,133,431.5 lbf·ft
Resisting Force: 118,750.08 lbf
Activating Force: 84,404.133 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (247.8, 561.5) ft
Entry: (31.971573, 513) ft
Radius: 96.962757 ft
Center: (131.71176, 573.625) ft

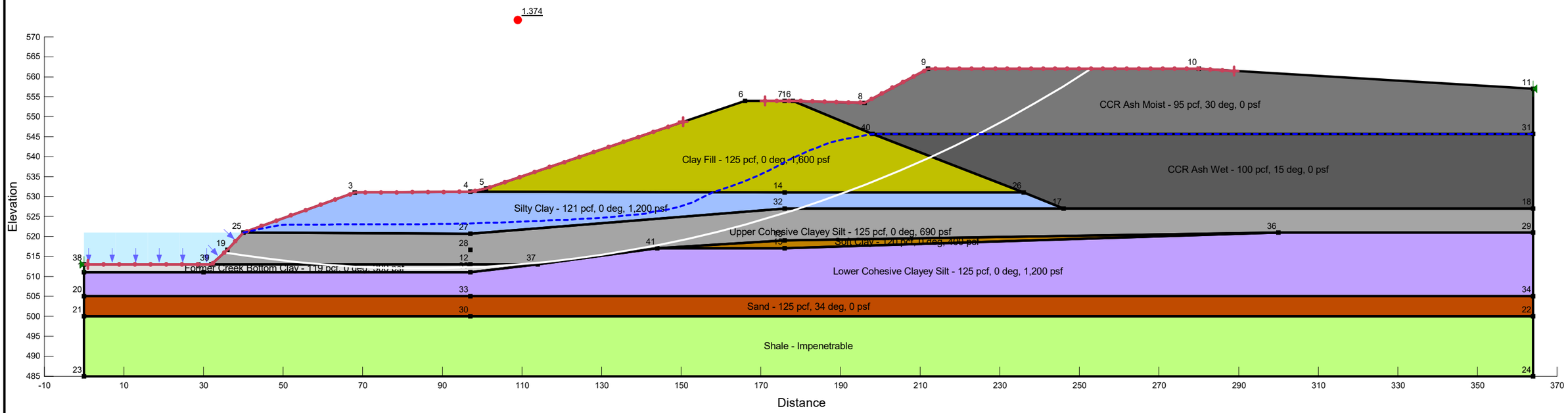
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	243.85000 ft	557.55000 ft	-512.63199 psf	241.09725 psf	139.19756 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	235.95000 ft	549.65000 ft	-223.50045 psf	724.81621 psf	418.47283 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	227.25806 ft	540.95806 ft	296.02746 psf	1,542.3498 psf	333.95106 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 25 deg, 0 psf
Column 4	219.90806 ft	533.60806 ft	654.18493 psf	1,499.7602 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	215.30000 ft	529.00000 ft	620.06647 psf	2,345.4085 psf	0 psf	1,100 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 6	212.65000 ft	526.35000 ft	498.37772 psf	2,883.1507 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 7	209.40000 ft	523.10000 ft	367.19614 psf	3,148.1284 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 8	202.40000 ft	520.25412 ft	269.67677 psf	4,056.4445 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Column 9	197.00000 ft	519.95235 ft	267.4817 psf	3,922.4093 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 10	192.39093 ft	519.69479 ft	265.62319 psf	3,986.7372 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 11	185.17279 ft	519.29142 ft	263.09715 psf	4,161.4737 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 12	179.78186 ft	518.99016 ft	267.8754 psf	4,266.2925 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 13	177.00000 ft	518.83471 ft	276.54739 psf	4,316.2998 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 14	171.00000 ft	518.49941 ft	294.14618 psf	4,364.8234 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 15	162.36140 ft	518.01667 ft	320.02979 psf	4,282.4549 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 16	155.08421 ft	517.61000 ft	342.85236 psf	4,037.0661 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 17	147.80702 ft	517.20333 ft	366.49319 psf	3,791.7291 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 20 deg, 0 psf
Column 18	140.45024 ft	516.79222 ft	396.17225 psf	3,573.9262 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	133.15886 ft	516.38476 ft	427.36476 psf	3,326.2151 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	126.01245 ft	515.98540 ft	454.52154 psf	3,081.1758 psf	0 psf	690 psf	0 psf	Upper Cohesive

								Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	118.86603 ft	515.58604 ft	479.29316 psf	2,833.7229 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 22	111.71962 ft	515.18668 ft	501.11063 psf	2,583.6652 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 23	104.57321 ft	514.78733 ft	520.79153 psf	2,330.8582 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 24	99.00000 ft	514.47588 ft	537.969 psf	2,166.1106 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 25	92.93158 ft	514.13676 ft	557.22842 psf	2,150.2701 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 26	84.79474 ft	513.68206 ft	584.40197 psf	2,191.857 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 27	76.65789 ft	513.22735 ft	612.3392 psf	2,230.9645 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 28	70.29474 ft	512.87176 ft	634.28269 psf	2,246.2669 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 29	64.50000 ft	512.54794 ft	654.81785 psf	2,130.6945 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 19 deg, 0 psf
Column 30	57.50000 ft	512.15676 ft	678.84416 psf	1,873.206 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 31	50.50000 ft	511.76559 ft	702.10104 psf	1,614.4102 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 32	43.50000 ft	511.37441 ft	727.85506 psf	1,354.3314 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 33	38.40000 ft	511.08941 ft	739.97815 psf	1,127.3008 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 34	36.40000 ft	511.16569 ft	729.48347 psf	1,088.7261 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 35	34.00000 ft	512.15980 ft	624.10302 psf	814.47176 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf
Column 36	31.98579 ft	512.99411 ft	500.12258 psf	588.48016 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 19 deg, 0 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Circular Slope Stability	
CWLP Seismic F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 464
Date: 10/23/2026
Time: 10:57:21 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 10:57:36 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (1, 513) ft
Left-Zone Right Coordinate: (150.42636, 548.72892) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (171, 554) ft
Right-Zone Right Coordinate: (288.89408, 561.47059) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)

Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)

Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft

Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 0 deg, 1,600 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 17039 of 18491 converged

Current Slip Surface

Slip Surface: 4,370
Factor of Safety: 1.374
Volume: 4,321.6044 ft³
Weight: 507,989.15 lbf
Resisting Moment: 46,170,908 lbf·ft

Activating Moment: 33,615,495 lbf·ft
Resisting Force: 142,891.65 lbf
Activating Force: 104,010.23 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (252.89949, 562) ft
Entry: (35.226907, 515.98489) ft
Radius: 308.66685 ft
Center: (84.513159, 820.69145) ft

Slip Columns

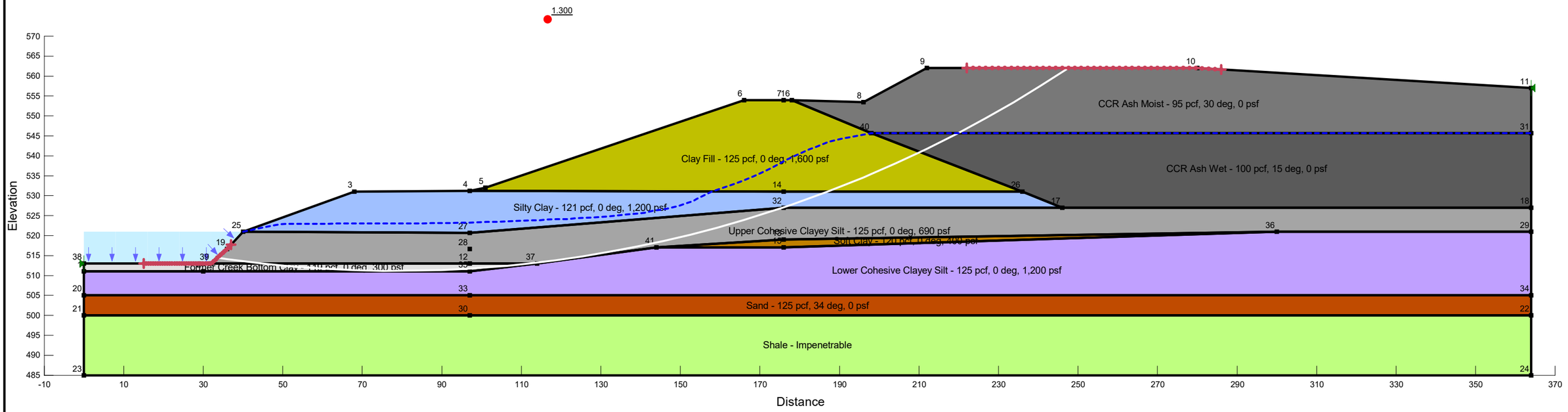
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	249.37570 ft	559.77347 ft	-878.60963 psf	146.94571 psf	84.839144 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	242.32813 ft	555.45034 ft	-608.71557 psf	439.80223 psf	253.91994 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	235.28055 ft	551.38102 ft	-354.66707 psf	728.36389 psf	420.52109 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	228.23297 ft	547.55415 ft	-115.75505 psf	1,017.3262 psf	587.35356 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 5	221.74024 ft	544.22633 ft	91.998061 psf	1,392.9532 psf	348.58987 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 6	215.80236 ft	541.35723 ft	271.10968 psf	1,651.1394 psf	369.77786 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 7	212.41671 ft	539.77208 ft	363.63532 psf	1,537.1669 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	208.50000 ft	538.04701 ft	413.06373 psf	1,659.1682 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	201.50000 ft	535.07808 ft	498.72309 psf	1,827.1464 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	197.00000 ft	533.25314 ft	548.35879 psf	1,923.4448 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	193.53436 ft	531.93090 ft	583.43992 psf	2,105.1195 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0

								deg, 1,600 psf
Column 12	188.17398 ft	529.96785 ft	536.94133 psf	2,486.3911 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 13	182.38450 ft	527.96785 ft	423.06059 psf	2,828.9375 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 14	178.74488 ft	526.76120 ft	359.24789 psf	3,077.9314 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	177.00000 ft	526.20833 ft	334.86769 psf	3,158.8334 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	171.00000 ft	524.43460 ft	269.96917 psf	3,380.8935 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	162.43953 ft	522.04590 ft	239.09588 psf	3,547.8585 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	155.31858 ft	520.27768 ft	259.07292 psf	3,502.9532 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	148.19763 ft	518.68769 ft	306.15425 psf	3,440.5699 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 20	141.07669 ft	517.27314 ft	371.08121 psf	3,359.2586 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf
Column 21	133.95574 ft	516.03157 ft	441.88266 psf	3,257.4301 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	126.83480 ft	514.96088 ft	506.35779 psf	3,133.4312 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	119.71385 ft	514.05928 ft	562.15755 psf	2,985.627 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	112.59290 ft	513.32527 ft	607.42702 psf	2,812.4892 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	105.01622 ft	512.73261 ft	643.0262 psf	2,558.8015 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 26	99.00000 ft	512.37125 ft	665.46895 psf	2,403.1324 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 27	93.37500 ft	512.17315 ft	677.73303 psf	2,389.407 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 28	86.12500 ft	512.05010 ft	685.29861 psf	2,415.2369 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 0 deg, 300 psf
Column 29	78.87500 ft	512.09740 ft	682.27284 psf	2,416.443 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 30	71.62500 ft	512.31513 ft	668.50514 psf	2,392.2198 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 31	63.99694 ft	512.73332 ft	642.70995 psf	2,167.9645 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 32	56.66157 ft	513.30193 ft	605.82048 psf	1,820.6583 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	49.99694 ft	513.97887 ft	560.06258 psf	1,432.4222 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 34	43.33231 ft	514.80249 ft	500.85561 psf	1,023.7959 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 35	38.00000 ft	515.55598 ft	390.43757 psf	637.33839 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 36	35.61345 ft	515.92287 ft	324.00173 psf	426.13962 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Circular Slope Stability	
CWLP Seismic F-F' Stockpile rev2 Optimized2.gsz	
10/28/2026	1:300

Circular Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 478
Date: 10/28/2026
Time: 01:56:52 PM
Tool Version: 23.1.2.11
File Name: CWLP Seismic F-F' Stockpile rev2 Optimized2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/28/2026
Last Solved Time: 01:57:08 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Circular Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100

Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (15, 513) ft
Left-Zone Right Coordinate: (37, 517.775) ft
Left-Zone Increment: 40
Right Type: Range
Right-Zone Left Coordinate: (222, 562) ft
Right-Zone Right Coordinate: (286, 561.64286) ft
Right-Zone Increment: 40
Radius Increments: 10

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
    Compressibility: 0 /psf
    Saturated Water Content: 0.30000006
    Curve Fit to Data: 100 %
    Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
    Data Point: (0, 0.3)

Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)
Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)

Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft
Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft

Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 0 deg, 1,600 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 18454 of 18491 converged

Current Slip Surface

Slip Surface: 14,611
Factor of Safety: 1.300
Volume: 4,203.4132 ft³
Weight: 496,655.62 lbf
Resisting Moment: 43,702,543 lbf·ft

Activating Moment: 33,607,141 lbf·ft
Resisting Force: 135,196.96 lbf
Activating Force: 103,957.8 lbf
Slip Rank: 1 of 18,491 slip surfaces
Exit: (247.60425, 562) ft
Entry: (33.566308, 514.44884) ft
Radius: 307.19259 ft
Center: (78.349808, 818.35955) ft

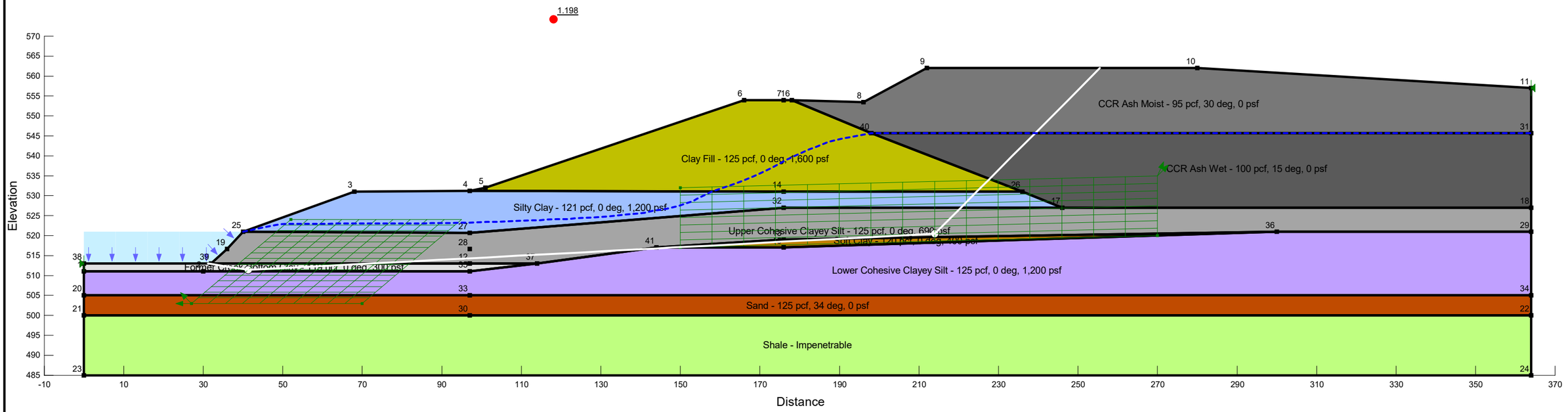
Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	244.13574 ft	559.77623 ft	-878.78169 psf	144.58738 psf	83.477562 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	237.19872 ft	555.45675 ft	-609.11557 psf	433.11463 psf	250.05885 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	230.26171 ft	551.38739 ft	-355.06484 psf	718.05503 psf	414.56926 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 4	223.32469 ft	547.55687 ft	-115.92516 psf	1,004.1362 psf	579.7383 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 5	215.92809 ft	543.73217 ft	122.84744 psf	1,425.3938 psf	349.01625 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 6	211.14566 ft	541.35477 ft	271.2636 psf	1,604.5417 psf	357.25078 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 7	207.21849 ft	539.52503 ft	338.85337 psf	1,397.6523 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 8	201.07283 ft	536.76568 ft	420.13631 psf	1,569.8879 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 9	197.00000 ft	535.00775 ft	469.37357 psf	1,673.829 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 10	191.46987 ft	532.79451 ft	521.27449 psf	2,006.3221 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 11	182.46987 ft	529.38944 ft	453.8032 psf	2,635.74 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf,

								0 deg, 1,200 psf
Column 12	177.00000 ft	527.43979 ft	347.87487 psf	2,952.9165 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 13	171.00000 ft	525.51877 ft	268.63909 psf	3,226.6856 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	162.61615 ft	522.97153 ft	224.33674 psf	3,412.8908 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	155.84846 ft	521.12393 ft	236.35307 psf	3,387.5949 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 16	149.08077 ft	519.44096 ft	277.86607 psf	3,347.2399 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 17	142.31307 ft	517.91985 ft	339.54572 psf	3,290.6382 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 18	135.54538 ft	516.55814 ft	413.37665 psf	3,216.4301 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 19	128.77769 ft	515.35370 ft	483.33082 psf	3,123.1429 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 20	122.01000 ft	514.30464 ft	546.67536 psf	3,009.2565 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 21	115.24230 ft	513.40937 ft	602.00402 psf	2,873.2752 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	109.14384 ft	512.72649 ft	643.396 psf	2,691.1793 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 23	103.71461 ft	512.22806 ft	674.439 psf	2,545.4353 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 24	99.00000 ft	511.86838 ft	696.8192 psf	2,441.6839 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 25	93.37500 ft	511.55610 ft	716.22125 psf	2,443.5009 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 26	86.12500 ft	511.28679 ft	732.93073 psf	2,489.2956 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 27	78.87500 ft	511.18880 ft	738.96681 psf	2,510.6122 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Column 28	71.62500 ft	511.26199 ft	734.32487 psf	2,506.3946 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 29	64.14019 ft	511.52011 ft	718.17961 psf	2,310.2662 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 30	56.42058 ft	511.97512 ft	689.34835 psf	1,919.2276 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 31	48.70097 ft	512.62569 ft	648.54625 psf	1,498.7263 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 32	42.42058 ft	513.28508 ft	618.35746 psf	1,179.749 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 33	38.00000 ft	513.83516 ft	526.36081 psf	859.37586 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 34	34.78315 ft	514.27450 ft	441.67145 psf	585.98626 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability	
CWLP Seismic F-F' Stockpile rev2.gsz	
10/23/2026	1:300

Block Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 466
Date: 10/23/2026
Time: 11:16:44 AM
Tool Version: 23.1.2.11
File Name: CWLP Seismic F-F' Stockpile rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Dallman\Revised CCR\Revised Seepage\Sept 2026 Revisions\Revised Former Creek Bottom Deposit Depth\
Last Solved Date: 10/23/2026
Last Solved Time: 11:21:08 AM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf

Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (52, 524) ft
- Lower Left: (27, 503) ft
- Lower Right: (70, 503) ft
- X Increments: 10
- Y Increments: 15
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 5

Right Grid
- Upper Left: (150, 532) ft
- Lower Left: (150, 517) ft
- Lower Right: (270, 520) ft
- X Increments: 15
- Y Increments: 8
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)

Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft

Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 0 deg, 1,600 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 403042 of 456192 converged

Current Slip Surface

Slip Surface: 175,465
Factor of Safety: 1.198
Volume: 5,346.5382 ft³
Weight: 626,793.32 lbf
Resisting Moment: 8,910,954 lbf·ft
Activating Moment: 7,435,883.1 lbf·ft
Resisting Force: 123,815.34 lbf
Activating Force: 103,338.45 lbf
Slip Rank: 1 of 456,192 slip surfaces
Exit: (255.525, 562) ft
Entry: (31.197998, 513) ft
Radius: 99.89055 ft
Center: (135.33415, 574.25) ft

Slip Columns

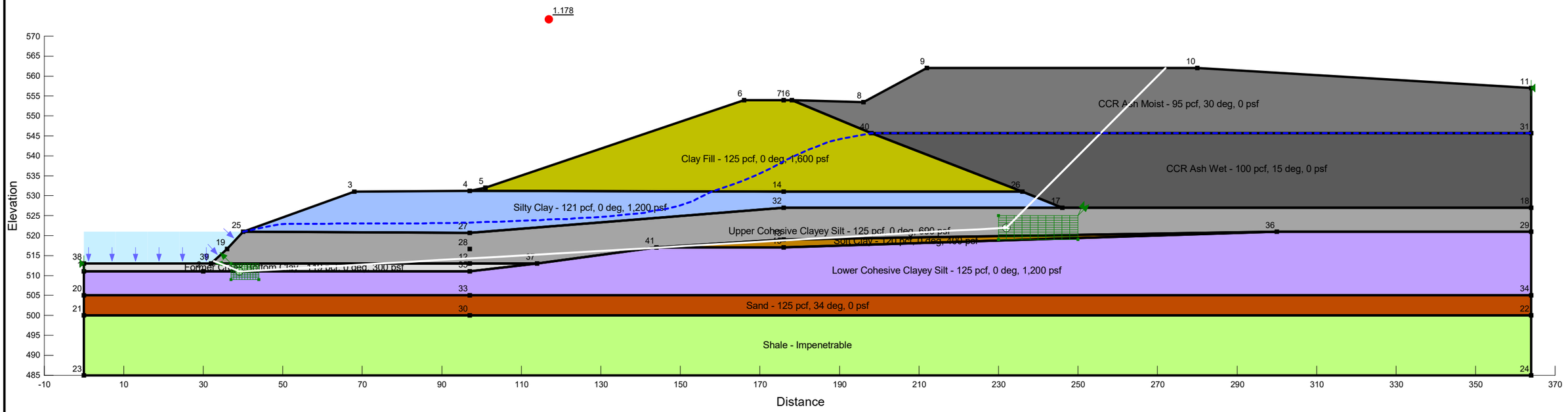
	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	251.45000 ft	557.92500 ft	-763.20906 psf	229.14828 psf	132.29882 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	243.30000 ft	549.77500 ft	-254.40302 psf	695.34349 psf	401.45675 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	236.35020 ft	542.82520 ft	179.46502 psf	1,355.0374 psf	314.99367 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 4	230.60060 ft	537.07560 ft	538.39903 psf	1,815.4815 psf	342.19322 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	226.12540 ft	532.60040 ft	772.58158 psf	1,384.9747 psf	0 psf	1,600 psf	0 psf	Clay Fill - 125 pcf, 0 deg, 1,600 psf
Column 6	222.52500 ft	529.00000 ft	706.29706 psf	2,065.0176 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 7	217.26250 ft	523.73750 ft	423.14813 psf	2,958.6505 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 8	213.00000 ft	520.42245 ft	268.32752 psf	4,309.4636 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf
Column 9	208.50000 ft	520.18599 ft	263.4021 psf	4,238.817 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 10	201.50000 ft	519.81815 ft	257.74169 psf	4,057.3787 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 11	197.00000 ft	519.58169 ft	255.18478 psf	3,940.211 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 12	193.16410 ft	519.38012 ft	253.83365 psf	3,984.0428 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	187.24616 ft	519.06915 ft	262.29139 psf	4,088.9446 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 14	181.08205 ft	518.74524 ft	280.30787 psf	4,240.5049 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 15	177.00000 ft	518.53073 ft	292.25763 psf	4,326.3419 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 16	171.00000 ft	518.21545 ft	309.03795 psf	4,373.0467 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 17	161.46742 ft	517.71453 ft	336.42732 psf	4,260.4538 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 18	152.40227 ft	517.23818 ft	363.78225 psf	3,957.9667 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf

Column 19	145.93485 ft	516.89833 ft	384.14659 psf	3,883.3728 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 20	142.74146 ft	516.73052 ft	394.45466 psf	3,777.3894 psf	0 psf	1,200 psf	0 psf	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
Column 21	137.43463 ft	516.45166 ft	416.03094 psf	3,509.2128 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 22	129.33804 ft	516.02620 ft	447.14141 psf	3,233.9971 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	121.24146 ft	515.60075 ft	474.83267 psf	2,955.11 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	113.14488 ft	515.17529 ft	499.96581 psf	2,672.0444 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	105.04829 ft	514.74983 ft	521.79298 psf	2,384.3851 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 26	99.00000 ft	514.43201 ft	539.47325 psf	2,200.4668 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 27	92.79141 ft	514.10576 ft	558.24382 psf	2,180.8042 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 28	84.37424 ft	513.66346 ft	584.85272 psf	2,216.4557 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 29	75.95707 ft	513.22115 ft	612.07099 psf	2,248.9474 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 30	69.87424 ft	512.90151 ft	631.78887 psf	2,244.909 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 31	64.66250 ft	512.62765 ft	649.22724 psf	2,131.9642 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 32	57.98750 ft	512.27689 ft	670.85718 psf	1,885.2332 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 33	51.31250 ft	511.92613 ft	691.27934 psf	1,636.589 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 34	44.63750 ft	511.57538 ft	715.48477 psf	1,386.0023 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Column 35	40.65000 ft	511.50295 ft	720.73851 psf	1,280.7019 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 36	38.00000 ft	511.92267 ft	680.32762 psf	1,062.2941 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 37	34.00000 ft	512.55621 ft	580.92427 psf	721.33022 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 38	31.59900 ft	512.93649 ft	506.77035 psf	547.64413 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf



Materials

- CCR Ash Moist - 95 pcf, 30 deg, 0 psf
- CCR Ash Wet - 100 pcf, 15 deg, 0 psf
- Clay Fill - 125 pcf, 0 deg, 1,600 psf
- Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
- Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf
- Sand - 125 pcf, 34 deg, 0 psf
- Shale - Impenetrable
- Silty Clay - 121 pcf, 0 deg, 1,200 psf
- Soft Clay - 120 pcf, 0 deg, 400 psf
- Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Block Slope Stability
CWLP Seismic F-F' Stockpile rev2 Optimized2.gsz
10/28/2026 1:300

Block Slope Stability

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File Information

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Last Solved Date: 10/28/2026
Last Solved Time: 01:56:02 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Block Slope Stability

Kind: SLOPE/W
Parent: Steady-State Seepage
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Steady-State Seepage [(last)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Restrict Block Crossing: No
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.1 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings

Maximum Number of Iterations: 100
Tolerable difference in F of S: 0.001
Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 0 deg, 1,600 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,600 psf

Shale - Impenetrable

Slope Stability Material Model: Bedrock (Impenetrable)

Sand - 125 pcf, 34 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 34 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: Sand

Silty Clay - 121 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 121 pcf
Total Cohesion: 1,200 psf

Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 1,200 psf

CCR Ash Moist - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Phi-B: 0 °
Vol. WC Fn used for Unit Wt. Above Piezometric Surface: CCR Ash Moist

CCR Ash Wet - 100 pcf, 15 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf

Effective Cohesion: 0 psf
Effective Friction Angle: 15 °
Phi-B: 0 °

Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 119 pcf
Total Cohesion: 300 psf

Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Total Cohesion: 690 psf

Soft Clay - 120 pcf, 0 deg, 400 psf

Slope Stability Material Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Total Cohesion: 400 psf

Slip Surface Limits

Left Coordinate: (0, 513) ft
Right Coordinate: (364, 557) ft

Slip Surface Block

Left Grid
- Upper Left: (37, 513) ft
- Lower Left: (37, 509) ft
- Lower Right: (44, 509) ft
- X Increments: 10
- Y Increments: 10
- Starting Angle: 135 °
- Ending Angle: 180 °
- Angle Increments: 2

Right Grid
- Upper Left: (230, 525) ft
- Lower Left: (230, 519) ft
- Lower Right: (250, 519) ft
- X Increments: 10
- Y Increments: 10
- Angle Increments: 2

Seismic Coefficients

Horz Seismic Coef.: 0.033

Vol. Water Content Functions

CCR Ash Moist

Model: Vol WC Data Point Function

Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 26 %
Diameter at 10% passing: 0.0008
Diameter at 60% passing: 0.022
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Sand

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.3000003
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.3000003
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.29999621)
Data Point: (0.38282598, 0.29999025)
Data Point: (0.70171264, 0.29997486)
Data Point: (1.2862257, 0.29993496)
Data Point: (2.357627, 0.29983146)

Data Point: (4.3214847, 0.29956292)
Data Point: (7.9211981, 0.29886732)
Data Point: (14.519403, 0.29707538)
Data Point: (26.613786, 0.29252873)
Data Point: (48.782557, 0.28143152)
Data Point: (89.417486, 0.25674265)
Data Point: (163.90053, 0.21156936)
Data Point: (300.42651, 0.15208505)
Data Point: (550.67599, 0.099183781)
Data Point: (1,009.3785, 0.06424964)
Data Point: (1,850.1713, 0.043755901)
Data Point: (3,391.3282, 0.031610992)
Data Point: (6,216.2392, 0.023966697)
Data Point: (11,394.247, 0.018806995)
Data Point: (20,885.434, 0.015081481)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silty Sand
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 1 ft

Points

	X	Y
Point 1	0 ft	511 ft
Point 2	30 ft	511 ft
Point 3	68 ft	531 ft
Point 4	97 ft	531.2 ft
Point 5	101 ft	532 ft
Point 6	166 ft	554 ft
Point 7	176 ft	554 ft
Point 8	196 ft	553.5 ft
Point 9	212 ft	562 ft
Point 10	280 ft	562 ft
Point 11	364 ft	557 ft
Point 12	97 ft	513 ft
Point 13	176 ft	519 ft
Point 14	176 ft	531 ft
Point 15	176 ft	517 ft
Point 16	178 ft	554 ft

Point 17	246 ft	527 ft
Point 18	364 ft	527 ft
Point 19	36 ft	516.7 ft
Point 20	0 ft	505 ft
Point 21	0 ft	500 ft
Point 22	364 ft	500 ft
Point 23	0 ft	485 ft
Point 24	364 ft	485 ft
Point 25	40 ft	521 ft
Point 26	236 ft	531 ft
Point 27	97 ft	520.7 ft
Point 28	97 ft	516.7 ft
Point 29	364 ft	521 ft
Point 30	97 ft	500 ft
Point 31	364 ft	545.7 ft
Point 32	176 ft	527 ft
Point 33	97 ft	505 ft
Point 34	364 ft	505 ft
Point 35	97 ft	511 ft
Point 36	300 ft	521 ft
Point 37	114 ft	513 ft
Point 38	0 ft	513 ft
Point 39	32 ft	513 ft
Point 40	198 ft	545.7 ft
Point 41	144 ft	517 ft

Regions

	Material	Points	Area
Region 1	Clay Fill - 125 pcf, 0 deg, 1,600 psf	4,14,26,40,16,7,6,5	1,706.8 ft²
Region 2	CCR Ash Moist - 95 pcf, 30 deg, 0 psf	11,10,9,8,16,40,31	2,522.3 ft²
Region 3	Shale - Impenetrable	21,23,24,22,30	5,460 ft²
Region 4	Silty Clay - 121 pcf, 0 deg, 1,200 psf	25,27,32,17,26,14,4,3	1,274.2 ft²
Region 5	CCR Ash Wet - 100 pcf, 15 deg, 0 psf	26,17,18,31,40	2,652.9 ft²
Region 6	Sand - 125 pcf, 34 deg, 0 psf	20,33,34,22,30,21	1,820 ft²
Region 7	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf	1,2,35,37,12,39,38	211 ft²
Region 8	Lower Cohesive Clayey Silt - 125 pcf, 0 deg, 1,200 psf	20,33,34,29,36,15,41,37,35,2,1	4,145 ft²
Region 9	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf	39,19,25,27,32,17,18,29,36,13,41,37,12	2,367.4 ft²
Region 10	Soft Clay - 120 pcf, 0 deg, 400 psf	41,13,36,15	156 ft²

Slip Results

Slip Surfaces Analysed: 91839 of 131769 converged

Current Slip Surface

Slip Surface: 63,694
Factor of Safety: 1.178
Volume: 5,994.5403 ft³
Weight: 691,998.26 lbf
Resisting Moment: 8,748,801.6 lbf·ft
Activating Moment: 7,427,365.4 lbf·ft
Resisting Force: 127,644.51 lbf
Activating Force: 108,394.6 lbf
Slip Rank: 1 of 131,769 slip surfaces
Exit: (272, 562) ft
Entry: (32.702589, 513.64989) ft
Radius: 104.06689 ft
Center: (145.02443, 574.08753) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	267.92500 ft	557.92500 ft	-763.20906 psf	228.05023 psf	131.66486 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 2	259.77500 ft	549.77500 ft	-254.40302 psf	692.75185 psf	399.96047 psf	0 psf	0 psf	CCR Ash Moist - 95 pcf, 30 deg, 0 psf
Column 3	251.66786 ft	541.66786 ft	251.71093 psf	1,450.5162 psf	321.21891 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 4	243.60357 ft	533.60357 ft	755.13662 psf	2,090.6956 psf	357.86195 psf	0 psf	0 psf	CCR Ash Wet - 100 pcf, 15 deg, 0 psf
Column 5	238.28571 ft	528.28571 ft	847.36058 psf	1,978.8935 psf	0 psf	1,200 psf	0 psf	Silty Clay - 121 pcf, 0 deg, 1,200 psf
Column 6	236.50000 ft	526.50000 ft	659.28094 psf	2,514.9595 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 7	234.00000 ft	524.00000 ft	474.18737 psf	2,783.4479 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Column 8	228.66667 ft	521.80992 ft	326.15321 psf	3,984.5868 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 9	222.00000 ft	521.42976 ft	309.09186 psf	4,110.6664 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 10	215.33333 ft	521.04959 ft	294.90412 psf	4,236.2301 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 11	208.50000 ft	520.65993 ft	283.29325 psf	4,211.1925 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 12	201.50000 ft	520.26076 ft	274.20624 psf	4,032.3706 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 13	197.00000 ft	520.00415 ft	269.45672 psf	3,916.6197 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 14	192.18207 ft	519.72941 ft	265.43885 psf	3,984.9557 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 15	184.54621 ft	519.29398 ft	261.71398 psf	4,176.645 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

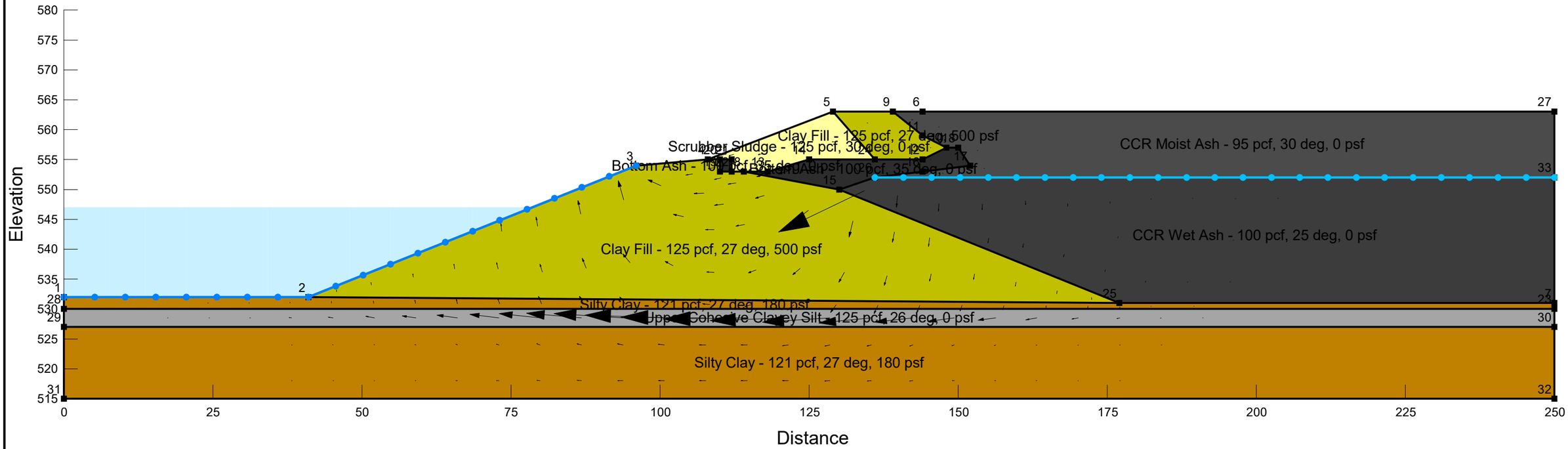
Column 16	179.36414 ft	518.99847 ft	265.74307 psf	4,263.7694 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 17	177.00000 ft	518.86366 ft	273.19906 psf	4,306.8136 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 18	171.00000 ft	518.52151 ft	291.27999 psf	4,354.9392 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 19	162.38636 ft	518.03033 ft	317.91476 psf	4,275.1824 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 20	155.15909 ft	517.61820 ft	341.29345 psf	4,035.596 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 21	147.77273 ft	517.19699 ft	365.99457 psf	3,791.0161 psf	0 psf	400 psf	0 psf	Soft Clay - 120 pcf, 0 deg, 400 psf
Column 22	139.60489 ft	516.73123 ft	398.99203 psf	3,569.7897 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 23	130.93356 ft	516.23675 ft	434.68516 psf	3,277.3183 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 24	122.38111 ft	515.74905 ft	466.11838 psf	2,984.963 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 25	113.82867 ft	515.26135 ft	495.24328 psf	2,688.292 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 26	105.27622 ft	514.77366 ft	520.50674 psf	2,386.9115 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125

								pcf, 0 deg, 690 psf
Column 27	99.00000 ft	514.41576 ft	540.45801 psf	2,196.744 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 28	93.19545 ft	514.08476 ft	559.59928 psf	2,177.381 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 29	85.58636 ft	513.65086 ft	585.6836 psf	2,213.0649 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 30	77.97727 ft	513.21695 ft	612.41243 psf	2,246.6218 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf
Column 31	71.08636 ft	512.82400 ft	636.67816 psf	2,253.7986 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 32	64.50000 ft	512.44842 ft	660.39051 psf	2,144.8054 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 33	57.50000 ft	512.04925 ft	684.96525 psf	1,889.8068 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 34	50.50000 ft	511.65008 ft	708.96127 psf	1,632.7935 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119

								pcf, 0 deg, 300 psf
Column 35	43.50000 ft	511.25091 ft	734.24776 psf	1,373.74 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 36	39.55000 ft	511.02566 ft	745.51958 psf	1,216.6887 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 37	37.55000 ft	511.64203 ft	698.10834 psf	1,134.3874 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 38	35.13579 ft	512.64203 ft	586.12071 psf	846.39794 psf	0 psf	300 psf	0 psf	Former Creek Bottom Clay - 119 pcf, 0 deg, 300 psf
Column 39	33.48708 ft	513.32495 ft	496.77142 psf	794.6135 psf	0 psf	690 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 0 deg, 690 psf

Appendix I:
Rapid Drawdown Analysis

Appendix I-1:
Steady State Seepage Analysis



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Intial Steady-State Condition	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200

Intial Steady-State Condition

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 428
Date: 10/23/2026
Time: 01:51:22 PM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Clarification\Revise CCR Seepage\Sept 2026\
Last Solved Date: 10/23/2026
Last Solved Time: 01:51:32 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Intial Steady-State Condition

Kind: SEEP/W
Analysis Type: Steady-State
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Steps
- Starting Time: 0 d
- Duration: 0 d
- Ending Time: 0 d

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Fly Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash - 100 pcf, 35 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge - 125 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0
Compressibility: 0 /psf

Boundary Conditions

Clarification Basin

Category: Hydraulic
Kind: Water Total Head 547 ft
Review: No

CCR Ash Impoundment Head

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Water K Functions

Gray Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure

Curve Fit to Data: 100 %
Segment Curvature: 100 %

Saturated Kx: 3.28e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)

Data Point: (0, 3.28e-09)
Data Point: (0.20885434, 3.2768413e-09)
Data Point: (0.3864664, 3.2740449e-09)
Data Point: (0.71512174, 3.269786e-09)
Data Point: (1.3232692, 3.2628706e-09)
Data Point: (2.4485922, 3.2514884e-09)
Data Point: (4.5309023, 3.2323852e-09)
Data Point: (8.384032, 3.1999866e-09)
Data Point: (15.513906, 3.145105e-09)
Data Point: (28.707105, 3.0519519e-09)
Data Point: (53.119948, 2.8966031e-09)
Data Point: (98.293744, 2.6445678e-09)
Data Point: (181.88384, 2.2543966e-09)
Data Point: (336.55989, 1.7057192e-09)
Data Point: (622.77416, 1.0504843e-09)
Data Point: (1,152.3883, 4.6609534e-10)
Data Point: (2,132.3921, 1.3414591e-10)
Data Point: (3,945.8021, 2.5857655e-11)
Data Point: (7,301.3562, 3.9605113e-12)
Data Point: (13,510.511, 5.4476118e-13)
Data Point: (25,000, 4.1661512e-14)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Gray Silty Clay
Saturated Kx: 3.28e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361145e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213973e-09)
Data Point: (4.5309023, 2.1089335e-09)
Data Point: (8.384032, 2.0877956e-09)
Data Point: (15.513906, 2.0519887e-09)
Data Point: (28.707105, 1.9912121e-09)
Data Point: (53.119948, 1.8898566e-09)
Data Point: (98.293744, 1.7254192e-09)
Data Point: (181.88384, 1.4708563e-09)
Data Point: (336.55989, 1.1128779e-09)
Data Point: (622.77416, 6.8537712e-10)
Data Point: (1,152.3883, 3.0409879e-10)
Data Point: (2,132.3921, 8.7522018e-11)
Data Point: (3,945.8021, 1.6870537e-11)
Data Point: (7,301.3562, 2.5839914e-12)
Data Point: (13,510.511, 3.5542305e-13)
Data Point: (25,000, 2.7181552e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Fly Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.3864664, 2.5573948e-05)

Data Point: (0.71512174, 2.5546723e-05)
Data Point: (1.3232692, 2.5491435e-05)
Data Point: (2.4485922, 2.5380193e-05)
Data Point: (4.5309023, 2.5156329e-05)
Data Point: (8.384032, 2.4710464e-05)
Data Point: (15.513906, 2.3846489e-05)
Data Point: (28.707105, 2.2216354e-05)
Data Point: (53.119948, 1.9335256e-05)
Data Point: (98.293744, 1.4758027e-05)
Data Point: (181.88384, 8.8022586e-06)
Data Point: (336.55989, 3.4311782e-06)
Data Point: (622.77416, 7.5651642e-07)
Data Point: (1,152.3883, 1.0237451e-07)
Data Point: (2,132.3921, 1.1379726e-08)
Data Point: (3,945.8021, 1.3068497e-09)
Data Point: (7,301.3562, 1.6528043e-10)
Data Point: (13,510.511, 2.1533388e-11)
Data Point: (25,000, 1.4511011e-12)

Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)

Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure

Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %

Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content

Data Point: (0, 0.44)
Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)
Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf

Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	532 ft
Point 2	41 ft	532 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	531 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	250 ft	530 ft
Point 24	136 ft	555 ft
Point 25	177 ft	531 ft
Point 26	136 ft	552 ft
Point 27	250 ft	563 ft
Point 28	0 ft	530 ft
Point 29	0 ft	527 ft
Point 30	250 ft	527 ft
Point 31	0 ft	515 ft
Point 32	250 ft	515 ft
Point 33	250 ft	552 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	

Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	
Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	23	7	1 ft	90 °	
Line 19	12	24	8 ft	0 °	
Line 20	24	14	11 ft	0 °	
Line 21	5	24	10.63 ft	-48.8 °	
Line 22	9	5	10 ft	0 °	
Line 23	15	26	6.3246 ft	18.4 °	
Line 24	26	16	8.0623 ft	7.13 °	
Line 25	25	15	50.695 ft	-22 °	
Line 26	3	2	59.237 ft	21.8 °	Clarification Basin
Line 27	7	25	73 ft	0 °	
Line 28	1	28	2 ft	90 °	
Line 29	28	23	250 ft	0 °	
Line 30	2	25	136 ft	-0.421 °	
Line 31	2	1	41 ft	0 °	Clarification Basin
Line 32	30	23	3 ft	90 °	
Line 33	28	29	3 ft	90 °	
Line 34	29	30	250 ft	0 °	
Line 35	29	31	12 ft	90 °	
Line 36	31	32	250 ft	0 °	
Line 37	32	30	12 ft	90 °	
Line 38	9	6	5 ft	0 °	
Line 39	6	27	106 ft	0 °	
Line 40	27	33	11 ft	90 °	
Line 41	33	26	114 ft	0 °	CCR Ash Impoundment Head
Line 42	7	33	21 ft	90 °	

Regions

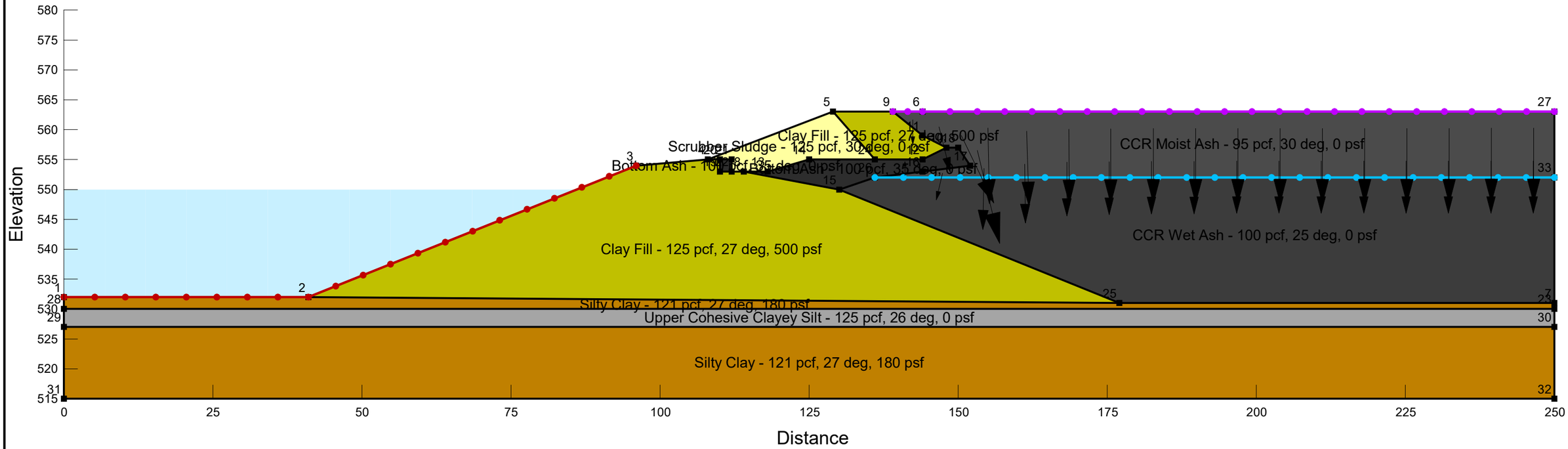
	Material	Points	Area
Region 1	Scrubber Sludge - 125 pcf, 30 deg, 0 psf	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill - 125 pcf, 27 deg, 500 psf	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash - 100 pcf, 35 deg, 0 psf	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash - 100 pcf, 35 deg, 0 psf	20,21,22,19	4 ft²
Region 5	Silty Clay - 121 pcf, 27 deg, 180 psf	23,7,25,2,1,28	359 ft²

Region 6	Clay Fill - 125 pcf, 27 deg, 500 psf	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	30,23,28,29	750 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	25,7,33,26,15	2,067.5 ft²

Mesh Properties

Global Element Size: 7 ft

Appendix I-2:
Transient Seepage Analysis



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

16-hr Rapid Rise Seepage Analysis	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200

16-hr Rapid Rise Seepage Analysis

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 428
Date: 10/23/2026
Time: 01:51:22 PM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Clarification\Revise CCR Seepage\Sept 2026\
Last Solved Date: 10/23/2026
Last Solved Time: 01:51:34 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

16-hr Rapid Rise Seepage Analysis

Kind: SEEP/W
Parent: Intial Steady-State Condition
Analysis Type: Transient
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Initial PWP Conditions from Parent Analysis: Intial Steady-State Condition [(last)]
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Settings
- Exclude cumulative values: No

Steps

Starting Time: 0 d
Duration: 0.667 d
# of Steps: 1
Step Generation Method: Linear
Time Increment: 0.667 d
Save Steps Every: 1

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Fly Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash - 100 pcf, 35 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge - 125 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Hydraulic
Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0
Compressibility: 0 /psf

Boundary Conditions

CCR Ash Impoundment Head

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Clarification Basin Rising Elevation

Category: Hydraulic
Kind: Water Total Head
Seep Head vs. Time Function: 24-hr Storm
Review: No

CCR Ash Impoundment Head 24-hr Storm

Category: Hydraulic
Kind: Water Total Head 562.5 ft
Review: No

Water K Functions

Gray Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 3.28e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.28e-09)
Data Point: (0.20885434, 3.2768413e-09)
Data Point: (0.3864664, 3.2740449e-09)
Data Point: (0.71512174, 3.269786e-09)
Data Point: (1.3232692, 3.2628706e-09)
Data Point: (2.4485922, 3.2514884e-09)
Data Point: (4.5309023, 3.2323852e-09)
Data Point: (8.384032, 3.1999866e-09)
Data Point: (15.513906, 3.145105e-09)

Data Point: (28.707105, 3.0519519e-09)
Data Point: (53.119948, 2.8966031e-09)
Data Point: (98.293744, 2.6445678e-09)
Data Point: (181.88384, 2.2543966e-09)
Data Point: (336.55989, 1.7057192e-09)
Data Point: (622.77416, 1.0504843e-09)
Data Point: (1,152.3883, 4.6609534e-10)
Data Point: (2,132.3921, 1.3414591e-10)
Data Point: (3,945.8021, 2.5857655e-11)
Data Point: (7,301.3562, 3.9605113e-12)
Data Point: (13,510.511, 5.4476118e-13)
Data Point: (25,000, 4.1661512e-14)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Gray Silty Clay
Saturated Kx: 3.28e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361145e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213973e-09)
Data Point: (4.5309023, 2.1089335e-09)
Data Point: (8.384032, 2.0877956e-09)
Data Point: (15.513906, 2.0519887e-09)
Data Point: (28.707105, 1.9912121e-09)
Data Point: (53.119948, 1.8898566e-09)
Data Point: (98.293744, 1.7254192e-09)
Data Point: (181.88384, 1.4708563e-09)
Data Point: (336.55989, 1.1128779e-09)
Data Point: (622.77416, 6.8537712e-10)
Data Point: (1,152.3883, 3.0409879e-10)
Data Point: (2,132.3921, 8.7522018e-11)
Data Point: (3,945.8021, 1.6870537e-11)
Data Point: (7,301.3562, 2.5839914e-12)
Data Point: (13,510.511, 3.5542305e-13)
Data Point: (25,000, 2.7181552e-14)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf

Num. Points: 20

Fly Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.3864664, 2.5573948e-05)
Data Point: (0.71512174, 2.5546723e-05)
Data Point: (1.3232692, 2.5491435e-05)
Data Point: (2.4485922, 2.5380193e-05)
Data Point: (4.5309023, 2.5156329e-05)
Data Point: (8.384032, 2.4710464e-05)
Data Point: (15.513906, 2.3846489e-05)
Data Point: (28.707105, 2.2216354e-05)
Data Point: (53.119948, 1.9335256e-05)
Data Point: (98.293744, 1.4758027e-05)
Data Point: (181.88384, 8.8022586e-06)
Data Point: (336.55989, 3.4311782e-06)
Data Point: (622.77416, 7.5651642e-07)
Data Point: (1,152.3883, 1.0237451e-07)
Data Point: (2,132.3921, 1.1379726e-08)
Data Point: (3,945.8021, 1.3068497e-09)
Data Point: (7,301.3562, 1.6528043e-10)
Data Point: (13,510.511, 2.1533388e-11)
Data Point: (25,000, 1.4511011e-12)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Hydraulic Boundary Functions

24-hr Storm

Model: Spline Data Point Function
Function: Water Total Head vs. Time
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Y-Intercept: 547 ft
Data Points: Time (d), Water Total Head (ft)
Data Point: (0, 547)
Data Point: (0.5, 550)

Vol. Water Content Functions

Fly Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)

Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)
Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	532 ft
Point 2	41 ft	532 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	531 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft

Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	250 ft	530 ft
Point 24	136 ft	555 ft
Point 25	177 ft	531 ft
Point 26	136 ft	552 ft
Point 27	250 ft	563 ft
Point 28	0 ft	530 ft
Point 29	0 ft	527 ft
Point 30	250 ft	527 ft
Point 31	0 ft	515 ft
Point 32	250 ft	515 ft
Point 33	250 ft	552 ft

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	
Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	23	7	1 ft	90 °	
Line 19	12	24	8 ft	0 °	
Line 20	24	14	11 ft	0 °	
Line 21	5	24	10.63 ft	-48.8 °	
Line 22	9	5	10 ft	0 °	
Line 23	15	26	6.3246 ft	18.4 °	
Line 24	26	16	8.0623 ft	7.13 °	

Line 25	25	15	50.695 ft	-22 °	
Line 26	3	2	59.237 ft	21.8 °	Clarification Basin Rising Elevation
Line 27	7	25	73 ft	0 °	
Line 28	1	28	2 ft	90 °	
Line 29	28	23	250 ft	0 °	
Line 30	2	25	136 ft	-0.421 °	
Line 31	2	1	41 ft	0 °	Clarification Basin Rising Elevation
Line 32	30	23	3 ft	90 °	
Line 33	28	29	3 ft	90 °	
Line 34	29	30	250 ft	0 °	
Line 35	29	31	12 ft	90 °	
Line 36	31	32	250 ft	0 °	
Line 37	32	30	12 ft	90 °	
Line 38	9	6	5 ft	0 °	CCR Ash Impoundment Head 24-hr Storm
Line 39	6	27	106 ft	0 °	CCR Ash Impoundment Head 24-hr Storm
Line 40	27	33	11 ft	90 °	
Line 41	33	26	114 ft	0 °	CCR Ash Impoundment Head
Line 42	7	33	21 ft	90 °	

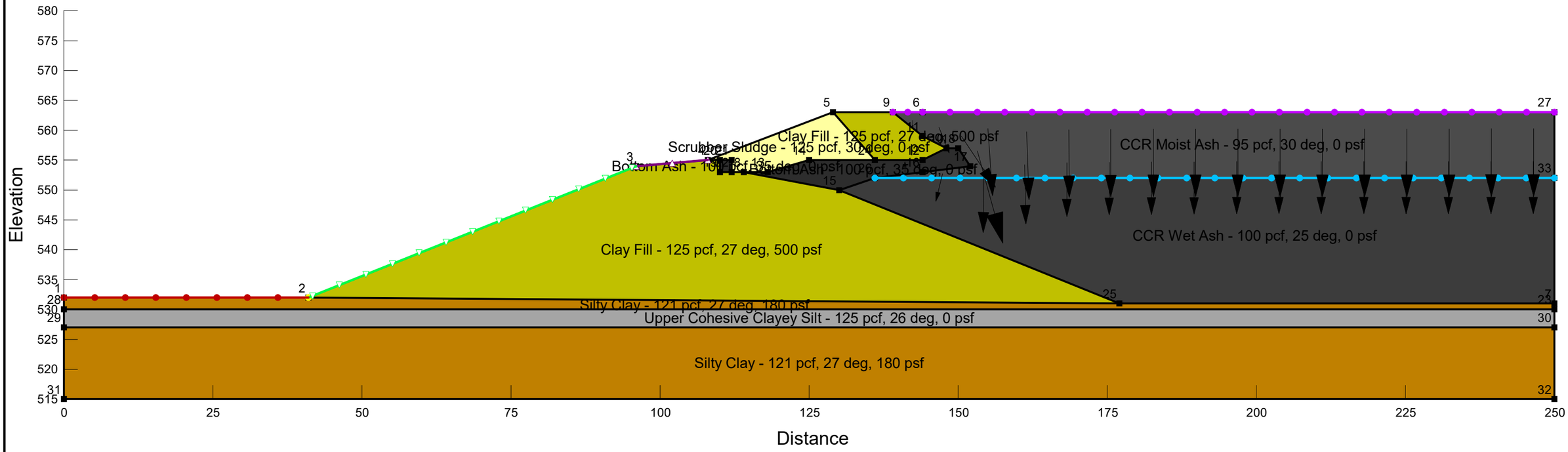
Regions

	Material	Points	Area
Region 1	Scrubber Sludge - 125 pcf, 30 deg, 0 psf	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill - 125 pcf, 27 deg, 500 psf	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash - 100 pcf, 35 deg, 0 psf	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash - 100 pcf, 35 deg, 0 psf	20,21,22,19	4 ft²
Region 5	Silty Clay - 121 pcf, 27 deg, 180 psf	23,7,25,2,1,28	359 ft²
Region 6	Clay Fill - 125 pcf, 27 deg, 500 psf	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	30,23,28,29	750 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	25,7,33,26,15	2,067.5 ft²

Mesh Properties

Global Element Size: 7 ft

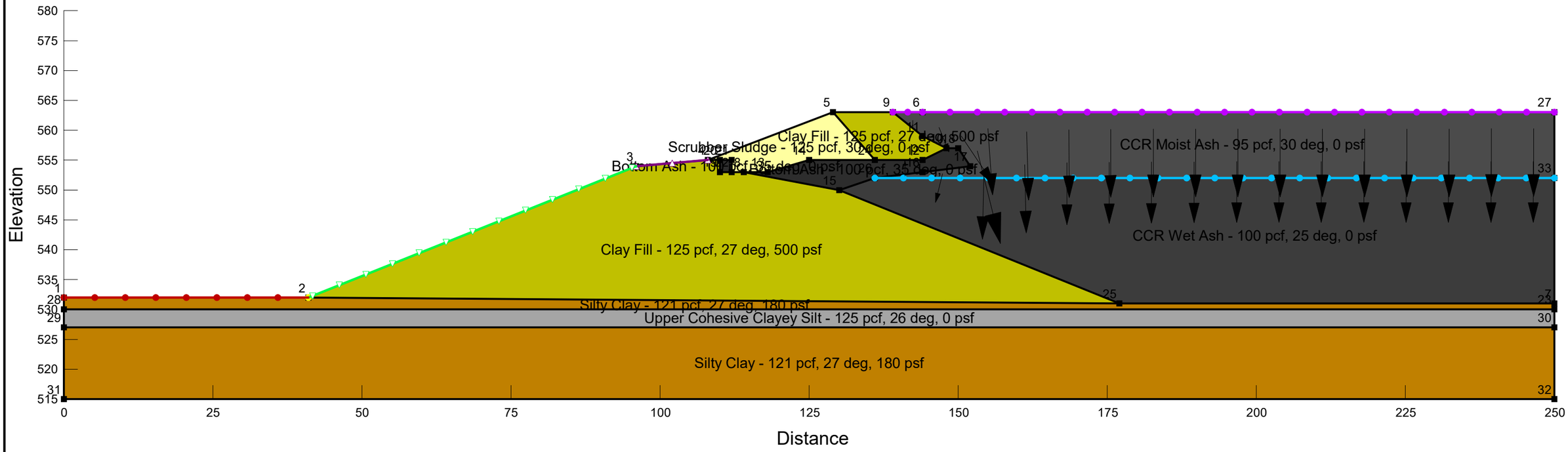
Appendix I-3:
Instantaneous Drawdown to Day 7 Transient Seepage



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

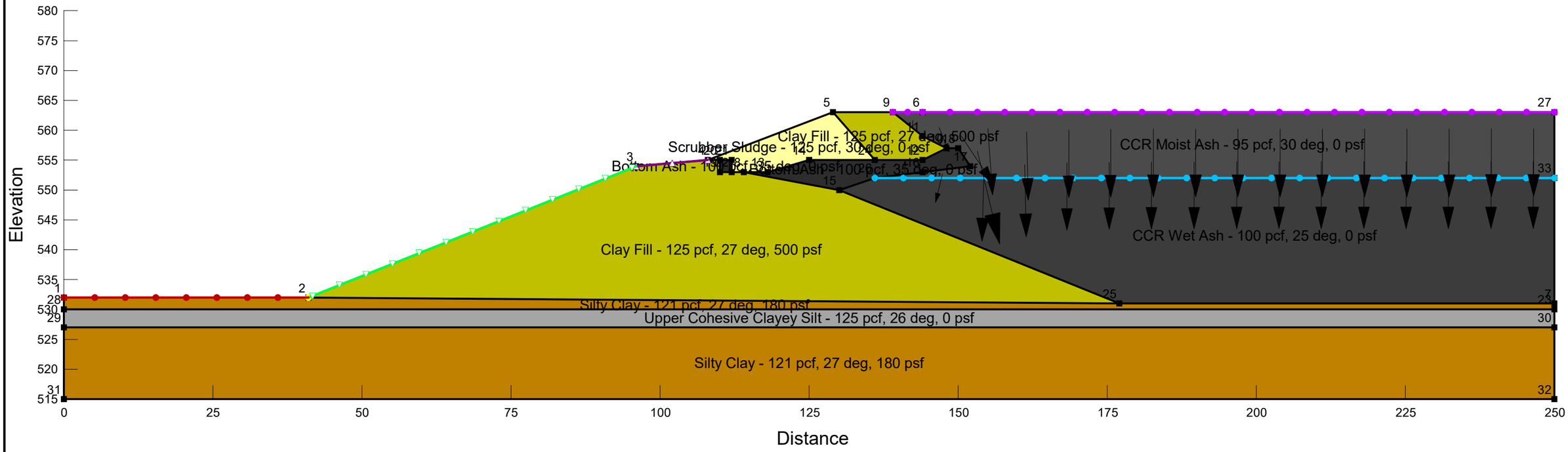
Instantaneous drawdown	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

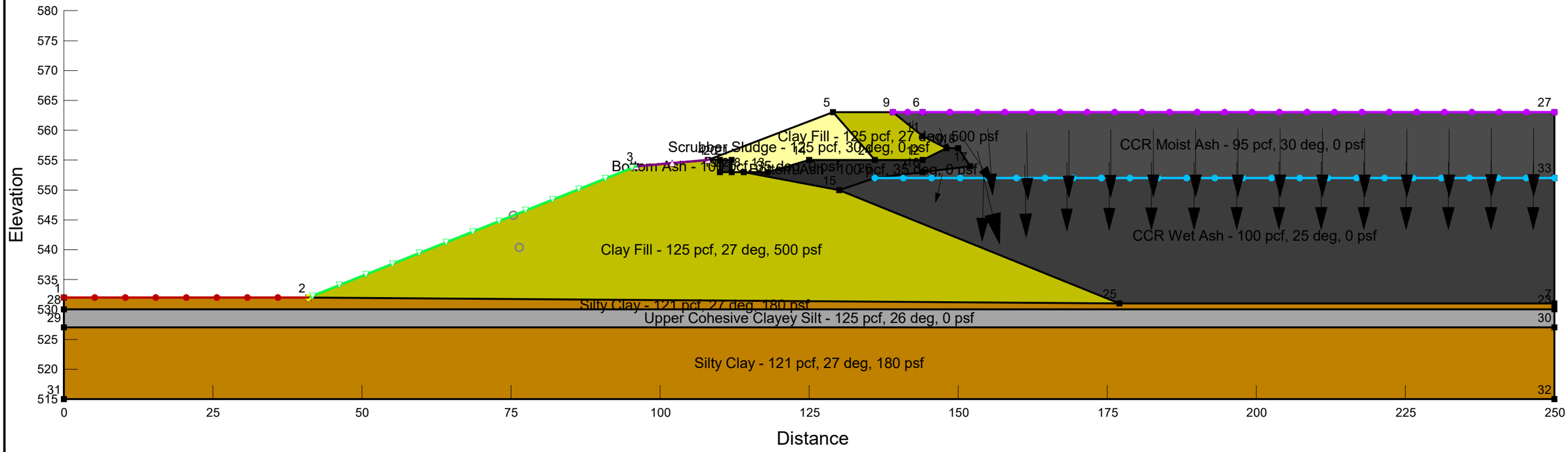
Instantaneous drawdown	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

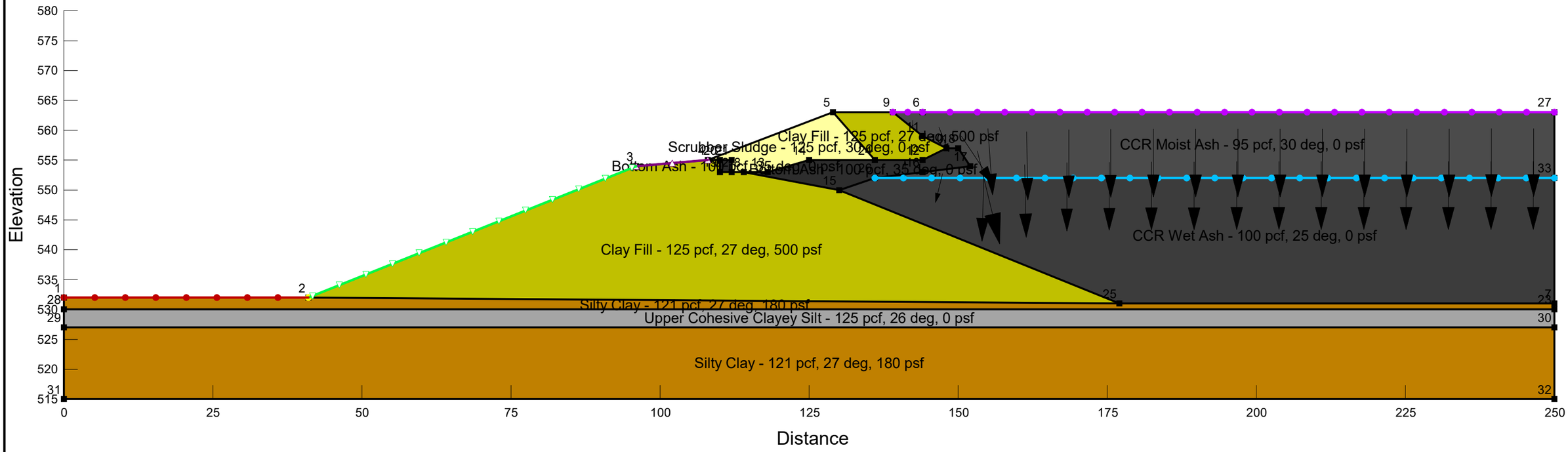
Instantaneous drawdown	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Instantaneous drawdown	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Instantaneous drawdown	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200

Instantaneous drawdown

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 428
Date: 10/23/2026
Time: 01:51:22 PM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Clarification\Revise CCR Seepage\Sept 2026\
Last Solved Date: 10/23/2026
Last Solved Time: 01:51:34 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Instantaneous drawdown

Kind: SEEP/W
Parent: 16-hr Rapid Rise Seepage Analysis
Analysis Type: Transient
Physics
- Water Transfer
  - Free convection: thermal effects: No
  - Free convection: solute effects: No
  - Vapor transfer: isothermal: No
  - Vapor transfer: thermal: No

Water Settings
- Initial PWP Conditions from Parent Analysis: 16-hr Rapid Rise Seepage Analysis [(last)]
- Maximum Number of Iterations: 500
- Maximum Difference: 0.005
- Significant Digits: 2
- Max # of Reviews: 10
- Under-Relaxation Criteria
  - Initial Rate: 1
  - Minimum Rate: 0.1
  - Rate Reduction Factor: 0.65
  - Reduction Frequency (iterations): 10
- Unit Weight of Water: 62.430189 pcf
- Bulk Modulus of Pore-Fluid: 43,511,321 psf

Settings
- Exclude cumulative values: No

Steps

Starting Time: 0.667 d
Duration: 7 d
# of Steps: 5
Step Generation Method: Exponential
Initial Increment Size: 0.04167 d
Save Steps Every: 1

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 3
Rotation: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.25e-09 ft/sec
Ky'/Kx' Ratio: 1.3
Rotation: 0 °
Volumetric Water Content: 0.51
Compressibility: 0 /psf

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Fly Ash
Ky'/Kx' Ratio: 1
Rotation: 0 °

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.7e-08 ft/sec
Ky'/Kx' Ratio: 1.5
Rotation: 0 °
Volumetric Water Content: 0.24
Compressibility: 0 /psf

Bottom Ash - 100 pcf, 35 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Fly Ash
K-Function: Gray Silty Clay
Ky'/Kx' Ratio: 1
Rotation: 0 °

Scrubber Sludge - 125 pcf, 30 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated / Unsaturated
Vol. WC. Function: Silty Clay Fill
K-Function: Silty Clay Fill
Ky'/Kx' Ratio: 1
Rotation: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Hydraulic

Hydraulic Material Model: Saturated Only
Sat Kx: 2.56e-05 ft/sec
Ky'/Kx' Ratio: 2
Rotation: 0 °
Volumetric Water Content: 0
Compressibility: 0 /psf

Boundary Conditions

Drainage

Category: Hydraulic
Kind: Water Rate 0 ft^3/sec
Review: Yes

CCR Ash Impoundment Head

Category: Hydraulic
Kind: Water Total Head 552 ft
Review: No

Zero Pressure Head

Category: Hydraulic
Kind: Water Pressure Head 0 ft

Drawdown

Category: Hydraulic
Kind: Water Total Head 532 ft
Review: No

Upstream Face

Category: Hydraulic
Kind: Water Flux 0 ft/sec
Review: Yes

CCR Ash Impoundment Head 24-hr Storm

Category: Hydraulic
Kind: Water Total Head 562.5 ft
Review: No

Water K Functions

Gray Silty Clay

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure

Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 3.28e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 3.28e-09)
Data Point: (0.20885434, 3.2768413e-09)
Data Point: (0.3864664, 3.2740449e-09)
Data Point: (0.71512174, 3.269786e-09)
Data Point: (1.3232692, 3.2628706e-09)
Data Point: (2.4485922, 3.2514884e-09)
Data Point: (4.5309023, 3.2323852e-09)
Data Point: (8.384032, 3.1999866e-09)
Data Point: (15.513906, 3.145105e-09)
Data Point: (28.707105, 3.0519519e-09)
Data Point: (53.119948, 2.8966031e-09)
Data Point: (98.293744, 2.6445678e-09)
Data Point: (181.88384, 2.2543966e-09)
Data Point: (336.55989, 1.7057192e-09)
Data Point: (622.77416, 1.0504843e-09)
Data Point: (1,152.3883, 4.6609534e-10)
Data Point: (2,132.3921, 1.3414591e-10)
Data Point: (3,945.8021, 2.5857655e-11)
Data Point: (7,301.3562, 3.9605113e-12)
Data Point: (13,510.511, 5.4476118e-13)
Data Point: (25,000, 4.1661512e-14)
Estimation Properties
Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Gray Silty Clay
Saturated Kx: 3.28e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Saturated Kx: 2.14e-09 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)
Data Point: (0, 2.14e-09)
Data Point: (0.20885434, 2.137939e-09)
Data Point: (0.3864664, 2.1361145e-09)
Data Point: (0.71512174, 2.1333357e-09)
Data Point: (1.3232692, 2.1288237e-09)
Data Point: (2.4485922, 2.1213973e-09)
Data Point: (4.5309023, 2.1089335e-09)
Data Point: (8.384032, 2.0877956e-09)
Data Point: (15.513906, 2.0519887e-09)
Data Point: (28.707105, 1.9912121e-09)
Data Point: (53.119948, 1.8898566e-09)
Data Point: (98.293744, 1.7254192e-09)
Data Point: (181.88384, 1.4708563e-09)
Data Point: (336.55989, 1.1128779e-09)

Data Point: (622.77416, 6.8537712e-10)
Data Point: (1,152.3883, 3.0409879e-10)
Data Point: (2,132.3921, 8.7522018e-11)
Data Point: (3,945.8021, 1.6870537e-11)
Data Point: (7,301.3562, 2.5839914e-12)
Data Point: (13,510.511, 3.5542305e-13)
Data Point: (25,000, 2.7181552e-14)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Silty Clay Fill
Saturated Kx: 2.14e-09 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Fly Ash

Model: Hyd K Data Point Function
Function: Water X-Conductivity vs. Water Pressure

Curve Fit to Data: 100 %
Segment Curvature: 100 %

Saturated Kx: 2.56e-05 ft/sec
Data Points: Matric Suction (psf), Water X-Conductivity (ft/sec)

Data Point: (0, 2.56e-05)
Data Point: (0.20885434, 2.5588078e-05)
Data Point: (0.3864664, 2.5573948e-05)
Data Point: (0.71512174, 2.5546723e-05)
Data Point: (1.3232692, 2.5491435e-05)
Data Point: (2.4485922, 2.5380193e-05)
Data Point: (4.5309023, 2.5156329e-05)
Data Point: (8.384032, 2.4710464e-05)
Data Point: (15.513906, 2.3846489e-05)
Data Point: (28.707105, 2.2216354e-05)
Data Point: (53.119948, 1.9335256e-05)
Data Point: (98.293744, 1.4758027e-05)
Data Point: (181.88384, 8.8022586e-06)
Data Point: (336.55989, 3.4311782e-06)
Data Point: (622.77416, 7.5651642e-07)
Data Point: (1,152.3883, 1.0237451e-07)
Data Point: (2,132.3921, 1.1379726e-08)
Data Point: (3,945.8021, 1.3068497e-09)
Data Point: (7,301.3562, 1.6528043e-10)
Data Point: (13,510.511, 2.1533388e-11)
Data Point: (25,000, 1.4511011e-12)

Estimation Properties

Hyd. K-Function Estimation Method: Fredlund-Xing Function
Volume Water Content Function: Fly Ash
Saturated Kx: 2.56e-05 ft/sec
Maximum Suction: 25,000 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Vol. Water Content Functions

Fly Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)
Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)
Estimation Properties
Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Silty Clay Fill

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.44
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.44
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.44)

Data Point: (0.20885434, 0.43999943)
Data Point: (0.38282598, 0.43999876)
Data Point: (0.70171264, 0.43999724)
Data Point: (1.2862257, 0.43999374)
Data Point: (2.357627, 0.43998553)
Data Point: (4.3214847, 0.43996612)
Data Point: (7.9211981, 0.43991975)
Data Point: (14.519403, 0.4398082)
Data Point: (26.613786, 0.43953846)
Data Point: (48.782557, 0.4388846)
Data Point: (89.417486, 0.43730204)
Data Point: (163.90053, 0.43350822)
Data Point: (300.42651, 0.42465677)
Data Point: (550.67599, 0.40530206)
Data Point: (1,009.3785, 0.36835683)
Data Point: (1,850.1713, 0.31255742)
Data Point: (3,391.3282, 0.25021932)
Data Point: (6,216.2392, 0.19676385)
Data Point: (11,394.247, 0.15695087)
Data Point: (20,885.434, 0.12794241)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.44
Sample Material: Clay
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y	Hydraulic Boundary
Point 1	0 ft	532 ft	
Point 2	41 ft	532 ft	Drawdown
Point 3	96 ft	554 ft	
Point 4	108 ft	555 ft	
Point 5	129 ft	563 ft	
Point 6	144 ft	563 ft	
Point 7	250 ft	531 ft	
Point 8	114 ft	553 ft	
Point 9	139 ft	563 ft	
Point 10	148 ft	557 ft	
Point 11	144 ft	559 ft	

Point 12	144 ft	555 ft	
Point 13	118 ft	553 ft	
Point 14	125 ft	555 ft	
Point 15	130 ft	550 ft	
Point 16	144 ft	553 ft	
Point 17	152 ft	554 ft	
Point 18	150 ft	557 ft	
Point 19	110 ft	553 ft	
Point 20	110 ft	555 ft	
Point 21	112 ft	555 ft	
Point 22	112 ft	553 ft	
Point 23	250 ft	530 ft	
Point 24	136 ft	555 ft	
Point 25	177 ft	531 ft	
Point 26	136 ft	552 ft	
Point 27	250 ft	563 ft	
Point 28	0 ft	530 ft	
Point 29	0 ft	527 ft	
Point 30	250 ft	527 ft	
Point 31	0 ft	515 ft	
Point 32	250 ft	515 ft	
Point 33	250 ft	552 ft	

Lines

	Start Point	End Point	Length	Angle	Hydraulic Boundary
Line 1	4	5	22.472 ft	20.9 °	
Line 2	4	3	12.042 ft	4.76 °	Drainage
Line 3	12	10	4.4721 ft	26.6 °	
Line 4	10	11	4.4721 ft	-26.6 °	
Line 5	11	9	6.4031 ft	-38.7 °	
Line 6	16	17	8.0623 ft	7.13 °	
Line 7	17	18	3.6056 ft	-56.3 °	
Line 8	18	10	2 ft	0 °	
Line 9	14	13	7.2801 ft	15.9 °	
Line 10	13	8	4 ft	0 °	
Line 11	15	8	16.279 ft	-10.6 °	
Line 12	8	22	2 ft	0 °	
Line 13	22	19	2 ft	0 °	
Line 14	19	20	2 ft	90 °	
Line 15	20	4	2 ft	0 °	
Line 16	22	21	2 ft	90 °	
Line 17	21	20	2 ft	0 °	
Line 18	23	7	1 ft	90 °	
Line 19	12	24	8 ft	0 °	
Line 20	24	14	11 ft	0 °	
Line 21	5	24	10.63 ft	-48.8 °	
Line 22	9	5	10 ft	0 °	
Line 23	15	26	6.3246 ft	18.4 °	
Line 24	26	16	8.0623 ft	7.13 °	

Line 25	25	15	50.695 ft	-22 °	
Line 26	3	2	59.237 ft	21.8 °	Upstream Face
Line 27	7	25	73 ft	0 °	
Line 28	1	28	2 ft	90 °	
Line 29	28	23	250 ft	0 °	
Line 30	2	25	136 ft	-0.421 °	
Line 31	2	1	41 ft	0 °	Zero Pressure Head
Line 32	30	23	3 ft	90 °	
Line 33	28	29	3 ft	90 °	
Line 34	29	30	250 ft	0 °	
Line 35	29	31	12 ft	90 °	
Line 36	31	32	250 ft	0 °	
Line 37	32	30	12 ft	90 °	
Line 38	9	6	5 ft	0 °	CCR Ash Impoundment Head 24-hr Storm
Line 39	6	27	106 ft	0 °	CCR Ash Impoundment Head 24-hr Storm
Line 40	27	33	11 ft	90 °	
Line 41	33	26	114 ft	0 °	CCR Ash Impoundment Head
Line 42	7	33	21 ft	90 °	

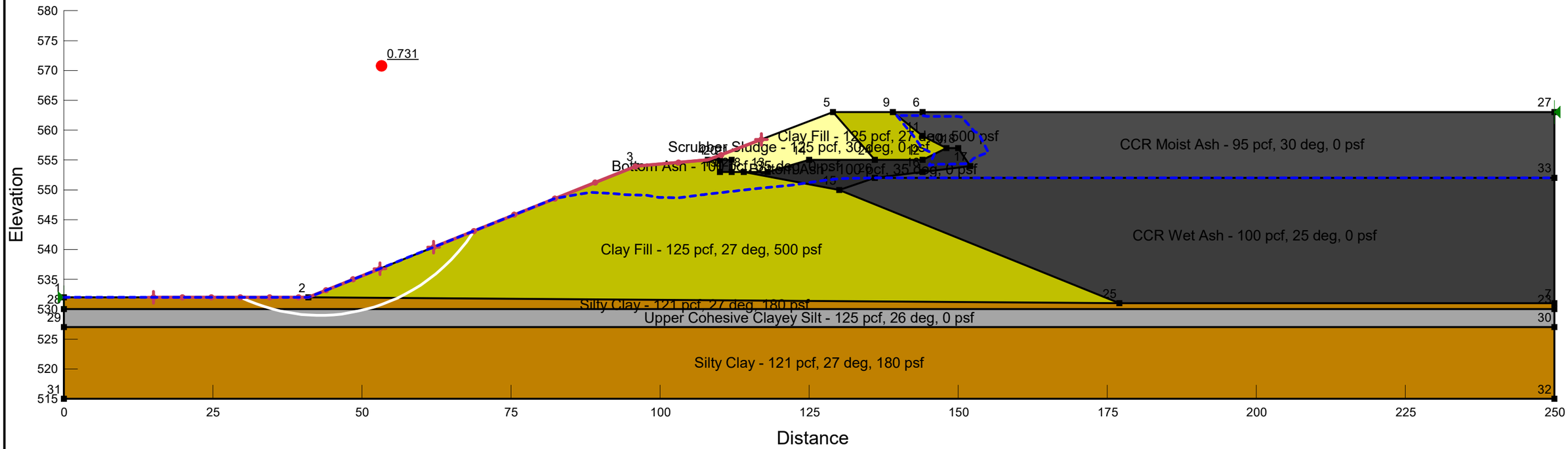
Regions

	Material	Points	Area
Region 1	Scrubber Sludge - 125 pcf, 30 deg, 0 psf	24,14,13,8,22,21,20,4,5	131 ft²
Region 2	Clay Fill - 125 pcf, 27 deg, 500 psf	25,15,8,22,19,20,4,3,2	1,784.5 ft²
Region 3	Bottom Ash - 100 pcf, 35 deg, 0 psf	8,15,26,16,17,18,10,12,24,14,13	106 ft²
Region 4	Bottom Ash - 100 pcf, 35 deg, 0 psf	20,21,22,19	4 ft²
Region 5	Silty Clay - 121 pcf, 27 deg, 180 psf	23,7,25,2,1,28	359 ft²
Region 6	Clay Fill - 125 pcf, 27 deg, 500 psf	5,24,12,10,11,9	90 ft²
Region 7	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	30,23,28,29	750 ft²
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	29,31,32,30	3,000 ft²
Region 9	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	9,6,27,33,26,16,17,18,10,11	1,151 ft²
Region 10	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	25,7,33,26,15	2,067.5 ft²

Mesh Properties

Global Element Size: 7 ft

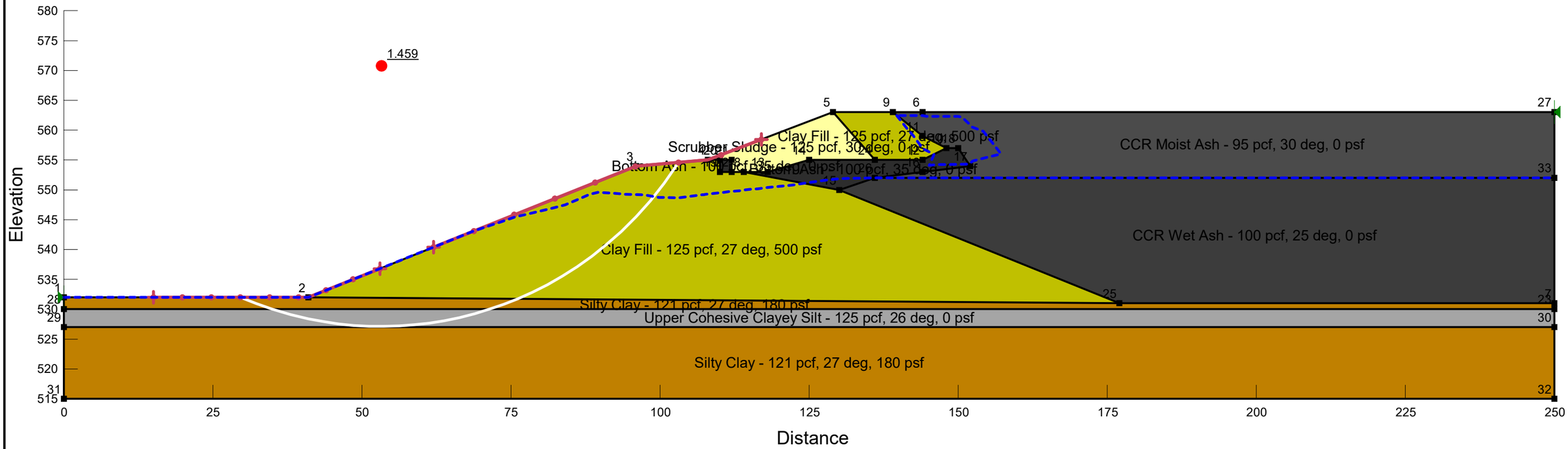
Appendix I-4:
Drained Stability Analysis



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

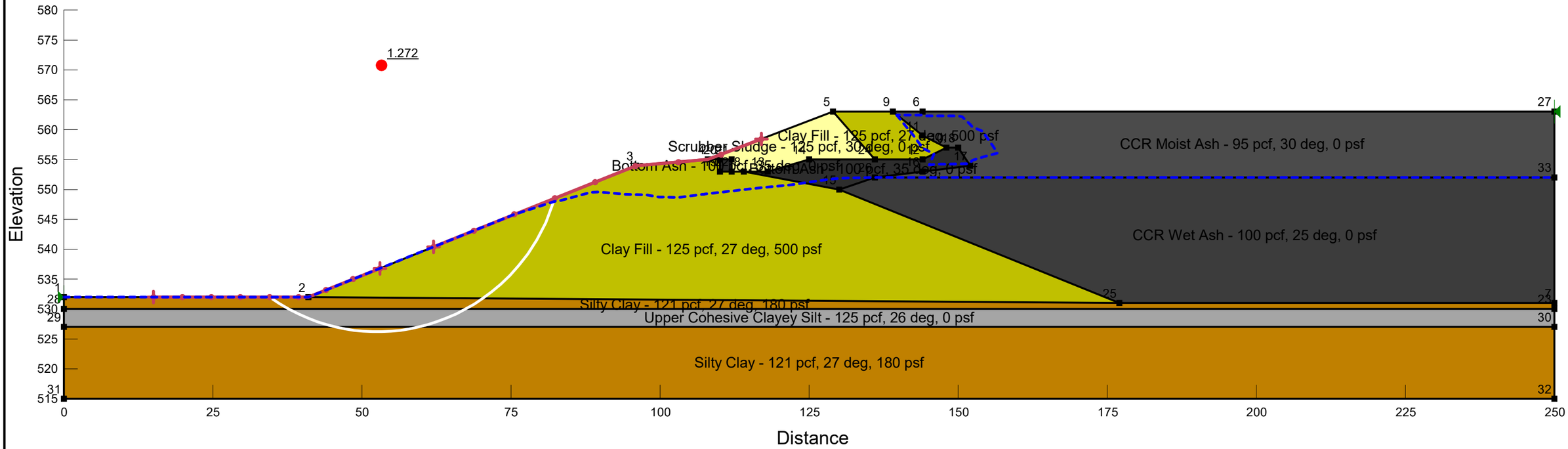
Instantaneous DD Slope Stability
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
10/23/2026 1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

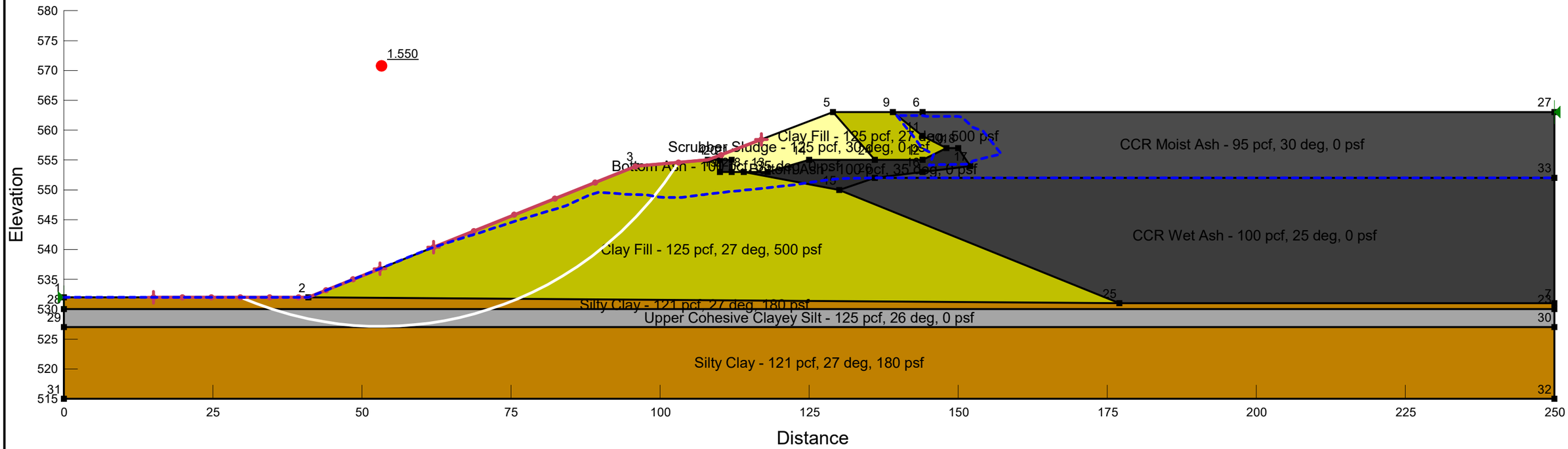
Instantaneous DD Slope Stability	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

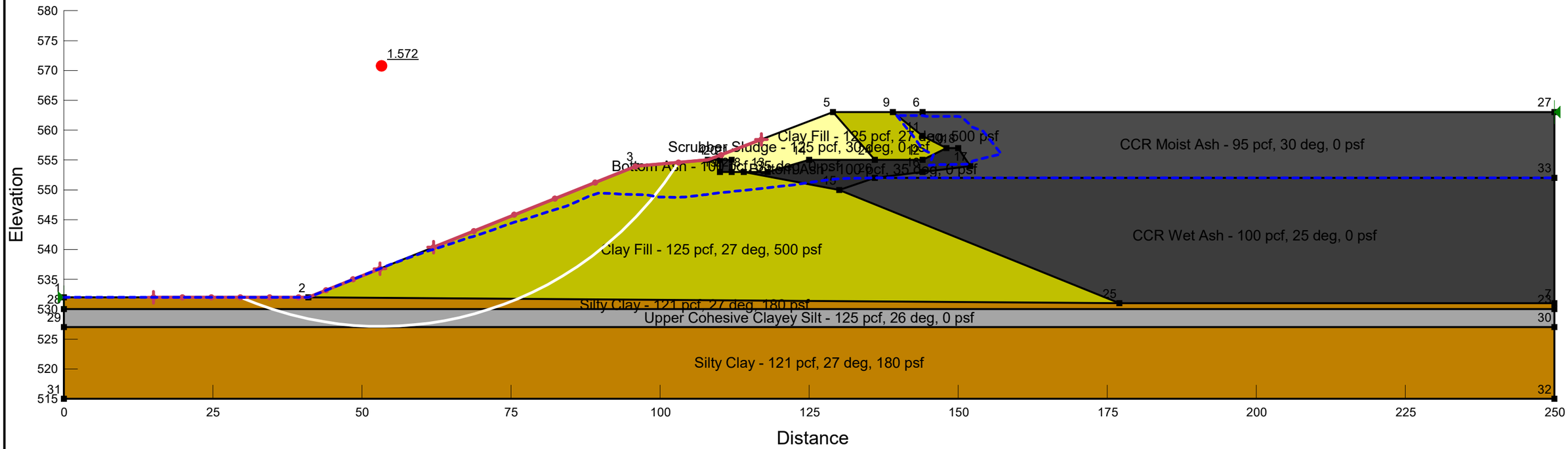
Instantaneous DD Slope Stability
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
10/23/2026 1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Instantaneous DD Slope Stability
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
10/23/2026 1:200



Materials

- Bottom Ash - 100 pcf, 35 deg, 0 psf
- CCR Moist Ash - 95 pcf, 30 deg, 0 psf
- CCR Wet Ash - 100 pcf, 25 deg, 0 psf
- Clay Fill - 125 pcf, 27 deg, 500 psf
- Scrubber Sludge - 125 pcf, 30 deg, 0 psf
- Silty Clay - 121 pcf, 27 deg, 180 psf
- Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Instantaneous DD Slope Stability	
CWLP Rapid Drawdown C-C' Max Pool rev2.gsz	
10/23/2026	1:200

Instantaneous DD Slope Stability

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File Information

File Version: 11.05
Title: Springfield CWLP
Created By: Karl Finke
Last Edited By: Karl Finke
Revision Number: 428
Date: 10/23/2026
Time: 01:51:22 PM
Tool Version: 23.1.2.11
File Name: CWLP Rapid Drawdown C-C' Max Pool rev2.gsz
Directory: D:\SlopeW\CWLP\Updated Geometry\USEPA\2026 Update\Clarification\Revise CCR Seepage\Sept 2026\
Last Solved Date: 10/23/2026
Last Solved Time: 01:51:34 PM

Project Settings

Unit System: U.S. Customary Units

Analysis Settings

Instantaneous DD Slope Stability

Kind: SLOPE/W
Parent: Instantaneous drawdown
Analysis Type: Morgenstern-Price
Settings
- Side Function
  - Intercolumn force function option: Half-Sine
- PWP Conditions from Parent Analysis: Instantaneous drawdown [(all)]
- Unit Weight of Water: 62.430189 pcf

Slip Surface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: No
- Tension Crack Option: (none)

Distribution
- F of S Calculation Option: Constant

Convergence
- Geometry Settings
  - Minimum Slip Surface Depth: 0.5 ft
  - Minimum Slip Surface Volume: 35.314667 ft^3
  - Number of Columns: 30
- Factor of Safety Convergence Settings
  - Maximum Number of Iterations: 100
  - Tolerable difference in F of S: 0.001

Under-Relaxation Criteria
Initial Rate: 1
Minimum Rate: 0.1
Rate Reduction Factor: 0.65
Reduction Frequency (iterations): 50
Solution Settings
Search Method: Root Finder
Tolerable difference between starting and converged F of S: 3
Maximum iterations to calculate converged lambda: 20
Max Absolute Lambda: 2

Materials

Clay Fill - 125 pcf, 27 deg, 500 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 500 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

Silty Clay - 121 pcf, 27 deg, 180 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 121 pcf
Effective Cohesion: 180 psf
Effective Friction Angle: 27 °
Phi-B: 0 °

CCR Moist Ash - 95 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 95 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 30 °
Vol. WC. Function: Fly Ash
Residual Water Content (% of Sat WC): 35 %

Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 26 °
Phi-B: 0 °

Bottom Ash - 100 pcf, 35 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 35 °
Phi-B: 0 °

Scrubber Sludge - 125 pcf, 30 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 125 pcf
Effective Cohesion: 0 psf

Effective Friction Angle: 30 °
Phi-B: 0 °

CCR Wet Ash - 100 pcf, 25 deg, 0 psf

Slope Stability Material Model: Mohr-Coulomb
Unit Weight: 100 pcf
Effective Cohesion: 0 psf
Effective Friction Angle: 25 °
Phi-B: 0 °

Slip Surface Entry and Exit

Left Type: Range
Left-Zone Left Coordinate: (15, 532) ft
Left-Zone Right Coordinate: (53, 536.8) ft
Left-Zone Increment: 8
Right Type: Range
Right-Zone Left Coordinate: (62, 540.4) ft
Right-Zone Right Coordinate: (117, 558.42857) ft
Right-Zone Increment: 8
Radius Increments: 4

Slip Surface Limits

Left Coordinate: (0, 532) ft
Right Coordinate: (250, 563) ft

Vol. Water Content Functions

Fly Ash

Model: Vol WC Data Point Function
Function: Volumetric Water Content vs. Water Pressure
Compressibility: 0 /psf
Saturated Water Content: 0.30000006
Curve Fit to Data: 100 %
Segment Curvature: 100 %
Porosity: 0.30000006
Data Points: Matric Suction (psf), Volumetric Water Content
Data Point: (0, 0.3)
Data Point: (0.20885434, 0.299999)
Data Point: (0.38282598, 0.29999749)
Data Point: (0.70171264, 0.29999356)
Data Point: (1.2862257, 0.2999833)
Data Point: (2.357627, 0.29995631)
Data Point: (4.3214847, 0.29988506)
Data Point: (7.9211981, 0.29969647)
Data Point: (14.519403, 0.2991971)
Data Point: (26.613786, 0.29787936)
Data Point: (48.782557, 0.29444321)
Data Point: (89.417486, 0.28577206)
Data Point: (163.90053, 0.26560983)
Data Point: (300.42651, 0.22645249)

Data Point: (550.67599, 0.17101613)
Data Point: (1,009.3785, 0.11800084)
Data Point: (1,850.1713, 0.080740817)
Data Point: (3,391.3282, 0.057711328)
Data Point: (6,216.2392, 0.043406793)
Data Point: (11,394.247, 0.033978031)
Data Point: (20,885.434, 0.027298541)

Estimation Properties

Vol. WC Estimation Method: Sample functions
Saturated Water Content: 0.3
Sample Material: Silt
Liquid Limit: 0 %
Diameter at 10% passing: 0
Diameter at 60% passing: 0
Maximum Suction: 20,885.434 psf
Minimum Suction: 0.20885434 psf
Num. Points: 20

Geometry

Name: 2D Geometry

Settings

View: 2D
Element Thickness: 0.5 ft

Points

	X	Y
Point 1	0 ft	532 ft
Point 2	41 ft	532 ft
Point 3	96 ft	554 ft
Point 4	108 ft	555 ft
Point 5	129 ft	563 ft
Point 6	144 ft	563 ft
Point 7	250 ft	531 ft
Point 8	114 ft	553 ft
Point 9	139 ft	563 ft
Point 10	148 ft	557 ft
Point 11	144 ft	559 ft
Point 12	144 ft	555 ft
Point 13	118 ft	553 ft
Point 14	125 ft	555 ft
Point 15	130 ft	550 ft
Point 16	144 ft	553 ft
Point 17	152 ft	554 ft
Point 18	150 ft	557 ft
Point 19	110 ft	553 ft
Point 20	110 ft	555 ft
Point 21	112 ft	555 ft
Point 22	112 ft	553 ft
Point 23	250 ft	530 ft

Point 24	136 ft	555 ft
Point 25	177 ft	531 ft
Point 26	136 ft	552 ft
Point 27	250 ft	563 ft
Point 28	0 ft	530 ft
Point 29	0 ft	527 ft
Point 30	250 ft	527 ft
Point 31	0 ft	515 ft
Point 32	250 ft	515 ft
Point 33	250 ft	552 ft

Regions

	Material	Points	Area
Region 1	Scrubber Sludge - 125 pcf, 30 deg, 0 psf	24,14,13,8,22,21,20,4,5	131 ft^2
Region 2	Clay Fill - 125 pcf, 27 deg, 500 psf	25,15,8,22,19,20,4,3,2	1,784.5 ft^2
Region 3	Bottom Ash - 100 pcf, 35 deg, 0 psf	8,15,26,16,17,18,10,12,24,14,13	106 ft^2
Region 4	Bottom Ash - 100 pcf, 35 deg, 0 psf	20,21,22,19	4 ft^2
Region 5	Silty Clay - 121 pcf, 27 deg, 180 psf	23,7,25,2,1,28	359 ft^2
Region 6	Clay Fill - 125 pcf, 27 deg, 500 psf	5,24,12,10,11,9	90 ft^2
Region 7	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf	30,23,28,29	750 ft^2
Region 8	Silty Clay - 121 pcf, 27 deg, 180 psf	29,31,32,30	3,000 ft^2
Region 9	CCR Moist Ash - 95 pcf, 30 deg, 0 psf	9,6,27,33,26,16,17,18,10,11	1,151 ft^2
Region 10	CCR Wet Ash - 100 pcf, 25 deg, 0 psf	25,7,33,26,15	2,067.5 ft^2

Slip Results

Slip Surfaces Analysed: 319 of 405 converged

Current Slip Surface

Slip Surface: 168
Factor of Safety: 1.572
Volume: 678.84629 ft^3
Weight: 84,538.297 lbf
Resisting Moment: 2,385,941.7 lbf·ft
Activating Moment: 1,518,384 lbf·ft
Resisting Force: 34,044.583 lbf
Activating Force: 21,661.045 lbf
Slip Rank: 1 of 405 slip surfaces
Exit: (103.0751, 554.58959) ft
Entry: (29.596648, 532) ft
Radius: 59.126882 ft
Center: (53.133025, 586.24046) ft

Slip Columns

	X	Y	PWP	Base Normal Stress	Frictional Strength	Cohesive Strength	Suction Strength	Base Material
Column 1	101.89592 ft	552.86667 ft	-258.50676 psf	-174.03256 psf	-88.674018 psf	500 psf	0 psf	Clay Fill - 125 pcf,

								27 deg, 500 psf
Column 2	99.53755 ft	549.64836 ft	-43.194633 psf	132.15093 psf	67.33426 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 3	97.17918 ft	546.83492 ft	123.83079 psf	441.92231 psf	162.07572 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 4	94.75413 ft	544.28104 ft	256.83117 psf	693.59902 psf	222.54434 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 5	92.26239 ft	541.94466 ft	382.25082 psf	884.14718 psf	255.72897 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 6	89.77064 ft	539.85994 ft	478.5132 psf	1,042.3186 psf	287.27322 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 7	87.27890 ft	537.99403 ft	553.52152 psf	1,174.3543 psf	316.33011 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 8	84.78716 ft	536.32225 ft	618.03732 psf	1,285.2258 psf	339.94952 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 9	82.29541 ft	534.82556 ft	666.05249 psf	1,376.1925 psf	361.83442 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 10	79.80367 ft	533.48900 ft	702.74414 psf	1,449.6578 psf	380.57149 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 11	77.31193 ft	532.30063 ft	732.92469 psf	1,507.199 psf	394.51246 psf	500 psf	0 psf	Clay Fill - 125 pcf, 27 deg, 500 psf
Column 12	74.89487 ft	531.27844 ft	749.98173 psf	1,600.2882 psf	433.25279 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 13	72.55248 ft	530.40736 ft	758.04462 psf	1,613.9683 psf	436.11492 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 14	70.11540 ft	529.62032 ft	764.35902 psf	1,639.7459 psf	426.95472 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 15	67.58363 ft	528.92149 ft	764.45178 psf	1,624.1406 psf	419.29824 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 16	65.05185 ft	528.34176 ft	756.2635 psf	1,593.5457 psf	408.36983 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 17	62.52008 ft	527.87756 ft	740.93122 psf	1,547.5839 psf	393.43078 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 18	59.98831 ft	527.52616 ft	716.27295 psf	1,485.7241 psf	375.28642 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 19	57.45653 ft	527.28552 ft	684.73717 psf	1,407.4816 psf	352.50603 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 20	54.92476 ft	527.15430 ft	646.30716 psf	1,312.3043 psf	324.82851 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 21	52.39298 ft	527.13176 ft	600.81352 psf	1,199.6912 psf	292.09215 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 22	49.86121 ft	527.21778 ft	548.51332 psf	1,069.209 psf	253.96025 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26

								deg, 0 psf
Column 23	47.32944 ft	527.41284 ft	492.31037 psf	920.37168 psf	208.77945 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 24	44.79766 ft	527.71803 ft	431.82648 psf	752.8896 psf	156.59294 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 25	42.26589 ft	528.13508 ft	363.8212 psf	566.82991 psf	99.013963 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 26	39.47119 ft	528.73504 ft	295.7324 psf	421.86305 psf	61.518027 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 27	36.41357 ft	529.54912 ft	216.42171 psf	316.52107 psf	48.821719 psf	0 psf	0 psf	Upper Cohesive Clayey Silt - 125 pcf, 26 deg, 0 psf
Column 28	33.56273 ft	530.46386 ft	129.74259 psf	246.85774 psf	59.673153 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf
Column 29	30.91868 ft	531.46386 ft	42.898212 psf	124.14649 psf	41.398067 psf	180 psf	0 psf	Silty Clay - 121 pcf, 27 deg, 180 psf

Appendix J:
Liquefaction Analysis

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Springfield, Illinois
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LIQUEFACTION ANALYSIS REPORT

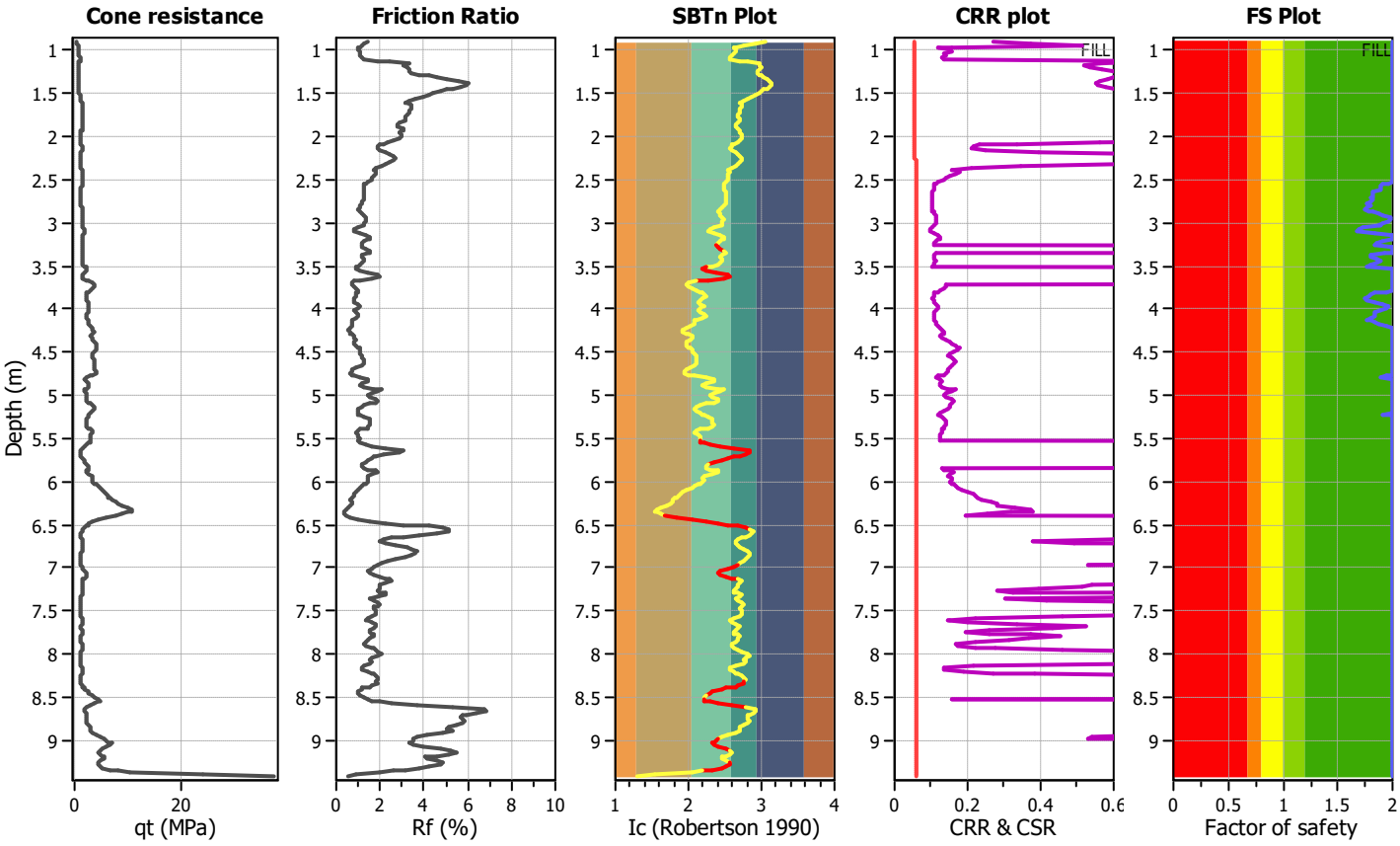
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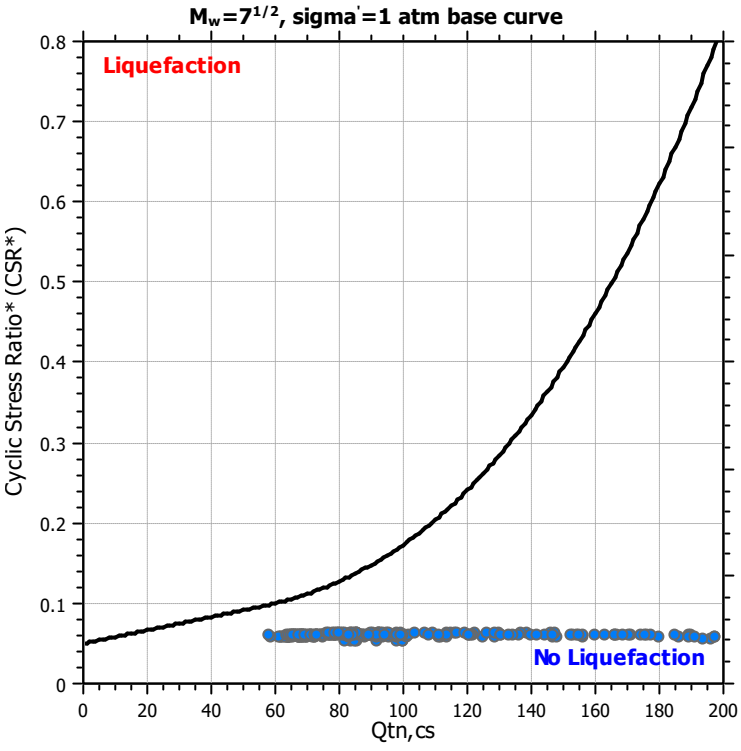
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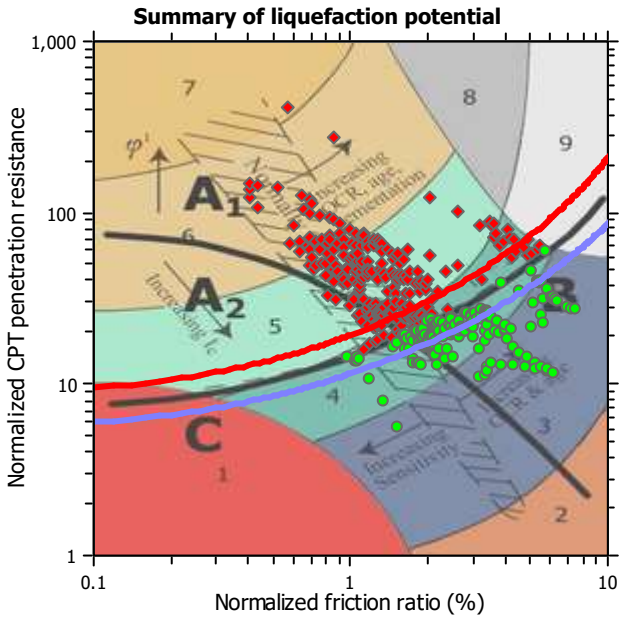
CPT file : CWLP CPT-2L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	0.50 m	Use fill:	Yes	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.63 m	Fill height:	5.52 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	19.32 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No		

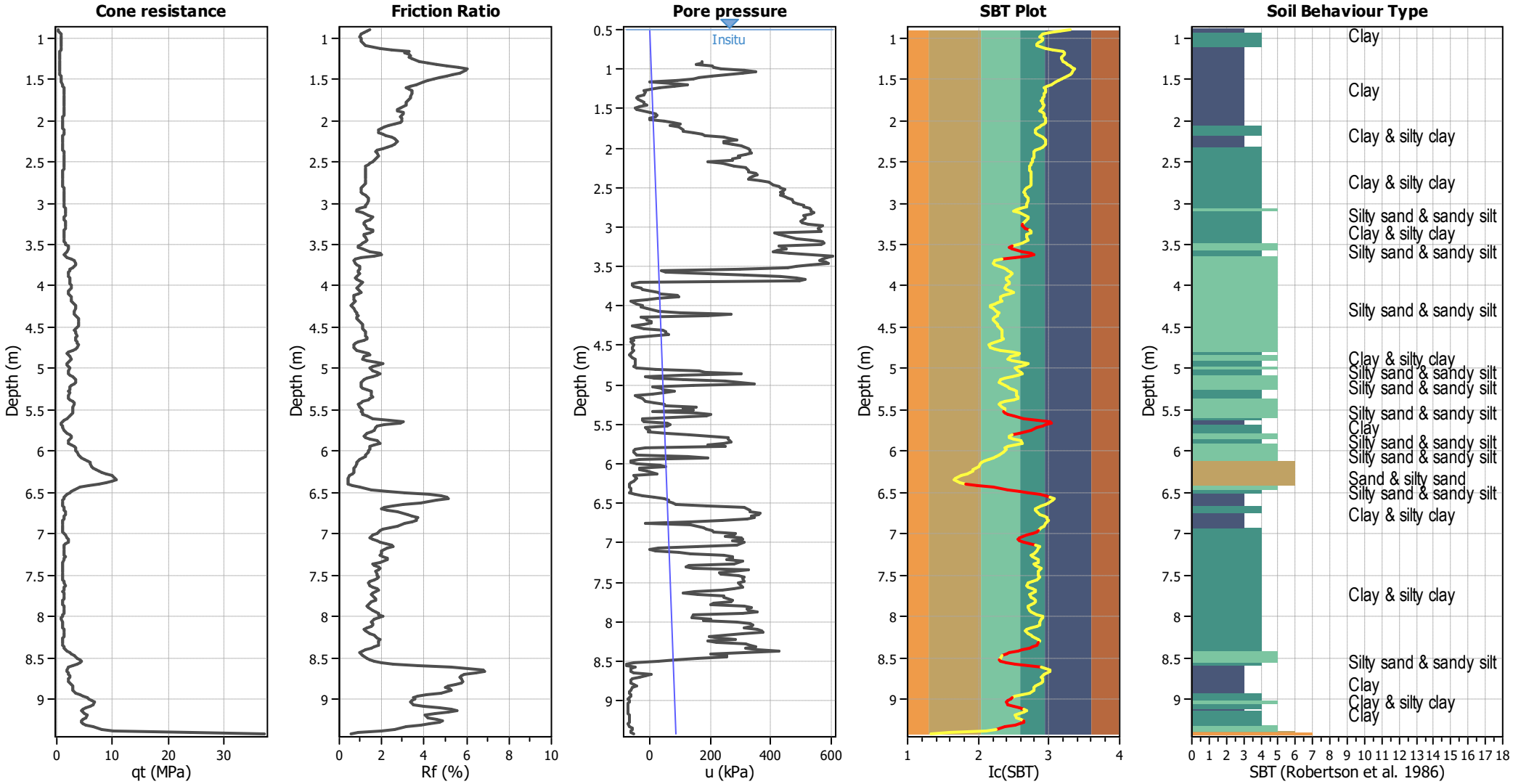






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



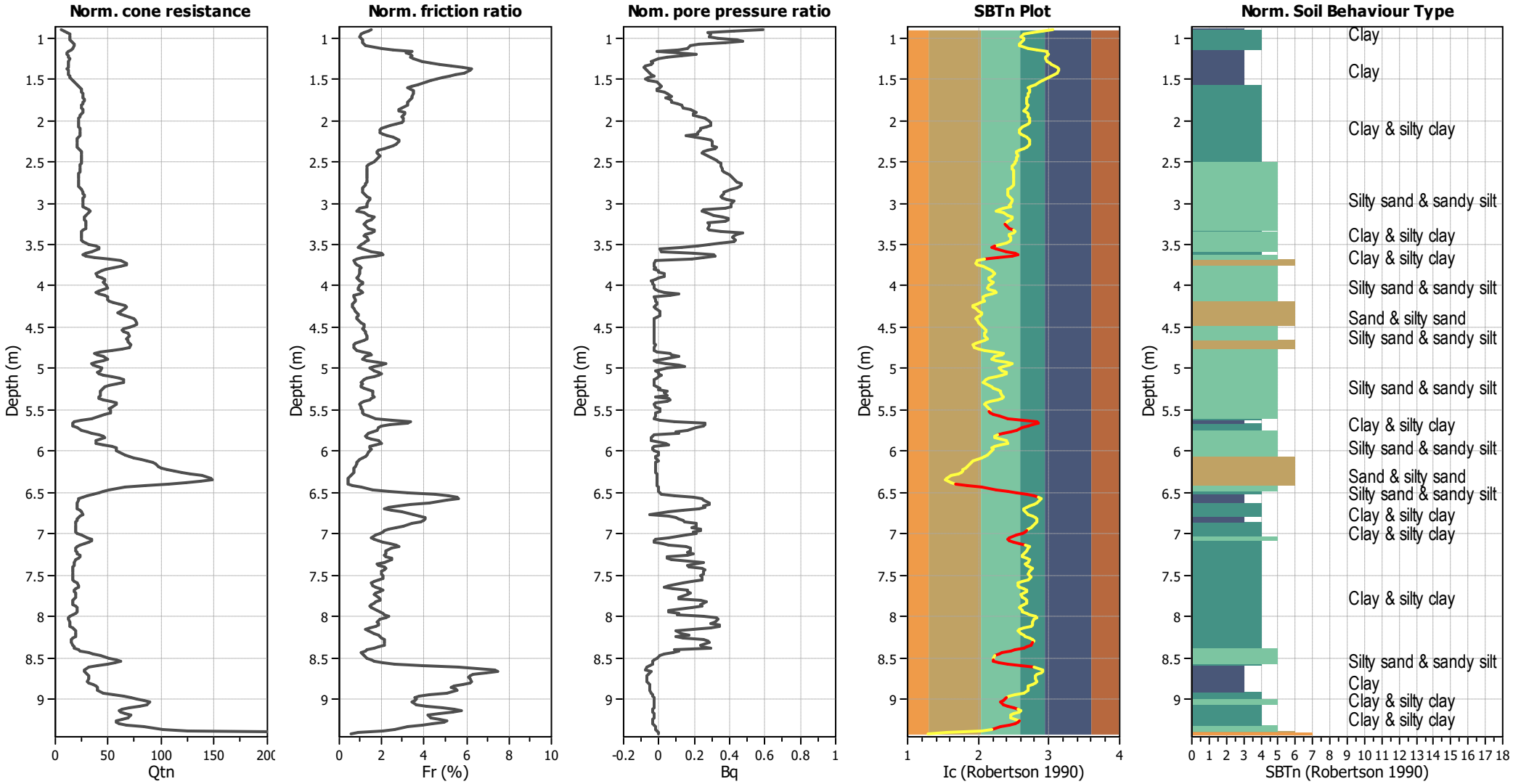
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



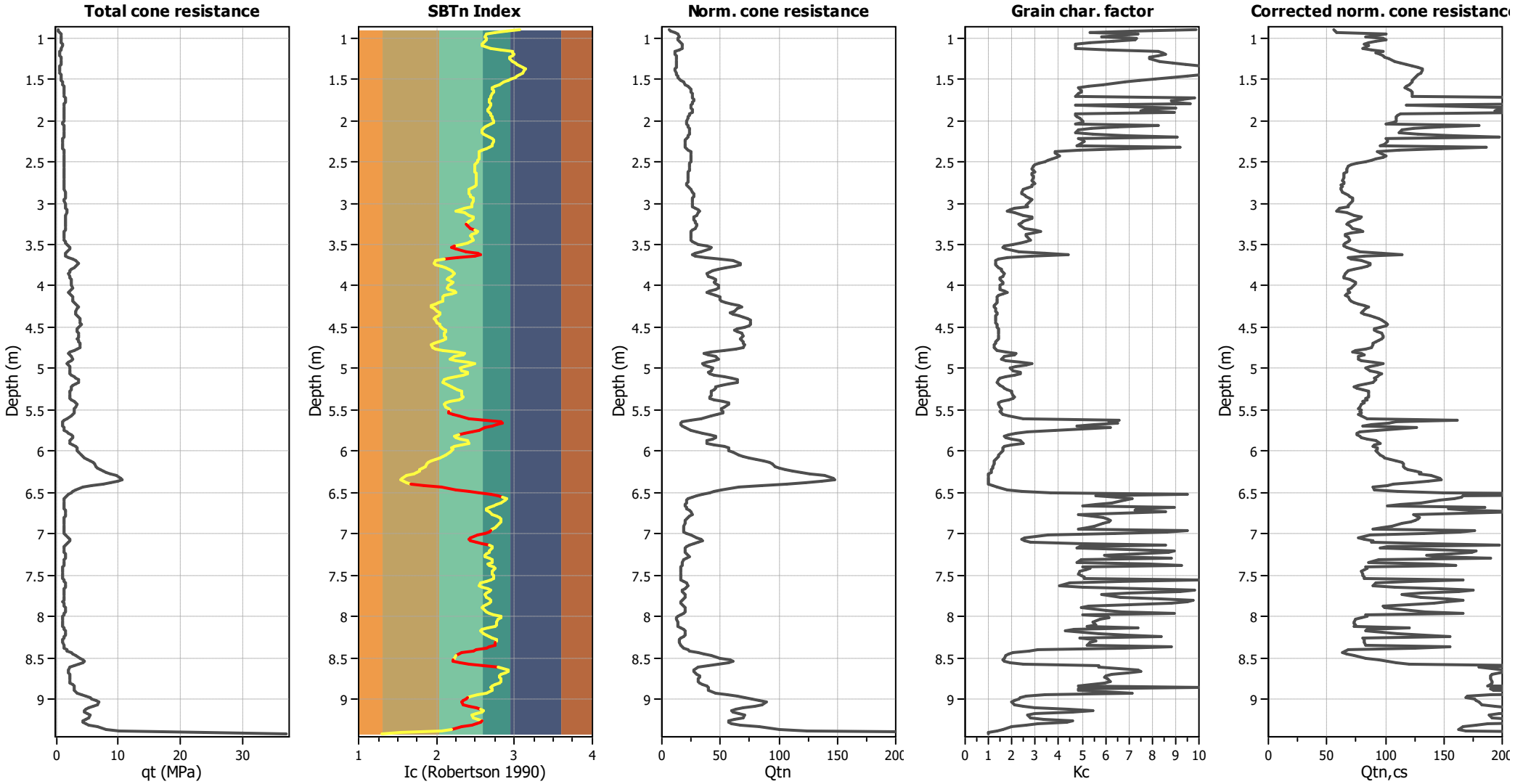
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

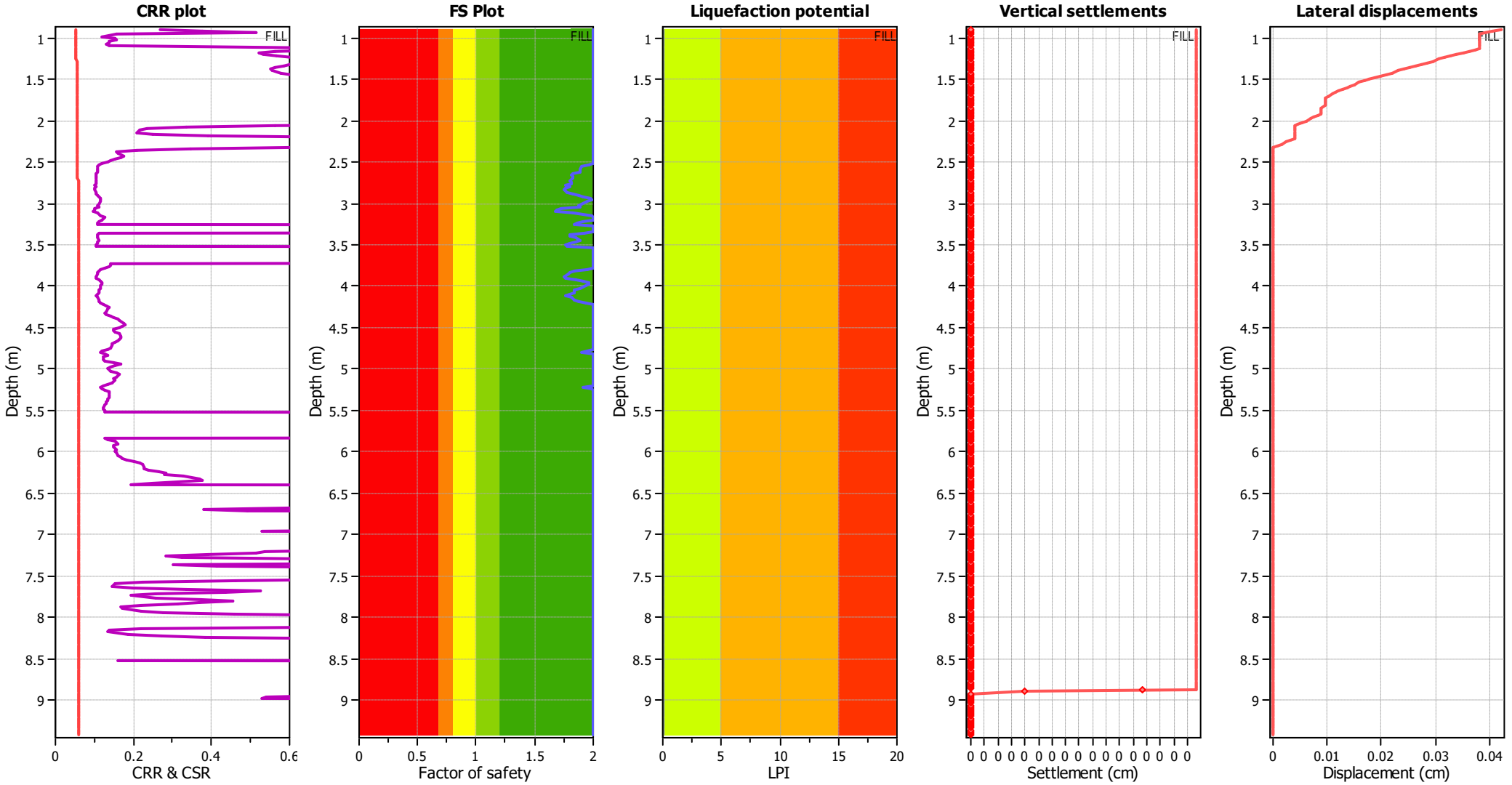
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

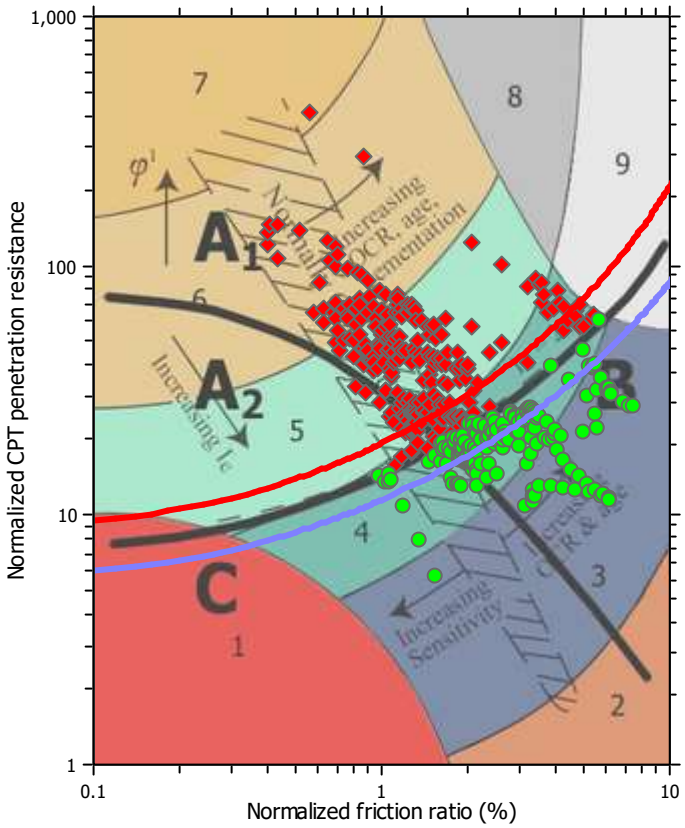
F.S. color scheme

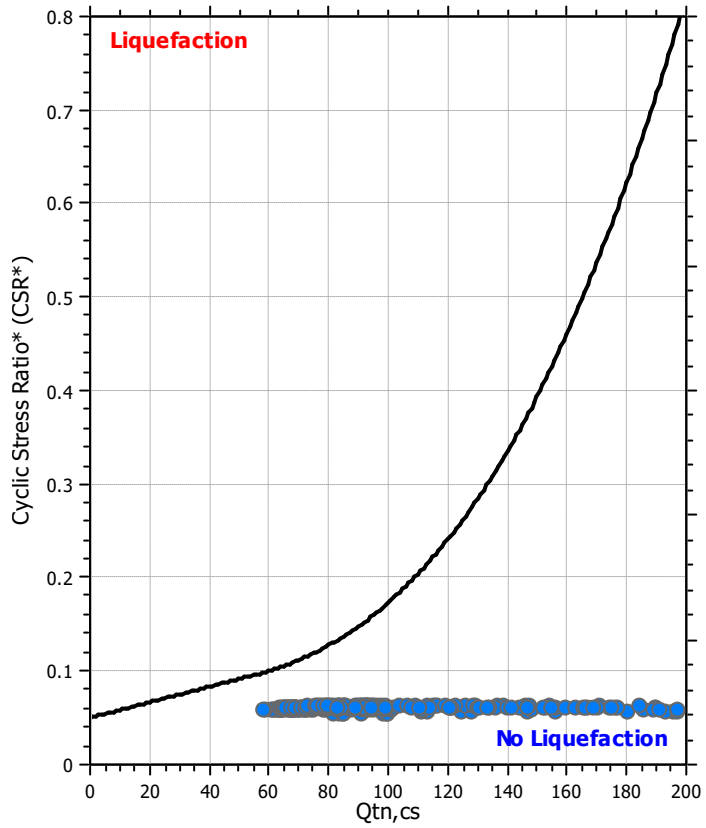
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

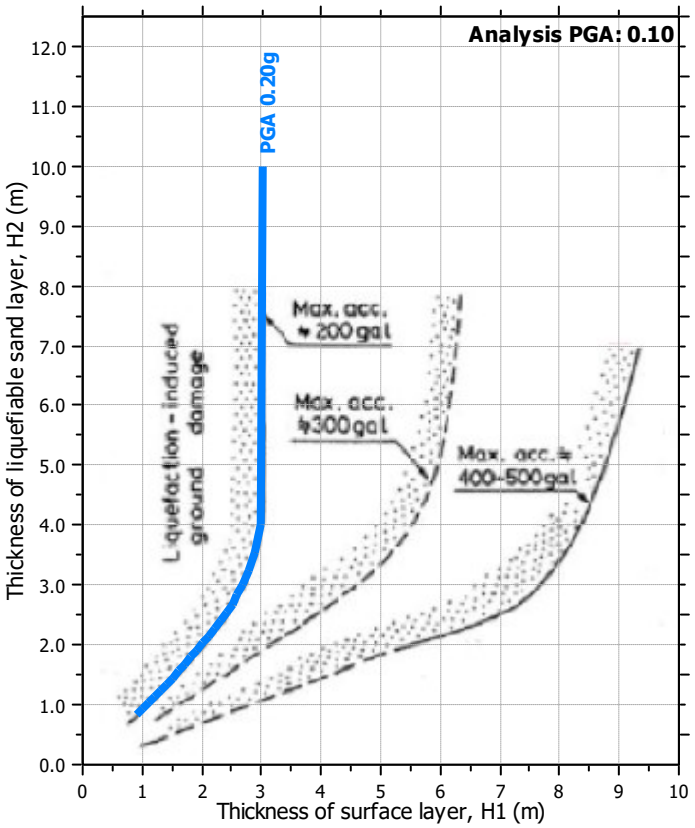
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



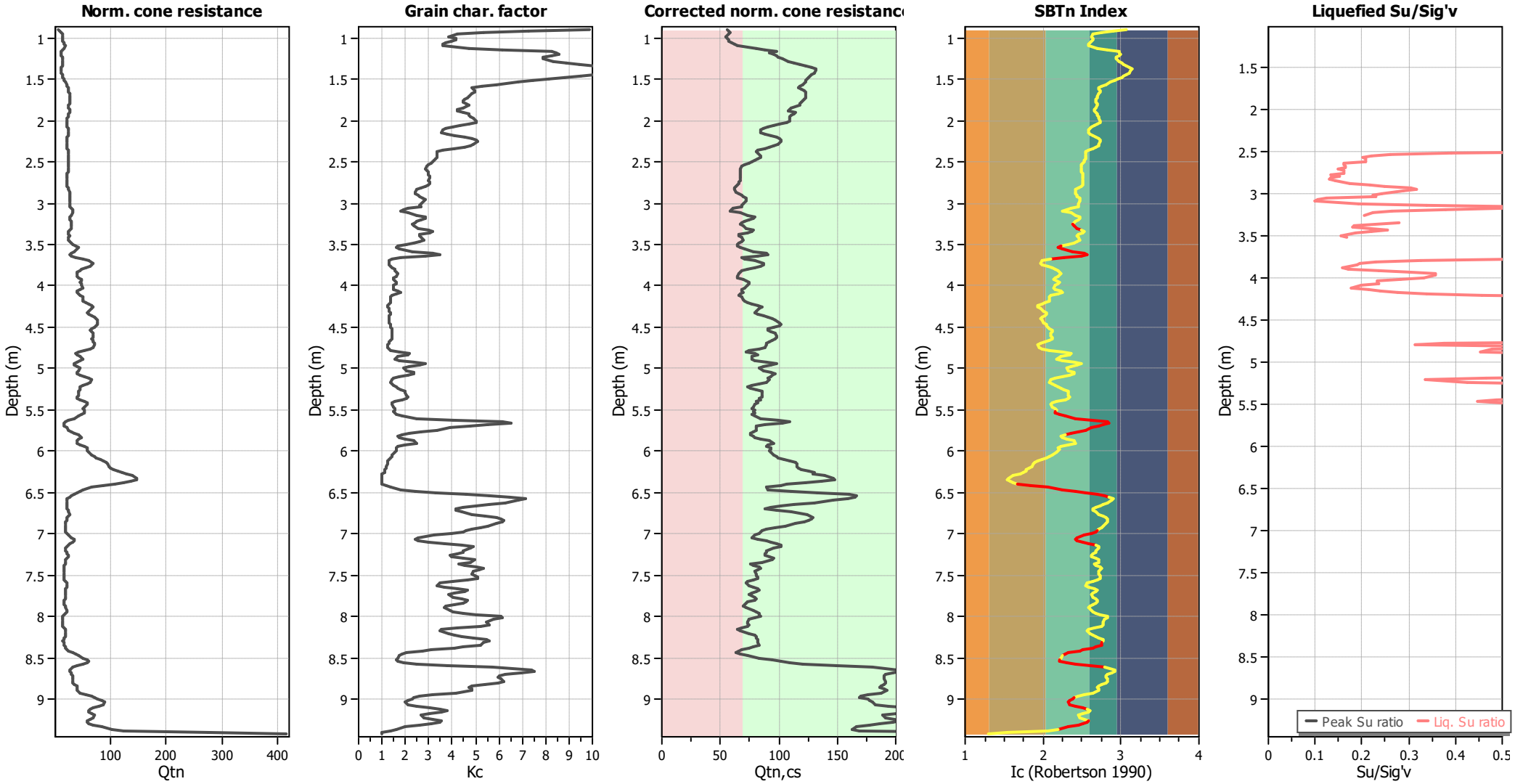




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

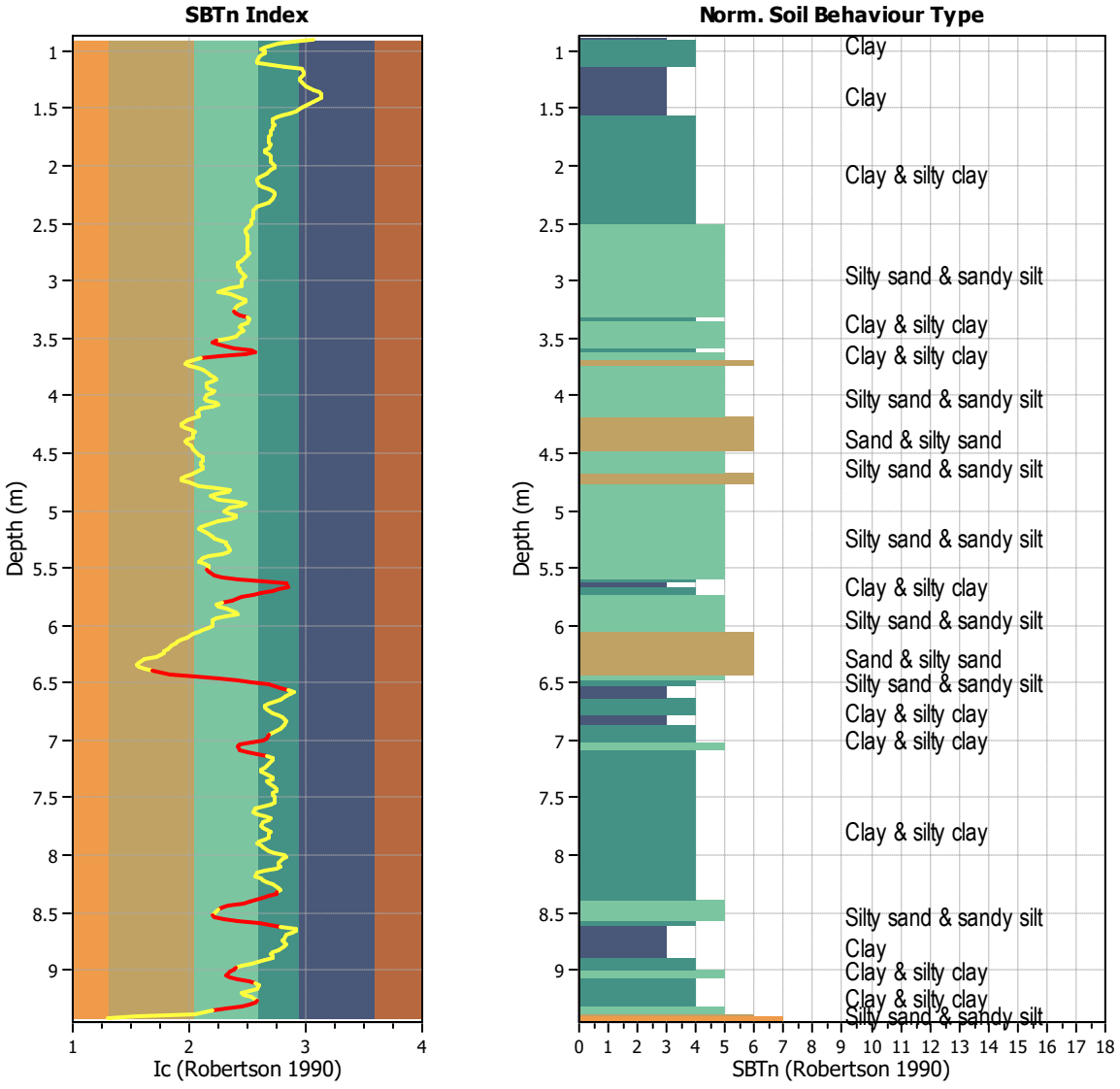
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.32 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	5.52 m	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between 1.80 < I_c < 3.0) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	427
I_c maximum check value:	3.00	Total points excluded:	80
I_c change ratio value:	0.0100	Exclusion percentage:	18.74%
Minimum number of points in layer:	3	Number of layers detected:	13

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	4	Start depth: 3.28 (m)	5	Silty sand & sandy silt
		End depth: 3.34 (m)	4	Clay & silty clay
Transition layer 2	5	Start depth: 3.54 (m)	5	Silty sand & sandy silt
		End depth: 3.62 (m)	4	Clay & silty clay
Transition layer 3	5	Start depth: 3.62 (m)	4	Clay & silty clay
		End depth: 3.70 (m)	6	Sand & silty sand
Transition layer 4	7	Start depth: 5.54 (m)	5	Silty sand & sandy silt
		End depth: 5.66 (m)	3	Clay
Transition layer 5	9	Start depth: 5.66 (m)	3	Clay
		End depth: 5.82 (m)	5	Silty sand & sandy silt
Transition layer 6	9	Start depth: 6.42 (m)	6	Sand & silty sand
		End depth: 6.58 (m)	3	Clay
Transition layer 7	5	Start depth: 6.98 (m)	4	Clay & silty clay
		End depth: 7.06 (m)	5	Silty sand & sandy silt
Transition layer 8	6	Start depth: 7.06 (m)	5	Silty sand & sandy silt
		End depth: 7.16 (m)	4	Clay & silty clay
Transition layer 9	9	Start depth: 8.34 (m)	4	Clay & silty clay
		End depth: 8.50 (m)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 8.54 (m)	5	Silty sand & sandy silt
		End depth: 8.64 (m)	3	Clay
Transition layer 11	3	Start depth: 9.00 (m)	4	Clay & silty clay
		End depth: 9.04 (m)	5	Silty sand & sandy silt
Transition layer 12	6	Start depth: 9.04 (m)	5	Silty sand & sandy silt
		End depth: 9.14 (m)	4	Clay & silty clay
Transition layer 13	6	Start depth: 9.28 (m)	4	Clay & silty clay
		End depth: 9.38 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.27	4.40	172.40	62.64	14.23
2	0.92	0.27	4.40	172.40	52.39	14.58
3	0.94	0.61	7.30	154.80	43.66	14.91
4	0.96	0.71	7.70	206.80	37.78	15.14
5	0.98	0.69	6.90	213.70	35.95	15.13
6	1.00	0.71	6.70	233.70	37.70	15.10
7	1.02	0.57	7.70	311.80	37.66	15.18
8	1.04	0.71	8.10	351.50	36.56	15.24
9	1.06	0.81	7.60	309.30	35.28	15.45
10	1.08	0.81	11.60	207.60	34.38	15.63
11	1.10	0.93	11.70	165.80	34.38	15.76
12	1.12	0.94	11.10	146.10	40.63	16.20
13	1.14	0.69	28.20	90.20	47.36	16.23
14	1.16	0.57	16.10	-1.00	56.46	16.26
15	1.18	0.56	16.60	66.40	57.14	16.07
16	1.20	0.56	20.00	126.90	57.63	16.18
17	1.22	0.59	20.80	83.20	56.40	16.29
18	1.24	0.67	21.20	34.50	54.87	16.37
19	1.26	0.69	23.00	5.10	54.79	16.46
20	1.28	0.67	25.60	-20.00	56.73	16.57
21	1.30	0.67	28.10	-13.60	58.84	16.66
22	1.32	0.67	30.00	-21.60	60.99	16.75
23	1.34	0.65	32.60	-38.10	63.44	16.82
24	1.36	0.63	35.00	-43.10	66.33	16.89
25	1.38	0.60	36.80	-37.20	68.28	16.93
26	1.40	0.61	37.20	-30.00	67.91	16.93
27	1.42	0.64	35.20	-20.70	66.02	16.93
28	1.44	0.67	35.20	-20.10	63.62	16.93
29	1.46	0.69	35.30	-11.50	61.23	16.95
30	1.48	0.75	35.30	-35.40	58.71	16.97
31	1.50	0.80	34.90	-47.70	55.92	17.00
32	1.52	0.86	35.90	-41.30	53.03	17.06
33	1.54	0.95	37.90	-1.60	50.30	17.13
34	1.56	1.01	38.20	17.80	46.31	17.20
35	1.58	1.19	38.20	22.10	43.25	17.24
36	1.60	1.25	38.70	17.60	41.22	17.29
37	1.62	1.26	41.00	-1.20	41.45	17.35
38	1.64	1.24	43.30	2.10	41.87	17.40
39	1.66	1.27	44.10	49.50	41.79	17.44
40	1.68	1.31	44.90	76.00	41.11	17.47
41	1.70	1.33	45.30	102.60	40.62	17.49
42	1.72	1.34	45.60	67.80	40.14	17.50
43	1.74	1.37	45.30	96.50	39.70	17.49
44	1.76	1.38	44.60	109.90	39.22	17.48
45	1.78	1.37	43.30	112.20	39.29	17.44
46	1.80	1.30	41.60	145.90	39.97	17.40
47	1.82	1.23	41.10	172.00	40.55	17.36
48	1.84	1.25	40.40	183.40	39.41	17.21

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.22	27.70	244.60	38.10	17.24
50	1.88	1.39	41.80	264.00	37.96	17.24
51	1.90	1.24	40.20	286.90	39.37	17.34
52	1.92	1.20	37.90	246.50	40.52	17.26
53	1.94	1.17	35.80	243.30	40.63	17.18
54	1.96	1.14	33.50	276.40	40.88	17.12
55	1.98	1.10	33.50	302.30	41.51	17.09
56	2.00	1.07	34.40	326.00	42.09	17.06
57	2.02	1.05	31.80	333.20	41.92	17.01
58	2.04	1.05	29.20	331.50	40.55	16.91
59	2.06	1.08	26.50	339.20	38.68	16.82
60	2.08	1.12	24.70	319.10	36.80	16.75
61	2.10	1.15	23.40	295.10	35.36	16.69
62	2.12	1.17	22.40	299.50	34.52	16.67
63	2.14	1.19	23.00	275.40	34.31	16.68
64	2.16	1.20	24.10	275.90	35.42	16.76
65	2.18	1.16	27.40	190.70	37.20	16.82
66	2.20	1.09	27.80	242.70	39.47	16.87
67	2.22	1.04	29.00	280.10	41.12	16.87
68	2.24	1.00	28.70	316.20	42.02	16.87
69	2.26	1.00	28.50	323.40	42.34	16.86
70	2.28	0.99	28.20	326.00	41.61	16.81
71	2.30	1.00	24.80	326.00	40.89	16.75
72	2.32	0.99	24.30	351.30	39.56	16.67
73	2.34	1.02	22.90	358.20	37.29	16.63
74	2.36	1.16	21.20	340.50	34.59	16.59
75	2.38	1.22	20.50	330.60	32.89	16.61
76	2.40	1.24	23.00	328.80	32.88	16.68
77	2.42	1.24	24.70	367.10	33.21	16.74
78	2.44	1.24	23.90	395.30	33.01	16.72
79	2.46	1.23	22.00	409.60	32.59	16.66
80	2.48	1.21	21.30	428.00	32.30	16.62
81	2.50	1.21	21.20	435.60	32.02	16.53
82	2.52	1.16	17.80	446.00	31.44	16.43
83	2.54	1.16	16.40	442.10	30.63	16.30
84	2.56	1.16	15.50	435.50	30.18	16.23
85	2.58	1.14	14.90	441.90	30.07	16.19
86	2.60	1.14	14.90	435.70	30.39	16.18
87	2.62	1.12	15.40	448.30	30.62	16.17
88	2.64	1.10	14.60	458.80	30.83	16.16
89	2.66	1.09	14.60	471.60	30.88	16.13
90	2.68	1.08	14.50	479.40	30.94	16.13
91	2.70	1.09	14.50	491.80	30.94	16.12
92	2.72	1.08	14.40	509.00	30.84	16.10
93	2.74	1.07	13.90	512.60	31.00	16.08
94	2.76	1.04	13.90	528.80	31.09	16.05
95	2.78	1.04	13.30	534.10	30.83	16.02
96	2.80	1.07	12.90	537.00	29.91	16.02

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	1.14	13.40	546.80	28.45	16.02
98	2.84	1.22	12.90	536.90	27.26	16.08
99	2.86	1.28	13.90	510.20	26.83	16.17
100	2.88	1.31	16.10	517.10	26.99	16.29
101	2.90	1.34	17.20	516.00	27.50	16.39
102	2.92	1.33	18.00	502.60	28.09	16.43
103	2.94	1.28	18.30	505.20	29.20	16.48
104	2.96	1.24	19.70	525.40	29.71	16.47
105	2.98	1.24	17.90	574.50	29.42	16.44
106	3.00	1.27	16.80	564.70	28.64	16.38
107	3.02	1.28	17.10	558.90	28.35	16.36
108	3.04	1.26	16.70	562.40	28.51	16.36
109	3.06	1.25	16.90	570.40	24.49	16.20
110	3.08	1.71	9.10	416.00	22.35	16.19
111	3.10	1.65	15.20	431.10	20.98	16.18
112	3.12	1.55	16.10	447.30	24.50	16.49
113	3.14	1.45	22.20	486.10	27.46	16.64
114	3.16	1.35	24.00	536.50	29.83	16.74
115	3.18	1.31	22.70	575.80	29.72	16.70
116	3.20	1.40	20.30	578.20	28.81	16.62
117	3.22	1.36	19.10	567.20	27.35	16.51
118	3.24	1.41	16.80	428.00	26.60	16.46
119	3.26	1.48	17.70	443.70	25.88	16.45
120	3.28	1.49	18.40	451.40	26.25	16.51
121	3.30	1.43	19.50	425.60	27.68	16.55
122	3.32	1.31	20.10	408.90	30.68	16.63
123	3.34	1.18	24.40	461.70	31.70	16.55
124	3.36	1.17	16.20	607.20	30.97	16.43
125	3.38	1.22	14.20	588.00	28.37	16.23
126	3.40	1.27	15.40	571.50	28.11	16.24
127	3.42	1.22	16.30	565.50	28.81	16.31
128	3.44	1.21	17.20	585.10	29.32	16.37
129	3.46	1.27	18.00	593.10	28.05	16.36
130	3.48	1.39	15.40	532.70	26.09	16.39
131	3.50	1.55	16.90	488.70	23.47	16.41
132	3.52	1.78	17.50	457.80	20.04	16.58
133	3.54	2.44	19.70	298.90	18.84	16.69
134	3.56	2.15	20.70	40.00	20.56	16.87
135	3.58	1.73	27.70	55.20	25.88	16.94
136	3.60	1.39	28.40	311.30	32.06	17.00
137	3.62	1.19	29.80	431.40	33.85	16.91
138	3.64	1.31	23.70	488.70	30.00	16.83
139	3.66	1.76	20.60	513.80	21.52	16.72
140	3.68	2.55	17.30	496.20	15.69	16.82
141	3.70	3.32	23.00	-33.10	12.64	16.96
142	3.72	3.56	24.20	-59.60	12.12	17.18
143	3.74	3.57	28.30	-59.50	12.83	17.28
144	3.76	3.26	30.50	-54.30	14.65	17.33

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	2.79	30.30	-30.90	16.41	17.20
146	3.80	2.44	22.10	-25.40	17.68	16.98
147	3.82	2.24	18.80	27.50	18.47	16.79
148	3.84	2.12	21.10	32.90	19.38	16.69
149	3.86	1.98	18.40	92.70	20.16	16.66
150	3.88	1.97	18.00	96.80	18.95	16.56
151	3.90	2.26	16.00	28.30	17.42	16.60
152	3.92	2.51	18.80	-9.80	17.16	16.79
153	3.94	2.46	26.00	-60.90	18.09	16.94
154	3.96	2.30	24.50	-54.10	19.36	17.03
155	3.98	2.32	25.00	-45.60	18.84	17.03
156	4.00	2.62	25.70	-25.00	17.57	16.99
157	4.02	2.61	20.80	-30.30	16.65	16.88
158	4.04	2.38	18.40	-8.50	17.60	16.79
159	4.06	2.09	22.10	27.20	20.00	16.78
160	4.08	1.88	22.60	101.60	20.94	16.77
161	4.10	2.07	18.50	269.80	18.92	16.71
162	4.12	2.48	17.50	190.90	15.86	16.56
163	4.14	2.58	14.10	-27.40	14.97	16.63
164	4.16	2.58	20.30	-10.80	15.15	16.71
165	4.18	2.63	21.10	-10.60	15.33	16.81
166	4.20	2.73	18.70	2.70	13.81	16.80
167	4.22	3.20	18.60	6.00	12.37	16.82
168	4.24	3.35	20.20	-21.80	11.03	16.86
169	4.26	3.60	19.20	-56.50	11.13	17.00
170	4.28	3.56	25.40	-20.70	12.00	17.04
171	4.30	2.94	23.20	44.80	13.18	17.07
172	4.32	3.05	22.40	52.80	14.21	17.08
173	4.34	3.08	27.20	55.20	14.08	17.20
174	4.36	3.34	30.00	61.20	13.64	17.35
175	4.38	3.72	31.20	2.70	12.55	17.38
176	4.40	3.81	27.80	-49.30	12.06	17.46
177	4.42	3.92	34.60	-61.20	12.44	17.58
178	4.44	3.94	41.20	-54.60	13.31	17.76
179	4.46	3.94	44.30	-61.20	13.92	17.86
180	4.48	3.95	45.60	-59.10	14.22	17.82
181	4.50	3.61	37.70	-54.20	14.73	17.73
182	4.52	3.35	37.40	-59.00	15.41	17.59
183	4.54	3.13	34.20	-57.20	16.15	17.60
184	4.56	3.30	40.00	-54.80	16.24	17.69
185	4.58	3.62	45.90	-58.30	15.78	17.81
186	4.60	3.73	43.90	-63.60	15.76	17.85
187	4.62	3.46	44.00	-66.80	16.14	17.85
188	4.64	3.43	46.60	-61.50	16.44	17.83
189	4.66	3.52	42.40	-56.10	15.31	17.72
190	4.68	3.64	31.70	-46.30	13.54	17.52
191	4.70	3.76	26.60	-48.60	12.13	17.34
192	4.72	3.85	27.00	-46.80	11.24	17.26

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	4.03	24.90	-48.70	11.41	17.23
194	4.76	3.54	24.90	-51.90	12.86	17.18
195	4.78	2.70	26.10	-41.70	15.36	16.98
196	4.80	2.16	17.70	17.70	20.35	16.94
197	4.82	1.75	27.70	162.90	24.63	17.03
198	4.84	1.84	35.80	184.50	24.04	17.20
199	4.86	2.55	28.20	302.10	20.03	17.16
200	4.88	2.70	20.40	107.20	18.42	17.15
201	4.90	2.36	33.40	-15.30	20.90	17.24
202	4.92	2.04	36.60	15.60	26.13	17.35
203	4.94	1.67	35.00	110.10	29.89	17.39
204	4.96	1.69	41.50	248.80	28.17	17.33
205	4.98	2.17	29.00	347.60	24.65	17.33
206	5.00	2.40	31.50	144.90	22.41	17.31
207	5.02	2.22	37.00	9.60	23.73	17.39
208	5.04	2.06	36.70	37.90	26.16	17.46
209	5.06	2.01	40.40	43.20	26.48	17.54
210	5.08	2.31	44.80	83.30	24.21	17.60
211	5.10	2.73	39.40	47.10	20.86	17.71
212	5.12	3.26	45.80	10.00	17.59	17.70
213	5.14	3.58	37.20	-49.10	15.80	17.70
214	5.16	3.66	35.80	-41.10	15.08	17.60
215	5.18	3.35	35.70	-25.90	16.29	17.43
216	5.20	2.41	26.00	-15.90	17.61	17.21
217	5.22	2.48	22.60	15.60	18.72	17.03
218	5.24	2.50	26.20	50.10	19.75	17.13
219	5.26	2.28	33.10	46.20	21.43	17.24
220	5.28	2.16	31.60	155.30	23.31	17.33
221	5.30	2.22	35.50	109.90	23.37	17.35
222	5.32	2.29	34.90	144.60	23.52	17.34
223	5.34	2.11	30.30	9.70	24.26	17.31
224	5.36	1.97	34.10	154.30	23.70	17.26
225	5.38	2.32	30.70	202.40	21.86	17.36
226	5.40	2.81	35.90	186.70	17.99	17.39
227	5.42	3.48	30.50	-23.10	16.21	17.43
228	5.44	3.28	30.20	-26.10	15.53	17.34
229	5.46	2.95	28.70	-17.30	16.63	17.28
230	5.48	2.76	28.00	58.30	17.67	17.25
231	5.50	2.73	29.40	69.00	17.89	17.34
232	5.52	3.12	35.70	56.00	17.39	17.32
233	5.54	2.94	25.60	-13.10	17.81	17.35
234	5.56	2.66	32.20	-7.50	19.28	17.25
235	5.58	2.28	30.50	-0.20	22.15	17.22
236	5.60	1.95	27.50	-3.10	27.42	17.08
237	5.62	1.14	28.60	54.70	36.86	17.04
238	5.64	0.90	36.20	131.30	47.49	16.89
239	5.66	0.84	24.80	258.80	48.89	16.68
240	5.68	0.84	16.20	261.70	44.45	16.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.88	16.60	263.90	40.95	16.23
242	5.72	0.99	18.50	267.80	36.42	16.42
243	5.74	1.38	21.80	247.40	32.86	16.63
244	5.76	1.48	24.30	194.40	28.54	16.80
245	5.78	1.80	24.50	250.30	24.94	16.96
246	5.80	2.38	27.40	-12.90	21.73	17.15
247	5.82	2.74	32.70	-47.80	20.04	17.30
248	5.84	2.75	32.00	-50.80	20.43	17.37
249	5.86	2.44	33.20	-53.40	22.87	17.42
250	5.88	2.07	39.80	-42.00	26.53	17.46
251	5.90	1.85	40.60	125.30	27.09	17.52
252	5.92	2.41	39.60	191.60	23.36	17.62
253	5.94	3.31	43.60	-34.10	19.97	17.76
254	5.96	3.47	47.80	-62.30	18.96	17.89
255	5.98	3.31	50.70	-61.20	19.26	17.90
256	6.00	3.22	45.30	-41.90	18.94	17.88
257	6.02	3.57	45.40	34.50	17.92	17.94
258	6.04	4.00	54.70	51.80	16.51	18.01
259	6.06	4.26	49.40	-34.40	15.45	18.07
260	6.08	4.51	49.90	-31.90	14.08	18.06
261	6.10	4.93	49.50	-9.70	12.46	18.08
262	6.12	5.67	47.00	25.60	11.11	18.12
263	6.14	6.04	50.30	-52.60	10.28	18.17
264	6.16	6.14	52.40	-47.20	9.85	18.17
265	6.18	6.23	45.70	-43.40	9.19	18.14
266	6.20	6.71	44.80	-46.50	8.42	18.11
267	6.22	7.03	46.50	-51.00	7.75	18.14
268	6.24	7.49	46.90	-61.50	7.64	18.31
269	6.26	8.11	63.50	-66.40	7.15	18.41
270	6.28	8.68	56.40	-67.50	6.34	18.45
271	6.30	9.47	48.60	-68.60	4.76	18.37
272	6.32	11.21	45.50	-64.10	3.76	18.27
273	6.34	10.85	41.50	-62.40	3.47	18.22
274	6.36	9.95	41.80	-65.80	3.87	18.09
275	6.38	8.78	35.00	-49.60	4.50	17.90
276	6.40	7.55	27.50	-22.00	5.00	17.75
277	6.42	6.16	33.40	11.90	8.90	17.73
278	6.44	3.60	41.90	45.90	14.49	17.82
279	6.46	2.87	49.00	60.90	20.93	17.84
280	6.48	2.87	49.00	60.90	27.01	18.08
281	6.50	2.23	83.10	75.70	32.47	18.25
282	6.52	1.92	85.80	85.10	39.85	18.34
283	6.54	1.67	82.30	189.90	44.85	18.21
284	6.56	1.25	70.20	311.80	48.78	18.03
285	6.58	1.17	62.50	331.60	51.65	17.85
286	6.60	1.15	58.80	334.20	50.45	17.67
287	6.62	1.12	44.10	365.40	47.98	17.44
288	6.64	1.11	33.00	360.10	44.79	17.16

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.11	29.40	336.10	42.12	16.96
290	6.68	1.16	27.50	349.00	39.35	16.83
291	6.70	1.24	22.30	321.90	37.70	16.78
292	6.72	1.25	25.00	243.00	37.63	17.12
293	6.74	1.62	49.40	135.20	39.00	17.38
294	6.76	1.50	45.80	-13.10	41.22	17.61
295	6.78	1.33	50.20	134.20	43.95	17.54
296	6.80	1.22	45.80	176.00	46.30	17.51
297	6.82	1.20	45.00	185.50	47.07	17.44
298	6.84	1.17	43.80	208.20	47.55	17.39
299	6.86	1.12	40.50	211.50	47.42	17.31
300	6.88	1.11	37.10	282.00	46.23	17.16
301	6.90	1.11	30.20	278.00	44.58	17.00
302	6.92	1.08	26.40	250.80	42.84	16.83
303	6.94	1.09	24.60	304.10	41.14	16.69
304	6.96	1.12	20.60	308.60	39.87	16.59
305	6.98	1.10	20.40	274.10	39.09	16.61
306	7.00	1.19	24.80	313.60	36.63	16.69
307	7.02	1.47	23.20	290.50	32.26	16.85
308	7.04	1.91	26.30	160.80	27.69	17.06
309	7.06	2.37	33.10	30.70	26.77	17.34
310	7.08	2.26	41.90	0.10	27.93	17.50
311	7.10	2.01	41.60	16.80	30.73	17.46
312	7.12	1.68	32.80	97.20	34.76	17.36
313	7.14	1.38	38.40	135.70	38.97	17.23
314	7.16	1.21	34.70	244.20	41.60	17.10
315	7.18	1.20	25.20	272.20	40.92	16.92
316	7.20	1.22	25.10	273.20	39.38	16.80
317	7.22	1.23	25.80	256.20	39.11	16.83
318	7.24	1.26	26.80	309.50	37.80	16.89
319	7.26	1.44	27.70	280.10	36.12	16.98
320	7.28	1.57	30.10	127.70	36.47	17.06
321	7.30	1.36	32.50	120.70	39.24	17.06
322	7.32	1.14	30.50	146.30	41.66	16.88
323	7.34	1.08	19.60	325.60	40.94	16.62
324	7.36	1.14	17.10	280.70	38.33	16.40
325	7.38	1.16	18.50	233.40	39.63	16.43
326	7.40	1.00	21.60	234.30	42.03	16.49
327	7.42	0.99	21.30	296.20	43.58	16.47
328	7.44	1.00	18.30	311.00	42.74	16.43
329	7.46	1.03	19.30	308.10	41.49	16.39
330	7.48	1.05	18.60	310.90	41.25	16.42
331	7.50	1.06	19.70	292.30	41.82	16.43
332	7.52	0.99	20.10	299.50	42.50	16.45
333	7.54	1.01	19.70	303.00	42.32	16.43
334	7.56	1.06	18.60	310.40	40.30	16.40
335	7.58	1.15	17.60	280.30	36.98	16.40
336	7.60	1.36	18.20	240.60	33.89	16.53

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.59	22.20	147.60	33.18	16.69
338	7.64	1.48	25.10	112.50	34.80	16.75
339	7.66	1.24	22.50	160.40	37.95	16.71
340	7.68	1.15	22.00	246.10	40.13	16.63
341	7.70	1.15	22.00	246.10	39.62	16.55
342	7.72	1.19	18.20	273.60	37.39	16.51
343	7.74	1.34	19.20	269.10	35.98	16.53
344	7.76	1.34	22.10	212.10	36.97	16.66
345	7.78	1.23	24.80	201.30	38.77	16.61
346	7.80	1.09	18.00	314.90	40.08	16.48
347	7.82	1.06	16.60	337.20	39.84	16.28
348	7.84	1.04	15.80	322.30	39.22	16.24
349	7.86	1.12	16.20	326.90	37.44	16.27
350	7.88	1.26	17.00	355.00	35.17	16.34
351	7.90	1.37	17.30	310.10	34.77	16.53
352	7.92	1.41	24.00	145.50	36.16	16.71
353	7.94	1.34	26.60	138.10	36.99	16.77
354	7.96	1.36	21.00	200.90	39.36	16.73
355	7.98	1.10	23.60	178.80	42.17	16.58
356	8.00	0.89	20.40	289.40	47.01	16.43
357	8.02	0.83	16.20	330.70	47.48	16.22
358	8.04	0.88	14.70	340.70	45.52	16.08
359	8.06	0.92	14.40	334.90	44.16	16.06
360	8.08	0.91	14.90	315.40	44.45	16.10
361	8.10	0.89	16.10	357.20	44.68	16.13
362	8.12	0.92	15.50	372.50	42.91	16.13
363	8.14	1.04	14.40	377.00	37.82	16.18
364	8.16	1.39	15.70	307.20	34.26	16.20
365	8.18	1.36	14.70	199.80	33.61	16.38
366	8.20	1.34	20.60	232.30	35.80	16.58
367	8.22	1.35	25.70	285.60	37.26	16.70
368	8.24	1.34	21.60	192.90	38.81	16.71
369	8.26	1.18	22.10	223.80	41.37	16.59
370	8.28	0.96	20.70	316.40	44.17	16.51
371	8.30	1.00	19.20	333.60	44.82	16.46
372	8.32	1.07	20.20	354.00	43.60	16.50
373	8.34	1.09	21.70	318.00	43.06	16.58
374	8.36	1.12	22.90	357.80	39.24	16.61
375	8.38	1.46	19.60	427.40	37.17	16.56
376	8.40	1.29	18.20	201.30	31.42	16.59
377	8.42	1.94	20.80	257.20	29.22	16.65
378	8.44	1.94	20.80	257.20	23.57	16.91
379	8.46	3.01	26.70	159.90	22.17	17.16
380	8.48	2.94	34.10	88.20	20.44	17.53
381	8.50	3.56	44.70	31.10	19.72	17.94
382	8.52	4.68	63.90	-51.90	19.25	18.32
383	8.54	4.72	81.00	-76.50	19.54	18.52
384	8.56	4.31	76.20	-77.30	22.46	18.61

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	3.57	90.40	-47.10	27.17	18.64
386	8.60	2.82	100.30	-63.80	35.73	18.71
387	8.62	2.02	118.50	-64.90	45.24	18.77
388	8.64	1.85	132.40	-53.20	52.82	18.81
389	8.66	1.84	133.20	3.40	53.28	18.83
390	8.68	2.00	125.30	-13.00	51.01	18.84
391	8.70	2.15	126.60	-32.80	48.05	18.85
392	8.72	2.30	128.30	-58.40	46.65	18.89
393	8.74	2.33	132.70	-60.70	46.40	18.90
394	8.76	2.24	129.60	-62.60	46.98	18.88
395	8.78	2.16	123.20	-63.50	47.58	18.88
396	8.80	2.23	132.70	-53.70	46.62	18.93
397	8.82	2.51	141.00	-44.50	43.77	19.02
398	8.84	2.92	143.20	-55.80	41.25	19.09
399	8.86	2.94	144.70	-64.10	40.40	19.12
400	8.88	2.80	146.60	-67.50	41.00	19.14
401	8.90	2.87	152.60	-65.60	41.11	19.18
402	8.92	3.06	159.40	-62.10	37.53	19.29
403	8.94	4.07	169.00	-61.00	32.03	19.43
404	8.96	5.23	177.80	-65.50	28.37	19.55
405	8.98	5.23	184.70	-71.20	26.41	19.65
406	9.00	5.66	196.40	-69.80	25.78	19.79
407	9.02	6.52	235.20	-68.60	24.38	19.90
408	9.04	6.95	226.70	-72.70	23.37	19.98
409	9.06	7.03	228.20	-73.00	24.34	19.97
410	9.08	5.78	240.60	-72.30	27.03	19.97
411	9.10	5.17	248.20	-72.00	31.07	19.96
412	9.12	4.76	253.60	-72.10	33.84	19.94
413	9.14	4.42	250.60	-72.10	35.47	19.91
414	9.16	4.37	243.30	-71.70	34.15	19.87
415	9.18	5.07	220.80	-65.60	31.08	19.86
416	9.20	5.74	225.40	-67.20	28.56	19.85
417	9.22	5.59	218.60	-66.50	29.31	19.84
418	9.24	4.60	218.80	-67.30	31.89	19.79
419	9.26	4.23	218.00	-69.30	34.17	19.73
420	9.28	4.38	206.80	-69.20	33.78	19.69
421	9.30	4.54	195.30	-71.90	31.39	19.66
422	9.32	5.09	191.20	-66.70	28.37	19.72
423	9.34	6.14	213.30	-58.10	23.24	19.84
424	9.36	8.54	212.80	-56.00	18.96	19.93
425	9.38	9.61	198.40	-62.50	14.55	19.99
426	9.40	12.28	199.60	-64.60	3.54	20.32
427	9.42	49.58	213.60	-55.50	0.33	20.52

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	6.42	119.45	17.56	101.89	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
2	6.44	119.74	17.76	101.99	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
3	6.46	120.04	17.95	102.09	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
4	6.48	120.35	18.15	102.20	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
5	6.50	120.65	18.34	102.30	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
6	6.52	120.95	18.54	102.41	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
7	6.54	121.25	18.74	102.52	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
8	6.56	121.56	18.93	102.63	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
9	6.58	121.87	19.13	102.74	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
10	6.60	122.18	19.33	102.85	0.95	0.074	1.38	0.053	1.00	1.00	0.053	No
11	6.62	122.50	19.52	102.97	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
12	6.64	122.82	19.72	103.10	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
13	6.66	123.14	19.91	103.23	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
14	6.68	123.47	20.11	103.36	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
15	6.70	123.79	20.31	103.48	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
16	6.72	124.11	20.50	103.61	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
17	6.74	124.44	20.70	103.74	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
18	6.76	124.77	20.90	103.87	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
19	6.78	125.10	21.09	104.00	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
20	6.80	125.43	21.29	104.14	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
21	6.82	125.76	21.48	104.28	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
22	6.84	126.10	21.68	104.42	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
23	6.86	126.43	21.88	104.56	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
24	6.88	126.77	22.07	104.70	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
25	6.90	127.11	22.27	104.84	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
26	6.92	127.45	22.46	104.98	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
27	6.94	127.79	22.66	105.12	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
28	6.96	128.12	22.86	105.27	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
29	6.98	128.46	23.05	105.41	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
30	7.00	128.80	23.25	105.55	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
31	7.02	129.14	23.45	105.70	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
32	7.04	129.48	23.64	105.84	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
33	7.06	129.83	23.84	105.99	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
34	7.08	130.17	24.03	106.14	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
35	7.10	130.52	24.23	106.28	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
36	7.12	130.86	24.43	106.43	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
37	7.14	131.21	24.62	106.58	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
38	7.16	131.56	24.82	106.74	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
39	7.18	131.90	25.02	106.89	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
40	7.20	132.25	25.21	107.04	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
41	7.22	132.60	25.41	107.20	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
42	7.24	132.95	25.60	107.35	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
43	7.26	133.30	25.80	107.50	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
44	7.28	133.65	26.00	107.66	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
45	7.30	134.00	26.19	107.81	0.95	0.076	1.38	0.056	1.00	1.00	0.056	No
46	7.32	134.35	26.39	107.96	0.95	0.076	1.38	0.056	1.00	1.00	0.056	No
47	7.34	134.70	26.59	108.11	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
48	7.36	135.04	26.78	108.26	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	7.38	135.39	26.98	108.41	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
50	7.40	135.73	27.17	108.56	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
51	7.42	136.08	27.37	108.71	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
52	7.44	136.42	27.57	108.86	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
53	7.46	136.77	27.76	109.00	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
54	7.48	137.11	27.96	109.15	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
55	7.50	137.45	28.15	109.30	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
56	7.52	137.79	28.35	109.44	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
57	7.54	138.13	28.55	109.58	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
58	7.56	138.47	28.74	109.73	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
59	7.58	138.81	28.94	109.87	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
60	7.60	139.14	29.14	110.01	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
61	7.62	139.48	29.33	110.14	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
62	7.64	139.81	29.53	110.28	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
63	7.66	140.14	29.72	110.42	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
64	7.68	140.48	29.92	110.56	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
65	7.70	140.81	30.12	110.70	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
66	7.72	141.15	30.31	110.84	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
67	7.74	141.49	30.51	110.98	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
68	7.76	141.83	30.71	111.12	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
69	7.78	142.16	30.90	111.26	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
70	7.80	142.50	31.10	111.40	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
71	7.82	142.83	31.29	111.54	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
72	7.84	143.17	31.49	111.68	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
73	7.86	143.50	31.69	111.81	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
74	7.88	143.83	31.88	111.95	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
75	7.90	144.16	32.08	112.09	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
76	7.92	144.50	32.27	112.22	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
77	7.94	144.83	32.47	112.36	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
78	7.96	145.17	32.67	112.50	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
79	7.98	145.50	32.86	112.64	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
80	8.00	145.83	33.06	112.77	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
81	8.02	146.16	33.26	112.91	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
82	8.04	146.49	33.45	113.04	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
83	8.06	146.82	33.65	113.17	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
84	8.08	147.14	33.84	113.30	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
85	8.10	147.47	34.04	113.43	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
86	8.12	147.79	34.24	113.55	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
87	8.14	148.11	34.43	113.68	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
88	8.16	148.44	34.63	113.81	0.94	0.079	1.38	0.058	1.00	1.00	0.058	No
89	8.18	148.76	34.83	113.93	0.93	0.079	1.38	0.058	1.00	1.00	0.058	No
90	8.20	149.08	35.02	114.06	0.93	0.079	1.38	0.058	1.00	1.00	0.058	No
91	8.22	149.40	35.22	114.19	0.93	0.079	1.38	0.058	1.00	1.00	0.058	No
92	8.24	149.73	35.41	114.31	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
93	8.26	150.05	35.61	114.44	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
94	8.28	150.37	35.81	114.56	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
95	8.30	150.69	36.00	114.69	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
96	8.32	151.01	36.20	114.81	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	8.34	151.33	36.40	114.93	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
98	8.36	151.65	36.59	115.06	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
99	8.38	151.97	36.79	115.19	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
100	8.40	152.30	36.98	115.32	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
101	8.42	152.63	37.18	115.45	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
102	8.44	152.96	37.38	115.58	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
103	8.46	153.29	37.57	115.71	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
104	8.48	153.62	37.77	115.85	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
105	8.50	153.94	37.96	115.98	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
106	8.52	154.27	38.16	116.11	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
107	8.54	154.60	38.36	116.24	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
108	8.56	154.93	38.55	116.37	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
109	8.58	155.25	38.75	116.50	0.93	0.080	1.38	0.059	1.00	1.00	0.059	No
110	8.60	155.57	38.95	116.63	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
111	8.62	155.90	39.14	116.76	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
112	8.64	156.23	39.34	116.89	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
113	8.66	156.56	39.53	117.03	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
114	8.68	156.90	39.73	117.16	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
115	8.70	157.23	39.93	117.30	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
116	8.72	157.56	40.12	117.44	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
117	8.74	157.89	40.32	117.57	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
118	8.76	158.22	40.52	117.71	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
119	8.78	158.55	40.71	117.84	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
120	8.80	158.88	40.91	117.97	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
121	8.82	159.21	41.10	118.11	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
122	8.84	159.54	41.30	118.24	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
123	8.86	159.87	41.50	118.38	0.93	0.081	1.38	0.059	1.00	1.00	2.000	Yes
124	8.88	160.20	41.69	118.51	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
125	8.90	160.53	41.89	118.64	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
126	8.92	160.85	42.08	118.77	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
127	8.94	161.18	42.28	118.90	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
128	8.96	161.51	42.48	119.03	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
129	8.98	161.83	42.67	119.16	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
130	9.00	162.16	42.87	119.29	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
131	9.02	162.49	43.07	119.42	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
132	9.04	162.82	43.26	119.56	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
133	9.06	163.15	43.46	119.70	0.92	0.082	1.38	0.059	1.00	1.00	2.000	Yes
134	9.08	163.49	43.65	119.84	0.92	0.082	1.38	0.059	1.00	1.00	2.000	Yes
135	9.10	163.83	43.85	119.98	0.92	0.082	1.38	0.059	1.00	1.00	2.000	Yes
136	9.12	164.17	44.05	120.12	0.92	0.082	1.38	0.059	1.00	1.00	2.000	Yes
137	9.14	164.51	44.24	120.27	0.92	0.082	1.38	0.059	1.00	1.00	2.000	Yes
138	9.16	164.85	44.44	120.41	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
139	9.18	165.18	44.64	120.54	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
140	9.20	165.52	44.83	120.68	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
141	9.22	165.86	45.03	120.83	0.92	0.082	1.38	0.060	1.00	1.00	2.000	Yes
142	9.24	166.20	45.22	120.97	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
143	9.26	166.54	45.42	121.12	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
144	9.28	166.89	45.62	121.27	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	9.30	167.24	45.81	121.42	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
146	9.32	167.58	46.01	121.57	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
147	9.34	167.91	46.21	121.71	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
148	9.36	168.24	46.40	121.84	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
149	9.38	168.58	46.60	121.98	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
150	9.40	168.91	46.79	122.12	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
151	9.42	169.24	46.99	122.25	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
152	9.44	169.58	47.19	122.39	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
153	9.46	169.92	47.38	122.53	0.92	0.082	1.38	0.060	1.00	1.00	0.060	No
154	9.48	170.26	47.58	122.68	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
155	9.50	170.60	47.77	122.82	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
156	9.52	170.94	47.97	122.97	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
157	9.54	171.27	48.17	123.11	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
158	9.56	171.61	48.36	123.25	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
159	9.58	171.95	48.56	123.39	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
160	9.60	172.28	48.76	123.52	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
161	9.62	172.61	48.95	123.66	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
162	9.64	172.95	49.15	123.80	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
163	9.66	173.28	49.34	123.93	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
164	9.68	173.61	49.54	124.07	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
165	9.70	173.95	49.74	124.21	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
166	9.72	174.28	49.93	124.35	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
167	9.74	174.62	50.13	124.49	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
168	9.76	174.96	50.33	124.63	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
169	9.78	175.30	50.52	124.78	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
170	9.80	175.64	50.72	124.92	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
171	9.82	175.98	50.91	125.07	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
172	9.84	176.32	51.11	125.21	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
173	9.86	176.67	51.31	125.36	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
174	9.88	177.01	51.50	125.51	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
175	9.90	177.36	51.70	125.66	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
176	9.92	177.71	51.89	125.82	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
177	9.94	178.06	52.09	125.97	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
178	9.96	178.42	52.29	126.13	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
179	9.98	178.77	52.48	126.29	0.91	0.083	1.38	0.061	1.00	1.00	0.061	No
180	10.00	179.13	52.68	126.45	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
181	10.02	179.49	52.88	126.61	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
182	10.04	179.84	53.07	126.76	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
183	10.06	180.19	53.27	126.92	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
184	10.08	180.54	53.46	127.08	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
185	10.10	180.90	53.66	127.24	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
186	10.12	181.26	53.86	127.40	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
187	10.14	181.61	54.05	127.56	0.90	0.083	1.38	0.061	1.00	1.00	0.061	No
188	10.16	181.97	54.25	127.72	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
189	10.18	182.32	54.45	127.88	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
190	10.20	182.67	54.64	128.03	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
191	10.22	183.02	54.84	128.18	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
192	10.24	183.37	55.03	128.33	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	10.26	183.71	55.23	128.48	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
194	10.28	184.05	55.43	128.63	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
195	10.30	184.39	55.62	128.77	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
196	10.32	184.73	55.82	128.91	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
197	10.34	185.07	56.02	129.06	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
198	10.36	185.42	56.21	129.21	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
199	10.38	185.76	56.41	129.35	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
200	10.40	186.10	56.60	129.50	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
201	10.42	186.45	56.80	129.65	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
202	10.44	186.80	57.00	129.80	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
203	10.46	187.14	57.19	129.95	0.90	0.084	1.38	0.061	1.00	1.00	0.061	No
204	10.48	187.49	57.39	130.10	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
205	10.50	187.84	57.58	130.25	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
206	10.52	188.18	57.78	130.40	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
207	10.54	188.53	57.98	130.55	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
208	10.56	188.88	58.17	130.71	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
209	10.58	189.23	58.37	130.86	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
210	10.60	189.58	58.57	131.02	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
211	10.62	189.94	58.76	131.18	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
212	10.64	190.29	58.96	131.33	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
213	10.66	190.64	59.15	131.49	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
214	10.68	191.00	59.35	131.65	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
215	10.70	191.35	59.55	131.80	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
216	10.72	191.69	59.74	131.95	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
217	10.74	192.03	59.94	132.09	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
218	10.76	192.37	60.14	132.24	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
219	10.78	192.72	60.33	132.39	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
220	10.80	193.06	60.53	132.54	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
221	10.82	193.41	60.72	132.69	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
222	10.84	193.76	60.92	132.84	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
223	10.86	194.10	61.12	132.99	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
224	10.88	194.45	61.31	133.14	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
225	10.90	194.80	61.51	133.29	0.89	0.084	1.38	0.061	1.00	1.00	0.061	No
226	10.92	195.14	61.70	133.44	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
227	10.94	195.49	61.90	133.59	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
228	10.96	195.84	62.10	133.74	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
229	10.98	196.19	62.29	133.89	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
230	11.00	196.53	62.49	134.04	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
231	11.02	196.88	62.69	134.19	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
232	11.04	197.22	62.88	134.34	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
233	11.06	197.57	63.08	134.49	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
234	11.08	197.92	63.27	134.64	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
235	11.10	198.26	63.47	134.79	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
236	11.12	198.60	63.67	134.94	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
237	11.14	198.94	63.86	135.08	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
238	11.16	199.28	64.06	135.22	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
239	11.18	199.61	64.26	135.36	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
240	11.20	199.94	64.45	135.49	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	11.22	200.27	64.65	135.62	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
242	11.24	200.59	64.84	135.75	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
243	11.26	200.93	65.04	135.89	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
244	11.28	201.26	65.24	136.03	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
245	11.30	201.60	65.43	136.17	0.88	0.084	1.38	0.061	1.00	1.00	2.000	Yes
246	11.32	201.95	65.63	136.32	0.87	0.084	1.38	0.061	1.00	1.00	2.000	Yes
247	11.34	202.29	65.83	136.47	0.87	0.084	1.38	0.061	1.00	1.00	2.000	Yes
248	11.36	202.64	66.02	136.62	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
249	11.38	202.99	66.22	136.77	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
250	11.40	203.34	66.41	136.92	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
251	11.42	203.69	66.61	137.08	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
252	11.44	204.04	66.81	137.23	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
253	11.46	204.39	67.00	137.39	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
254	11.48	204.75	67.20	137.55	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
255	11.50	205.11	67.39	137.72	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
256	11.52	205.47	67.59	137.88	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
257	11.54	205.83	67.79	138.04	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
258	11.56	206.19	67.98	138.20	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
259	11.58	206.55	68.18	138.37	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
260	11.60	206.91	68.38	138.53	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
261	11.62	207.27	68.57	138.70	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
262	11.64	207.63	68.77	138.87	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
263	11.66	208.00	68.96	139.03	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
264	11.68	208.36	69.16	139.20	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
265	11.70	208.72	69.36	139.37	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
266	11.72	209.08	69.55	139.53	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
267	11.74	209.45	69.75	139.70	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
268	11.76	209.81	69.95	139.87	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
269	11.78	210.18	70.14	140.04	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
270	11.80	210.55	70.34	140.21	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
271	11.82	210.92	70.53	140.38	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
272	11.84	211.28	70.73	140.55	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
273	11.86	211.65	70.93	140.72	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
274	11.88	212.01	71.12	140.89	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
275	11.90	212.37	71.32	141.05	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
276	11.92	212.72	71.51	141.21	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
277	11.94	213.08	71.71	141.37	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
278	11.96	213.43	71.91	141.53	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
279	11.98	213.79	72.10	141.69	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
280	12.00	214.15	72.30	141.85	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
281	12.02	214.52	72.50	142.02	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
282	12.04	214.88	72.69	142.19	0.86	0.084	1.38	0.061	1.00	1.00	2.000	Yes
283	12.06	215.25	72.89	142.36	0.85	0.084	1.38	0.061	1.00	1.00	2.000	Yes
284	12.08	215.61	73.08	142.52	0.85	0.084	1.38	0.061	1.00	1.00	2.000	Yes
285	12.10	215.97	73.28	142.69	0.85	0.084	1.38	0.061	1.00	1.00	2.000	Yes
286	12.12	216.32	73.48	142.84	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
287	12.14	216.67	73.67	143.00	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
288	12.16	217.01	73.87	143.14	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	12.18	217.35	74.07	143.29	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
290	12.20	217.69	74.26	143.43	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
291	12.22	218.02	74.46	143.57	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
292	12.24	218.37	74.65	143.71	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
293	12.26	218.71	74.85	143.86	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
294	12.28	219.07	75.05	144.02	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
295	12.30	219.42	75.24	144.17	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
296	12.32	219.77	75.44	144.33	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
297	12.34	220.12	75.64	144.48	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
298	12.36	220.46	75.83	144.63	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
299	12.38	220.81	76.03	144.78	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
300	12.40	221.15	76.22	144.93	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
301	12.42	221.49	76.42	145.07	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
302	12.44	221.83	76.62	145.21	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
303	12.46	222.16	76.81	145.35	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
304	12.48	222.49	77.01	145.49	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
305	12.50	222.83	77.20	145.62	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
306	12.52	223.16	77.40	145.76	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
307	12.54	223.50	77.60	145.90	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
308	12.56	223.84	77.79	146.05	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
309	12.58	224.19	77.99	146.20	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
310	12.60	224.54	78.19	146.35	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
311	12.62	224.88	78.38	146.50	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
312	12.64	225.23	78.58	146.65	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
313	12.66	225.58	78.77	146.80	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
314	12.68	225.92	78.97	146.95	0.84	0.084	1.38	0.061	1.00	1.00	2.000	Yes
315	12.70	226.26	79.17	147.09	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
316	12.72	226.59	79.36	147.23	0.84	0.084	1.38	0.061	1.00	1.00	0.061	No
317	12.74	226.93	79.56	147.37	0.83	0.084	1.38	0.061	1.00	1.00	0.061	No
318	12.76	227.27	79.76	147.51	0.83	0.084	1.38	0.061	1.00	1.00	0.061	No
319	12.78	227.61	79.95	147.66	0.83	0.084	1.38	0.061	1.00	1.00	0.061	No
320	12.80	227.95	80.15	147.80	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
321	12.82	228.29	80.34	147.95	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
322	12.84	228.63	80.54	148.09	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
323	12.86	228.96	80.74	148.22	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
324	12.88	229.29	80.93	148.35	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
325	12.90	229.62	81.13	148.49	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
326	12.92	229.95	81.32	148.62	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
327	12.94	230.28	81.52	148.75	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
328	12.96	230.60	81.72	148.89	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
329	12.98	230.93	81.91	149.02	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
330	13.00	231.26	82.11	149.15	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
331	13.02	231.59	82.31	149.28	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
332	13.04	231.92	82.50	149.42	0.83	0.083	1.38	0.061	1.00	1.00	0.061	No
333	13.06	232.25	82.70	149.55	0.82	0.083	1.38	0.061	1.00	1.00	0.061	No
334	13.08	232.57	82.89	149.68	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
335	13.10	232.90	83.09	149.81	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
336	13.12	233.23	83.29	149.95	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	13.14	233.57	83.48	150.08	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
338	13.16	233.90	83.68	150.22	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
339	13.18	234.24	83.88	150.36	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
340	13.20	234.57	84.07	150.50	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
341	13.22	234.90	84.27	150.63	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
342	13.24	235.23	84.46	150.77	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
343	13.26	235.56	84.66	150.90	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
344	13.28	235.89	84.86	151.04	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
345	13.30	236.23	85.05	151.17	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
346	13.32	236.56	85.25	151.31	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
347	13.34	236.88	85.45	151.44	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
348	13.36	237.21	85.64	151.56	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
349	13.38	237.53	85.84	151.69	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
350	13.40	237.86	86.03	151.82	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
351	13.42	238.19	86.23	151.96	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
352	13.44	238.52	86.43	152.10	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
353	13.46	238.86	86.62	152.24	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
354	13.48	239.19	86.82	152.37	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
355	13.50	239.52	87.01	152.51	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
356	13.52	239.85	87.21	152.64	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
357	13.54	240.18	87.41	152.77	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
358	13.56	240.50	87.60	152.90	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
359	13.58	240.82	87.80	153.02	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
360	13.60	241.14	88.00	153.15	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
361	13.62	241.46	88.19	153.27	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
362	13.64	241.79	88.39	153.40	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
363	13.66	242.11	88.58	153.53	0.81	0.083	1.38	0.060	1.00	1.00	0.060	No
364	13.68	242.44	88.78	153.65	0.80	0.083	1.38	0.060	1.00	1.00	0.060	No
365	13.70	242.76	88.98	153.79	0.80	0.083	1.38	0.060	1.00	1.00	0.060	No
366	13.72	243.09	89.17	153.92	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
367	13.74	243.43	89.37	154.06	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
368	13.76	243.76	89.57	154.20	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
369	13.78	244.09	89.76	154.33	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
370	13.80	244.42	89.96	154.47	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
371	13.82	244.75	90.15	154.60	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
372	13.84	245.08	90.35	154.73	0.80	0.082	1.38	0.060	1.00	1.00	0.060	No
373	13.86	245.42	90.55	154.87	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
374	13.88	245.75	90.74	155.00	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
375	13.90	246.08	90.94	155.14	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
376	13.92	246.41	91.13	155.28	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
377	13.94	246.74	91.33	155.41	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
378	13.96	247.08	91.53	155.55	0.80	0.082	1.38	0.060	1.00	1.00	2.000	Yes
379	13.98	247.42	91.72	155.70	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes
380	14.00	247.78	91.92	155.86	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes
381	14.02	248.13	92.12	156.02	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes
382	14.04	248.50	92.31	156.19	0.79	0.082	1.38	0.060	1.00	1.00	0.060	No
383	14.06	248.87	92.51	156.36	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes
384	14.08	249.24	92.70	156.54	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	14.10	249.62	92.90	156.72	0.79	0.082	1.38	0.060	1.00	1.00	2.000	Yes
386	14.12	249.99	93.10	156.89	0.79	0.082	1.38	0.059	1.00	1.00	2.000	Yes
387	14.14	250.37	93.29	157.07	0.79	0.082	1.38	0.059	1.00	1.00	2.000	Yes
388	14.16	250.74	93.49	157.25	0.79	0.082	1.38	0.059	1.00	1.00	2.000	Yes
389	14.18	251.12	93.69	157.43	0.79	0.082	1.38	0.059	1.00	1.00	0.059	No
390	14.20	251.50	93.88	157.61	0.79	0.082	1.38	0.059	1.00	1.00	0.059	No
391	14.22	251.87	94.08	157.79	0.79	0.082	1.38	0.059	1.00	1.00	0.059	No
392	14.24	252.25	94.27	157.98	0.79	0.082	1.38	0.059	1.00	1.00	0.059	No
393	14.26	252.63	94.47	158.16	0.79	0.082	1.38	0.059	1.00	1.00	0.059	No
394	14.28	253.01	94.67	158.34	0.78	0.082	1.38	0.059	1.00	1.00	0.059	No
395	14.30	253.38	94.86	158.52	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
396	14.32	253.76	95.06	158.70	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
397	14.34	254.14	95.26	158.89	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
398	14.36	254.52	95.45	159.07	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
399	14.38	254.91	95.65	159.26	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
400	14.40	255.29	95.84	159.45	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
401	14.42	255.67	96.04	159.63	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
402	14.44	256.06	96.24	159.82	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
403	14.46	256.45	96.43	160.01	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
404	14.48	256.84	96.63	160.21	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
405	14.50	257.23	96.82	160.41	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
406	14.52	257.63	97.02	160.61	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
407	14.54	258.02	97.22	160.81	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
408	14.56	258.42	97.41	161.01	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
409	14.58	258.82	97.61	161.21	0.77	0.081	1.38	0.059	1.00	1.00	2.000	Yes
410	14.60	259.22	97.81	161.42	0.77	0.081	1.38	0.059	1.00	1.00	2.000	Yes
411	14.62	259.62	98.00	161.62	0.77	0.081	1.38	0.059	1.00	1.00	2.000	Yes
412	14.64	260.02	98.20	161.82	0.77	0.081	1.38	0.059	1.00	1.00	2.000	Yes
413	14.66	260.42	98.39	162.03	0.77	0.081	1.38	0.059	1.00	1.00	2.000	Yes
414	14.68	260.82	98.59	162.23	0.77	0.081	1.38	0.059	1.00	1.00	0.059	No
415	14.70	261.21	98.79	162.43	0.77	0.081	1.38	0.059	1.00	1.00	0.059	No
416	14.72	261.61	98.98	162.63	0.77	0.081	1.38	0.059	1.00	1.00	0.059	No
417	14.74	262.01	99.18	162.83	0.77	0.080	1.38	0.058	1.00	1.00	0.058	No
418	14.76	262.40	99.38	163.03	0.77	0.080	1.38	0.058	1.00	1.00	0.058	No
419	14.78	262.80	99.57	163.23	0.77	0.080	1.38	0.058	1.00	1.00	0.058	No
420	14.80	263.19	99.77	163.42	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
421	14.82	263.59	99.96	163.62	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
422	14.84	263.98	100.16	163.82	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
423	14.86	264.38	100.36	164.02	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
424	14.88	264.77	100.55	164.22	0.76	0.080	1.38	0.058	1.00	1.00	2.000	Yes
425	14.90	265.17	100.75	164.43	0.76	0.080	1.38	0.058	1.00	1.00	2.000	Yes
426	14.92	265.58	100.94	164.64	0.76	0.080	1.38	0.058	1.00	1.00	0.058	No
427	14.94	265.99	101.14	164.85	0.76	0.080	1.38	0.058	1.00	1.00	0.058	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	6.42	0.30	3.06	1.54	1.00	5.65	9.86	55.69	0.270	No	Yes	2.00
2	6.44	0.41	2.91	1.35	0.96	7.87	7.30	57.42	0.375	No	Yes	2.00
3	6.46	0.56	2.76	1.18	0.91	10.79	5.36	57.79	0.515	No	Yes	2.00
4	6.48	0.70	2.65	1.06	0.86	13.57	7.38	100.16	0.156	No	No	2.00
5	6.50	0.74	2.61	0.98	0.85	14.31	5.85	83.66	0.121	No	No	2.00
6	6.52	0.70	2.65	1.04	0.86	13.48	7.30	98.42	0.152	No	No	2.00
7	6.54	0.71	2.65	1.08	0.86	13.76	7.27	100.03	0.156	No	No	2.00
8	6.56	0.75	2.62	1.06	0.85	14.47	6.33	91.60	0.136	No	No	2.00
9	6.58	0.82	2.60	1.12	0.84	15.98	5.35	85.56	0.138	No	No	2.00
10	6.60	0.89	2.58	1.18	0.84	17.25	4.74	81.84	0.131	No	No	2.00
11	6.62	0.92	2.58	1.26	0.84	17.94	4.75	85.18	0.137	No	No	2.00
12	6.64	0.88	2.70	1.97	0.88	17.02	4.74	80.70	0.812	No	Yes	2.00
13	6.66	0.75	2.82	2.53	0.93	14.43	6.15	88.75	0.688	No	Yes	2.00
14	6.68	0.61	2.97	3.40	0.99	11.79	8.28	97.64	0.563	No	Yes	2.00
15	6.70	0.57	2.98	3.18	0.99	10.92	8.45	92.20	0.521	No	Yes	2.00
16	6.72	0.58	2.99	3.38	0.99	11.17	8.57	95.75	0.533	No	Yes	2.00
17	6.74	0.62	2.97	3.43	0.99	11.90	8.26	98.35	0.568	No	Yes	2.00
18	6.76	0.66	2.95	3.39	0.98	12.62	7.89	99.57	0.602	No	Yes	2.00
19	6.78	0.68	2.94	3.52	0.98	13.04	7.87	102.61	0.622	No	Yes	2.00
20	6.80	0.67	2.97	3.90	0.99	12.93	8.35	107.92	0.617	No	Yes	2.00
21	6.82	0.67	3.01	4.32	1.00	12.76	8.87	113.19	0.608	No	Yes	2.00
22	6.84	0.66	3.04	4.75	1.00	12.55	9.43	118.31	0.599	No	Yes	2.00
23	6.86	0.64	3.07	5.24	1.00	12.25	10.07	123.33	0.584	No	Yes	2.00
24	6.88	0.62	3.11	5.81	1.00	11.83	10.85	128.28	0.564	No	Yes	2.00
25	6.90	0.61	3.14	6.21	1.00	11.55	11.39	131.51	0.551	No	Yes	2.00
26	6.92	0.61	3.13	6.17	1.00	11.65	11.28	131.49	0.556	No	Yes	2.00
27	6.94	0.63	3.11	5.86	1.00	12.07	10.76	129.93	0.576	No	Yes	2.00
28	6.96	0.66	3.07	5.50	1.00	12.64	10.12	127.92	0.603	No	Yes	2.00
29	6.98	0.70	3.04	5.20	1.00	13.38	9.49	126.89	0.638	No	Yes	2.00
30	7.00	0.74	3.00	4.89	1.00	14.19	8.84	125.42	0.677	No	Yes	2.00
31	7.02	0.79	2.96	4.58	0.98	15.23	8.15	124.10	0.727	No	Yes	2.00
32	7.04	0.86	2.92	4.31	0.97	16.58	7.45	123.47	0.791	No	Yes	2.00
33	7.06	0.94	2.87	4.08	0.95	18.05	6.81	122.98	0.861	No	Yes	2.00
34	7.08	1.05	2.81	3.70	0.93	20.33	5.92	120.39	0.970	No	Yes	2.00
35	7.10	1.15	2.75	3.40	0.90	22.28	5.27	117.45	1.063	No	Yes	2.00
36	7.12	1.24	2.71	3.24	0.89	23.93	4.86	116.29	1.141	No	Yes	2.00
37	7.14	1.25	2.72	3.34	0.89	24.23	4.91	118.84	1.156	No	Yes	2.00
38	7.16	1.26	2.73	3.46	0.90	24.40	4.99	121.73	1.164	No	Yes	2.00
39	7.18	1.28	2.72	3.51	0.90	24.79	4.97	123.31	1.183	No	Yes	2.00
40	7.20	1.32	2.71	3.47	0.89	25.48	4.84	123.26	1.216	No	Yes	2.00
41	7.22	1.34	2.70	3.44	0.89	26.00	4.74	123.23	1.240	No	Yes	2.00
42	7.24	1.36	2.69	3.39	0.88	26.42	9.82	259.38	3.600	No	No	2.00
43	7.26	1.38	2.69	3.34	0.88	26.73	9.31	248.90	3.600	No	No	2.00
44	7.28	1.39	2.68	3.26	0.88	26.92	8.79	236.70	3.600	No	No	2.00
45	7.30	1.37	2.68	3.21	0.88	26.51	8.87	235.23	3.600	No	No	2.00
46	7.32	1.33	2.69	3.23	0.88	25.64	9.61	246.48	3.600	No	No	2.00
47	7.34	1.29	2.70	3.25	0.89	24.91	4.72	117.72	1.188	No	Yes	2.00
48	7.36	1.27	2.68	2.94	0.88	24.45	8.99	219.95	3.600	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	7.38	1.32	2.65	2.83	0.87	25.55	7.68	196.25	0.705	No	No	2.00
50	7.40	1.33	2.65	2.81	0.87	25.65	7.54	193.51	0.679	No	No	2.00
51	7.42	1.32	2.68	3.09	0.88	25.53	8.96	228.71	3.600	No	No	2.00
52	7.44	1.25	2.70	3.11	0.89	24.08	4.72	113.61	1.148	No	Yes	2.00
53	7.46	1.21	2.70	3.02	0.89	23.35	4.74	110.70	1.114	No	Yes	2.00
54	7.48	1.18	2.71	2.97	0.89	22.74	4.79	108.94	1.085	No	Yes	2.00
55	7.50	1.15	2.72	3.01	0.89	22.17	4.92	109.02	1.058	No	Yes	2.00
56	7.52	1.13	2.73	3.03	0.90	21.62	5.03	108.86	1.031	No	Yes	2.00
57	7.54	1.11	2.73	2.95	0.90	21.31	5.00	106.57	1.017	No	Yes	2.00
58	7.56	1.12	2.70	2.69	0.89	21.40	4.72	101.12	1.021	No	Yes	2.00
59	7.58	1.14	2.67	2.42	0.87	21.88	8.24	180.26	0.562	No	No	2.00
60	7.60	1.17	2.63	2.18	0.86	22.52	6.52	146.78	0.337	No	No	2.00
61	7.62	1.20	2.60	2.01	0.85	23.07	5.41	124.79	0.235	No	No	2.00
62	7.64	1.22	2.58	1.93	0.84	23.49	4.84	113.69	0.217	No	No	2.00
63	7.66	1.24	2.58	1.92	0.84	23.77	4.70	111.72	0.210	No	No	2.00
64	7.68	1.23	2.60	2.08	0.85	23.56	5.45	128.47	0.249	No	No	2.00
65	7.70	1.19	2.64	2.29	0.86	22.81	6.86	156.41	0.392	No	No	2.00
66	7.72	1.14	2.68	2.55	0.88	21.77	9.06	197.25	0.714	No	No	2.00
67	7.74	1.09	2.71	2.70	0.89	20.82	4.84	100.72	0.993	No	Yes	2.00
68	7.76	1.06	2.73	2.79	0.90	20.33	5.02	102.04	0.970	No	Yes	2.00
69	7.78	1.05	2.73	2.80	0.90	20.05	5.08	101.96	0.956	No	Yes	2.00
70	7.80	1.05	2.72	2.67	0.90	20.09	4.94	99.17	0.958	No	Yes	2.00
71	7.82	1.05	2.71	2.53	0.89	20.07	4.79	96.21	0.957	No	Yes	2.00
72	7.84	1.06	2.68	2.33	0.88	20.29	9.17	186.04	0.611	No	No	2.00
73	7.86	1.12	2.64	2.11	0.86	21.36	6.94	148.28	0.345	No	No	2.00
74	7.88	1.19	2.58	1.86	0.84	22.84	4.88	111.44	0.209	No	No	2.00
75	7.90	1.27	2.55	1.76	0.83	24.24	3.86	93.67	0.156	No	No	2.00
76	7.92	1.29	2.55	1.81	0.83	24.79	3.86	95.58	0.161	No	No	2.00
77	7.94	1.30	2.56	1.88	0.83	25.00	4.04	101.07	0.176	No	No	2.00
78	7.96	1.31	2.55	1.86	0.83	25.03	3.93	98.35	0.168	No	No	2.00
79	7.98	1.30	2.54	1.78	0.83	24.89	3.70	92.12	0.153	No	No	2.00
80	8.00	1.29	2.54	1.72	0.83	24.72	3.55	87.84	0.143	No	No	2.00
81	8.02	1.27	2.53	1.63	0.82	24.30	3.41	82.90	0.133	No	No	2.00
82	8.04	1.25	2.52	1.52	0.82	23.97	3.14	75.21	0.120	No	No	2.00
83	8.06	1.24	2.50	1.38	0.81	23.66	2.97	70.29	0.112	No	No	1.96
84	8.08	1.23	2.49	1.31	0.81	23.51	2.90	68.20	0.110	No	No	1.91
85	8.10	1.22	2.49	1.28	0.81	23.31	2.88	67.24	0.108	No	No	1.88
86	8.12	1.21	2.49	1.29	0.81	23.00	2.93	67.50	0.109	No	No	1.89
87	8.14	1.19	2.50	1.30	0.81	22.75	2.97	67.54	0.109	No	No	1.89
88	8.16	1.18	2.50	1.30	0.81	22.51	2.87	64.51	0.105	No	No	1.82
89	8.18	1.17	2.50	1.29	0.81	22.30	2.89	64.36	0.105	No	No	1.82
90	8.20	1.17	2.51	1.29	0.82	22.22	2.91	64.76	0.105	No	No	1.82
91	8.22	1.17	2.51	1.29	0.82	22.19	2.91	64.63	0.105	No	No	1.82
92	8.24	1.17	2.50	1.27	0.81	22.15	2.87	63.54	0.104	No	No	1.80
93	8.26	1.15	2.51	1.27	0.82	21.90	2.94	64.38	0.105	No	No	1.81
94	8.28	1.14	2.51	1.25	0.82	21.61	2.98	64.38	0.105	No	No	1.81
95	8.30	1.14	2.50	1.22	0.81	21.62	2.87	61.93	0.102	No	No	1.76
96	8.32	1.17	2.48	1.17	0.81	22.27	2.86	63.73	0.104	No	No	1.80

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	8.34	1.23	2.45	1.10	0.79	23.47	2.65	62.19	0.102	No	No	1.76
98	8.36	1.30	2.42	1.06	0.78	24.85	2.48	61.76	0.102	No	No	1.76
99	8.38	1.36	2.41	1.09	0.78	25.91	2.43	62.93	0.103	No	No	1.78
100	8.40	1.40	2.41	1.16	0.78	26.71	2.45	65.41	0.106	No	No	1.82
101	8.42	1.42	2.43	1.25	0.79	27.02	2.52	68.05	0.109	No	No	1.88
102	8.44	1.41	2.44	1.31	0.79	26.85	2.60	69.76	0.112	No	No	1.92
103	8.46	1.37	2.47	1.41	0.80	26.18	2.76	72.19	0.115	No	No	1.97
104	8.48	1.35	2.48	1.43	0.81	25.66	2.83	72.67	0.116	No	No	1.98
105	8.50	1.35	2.47	1.39	0.80	25.67	2.79	71.58	0.114	No	No	1.96
106	8.52	1.36	2.45	1.31	0.80	25.94	2.68	69.42	0.111	No	No	1.90
107	8.54	1.37	2.45	1.28	0.79	26.00	2.63	68.49	0.110	No	No	1.88
108	8.56	1.36	2.45	1.29	0.80	25.86	2.66	68.70	0.110	No	No	1.88
109	8.58	1.49	2.35	0.98	0.76	28.53	2.14	61.02	0.101	No	No	1.73
110	8.60	1.62	2.30	0.88	0.74	30.95	1.91	59.04	0.099	No	No	1.69
111	8.62	1.71	2.26	0.81	0.72	32.75	1.78	58.20	0.098	No	No	1.68
112	8.64	1.63	2.35	1.13	0.76	31.10	2.14	66.54	0.107	No	No	1.83
113	8.66	1.53	2.43	1.40	0.79	29.25	2.51	73.49	0.117	No	No	1.99
114	8.68	1.46	2.48	1.63	0.81	27.82	2.85	79.27	0.126	No	No	2.00
115	8.70	1.45	2.48	1.60	0.81	27.61	2.83	78.23	0.125	No	No	2.00
116	8.72	1.46	2.46	1.47	0.80	27.72	2.70	74.83	0.119	No	No	2.00
117	8.74	1.48	2.42	1.31	0.79	28.18	2.50	70.40	0.112	No	No	1.91
118	8.76	1.50	2.40	1.24	0.78	28.51	2.40	68.38	0.110	No	No	1.86
119	8.78	1.53	2.39	1.19	0.77	29.22	2.31	67.38	0.108	No	No	1.84
120	8.80	1.54	2.40	1.25	0.78	29.34	2.35	69.05	4.000	Yes	No	2.00
121	8.82	1.48	2.43	1.35	0.79	28.17	2.54	71.62	4.000	Yes	No	2.00
122	8.84	1.38	2.50	1.61	0.81	26.14	2.98	77.86	4.000	Yes	No	2.00
123	8.86	1.30	2.52	1.62	0.82	24.64	3.26	80.32	4.000	Yes	No	2.00
124	8.88	1.28	2.51	1.48	0.82	24.29	2.93	71.07	0.113	No	No	1.92
125	8.90	1.32	2.45	1.21	0.79	24.99	2.64	65.91	0.107	No	No	1.80
126	8.92	1.33	2.44	1.20	0.79	25.26	2.60	65.72	0.106	No	No	1.80
127	8.94	1.33	2.46	1.28	0.80	25.20	2.70	68.03	0.109	No	No	1.85
128	8.96	1.33	2.47	1.34	0.80	25.21	2.77	69.94	0.112	No	No	1.89
129	8.98	1.39	2.44	1.27	0.79	26.31	2.59	68.20	0.110	No	No	1.85
130	9.00	1.49	2.39	1.17	0.77	28.40	2.33	66.25	0.107	No	No	1.81
131	9.02	1.66	2.33	1.04	0.75	31.63	2.02	64.02	0.104	No	No	1.76
132	9.04	1.99	2.23	0.93	0.71	38.24	1.70	64.85	0.105	No	No	1.78
133	9.06	2.17	2.20	0.91	0.70	41.65	1.60	66.74	4.000	Yes	No	2.00
134	9.08	2.13	2.25	1.10	0.72	40.85	1.74	71.08	4.000	Yes	No	2.00
135	9.10	1.78	2.39	1.49	0.77	33.98	2.31	78.38	4.000	Yes	No	2.00
136	9.12	1.48	2.53	2.01	0.83	28.14	3.43	96.55	4.000	Yes	No	2.00
137	9.14	1.37	2.57	2.08	0.84	25.88	4.42	114.31	4.000	Yes	No	2.00
138	9.16	1.50	2.48	1.71	0.81	28.50	2.87	81.91	4.000	Yes	No	2.00
139	9.18	1.96	2.27	1.08	0.73	37.52	1.83	68.54	4.000	Yes	No	2.00
140	9.20	2.60	2.10	0.80	0.66	50.13	1.41	70.83	4.000	Yes	No	2.00
141	9.22	3.17	1.99	0.69	0.62	61.34	1.30	79.61	4.000	Yes	No	2.00
142	9.24	3.48	1.97	0.74	0.61	67.42	1.28	86.51	0.140	No	No	2.00
143	9.26	3.45	2.00	0.82	0.62	66.98	1.30	87.32	0.142	No	No	2.00
144	9.28	3.20	2.06	0.95	0.65	61.93	1.37	84.67	0.136	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	9.30	2.82	2.12	1.00	0.67	54.54	1.45	79.05	0.126	No	No	2.00
146	9.32	2.49	2.16	0.98	0.69	47.93	1.52	73.04	0.116	No	No	1.95
147	9.34	2.27	2.18	0.94	0.70	43.58	1.58	68.69	0.110	No	No	1.84
148	9.36	2.12	2.21	0.94	0.71	40.66	1.64	66.80	0.108	No	No	1.80
149	9.38	2.03	2.23	0.97	0.72	38.94	1.71	66.41	0.107	No	No	1.79
150	9.40	2.08	2.20	0.87	0.70	39.85	1.61	64.19	0.105	No	No	1.75
151	9.42	2.25	2.15	0.80	0.68	43.22	1.51	65.15	0.106	No	No	1.77
152	9.44	2.41	2.14	0.86	0.68	46.26	1.49	69.01	0.111	No	No	1.85
153	9.46	2.42	2.17	0.98	0.69	46.43	1.55	71.99	0.115	No	No	1.91
154	9.48	2.35	2.21	1.10	0.71	45.13	1.64	74.09	0.118	No	No	1.96
155	9.50	2.41	2.20	1.07	0.70	46.22	1.60	74.09	0.118	No	No	1.96
156	9.52	2.51	2.16	0.97	0.69	48.30	1.52	73.25	0.117	No	No	1.94
157	9.54	2.54	2.13	0.88	0.68	48.77	1.46	71.32	0.114	No	No	1.89
158	9.56	2.36	2.16	0.89	0.69	45.35	1.52	68.88	0.110	No	No	1.84
159	9.58	2.13	2.23	1.02	0.71	40.69	1.69	68.88	0.110	No	No	1.84
160	9.60	2.04	2.26	1.07	0.72	38.94	1.77	69.06	0.111	No	No	1.84
161	9.62	2.18	2.20	0.93	0.70	41.68	1.61	67.03	0.108	No	No	1.80
162	9.64	2.40	2.10	0.72	0.67	46.09	1.42	65.51	0.106	No	No	1.76
163	9.66	2.56	2.07	0.70	0.65	49.13	1.38	67.81	0.109	No	No	1.81
164	9.68	2.59	2.08	0.73	0.66	49.86	1.39	69.21	0.111	No	No	1.84
165	9.70	2.65	2.08	0.78	0.66	50.89	1.40	71.05	0.113	No	No	1.88
166	9.72	2.85	2.03	0.70	0.64	54.95	1.34	73.39	0.117	No	No	1.94
167	9.74	3.09	1.98	0.63	0.62	59.69	1.29	77.02	0.122	No	No	2.00
168	9.76	3.38	1.93	0.58	0.60	65.39	1.25	82.00	0.131	No	No	2.00
169	9.78	3.50	1.93	0.63	0.60	67.72	1.26	85.11	0.137	No	No	2.00
170	9.80	3.37	1.96	0.69	0.61	65.09	1.28	83.32	0.134	No	No	2.00
171	9.82	3.19	2.01	0.76	0.63	61.57	1.31	80.94	0.129	No	No	2.00
172	9.84	3.03	2.05	0.82	0.65	58.51	1.35	78.98	0.126	No	No	2.00
173	9.86	3.17	2.04	0.86	0.64	61.11	1.35	82.20	0.132	No	No	2.00
174	9.88	3.39	2.03	0.89	0.64	65.46	1.33	87.04	0.141	No	No	2.00
175	9.90	3.62	1.99	0.83	0.62	70.15	1.30	90.86	0.150	No	No	2.00
176	9.92	3.81	1.97	0.83	0.62	73.87	1.28	94.66	0.159	No	No	2.00
177	9.94	3.88	1.98	0.91	0.62	75.26	1.29	97.24	0.166	No	No	2.00
178	9.96	3.93	2.01	1.04	0.63	76.08	1.32	100.31	0.174	No	No	2.00
179	9.98	3.94	2.04	1.13	0.64	76.28	1.34	102.17	0.179	No	No	2.00
180	10.00	3.82	2.05	1.13	0.65	74.06	1.35	100.01	0.173	No	No	2.00
181	10.02	3.63	2.06	1.13	0.65	70.19	1.37	96.20	0.163	No	No	2.00
182	10.04	3.35	2.09	1.11	0.66	64.74	1.40	90.61	0.149	No	No	2.00
183	10.06	3.25	2.11	1.17	0.67	62.73	1.44	90.07	0.148	No	No	2.00
184	10.08	3.34	2.11	1.23	0.67	64.46	1.44	92.86	0.154	No	No	2.00
185	10.10	3.54	2.10	1.25	0.67	68.41	1.42	96.95	0.165	No	No	2.00
186	10.12	3.59	2.10	1.27	0.67	69.41	1.42	98.32	0.168	No	No	2.00
187	10.14	3.53	2.11	1.30	0.67	68.15	1.44	97.83	0.167	No	No	2.00
188	10.16	3.46	2.12	1.31	0.68	66.76	1.45	96.86	0.165	No	No	2.00
189	10.18	3.52	2.08	1.17	0.66	67.98	1.40	94.84	0.159	No	No	2.00
190	10.20	3.63	2.02	0.94	0.64	69.10	1.33	91.63	0.152	No	No	2.00
191	10.22	3.74	1.97	0.78	0.62	69.65	1.28	89.40	0.146	No	No	2.00
192	10.24	3.87	1.93	0.69	0.61	70.93	1.26	89.34	0.146	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	10.26	3.80	1.94	0.69	0.61	69.56	1.26	87.92	0.143	No	No	2.00
194	10.28	3.42	2.00	0.76	0.63	63.60	1.30	82.96	0.133	No	No	2.00
195	10.30	2.80	2.08	0.84	0.66	53.46	1.40	74.71	0.119	No	No	1.95
196	10.32	2.21	2.24	1.12	0.72	42.08	1.72	72.47	0.115	No	No	1.90
197	10.34	1.93	2.36	1.46	0.77	36.64	2.16	78.96	0.126	No	No	2.00
198	10.36	2.08	2.34	1.53	0.76	39.55	2.09	82.58	0.132	No	No	2.00
199	10.38	2.40	2.23	1.21	0.72	45.76	1.70	77.57	0.123	No	No	2.00
200	10.40	2.56	2.18	1.10	0.70	48.93	1.57	76.94	0.122	No	No	2.00
201	10.42	2.37	2.26	1.32	0.73	45.21	1.77	80.02	0.128	No	No	2.00
202	10.44	2.03	2.39	1.80	0.78	38.47	2.34	89.91	0.148	No	No	2.00
203	10.46	1.82	2.48	2.17	0.81	34.35	2.86	98.18	0.168	No	No	2.00
204	10.48	1.88	2.44	1.95	0.80	35.56	2.61	92.78	0.154	No	No	2.00
205	10.50	2.13	2.36	1.66	0.77	40.37	2.16	87.08	0.141	No	No	2.00
206	10.52	2.29	2.30	1.47	0.74	43.61	1.91	83.43	0.134	No	No	2.00
207	10.54	2.24	2.33	1.63	0.76	42.55	2.05	87.33	0.142	No	No	2.00
208	10.56	2.10	2.39	1.88	0.78	39.86	2.34	93.31	0.156	No	No	2.00
209	10.58	2.14	2.40	1.98	0.78	40.53	2.38	96.54	0.164	No	No	2.00
210	10.60	2.36	2.34	1.82	0.76	44.92	2.11	94.65	0.159	No	No	2.00
211	10.62	2.77	2.25	1.61	0.73	53.09	1.77	93.79	0.157	No	No	2.00
212	10.64	3.19	2.16	1.31	0.69	60.02	1.52	91.11	0.150	No	No	2.00
213	10.66	3.50	2.10	1.16	0.67	64.42	1.42	91.38	0.151	No	No	2.00
214	10.68	3.52	2.08	1.05	0.66	64.21	1.39	88.94	0.145	No	No	2.00
215	10.70	3.14	2.12	1.06	0.68	57.67	1.44	83.22	0.134	No	No	2.00
216	10.72	2.75	2.16	1.06	0.69	50.89	1.52	77.32	0.123	No	No	2.00
217	10.74	2.47	2.19	1.05	0.70	46.00	1.59	73.31	0.117	No	No	1.91
218	10.76	2.42	2.22	1.17	0.72	45.55	1.67	76.17	0.121	No	No	1.98
219	10.78	2.33	2.27	1.35	0.73	44.23	1.82	80.41	0.128	No	No	2.00
220	10.80	2.24	2.32	1.55	0.75	42.41	2.01	85.12	0.137	No	No	2.00
221	10.82	2.25	2.32	1.57	0.75	42.62	2.01	85.84	0.139	No	No	2.00
222	10.84	2.22	2.33	1.57	0.76	42.11	2.03	85.49	0.138	No	No	2.00
223	10.86	2.14	2.35	1.61	0.76	40.56	2.11	85.67	0.138	No	No	2.00
224	10.88	2.15	2.33	1.53	0.76	40.77	2.05	83.56	0.134	No	No	2.00
225	10.90	2.40	2.28	1.45	0.74	45.11	1.86	83.86	0.135	No	No	2.00
226	10.92	2.89	2.17	1.15	0.70	52.50	1.54	81.04	0.129	No	No	2.00
227	10.94	3.20	2.11	1.04	0.68	56.92	1.44	81.91	0.131	No	No	2.00
228	10.96	3.23	2.09	0.95	0.67	56.98	1.41	80.07	0.128	No	No	2.00
229	10.98	3.00	2.13	1.00	0.68	53.26	1.46	77.84	0.124	No	No	2.00
230	11.00	2.82	2.16	1.05	0.69	50.45	1.52	76.82	0.122	No	No	2.00
231	11.02	2.88	2.17	1.11	0.70	51.52	1.54	79.19	0.126	No	No	2.00
232	11.04	2.94	2.15	1.06	0.69	52.13	1.51	78.47	0.125	No	No	2.00
233	11.06	2.91	2.16	1.11	0.69	51.70	1.53	79.20	4.000	Yes	No	2.00
234	11.08	2.63	2.21	1.16	0.71	47.18	1.64	77.16	4.000	Yes	No	2.00
235	11.10	2.30	2.29	1.36	0.74	42.04	1.89	79.37	4.000	Yes	No	2.00
236	11.12	1.79	2.42	1.70	0.79	33.61	2.51	84.24	4.000	Yes	No	2.00
237	11.14	1.34	2.63	2.47	0.87	24.63	6.57	161.88	4.000	Yes	No	2.00
238	11.16	0.99	2.83	3.34	0.95	17.65	6.18	109.04	4.000	Yes	Yes	2.00
239	11.18	0.90	2.85	3.19	0.96	15.91	6.49	103.28	4.000	Yes	Yes	2.00
240	11.20	0.90	2.77	2.38	0.93	15.94	5.52	88.03	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	11.22	0.95	2.71	2.00	0.90	16.89	4.80	81.16	4.000	Yes	Yes	2.00
242	11.24	1.13	2.62	1.84	0.87	20.37	6.21	126.55	4.000	Yes	No	2.00
243	11.26	1.32	2.55	1.75	0.84	24.25	3.85	93.30	4.000	Yes	No	2.00
244	11.28	1.59	2.45	1.57	0.81	29.48	2.66	78.46	4.000	Yes	No	2.00
245	11.30	1.91	2.36	1.40	0.77	34.72	2.19	76.10	4.000	Yes	No	2.00
246	11.32	2.32	2.28	1.27	0.74	41.21	1.85	76.09	4.000	Yes	No	2.00
247	11.34	2.62	2.23	1.22	0.72	45.84	1.70	77.72	4.000	Yes	No	2.00
248	11.36	2.63	2.24	1.29	0.73	46.19	1.73	79.84	0.127	No	No	2.00
249	11.38	2.41	2.31	1.51	0.75	42.96	1.96	84.23	0.136	No	No	2.00
250	11.40	2.12	2.40	1.87	0.79	38.59	2.39	92.19	0.153	No	No	2.00
251	11.42	2.12	2.42	1.97	0.79	38.69	2.46	95.30	0.160	No	No	2.00
252	11.44	2.54	2.32	1.69	0.76	45.14	2.01	90.82	0.150	No	No	2.00
253	11.46	3.07	2.23	1.47	0.72	53.17	1.69	89.87	0.147	No	No	2.00
254	11.48	3.35	2.20	1.45	0.71	57.58	1.61	92.78	0.154	No	No	2.00
255	11.50	3.32	2.21	1.49	0.71	57.04	1.63	93.22	0.155	No	No	2.00
256	11.52	3.36	2.20	1.45	0.71	57.38	1.61	92.37	0.153	No	No	2.00
257	11.54	3.60	2.17	1.39	0.70	60.79	1.54	93.55	0.156	No	No	2.00
258	11.56	3.94	2.12	1.30	0.68	65.73	1.45	95.61	0.161	No	No	2.00
259	11.58	4.25	2.09	1.24	0.67	70.10	1.40	98.26	0.168	No	No	2.00
260	11.60	4.56	2.04	1.11	0.65	74.04	1.35	99.59	0.172	No	No	2.00
261	11.62	5.03	1.98	0.99	0.63	80.25	1.29	103.75	0.184	No	No	2.00
262	11.64	5.54	1.93	0.90	0.61	86.93	1.26	109.19	0.201	No	No	2.00
263	11.66	5.94	1.90	0.85	0.59	92.16	1.23	113.71	0.217	No	No	2.00
264	11.68	6.13	1.88	0.82	0.59	94.32	1.22	115.18	0.222	No	No	2.00
265	11.70	6.35	1.85	0.76	0.58	96.83	1.20	116.14	0.226	No	No	2.00
266	11.72	6.65	1.81	0.70	0.56	100.20	1.17	117.00	0.229	No	No	2.00
267	11.74	7.07	1.78	0.66	0.55	105.42	1.13	119.29	0.238	No	No	2.00
268	11.76	7.53	1.78	0.70	0.55	112.04	1.12	126.01	0.266	No	No	2.00
269	11.78	8.08	1.75	0.70	0.54	119.22	1.09	129.86	0.284	No	No	2.00
270	11.80	8.74	1.71	0.65	0.53	127.31	1.01	128.89	0.279	No	No	2.00
271	11.82	9.78	1.62	0.52	0.49	138.70	1.00	138.70	0.328	No	No	2.00
272	11.84	10.50	1.56	0.43	0.47	146.20	1.00	146.20	0.371	No	No	2.00
273	11.86	10.66	1.54	0.41	0.46	147.40	1.00	147.40	0.378	No	No	2.00
274	11.88	9.85	1.57	0.40	0.47	136.90	1.00	136.90	0.319	No	No	2.00
275	11.90	8.75	1.61	0.40	0.49	122.63	1.00	122.63	0.252	No	No	2.00
276	11.92	7.49	1.68	0.43	0.51	106.66	1.00	106.66	0.193	No	No	2.00
277	11.94	5.77	1.84	0.60	0.57	85.42	1.19	101.53	4.000	Yes	No	2.00
278	11.96	4.22	2.06	1.01	0.66	65.83	1.36	89.58	4.000	Yes	No	2.00
279	11.98	3.13	2.26	1.54	0.73	51.01	1.77	90.43	4.000	Yes	No	2.00
280	12.00	2.67	2.41	2.36	0.79	45.14	2.45	110.70	4.000	Yes	No	2.00
281	12.02	2.35	2.54	3.23	0.84	40.84	3.64	148.62	4.000	Yes	No	2.00
282	12.04	1.96	2.69	4.53	0.90	34.98	9.48	331.62	4.000	Yes	No	2.00
283	12.06	1.65	2.78	5.17	0.93	29.68	5.61	166.45	4.000	Yes	Yes	2.00
284	12.08	1.41	2.85	5.52	0.96	25.48	6.47	164.79	4.000	Yes	Yes	2.00
285	12.10	1.24	2.89	5.63	0.98	22.38	7.12	159.45	4.000	Yes	Yes	2.00
286	12.12	1.20	2.87	5.04	0.97	21.49	6.85	147.14	1.025	No	Yes	2.00
287	12.14	1.18	2.83	4.21	0.95	20.82	6.29	130.97	0.993	No	Yes	2.00
288	12.16	1.17	2.78	3.34	0.93	20.24	5.59	113.23	0.966	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	12.18	1.19	2.73	2.78	0.92	20.19	5.04	101.74	0.963	No	Yes	2.00
290	12.20	1.23	2.68	2.36	0.90	20.67	8.94	184.80	0.600	No	No	2.00
291	12.22	1.27	2.65	2.15	0.88	21.17	7.30	154.56	0.381	No	No	2.00
292	12.24	1.41	2.65	2.48	0.88	23.65	7.24	171.32	0.493	No	No	2.00
293	12.26	1.48	2.67	2.93	0.89	24.97	8.57	214.02	3.600	No	No	2.00
294	12.28	1.50	2.71	3.50	0.91	25.53	4.86	124.03	1.218	No	Yes	2.00
295	12.30	1.37	2.76	3.77	0.93	23.37	5.42	126.64	1.115	No	Yes	2.00
296	12.32	1.28	2.81	4.03	0.94	21.87	5.92	129.48	1.043	No	Yes	2.00
297	12.34	1.23	2.82	4.02	0.95	20.96	6.09	127.59	1.000	No	Yes	2.00
298	12.36	1.20	2.83	3.98	0.95	20.30	6.19	125.71	0.968	No	Yes	2.00
299	12.38	1.17	2.82	3.83	0.95	19.77	6.16	121.85	0.943	No	Yes	2.00
300	12.40	1.15	2.80	3.45	0.94	19.30	5.90	113.99	0.921	No	Yes	2.00
301	12.42	1.15	2.78	3.03	0.93	18.94	5.55	105.15	0.904	No	Yes	2.00
302	12.44	1.14	2.74	2.64	0.92	18.66	5.19	96.79	0.890	No	Yes	2.00
303	12.46	1.15	2.71	2.32	0.91	18.55	4.84	89.82	0.885	No	Yes	2.00
304	12.48	1.15	2.69	2.11	0.90	18.54	9.50	176.19	0.530	No	No	2.00
305	12.50	1.19	2.67	2.05	0.89	18.97	8.66	164.37	4.000	Yes	No	2.00
306	12.52	1.30	2.63	1.92	0.88	20.76	6.38	132.51	4.000	Yes	No	2.00
307	12.54	1.57	2.53	1.71	0.84	24.71	3.53	87.34	4.000	Yes	No	2.00
308	12.56	1.94	2.43	1.51	0.80	30.30	2.54	77.07	4.000	Yes	No	2.00
309	12.58	2.19	2.41	1.63	0.79	34.13	2.42	82.59	4.000	Yes	No	2.00
310	12.60	2.22	2.44	1.85	0.80	34.70	2.58	89.39	4.000	Yes	No	2.00
311	12.62	1.99	2.50	2.07	0.83	31.37	2.82	88.53	4.000	Yes	No	2.00
312	12.64	1.70	2.59	2.37	0.86	27.07	5.00	135.25	4.000	Yes	No	2.00
313	12.66	1.45	2.67	2.66	0.90	23.12	8.54	197.47	4.000	Yes	No	2.00
314	12.68	1.30	2.72	2.78	0.91	20.72	4.93	102.24	4.000	Yes	Yes	2.00
315	12.70	1.25	2.71	2.50	0.91	19.82	4.80	95.12	0.945	No	Yes	2.00
316	12.72	1.26	2.68	2.22	0.90	19.77	8.96	177.22	0.538	No	No	2.00
317	12.74	1.28	2.67	2.22	0.90	20.09	8.68	174.28	0.515	No	No	2.00
318	12.76	1.36	2.65	2.16	0.89	21.16	7.40	156.48	0.393	No	No	2.00
319	12.78	1.47	2.62	2.10	0.87	22.76	5.98	136.00	0.283	No	No	2.00
320	12.80	1.49	2.62	2.20	0.88	23.12	6.25	144.54	0.325	No	No	2.00
321	12.82	1.38	2.68	2.47	0.90	21.52	8.82	189.73	0.644	No	No	2.00
322	12.84	1.23	2.72	2.49	0.92	19.04	4.95	94.17	0.908	No	Yes	2.00
323	12.86	1.16	2.71	2.16	0.91	17.81	4.80	85.55	0.850	No	Yes	2.00
324	12.88	1.17	2.66	1.75	0.89	17.77	7.90	140.31	0.303	No	No	2.00
325	12.90	1.14	2.68	1.87	0.90	17.31	9.23	159.88	0.414	No	No	2.00
326	12.92	1.09	2.73	2.11	0.92	16.59	5.02	83.31	0.791	No	Yes	2.00
327	12.94	1.05	2.76	2.21	0.93	15.84	5.34	84.60	0.756	No	Yes	2.00
328	12.96	1.06	2.74	2.10	0.92	15.96	5.17	82.44	0.761	No	Yes	2.00
329	12.98	1.08	2.72	1.96	0.91	16.22	4.91	79.67	0.774	No	Yes	2.00
330	13.00	1.10	2.71	1.97	0.91	16.48	4.86	80.17	0.786	No	Yes	2.00
331	13.02	1.09	2.73	2.02	0.92	16.29	4.98	81.08	0.777	No	Yes	2.00
332	13.04	1.07	2.74	2.09	0.92	16.08	5.12	82.27	0.767	No	Yes	2.00
333	13.06	1.07	2.73	2.05	0.92	16.03	5.08	81.42	0.764	No	Yes	2.00
334	13.08	1.12	2.70	1.87	0.91	16.69	10.00	166.90	0.461	No	No	2.00
335	13.10	1.24	2.63	1.63	0.88	18.25	6.67	121.76	0.223	No	No	2.00
336	13.12	1.40	2.57	1.51	0.86	20.66	4.44	91.78	0.152	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	13.14	1.51	2.55	1.58	0.85	22.19	4.03	89.33	0.146	No	No	2.00
338	13.16	1.46	2.59	1.75	0.86	21.56	5.02	108.34	0.198	No	No	2.00
339	13.18	1.32	2.65	1.95	0.89	19.49	7.54	146.86	0.337	No	No	2.00
340	13.20	1.21	2.69	2.04	0.91	17.90	9.80	175.39	0.524	No	No	2.00
341	13.22	1.20	2.68	1.93	0.90	17.67	9.22	162.99	0.434	No	No	2.00
342	13.24	1.27	2.64	1.73	0.89	18.56	7.02	130.35	0.257	No	No	2.00
343	13.26	1.33	2.61	1.65	0.87	19.40	5.87	113.77	0.195	No	No	2.00
344	13.28	1.34	2.63	1.82	0.88	19.59	6.67	130.59	0.258	No	No	2.00
345	13.30	1.26	2.67	1.91	0.90	18.38	8.33	153.16	0.373	No	No	2.00
346	13.32	1.18	2.69	1.89	0.91	17.04	9.75	166.09	0.456	No	No	2.00
347	13.34	1.12	2.69	1.70	0.90	16.07	9.47	152.21	0.367	No	No	2.00
348	13.36	1.13	2.68	1.62	0.90	16.13	8.80	141.93	0.311	No	No	2.00
349	13.38	1.20	2.64	1.53	0.89	17.09	7.07	120.79	0.219	No	No	2.00
350	13.40	1.30	2.60	1.43	0.87	18.57	5.28	98.01	0.168	No	No	2.00
351	13.42	1.39	2.59	1.54	0.86	19.89	5.00	99.43	0.171	No	No	2.00
352	13.44	1.41	2.62	1.77	0.88	20.19	6.00	121.24	0.221	No	No	2.00
353	13.46	1.40	2.63	1.88	0.88	20.08	6.68	134.15	0.274	No	No	2.00
354	13.48	1.30	2.68	2.04	0.90	18.61	8.95	166.51	0.458	No	No	2.00
355	13.50	1.16	2.73	2.12	0.92	16.49	5.05	83.31	0.787	No	Yes	2.00
356	13.52	0.99	2.82	2.35	0.95	13.96	6.07	84.79	0.666	No	Yes	2.00
357	13.54	0.92	2.83	2.17	0.96	12.91	6.18	79.79	0.616	No	Yes	2.00
358	13.56	0.93	2.79	1.89	0.94	12.97	5.75	74.57	0.618	No	Yes	2.00
359	13.58	0.96	2.77	1.77	0.93	13.31	5.46	72.70	0.635	No	Yes	2.00
360	13.60	0.96	2.77	1.82	0.94	13.35	5.52	73.75	0.637	No	Yes	2.00
361	13.62	0.97	2.78	1.86	0.94	13.38	5.57	74.55	0.638	No	Yes	2.00
362	13.64	1.01	2.75	1.75	0.93	14.00	5.20	72.84	0.668	No	Yes	2.00
363	13.66	1.18	2.65	1.46	0.89	16.26	7.42	120.55	0.219	No	No	2.00
364	13.68	1.31	2.58	1.27	0.86	18.11	4.67	84.57	0.136	No	No	2.00
365	13.70	1.41	2.56	1.34	0.86	19.43	4.27	82.97	0.133	No	No	2.00
366	13.72	1.39	2.61	1.62	0.87	19.36	5.74	111.06	0.187	No	No	2.00
367	13.74	1.38	2.64	1.82	0.89	19.28	6.92	133.32	0.270	No	No	2.00
368	13.76	1.33	2.67	1.94	0.90	18.53	8.37	155.10	0.384	No	No	2.00
369	13.78	1.20	2.72	2.02	0.92	16.64	4.89	81.33	0.794	No	Yes	2.00
370	13.80	1.10	2.77	2.16	0.94	15.10	5.46	82.53	0.720	No	Yes	2.00
371	13.82	1.07	2.78	2.16	0.94	14.63	5.60	81.97	0.698	No	Yes	2.00
372	13.84	1.11	2.76	2.09	0.93	15.23	5.34	81.43	0.727	No	Yes	2.00
373	13.86	1.15	2.75	2.13	0.93	15.83	5.23	82.84	4.000	Yes	Yes	2.00
374	13.88	1.29	2.68	1.86	0.90	17.63	8.82	155.58	4.000	Yes	No	2.00
375	13.90	1.35	2.64	1.68	0.89	18.37	6.83	125.58	4.000	Yes	No	2.00
376	13.92	1.62	2.52	1.32	0.84	21.93	3.13	68.59	4.000	Yes	No	2.00
377	13.94	1.77	2.47	1.22	0.82	23.91	2.76	65.97	4.000	Yes	No	2.00
378	13.96	2.34	2.33	1.04	0.77	31.40	2.04	63.91	4.000	Yes	No	2.00
379	13.98	2.66	2.29	1.08	0.75	35.72	1.89	67.46	4.000	Yes	No	2.00
380	14.00	3.19	2.24	1.15	0.74	42.72	1.73	73.89	4.000	Yes	No	2.00
381	14.02	3.73	2.22	1.32	0.73	50.09	1.67	83.64	4.000	Yes	No	2.00
382	14.04	4.32	2.21	1.51	0.72	57.95	1.63	94.66	0.159	No	No	2.00
383	14.06	4.56	2.22	1.67	0.73	61.29	1.66	101.48	4.000	Yes	No	2.00
384	14.08	4.19	2.30	2.04	0.76	56.85	1.92	109.04	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	14.10	3.56	2.42	2.61	0.80	48.88	2.47	120.87	4.000	Yes	No	2.00
386	14.12	2.79	2.61	3.89	0.88	39.15	5.68	222.54	4.000	Yes	No	2.00
387	14.14	2.22	2.79	5.64	0.94	31.60	5.69	179.83	4.000	Yes	Yes	2.00
388	14.16	1.90	2.91	7.31	0.99	27.17	7.40	201.05	4.000	Yes	Yes	2.00
389	14.18	1.89	2.92	7.45	0.99	27.07	7.51	203.27	1.291	No	Yes	2.00
390	14.20	1.99	2.88	6.94	0.98	28.38	6.98	197.95	1.354	No	Yes	2.00
391	14.22	2.15	2.84	6.34	0.96	30.36	6.30	191.41	1.448	No	Yes	2.00
392	14.24	2.25	2.81	6.13	0.95	31.77	5.99	190.44	1.515	No	Yes	2.00
393	14.26	2.28	2.81	6.10	0.95	32.06	5.94	190.47	1.529	No	Yes	2.00
394	14.28	2.23	2.82	6.16	0.96	31.32	6.07	190.03	1.494	No	Yes	2.00
395	14.30	2.20	2.83	6.26	0.96	30.79	6.20	190.88	1.469	No	Yes	2.00
396	14.32	2.29	2.81	6.17	0.95	32.01	5.99	191.67	1.527	No	Yes	2.00
397	14.34	2.55	2.76	5.79	0.93	35.40	5.38	190.46	1.689	No	Yes	2.00
398	14.36	2.78	2.71	5.42	0.92	38.51	4.87	187.33	1.837	No	Yes	2.00
399	14.38	2.88	2.70	5.31	0.91	39.67	10.12	401.58	3.600	No	No	2.00
400	14.40	2.86	2.71	5.46	0.92	39.37	4.81	189.56	1.878	No	Yes	2.00
401	14.42	2.90	2.71	5.56	0.92	39.85	4.84	192.77	1.901	No	Yes	2.00
402	14.44	3.32	2.64	5.06	0.89	45.35	7.15	324.40	3.600	No	No	2.00
403	14.46	4.11	2.53	4.26	0.85	55.47	3.42	189.61	0.714	No	No	2.00
404	14.48	4.83	2.45	3.78	0.82	64.59	2.64	170.37	0.540	No	No	2.00
405	14.50	5.36	2.40	3.57	0.80	71.24	2.37	169.06	0.529	No	No	2.00
406	14.52	5.79	2.38	3.64	0.79	76.71	2.29	176.01	4.000	Yes	No	2.00
407	14.54	6.36	2.35	3.53	0.78	83.84	2.13	178.23	4.000	Yes	No	2.00
408	14.56	6.82	2.32	3.45	0.77	89.43	2.01	180.12	4.000	Yes	No	2.00
409	14.58	6.58	2.35	3.61	0.78	86.28	2.12	183.02	4.000	Yes	No	2.00
410	14.60	5.98	2.42	4.10	0.80	78.93	2.45	193.71	4.000	Yes	No	2.00
411	14.62	5.22	2.51	4.88	0.84	69.45	2.97	206.28	4.000	Yes	No	2.00
412	14.64	4.77	2.57	5.43	0.86	63.65	4.41	280.82	4.000	Yes	No	2.00
413	14.66	4.51	2.60	5.73	0.88	60.11	5.49	329.81	4.000	Yes	No	2.00
414	14.68	4.61	2.58	5.35	0.87	61.13	4.60	281.26	4.000	No	No	2.00
415	14.70	5.05	2.51	4.70	0.84	66.38	2.97	197.44	0.796	No	No	2.00
416	14.72	5.45	2.45	4.18	0.82	71.09	2.66	189.42	0.712	No	No	2.00
417	14.74	5.30	2.47	4.30	0.83	69.00	2.77	191.29	0.731	No	No	2.00
418	14.76	4.79	2.53	4.71	0.85	62.60	3.35	209.71	4.000	No	No	2.00
419	14.78	4.39	2.58	5.07	0.87	57.40	4.61	264.73	4.000	No	No	2.00
420	14.80	4.37	2.57	4.91	0.86	56.93	4.37	248.97	4.000	Yes	No	2.00
421	14.82	4.66	2.52	4.40	0.84	60.21	3.11	187.33	4.000	Yes	No	2.00
422	14.84	5.24	2.45	3.93	0.82	67.30	2.64	177.54	4.000	Yes	No	2.00
423	14.86	6.58	2.32	3.20	0.77	83.31	2.00	166.55	4.000	Yes	No	2.00
424	14.88	8.09	2.20	2.63	0.72	100.98	1.61	162.72	4.000	Yes	No	2.00
425	14.90	10.13	2.06	2.04	0.67	124.39	1.36	169.53	4.000	Yes	No	2.00
426	14.92	23.81	1.55	0.86	0.48	275.25	1.00	275.25	4.000	No	No	2.00
427	14.94	37.13	1.29	0.57	0.38	415.53	1.00	415.53	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.42	2.00	0.00	0.00	0.02	0.00	6.44	2.00	0.00	0.00	0.02	0.00
6.46	2.00	0.00	0.00	0.02	0.00	6.48	2.00	0.00	0.00	0.02	0.00
6.50	2.00	0.00	0.00	0.02	0.00	6.52	2.00	0.00	0.00	0.02	0.00
6.54	2.00	0.00	0.00	0.02	0.00	6.56	2.00	0.00	0.00	0.02	0.00
6.58	2.00	0.00	0.00	0.02	0.00	6.60	2.00	0.00	0.00	0.02	0.00
6.62	2.00	0.00	0.00	0.02	0.00	6.64	2.00	0.00	0.00	0.02	0.00
6.66	2.00	0.00	0.00	0.02	0.00	6.68	2.00	0.00	0.00	0.02	0.00
6.70	2.00	0.00	0.00	0.02	0.00	6.72	2.00	0.00	0.00	0.02	0.00
6.74	2.00	0.00	0.00	0.02	0.00	6.76	2.00	0.00	0.00	0.02	0.00
6.78	2.00	0.00	0.00	0.02	0.00	6.80	2.00	0.00	0.00	0.02	0.00
6.82	2.00	0.00	0.00	0.02	0.00	6.84	2.00	0.00	0.00	0.02	0.00
6.86	2.00	0.00	0.00	0.02	0.00	6.88	2.00	0.00	0.00	0.02	0.00
6.90	2.00	0.00	0.00	0.02	0.00	6.92	2.00	0.00	0.00	0.02	0.00
6.94	2.00	0.00	0.00	0.02	0.00	6.96	2.00	0.00	0.00	0.02	0.00
6.98	2.00	0.00	0.00	0.02	0.00	7.00	2.00	0.00	0.00	0.02	0.00
7.02	2.00	0.00	0.00	0.02	0.00	7.04	2.00	0.00	0.00	0.02	0.00
7.06	2.00	0.00	0.00	0.02	0.00	7.08	2.00	0.00	0.00	0.02	0.00
7.10	2.00	0.00	0.00	0.02	0.00	7.12	2.00	0.00	0.00	0.02	0.00
7.14	2.00	0.00	0.00	0.02	0.00	7.16	2.00	0.00	0.00	0.02	0.00
7.18	2.00	0.00	0.00	0.02	0.00	7.20	2.00	0.00	0.00	0.02	0.00
7.22	2.00	0.00	0.00	0.02	0.00	7.24	2.00	0.00	0.00	0.02	0.00
7.26	2.00	0.00	0.00	0.02	0.00	7.28	2.00	0.00	0.00	0.02	0.00
7.30	2.00	0.00	0.00	0.02	0.00	7.32	2.00	0.00	0.00	0.02	0.00
7.34	2.00	0.00	0.00	0.02	0.00	7.36	2.00	0.00	0.00	0.02	0.00
7.38	2.00	0.00	0.00	0.02	0.00	7.40	2.00	0.00	0.00	0.02	0.00
7.42	2.00	0.00	0.00	0.02	0.00	7.44	2.00	0.00	0.00	0.02	0.00
7.46	2.00	0.00	0.00	0.02	0.00	7.48	2.00	0.00	0.00	0.02	0.00
7.50	2.00	0.00	0.00	0.02	0.00	7.52	2.00	0.00	0.00	0.02	0.00
7.54	2.00	0.00	0.00	0.02	0.00	7.56	2.00	0.00	0.00	0.02	0.00
7.58	2.00	0.00	0.00	0.02	0.00	7.60	2.00	0.00	0.00	0.02	0.00
7.62	2.00	0.00	0.00	0.02	0.00	7.64	2.00	0.00	0.00	0.02	0.00
7.66	2.00	0.00	0.00	0.02	0.00	7.68	2.00	0.00	0.00	0.02	0.00
7.70	2.00	0.00	0.00	0.02	0.00	7.72	2.00	0.00	0.00	0.02	0.00
7.74	2.00	0.00	0.00	0.02	0.00	7.76	2.00	0.00	0.00	0.02	0.00
7.78	2.00	0.00	0.00	0.02	0.00	7.80	2.00	0.00	0.00	0.02	0.00
7.82	2.00	0.00	0.00	0.02	0.00	7.84	2.00	0.00	0.00	0.02	0.00
7.86	2.00	0.00	0.00	0.02	0.00	7.88	2.00	0.00	0.00	0.02	0.00
7.90	2.00	0.00	0.00	0.02	0.00	7.92	2.00	0.00	0.00	0.02	0.00
7.94	2.00	0.00	0.00	0.02	0.00	7.96	2.00	0.00	0.00	0.02	0.00
7.98	2.00	0.00	0.00	0.02	0.00	8.00	2.00	0.00	0.00	0.02	0.00
8.02	2.00	0.00	0.00	0.02	0.00	8.04	2.00	0.00	0.00	0.02	0.00
8.06	1.96	0.00	0.00	0.02	0.00	8.08	1.91	0.00	0.00	0.02	0.00
8.10	1.88	0.00	0.00	0.02	0.00	8.12	1.89	0.00	0.00	0.02	0.00
8.14	1.89	0.00	0.00	0.02	0.00	8.16	1.82	0.00	0.00	0.02	0.00
8.18	1.82	0.00	0.00	0.02	0.00	8.20	1.82	0.00	0.00	0.02	0.00
8.22	1.82	0.00	0.00	0.02	0.00	8.24	1.80	0.00	0.00	0.02	0.00
8.26	1.81	0.00	0.00	0.02	0.00	8.28	1.81	0.00	0.00	0.02	0.00
8.30	1.76	0.00	0.00	0.02	0.00	8.32	1.80	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.34	1.76	0.00	0.00	0.02	0.00	8.36	1.76	0.00	0.00	0.02	0.00
8.38	1.78	0.00	0.00	0.02	0.00	8.40	1.82	0.00	0.00	0.02	0.00
8.42	1.88	0.00	0.00	0.02	0.00	8.44	1.92	0.00	0.00	0.02	0.00
8.46	1.97	0.00	0.00	0.02	0.00	8.48	1.98	0.00	0.00	0.02	0.00
8.50	1.96	0.00	0.00	0.02	0.00	8.52	1.90	0.00	0.00	0.02	0.00
8.54	1.88	0.00	0.00	0.02	0.00	8.56	1.88	0.00	0.00	0.02	0.00
8.58	1.73	0.00	0.00	0.02	0.00	8.60	1.69	0.00	0.00	0.02	0.00
8.62	1.68	0.00	0.00	0.02	0.00	8.64	1.83	0.00	0.00	0.02	0.00
8.66	1.99	0.00	0.00	0.02	0.00	8.68	2.00	0.00	0.00	0.02	0.00
8.70	2.00	0.00	0.00	0.02	0.00	8.72	2.00	0.00	0.00	0.02	0.00
8.74	1.91	0.00	0.00	0.02	0.00	8.76	1.86	0.00	0.00	0.02	0.00
8.78	1.84	0.00	0.00	0.02	0.00	8.80	2.00	0.00	0.00	0.02	0.00
8.82	2.00	0.00	0.00	0.02	0.00	8.84	2.00	0.00	0.00	0.02	0.00
8.86	2.00	0.00	0.00	0.02	0.00	8.88	1.92	0.00	0.00	0.02	0.00
8.90	1.80	0.00	0.00	0.02	0.00	8.92	1.80	0.00	0.00	0.02	0.00
8.94	1.85	0.00	0.00	0.02	0.00	8.96	1.89	0.00	0.00	0.02	0.00
8.98	1.85	0.00	0.00	0.02	0.00	9.00	1.81	0.00	0.00	0.02	0.00
9.02	1.76	0.00	0.00	0.02	0.00	9.04	1.78	0.00	0.00	0.02	0.00
9.06	2.00	0.00	0.00	0.02	0.00	9.08	2.00	0.00	0.00	0.02	0.00
9.10	2.00	0.00	0.00	0.02	0.00	9.12	2.00	0.00	0.00	0.02	0.00
9.14	2.00	0.00	0.00	0.02	0.00	9.16	2.00	0.00	0.00	0.02	0.00
9.18	2.00	0.00	0.00	0.02	0.00	9.20	2.00	0.00	0.00	0.02	0.00
9.22	2.00	0.00	0.00	0.02	0.00	9.24	2.00	0.00	0.00	0.02	0.00
9.26	2.00	0.00	0.00	0.02	0.00	9.28	2.00	0.00	0.00	0.02	0.00
9.30	2.00	0.00	0.00	0.02	0.00	9.32	1.95	0.00	0.00	0.02	0.00
9.34	1.84	0.00	0.00	0.02	0.00	9.36	1.80	0.00	0.00	0.02	0.00
9.38	1.79	0.00	0.00	0.02	0.00	9.40	1.75	0.00	0.00	0.02	0.00
9.42	1.77	0.00	0.00	0.02	0.00	9.44	1.85	0.00	0.00	0.02	0.00
9.46	1.91	0.00	0.00	0.02	0.00	9.48	1.96	0.00	0.00	0.02	0.00
9.50	1.96	0.00	0.00	0.02	0.00	9.52	1.94	0.00	0.00	0.02	0.00
9.54	1.89	0.00	0.00	0.02	0.00	9.56	1.84	0.00	0.00	0.02	0.00
9.58	1.84	0.00	0.00	0.02	0.00	9.60	1.84	0.00	0.00	0.02	0.00
9.62	1.80	0.00	0.00	0.02	0.00	9.64	1.76	0.00	0.00	0.02	0.00
9.66	1.81	0.00	0.00	0.02	0.00	9.68	1.84	0.00	0.00	0.02	0.00
9.70	1.88	0.00	0.00	0.02	0.00	9.72	1.94	0.00	0.00	0.02	0.00
9.74	2.00	0.00	0.00	0.02	0.00	9.76	2.00	0.00	0.00	0.02	0.00
9.78	2.00	0.00	0.00	0.02	0.00	9.80	2.00	0.00	0.00	0.02	0.00
9.82	2.00	0.00	0.00	0.02	0.00	9.84	2.00	0.00	0.00	0.02	0.00
9.86	2.00	0.00	0.00	0.02	0.00	9.88	2.00	0.00	0.00	0.02	0.00
9.90	2.00	0.00	0.00	0.02	0.00	9.92	2.00	0.00	0.00	0.02	0.00
9.94	2.00	0.00	0.00	0.02	0.00	9.96	2.00	0.00	0.00	0.02	0.00
9.98	2.00	0.00	0.00	0.02	0.00	10.00	2.00	0.00	0.00	0.02	0.00
10.02	2.00	0.00	0.00	0.02	0.00	10.04	2.00	0.00	0.00	0.02	0.00
10.06	2.00	0.00	0.00	0.02	0.00	10.08	2.00	0.00	0.00	0.02	0.00
10.10	2.00	0.00	0.00	0.02	0.00	10.12	2.00	0.00	0.00	0.02	0.00
10.14	2.00	0.00	0.00	0.02	0.00	10.16	2.00	0.00	0.00	0.02	0.00
10.18	2.00	0.00	0.00	0.02	0.00	10.20	2.00	0.00	0.00	0.02	0.00
10.22	2.00	0.00	0.00	0.02	0.00	10.24	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.26	2.00	0.00	0.00	0.02	0.00	10.28	2.00	0.00	0.00	0.02	0.00
10.30	1.95	0.00	0.00	0.02	0.00	10.32	1.90	0.00	0.00	0.02	0.00
10.34	2.00	0.00	0.00	0.02	0.00	10.36	2.00	0.00	0.00	0.02	0.00
10.38	2.00	0.00	0.00	0.02	0.00	10.40	2.00	0.00	0.00	0.02	0.00
10.42	2.00	0.00	0.00	0.02	0.00	10.44	2.00	0.00	0.00	0.02	0.00
10.46	2.00	0.00	0.00	0.02	0.00	10.48	2.00	0.00	0.00	0.02	0.00
10.50	2.00	0.00	0.00	0.02	0.00	10.52	2.00	0.00	0.00	0.02	0.00
10.54	2.00	0.00	0.00	0.02	0.00	10.56	2.00	0.00	0.00	0.02	0.00
10.58	2.00	0.00	0.00	0.02	0.00	10.60	2.00	0.00	0.00	0.02	0.00
10.62	2.00	0.00	0.00	0.02	0.00	10.64	2.00	0.00	0.00	0.02	0.00
10.66	2.00	0.00	0.00	0.02	0.00	10.68	2.00	0.00	0.00	0.02	0.00
10.70	2.00	0.00	0.00	0.02	0.00	10.72	2.00	0.00	0.00	0.02	0.00
10.74	1.91	0.00	0.00	0.02	0.00	10.76	1.98	0.00	0.00	0.02	0.00
10.78	2.00	0.00	0.00	0.02	0.00	10.80	2.00	0.00	0.00	0.02	0.00
10.82	2.00	0.00	0.00	0.02	0.00	10.84	2.00	0.00	0.00	0.02	0.00
10.86	2.00	0.00	0.00	0.02	0.00	10.88	2.00	0.00	0.00	0.02	0.00
10.90	2.00	0.00	0.00	0.02	0.00	10.92	2.00	0.00	0.00	0.02	0.00
10.94	2.00	0.00	0.00	0.02	0.00	10.96	2.00	0.00	0.00	0.02	0.00
10.98	2.00	0.00	0.00	0.02	0.00	11.00	2.00	0.00	0.00	0.02	0.00
11.02	2.00	0.00	0.00	0.02	0.00	11.04	2.00	0.00	0.00	0.02	0.00
11.06	2.00	0.00	0.00	0.02	0.00	11.08	2.00	0.00	0.00	0.02	0.00
11.10	2.00	0.00	0.00	0.02	0.00	11.12	2.00	0.00	0.00	0.02	0.00
11.14	2.00	0.00	0.00	0.02	0.00	11.16	2.00	0.00	0.00	0.02	0.00
11.18	2.00	0.00	0.00	0.02	0.00	11.20	2.00	0.00	0.00	0.02	0.00
11.22	2.00	0.00	0.00	0.02	0.00	11.24	2.00	0.00	0.00	0.02	0.00
11.26	2.00	0.00	0.00	0.02	0.00	11.28	2.00	0.00	0.00	0.02	0.00
11.30	2.00	0.00	0.00	0.02	0.00	11.32	2.00	0.00	0.00	0.02	0.00
11.34	2.00	0.00	0.00	0.02	0.00	11.36	2.00	0.00	0.00	0.02	0.00
11.38	2.00	0.00	0.00	0.02	0.00	11.40	2.00	0.00	0.00	0.02	0.00
11.42	2.00	0.00	0.00	0.02	0.00	11.44	2.00	0.00	0.00	0.02	0.00
11.46	2.00	0.00	0.00	0.02	0.00	11.48	2.00	0.00	0.00	0.02	0.00
11.50	2.00	0.00	0.00	0.02	0.00	11.52	2.00	0.00	0.00	0.02	0.00
11.54	2.00	0.00	0.00	0.02	0.00	11.56	2.00	0.00	0.00	0.02	0.00
11.58	2.00	0.00	0.00	0.02	0.00	11.60	2.00	0.00	0.00	0.02	0.00
11.62	2.00	0.00	0.00	0.02	0.00	11.64	2.00	0.00	0.00	0.02	0.00
11.66	2.00	0.00	0.00	0.02	0.00	11.68	2.00	0.00	0.00	0.02	0.00
11.70	2.00	0.00	0.00	0.02	0.00	11.72	2.00	0.00	0.00	0.02	0.00
11.74	2.00	0.00	0.00	0.02	0.00	11.76	2.00	0.00	0.00	0.02	0.00
11.78	2.00	0.00	0.00	0.02	0.00	11.80	2.00	0.00	0.00	0.02	0.00
11.82	2.00	0.00	0.00	0.02	0.00	11.84	2.00	0.00	0.00	0.02	0.00
11.86	2.00	0.00	0.00	0.02	0.00	11.88	2.00	0.00	0.00	0.02	0.00
11.90	2.00	0.00	0.00	0.02	0.00	11.92	2.00	0.00	0.00	0.02	0.00
11.94	2.00	0.00	0.00	0.02	0.00	11.96	2.00	0.00	0.00	0.02	0.00
11.98	2.00	0.00	0.00	0.02	0.00	12.00	2.00	0.00	0.00	0.02	0.00
12.02	2.00	0.00	0.00	0.02	0.00	12.04	2.00	0.00	0.00	0.02	0.00
12.06	2.00	0.00	0.00	0.02	0.00	12.08	2.00	0.00	0.00	0.02	0.00
12.10	2.00	0.00	0.00	0.02	0.00	12.12	2.00	0.00	0.00	0.02	0.00
12.14	2.00	0.00	0.00	0.02	0.00	12.16	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
12.18	2.00	0.00	0.00	0.02	0.00	12.20	2.00	0.00	0.00	0.02	0.00
12.22	2.00	0.00	0.00	0.02	0.00	12.24	2.00	0.00	0.00	0.02	0.00
12.26	2.00	0.00	0.00	0.02	0.00	12.28	2.00	0.00	0.00	0.02	0.00
12.30	2.00	0.00	0.00	0.02	0.00	12.32	2.00	0.00	0.00	0.02	0.00
12.34	2.00	0.00	0.00	0.02	0.00	12.36	2.00	0.00	0.00	0.02	0.00
12.38	2.00	0.00	0.00	0.02	0.00	12.40	2.00	0.00	0.00	0.02	0.00
12.42	2.00	0.00	0.00	0.02	0.00	12.44	2.00	0.00	0.00	0.02	0.00
12.46	2.00	0.00	0.00	0.02	0.00	12.48	2.00	0.00	0.00	0.02	0.00
12.50	2.00	0.00	0.00	0.02	0.00	12.52	2.00	0.00	0.00	0.02	0.00
12.54	2.00	0.00	0.00	0.02	0.00	12.56	2.00	0.00	0.00	0.02	0.00
12.58	2.00	0.00	0.00	0.02	0.00	12.60	2.00	0.00	0.00	0.02	0.00
12.62	2.00	0.00	0.00	0.02	0.00	12.64	2.00	0.00	0.00	0.02	0.00
12.66	2.00	0.00	0.00	0.02	0.00	12.68	2.00	0.00	0.00	0.02	0.00
12.70	2.00	0.00	0.00	0.02	0.00	12.72	2.00	0.00	0.00	0.02	0.00
12.74	2.00	0.00	0.00	0.02	0.00	12.76	2.00	0.00	0.00	0.02	0.00
12.78	2.00	0.00	0.00	0.02	0.00	12.80	2.00	0.00	0.00	0.02	0.00
12.82	2.00	0.00	0.00	0.02	0.00	12.84	2.00	0.00	0.00	0.02	0.00
12.86	2.00	0.00	0.00	0.02	0.00	12.88	2.00	0.00	0.00	0.02	0.00
12.90	2.00	0.00	0.00	0.02	0.00	12.92	2.00	0.00	0.00	0.02	0.00
12.94	2.00	0.00	0.00	0.02	0.00	12.96	2.00	0.00	0.00	0.02	0.00
12.98	2.00	0.00	0.00	0.02	0.00	13.00	2.00	0.00	0.00	0.02	0.00
13.02	2.00	0.00	0.00	0.02	0.00	13.04	2.00	0.00	0.00	0.02	0.00
13.06	2.00	0.00	0.00	0.02	0.00	13.08	2.00	0.00	0.00	0.02	0.00
13.10	2.00	0.00	0.00	0.02	0.00	13.12	2.00	0.00	0.00	0.02	0.00
13.14	2.00	0.00	0.00	0.02	0.00	13.16	2.00	0.00	0.00	0.02	0.00
13.18	2.00	0.00	0.00	0.02	0.00	13.20	2.00	0.00	0.00	0.02	0.00
13.22	2.00	0.00	0.00	0.02	0.00	13.24	2.00	0.00	0.00	0.02	0.00
13.26	2.00	0.00	0.00	0.02	0.00	13.28	2.00	0.00	0.00	0.02	0.00
13.30	2.00	0.00	0.00	0.02	0.00	13.32	2.00	0.00	0.00	0.02	0.00
13.34	2.00	0.00	0.00	0.02	0.00	13.36	2.00	0.00	0.00	0.02	0.00
13.38	2.00	0.00	0.00	0.02	0.00	13.40	2.00	0.00	0.00	0.02	0.00
13.42	2.00	0.00	0.00	0.02	0.00	13.44	2.00	0.00	0.00	0.02	0.00
13.46	2.00	0.00	0.00	0.02	0.00	13.48	2.00	0.00	0.00	0.02	0.00
13.50	2.00	0.00	0.00	0.02	0.00	13.52	2.00	0.00	0.00	0.02	0.00
13.54	2.00	0.00	0.00	0.02	0.00	13.56	2.00	0.00	0.00	0.02	0.00
13.58	2.00	0.00	0.00	0.02	0.00	13.60	2.00	0.00	0.00	0.02	0.00
13.62	2.00	0.00	0.00	0.02	0.00	13.64	2.00	0.00	0.00	0.02	0.00
13.66	2.00	0.00	0.00	0.02	0.00	13.68	2.00	0.00	0.00	0.02	0.00
13.70	2.00	0.00	0.00	0.02	0.00	13.72	2.00	0.00	0.00	0.02	0.00
13.74	2.00	0.00	0.00	0.02	0.00	13.76	2.00	0.00	0.00	0.02	0.00
13.78	2.00	0.00	0.00	0.02	0.00	13.80	2.00	0.00	0.00	0.02	0.00
13.82	2.00	0.00	0.00	0.02	0.00	13.84	2.00	0.00	0.00	0.02	0.00
13.86	2.00	0.00	0.00	0.02	0.00	13.88	2.00	0.00	0.00	0.02	0.00
13.90	2.00	0.00	0.00	0.02	0.00	13.92	2.00	0.00	0.00	0.02	0.00
13.94	2.00	0.00	0.00	0.02	0.00	13.96	2.00	0.00	0.00	0.02	0.00
13.98	2.00	0.00	0.00	0.02	0.00	14.00	2.00	0.00	0.00	0.02	0.00
14.02	2.00	0.00	0.00	0.02	0.00	14.04	2.00	0.00	0.00	0.02	0.00
14.06	2.00	0.00	0.00	0.02	0.00	14.08	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
14.10	2.00	0.00	0.00	0.02	0.00	14.12	2.00	0.00	0.00	0.02	0.00
14.14	2.00	0.00	0.00	0.02	0.00	14.16	2.00	0.00	0.00	0.02	0.00
14.18	2.00	0.00	0.00	0.02	0.00	14.20	2.00	0.00	0.00	0.02	0.00
14.22	2.00	0.00	0.00	0.02	0.00	14.24	2.00	0.00	0.00	0.02	0.00
14.26	2.00	0.00	0.00	0.02	0.00	14.28	2.00	0.00	0.00	0.02	0.00
14.30	2.00	0.00	0.00	0.02	0.00	14.32	2.00	0.00	0.00	0.02	0.00
14.34	2.00	0.00	0.00	0.02	0.00	14.36	2.00	0.00	0.00	0.02	0.00
14.38	2.00	0.00	0.00	0.02	0.00	14.40	2.00	0.00	0.00	0.02	0.00
14.42	2.00	0.00	0.00	0.02	0.00	14.44	2.00	0.00	0.00	0.02	0.00
14.46	2.00	0.00	0.00	0.02	0.00	14.48	2.00	0.00	0.00	0.02	0.00
14.50	2.00	0.00	0.00	0.02	0.00	14.52	2.00	0.00	0.00	0.02	0.00
14.54	2.00	0.00	0.00	0.02	0.00	14.56	2.00	0.00	0.00	0.02	0.00
14.58	2.00	0.00	0.00	0.02	0.00	14.60	2.00	0.00	0.00	0.02	0.00
14.62	2.00	0.00	0.00	0.02	0.00	14.64	2.00	0.00	0.00	0.02	0.00
14.66	2.00	0.00	0.00	0.02	0.00	14.68	2.00	0.00	0.00	0.02	0.00
14.70	2.00	0.00	0.00	0.02	0.00	14.72	2.00	0.00	0.00	0.02	0.00
14.74	2.00	0.00	0.00	0.02	0.00	14.76	2.00	0.00	0.00	0.02	0.00
14.78	2.00	0.00	0.00	0.02	0.00	14.80	2.00	0.00	0.00	0.02	0.00
14.82	2.00	0.00	0.00	0.02	0.00	14.84	2.00	0.00	0.00	0.02	0.00
14.86	2.00	0.00	0.00	0.02	0.00	14.88	2.00	0.00	0.00	0.02	0.00
14.90	2.00	0.00	0.00	0.02	0.00	14.92	2.00	0.00	0.00	0.02	0.00
14.94	2.00	0.00	0.00	0.02	0.00						

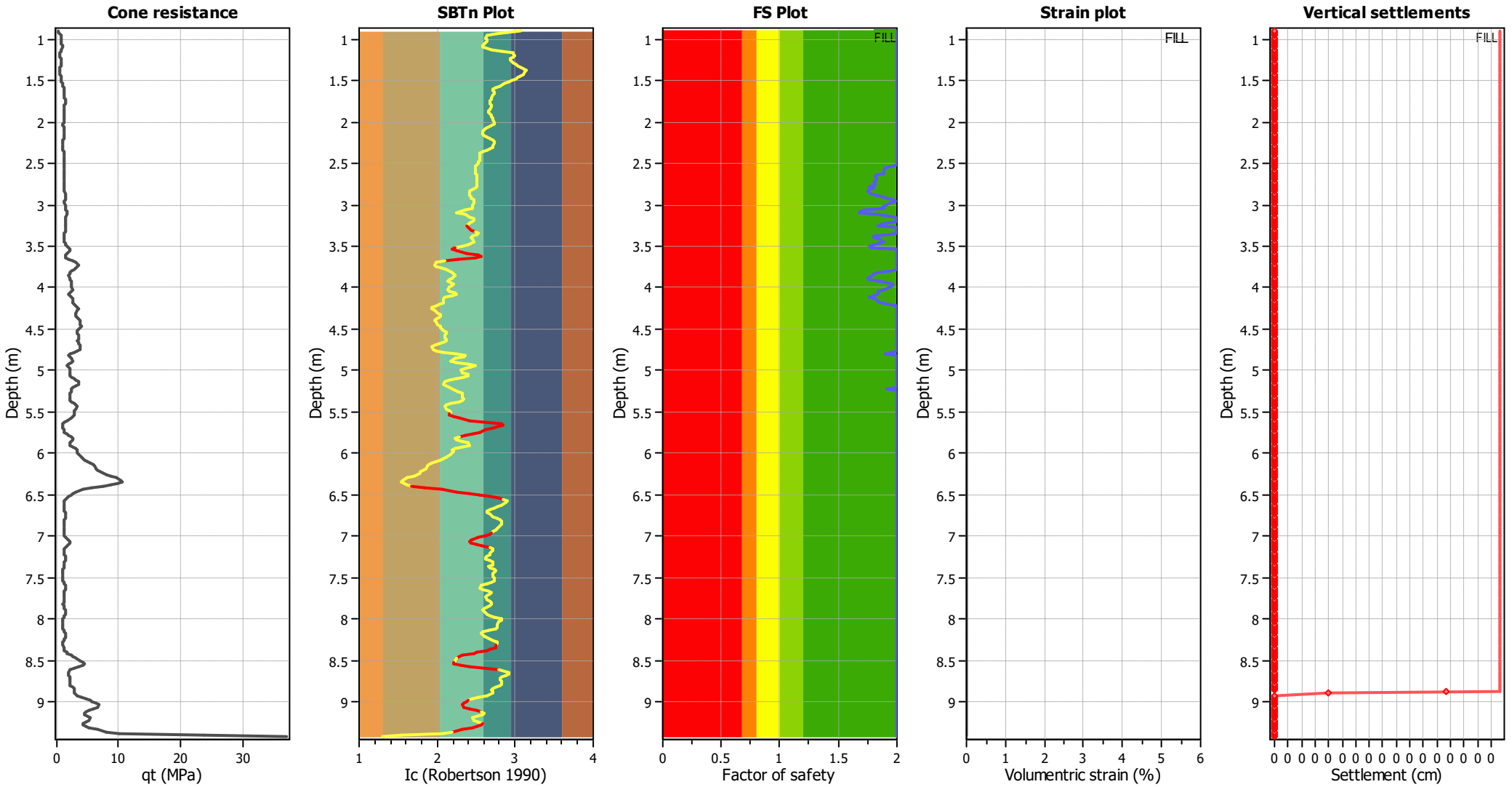
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.42	55.69	2.00	0.00	0.64	0.00	6.44	57.42	2.00	0.00	0.64	0.00
6.46	57.79	2.00	0.00	0.64	0.00	6.48	100.16	2.00	0.00	0.64	0.00
6.50	83.66	2.00	0.00	0.64	0.00	6.52	98.42	2.00	0.00	0.64	0.00
6.54	100.03	2.00	0.00	0.64	0.00	6.56	91.60	2.00	0.00	0.64	0.00
6.58	85.56	2.00	0.00	0.63	0.00	6.60	81.84	2.00	0.00	0.63	0.00
6.62	85.18	2.00	0.00	0.63	0.00	6.64	80.70	2.00	0.00	0.63	0.00
6.66	88.75	2.00	0.00	0.63	0.00	6.68	97.64	2.00	0.00	0.63	0.00
6.70	92.20	2.00	0.00	0.63	0.00	6.72	95.75	2.00	0.00	0.63	0.00
6.74	98.35	2.00	0.00	0.63	0.00	6.76	99.57	2.00	0.00	0.62	0.00
6.78	102.61	2.00	0.00	0.62	0.00	6.80	107.92	2.00	0.00	0.62	0.00
6.82	113.19	2.00	0.00	0.62	0.00	6.84	118.31	2.00	0.00	0.62	0.00
6.86	123.33	2.00	0.00	0.62	0.00	6.88	128.28	2.00	0.00	0.62	0.00
6.90	131.51	2.00	0.00	0.62	0.00	6.92	131.49	2.00	0.00	0.62	0.00
6.94	129.93	2.00	0.00	0.61	0.00	6.96	127.92	2.00	0.00	0.61	0.00
6.98	126.89	2.00	0.00	0.61	0.00	7.00	125.42	2.00	0.00	0.61	0.00
7.02	124.10	2.00	0.00	0.61	0.00	7.04	123.47	2.00	0.00	0.61	0.00
7.06	122.98	2.00	0.00	0.61	0.00	7.08	120.39	2.00	0.00	0.61	0.00
7.10	117.45	2.00	0.00	0.61	0.00	7.12	116.29	2.00	0.00	0.60	0.00
7.14	118.84	2.00	0.00	0.60	0.00	7.16	121.73	2.00	0.00	0.60	0.00
7.18	123.31	2.00	0.00	0.60	0.00	7.20	123.26	2.00	0.00	0.60	0.00
7.22	123.23	2.00	0.00	0.60	0.00	7.24	259.38	2.00	0.00	0.60	0.00
7.26	248.90	2.00	0.00	0.60	0.00	7.28	236.70	2.00	0.00	0.60	0.00
7.30	235.23	2.00	0.00	0.59	0.00	7.32	246.48	2.00	0.00	0.59	0.00
7.34	117.72	2.00	0.00	0.59	0.00	7.36	219.95	2.00	0.00	0.59	0.00
7.38	196.25	2.00	0.00	0.59	0.00	7.40	193.51	2.00	0.00	0.59	0.00
7.42	228.71	2.00	0.00	0.59	0.00	7.44	113.61	2.00	0.00	0.59	0.00
7.46	110.70	2.00	0.00	0.59	0.00	7.48	108.94	2.00	0.00	0.58	0.00
7.50	109.02	2.00	0.00	0.58	0.00	7.52	108.86	2.00	0.00	0.58	0.00
7.54	106.57	2.00	0.00	0.58	0.00	7.56	101.12	2.00	0.00	0.58	0.00
7.58	180.26	2.00	0.00	0.58	0.00	7.60	146.78	2.00	0.00	0.58	0.00
7.62	124.79	2.00	0.00	0.58	0.00	7.64	113.69	2.00	0.00	0.58	0.00
7.66	111.72	2.00	0.00	0.57	0.00	7.68	128.47	2.00	0.00	0.57	0.00
7.70	156.41	2.00	0.00	0.57	0.00	7.72	197.25	2.00	0.00	0.57	0.00
7.74	100.72	2.00	0.00	0.57	0.00	7.76	102.04	2.00	0.00	0.57	0.00
7.78	101.96	2.00	0.00	0.57	0.00	7.80	99.17	2.00	0.00	0.57	0.00
7.82	96.21	2.00	0.00	0.57	0.00	7.84	186.04	2.00	0.00	0.56	0.00
7.86	148.28	2.00	0.00	0.56	0.00	7.88	111.44	2.00	0.00	0.56	0.00
7.90	93.67	2.00	0.00	0.56	0.00	7.92	95.58	2.00	0.00	0.56	0.00
7.94	101.07	2.00	0.00	0.56	0.00	7.96	98.35	2.00	0.00	0.56	0.00
7.98	92.12	2.00	0.00	0.56	0.00	8.00	87.84	2.00	0.00	0.56	0.00
8.02	82.90	2.00	0.00	0.55	0.00	8.04	75.21	2.00	0.00	0.55	0.00
8.06	70.29	1.96	0.00	0.55	0.00	8.08	68.20	1.91	0.00	0.55	0.00
8.10	67.24	1.88	0.00	0.55	0.00	8.12	67.50	1.89	0.00	0.55	0.00
8.14	67.54	1.89	0.00	0.55	0.00	8.16	64.51	1.82	0.00	0.55	0.00
8.18	64.36	1.82	0.00	0.55	0.00	8.20	64.76	1.82	0.00	0.54	0.00
8.22	64.63	1.82	0.00	0.54	0.00	8.24	63.54	1.80	0.00	0.54	0.00
8.26	64.38	1.81	0.00	0.54	0.00	8.28	64.38	1.81	0.00	0.54	0.00
8.30	61.93	1.76	0.00	0.54	0.00	8.32	63.73	1.80	0.00	0.54	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.34	62.19	1.76	0.00	0.54	0.00	8.36	61.76	1.76	0.00	0.54	0.00
8.38	62.93	1.78	0.00	0.53	0.00	8.40	65.41	1.82	0.00	0.53	0.00
8.42	68.05	1.88	0.00	0.53	0.00	8.44	69.76	1.92	0.00	0.53	0.00
8.46	72.19	1.97	0.00	0.53	0.00	8.48	72.67	1.98	0.00	0.53	0.00
8.50	71.58	1.96	0.00	0.53	0.00	8.52	69.42	1.90	0.00	0.53	0.00
8.54	68.49	1.88	0.00	0.53	0.00	8.56	68.70	1.88	0.00	0.52	0.00
8.58	61.02	1.73	0.00	0.52	0.00	8.60	59.04	1.69	0.00	0.52	0.00
8.62	58.20	1.68	0.00	0.52	0.00	8.64	66.54	1.83	0.00	0.52	0.00
8.66	73.49	1.99	0.00	0.52	0.00	8.68	79.27	2.00	0.00	0.52	0.00
8.70	78.23	2.00	0.00	0.52	0.00	8.72	74.83	2.00	0.00	0.52	0.00
8.74	70.40	1.91	0.00	0.51	0.00	8.76	68.38	1.86	0.00	0.51	0.00
8.78	67.38	1.84	0.00	0.51	0.00	8.80	69.05	2.00	0.00	0.51	0.00
8.82	71.62	2.00	0.00	0.51	0.00	8.84	77.86	2.00	0.00	0.51	0.00
8.86	80.32	2.00	0.00	0.51	0.00	8.88	71.07	1.92	0.00	0.51	0.00
8.90	65.91	1.80	0.00	0.51	0.00	8.92	65.72	1.80	0.00	0.50	0.00
8.94	68.03	1.85	0.00	0.50	0.00	8.96	69.94	1.89	0.00	0.50	0.00
8.98	68.20	1.85	0.00	0.50	0.00	9.00	66.25	1.81	0.00	0.50	0.00
9.02	64.02	1.76	0.00	0.50	0.00	9.04	64.85	1.78	0.00	0.50	0.00
9.06	66.74	2.00	0.00	0.50	0.00	9.08	71.08	2.00	0.00	0.50	0.00
9.10	78.38	2.00	0.00	0.49	0.00	9.12	96.55	2.00	0.00	0.49	0.00
9.14	114.31	2.00	0.00	0.49	0.00	9.16	81.91	2.00	0.00	0.49	0.00
9.18	68.54	2.00	0.00	0.49	0.00	9.20	70.83	2.00	0.00	0.49	0.00
9.22	79.61	2.00	0.00	0.49	0.00	9.24	86.51	2.00	0.00	0.49	0.00
9.26	87.32	2.00	0.00	0.49	0.00	9.28	84.67	2.00	0.00	0.48	0.00
9.30	79.05	2.00	0.00	0.48	0.00	9.32	73.04	1.95	0.00	0.48	0.00
9.34	68.69	1.84	0.00	0.48	0.00	9.36	66.80	1.80	0.00	0.48	0.00
9.38	66.41	1.79	0.00	0.48	0.00	9.40	64.19	1.75	0.00	0.48	0.00
9.42	65.15	1.77	0.00	0.48	0.00	9.44	69.01	1.85	0.00	0.48	0.00
9.46	71.99	1.91	0.00	0.47	0.00	9.48	74.09	1.96	0.00	0.47	0.00
9.50	74.09	1.96	0.00	0.47	0.00	9.52	73.25	1.94	0.00	0.47	0.00
9.54	71.32	1.89	0.00	0.47	0.00	9.56	68.88	1.84	0.00	0.47	0.00
9.58	68.88	1.84	0.00	0.47	0.00	9.60	69.06	1.84	0.00	0.47	0.00
9.62	67.03	1.80	0.00	0.47	0.00	9.64	65.51	1.76	0.00	0.46	0.00
9.66	67.81	1.81	0.00	0.46	0.00	9.68	69.21	1.84	0.00	0.46	0.00
9.70	71.05	1.88	0.00	0.46	0.00	9.72	73.39	1.94	0.00	0.46	0.00
9.74	77.02	2.00	0.00	0.46	0.00	9.76	82.00	2.00	0.00	0.46	0.00
9.78	85.11	2.00	0.00	0.46	0.00	9.80	83.32	2.00	0.00	0.46	0.00
9.82	80.94	2.00	0.00	0.45	0.00	9.84	78.98	2.00	0.00	0.45	0.00
9.86	82.20	2.00	0.00	0.45	0.00	9.88	87.04	2.00	0.00	0.45	0.00
9.90	90.86	2.00	0.00	0.45	0.00	9.92	94.66	2.00	0.00	0.45	0.00
9.94	97.24	2.00	0.00	0.45	0.00	9.96	100.31	2.00	0.00	0.45	0.00
9.98	102.17	2.00	0.00	0.45	0.00	10.00	100.01	2.00	0.00	0.44	0.00
10.02	96.20	2.00	0.00	0.44	0.00	10.04	90.61	2.00	0.00	0.44	0.00
10.06	90.07	2.00	0.00	0.44	0.00	10.08	92.86	2.00	0.00	0.44	0.00
10.10	96.95	2.00	0.00	0.44	0.00	10.12	98.32	2.00	0.00	0.44	0.00
10.14	97.83	2.00	0.00	0.44	0.00	10.16	96.86	2.00	0.00	0.44	0.00
10.18	94.84	2.00	0.00	0.43	0.00	10.20	91.63	2.00	0.00	0.43	0.00
10.22	89.40	2.00	0.00	0.43	0.00	10.24	89.34	2.00	0.00	0.43	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.26	87.92	2.00	0.00	0.43	0.00	10.28	82.96	2.00	0.00	0.43	0.00
10.30	74.71	1.95	0.00	0.43	0.00	10.32	72.47	1.90	0.00	0.43	0.00
10.34	78.96	2.00	0.00	0.43	0.00	10.36	82.58	2.00	0.00	0.42	0.00
10.38	77.57	2.00	0.00	0.42	0.00	10.40	76.94	2.00	0.00	0.42	0.00
10.42	80.02	2.00	0.00	0.42	0.00	10.44	89.91	2.00	0.00	0.42	0.00
10.46	98.18	2.00	0.00	0.42	0.00	10.48	92.78	2.00	0.00	0.42	0.00
10.50	87.08	2.00	0.00	0.42	0.00	10.52	83.43	2.00	0.00	0.42	0.00
10.54	87.33	2.00	0.00	0.41	0.00	10.56	93.31	2.00	0.00	0.41	0.00
10.58	96.54	2.00	0.00	0.41	0.00	10.60	94.65	2.00	0.00	0.41	0.00
10.62	93.79	2.00	0.00	0.41	0.00	10.64	91.11	2.00	0.00	0.41	0.00
10.66	91.38	2.00	0.00	0.41	0.00	10.68	88.94	2.00	0.00	0.41	0.00
10.70	83.22	2.00	0.00	0.41	0.00	10.72	77.32	2.00	0.00	0.40	0.00
10.74	73.31	1.91	0.00	0.40	0.00	10.76	76.17	1.98	0.00	0.40	0.00
10.78	80.41	2.00	0.00	0.40	0.00	10.80	85.12	2.00	0.00	0.40	0.00
10.82	85.84	2.00	0.00	0.40	0.00	10.84	85.49	2.00	0.00	0.40	0.00
10.86	85.67	2.00	0.00	0.40	0.00	10.88	83.56	2.00	0.00	0.40	0.00
10.90	83.86	2.00	0.00	0.39	0.00	10.92	81.04	2.00	0.00	0.39	0.00
10.94	81.91	2.00	0.00	0.39	0.00	10.96	80.07	2.00	0.00	0.39	0.00
10.98	77.84	2.00	0.00	0.39	0.00	11.00	76.82	2.00	0.00	0.39	0.00
11.02	79.19	2.00	0.00	0.39	0.00	11.04	78.47	2.00	0.00	0.39	0.00
11.06	79.20	2.00	0.00	0.39	0.00	11.08	77.16	2.00	0.00	0.38	0.00
11.10	79.37	2.00	0.00	0.38	0.00	11.12	84.24	2.00	0.00	0.38	0.00
11.14	161.88	2.00	0.00	0.38	0.00	11.16	109.04	2.00	0.00	0.38	0.00
11.18	103.28	2.00	0.00	0.38	0.00	11.20	88.03	2.00	0.00	0.38	0.00
11.22	81.16	2.00	0.00	0.38	0.00	11.24	126.55	2.00	0.00	0.38	0.00
11.26	93.30	2.00	0.00	0.37	0.00	11.28	78.46	2.00	0.00	0.37	0.00
11.30	76.10	2.00	0.00	0.37	0.00	11.32	76.09	2.00	0.00	0.37	0.00
11.34	77.72	2.00	0.00	0.37	0.00	11.36	79.84	2.00	0.00	0.37	0.00
11.38	84.23	2.00	0.00	0.37	0.00	11.40	92.19	2.00	0.00	0.37	0.00
11.42	95.30	2.00	0.00	0.37	0.00	11.44	90.82	2.00	0.00	0.36	0.00
11.46	89.87	2.00	0.00	0.36	0.00	11.48	92.78	2.00	0.00	0.36	0.00
11.50	93.22	2.00	0.00	0.36	0.00	11.52	92.37	2.00	0.00	0.36	0.00
11.54	93.55	2.00	0.00	0.36	0.00	11.56	95.61	2.00	0.00	0.36	0.00
11.58	98.26	2.00	0.00	0.36	0.00	11.60	99.59	2.00	0.00	0.36	0.00
11.62	103.75	2.00	0.00	0.35	0.00	11.64	109.19	2.00	0.00	0.35	0.00
11.66	113.71	2.00	0.00	0.35	0.00	11.68	115.18	2.00	0.00	0.35	0.00
11.70	116.14	2.00	0.00	0.35	0.00	11.72	117.00	2.00	0.00	0.35	0.00
11.74	119.29	2.00	0.00	0.35	0.00	11.76	126.01	2.00	0.00	0.35	0.00
11.78	129.86	2.00	0.00	0.35	0.00	11.80	128.89	2.00	0.00	0.34	0.00
11.82	138.70	2.00	0.00	0.34	0.00	11.84	146.20	2.00	0.00	0.34	0.00
11.86	147.40	2.00	0.00	0.34	0.00	11.88	136.90	2.00	0.00	0.34	0.00
11.90	122.63	2.00	0.00	0.34	0.00	11.92	106.66	2.00	0.00	0.34	0.00
11.94	101.53	2.00	0.00	0.34	0.00	11.96	89.58	2.00	0.00	0.34	0.00
11.98	90.43	2.00	0.00	0.33	0.00	12.00	110.70	2.00	0.00	0.33	0.00
12.02	148.62	2.00	0.00	0.33	0.00	12.04	331.62	2.00	0.00	0.33	0.00
12.06	166.45	2.00	0.00	0.33	0.00	12.08	164.79	2.00	0.00	0.33	0.00
12.10	159.45	2.00	0.00	0.33	0.00	12.12	147.14	2.00	0.00	0.33	0.00
12.14	130.97	2.00	0.00	0.33	0.00	12.16	113.23	2.00	0.00	0.32	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
12.18	101.74	2.00	0.00	0.32	0.00	12.20	184.80	2.00	0.00	0.32	0.00
12.22	154.56	2.00	0.00	0.32	0.00	12.24	171.32	2.00	0.00	0.32	0.00
12.26	214.02	2.00	0.00	0.32	0.00	12.28	124.03	2.00	0.00	0.32	0.00
12.30	126.64	2.00	0.00	0.32	0.00	12.32	129.48	2.00	0.00	0.32	0.00
12.34	127.59	2.00	0.00	0.31	0.00	12.36	125.71	2.00	0.00	0.31	0.00
12.38	121.85	2.00	0.00	0.31	0.00	12.40	113.99	2.00	0.00	0.31	0.00
12.42	105.15	2.00	0.00	0.31	0.00	12.44	96.79	2.00	0.00	0.31	0.00
12.46	89.82	2.00	0.00	0.31	0.00	12.48	176.19	2.00	0.00	0.31	0.00
12.50	164.37	2.00	0.00	0.31	0.00	12.52	132.51	2.00	0.00	0.30	0.00
12.54	87.34	2.00	0.00	0.30	0.00	12.56	77.07	2.00	0.00	0.30	0.00
12.58	82.59	2.00	0.00	0.30	0.00	12.60	89.39	2.00	0.00	0.30	0.00
12.62	88.53	2.00	0.00	0.30	0.00	12.64	135.25	2.00	0.00	0.30	0.00
12.66	197.47	2.00	0.00	0.30	0.00	12.68	102.24	2.00	0.00	0.30	0.00
12.70	95.12	2.00	0.00	0.29	0.00	12.72	177.22	2.00	0.00	0.29	0.00
12.74	174.28	2.00	0.00	0.29	0.00	12.76	156.48	2.00	0.00	0.29	0.00
12.78	136.00	2.00	0.00	0.29	0.00	12.80	144.54	2.00	0.00	0.29	0.00
12.82	189.73	2.00	0.00	0.29	0.00	12.84	94.17	2.00	0.00	0.29	0.00
12.86	85.55	2.00	0.00	0.29	0.00	12.88	140.31	2.00	0.00	0.28	0.00
12.90	159.88	2.00	0.00	0.28	0.00	12.92	83.31	2.00	0.00	0.28	0.00
12.94	84.60	2.00	0.00	0.28	0.00	12.96	82.44	2.00	0.00	0.28	0.00
12.98	79.67	2.00	0.00	0.28	0.00	13.00	80.17	2.00	0.00	0.28	0.00
13.02	81.08	2.00	0.00	0.28	0.00	13.04	82.27	2.00	0.00	0.28	0.00
13.06	81.42	2.00	0.00	0.27	0.00	13.08	166.90	2.00	0.00	0.27	0.00
13.10	121.76	2.00	0.00	0.27	0.00	13.12	91.78	2.00	0.00	0.27	0.00
13.14	89.33	2.00	0.00	0.27	0.00	13.16	108.34	2.00	0.00	0.27	0.00
13.18	146.86	2.00	0.00	0.27	0.00	13.20	175.39	2.00	0.00	0.27	0.00
13.22	162.99	2.00	0.00	0.27	0.00	13.24	130.35	2.00	0.00	0.26	0.00
13.26	113.77	2.00	0.00	0.26	0.00	13.28	130.59	2.00	0.00	0.26	0.00
13.30	153.16	2.00	0.00	0.26	0.00	13.32	166.09	2.00	0.00	0.26	0.00
13.34	152.21	2.00	0.00	0.26	0.00	13.36	141.93	2.00	0.00	0.26	0.00
13.38	120.79	2.00	0.00	0.26	0.00	13.40	98.01	2.00	0.00	0.26	0.00
13.42	99.43	2.00	0.00	0.25	0.00	13.44	121.24	2.00	0.00	0.25	0.00
13.46	134.15	2.00	0.00	0.25	0.00	13.48	166.51	2.00	0.00	0.25	0.00
13.50	83.31	2.00	0.00	0.25	0.00	13.52	84.79	2.00	0.00	0.25	0.00
13.54	79.79	2.00	0.00	0.25	0.00	13.56	74.57	2.00	0.00	0.25	0.00
13.58	72.70	2.00	0.00	0.25	0.00	13.60	73.75	2.00	0.00	0.24	0.00
13.62	74.55	2.00	0.00	0.24	0.00	13.64	72.84	2.00	0.00	0.24	0.00
13.66	120.55	2.00	0.00	0.24	0.00	13.68	84.57	2.00	0.00	0.24	0.00
13.70	82.97	2.00	0.00	0.24	0.00	13.72	111.06	2.00	0.00	0.24	0.00
13.74	133.32	2.00	0.00	0.24	0.00	13.76	155.10	2.00	0.00	0.24	0.00
13.78	81.33	2.00	0.00	0.23	0.00	13.80	82.53	2.00	0.00	0.23	0.00
13.82	81.97	2.00	0.00	0.23	0.00	13.84	81.43	2.00	0.00	0.23	0.00
13.86	82.84	2.00	0.00	0.23	0.00	13.88	155.58	2.00	0.00	0.23	0.00
13.90	125.58	2.00	0.00	0.23	0.00	13.92	68.59	2.00	0.00	0.23	0.00
13.94	65.97	2.00	0.00	0.23	0.00	13.96	63.91	2.00	0.00	0.22	0.00
13.98	67.46	2.00	0.00	0.22	0.00	14.00	73.89	2.00	0.00	0.22	0.00
14.02	83.64	2.00	0.00	0.22	0.00	14.04	94.66	2.00	0.00	0.22	0.00
14.06	101.48	2.00	0.00	0.22	0.00	14.08	109.04	2.00	0.00	0.22	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
14.10	120.87	2.00	0.00	0.22	0.00	14.12	222.54	2.00	0.00	0.22	0.00
14.14	179.83	2.00	0.00	0.21	0.00	14.16	201.05	2.00	0.00	0.21	0.00
14.18	203.27	2.00	0.00	0.21	0.00	14.20	197.95	2.00	0.00	0.21	0.00
14.22	191.41	2.00	0.00	0.21	0.00	14.24	190.44	2.00	0.00	0.21	0.00
14.26	190.47	2.00	0.00	0.21	0.00	14.28	190.03	2.00	0.00	0.21	0.00
14.30	190.88	2.00	0.00	0.21	0.00	14.32	191.67	2.00	0.00	0.20	0.00
14.34	190.46	2.00	0.00	0.20	0.00	14.36	187.33	2.00	0.00	0.20	0.00
14.38	401.58	2.00	0.00	0.20	0.00	14.40	189.56	2.00	0.00	0.20	0.00
14.42	192.77	2.00	0.00	0.20	0.00	14.44	324.40	2.00	0.00	0.20	0.00
14.46	189.61	2.00	0.00	0.20	0.00	14.48	170.37	2.00	0.00	0.20	0.00
14.50	169.06	2.00	0.00	0.19	0.00	14.52	176.01	2.00	0.00	0.19	0.00
14.54	178.23	2.00	0.00	0.19	0.00	14.56	180.12	2.00	0.00	0.19	0.00
14.58	183.02	2.00	0.00	0.19	0.00	14.60	193.71	2.00	0.00	0.19	0.00
14.62	206.28	2.00	0.00	0.19	0.00	14.64	280.82	2.00	0.00	0.19	0.00
14.66	329.81	2.00	0.00	0.19	0.00	14.68	281.26	2.00	0.00	0.18	0.00
14.70	197.44	2.00	0.00	0.18	0.00	14.72	189.42	2.00	0.00	0.18	0.00
14.74	191.29	2.00	0.00	0.18	0.00	14.76	209.71	2.00	0.00	0.18	0.00
14.78	264.73	2.00	0.00	0.18	0.00	14.80	248.97	2.00	0.00	0.18	0.00
14.82	187.33	2.00	0.00	0.18	0.00	14.84	177.54	2.00	0.00	0.18	0.00
14.86	166.55	2.00	0.00	0.17	0.00	14.88	162.72	2.00	0.00	0.17	0.00
14.90	169.53	2.00	0.00	0.17	0.00	14.92	275.25	2.00	0.00	0.17	0.00
14.94	415.53	2.00	0.00	0.17	0.00						

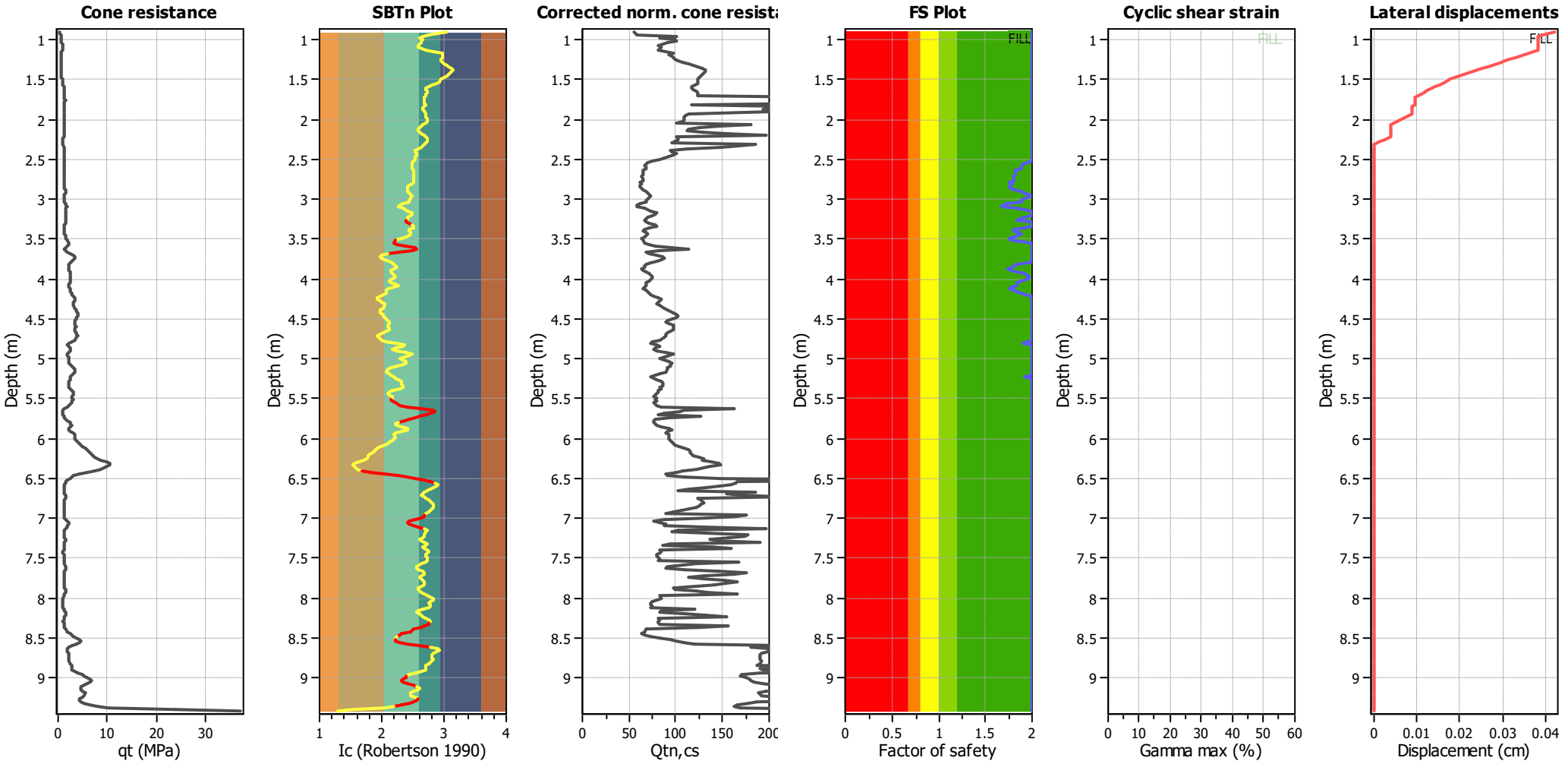
Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Estimation of post-earthquake lateral Displacements

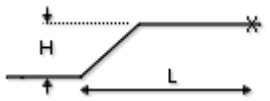
Geometric parameters: Level ground (or gently sloping) with free face (L: 72.00 m - H: 4.60 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.42	0.30	5.65	1.47	55.69	2.00	0.00	0.12	0.00
6.44	0.41	7.87	1.30	57.42	2.00	0.00	0.10	0.00
6.46	0.56	10.79	1.15	57.79	2.00	0.00	0.09	0.00
6.48	0.70	13.57	1.04	100.16	2.00	1.09	0.00	0.00
6.50	0.74	14.31	0.96	83.66	2.00	2.82	0.00	0.00
6.52	0.70	13.48	1.02	98.42	2.00	0.86	0.00	0.00
6.54	0.71	13.76	1.05	100.03	2.00	1.53	0.00	0.00
6.56	0.75	14.47	1.04	91.60	2.00	3.21	0.00	0.00
6.58	0.82	15.98	1.10	85.56	2.00	6.47	0.00	0.00
6.60	0.89	17.25	1.16	81.84	2.00	8.99	0.00	0.00
6.62	0.92	17.94	1.24	85.18	2.00	10.30	0.00	0.00
6.64	0.88	17.02	1.94	80.70	2.00	8.55	0.07	0.00
6.66	0.75	14.43	2.47	88.75	2.00	3.10	0.07	0.00
6.68	0.61	11.79	3.30	97.64	2.00	0.00	0.08	0.00
6.70	0.57	10.92	3.08	92.20	2.00	0.00	0.09	0.00
6.72	0.58	11.17	3.28	95.75	2.00	0.00	0.09	0.00
6.74	0.62	11.90	3.33	98.35	2.00	0.00	0.08	0.00
6.76	0.66	12.62	3.30	99.57	2.00	0.00	0.08	0.00
6.78	0.68	13.04	3.43	102.61	2.00	0.00	0.08	0.00
6.80	0.67	12.93	3.79	107.92	2.00	0.00	0.08	0.00
6.82	0.67	12.76	4.19	113.19	2.00	0.00	0.08	0.00
6.84	0.66	12.55	4.61	118.31	2.00	0.00	0.08	0.00
6.86	0.64	12.25	5.08	123.33	2.00	0.00	0.08	0.00
6.88	0.62	11.83	5.62	128.28	2.00	0.00	0.08	0.00
6.90	0.61	11.55	6.00	131.51	2.00	0.00	0.08	0.00
6.92	0.61	11.65	5.96	131.49	2.00	0.00	0.08	0.00
6.94	0.63	12.07	5.67	129.93	2.00	0.00	0.08	0.00
6.96	0.66	12.64	5.32	127.92	2.00	0.00	0.08	0.00
6.98	0.70	13.38	5.04	126.89	2.00	0.60	0.08	0.00
7.00	0.74	14.19	4.75	125.42	2.00	2.55	0.08	0.00
7.02	0.79	15.23	4.45	124.10	2.00	4.89	0.07	0.00
7.04	0.86	16.58	4.20	123.47	2.00	7.68	0.07	0.00
7.06	0.94	18.05	3.98	122.98	2.00	10.50	0.06	0.00
7.08	1.05	20.33	3.62	120.39	2.00	14.42	0.06	0.00
7.10	1.15	22.28	3.33	117.45	2.00	17.44	0.05	0.00
7.12	1.24	23.93	3.18	116.29	2.00	19.80	0.05	0.00
7.14	1.25	24.23	3.27	118.84	2.00	20.21	0.05	0.00
7.16	1.26	24.40	3.39	121.73	2.00	20.44	0.05	0.00
7.18	1.28	24.79	3.44	123.31	2.00	20.97	0.05	0.00
7.20	1.32	25.48	3.40	123.26	2.00	21.88	0.05	0.00
7.22	1.34	26.00	3.37	123.23	2.00	22.54	0.05	0.00
7.24	1.36	26.42	3.33	259.38	2.00	23.07	0.00	0.00
7.26	1.38	26.73	3.27	248.90	2.00	23.45	0.00	0.00
7.28	1.39	26.92	3.19	236.70	2.00	23.68	0.00	0.00
7.30	1.37	26.51	3.15	235.23	2.00	23.18	0.00	0.00
7.32	1.33	25.64	3.17	246.48	2.00	22.07	0.00	0.00
7.34	1.29	24.91	3.18	117.72	2.00	21.13	0.05	0.00
7.36	1.27	24.45	2.87	219.95	2.00	20.51	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.38	1.32	25.55	2.77	196.25	2.00	21.97	0.00	0.00
7.40	1.33	25.65	2.75	193.51	2.00	22.09	0.00	0.00
7.42	1.32	25.53	3.02	228.71	2.00	21.94	0.00	0.00
7.44	1.25	24.08	3.04	113.61	2.00	20.00	0.05	0.00
7.46	1.21	23.35	2.95	110.70	2.00	18.99	0.05	0.00
7.48	1.18	22.74	2.90	108.94	2.00	18.12	0.05	0.00
7.50	1.15	22.17	2.93	109.02	2.00	17.28	0.05	0.00
7.52	1.13	21.62	2.95	108.86	2.00	16.45	0.06	0.00
7.54	1.11	21.31	2.86	106.57	2.00	15.98	0.06	0.00
7.56	1.12	21.40	2.61	101.12	2.00	16.11	0.06	0.00
7.58	1.14	21.88	2.35	180.26	2.00	16.84	0.00	0.00
7.60	1.17	22.52	2.12	146.78	2.00	17.79	0.00	0.00
7.62	1.20	23.07	1.96	124.79	2.00	18.59	0.00	0.00
7.64	1.22	23.49	1.87	113.69	2.00	19.19	0.00	0.00
7.66	1.24	23.77	1.87	111.72	2.00	19.57	0.00	0.00
7.68	1.23	23.56	2.02	128.47	2.00	19.29	0.00	0.00
7.70	1.19	22.81	2.22	156.41	2.00	18.22	0.00	0.00
7.72	1.14	21.77	2.47	197.25	2.00	16.67	0.00	0.00
7.74	1.09	20.82	2.62	100.72	2.00	15.20	0.06	0.00
7.76	1.06	20.33	2.70	102.04	2.00	14.41	0.06	0.00
7.78	1.05	20.05	2.71	101.96	2.00	13.96	0.06	0.00
7.80	1.05	20.09	2.58	99.17	2.00	14.03	0.06	0.00
7.82	1.05	20.07	2.45	96.21	2.00	13.99	0.06	0.00
7.84	1.06	20.29	2.25	186.04	2.00	14.36	0.00	0.00
7.86	1.12	21.36	2.04	148.28	2.00	16.05	0.00	0.00
7.88	1.19	22.84	1.80	111.44	2.00	18.25	0.00	0.00
7.90	1.27	24.24	1.70	93.67	2.00	20.22	0.00	0.00
7.92	1.29	24.79	1.76	95.58	2.00	20.96	0.00	0.00
7.94	1.30	25.00	1.83	101.07	2.00	21.24	0.00	0.00
7.96	1.31	25.03	1.80	98.35	2.00	21.28	0.00	0.00
7.98	1.30	24.89	1.72	92.12	2.00	21.10	0.00	0.00
8.00	1.29	24.72	1.66	87.84	2.00	20.88	0.00	0.00
8.02	1.27	24.30	1.58	82.90	2.00	20.30	0.00	0.00
8.04	1.25	23.97	1.47	75.21	2.00	19.86	0.00	0.00
8.06	1.24	23.66	1.34	70.29	1.96	19.42	0.00	0.00
8.08	1.23	23.51	1.27	68.20	1.91	19.21	0.00	0.00
8.10	1.22	23.31	1.24	67.24	1.88	18.93	0.00	0.00
8.12	1.21	23.00	1.25	67.50	1.89	18.50	0.00	0.00
8.14	1.19	22.75	1.25	67.54	1.89	18.13	0.00	0.00
8.16	1.18	22.51	1.26	64.51	1.82	17.79	0.00	0.00
8.18	1.17	22.30	1.24	64.36	1.82	17.47	0.00	0.00
8.20	1.17	22.22	1.24	64.76	1.82	17.36	0.00	0.00
8.22	1.17	22.19	1.24	64.63	1.82	17.30	0.00	0.00
8.24	1.17	22.15	1.22	63.54	1.80	17.26	0.00	0.00
8.26	1.15	21.90	1.22	64.38	1.81	16.87	0.00	0.00
8.28	1.14	21.61	1.20	64.38	1.81	16.43	0.00	0.00
8.30	1.14	21.62	1.17	61.93	1.76	16.44	0.00	0.00
8.32	1.17	22.27	1.13	63.73	1.80	17.43	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.34	1.23	23.47	1.06	62.19	1.76	19.17	0.00	0.00
8.36	1.30	24.85	1.03	61.76	1.76	21.05	0.00	0.00
8.38	1.36	25.91	1.05	62.93	1.78	22.42	0.00	0.00
8.40	1.40	26.71	1.12	65.41	1.82	23.43	0.00	0.00
8.42	1.42	27.02	1.21	68.05	1.88	23.81	0.00	0.00
8.44	1.41	26.85	1.27	69.76	1.92	23.59	0.00	0.00
8.46	1.37	26.18	1.36	72.19	1.97	22.77	0.00	0.00
8.48	1.35	25.66	1.38	72.67	1.98	22.11	0.00	0.00
8.50	1.35	25.67	1.35	71.58	1.96	22.12	0.00	0.00
8.52	1.36	25.94	1.27	69.42	1.90	22.46	0.00	0.00
8.54	1.37	26.00	1.24	68.49	1.88	22.54	0.00	0.00
8.56	1.36	25.86	1.24	68.70	1.88	22.36	0.00	0.00
8.58	1.49	28.53	0.95	61.02	1.73	25.61	0.00	0.00
8.60	1.62	30.95	0.85	59.04	1.69	28.29	0.00	0.00
8.62	1.71	32.75	0.79	58.20	1.68	30.15	0.00	0.00
8.64	1.63	31.10	1.10	66.54	1.83	28.45	0.00	0.00
8.66	1.53	29.25	1.36	73.49	1.99	26.43	0.00	0.00
8.68	1.46	27.82	1.57	79.27	2.00	24.77	0.00	0.00
8.70	1.45	27.61	1.54	78.23	2.00	24.52	0.00	0.00
8.72	1.46	27.72	1.42	74.83	2.00	24.65	0.00	0.00
8.74	1.48	28.18	1.27	70.40	1.91	25.20	0.00	0.00
8.76	1.50	28.51	1.19	68.38	1.86	25.58	0.00	0.00
8.78	1.53	29.22	1.15	67.38	1.84	26.39	0.00	0.00
8.80	1.54	29.34	1.20	69.05	2.00	26.53	0.00	0.00
8.82	1.48	28.17	1.31	71.62	2.00	25.19	0.00	0.00
8.84	1.38	26.14	1.55	77.86	2.00	22.72	0.00	0.00
8.86	1.30	24.64	1.55	80.32	2.00	20.77	0.00	0.00
8.88	1.28	24.29	1.42	71.07	1.92	20.29	0.00	0.00
8.90	1.32	24.99	1.16	65.91	1.80	21.23	0.00	0.00
8.92	1.33	25.26	1.15	65.72	1.80	21.59	0.00	0.00
8.94	1.33	25.20	1.22	68.03	1.85	21.50	0.00	0.00
8.96	1.33	25.21	1.29	69.94	1.89	21.52	0.00	0.00
8.98	1.39	26.31	1.22	68.20	1.85	22.93	0.00	0.00
9.00	1.49	28.40	1.12	66.25	1.81	25.45	0.00	0.00
9.02	1.66	31.63	1.00	64.02	1.76	29.01	0.00	0.00
9.04	1.99	38.24	0.90	64.85	1.78	35.27	0.00	0.00
9.06	2.17	41.65	0.89	66.74	2.00	38.09	0.00	0.00
9.08	2.13	40.85	1.07	71.08	2.00	37.45	0.00	0.00
9.10	1.78	33.98	1.44	78.38	2.00	31.37	0.00	0.00
9.12	1.48	28.14	1.93	96.55	2.00	25.14	0.00	0.00
9.14	1.37	25.88	1.99	114.31	2.00	22.38	0.00	0.00
9.16	1.50	28.50	1.64	81.91	2.00	25.56	0.00	0.00
9.18	1.96	37.52	1.05	68.54	2.00	34.64	0.00	0.00
9.20	2.60	50.13	0.78	70.83	2.00	44.21	0.00	0.00
9.22	3.17	61.34	0.68	79.61	2.00	50.87	0.00	0.00
9.24	3.48	67.42	0.72	86.51	2.00	53.99	0.00	0.00
9.26	3.45	66.98	0.80	87.32	2.00	53.77	0.00	0.00
9.28	3.20	61.93	0.93	84.67	2.00	51.19	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.30	2.82	54.54	0.98	79.05	2.00	46.99	0.00	0.00
9.32	2.49	47.93	0.95	73.04	1.95	42.73	0.00	0.00
9.34	2.27	43.58	0.91	68.69	1.84	39.59	0.00	0.00
9.36	2.12	40.66	0.92	66.80	1.80	37.30	0.00	0.00
9.38	2.03	38.94	0.94	66.41	1.79	35.87	0.00	0.00
9.40	2.08	39.85	0.84	64.19	1.75	36.63	0.00	0.00
9.42	2.25	43.22	0.78	65.15	1.77	39.31	0.00	0.00
9.44	2.41	46.26	0.84	69.01	1.85	41.56	0.00	0.00
9.46	2.42	46.43	0.96	71.99	1.91	41.68	0.00	0.00
9.48	2.35	45.13	1.07	74.09	1.96	40.74	0.00	0.00
9.50	2.41	46.22	1.04	74.09	1.96	41.53	0.00	0.00
9.52	2.51	48.30	0.95	73.25	1.94	42.98	0.00	0.00
9.54	2.54	48.77	0.85	71.32	1.89	43.30	0.00	0.00
9.56	2.36	45.35	0.86	68.88	1.84	40.90	0.00	0.00
9.58	2.13	40.69	0.99	68.88	1.84	37.32	0.00	0.00
9.60	2.04	38.94	1.03	69.06	1.84	35.87	0.00	0.00
9.62	2.18	41.68	0.90	67.03	1.80	38.11	0.00	0.00
9.64	2.40	46.09	0.70	65.51	1.76	41.43	0.00	0.00
9.66	2.56	49.13	0.68	67.81	1.81	43.54	0.00	0.00
9.68	2.59	49.86	0.71	69.21	1.84	44.03	0.00	0.00
9.70	2.65	50.89	0.76	71.05	1.88	44.70	0.00	0.00
9.72	2.85	54.95	0.68	73.39	1.94	47.24	0.06	0.00
9.74	3.09	59.69	0.62	77.02	2.00	49.97	0.00	0.00
9.76	3.38	65.39	0.57	82.00	2.00	52.98	0.00	0.00
9.78	3.50	67.72	0.62	85.11	2.00	54.13	0.00	0.00
9.80	3.37	65.09	0.67	83.32	2.00	52.83	0.00	0.00
9.82	3.19	61.57	0.74	80.94	2.00	50.99	0.00	0.00
9.84	3.03	58.51	0.80	78.98	2.00	49.31	0.00	0.00
9.86	3.17	61.11	0.84	82.20	2.00	50.75	0.00	0.00
9.88	3.39	65.46	0.87	87.04	2.00	53.02	0.00	0.00
9.90	3.62	70.15	0.82	90.86	2.00	55.30	0.00	0.00
9.92	3.81	73.87	0.82	94.66	2.00	57.00	0.00	0.00
9.94	3.88	75.26	0.89	97.24	2.00	57.62	0.00	0.00
9.96	3.93	76.08	1.02	100.31	2.00	57.98	0.00	0.00
9.98	3.94	76.28	1.11	102.17	2.00	58.06	0.00	0.00
10.00	3.82	74.06	1.11	100.01	2.00	57.09	0.00	0.00
10.02	3.63	70.19	1.11	96.20	2.00	55.32	0.00	0.00
10.04	3.35	64.74	1.09	90.61	2.00	52.65	0.00	0.00
10.06	3.25	62.73	1.14	90.07	2.00	51.61	0.00	0.00
10.08	3.34	64.46	1.20	92.86	2.00	52.50	0.00	0.00
10.10	3.54	68.41	1.22	96.95	2.00	54.47	0.00	0.00
10.12	3.59	69.41	1.24	98.32	2.00	54.95	0.00	0.00
10.14	3.53	68.15	1.27	97.83	2.00	54.35	0.00	0.00
10.16	3.46	66.76	1.28	96.86	2.00	53.66	0.00	0.00
10.18	3.52	67.98	1.14	94.84	2.00	54.26	0.00	0.00
10.20	3.63	69.10	0.92	91.63	2.00	54.80	0.00	0.00
10.22	3.74	69.65	0.76	89.40	2.00	55.06	0.00	0.00
10.24	3.87	70.93	0.68	89.34	2.00	55.66	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.26	3.80	69.56	0.67	87.92	2.00	55.02	0.00	0.00
10.28	3.42	63.60	0.74	82.96	2.00	52.06	0.00	0.00
10.30	2.80	53.46	0.82	74.71	1.95	46.33	0.06	0.00
10.32	2.21	42.08	1.08	72.47	1.90	38.43	0.00	0.00
10.34	1.93	36.64	1.40	78.96	2.00	33.86	0.00	0.00
10.36	2.08	39.55	1.47	82.58	2.00	36.38	0.00	0.00
10.38	2.40	45.76	1.17	77.57	2.00	41.20	0.00	0.00
10.40	2.56	48.93	1.07	76.94	2.00	43.41	0.00	0.00
10.42	2.37	45.21	1.27	80.02	2.00	40.80	0.00	0.00
10.44	2.03	38.47	1.73	89.91	2.00	35.47	0.00	0.00
10.46	1.82	34.35	2.07	98.18	2.00	31.73	0.00	0.00
10.48	1.88	35.56	1.87	92.78	2.00	32.87	0.00	0.00
10.50	2.13	40.37	1.60	87.08	2.00	37.06	0.00	0.00
10.52	2.29	43.61	1.42	83.43	2.00	39.61	0.00	0.00
10.54	2.24	42.55	1.57	87.33	2.00	38.79	0.00	0.00
10.56	2.10	39.86	1.81	93.31	2.00	36.64	0.00	0.00
10.58	2.14	40.53	1.90	96.54	2.00	37.19	0.00	0.00
10.60	2.36	44.92	1.76	94.65	2.00	40.59	0.00	0.00
10.62	2.77	53.09	1.56	93.79	2.00	46.10	0.00	0.00
10.64	3.19	60.02	1.28	91.11	2.00	50.15	0.00	0.00
10.66	3.50	64.42	1.13	91.38	2.00	52.49	0.00	0.00
10.68	3.52	64.21	1.03	88.94	2.00	52.38	0.00	0.00
10.70	3.14	57.67	1.04	83.22	2.00	48.83	0.00	0.00
10.72	2.75	50.89	1.02	77.32	2.00	44.70	0.00	0.00
10.74	2.47	46.00	1.01	73.31	1.91	41.37	0.00	0.00
10.76	2.42	45.55	1.13	76.17	1.98	41.04	0.00	0.00
10.78	2.33	44.23	1.30	80.41	2.00	40.07	0.00	0.00
10.80	2.24	42.41	1.49	85.12	2.00	38.69	0.00	0.00
10.82	2.25	42.62	1.51	85.84	2.00	38.85	0.00	0.00
10.84	2.22	42.11	1.51	85.49	2.00	38.46	0.00	0.00
10.86	2.14	40.56	1.55	85.67	2.00	37.21	0.00	0.00
10.88	2.15	40.77	1.47	83.56	2.00	37.39	0.00	0.00
10.90	2.40	45.11	1.40	83.86	2.00	40.72	0.00	0.00
10.92	2.89	52.50	1.12	81.04	2.00	45.73	0.00	0.00
10.94	3.20	56.92	1.01	81.91	2.00	48.40	0.00	0.00
10.96	3.23	56.98	0.92	80.07	2.00	48.43	0.00	0.00
10.98	3.00	53.26	0.97	77.84	2.00	46.20	0.00	0.00
11.00	2.82	50.45	1.02	76.82	2.00	44.41	0.00	0.00
11.02	2.88	51.52	1.08	79.19	2.00	45.11	0.00	0.00
11.04	2.94	52.13	1.03	78.47	2.00	45.50	0.00	0.00
11.06	2.91	51.70	1.07	79.20	2.00	45.23	0.00	0.00
11.08	2.63	47.18	1.12	77.16	2.00	42.21	0.00	0.00
11.10	2.30	42.04	1.31	79.37	2.00	38.40	0.00	0.00
11.12	1.79	33.61	1.61	84.24	2.00	31.01	0.00	0.00
11.14	1.34	24.63	2.30	161.88	2.00	20.75	0.00	0.00
11.16	0.99	17.65	3.03	109.04	2.00	9.75	0.07	0.00
11.18	0.90	15.91	2.86	103.28	2.00	6.32	0.07	0.00
11.20	0.90	15.94	2.13	88.03	2.00	6.39	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
11.22	0.95	16.89	1.80	81.16	2.00	8.30	0.07	0.00
11.24	1.13	20.37	1.68	126.55	2.00	14.49	0.00	0.00
11.26	1.32	24.25	1.63	93.30	2.00	20.24	0.00	0.00
11.28	1.59	29.48	1.48	78.46	2.00	26.68	0.00	0.00
11.30	1.91	34.72	1.33	76.10	2.00	32.08	0.00	0.00
11.32	2.32	41.21	1.22	76.09	2.00	37.74	0.00	0.00
11.34	2.62	45.84	1.17	77.72	2.00	41.25	0.00	0.00
11.36	2.63	46.19	1.24	79.84	2.00	41.50	0.00	0.00
11.38	2.41	42.96	1.45	84.23	2.00	39.12	0.00	0.00
11.40	2.12	38.59	1.79	92.19	2.00	35.58	0.00	0.00
11.42	2.12	38.69	1.88	95.30	2.00	35.66	0.00	0.00
11.44	2.54	45.14	1.63	90.82	2.00	40.74	0.00	0.00
11.46	3.07	53.17	1.42	89.87	2.00	46.15	0.00	0.00
11.48	3.35	57.58	1.41	92.78	2.00	48.78	0.00	0.00
11.50	3.32	57.04	1.44	93.22	2.00	48.47	0.00	0.00
11.52	3.36	57.38	1.40	92.37	2.00	48.66	0.00	0.00
11.54	3.60	60.79	1.35	93.55	2.00	50.57	0.00	0.00
11.56	3.94	65.73	1.26	95.61	2.00	53.15	0.00	0.00
11.58	4.25	70.10	1.21	98.26	2.00	55.27	0.00	0.00
11.60	4.56	74.04	1.09	99.59	2.00	57.08	0.00	0.00
11.62	5.03	80.25	0.97	103.75	2.00	59.74	0.00	0.00
11.64	5.54	86.93	0.88	109.19	2.00	62.38	0.00	0.00
11.66	5.94	92.16	0.84	113.71	2.00	64.30	0.00	0.00
11.68	6.13	94.32	0.81	115.18	2.00	65.07	0.00	0.00
11.70	6.35	96.83	0.75	116.14	2.00	65.94	0.00	0.00
11.72	6.65	100.20	0.69	117.00	2.00	67.07	0.00	0.00
11.74	7.07	105.42	0.65	119.29	2.00	68.74	0.00	0.00
11.76	7.53	112.04	0.69	126.01	2.00	70.75	0.00	0.00
11.78	8.08	119.22	0.69	129.86	2.00	72.80	0.00	0.00
11.80	8.74	127.31	0.64	128.89	2.00	74.97	0.00	0.00
11.82	9.78	138.70	0.51	138.70	2.00	77.80	0.00	0.00
11.84	10.50	146.20	0.43	146.20	2.00	79.54	0.00	0.00
11.86	10.66	147.40	0.40	147.40	2.00	79.81	0.00	0.00
11.88	9.85	136.90	0.40	136.90	2.00	77.37	0.00	0.00
11.90	8.75	122.63	0.40	122.63	2.00	73.73	0.00	0.00
11.92	7.49	106.66	0.43	106.66	2.00	69.13	0.00	0.00
11.94	5.77	85.42	0.59	101.53	2.00	61.80	0.00	0.00
11.96	4.22	65.83	0.98	89.58	2.00	53.20	0.00	0.00
11.98	3.13	51.01	1.49	90.43	2.00	44.78	0.00	0.00
12.00	2.67	45.14	2.26	110.70	2.00	40.75	0.00	0.00
12.02	2.35	40.84	3.09	148.62	2.00	37.44	0.00	0.00
12.04	1.96	34.98	4.28	331.62	2.00	32.33	0.00	0.00
12.06	1.65	29.68	4.83	166.45	2.00	26.91	0.04	0.00
12.08	1.41	25.48	5.09	164.79	2.00	21.87	0.05	0.00
12.10	1.24	22.38	5.13	159.45	2.00	17.59	0.05	0.00
12.12	1.20	21.49	4.58	147.14	2.00	16.25	0.06	0.00
12.14	1.18	20.82	3.82	130.97	2.00	15.21	0.06	0.00
12.16	1.17	20.24	3.03	113.23	2.00	14.27	0.06	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
12.18	1.19	20.19	2.52	101.74	2.00	14.19	0.06	0.00
12.20	1.23	20.67	2.14	184.80	2.00	14.97	0.00	0.00
12.22	1.27	21.17	1.96	154.56	2.00	15.76	0.00	0.00
12.24	1.41	23.65	2.28	171.32	2.00	19.41	0.00	0.00
12.26	1.48	24.97	2.71	214.02	2.00	21.20	0.00	0.00
12.28	1.50	25.53	3.24	124.03	2.00	21.93	0.05	0.00
12.30	1.37	23.37	3.45	126.64	2.00	19.02	0.05	0.00
12.32	1.28	21.87	3.68	129.48	2.00	16.83	0.06	0.00
12.34	1.23	20.96	3.65	127.59	2.00	15.43	0.06	0.00
12.36	1.20	20.30	3.61	125.71	2.00	14.37	0.06	0.00
12.38	1.17	19.77	3.46	121.85	2.00	13.49	0.06	0.00
12.40	1.15	19.30	3.11	113.99	2.00	12.71	0.06	0.00
12.42	1.15	18.94	2.73	105.15	2.00	12.09	0.06	0.00
12.44	1.14	18.66	2.37	96.79	2.00	11.59	0.06	0.00
12.46	1.15	18.55	2.08	89.82	2.00	11.39	0.06	0.00
12.48	1.15	18.54	1.89	176.19	2.00	11.38	0.00	0.00
12.50	1.19	18.97	1.85	164.37	2.00	12.14	0.00	0.00
12.52	1.30	20.76	1.75	132.51	2.00	15.11	0.00	0.00
12.54	1.57	24.71	1.58	87.34	2.00	20.86	0.00	0.00
12.56	1.94	30.30	1.42	77.07	2.00	27.59	0.00	0.00
12.58	2.19	34.13	1.54	82.59	2.00	31.51	0.00	0.00
12.60	2.22	34.70	1.75	89.39	2.00	32.07	0.00	0.00
12.62	1.99	31.37	1.95	88.53	2.00	28.73	0.00	0.00
12.64	1.70	27.07	2.21	135.25	2.00	23.86	0.00	0.00
12.66	1.45	23.12	2.44	197.47	2.00	18.67	0.00	0.00
12.68	1.30	20.72	2.52	102.24	2.00	15.05	0.06	0.00
12.70	1.25	19.82	2.26	95.12	2.00	13.58	0.06	0.00
12.72	1.26	19.77	2.01	177.22	2.00	13.50	0.00	0.00
12.74	1.28	20.09	2.02	174.28	2.00	14.02	0.00	0.00
12.76	1.36	21.16	1.97	156.48	2.00	15.74	0.00	0.00
12.78	1.47	22.76	1.92	136.00	2.00	18.14	0.00	0.00
12.80	1.49	23.12	2.02	144.54	2.00	18.66	0.00	0.00
12.82	1.38	21.52	2.25	189.73	2.00	16.30	0.00	0.00
12.84	1.23	19.04	2.25	94.17	2.00	12.25	0.06	0.00
12.86	1.16	17.81	1.93	85.55	2.00	10.06	0.06	0.00
12.88	1.17	17.77	1.57	140.31	2.00	9.97	0.00	0.00
12.90	1.14	17.31	1.67	159.88	2.00	9.12	0.00	0.00
12.92	1.09	16.59	1.87	83.31	2.00	7.71	0.07	0.00
12.94	1.05	15.84	1.95	84.60	2.00	6.19	0.07	0.00
12.96	1.06	15.96	1.86	82.44	2.00	6.43	0.07	0.00
12.98	1.08	16.22	1.73	79.67	2.00	6.96	0.07	0.00
13.00	1.10	16.48	1.75	80.17	2.00	7.49	0.07	0.00
13.02	1.09	16.29	1.79	81.08	2.00	7.10	0.07	0.00
13.04	1.07	16.08	1.85	82.27	2.00	6.68	0.07	0.00
13.06	1.07	16.03	1.81	81.42	2.00	6.57	0.07	0.00
13.08	1.12	16.69	1.66	166.90	2.00	7.90	0.00	0.00
13.10	1.24	18.25	1.47	121.76	2.00	10.86	0.00	0.00
13.12	1.40	20.66	1.38	91.78	2.00	14.96	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
13.14	1.51	22.19	1.45	89.33	2.00	17.30	0.00	0.00
13.16	1.46	21.56	1.59	108.34	2.00	16.36	0.00	0.00
13.18	1.32	19.49	1.76	146.86	2.00	13.02	0.00	0.00
13.20	1.21	17.90	1.83	175.39	2.00	10.21	0.00	0.00
13.22	1.20	17.67	1.72	162.99	2.00	9.80	0.00	0.00
13.24	1.27	18.56	1.56	130.35	2.00	11.41	0.00	0.00
13.26	1.33	19.40	1.49	113.77	2.00	12.87	0.00	0.00
13.28	1.34	19.59	1.64	130.59	2.00	13.20	0.00	0.00
13.30	1.26	18.38	1.71	153.16	2.00	11.09	0.00	0.00
13.32	1.18	17.04	1.68	166.09	2.00	8.58	0.00	0.00
13.34	1.12	16.07	1.50	152.21	2.00	6.65	0.00	0.00
13.36	1.13	16.13	1.44	141.93	2.00	6.78	0.00	0.00
13.38	1.20	17.09	1.36	120.79	2.00	8.68	0.00	0.00
13.40	1.30	18.57	1.29	98.01	2.00	11.43	0.00	0.00
13.42	1.39	19.89	1.40	99.43	2.00	13.69	0.00	0.00
13.44	1.41	20.19	1.61	121.24	2.00	14.20	0.00	0.00
13.46	1.40	20.08	1.71	134.15	2.00	14.01	0.00	0.00
13.48	1.30	18.61	1.83	166.51	2.00	11.51	0.00	0.00
13.50	1.16	16.49	1.87	83.31	2.00	7.52	0.07	0.00
13.52	0.99	13.96	2.03	84.79	2.00	2.02	0.08	0.00
13.54	0.92	12.91	1.85	79.79	2.00	0.00	0.08	0.00
13.56	0.93	12.97	1.62	74.57	2.00	0.00	0.08	0.00
13.58	0.96	13.31	1.53	72.70	2.00	0.44	0.08	0.00
13.60	0.96	13.35	1.57	73.75	2.00	0.54	0.08	0.00
13.62	0.97	13.38	1.60	74.55	2.00	0.61	0.08	0.00
13.64	1.01	14.00	1.51	72.84	2.00	2.11	0.08	0.00
13.66	1.18	16.26	1.29	120.55	2.00	7.04	0.00	0.00
13.68	1.31	18.11	1.14	84.57	2.00	10.60	0.00	0.00
13.70	1.41	19.43	1.21	82.97	2.00	12.92	0.00	0.00
13.72	1.39	19.36	1.46	111.06	2.00	12.81	0.00	0.00
13.74	1.38	19.28	1.64	133.32	2.00	12.66	0.00	0.00
13.76	1.33	18.53	1.74	155.10	2.00	11.35	0.00	0.00
13.78	1.20	16.64	1.79	81.33	2.00	7.80	0.07	0.00
13.80	1.10	15.10	1.88	82.53	2.00	4.61	0.07	0.00
13.82	1.07	14.63	1.88	81.97	2.00	3.57	0.07	0.00
13.84	1.11	15.23	1.83	81.43	2.00	4.90	0.07	0.00
13.86	1.15	15.83	1.87	82.84	2.00	6.16	0.07	0.00
13.88	1.29	17.63	1.66	155.58	2.00	9.72	0.00	0.00
13.90	1.35	18.37	1.50	125.58	2.00	11.08	0.00	0.00
13.92	1.62	21.93	1.21	68.59	2.00	16.92	0.00	0.00
13.94	1.77	23.91	1.13	65.97	2.00	19.78	0.00	0.00
13.96	2.34	31.40	0.97	63.91	2.00	28.77	0.00	0.00
13.98	2.66	35.72	1.02	67.46	2.00	33.02	0.00	0.00
14.00	3.19	42.72	1.10	73.89	2.00	38.93	0.00	0.00
14.02	3.73	50.09	1.27	83.64	2.00	44.18	0.00	0.00
14.04	4.32	57.95	1.46	94.66	2.00	48.99	0.00	0.00
14.06	4.56	61.29	1.62	101.48	2.00	50.84	0.00	0.00
14.08	4.19	56.85	1.97	109.04	2.00	48.36	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
14.10	3.56	48.88	2.50	120.87	2.00	43.37	0.00	0.00
14.12	2.79	39.15	3.69	222.54	2.00	36.05	0.00	0.00
14.14	2.22	31.60	5.27	179.83	2.00	28.98	0.04	0.00
14.16	1.90	27.17	6.75	201.05	2.00	23.99	0.05	0.00
14.18	1.89	27.07	6.88	203.27	2.00	23.87	0.05	0.00
14.20	1.99	28.38	6.44	197.95	2.00	25.43	0.04	0.00
14.22	2.15	30.36	5.91	191.41	2.00	27.66	0.04	0.00
14.24	2.25	31.77	5.73	190.44	2.00	29.15	0.04	0.00
14.26	2.28	32.06	5.71	190.47	2.00	29.45	0.04	0.00
14.28	2.23	31.32	5.75	190.03	2.00	28.69	0.04	0.00
14.30	2.20	30.79	5.84	190.88	2.00	28.12	0.04	0.00
14.32	2.29	32.01	5.77	191.67	2.00	29.40	0.04	0.00
14.34	2.55	35.40	5.46	190.46	2.00	32.73	0.03	0.00
14.36	2.78	38.51	5.14	187.33	2.00	35.50	0.03	0.00
14.38	2.88	39.67	5.03	401.58	2.00	36.48	0.00	0.00
14.40	2.86	39.37	5.18	189.56	2.00	36.23	0.03	0.00
14.42	2.90	39.85	5.27	192.77	2.00	36.63	0.03	0.00
14.44	3.32	45.35	4.83	324.40	2.00	40.90	0.00	0.00
14.46	4.11	55.47	4.11	189.61	2.00	47.55	0.00	0.00
14.48	4.83	64.59	3.67	170.37	2.00	52.57	0.00	0.00
14.50	5.36	71.24	3.47	169.06	2.00	55.81	0.00	0.00
14.52	5.79	76.71	3.55	176.01	2.00	58.25	0.00	0.00
14.54	6.36	83.84	3.45	178.23	2.00	61.18	0.00	0.00
14.56	6.82	89.43	3.37	180.12	2.00	63.31	0.00	0.00
14.58	6.58	86.28	3.53	183.02	2.00	62.13	0.00	0.00
14.60	5.98	78.93	3.99	193.71	2.00	59.19	0.00	0.00
14.62	5.22	69.45	4.74	206.28	2.00	54.97	0.00	0.00
14.64	4.77	63.65	5.26	280.82	2.00	52.09	0.00	0.00
14.66	4.51	60.11	5.53	329.81	2.00	50.20	0.00	0.00
14.68	4.61	61.13	5.17	281.26	2.00	50.76	0.00	0.00
14.70	5.05	66.38	4.55	197.44	2.00	53.47	0.00	0.00
14.72	5.45	71.09	4.06	189.42	2.00	55.74	0.00	0.00
14.74	5.30	69.00	4.17	191.29	2.00	54.75	0.00	0.00
14.76	4.79	62.60	4.56	209.71	2.00	51.54	0.00	0.00
14.78	4.39	57.40	4.89	264.73	2.00	48.68	0.00	0.00
14.80	4.37	56.93	4.73	248.97	2.00	48.41	0.00	0.00
14.82	4.66	60.21	4.25	187.33	2.00	50.25	0.00	0.00
14.84	5.24	67.30	3.81	177.54	2.00	53.93	0.00	0.00
14.86	6.58	83.31	3.13	166.55	2.00	60.97	0.00	0.00
14.88	8.09	100.98	2.57	162.72	2.00	67.32	0.00	0.00
14.90	10.13	124.39	2.01	169.53	2.00	74.20	0.00	0.00
14.92	23.81	275.25	0.86	275.25	2.00	100.00	0.00	0.00
14.94	37.13	415.53	0.56	415.53	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)

Total estimated displacement: 0.04

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.42	0.30	5.65	9.86	55.69	3.06	0.04	2.30
6.44	0.41	7.87	7.30	57.42	2.91	0.09	0.65
6.46	0.56	10.79	5.36	57.79	2.76	0.09	0.65
6.48	0.70	13.57	4.19	56.92	2.65	0.75	0.75
6.50	0.74	14.31	3.86	55.20	2.61	0.72	0.72
6.52	0.70	13.48	4.18	56.32	2.65	0.75	0.75
6.54	0.71	13.76	4.17	57.38	2.65	0.75	0.75
6.56	0.75	14.47	3.97	57.45	2.62	0.73	0.73
6.58	0.82	15.98	3.74	59.74	2.60	0.72	0.72
6.60	0.89	17.25	3.58	61.78	2.58	0.68	0.71
6.62	0.92	17.94	3.58	64.28	2.58	0.72	0.72
6.64	0.88	17.02	4.74	80.70	2.70	0.62	0.71
6.66	0.75	14.43	6.15	88.75	2.82	0.73	0.73
6.68	0.61	11.79	8.28	97.64	2.97	0.74	0.74
6.70	0.57	10.92	8.45	92.20	2.98	0.73	0.73
6.72	0.58	11.17	8.57	95.75	2.99	0.74	0.74
6.74	0.62	11.90	8.26	98.35	2.97	0.74	0.74
6.76	0.66	12.62	7.89	99.57	2.95	0.75	0.75
6.78	0.68	13.04	7.87	102.61	2.94	0.75	0.75
6.80	0.67	12.93	8.35	107.92	2.97	0.76	0.76
6.82	0.67	12.76	8.87	113.19	3.01	0.27	4.10
6.84	0.66	12.55	9.43	118.31	3.04	0.29	3.98
6.86	0.64	12.25	10.07	123.33	3.07	0.31	3.84
6.88	0.62	11.83	10.85	128.28	3.11	0.33	3.66
6.90	0.61	11.55	11.39	131.51	3.14	0.35	3.53
6.92	0.61	11.65	11.28	131.49	3.13	0.35	3.52
6.94	0.63	12.07	10.76	129.93	3.11	0.33	3.61
6.96	0.66	12.64	10.12	127.92	3.07	0.33	3.73
6.98	0.70	13.38	9.49	126.89	3.04	0.33	3.90
7.00	0.74	14.19	8.84	125.42	3.00	0.33	4.09
7.02	0.79	15.23	8.15	124.10	2.96	0.79	0.79
7.04	0.86	16.58	7.45	123.47	2.92	0.79	0.79
7.06	0.94	18.05	6.81	122.98	2.87	0.79	0.79
7.08	1.05	20.33	5.92	120.39	2.81	0.78	0.78
7.10	1.15	22.28	5.27	117.45	2.75	0.78	0.78
7.12	1.24	23.93	4.86	116.29	2.71	0.78	0.78
7.14	1.25	24.23	4.91	118.84	2.72	0.78	0.78
7.16	1.26	24.40	4.99	121.73	2.73	0.79	0.79
7.18	1.28	24.79	4.97	123.31	2.72	0.79	0.79
7.20	1.32	25.48	4.84	123.26	2.71	0.79	0.79
7.22	1.34	26.00	4.74	123.23	2.70	0.79	0.79
7.24	1.36	26.42	4.65	122.74	2.69	0.94	0.94
7.26	1.38	26.73	4.56	121.83	2.69	0.93	0.93
7.28	1.39	26.92	4.47	120.20	2.68	0.92	0.92
7.30	1.37	26.51	4.48	118.76	2.68	0.92	0.92
7.32	1.33	25.64	4.61	118.20	2.69	0.93	0.93
7.34	1.29	24.91	4.72	117.72	2.70	0.78	0.78
7.36	1.27	24.45	4.50	110.08	2.68	0.91	0.91

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.38	1.32	25.55	4.25	108.70	2.65	0.88	0.88
7.40	1.33	25.65	4.23	108.42	2.65	0.88	0.88
7.42	1.32	25.53	4.50	114.77	2.68	0.92	0.92
7.44	1.25	24.08	4.72	113.61	2.70	0.77	0.77
7.46	1.21	23.35	4.74	110.70	2.70	0.77	0.77
7.48	1.18	22.74	4.79	108.94	2.71	0.76	0.76
7.50	1.15	22.17	4.92	109.02	2.72	0.76	0.76
7.52	1.13	21.62	5.03	108.86	2.73	0.76	0.76
7.54	1.11	21.31	5.00	106.57	2.73	0.76	0.76
7.56	1.12	21.40	4.72	101.12	2.70	0.75	0.75
7.58	1.14	21.88	4.36	95.43	2.67	0.86	0.86
7.60	1.17	22.52	4.01	90.32	2.63	0.82	0.82
7.62	1.20	23.07	3.75	86.56	2.60	0.79	0.79
7.64	1.22	23.49	3.61	84.73	2.58	0.77	0.77
7.66	1.24	23.77	3.57	84.84	2.58	0.77	0.77
7.68	1.23	23.56	3.76	88.67	2.60	0.80	0.80
7.70	1.19	22.81	4.08	93.17	2.64	0.84	0.84
7.72	1.14	21.77	4.51	98.25	2.68	0.88	0.88
7.74	1.09	20.82	4.84	100.72	2.71	0.75	0.75
7.76	1.06	20.33	5.02	102.04	2.73	0.75	0.75
7.78	1.05	20.05	5.08	101.96	2.73	0.75	0.75
7.80	1.05	20.09	4.94	99.17	2.72	0.75	0.75
7.82	1.05	20.07	4.79	96.21	2.71	0.74	0.74
7.84	1.06	20.29	4.53	91.98	2.68	0.87	0.87
7.86	1.12	21.36	4.10	87.62	2.64	0.82	0.82
7.88	1.19	22.84	3.62	82.61	2.58	0.77	0.77
7.90	1.27	24.24	3.33	80.74	2.55	0.74	0.74
7.92	1.29	24.79	3.33	82.51	2.55	0.74	0.74
7.94	1.30	25.00	3.38	84.60	2.56	0.75	0.75
7.96	1.31	25.03	3.35	83.86	2.55	0.74	0.74
7.98	1.30	24.89	3.28	81.66	2.54	0.73	0.73
8.00	1.29	24.72	3.23	79.96	2.54	0.72	0.72
8.02	1.27	24.30	3.19	77.48	2.53	0.71	0.71
8.04	1.25	23.97	3.10	74.25	2.52	0.39	0.70
8.06	1.24	23.66	2.97	70.29	2.50	0.26	0.68
8.08	1.23	23.51	2.90	68.20	2.49	0.22	0.68
8.10	1.22	23.31	2.88	67.24	2.49	0.20	0.68
8.12	1.21	23.00	2.93	67.50	2.49	0.21	0.68
8.14	1.19	22.75	2.97	67.54	2.50	0.21	0.68
8.16	1.18	22.51	3.00	67.57	2.50	0.16	0.67
8.18	1.17	22.30	3.01	67.09	2.50	0.16	0.67
8.20	1.17	22.22	3.02	67.09	2.51	0.17	0.67
8.22	1.17	22.19	3.02	66.97	2.51	0.16	0.67
8.24	1.17	22.15	3.00	66.51	2.50	0.15	0.67
8.26	1.15	21.90	3.03	66.31	2.51	0.16	0.67
8.28	1.14	21.61	3.04	65.73	2.51	0.16	0.67
8.30	1.14	21.62	3.00	64.87	2.50	0.13	0.66
8.32	1.17	22.27	2.86	63.73	2.48	0.15	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.34	1.23	23.47	2.65	62.19	2.45	0.13	0.66
8.36	1.30	24.85	2.48	61.76	2.42	0.13	0.66
8.38	1.36	25.91	2.43	62.93	2.41	0.14	0.66
8.40	1.40	26.71	2.45	65.41	2.41	0.17	0.67
8.42	1.42	27.02	2.52	68.05	2.43	0.22	0.68
8.44	1.41	26.85	2.60	69.76	2.44	0.25	0.68
8.46	1.37	26.18	2.76	72.19	2.47	0.31	0.69
8.48	1.35	25.66	2.83	72.67	2.48	0.32	0.69
8.50	1.35	25.67	2.79	71.58	2.47	0.29	0.69
8.52	1.36	25.94	2.68	69.42	2.45	0.24	0.68
8.54	1.37	26.00	2.63	68.49	2.45	0.23	0.68
8.56	1.36	25.86	2.66	68.70	2.45	0.23	0.68
8.58	1.49	28.53	2.14	61.02	2.35	0.12	0.66
8.60	1.62	30.95	1.91	59.04	2.30	0.10	0.65
8.62	1.71	32.75	1.78	58.20	2.26	0.10	0.65
8.64	1.63	31.10	2.14	66.54	2.35	0.19	0.67
8.66	1.53	29.25	2.51	73.49	2.43	0.34	0.69
8.68	1.46	27.82	2.85	79.27	2.48	0.55	0.71
8.70	1.45	27.61	2.83	78.23	2.48	0.50	0.70
8.72	1.46	27.72	2.70	74.83	2.46	0.38	0.70
8.74	1.48	28.18	2.50	70.40	2.42	0.26	0.68
8.76	1.50	28.51	2.40	68.38	2.40	0.22	0.68
8.78	1.53	29.22	2.31	67.38	2.39	0.21	0.68
8.80	1.54	29.34	2.35	69.05	2.40	0.24	0.68
8.82	1.48	28.17	2.54	71.62	2.43	0.29	0.69
8.84	1.38	26.14	2.98	77.86	2.50	0.49	0.70
8.86	1.30	24.64	3.14	77.33	2.52	0.60	0.71
8.88	1.28	24.29	3.02	73.42	2.51	0.28	0.69
8.90	1.32	24.99	2.64	65.91	2.45	0.18	0.67
8.92	1.33	25.26	2.60	65.72	2.44	0.18	0.67
8.94	1.33	25.20	2.70	68.03	2.46	0.22	0.68
8.96	1.33	25.21	2.77	69.94	2.47	0.25	0.68
8.98	1.39	26.31	2.59	68.20	2.44	0.22	0.68
9.00	1.49	28.40	2.33	66.25	2.39	0.19	0.67
9.02	1.66	31.63	2.02	64.02	2.33	0.16	0.67
9.04	1.99	38.24	1.70	64.85	2.23	0.17	0.67
9.06	2.17	41.65	1.60	66.74	2.20	0.19	0.67
9.08	2.13	40.85	1.74	71.08	2.25	0.28	0.69
9.10	1.78	33.98	2.31	78.38	2.39	0.51	0.70
9.12	1.48	28.14	3.20	89.90	2.53	0.74	0.74
9.14	1.37	25.88	3.49	90.37	2.57	0.77	0.77
9.16	1.50	28.50	2.87	81.91	2.48	0.68	0.71
9.18	1.96	37.52	1.83	68.54	2.27	0.23	0.68
9.20	2.60	50.13	1.41	70.83	2.10	0.27	0.69
9.22	3.17	61.34	1.30	79.61	1.99	0.57	0.71
9.24	3.48	67.42	1.28	86.51	1.97	0.72	0.72
9.26	3.45	66.98	1.30	87.32	2.00	0.72	0.72
9.28	3.20	61.93	1.37	84.67	2.06	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.30	2.82	54.54	1.45	79.05	2.12	0.54	0.70
9.32	2.49	47.93	1.52	73.04	2.16	0.33	0.69
9.34	2.27	43.58	1.58	68.69	2.18	0.23	0.68
9.36	2.12	40.66	1.64	66.80	2.21	0.20	0.68
9.38	2.03	38.94	1.71	66.41	2.23	0.19	0.67
9.40	2.08	39.85	1.61	64.19	2.20	0.16	0.67
9.42	2.25	43.22	1.51	65.15	2.15	0.17	0.67
9.44	2.41	46.26	1.49	69.01	2.14	0.23	0.68
9.46	2.42	46.43	1.55	71.99	2.17	0.30	0.69
9.48	2.35	45.13	1.64	74.09	2.21	0.36	0.69
9.50	2.41	46.22	1.60	74.09	2.20	0.36	0.69
9.52	2.51	48.30	1.52	73.25	2.16	0.33	0.69
9.54	2.54	48.77	1.46	71.32	2.13	0.28	0.69
9.56	2.36	45.35	1.52	68.88	2.16	0.23	0.68
9.58	2.13	40.69	1.69	68.88	2.23	0.23	0.68
9.60	2.04	38.94	1.77	69.06	2.26	0.24	0.68
9.62	2.18	41.68	1.61	67.03	2.20	0.20	0.68
9.64	2.40	46.09	1.42	65.51	2.10	0.18	0.67
9.66	2.56	49.13	1.38	67.81	2.07	0.21	0.68
9.68	2.59	49.86	1.39	69.21	2.08	0.24	0.68
9.70	2.65	50.89	1.40	71.05	2.08	0.28	0.69
9.72	2.85	54.95	1.34	73.39	2.03	0.34	0.69
9.74	3.09	59.69	1.29	77.02	1.98	0.46	0.70
9.76	3.38	65.39	1.25	82.00	1.93	0.69	0.71
9.78	3.50	67.72	1.26	85.11	1.93	0.72	0.72
9.80	3.37	65.09	1.28	83.32	1.96	0.71	0.71
9.82	3.19	61.57	1.31	80.94	2.01	0.63	0.71
9.84	3.03	58.51	1.35	78.98	2.05	0.54	0.70
9.86	3.17	61.11	1.35	82.20	2.04	0.70	0.71
9.88	3.39	65.46	1.33	87.04	2.03	0.72	0.72
9.90	3.62	70.15	1.30	90.86	1.99	0.73	0.73
9.92	3.81	73.87	1.28	94.66	1.97	0.74	0.74
9.94	3.88	75.26	1.29	97.24	1.98	0.74	0.74
9.96	3.93	76.08	1.32	100.31	2.01	0.75	0.75
9.98	3.94	76.28	1.34	102.17	2.04	0.75	0.75
10.00	3.82	74.06	1.35	100.01	2.05	0.75	0.75
10.02	3.63	70.19	1.37	96.20	2.06	0.74	0.74
10.04	3.35	64.74	1.40	90.61	2.09	0.73	0.73
10.06	3.25	62.73	1.44	90.07	2.11	0.73	0.73
10.08	3.34	64.46	1.44	92.86	2.11	0.73	0.73
10.10	3.54	68.41	1.42	96.95	2.10	0.74	0.74
10.12	3.59	69.41	1.42	98.32	2.10	0.74	0.74
10.14	3.53	68.15	1.44	97.83	2.11	0.74	0.74
10.16	3.46	66.76	1.45	96.86	2.12	0.74	0.74
10.18	3.52	67.98	1.40	94.84	2.08	0.74	0.74
10.20	3.63	69.10	1.33	91.63	2.02	0.73	0.73
10.22	3.74	69.65	1.28	89.40	1.97	0.73	0.73
10.24	3.87	70.93	1.26	89.34	1.93	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.26	3.80	69.56	1.26	87.92	1.94	0.72	0.72
10.28	3.42	63.60	1.30	82.96	2.00	0.71	0.71
10.30	2.80	53.46	1.40	74.71	2.08	0.38	0.69
10.32	2.21	42.08	1.72	72.47	2.24	0.31	0.69
10.34	1.93	36.64	2.16	78.96	2.36	0.54	0.70
10.36	2.08	39.55	2.09	82.58	2.34	0.71	0.71
10.38	2.40	45.76	1.70	77.57	2.23	0.48	0.70
10.40	2.56	48.93	1.57	76.94	2.18	0.45	0.70
10.42	2.37	45.21	1.77	80.02	2.26	0.58	0.71
10.44	2.03	38.47	2.34	89.91	2.39	0.73	0.73
10.46	1.82	34.35	2.86	98.18	2.48	0.74	0.74
10.48	1.88	35.56	2.61	92.78	2.44	0.73	0.73
10.50	2.13	40.37	2.16	87.08	2.36	0.72	0.72
10.52	2.29	43.61	1.91	83.43	2.30	0.71	0.71
10.54	2.24	42.55	2.05	87.33	2.33	0.72	0.72
10.56	2.10	39.86	2.34	93.31	2.39	0.74	0.74
10.58	2.14	40.53	2.38	96.54	2.40	0.74	0.74
10.60	2.36	44.92	2.11	94.65	2.34	0.74	0.74
10.62	2.77	53.09	1.77	93.79	2.25	0.74	0.74
10.64	3.19	60.02	1.52	91.11	2.16	0.73	0.73
10.66	3.50	64.42	1.42	91.38	2.10	0.73	0.73
10.68	3.52	64.21	1.39	88.94	2.08	0.73	0.73
10.70	3.14	57.67	1.44	83.22	2.12	0.71	0.71
10.72	2.75	50.89	1.52	77.32	2.16	0.47	0.70
10.74	2.47	46.00	1.59	73.31	2.19	0.33	0.69
10.76	2.42	45.55	1.67	76.17	2.22	0.42	0.70
10.78	2.33	44.23	1.82	80.41	2.27	0.60	0.71
10.80	2.24	42.41	2.01	85.12	2.32	0.72	0.72
10.82	2.25	42.62	2.01	85.84	2.32	0.72	0.72
10.84	2.22	42.11	2.03	85.49	2.33	0.72	0.72
10.86	2.14	40.56	2.11	85.67	2.35	0.72	0.72
10.88	2.15	40.77	2.05	83.56	2.33	0.71	0.71
10.90	2.40	45.11	1.86	83.86	2.28	0.72	0.72
10.92	2.89	52.50	1.54	81.04	2.17	0.64	0.71
10.94	3.20	56.92	1.44	81.91	2.11	0.68	0.71
10.96	3.23	56.98	1.41	80.07	2.09	0.59	0.71
10.98	3.00	53.26	1.46	77.84	2.13	0.49	0.70
11.00	2.82	50.45	1.52	76.82	2.16	0.45	0.70
11.02	2.88	51.52	1.54	79.19	2.17	0.55	0.71
11.04	2.94	52.13	1.51	78.47	2.15	0.51	0.70
11.06	2.91	51.70	1.53	79.20	2.16	0.55	0.71
11.08	2.63	47.18	1.64	77.16	2.21	0.46	0.70
11.10	2.30	42.04	1.89	79.37	2.29	0.55	0.71
11.12	1.79	33.61	2.51	84.24	2.42	0.72	0.72
11.14	1.34	24.63	4.02	99.07	2.63	0.84	0.84
11.16	0.99	17.65	6.18	109.04	2.83	0.76	0.76
11.18	0.90	15.91	6.49	103.28	2.85	0.75	0.75
11.20	0.90	15.94	5.52	88.03	2.77	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.22	0.95	16.89	4.80	81.16	2.71	0.64	0.71
11.24	1.13	20.37	3.94	80.32	2.62	0.79	0.79
11.26	1.32	24.25	3.33	80.66	2.55	0.74	0.74
11.28	1.59	29.48	2.66	78.46	2.45	0.51	0.70
11.30	1.91	34.72	2.19	76.10	2.36	0.42	0.70
11.32	2.32	41.21	1.85	76.09	2.28	0.42	0.70
11.34	2.62	45.84	1.70	77.72	2.23	0.48	0.70
11.36	2.63	46.19	1.73	79.84	2.24	0.58	0.71
11.38	2.41	42.96	1.96	84.23	2.31	0.72	0.72
11.40	2.12	38.59	2.39	92.19	2.40	0.73	0.73
11.42	2.12	38.69	2.46	95.30	2.42	0.74	0.74
11.44	2.54	45.14	2.01	90.82	2.32	0.73	0.73
11.46	3.07	53.17	1.69	89.87	2.23	0.73	0.73
11.48	3.35	57.58	1.61	92.78	2.20	0.73	0.73
11.50	3.32	57.04	1.63	93.22	2.21	0.74	0.74
11.52	3.36	57.38	1.61	92.37	2.20	0.73	0.73
11.54	3.60	60.79	1.54	93.55	2.17	0.74	0.74
11.56	3.94	65.73	1.45	95.61	2.12	0.74	0.74
11.58	4.25	70.10	1.40	98.26	2.09	0.74	0.74
11.60	4.56	74.04	1.35	99.59	2.04	0.75	0.75
11.62	5.03	80.25	1.29	103.75	1.98	0.76	0.76
11.64	5.54	86.93	1.26	109.19	1.93	0.76	0.76
11.66	5.94	92.16	1.23	113.71	1.90	0.77	0.77
11.68	6.13	94.32	1.22	115.18	1.88	0.77	0.77
11.70	6.35	96.83	1.20	116.14	1.85	0.78	0.78
11.72	6.65	100.20	1.17	117.00	1.81	0.78	0.78
11.74	7.07	105.42	1.13	119.29	1.78	0.78	0.78
11.76	7.53	112.04	1.12	126.01	1.78	0.79	0.79
11.78	8.08	119.22	1.09	129.86	1.75	0.80	0.80
11.80	8.74	127.31	1.01	128.89	1.71	0.80	0.80
11.82	9.78	138.70	1.00	138.70	1.62	0.81	0.81
11.84	10.50	146.20	1.00	146.20	1.56	0.82	0.82
11.86	10.66	147.40	1.00	147.40	1.54	0.82	0.82
11.88	9.85	136.90	1.00	136.90	1.57	0.81	0.81
11.90	8.75	122.63	1.00	122.63	1.61	0.79	0.79
11.92	7.49	106.66	1.00	106.66	1.68	0.76	0.76
11.94	5.77	85.42	1.19	101.53	1.84	0.75	0.75
11.96	4.22	65.83	1.36	89.58	2.06	0.73	0.73
11.98	3.13	51.01	1.77	90.43	2.26	0.73	0.73
12.00	2.67	45.14	2.45	110.70	2.41	0.77	0.77
12.02	2.35	40.84	3.26	133.20	2.54	0.83	0.83
12.04	1.96	34.98	4.59	160.46	2.69	1.00	1.00
12.06	1.65	29.68	5.61	166.45	2.78	0.85	0.85
12.08	1.41	25.48	6.47	164.79	2.85	0.85	0.85
12.10	1.24	22.38	7.12	159.45	2.89	0.84	0.84
12.12	1.20	21.49	6.85	147.14	2.87	0.82	0.82
12.14	1.18	20.82	6.29	130.97	2.83	0.80	0.80
12.16	1.17	20.24	5.59	113.23	2.78	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.18	1.19	20.19	5.04	101.74	2.73	0.75	0.75
12.20	1.23	20.67	4.49	92.86	2.68	0.87	0.87
12.22	1.27	21.17	4.18	88.44	2.65	0.83	0.83
12.24	1.41	23.65	4.17	98.51	2.65	0.85	0.85
12.26	1.48	24.97	4.42	110.48	2.67	0.90	0.90
12.28	1.50	25.53	4.86	124.03	2.71	0.79	0.79
12.30	1.37	23.37	5.42	126.64	2.76	0.79	0.79
12.32	1.28	21.87	5.92	129.48	2.81	0.80	0.80
12.34	1.23	20.96	6.09	127.59	2.82	0.79	0.79
12.36	1.20	20.30	6.19	125.71	2.83	0.79	0.79
12.38	1.17	19.77	6.16	121.85	2.82	0.79	0.79
12.40	1.15	19.30	5.90	113.99	2.80	0.77	0.77
12.42	1.15	18.94	5.55	105.15	2.78	0.76	0.76
12.44	1.14	18.66	5.19	96.79	2.74	0.74	0.74
12.46	1.15	18.55	4.84	89.82	2.71	0.73	0.73
12.48	1.15	18.54	4.59	85.14	2.69	0.86	0.86
12.50	1.19	18.97	4.44	84.27	2.67	0.85	0.85
12.52	1.30	20.76	3.98	82.64	2.63	0.80	0.80
12.54	1.57	24.71	3.23	79.77	2.53	0.72	0.72
12.56	1.94	30.30	2.54	77.07	2.43	0.46	0.70
12.58	2.19	34.13	2.42	82.59	2.41	0.71	0.71
12.60	2.22	34.70	2.58	89.39	2.44	0.73	0.73
12.62	1.99	31.37	2.99	93.65	2.50	0.73	0.73
12.64	1.70	27.07	3.65	98.74	2.59	0.81	0.81
12.66	1.45	23.12	4.42	102.17	2.67	0.88	0.88
12.68	1.30	20.72	4.93	102.24	2.72	0.75	0.75
12.70	1.25	19.82	4.80	95.12	2.71	0.74	0.74
12.72	1.26	19.77	4.50	88.90	2.68	0.86	0.86
12.74	1.28	20.09	4.44	89.27	2.67	0.86	0.86
12.76	1.36	21.16	4.20	88.79	2.65	0.84	0.84
12.78	1.47	22.76	3.89	88.49	2.62	0.81	0.81
12.80	1.49	23.12	3.95	91.36	2.62	0.82	0.82
12.82	1.38	21.52	4.47	96.19	2.68	0.88	0.88
12.84	1.23	19.04	4.95	94.17	2.72	0.74	0.74
12.86	1.16	17.81	4.80	85.55	2.71	0.72	0.72
12.88	1.17	17.77	4.30	76.33	2.66	0.81	0.81
12.90	1.14	17.31	4.54	78.68	2.68	0.84	0.84
12.92	1.09	16.59	5.02	83.31	2.73	0.71	0.71
12.94	1.05	15.84	5.34	84.60	2.76	0.72	0.72
12.96	1.06	15.96	5.17	82.44	2.74	0.71	0.71
12.98	1.08	16.22	4.91	79.67	2.72	0.57	0.71
13.00	1.10	16.48	4.86	80.17	2.71	0.59	0.71
13.02	1.09	16.29	4.98	81.08	2.73	0.64	0.71
13.04	1.07	16.08	5.12	82.27	2.74	0.71	0.71
13.06	1.07	16.03	5.08	81.42	2.73	0.66	0.71
13.08	1.12	16.69	4.68	78.04	2.70	0.85	0.85
13.10	1.24	18.25	4.04	73.82	2.63	0.79	0.79
13.12	1.40	20.66	3.50	72.30	2.57	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.14	1.51	22.19	3.38	74.98	2.55	0.73	0.73
13.16	1.46	21.56	3.66	78.82	2.59	0.76	0.76
13.18	1.32	19.49	4.22	82.34	2.65	0.82	0.82
13.20	1.21	17.90	4.64	83.09	2.69	0.86	0.86
13.22	1.20	17.67	4.54	80.28	2.68	0.84	0.84
13.24	1.27	18.56	4.12	76.45	2.64	0.80	0.80
13.26	1.33	19.40	3.86	74.92	2.61	0.77	0.77
13.28	1.34	19.59	4.04	79.21	2.63	0.80	0.80
13.30	1.26	18.38	4.38	80.51	2.67	0.83	0.83
13.32	1.18	17.04	4.63	78.94	2.69	0.85	0.85
13.34	1.12	16.07	4.59	73.69	2.69	0.83	0.83
13.36	1.13	16.13	4.47	72.04	2.68	0.82	0.82
13.38	1.20	17.09	4.13	70.56	2.64	0.78	0.78
13.40	1.30	18.57	3.72	69.08	2.60	0.74	0.74
13.42	1.39	19.89	3.65	72.56	2.59	0.75	0.75
13.44	1.41	20.19	3.89	78.65	2.62	0.78	0.78
13.46	1.40	20.08	4.05	81.26	2.63	0.80	0.80
13.48	1.30	18.61	4.49	83.63	2.68	0.85	0.85
13.50	1.16	16.49	5.05	83.31	2.73	0.71	0.71
13.52	0.99	13.96	6.07	84.79	2.82	0.72	0.72
13.54	0.92	12.91	6.18	79.79	2.83	0.57	0.71
13.56	0.93	12.97	5.75	74.57	2.79	0.37	0.69
13.58	0.96	13.31	5.46	72.70	2.77	0.32	0.69
13.60	0.96	13.35	5.52	73.75	2.77	0.35	0.69
13.62	0.97	13.38	5.57	74.55	2.78	0.37	0.69
13.64	1.01	14.00	5.20	72.84	2.75	0.32	0.69
13.66	1.18	16.26	4.20	68.28	2.65	0.78	0.78
13.68	1.31	18.11	3.56	64.50	2.58	0.72	0.72
13.70	1.41	19.43	3.45	67.04	2.56	0.71	0.71
13.72	1.39	19.36	3.83	74.19	2.61	0.77	0.77
13.74	1.38	19.28	4.10	78.98	2.64	0.80	0.80
13.76	1.33	18.53	4.39	81.28	2.67	0.83	0.83
13.78	1.20	16.64	4.89	81.33	2.72	0.65	0.71
13.80	1.10	15.10	5.46	82.53	2.77	0.71	0.71
13.82	1.07	14.63	5.60	81.97	2.78	0.69	0.71
13.84	1.11	15.23	5.34	81.43	2.76	0.66	0.71
13.86	1.15	15.83	5.23	82.84	2.75	0.71	0.71
13.88	1.29	17.63	4.47	78.84	2.68	0.83	0.83
13.90	1.35	18.37	4.08	74.96	2.64	0.79	0.79
13.92	1.62	21.93	3.09	67.84	2.52	0.23	0.68
13.94	1.77	23.91	2.76	65.97	2.47	0.18	0.67
13.96	2.34	31.40	2.04	63.91	2.33	0.15	0.67
13.98	2.66	35.72	1.89	67.46	2.29	0.21	0.68
14.00	3.19	42.72	1.73	73.89	2.24	0.35	0.69
14.02	3.73	50.09	1.67	83.64	2.22	0.72	0.72
14.04	4.32	57.95	1.63	94.66	2.21	0.74	0.74
14.06	4.56	61.29	1.66	101.48	2.22	0.75	0.75
14.08	4.19	56.85	1.92	109.04	2.30	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
14.10	3.56	48.88	2.47	120.87	2.42	0.78	0.78
14.12	2.79	39.15	3.82	149.54	2.61	0.91	0.91
14.14	2.22	31.60	5.69	179.83	2.79	0.86	0.86
14.16	1.90	27.17	7.40	201.05	2.91	0.89	0.89
14.18	1.89	27.07	7.51	203.27	2.92	0.89	0.89
14.20	1.99	28.38	6.98	197.95	2.88	0.88	0.88
14.22	2.15	30.36	6.30	191.41	2.84	0.88	0.88
14.24	2.25	31.77	5.99	190.44	2.81	0.88	0.88
14.26	2.28	32.06	5.94	190.47	2.81	0.88	0.88
14.28	2.23	31.32	6.07	190.03	2.82	0.88	0.88
14.30	2.20	30.79	6.20	190.88	2.83	0.88	0.88
14.32	2.29	32.01	5.99	191.67	2.81	0.88	0.88
14.34	2.55	35.40	5.38	190.46	2.76	0.88	0.88
14.36	2.78	38.51	4.87	187.33	2.71	0.87	0.87
14.38	2.88	39.67	4.70	186.33	2.70	1.05	1.05
14.40	2.86	39.37	4.81	189.56	2.71	0.88	0.88
14.42	2.90	39.85	4.84	192.77	2.71	0.88	0.88
14.44	3.32	45.35	4.15	188.06	2.64	1.00	1.00
14.46	4.11	55.47	3.19	177.00	2.53	0.88	0.88
14.48	4.83	64.59	2.64	170.37	2.45	0.85	0.85
14.50	5.36	71.24	2.37	169.06	2.40	0.85	0.85
14.52	5.79	76.71	2.29	176.01	2.38	0.86	0.86
14.54	6.36	83.84	2.13	178.23	2.35	0.86	0.86
14.56	6.82	89.43	2.01	180.12	2.32	0.86	0.86
14.58	6.58	86.28	2.12	183.02	2.35	0.87	0.87
14.60	5.98	78.93	2.45	193.71	2.42	0.88	0.88
14.62	5.22	69.45	3.04	211.03	2.51	0.89	0.89
14.64	4.77	63.65	3.49	222.16	2.57	0.96	0.96
14.66	4.51	60.11	3.77	226.72	2.60	1.00	1.00
14.68	4.61	61.13	3.54	216.57	2.58	0.96	0.96
14.70	5.05	66.38	3.04	201.80	2.51	0.88	0.88
14.72	5.45	71.09	2.66	189.42	2.45	0.88	0.88
14.74	5.30	69.00	2.77	191.29	2.47	0.88	0.88
14.76	4.79	62.60	3.17	198.34	2.53	0.90	0.90
14.78	4.39	57.40	3.55	203.53	2.58	0.95	0.95
14.80	4.37	56.93	3.48	198.10	2.57	0.93	0.93
14.82	4.66	60.21	3.09	185.93	2.52	0.87	0.87
14.84	5.24	67.30	2.64	177.54	2.45	0.86	0.86
14.86	6.58	83.31	2.00	166.55	2.32	0.85	0.85
14.88	8.09	100.98	1.61	162.72	2.20	0.84	0.84
14.90	10.13	124.39	1.36	169.53	2.06	0.85	0.85
14.92	23.81	275.25	1.00	275.25	1.55	0.96	0.96
14.94	37.13	415.53	1.00	415.53	1.29	1.06	1.06

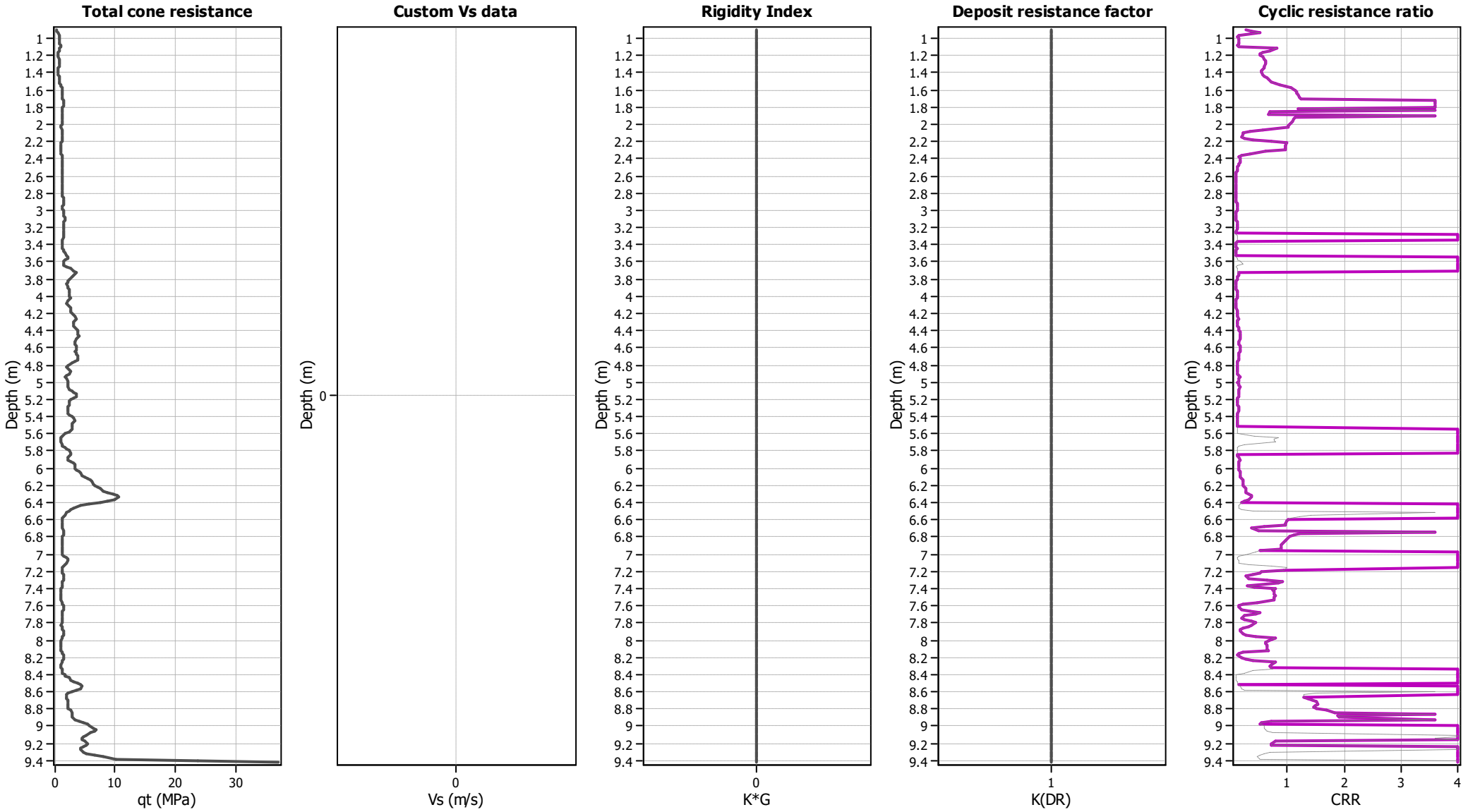
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

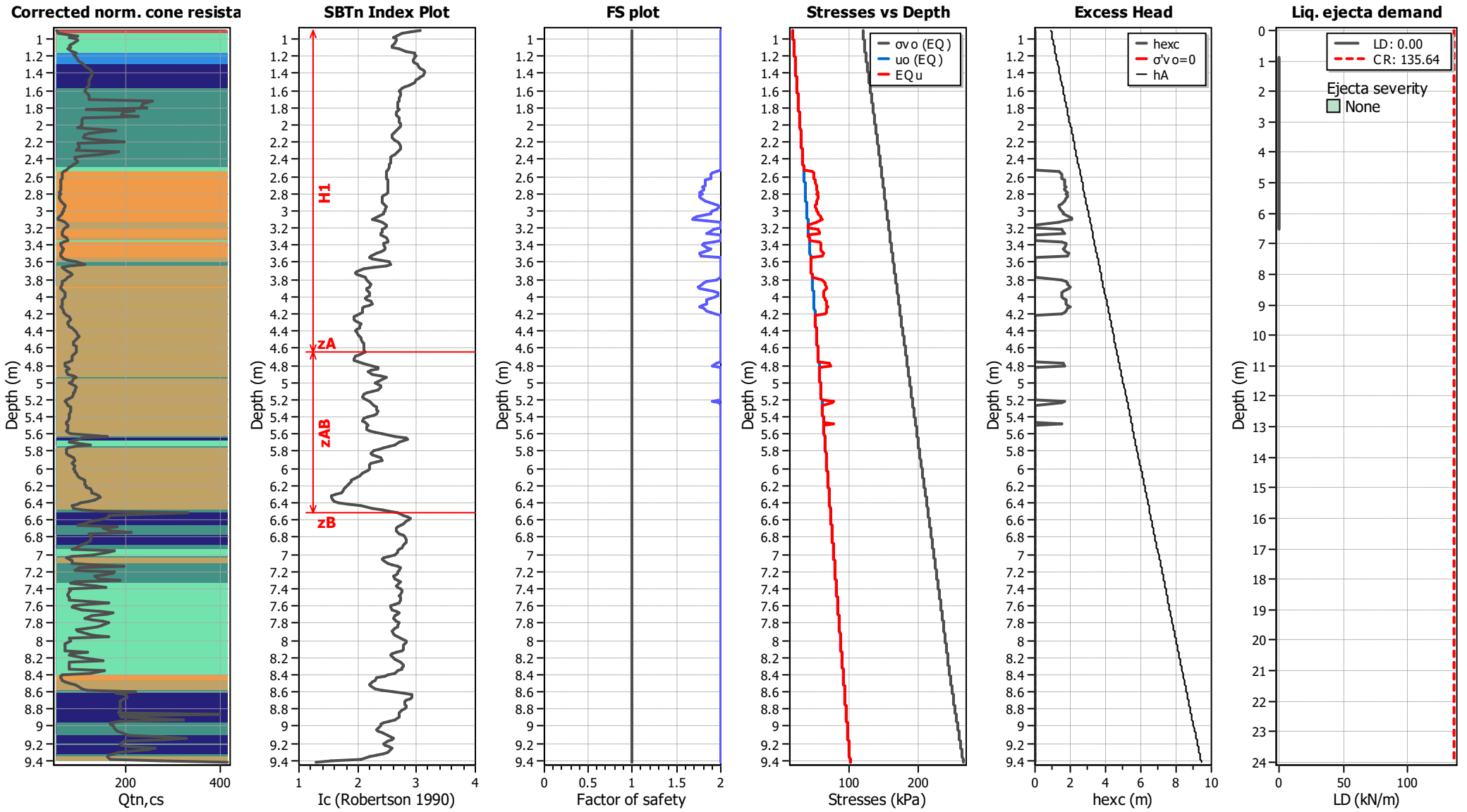
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

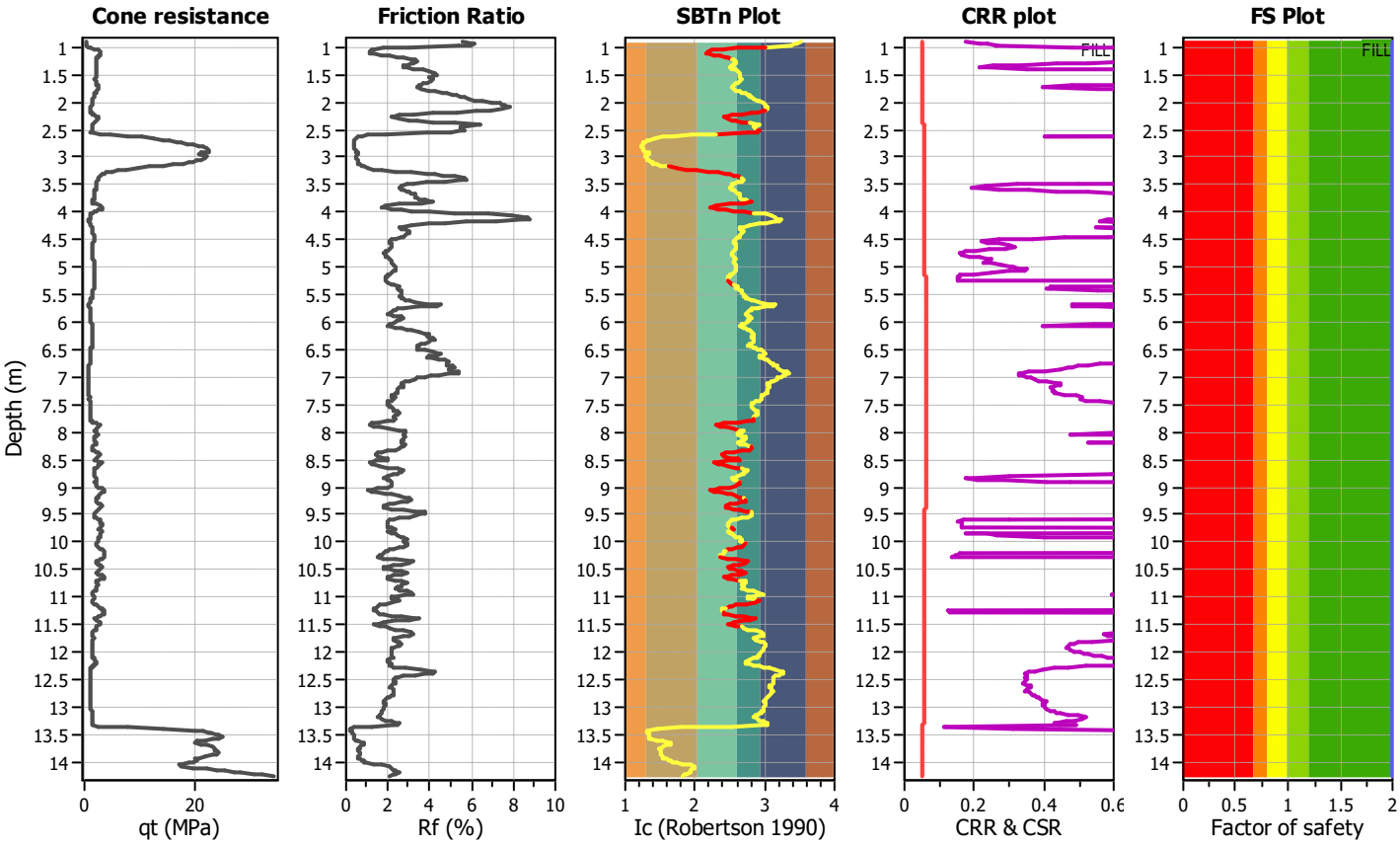
Project title : CWLP Liquefaction Analysis

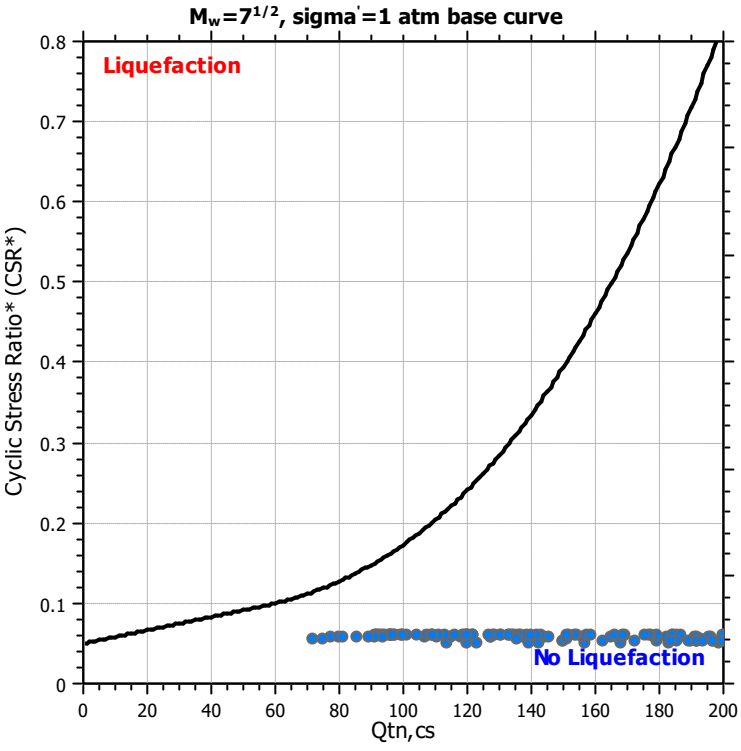
Location : East Lake Shore Drive, Springfield, Illinois

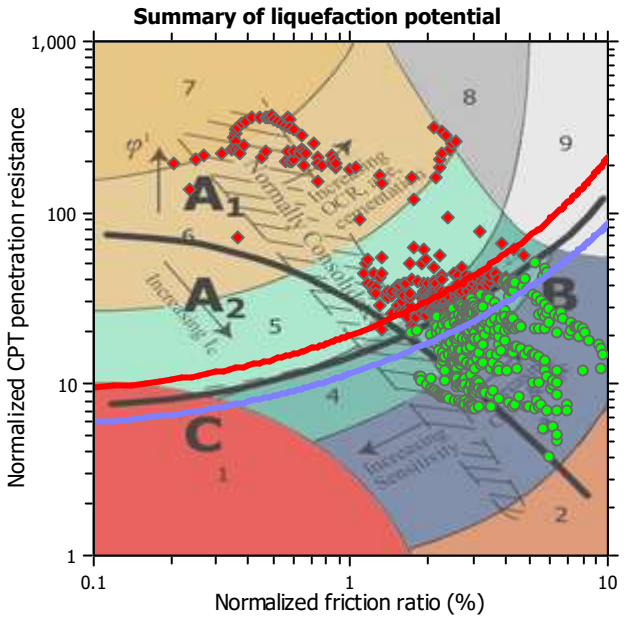
CPT file : CWLP CPT-4L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	0.30 m	Use fill:	Yes	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	4.63 m	Fill height:	4.33 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	19.50 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No		

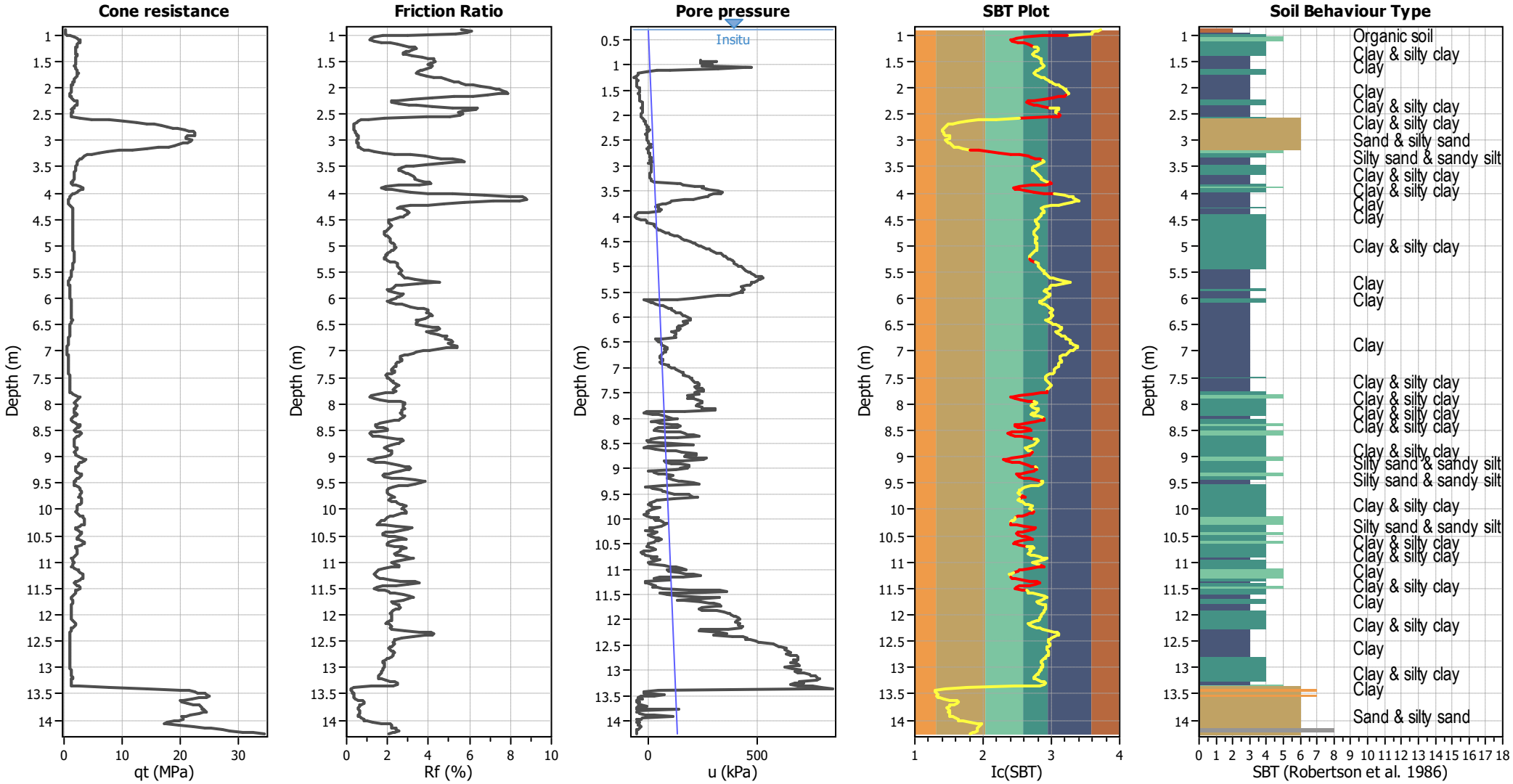






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



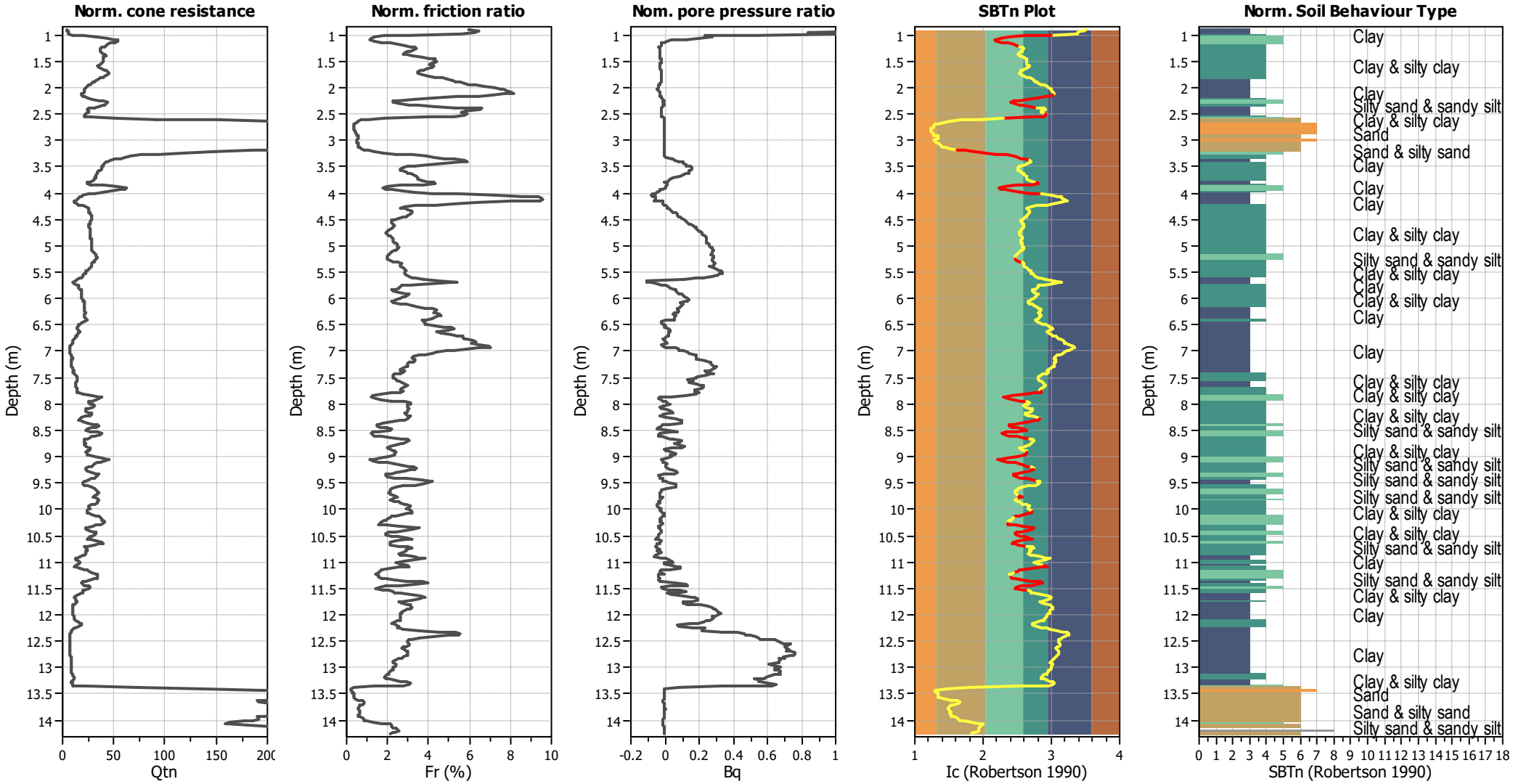
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



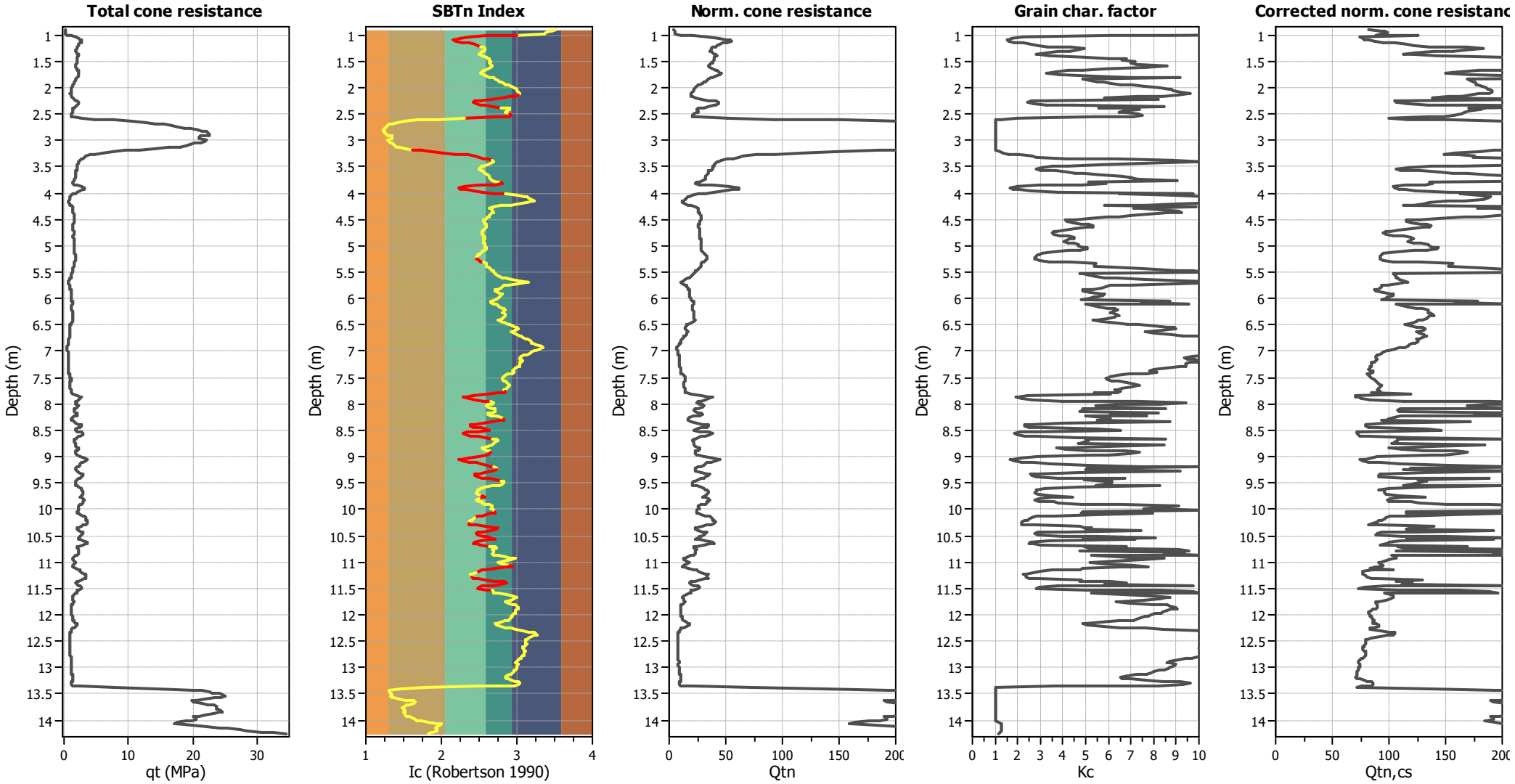
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

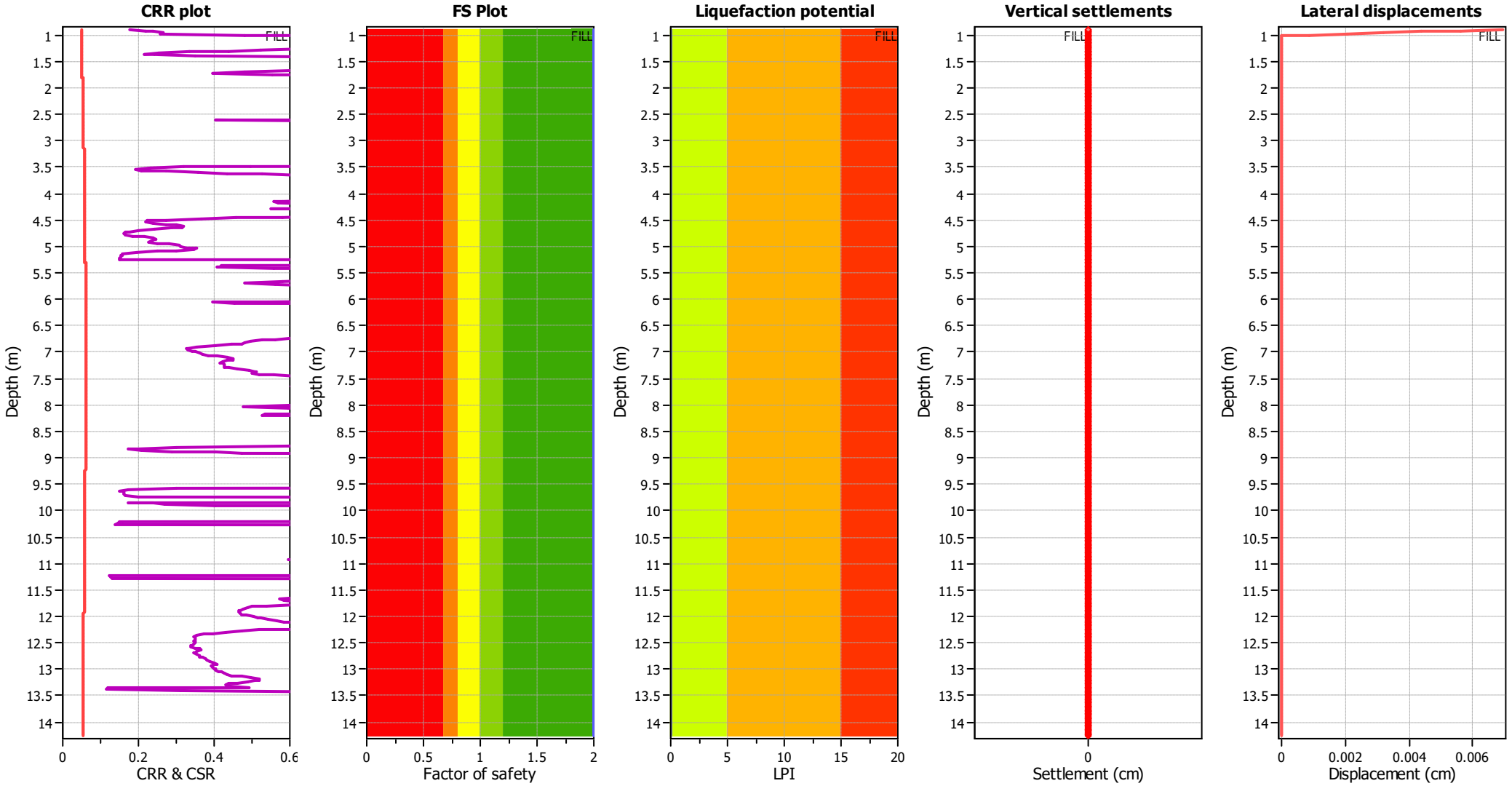
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m^3
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

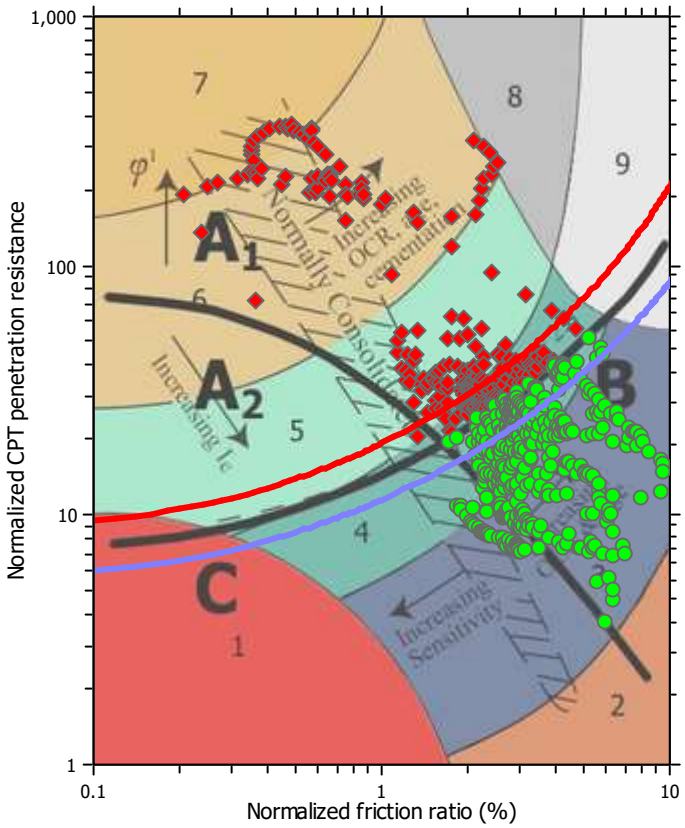
F.S. color scheme

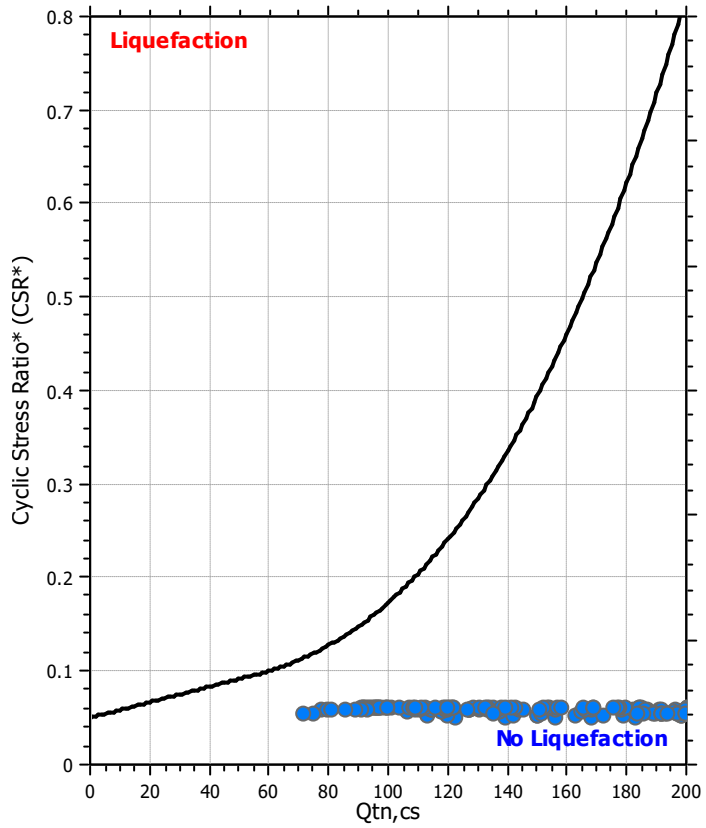
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

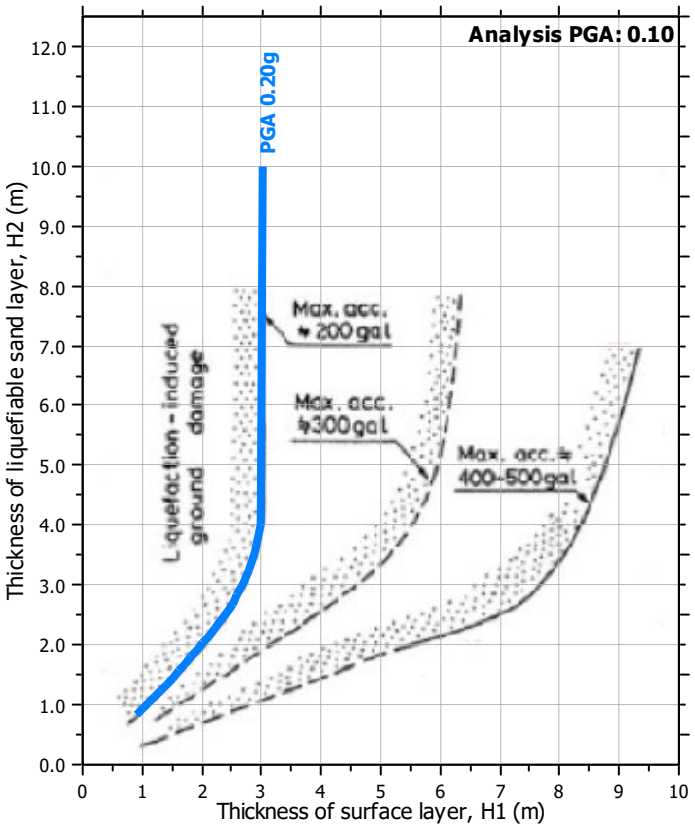
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



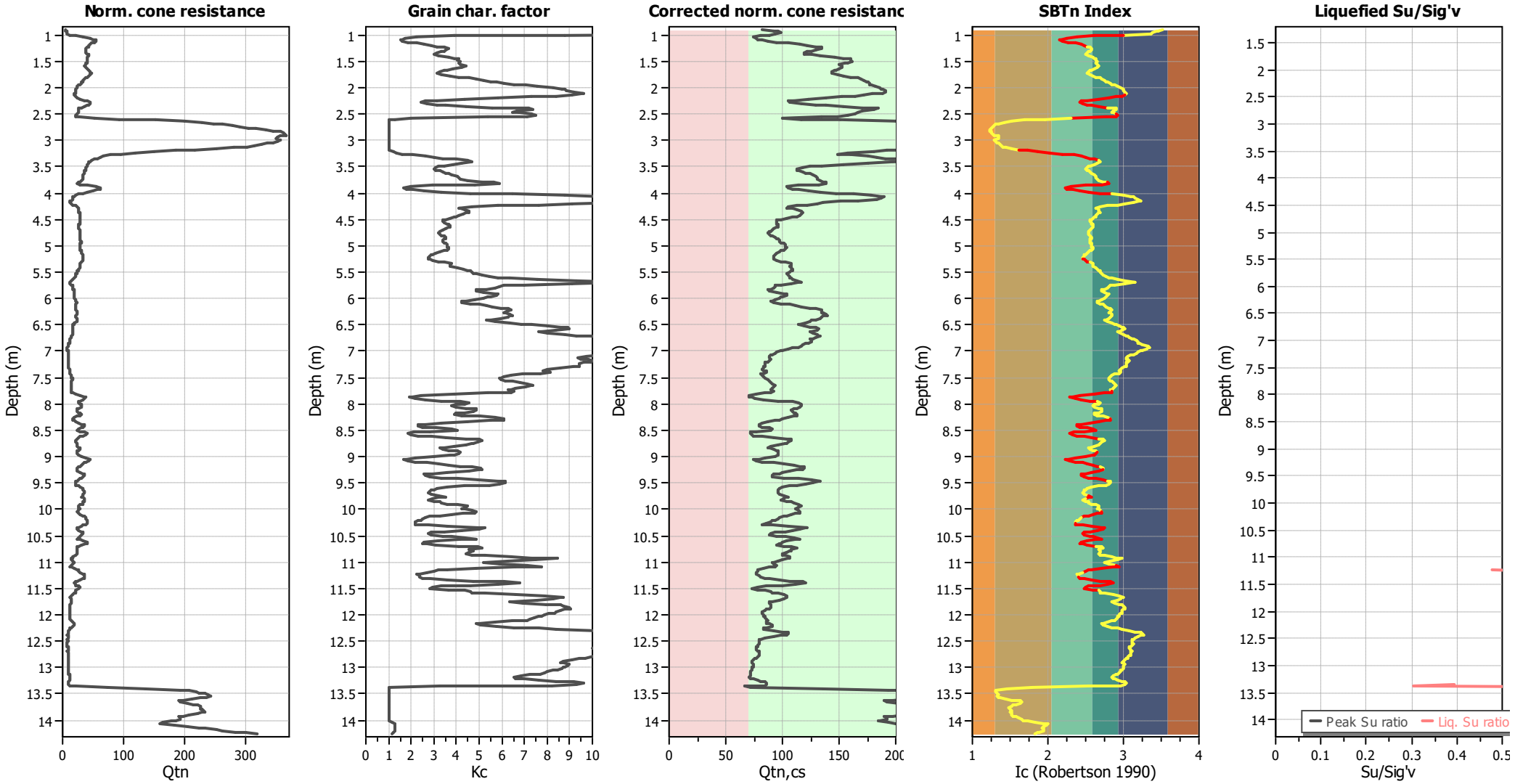




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

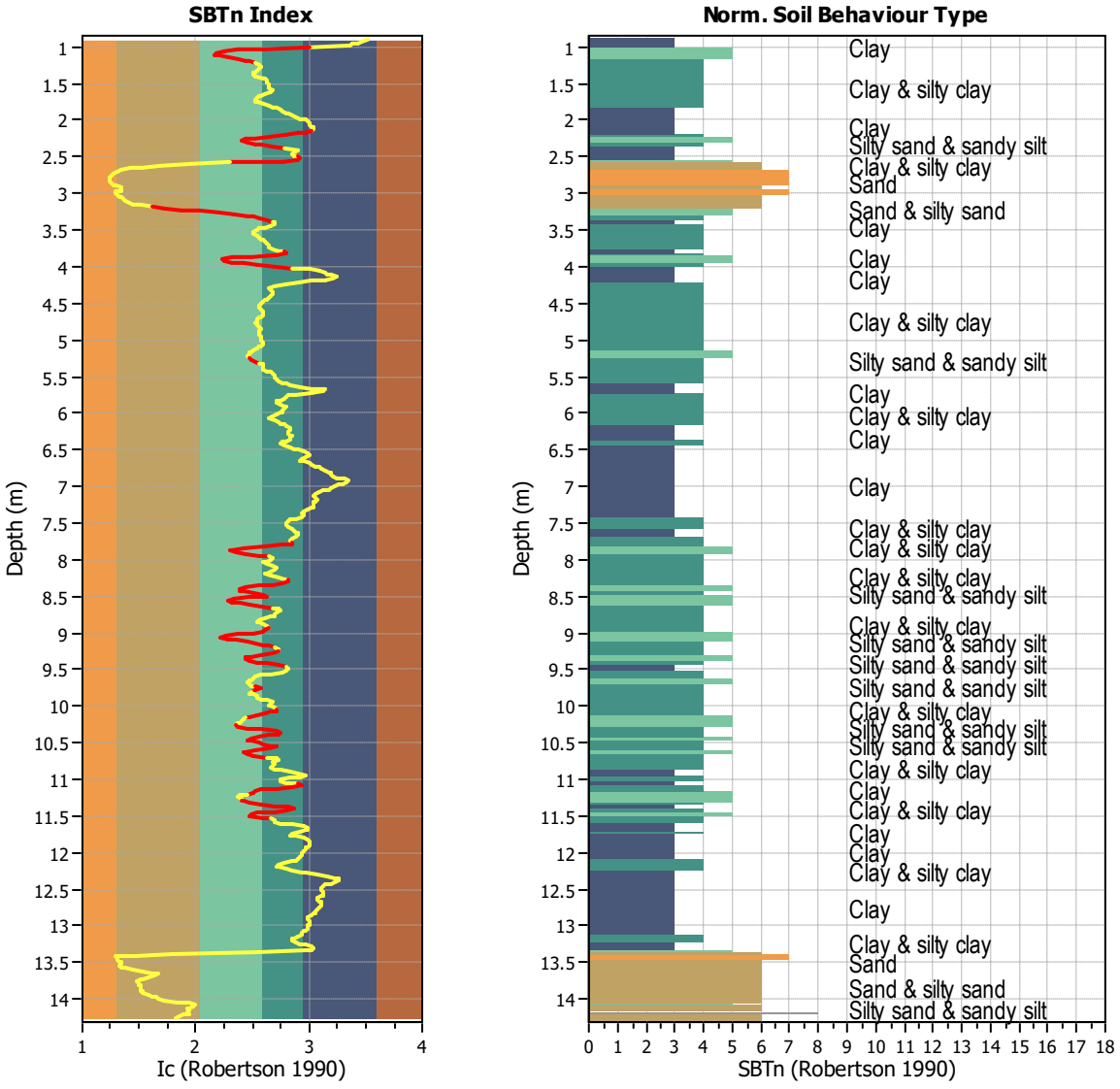
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	4.63 m	Fill weight:	19.50 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	0.30 m	Fill height:	4.33 m	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		**General statistics**	
I_c minimum check value:	1.70	Total points in CPT file:	669
I_c maximum check value:	3.00	Total points excluded:	182
I_c change ratio value:	0.0100	Exclusion percentage:	27.20%
Minimum number of points in layer:	4	Number of layers detected:	30

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	4	Start depth: 1.02 (m)	4	Clay & silty clay
		End depth: 1.08 (m)	5	Silty sand & sandy silt
Transition layer 2	8	Start depth: 1.10 (m)	5	Silty sand & sandy silt
		End depth: 1.24 (m)	4	Clay & silty clay
Transition layer 3	7	Start depth: 2.16 (m)	3	Clay
		End depth: 2.28 (m)	5	Silty sand & sandy silt
Transition layer 4	7	Start depth: 2.28 (m)	5	Silty sand & sandy silt
		End depth: 2.40 (m)	3	Clay
Transition layer 5	5	Start depth: 2.52 (m)	3	Clay
		End depth: 2.60 (m)	6	Sand & silty sand
Transition layer 6	11	Start depth: 3.20 (m)	6	Sand & silty sand
		End depth: 3.40 (m)	3	Clay
Transition layer 7	5	Start depth: 3.82 (m)	3	Clay
		End depth: 3.90 (m)	5	Silty sand & sandy silt
Transition layer 8	8	Start depth: 3.90 (m)	5	Silty sand & sandy silt
		End depth: 4.04 (m)	3	Clay
Transition layer 9	5	Start depth: 5.26 (m)	5	Silty sand & sandy silt
		End depth: 5.34 (m)	4	Clay & silty clay
Transition layer 10	6	Start depth: 7.78 (m)	4	Clay & silty clay
		End depth: 7.88 (m)	5	Silty sand & sandy silt
Transition layer 11	6	Start depth: 7.88 (m)	5	Silty sand & sandy silt
		End depth: 7.98 (m)	4	Clay & silty clay
Transition layer 12	6	Start depth: 8.30 (m)	4	Clay & silty clay
		End depth: 8.40 (m)	5	Silty sand & sandy silt
Transition layer 13	5	Start depth: 8.42 (m)	5	Silty sand & sandy silt
		End depth: 8.50 (m)	4	Clay & silty clay
Transition layer 14	4	Start depth: 8.50 (m)	4	Clay & silty clay
		End depth: 8.56 (m)	5	Silty sand & sandy silt
Transition layer 15	7	Start depth: 8.56 (m)	5	Silty sand & sandy silt
		End depth: 8.68 (m)	4	Clay & silty clay
Transition layer 16	7	Start depth: 8.94 (m)	4	Clay & silty clay
		End depth: 9.06 (m)	5	Silty sand & sandy silt
Transition layer 17	9	Start depth: 9.06 (m)	5	Silty sand & sandy silt
		End depth: 9.22 (m)	4	Clay & silty clay
Transition layer 18	5	Start depth: 9.26 (m)	4	Clay & silty clay
		End depth: 9.34 (m)	5	Silty sand & sandy silt
Transition layer 19	7	Start depth: 9.36 (m)	5	Silty sand & sandy silt
		End depth: 9.48 (m)	3	Clay
Transition layer 20	4	Start depth: 9.76 (m)	4	Clay & silty clay
		End depth: 9.82 (m)	5	Silty sand & sandy silt
Transition layer 21	7	Start depth: 10.06 (m)	4	Clay & silty clay
		End depth: 10.18 (m)	5	Silty sand & sandy silt
Transition layer 22	5	Start depth: 10.28 (m)	5	Silty sand & sandy silt
		End depth: 10.36 (m)	4	Clay & silty clay
Transition layer 23	6	Start depth: 10.36 (m)	4	Clay & silty clay
		End depth: 10.46 (m)	5	Silty sand & sandy silt

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 24	6	Start depth: 10.46 (m)	5	Silty sand & sandy silt
		End depth: 10.56 (m)	4	Clay & silty clay
Transition layer 25	4	Start depth: 10.56 (m)	4	Clay & silty clay
		End depth: 10.62 (m)	5	Silty sand & sandy silt
Transition layer 26	5	Start depth: 10.64 (m)	5	Silty sand & sandy silt
		End depth: 10.72 (m)	4	Clay & silty clay
Transition layer 27	8	Start depth: 11.08 (m)	3	Clay
		End depth: 11.22 (m)	5	Silty sand & sandy silt
Transition layer 28	6	Start depth: 11.30 (m)	5	Silty sand & sandy silt
		End depth: 11.40 (m)	3	Clay
Transition layer 29	5	Start depth: 11.40 (m)	3	Clay
		End depth: 11.48 (m)	5	Silty sand & sandy silt
Transition layer 30	4	Start depth: 11.50 (m)	5	Silty sand & sandy silt
		End depth: 11.56 (m)	4	Clay & silty clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.16	11.30	242.90	100.00	15.16
2	0.92	0.16	11.30	242.90	95.67	15.55
3	0.94	0.28	22.00	319.30	92.76	15.69
4	0.96	0.23	15.60	243.90	88.46	15.82
5	0.98	0.24	15.10	296.50	87.28	15.66
6	1.00	0.26	15.50	277.40	58.59	15.91
7	1.02	0.93	16.40	250.50	36.30	16.39
8	1.04	1.80	25.10	478.30	25.45	16.80
9	1.06	2.15	27.70	447.20	20.64	17.09
10	1.08	2.54	28.50	320.60	18.39	17.22
11	1.10	2.83	30.60	102.20	17.77	17.36
12	1.12	2.80	36.70	42.60	18.73	17.52
13	1.14	2.68	42.60	-1.20	21.73	17.70
14	1.16	2.36	52.10	-43.20	25.11	17.84
15	1.18	2.22	57.10	-45.90	28.01	17.94
16	1.20	2.25	60.40	-46.00	29.91	18.01
17	1.22	2.11	64.70	-49.20	31.83	18.07
18	1.24	1.98	69.30	-63.30	33.76	18.07
19	1.26	1.89	63.60	-54.30	34.65	18.03
20	1.28	1.88	60.50	-49.50	34.14	17.94
21	1.30	1.89	56.60	-47.40	33.67	17.88
22	1.32	1.84	54.50	-46.50	32.77	17.84
23	1.34	1.94	53.30	-47.60	31.67	17.83
24	1.36	2.07	54.20	-50.10	30.74	17.91
25	1.38	2.18	62.40	-52.80	30.90	18.02
26	1.40	2.16	68.30	-53.30	32.00	18.14
27	1.42	2.13	74.00	-51.70	34.71	18.23
28	1.44	1.89	83.30	-44.40	36.15	18.32
29	1.46	2.10	86.70	-38.80	37.14	18.38
30	1.48	2.10	87.20	-36.30	36.93	18.39
31	1.50	1.96	86.00	-35.10	37.56	18.38
32	1.52	1.97	86.00	-35.10	37.33	18.33
33	1.54	2.02	76.70	-39.60	37.37	18.27
34	1.56	1.83	75.50	-40.70	37.61	18.18
35	1.58	1.75	70.90	-42.20	39.05	18.15
36	1.60	1.75	74.60	-39.30	39.01	18.15
37	1.62	1.84	75.50	-37.60	38.09	18.20
38	1.64	1.97	77.10	-37.50	36.03	18.25
39	1.66	2.18	78.80	-36.10	34.53	18.29
40	1.68	2.17	78.20	-39.20	33.51	18.31
41	1.70	2.21	78.50	-38.80	32.67	18.30
42	1.72	2.32	74.90	-37.60	31.80	18.34
43	1.74	2.47	84.50	-26.30	31.74	18.36
44	1.76	2.28	81.80	-26.50	32.88	18.38
45	1.78	2.14	81.80	-26.50	35.15	18.37
46	1.80	2.00	87.70	-23.60	37.35	18.37
47	1.82	1.90	87.10	-24.50	39.57	18.38
48	1.84	1.81	88.30	-26.80	41.20	18.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	1.71	86.00	-26.10	42.97	18.32
50	1.88	1.60	84.70	-24.00	44.32	18.30
51	1.90	1.60	87.00	-22.70	45.64	18.28
52	1.92	1.52	84.90	-23.20	47.10	18.25
53	1.94	1.39	81.90	-22.20	49.15	18.19
54	1.96	1.30	79.30	-30.90	51.34	18.14
55	1.98	1.26	80.90	-31.10	53.62	18.13
56	2.00	1.19	83.30	-29.60	56.35	18.12
57	2.02	1.08	82.30	-30.60	58.07	18.11
58	2.04	1.13	82.10	-29.90	58.51	18.12
59	2.06	1.16	85.10	-21.60	58.74	18.15
60	2.08	1.10	88.80	-14.10	60.06	18.13
61	2.10	1.01	80.20	-13.90	61.69	18.05
62	2.12	0.97	73.40	-11.90	61.50	17.94
63	2.14	0.99	68.40	-9.50	59.63	17.85
64	2.16	1.03	63.90	-9.10	56.90	17.77
65	2.18	1.06	58.50	-8.10	52.34	17.68
66	2.20	1.19	49.70	-3.40	45.90	17.60
67	2.22	1.45	46.50	-2.30	38.66	17.57
68	2.24	1.75	45.60	1.70	31.73	17.61
69	2.26	2.22	44.30	3.20	28.08	17.68
70	2.28	2.28	49.20	-0.70	26.96	17.79
71	2.30	2.24	55.90	9.10	28.86	17.94
72	2.32	2.15	65.60	6.10	31.72	18.06
73	2.34	1.98	71.20	-1.20	34.00	18.14
74	2.36	1.98	71.20	-1.20	38.92	18.20
75	2.38	1.49	85.20	-7.40	44.82	18.24
76	2.40	1.30	90.40	-5.40	51.90	18.22
77	2.42	1.24	80.80	-5.40	52.67	18.14
78	2.44	1.32	73.10	-1.70	49.60	18.08
79	2.46	1.48	73.70	-1.80	48.85	18.04
80	2.48	1.25	73.20	-0.10	49.87	18.00
81	2.50	1.17	68.20	-0.50	52.55	17.89
82	2.52	1.11	60.30	0.30	53.16	17.76
83	2.54	1.05	54.90	3.80	51.70	17.63
84	2.56	1.13	50.00	9.40	43.93	17.60
85	2.58	1.71	46.70	14.70	22.83	17.83
86	2.60	5.06	49.10	11.30	11.95	18.09
87	2.62	7.29	55.60	6.00	5.93	18.43
88	2.64	10.81	66.80	13.60	3.24	18.58
89	2.66	12.80	56.10	-0.90	1.81	18.64
90	2.68	14.06	52.50	1.60	0.89	18.61
91	2.70	15.80	54.90	2.00	0.46	18.66
92	2.72	16.69	58.60	3.80	0.22	18.75
93	2.74	17.64	62.70	5.30	0.08	18.84
94	2.76	18.66	65.80	7.70	0.00	18.93
95	2.78	19.63	69.80	9.50	0.00	19.03
96	2.80	20.54	76.70	11.40	0.00	19.15

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	21.85	84.90	11.90	0.00	19.27
98	2.84	22.26	91.20	13.40	0.00	19.37
99	2.86	22.57	97.20	13.70	0.00	19.47
100	2.88	22.51	109.10	15.20	0.09	19.53
101	2.90	22.57	106.30	12.80	0.24	19.59
102	2.92	22.47	114.40	20.60	0.84	19.68
103	2.94	18.78	142.40	6.40	0.90	19.67
104	2.96	21.88	105.10	8.20	0.87	19.64
105	2.98	22.12	105.80	17.00	0.24	19.52
106	3.00	22.27	103.20	14.10	0.30	19.55
107	3.02	22.01	112.30	17.30	0.42	19.56
108	3.04	21.11	109.80	15.60	0.63	19.57
109	3.06	20.46	108.10	14.50	0.83	19.54
110	3.08	19.72	110.10	14.30	1.05	19.53
111	3.10	18.94	110.00	14.00	1.31	19.51
112	3.12	18.03	107.60	13.50	1.59	19.48
113	3.14	16.99	105.60	13.10	2.17	19.41
114	3.16	13.86	100.10	13.00	3.09	19.32
115	3.18	11.70	98.20	12.00	4.59	19.21
116	3.20	9.45	96.50	10.90	6.57	19.13
117	3.22	7.45	100.90	10.70	9.62	19.06
118	3.24	5.87	102.80	12.70	13.59	19.04
119	3.26	4.86	112.70	13.90	18.77	19.03
120	3.28	3.61	124.50	19.50	23.95	19.05
121	3.30	3.39	132.10	18.60	28.48	19.06
122	3.32	3.19	133.50	30.90	30.79	19.05
123	3.34	2.87	132.50	136.50	33.40	19.03
124	3.36	2.59	136.50	151.30	36.55	19.01
125	3.38	2.36	137.80	163.30	39.24	18.98
126	3.40	2.23	134.30	216.20	40.43	18.92
127	3.42	2.19	121.30	254.90	40.20	18.80
128	3.44	2.09	105.50	251.50	38.15	18.59
129	3.46	2.05	75.20	276.70	35.80	18.34
130	3.48	2.02	65.10	271.50	33.50	18.09
131	3.50	1.93	58.60	321.00	32.31	17.94
132	3.52	1.94	52.50	343.10	31.32	17.83
133	3.54	1.96	49.60	335.00	30.71	17.75
134	3.56	1.88	48.10	304.80	31.14	17.71
135	3.58	1.79	48.40	283.90	32.44	17.69
136	3.60	1.71	49.00	274.60	33.48	17.71
137	3.62	1.77	52.70	269.30	34.08	17.76
138	3.64	1.79	54.30	238.90	34.68	17.80
139	3.66	1.70	54.50	207.90	35.65	17.81
140	3.68	1.66	55.40	172.50	36.92	17.81
141	3.70	1.64	56.70	111.70	37.39	17.82
142	3.72	1.66	55.90	103.60	37.26	17.82
143	3.74	1.70	55.70	81.20	37.68	17.81
144	3.76	1.57	55.90	69.30	39.48	17.77

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	1.38	53.90	45.70	42.51	17.71
146	3.80	1.27	51.90	33.50	44.99	17.65
147	3.82	1.24	51.80	51.60	46.11	17.62
148	3.84	1.24	51.80	51.60	41.05	17.66
149	3.86	1.83	50.90	64.00	30.30	17.80
150	3.88	3.04	52.30	48.20	23.01	17.94
151	3.90	3.33	55.20	55.70	19.92	18.05
152	3.92	3.25	58.50	2.20	20.94	18.15
153	3.94	2.98	66.80	-43.90	23.50	18.17
154	3.96	2.56	65.10	-47.20	27.67	18.17
155	3.98	2.07	66.90	-57.60	32.76	18.09
156	4.00	1.70	65.50	-55.50	40.09	18.02
157	4.02	1.29	68.00	-54.10	48.73	17.98
158	4.04	1.08	75.20	-50.30	58.44	17.98
159	4.06	0.96	80.50	-29.30	64.72	17.99
160	4.08	0.92	78.30	-11.00	68.30	17.98
161	4.10	0.88	77.50	-4.20	69.80	17.92
162	4.12	0.83	72.50	-1.70	71.90	17.83
163	4.14	0.75	65.10	-0.10	76.11	17.52
164	4.16	0.49	37.40	29.30	73.55	17.28
165	4.18	0.75	41.10	30.20	68.19	17.04
166	4.20	0.77	37.50	31.40	59.71	17.08
167	4.22	0.86	35.00	37.20	53.74	17.04
168	4.24	1.02	33.10	41.30	45.81	17.02
169	4.26	1.26	30.50	50.50	40.21	17.07
170	4.28	1.36	33.60	58.50	37.46	17.15
171	4.30	1.40	37.40	70.30	37.79	17.27
172	4.32	1.37	39.90	80.10	38.70	17.34
173	4.34	1.36	41.30	94.30	39.53	17.39
174	4.36	1.37	42.40	103.40	39.63	17.42
175	4.38	1.40	43.10	125.40	39.09	17.45
176	4.40	1.45	43.00	135.50	38.22	17.47
177	4.42	1.49	43.50	147.80	37.36	17.46
178	4.44	1.49	41.70	159.00	36.73	17.43
179	4.46	1.47	39.00	169.60	36.08	17.35
180	4.48	1.46	36.00	178.90	35.09	17.25
181	4.50	1.46	32.00	199.40	34.11	17.16
182	4.52	1.46	31.00	207.90	33.37	17.09
183	4.54	1.45	30.20	218.00	33.44	17.07
184	4.56	1.41	30.40	226.20	33.84	17.05
185	4.58	1.38	30.30	233.50	34.50	17.05
186	4.60	1.36	30.40	241.00	34.94	17.04
187	4.62	1.34	30.00	257.90	35.21	17.03
188	4.64	1.33	29.90	268.30	35.23	17.02
189	4.66	1.33	29.50	280.00	34.85	17.00
190	4.68	1.37	28.90	291.70	34.11	16.99
191	4.70	1.39	28.30	303.60	33.28	16.97
192	4.72	1.41	27.80	316.80	32.66	16.95

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	1.40	26.70	333.50	32.38	16.93
194	4.76	1.40	26.70	344.50	32.23	16.91
195	4.78	1.40	26.60	347.20	32.41	16.92
196	4.80	1.39	27.50	358.80	32.91	16.94
197	4.82	1.36	28.60	361.00	33.58	16.98
198	4.84	1.36	29.20	367.90	33.99	17.02
199	4.86	1.39	30.60	375.30	33.97	17.07
200	4.88	1.44	32.50	392.30	33.68	17.13
201	4.90	1.47	33.30	395.50	33.42	17.18
202	4.92	1.48	33.40	397.70	33.20	17.18
203	4.94	1.48	32.90	393.30	33.55	17.21
204	4.96	1.47	35.70	408.10	33.97	17.24
205	4.98	1.47	36.20	418.70	34.28	17.27
206	5.00	1.48	35.90	428.60	34.32	17.28
207	5.02	1.46	36.00	435.50	34.54	17.28
208	5.04	1.44	36.50	440.30	34.87	17.27
209	5.06	1.43	35.70	442.60	34.82	17.26
210	5.08	1.45	34.80	452.50	34.33	17.23
211	5.10	1.46	34.10	460.70	33.55	17.22
212	5.12	1.50	33.50	468.60	32.42	17.21
213	5.14	1.59	33.20	475.10	31.27	17.22
214	5.16	1.63	33.30	487.00	30.40	17.23
215	5.18	1.66	33.90	498.50	29.86	17.24
216	5.20	1.69	33.50	523.60	29.48	17.25
217	5.22	1.70	33.30	526.20	29.11	17.24
218	5.24	1.70	32.90	516.10	29.20	17.23
219	5.26	1.66	33.10	509.60	29.66	17.23
220	5.28	1.63	33.80	500.70	30.59	17.24
221	5.30	1.58	34.60	491.00	31.93	17.28
222	5.32	1.53	37.40	473.50	33.64	17.32
223	5.34	1.45	38.80	474.10	35.45	17.36
224	5.36	1.40	39.60	469.00	35.31	17.36
225	5.38	1.55	37.50	457.50	35.29	17.35
226	5.40	1.46	38.20	426.40	35.31	17.32
227	5.42	1.35	36.70	436.20	37.10	17.28
228	5.44	1.29	36.10	435.10	38.43	17.23
229	5.46	1.24	35.60	440.00	39.46	17.19
230	5.48	1.19	33.70	431.30	40.08	17.13
231	5.50	1.16	32.50	434.90	40.44	17.08
232	5.52	1.15	31.50	424.90	40.62	17.03
233	5.54	1.12	30.10	397.10	41.29	16.99
234	5.56	1.08	30.60	375.90	42.47	16.96
235	5.58	1.03	30.40	323.70	44.00	16.94
236	5.60	1.00	29.60	263.50	45.96	16.89
237	5.62	0.91	28.30	207.40	48.25	16.82
238	5.64	0.85	27.20	135.80	53.40	16.73
239	5.66	0.69	27.20	-14.40	60.39	16.67
240	5.68	0.59	28.10	0.40	68.94	16.61

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.54	27.30	13.30	67.94	16.57
242	5.72	0.69	24.10	26.40	59.70	16.53
243	5.74	0.84	21.90	39.00	51.08	16.47
244	5.76	0.89	20.60	57.40	47.03	16.45
245	5.78	0.89	21.20	68.40	46.34	16.45
246	5.80	0.88	21.40	81.10	45.39	16.46
247	5.82	0.94	20.50	98.80	43.50	16.44
248	5.84	0.99	19.60	108.40	41.40	16.43
249	5.86	1.01	19.80	111.20	41.38	16.50
250	5.88	1.01	23.80	123.60	42.94	16.63
251	5.90	0.99	27.20	130.70	45.28	16.77
252	5.92	0.96	28.90	146.90	45.90	16.81
253	5.94	1.00	27.00	154.60	45.46	16.80
254	5.96	1.00	26.20	161.80	44.35	16.76
255	5.98	1.00	25.80	166.70	43.81	16.74
256	6.00	1.03	25.50	186.30	42.82	16.73
257	6.02	1.07	24.90	196.80	41.11	16.71
258	6.04	1.13	23.20	197.90	39.15	16.73
259	6.06	1.23	25.10	198.90	37.81	16.75
260	6.08	1.25	25.40	160.30	38.06	16.85
261	6.10	1.22	28.90	167.70	39.93	16.97
262	6.12	1.19	34.70	180.40	41.90	17.08
263	6.14	1.18	34.90	169.00	43.41	17.17
264	6.16	1.18	36.80	155.30	44.66	17.23
265	6.18	1.16	41.40	141.20	46.40	17.33
266	6.20	1.15	45.70	133.90	47.81	17.42
267	6.22	1.16	46.90	138.90	48.42	17.50
268	6.24	1.20	50.80	150.00	47.72	17.53
269	6.26	1.25	48.10	140.20	46.98	17.56
270	6.28	1.26	48.40	119.60	47.35	17.57
271	6.30	1.20	52.80	111.40	48.36	17.61
272	6.32	1.21	53.40	130.80	48.93	17.61
273	6.34	1.22	49.40	129.30	48.17	17.58
274	6.36	1.23	47.80	122.70	47.83	17.56
275	6.38	1.22	50.60	123.30	46.49	17.58
276	6.40	1.38	50.30	129.80	44.32	17.60
277	6.42	1.49	47.60	67.90	43.51	17.55
278	6.44	1.26	43.70	34.90	45.32	17.44
279	6.46	1.08	41.50	43.00	48.31	17.23
280	6.48	0.99	29.90	51.00	50.48	17.05
281	6.50	0.92	30.70	58.60	52.37	16.95
282	6.52	0.87	35.30	65.20	55.27	17.00
283	6.54	0.87	36.00	62.40	57.66	17.07
284	6.56	0.86	37.90	60.60	59.02	17.17
285	6.58	0.88	44.30	79.30	59.24	17.20
286	6.60	0.88	39.30	86.60	57.01	17.23
287	6.62	1.00	39.20	78.70	54.22	17.19
288	6.64	1.00	37.90	87.30	53.71	17.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	0.92	38.20	81.00	55.36	17.19
290	6.68	0.91	41.20	80.20	58.52	17.21
291	6.70	0.86	42.40	78.90	60.49	17.22
292	6.72	0.83	40.30	70.30	62.98	17.19
293	6.74	0.78	40.50	64.80	64.45	17.10
294	6.76	0.74	35.00	61.40	66.27	17.01
295	6.78	0.70	33.80	55.30	68.12	16.94
296	6.80	0.67	35.40	59.60	70.81	16.92
297	6.82	0.64	35.20	64.00	72.22	16.91
298	6.84	0.65	33.60	72.00	72.06	16.86
299	6.86	0.65	30.90	69.80	73.22	16.77
300	6.88	0.56	29.40	55.80	77.08	16.69
301	6.90	0.51	29.40	58.90	82.55	16.60
302	6.92	0.48	27.10	66.40	84.73	16.52
303	6.94	0.48	24.50	90.40	83.15	16.39
304	6.96	0.49	21.50	97.80	80.98	16.31
305	6.98	0.49	21.50	97.80	77.52	16.23
306	7.00	0.52	19.40	110.90	75.18	16.20
307	7.02	0.53	19.30	121.60	72.29	16.13
308	7.04	0.53	17.60	127.30	70.60	16.10
309	7.06	0.55	17.60	145.60	67.87	16.05
310	7.08	0.58	16.60	155.90	64.94	16.05
311	7.10	0.61	16.70	160.00	62.21	16.06
312	7.12	0.64	17.20	165.30	60.80	16.09
313	7.14	0.64	17.30	166.70	61.16	16.11
314	7.16	0.61	17.80	165.70	62.36	16.10
315	7.18	0.59	16.90	187.20	63.24	16.06
316	7.20	0.59	16.00	195.70	62.85	16.00
317	7.22	0.59	15.30	202.40	61.63	15.96
318	7.24	0.61	15.10	206.20	61.08	15.95
319	7.26	0.60	15.50	210.60	60.90	15.96
320	7.28	0.60	15.60	215.80	60.93	15.97
321	7.30	0.61	15.40	230.00	59.93	15.97
322	7.32	0.64	15.30	234.30	57.81	15.98
323	7.34	0.68	15.40	235.60	55.37	16.03
324	7.36	0.73	16.30	229.10	54.60	16.08
325	7.38	0.71	17.10	216.00	55.60	16.16
326	7.40	0.69	18.80	219.80	55.88	16.14
327	7.42	0.70	15.30	250.60	54.12	16.12
328	7.44	0.77	15.80	254.20	50.74	16.12
329	7.46	0.86	17.60	255.40	48.40	16.23
330	7.48	0.92	18.80	231.00	47.11	16.34
331	7.50	0.95	19.80	218.60	46.35	16.41
332	7.52	0.98	20.60	233.30	46.12	16.46
333	7.54	0.99	21.00	185.50	46.49	16.52
334	7.56	0.97	22.50	191.30	47.41	16.52
335	7.58	0.93	21.50	211.60	48.71	16.51
336	7.60	0.89	20.70	184.00	50.10	16.48

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	0.86	21.70	210.60	51.57	16.50
338	7.64	0.86	23.20	232.80	52.58	16.54
339	7.66	0.85	23.10	247.00	52.38	16.55
340	7.68	0.88	22.40	250.40	51.22	16.55
341	7.70	0.92	22.60	252.30	49.44	16.56
342	7.72	0.98	22.60	229.20	48.51	16.58
343	7.74	0.97	23.10	228.10	48.06	16.61
344	7.76	0.98	23.60	224.00	49.12	16.64
345	7.78	0.94	25.00	248.20	48.60	16.59
346	7.80	0.96	20.00	249.00	43.69	16.58
347	7.82	1.34	20.30	307.90	36.24	16.67
348	7.84	1.78	25.30	311.50	27.03	16.97
349	7.86	2.95	29.50	170.10	23.59	17.23
350	7.88	2.80	33.10	-0.20	22.38	17.37
351	7.90	2.57	33.90	-15.80	24.72	17.39
352	7.92	2.29	33.70	20.30	28.17	17.45
353	7.94	2.04	42.70	48.00	33.10	17.56
354	7.96	1.73	49.50	79.80	37.68	17.67
355	7.98	1.71	50.90	93.90	39.81	17.72
356	8.00	1.80	50.90	117.10	38.68	17.82
357	8.02	2.08	60.40	135.30	36.58	17.94
358	8.04	2.29	62.20	67.90	35.43	18.02
359	8.06	2.21	60.00	15.90	36.57	17.93
360	8.08	1.70	50.00	35.10	38.96	17.75
361	8.10	1.58	44.20	57.60	41.37	17.57
362	8.12	1.57	42.90	108.60	41.39	17.50
363	8.14	1.59	43.00	134.90	40.65	17.56
364	8.16	1.75	48.90	149.80	38.64	17.70
365	8.18	2.08	55.10	137.40	36.49	17.85
366	8.20	2.25	58.40	49.80	36.24	17.91
367	8.22	1.93	55.50	37.00	38.14	17.81
368	8.24	1.60	46.00	30.30	42.01	17.57
369	8.26	1.28	35.30	84.40	45.34	17.27
370	8.28	1.15	30.90	147.20	47.21	17.05
371	8.30	1.15	29.50	169.50	47.04	16.99
372	8.32	1.22	30.80	185.40	44.40	16.98
373	8.34	1.37	28.50	207.80	39.16	17.02
374	8.36	1.74	28.00	238.90	33.04	17.16
375	8.38	2.32	35.60	136.50	28.43	17.35
376	8.40	2.66	37.80	56.50	25.86	17.52
377	8.42	2.82	38.50	15.60	25.64	17.57
378	8.44	2.53	39.30	9.30	27.16	17.53
379	8.46	2.18	36.80	-4.70	31.25	17.51
380	8.48	1.83	41.90	4.00	35.47	17.36
381	8.50	1.48	31.10	108.90	36.84	17.23
382	8.52	1.73	27.30	211.30	29.83	17.16
383	8.54	2.88	30.10	169.50	24.17	17.31
384	8.56	3.23	36.00	5.30	21.94	17.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	2.83	34.00	-19.80	23.23	17.42
386	8.60	2.42	30.10	0.70	26.07	17.33
387	8.62	2.16	32.20	38.10	29.88	17.38
388	8.64	2.01	42.20	82.20	34.05	17.51
389	8.66	1.84	46.40	130.70	38.96	17.60
390	8.68	1.50	46.70	156.40	41.79	17.57
391	8.70	1.56	42.50	219.60	42.70	17.52
392	8.72	1.64	42.60	222.60	41.47	17.53
393	8.74	1.67	46.00	177.40	40.54	17.53
394	8.76	1.70	41.40	171.60	40.48	17.48
395	8.78	1.59	37.80	208.30	38.92	17.36
396	8.80	1.69	33.60	268.50	36.30	17.30
397	8.82	1.98	33.80	259.50	33.69	17.37
398	8.84	2.14	40.40	164.20	32.56	17.50
399	8.86	2.18	43.80	73.50	33.31	17.58
400	8.88	2.01	41.60	84.30	34.87	17.56
401	8.90	1.84	41.10	112.10	37.05	17.47
402	8.92	1.65	37.70	149.80	37.78	17.45
403	8.94	1.85	40.40	189.70	37.24	17.48
404	8.96	1.96	42.90	187.20	36.19	17.54
405	8.98	1.94	42.60	149.00	35.20	17.62
406	9.00	2.18	47.20	180.10	30.87	17.79
407	9.02	3.21	54.40	126.80	25.01	17.83
408	9.04	3.72	37.70	6.10	21.23	17.86
409	9.06	3.74	43.20	26.30	19.71	17.71
410	9.08	3.42	37.10	32.80	21.76	17.74
411	9.10	2.93	44.00	46.60	24.83	17.76
412	9.12	2.68	50.60	77.10	28.92	17.88
413	9.14	2.51	56.60	114.10	31.99	17.98
414	9.16	2.42	61.50	99.50	34.73	18.06
415	9.18	2.27	65.90	90.80	37.75	18.05
416	9.20	1.91	60.20	94.70	40.45	17.99
417	9.22	1.84	57.60	116.30	42.34	17.91
418	9.24	1.83	57.60	143.20	42.59	17.87
419	9.26	1.79	54.60	155.00	41.78	17.79
420	9.28	1.81	46.60	207.40	39.54	17.74
421	9.30	2.06	48.50	238.40	34.43	17.82
422	9.32	2.84	57.50	225.50	30.45	17.99
423	9.34	3.12	60.00	70.70	27.97	17.99
424	9.36	2.81	44.50	-11.00	28.25	17.92
425	9.38	2.61	49.60	11.40	29.82	17.84
426	9.40	2.51	53.40	25.90	32.74	17.95
427	9.42	2.37	62.60	65.30	37.02	18.07
428	9.44	1.98	71.80	73.10	41.72	18.14
429	9.46	1.85	72.30	73.60	45.83	18.12
430	9.48	1.75	67.00	99.40	47.39	18.04
431	9.50	1.64	61.90	124.60	47.41	17.93
432	9.52	1.65	56.10	188.40	46.34	17.83

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	1.70	51.40	195.80	43.96	17.76
434	9.56	1.81	49.50	211.70	38.70	17.80
435	9.58	2.48	54.40	230.70	34.36	17.87
436	9.60	2.66	54.00	124.10	31.56	17.94
437	9.62	2.62	53.20	47.90	30.76	17.96
438	9.64	2.76	54.90	43.80	30.25	17.99
439	9.66	2.90	57.30	32.00	29.60	18.05
440	9.68	2.97	59.30	11.40	29.17	18.07
441	9.70	2.96	57.10	13.60	29.34	18.07
442	9.72	2.86	57.30	2.70	30.20	18.04
443	9.74	2.66	57.20	13.80	32.14	18.04
444	9.76	2.46	60.00	20.40	33.86	18.05
445	9.78	2.49	62.00	57.10	32.21	18.09
446	9.80	3.16	60.00	29.80	30.38	18.15
447	9.82	3.11	65.00	10.80	29.23	18.15
448	9.84	2.84	59.90	9.90	31.00	18.19
449	9.86	2.77	68.40	-1.70	32.38	18.25
450	9.88	2.92	76.50	3.20	32.74	18.29
451	9.90	2.90	68.00	-18.40	34.44	18.27
452	9.92	2.30	68.30	-15.10	36.90	18.15
453	9.94	2.10	62.80	-6.00	39.48	18.09
454	9.96	2.26	62.50	19.10	38.84	18.05
455	9.98	2.33	61.60	47.10	37.96	18.06
456	10.00	2.28	62.40	29.90	38.54	18.04
457	10.02	2.11	60.30	38.40	40.28	18.01
458	10.04	1.99	61.30	55.60	41.22	18.00
459	10.06	2.09	61.30	70.90	40.81	18.02
460	10.08	2.22	62.80	79.30	38.36	18.05
461	10.10	2.48	62.00	87.10	35.53	18.10
462	10.12	2.77	63.50	74.70	32.46	18.17
463	10.14	3.12	67.30	63.70	29.69	18.24
464	10.16	3.44	65.90	30.20	28.25	18.24
465	10.18	3.26	61.70	10.40	27.41	18.23
466	10.20	3.38	63.50	9.20	26.91	18.19
467	10.22	3.50	59.40	22.40	25.91	18.19
468	10.24	3.61	58.50	-11.80	25.04	18.17
469	10.26	3.65	59.40	44.30	24.89	18.06
470	10.28	3.18	44.40	31.70	25.00	17.94
471	10.30	3.18	44.40	31.70	29.11	17.98
472	10.32	2.48	72.00	6.30	34.35	18.12
473	10.34	2.22	71.60	14.40	41.57	18.18
474	10.36	1.92	65.90	35.20	43.32	18.09
475	10.38	2.02	60.80	46.90	42.04	18.02
476	10.40	2.28	59.70	61.00	37.86	18.04
477	10.42	2.68	61.80	51.90	33.53	18.08
478	10.44	3.04	59.50	34.30	30.02	18.06
479	10.46	3.13	50.20	26.80	29.12	17.95
480	10.48	2.66	46.80	1.50	30.16	17.88

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	2.57	52.30	1.20	33.10	17.90
482	10.52	2.47	57.20	5.80	35.46	17.99
483	10.54	2.38	62.60	-2.90	38.53	18.06
484	10.56	2.12	65.80	-2.70	41.27	18.07
485	10.58	2.03	63.80	21.70	37.55	18.14
486	10.60	3.19	66.10	37.00	31.96	18.25
487	10.62	3.69	71.50	11.40	28.03	18.39
488	10.64	3.71	78.30	-13.50	27.55	18.38
489	10.66	3.36	63.90	-32.50	28.88	18.27
490	10.68	2.87	56.10	-24.80	31.12	18.02
491	10.70	2.35	48.50	-16.60	37.13	17.90
492	10.72	1.73	57.50	-7.10	41.46	17.88
493	10.74	2.09	59.70	21.40	42.41	17.97
494	10.76	2.37	61.40	41.60	39.52	17.99
495	10.78	2.25	56.80	15.50	39.89	17.98
496	10.80	2.00	58.20	28.10	40.50	17.91
497	10.82	2.13	52.80	56.00	39.74	17.86
498	10.84	2.29	49.90	27.00	38.88	17.80
499	10.86	2.04	50.00	3.80	40.36	17.74
500	10.88	1.79	47.70	6.70	43.30	17.69
501	10.90	1.79	47.70	6.70	48.43	17.61
502	10.92	1.29	47.00	76.40	52.51	17.49
503	10.94	1.21	38.90	105.90	57.13	17.35
504	10.96	1.24	37.40	130.40	53.29	17.28
505	10.98	1.49	37.00	156.20	47.84	17.33
506	11.00	1.76	38.90	173.00	43.12	17.37
507	11.02	1.84	36.80	92.20	42.84	17.37
508	11.04	1.55	37.40	94.10	46.31	17.28
509	11.06	1.24	34.10	147.00	51.74	17.17
510	11.08	1.17	31.50	177.60	54.27	17.05
511	11.10	1.21	30.20	207.20	49.41	17.02
512	11.12	1.58	28.50	240.30	41.39	17.17
513	11.14	2.22	36.70	162.20	34.36	17.33
514	11.16	2.58	36.20	57.00	32.19	17.46
515	11.18	2.31	37.10	29.10	31.10	17.53
516	11.20	2.62	41.00	48.60	28.70	17.60
517	11.22	3.36	40.10	104.50	26.21	17.74
518	11.24	3.42	46.80	-7.70	25.50	17.83
519	11.26	3.13	48.80	-12.30	26.33	17.87
520	11.28	3.22	45.80	-1.80	26.59	17.92
521	11.30	3.48	52.20	14.30	27.27	18.00
522	11.32	3.16	59.60	34.20	29.59	18.02
523	11.34	2.57	52.30	21.70	34.47	18.00
524	11.36	2.18	57.50	44.20	40.52	17.98
525	11.38	1.94	66.40	69.30	47.17	18.02
526	11.40	1.64	68.00	192.00	50.11	17.99
527	11.42	1.71	56.20	330.40	45.76	17.91
528	11.44	2.30	49.80	362.90	40.07	17.81

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
529	11.46	2.30	47.90	179.20	32.73	17.73
530	11.48	3.01	37.80	58.90	30.36	17.59
531	11.50	2.59	33.10	88.60	29.68	17.43
532	11.52	2.12	33.30	144.70	34.79	17.36
533	11.54	1.74	37.10	252.60	38.78	17.40
534	11.56	1.96	40.20	327.00	40.09	17.49
535	11.58	2.06	42.40	241.50	40.28	17.56
536	11.60	1.86	44.20	134.80	43.31	17.57
537	11.62	1.58	44.60	165.80	49.50	17.52
538	11.64	1.26	43.30	243.50	54.98	17.45
539	11.66	1.25	41.90	284.50	58.16	17.39
540	11.68	1.25	40.80	305.10	57.79	17.37
541	11.70	1.26	41.10	327.70	56.37	17.33
542	11.72	1.31	37.60	336.50	53.39	17.31
543	11.74	1.45	36.20	317.90	48.95	17.25
544	11.76	1.59	32.20	246.90	48.25	17.17
545	11.78	1.31	31.40	238.30	50.66	17.10
546	11.80	1.16	32.50	248.20	55.16	17.01
547	11.82	1.13	28.30	313.30	57.71	16.98
548	11.84	1.09	30.10	349.00	58.32	16.93
549	11.86	1.07	29.70	367.50	59.35	16.93
550	11.88	1.06	28.90	374.60	59.37	16.89
551	11.90	1.05	27.10	379.70	58.55	16.82
552	11.92	1.06	25.10	393.10	57.77	16.76
553	11.94	1.06	24.70	399.80	56.99	16.73
554	11.96	1.06	24.60	418.10	56.61	16.73
555	11.98	1.08	25.20	424.90	55.63	16.75
556	12.00	1.14	25.30	419.30	54.89	16.80
557	12.02	1.16	27.30	410.50	54.33	16.83
558	12.04	1.16	26.90	403.20	53.92	16.87
559	12.06	1.20	27.40	420.60	53.01	16.91
560	12.08	1.26	29.00	421.70	52.07	16.97
561	12.10	1.30	30.50	414.10	51.49	17.03
562	12.12	1.32	31.50	423.20	48.85	17.11
563	12.14	1.59	32.80	434.60	45.19	17.21
564	12.16	1.80	35.10	432.00	42.06	17.33
565	12.18	1.91	39.30	370.90	41.44	17.48
566	12.20	1.94	44.60	245.50	42.24	17.50
567	12.22	1.77	38.20	238.40	45.64	17.38
568	12.24	1.30	31.30	330.30	48.98	17.10
569	12.26	1.20	24.40	359.70	53.82	16.86
570	12.28	1.10	25.00	320.40	57.02	16.79
571	12.30	1.02	28.60	305.40	63.83	16.97
572	12.32	0.95	39.40	390.00	70.19	17.12
573	12.34	0.89	40.70	437.90	75.24	17.23
574	12.36	0.85	40.60	454.90	77.38	17.20
575	12.38	0.83	38.00	451.40	77.86	17.16
576	12.40	0.84	37.30	471.70	75.66	17.05

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
577	12.42	0.86	29.90	496.10	72.64	16.89
578	12.44	0.84	24.40	512.40	69.08	16.67
579	12.46	0.83	21.30	513.50	67.39	16.54
580	12.48	0.83	21.80	574.10	66.35	16.49
581	12.50	0.84	21.30	588.90	66.24	16.49
582	12.52	0.83	21.50	599.10	66.28	16.48
583	12.54	0.82	21.30	611.30	66.76	16.48
584	12.56	0.81	21.50	632.50	67.44	16.47
585	12.58	0.79	21.00	626.20	66.96	16.46
586	12.60	0.83	20.80	629.70	65.52	16.45
587	12.62	0.87	20.20	640.50	63.93	16.44
588	12.64	0.86	20.30	655.30	63.31	16.44
589	12.66	0.86	20.30	655.30	64.66	16.45
590	12.68	0.81	21.00	636.20	65.55	16.47
591	12.70	0.83	21.70	654.00	66.23	16.50
592	12.72	0.85	22.10	681.90	65.81	16.53
593	12.74	0.84	22.50	692.10	65.30	16.55
594	12.76	0.87	22.40	689.10	65.09	16.55
595	12.78	0.86	22.30	687.30	64.03	16.55
596	12.80	0.90	22.10	666.10	63.01	16.54
597	12.82	0.91	21.40	684.40	61.93	16.51
598	12.84	0.90	20.40	657.60	61.10	16.47
599	12.86	0.91	19.40	672.50	59.78	16.43
600	12.88	0.96	19.10	688.80	58.17	16.42
601	12.90	0.98	19.30	696.70	57.67	16.42
602	12.92	0.95	19.50	679.90	58.29	16.43
603	12.94	0.94	19.50	627.00	59.25	16.44
604	12.96	0.94	20.20	664.70	59.09	16.45
605	12.98	0.96	20.00	700.80	58.53	16.46
606	13.00	0.96	19.50	696.00	58.16	16.44
607	13.02	0.96	19.40	676.50	57.96	16.43
608	13.04	0.97	19.40	686.30	57.29	16.44
609	13.06	1.01	19.60	717.90	56.35	16.45
610	13.08	1.01	19.50	741.80	55.47	16.45
611	13.10	1.02	19.00	747.60	54.80	16.45
612	13.12	1.05	19.50	765.80	53.97	16.47
613	13.14	1.08	19.90	772.20	52.24	16.51
614	13.16	1.18	20.60	779.00	50.38	16.55
615	13.18	1.22	20.20	786.40	49.04	16.57
616	13.20	1.22	20.60	776.20	49.36	16.61
617	13.22	1.21	22.60	698.00	51.13	16.69
618	13.24	1.16	24.90	713.40	53.72	16.76
619	13.26	1.11	26.00	676.30	56.95	16.82
620	13.28	1.05	27.50	656.30	59.88	16.87
621	13.30	1.03	29.30	687.00	61.61	16.92
622	13.32	1.04	30.30	755.80	60.44	16.95
623	13.34	1.13	29.00	792.40	56.08	16.98
624	13.36	1.33	29.20	848.60	32.50	17.15

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
625	13.38	4.20	26.00	745.10	5.00	17.56
626	13.40	17.08	25.70	52.50	2.34	18.03
627	13.42	20.98	47.40	-15.60	0.39	18.40
628	13.44	21.90	48.60	-17.50	0.47	18.72
629	13.46	21.51	61.60	-17.10	0.46	18.89
630	13.48	24.15	69.60	76.90	0.77	19.11
631	13.50	23.41	85.00	29.30	0.79	19.28
632	13.52	25.02	92.10	-30.90	0.92	19.39
633	13.54	25.30	91.80	-41.40	0.73	19.37
634	13.56	24.83	78.30	-22.00	0.88	19.35
635	13.58	23.12	90.20	-41.00	1.17	19.32
636	13.60	22.23	90.40	-47.50	2.07	19.45
637	13.62	20.44	113.40	-51.20	3.18	19.60
638	13.64	19.23	140.20	-38.80	4.78	19.91
639	13.66	20.15	200.00	-46.00	5.39	20.07
640	13.68	21.11	180.70	-31.90	4.99	20.14
641	13.70	22.79	162.40	-4.00	4.05	20.06
642	13.72	23.30	153.90	-45.30	3.34	19.99
643	13.74	23.74	144.80	-50.30	3.05	19.95
644	13.76	23.94	147.00	-49.70	2.62	19.84
645	13.78	23.51	112.30	141.90	2.79	19.90
646	13.80	23.99	165.70	-42.90	2.78	19.91
647	13.82	24.31	149.60	-47.40	3.10	20.04
648	13.84	24.75	162.40	-42.70	2.97	20.04
649	13.86	24.72	160.70	-33.80	3.16	20.03
650	13.88	22.89	150.50	-10.30	3.14	19.94
651	13.90	22.50	129.30	31.70	3.22	19.76
652	13.92	20.06	107.60	118.30	3.37	19.68
653	13.94	20.15	128.30	-20.40	4.05	19.75
654	13.96	20.30	157.50	-33.30	4.60	19.92
655	13.98	20.97	168.90	-52.80	5.17	20.05
656	14.00	20.25	182.60	-40.50	5.54	20.04
657	14.02	18.43	159.10	-48.60	6.58	20.13
658	14.04	18.43	218.30	-36.70	8.83	20.33
659	14.06	16.16	302.30	-46.50	11.24	20.62
660	14.08	17.11	364.20	-42.00	12.95	20.87
661	14.10	18.95	428.60	-34.60	12.32	21.11
662	14.12	23.30	497.40	-29.90	11.64	21.30
663	14.14	24.26	536.60	-38.10	11.19	21.45
664	14.16	24.99	584.70	-40.30	11.50	21.58
665	14.18	26.94	697.90	-47.50	11.23	21.58
666	14.20	29.89	708.80	-48.70	11.28	21.58
667	14.22	28.71	748.30	-48.10	10.18	21.58
668	14.24	33.74	706.50	-52.50	9.49	21.58
669	14.26	34.99	725.90	-52.50	8.55	21.58

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	5.23	98.08	5.89	92.20	0.96	0.067	1.38	0.048	1.00	1.00	0.048	No
2	5.25	98.39	6.08	92.31	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
3	5.27	98.71	6.28	92.43	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
4	5.29	99.02	6.47	92.55	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
5	5.31	99.34	6.67	92.67	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
6	5.33	99.66	6.87	92.79	0.96	0.067	1.38	0.049	1.00	1.00	0.049	No
7	5.35	99.98	7.06	92.92	0.96	0.067	1.38	0.049	1.00	1.00	2.000	Yes
8	5.37	100.32	7.26	93.06	0.96	0.067	1.38	0.049	1.00	1.00	2.000	Yes
9	5.39	100.66	7.46	93.21	0.96	0.068	1.38	0.049	1.00	1.00	2.000	Yes
10	5.41	101.01	7.65	93.35	0.96	0.068	1.38	0.049	1.00	1.00	2.000	Yes
11	5.43	101.35	7.85	93.51	0.96	0.068	1.38	0.049	1.00	1.00	2.000	Yes
12	5.45	101.70	8.04	93.66	0.96	0.068	1.38	0.049	1.00	1.00	2.000	Yes
13	5.47	102.06	8.24	93.82	0.96	0.068	1.38	0.049	1.00	1.00	2.000	Yes
14	5.49	102.41	8.44	93.98	0.96	0.068	1.38	0.050	1.00	1.00	2.000	Yes
15	5.51	102.77	8.63	94.14	0.96	0.068	1.38	0.050	1.00	1.00	2.000	Yes
16	5.53	103.13	8.83	94.30	0.96	0.068	1.38	0.050	1.00	1.00	2.000	Yes
17	5.55	103.50	9.03	94.47	0.96	0.068	1.38	0.050	1.00	1.00	2.000	Yes
18	5.57	103.86	9.22	94.64	0.96	0.069	1.38	0.050	1.00	1.00	2.000	Yes
19	5.59	104.22	9.42	94.80	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
20	5.61	104.58	9.61	94.96	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
21	5.63	104.93	9.81	95.12	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
22	5.65	105.29	10.01	95.28	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
23	5.67	105.65	10.20	95.44	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
24	5.69	106.01	10.40	95.61	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
25	5.71	106.37	10.59	95.77	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
26	5.73	106.73	10.79	95.94	0.96	0.069	1.38	0.050	1.00	1.00	0.050	No
27	5.75	107.09	10.99	96.11	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
28	5.77	107.46	11.18	96.28	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
29	5.79	107.83	11.38	96.45	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
30	5.81	108.19	11.58	96.62	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
31	5.83	108.56	11.77	96.79	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
32	5.85	108.93	11.97	96.96	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
33	5.87	109.29	12.16	97.13	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
34	5.89	109.66	12.36	97.30	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
35	5.91	110.02	12.56	97.46	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
36	5.93	110.38	12.75	97.63	0.96	0.070	1.38	0.051	1.00	1.00	0.051	No
37	5.95	110.75	12.95	97.80	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
38	5.97	111.11	13.15	97.97	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
39	5.99	111.48	13.34	98.14	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
40	6.01	111.84	13.54	98.31	0.96	0.071	1.38	0.051	1.00	1.00	0.051	No
41	6.03	112.21	13.73	98.48	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
42	6.05	112.58	13.93	98.65	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
43	6.07	112.94	14.13	98.82	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
44	6.09	113.31	14.32	98.99	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
45	6.11	113.68	14.52	99.16	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
46	6.13	114.05	14.72	99.33	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
47	6.15	114.42	14.91	99.50	0.96	0.071	1.38	0.052	1.00	1.00	0.052	No
48	6.17	114.78	15.11	99.67	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	6.19	115.15	15.30	99.85	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
50	6.21	115.51	15.50	100.01	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
51	6.23	115.88	15.70	100.18	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
52	6.25	116.25	15.89	100.35	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
53	6.27	116.61	16.09	100.52	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
54	6.29	116.97	16.28	100.69	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
55	6.31	117.33	16.48	100.85	0.96	0.072	1.38	0.052	1.00	1.00	0.052	No
56	6.33	117.70	16.68	101.02	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
57	6.35	118.06	16.87	101.19	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
58	6.37	118.42	17.07	101.35	0.95	0.072	1.38	0.053	1.00	1.00	0.053	No
59	6.39	118.78	17.27	101.52	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
60	6.41	119.15	17.46	101.69	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
61	6.43	119.51	17.66	101.85	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
62	6.45	119.87	17.85	102.01	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
63	6.47	120.22	18.05	102.17	0.95	0.073	1.38	0.053	1.00	1.00	0.053	No
64	6.49	120.58	18.25	102.33	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
65	6.51	120.93	18.44	102.49	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
66	6.53	121.28	18.64	102.65	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
67	6.55	121.64	18.84	102.80	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
68	6.57	121.99	19.03	102.96	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
69	6.59	122.34	19.23	103.11	0.95	0.073	1.38	0.053	1.00	1.00	2.000	Yes
70	6.61	122.70	19.42	103.27	0.95	0.074	1.38	0.053	1.00	1.00	2.000	Yes
71	6.63	123.06	19.62	103.44	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
72	6.65	123.42	19.82	103.60	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
73	6.67	123.78	20.01	103.77	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
74	6.69	124.14	20.21	103.94	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
75	6.71	124.51	20.40	104.10	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
76	6.73	124.87	20.60	104.27	0.95	0.074	1.38	0.054	1.00	1.00	2.000	Yes
77	6.75	125.24	20.80	104.44	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
78	6.77	125.60	20.99	104.60	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
79	6.79	125.96	21.19	104.77	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
80	6.81	126.32	21.39	104.93	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
81	6.83	126.68	21.58	105.09	0.95	0.074	1.38	0.054	1.00	1.00	0.054	No
82	6.85	127.03	21.78	105.25	0.95	0.075	1.38	0.054	1.00	1.00	2.000	Yes
83	6.87	127.38	21.97	105.41	0.95	0.075	1.38	0.054	1.00	1.00	2.000	Yes
84	6.89	127.74	22.17	105.57	0.95	0.075	1.38	0.054	1.00	1.00	2.000	Yes
85	6.91	128.09	22.37	105.73	0.95	0.075	1.38	0.054	1.00	1.00	2.000	Yes
86	6.93	128.46	22.56	105.89	0.95	0.075	1.38	0.054	1.00	1.00	2.000	Yes
87	6.95	128.82	22.76	106.06	0.95	0.075	1.38	0.054	1.00	1.00	0.054	No
88	6.97	129.20	22.96	106.24	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
89	6.99	129.57	23.15	106.42	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
90	7.01	129.94	23.35	106.59	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
91	7.03	130.31	23.54	106.77	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
92	7.05	130.69	23.74	106.95	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
93	7.07	131.07	23.94	107.13	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
94	7.09	131.44	24.13	107.31	0.95	0.075	1.38	0.055	1.00	1.00	0.055	No
95	7.11	131.82	24.33	107.50	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
96	7.13	132.21	24.53	107.68	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	7.15	132.59	24.72	107.87	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
98	7.17	132.98	24.92	108.06	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
99	7.19	133.37	25.11	108.26	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
100	7.21	133.76	25.31	108.45	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
101	7.23	134.15	25.51	108.65	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
102	7.25	134.55	25.70	108.84	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
103	7.27	134.94	25.90	109.04	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
104	7.29	135.33	26.09	109.24	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
105	7.31	135.72	26.29	109.43	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
106	7.33	136.11	26.49	109.63	0.95	0.076	1.38	0.055	1.00	1.00	0.055	No
107	7.35	136.50	26.68	109.82	0.94	0.076	1.38	0.055	1.00	1.00	0.055	No
108	7.37	136.90	26.88	110.02	0.94	0.076	1.38	0.056	1.00	1.00	0.056	No
109	7.39	137.29	27.08	110.21	0.94	0.076	1.38	0.056	1.00	1.00	0.056	No
110	7.41	137.68	27.27	110.41	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
111	7.43	138.07	27.47	110.60	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
112	7.45	138.46	27.66	110.79	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
113	7.47	138.85	27.86	110.98	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
114	7.49	139.23	28.06	111.17	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
115	7.51	139.62	28.25	111.36	0.94	0.077	1.38	0.056	1.00	1.00	0.056	No
116	7.53	140.00	28.45	111.55	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
117	7.55	140.38	28.65	111.73	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
118	7.57	140.76	28.84	111.92	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
119	7.59	141.14	29.04	112.10	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
120	7.61	141.52	29.23	112.29	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
121	7.63	141.90	29.43	112.47	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
122	7.65	142.28	29.63	112.66	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
123	7.67	142.66	29.82	112.84	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
124	7.69	143.04	30.02	113.03	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
125	7.71	143.42	30.21	113.21	0.94	0.077	1.38	0.056	1.00	1.00	2.000	Yes
126	7.73	143.80	30.41	113.39	0.94	0.078	1.38	0.056	1.00	1.00	2.000	Yes
127	7.75	144.18	30.61	113.57	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
128	7.77	144.55	30.80	113.75	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
129	7.79	144.92	31.00	113.92	0.94	0.078	1.38	0.056	1.00	1.00	0.056	No
130	7.81	145.28	31.20	114.08	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
131	7.83	145.64	31.39	114.25	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
132	7.85	145.99	31.59	114.41	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
133	7.87	146.35	31.78	114.57	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
134	7.89	146.70	31.98	114.72	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
135	7.91	147.06	32.18	114.88	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
136	7.93	147.41	32.37	115.04	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
137	7.95	147.77	32.57	115.20	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
138	7.97	148.12	32.77	115.36	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
139	7.99	148.48	32.96	115.52	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
140	8.01	148.84	33.16	115.68	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
141	8.03	149.19	33.35	115.84	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
142	8.05	149.55	33.55	116.00	0.94	0.078	1.38	0.057	1.00	1.00	0.057	No
143	8.07	149.90	33.75	116.16	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
144	8.09	150.26	33.94	116.32	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	8.11	150.61	34.14	116.47	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
146	8.13	150.97	34.34	116.63	0.94	0.079	1.38	0.057	1.00	1.00	0.057	No
147	8.15	151.32	34.53	116.79	0.94	0.079	1.38	0.057	1.00	1.00	2.000	Yes
148	8.17	151.67	34.73	116.94	0.94	0.079	1.38	0.057	1.00	1.00	2.000	Yes
149	8.19	152.03	34.92	117.10	0.93	0.079	1.38	0.057	1.00	1.00	2.000	Yes
150	8.21	152.39	35.12	117.27	0.93	0.079	1.38	0.057	1.00	1.00	2.000	Yes
151	8.23	152.75	35.32	117.43	0.93	0.079	1.38	0.057	1.00	1.00	2.000	Yes
152	8.25	153.11	35.51	117.60	0.93	0.079	1.38	0.057	1.00	1.00	2.000	Yes
153	8.27	153.47	35.71	117.77	0.93	0.079	1.38	0.057	1.00	1.00	2.000	Yes
154	8.29	153.84	35.90	117.93	0.93	0.079	1.38	0.058	1.00	1.00	2.000	Yes
155	8.31	154.20	36.10	118.10	0.93	0.079	1.38	0.058	1.00	1.00	2.000	Yes
156	8.33	154.56	36.30	118.26	0.93	0.079	1.38	0.058	1.00	1.00	2.000	Yes
157	8.35	154.92	36.49	118.43	0.93	0.079	1.38	0.058	1.00	1.00	2.000	Yes
158	8.37	155.28	36.69	118.59	0.93	0.079	1.38	0.058	1.00	1.00	2.000	Yes
159	8.39	155.64	36.89	118.75	0.93	0.079	1.38	0.058	1.00	1.00	0.058	No
160	8.41	156.00	37.08	118.92	0.93	0.079	1.38	0.058	1.00	1.00	0.058	No
161	8.43	156.36	37.28	119.08	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
162	8.45	156.71	37.47	119.24	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
163	8.47	157.06	37.67	119.39	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
164	8.49	157.41	37.87	119.54	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
165	8.51	157.75	38.06	119.69	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
166	8.53	158.09	38.26	119.83	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
167	8.55	158.43	38.46	119.98	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
168	8.57	158.77	38.65	120.12	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
169	8.59	159.11	38.85	120.27	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
170	8.61	159.46	39.04	120.41	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
171	8.63	159.80	39.24	120.56	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
172	8.65	160.15	39.44	120.71	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
173	8.67	160.50	39.63	120.87	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
174	8.69	160.85	39.83	121.02	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
175	8.71	161.20	40.02	121.17	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
176	8.73	161.54	40.22	121.32	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
177	8.75	161.89	40.42	121.48	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
178	8.77	162.24	40.61	121.63	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
179	8.79	162.59	40.81	121.78	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
180	8.81	162.93	41.01	121.93	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
181	8.83	163.28	41.20	122.08	0.93	0.080	1.38	0.058	1.00	1.00	0.058	No
182	8.85	163.62	41.40	122.22	0.93	0.081	1.38	0.059	1.00	1.00	0.059	No
183	8.87	163.96	41.59	122.37	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
184	8.89	164.30	41.79	122.51	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
185	8.91	164.64	41.99	122.66	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
186	8.93	164.98	42.18	122.80	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
187	8.95	165.32	42.38	122.95	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
188	8.97	165.66	42.58	123.09	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
189	8.99	166.00	42.77	123.23	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
190	9.01	166.34	42.97	123.38	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
191	9.03	166.68	43.16	123.52	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
192	9.05	167.02	43.36	123.66	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	9.07	167.36	43.56	123.81	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
194	9.09	167.70	43.75	123.95	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
195	9.11	168.04	43.95	124.09	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
196	9.13	168.38	44.15	124.23	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
197	9.15	168.72	44.34	124.38	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
198	9.17	169.06	44.54	124.52	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
199	9.19	169.40	44.73	124.67	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
200	9.21	169.74	44.93	124.81	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
201	9.23	170.08	45.13	124.96	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
202	9.25	170.43	45.32	125.11	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
203	9.27	170.77	45.52	125.25	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
204	9.29	171.12	45.71	125.40	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
205	9.31	171.46	45.91	125.55	0.92	0.081	1.38	0.059	1.00	1.00	0.059	No
206	9.33	171.81	46.11	125.70	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
207	9.35	172.15	46.30	125.85	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
208	9.37	172.50	46.50	126.00	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
209	9.39	172.84	46.70	126.15	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
210	9.41	173.19	46.89	126.30	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
211	9.43	173.53	47.09	126.45	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
212	9.45	173.88	47.28	126.59	0.92	0.082	1.38	0.059	1.00	1.00	0.059	No
213	9.47	174.22	47.48	126.74	0.91	0.082	1.38	0.059	1.00	1.00	0.059	No
214	9.49	174.57	47.68	126.89	0.91	0.082	1.38	0.059	1.00	1.00	0.059	No
215	9.51	174.91	47.87	127.04	0.91	0.082	1.38	0.059	1.00	1.00	0.059	No
216	9.53	175.26	48.07	127.19	0.91	0.082	1.38	0.059	1.00	1.00	0.059	No
217	9.55	175.60	48.27	127.34	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
218	9.57	175.95	48.46	127.48	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
219	9.59	176.29	48.66	127.63	0.91	0.082	1.38	0.060	1.00	1.00	2.000	Yes
220	9.61	176.64	48.85	127.78	0.91	0.082	1.38	0.060	1.00	1.00	2.000	Yes
221	9.63	176.98	49.05	127.93	0.91	0.082	1.38	0.060	1.00	1.00	2.000	Yes
222	9.65	177.33	49.25	128.08	0.91	0.082	1.38	0.060	1.00	1.00	2.000	Yes
223	9.67	177.67	49.44	128.23	0.91	0.082	1.38	0.060	1.00	1.00	2.000	Yes
224	9.69	178.02	49.64	128.38	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
225	9.71	178.37	49.83	128.53	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
226	9.73	178.72	50.03	128.68	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
227	9.75	179.06	50.23	128.83	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
228	9.77	179.41	50.42	128.98	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
229	9.79	179.75	50.62	129.13	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
230	9.81	180.09	50.82	129.28	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
231	9.83	180.43	51.01	129.42	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
232	9.85	180.77	51.21	129.57	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
233	9.87	181.11	51.40	129.71	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
234	9.89	181.45	51.60	129.85	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
235	9.91	181.79	51.80	130.00	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
236	9.93	182.13	51.99	130.14	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
237	9.95	182.47	52.19	130.28	0.91	0.082	1.38	0.060	1.00	1.00	0.060	No
238	9.97	182.80	52.39	130.42	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
239	9.99	183.13	52.58	130.55	0.91	0.083	1.38	0.060	1.00	1.00	0.060	No
240	10.01	183.47	52.78	130.69	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	10.03	183.80	52.97	130.82	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
242	10.05	184.13	53.17	130.96	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
243	10.07	184.46	53.37	131.09	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
244	10.09	184.79	53.56	131.22	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
245	10.11	185.12	53.76	131.36	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
246	10.13	185.45	53.96	131.49	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
247	10.15	185.77	54.15	131.62	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
248	10.17	186.10	54.35	131.76	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
249	10.19	186.43	54.54	131.89	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
250	10.21	186.77	54.74	132.03	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
251	10.23	187.10	54.94	132.16	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
252	10.25	187.44	55.13	132.30	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
253	10.27	187.77	55.33	132.44	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
254	10.29	188.11	55.52	132.58	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
255	10.31	188.44	55.72	132.72	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
256	10.33	188.78	55.92	132.86	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
257	10.35	189.11	56.11	133.00	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
258	10.37	189.45	56.31	133.14	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
259	10.39	189.78	56.51	133.28	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
260	10.41	190.12	56.70	133.42	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
261	10.43	190.46	56.90	133.56	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
262	10.45	190.80	57.09	133.71	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
263	10.47	191.14	57.29	133.85	0.90	0.083	1.38	0.060	1.00	1.00	0.060	No
264	10.49	191.49	57.49	134.00	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
265	10.51	191.83	57.68	134.15	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
266	10.53	192.18	57.88	134.30	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
267	10.55	192.53	58.08	134.46	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
268	10.57	192.88	58.27	134.61	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
269	10.59	193.23	58.47	134.77	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
270	10.61	193.59	58.66	134.92	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
271	10.63	193.94	58.86	135.08	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
272	10.65	194.29	59.06	135.23	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
273	10.67	194.64	59.25	135.39	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
274	10.69	194.99	59.45	135.54	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
275	10.71	195.34	59.64	135.70	0.89	0.083	1.38	0.060	1.00	1.00	0.060	No
276	10.73	195.70	59.84	135.86	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
277	10.75	196.05	60.04	136.01	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
278	10.77	196.40	60.23	136.16	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
279	10.79	196.74	60.43	136.31	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
280	10.81	197.08	60.63	136.46	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
281	10.83	197.42	60.82	136.60	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
282	10.85	197.76	61.02	136.74	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
283	10.87	198.10	61.21	136.89	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
284	10.89	198.45	61.41	137.04	0.89	0.083	1.38	0.061	1.00	1.00	0.061	No
285	10.91	198.79	61.61	137.18	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
286	10.93	199.13	61.80	137.33	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
287	10.95	199.48	62.00	137.48	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
288	10.97	199.82	62.20	137.63	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	10.99	200.17	62.39	137.77	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
290	11.01	200.51	62.59	137.92	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
291	11.03	200.85	62.78	138.07	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
292	11.05	201.20	62.98	138.22	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
293	11.07	201.54	63.18	138.36	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
294	11.09	201.88	63.37	138.51	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
295	11.11	202.22	63.57	138.65	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
296	11.13	202.56	63.77	138.79	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
297	11.15	202.90	63.96	138.93	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
298	11.17	203.23	64.16	139.08	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
299	11.19	203.57	64.35	139.21	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
300	11.21	203.90	64.55	139.35	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
301	11.23	204.23	64.75	139.49	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
302	11.25	204.56	64.94	139.62	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
303	11.27	204.89	65.14	139.75	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
304	11.29	205.22	65.33	139.88	0.88	0.083	1.38	0.061	1.00	1.00	0.061	No
305	11.31	205.54	65.53	140.01	0.88	0.084	1.38	0.061	1.00	1.00	0.061	No
306	11.33	205.87	65.73	140.14	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
307	11.35	206.19	65.92	140.27	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
308	11.37	206.51	66.12	140.39	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
309	11.39	206.83	66.32	140.52	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
310	11.41	207.15	66.51	140.64	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
311	11.43	207.48	66.71	140.77	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
312	11.45	207.80	66.90	140.89	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
313	11.47	208.12	67.10	141.02	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
314	11.49	208.44	67.30	141.14	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
315	11.51	208.76	67.49	141.27	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
316	11.53	209.08	67.69	141.39	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
317	11.55	209.40	67.89	141.52	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
318	11.57	209.72	68.08	141.64	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
319	11.59	210.04	68.28	141.76	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
320	11.61	210.36	68.47	141.89	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
321	11.63	210.68	68.67	142.01	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
322	11.65	211.00	68.87	142.13	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
323	11.67	211.32	69.06	142.26	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
324	11.69	211.64	69.26	142.38	0.87	0.084	1.38	0.061	1.00	1.00	0.061	No
325	11.71	211.96	69.45	142.51	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
326	11.73	212.29	69.65	142.64	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
327	11.75	212.61	69.85	142.76	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
328	11.77	212.93	70.04	142.89	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
329	11.79	213.26	70.24	143.02	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
330	11.81	213.58	70.44	143.15	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
331	11.83	213.91	70.63	143.28	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
332	11.85	214.24	70.83	143.41	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
333	11.87	214.57	71.02	143.55	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
334	11.89	214.90	71.22	143.68	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
335	11.91	215.23	71.42	143.81	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
336	11.93	215.56	71.61	143.95	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	11.95	215.89	71.81	144.08	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
338	11.97	216.22	72.01	144.22	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
339	11.99	216.55	72.20	144.35	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
340	12.01	216.88	72.40	144.49	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
341	12.03	217.21	72.59	144.62	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
342	12.05	217.55	72.79	144.76	0.86	0.084	1.38	0.061	1.00	1.00	0.061	No
343	12.07	217.88	72.99	144.89	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
344	12.09	218.21	73.18	145.03	0.85	0.084	1.38	0.061	1.00	1.00	0.061	No
345	12.11	218.54	73.38	145.16	0.85	0.084	1.38	0.061	1.00	1.00	2.000	Yes
346	12.13	218.87	73.58	145.30	0.85	0.084	1.38	0.061	1.00	1.00	2.000	Yes
347	12.15	219.21	73.77	145.44	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
348	12.17	219.55	73.97	145.58	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
349	12.19	219.89	74.16	145.73	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
350	12.21	220.24	74.36	145.88	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
351	12.23	220.59	74.56	146.03	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
352	12.25	220.94	74.75	146.18	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
353	12.27	221.29	74.95	146.34	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
354	12.29	221.64	75.14	146.50	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
355	12.31	222.00	75.34	146.65	0.85	0.083	1.38	0.061	1.00	1.00	2.000	Yes
356	12.33	222.35	75.54	146.81	0.85	0.083	1.38	0.061	1.00	1.00	0.061	No
357	12.35	222.71	75.73	146.98	0.85	0.083	1.38	0.061	1.00	1.00	0.061	No
358	12.37	223.07	75.93	147.14	0.85	0.083	1.38	0.061	1.00	1.00	0.061	No
359	12.39	223.43	76.13	147.30	0.85	0.083	1.38	0.061	1.00	1.00	0.061	No
360	12.41	223.78	76.32	147.46	0.84	0.083	1.38	0.061	1.00	1.00	0.061	No
361	12.43	224.14	76.52	147.62	0.84	0.083	1.38	0.061	1.00	1.00	0.061	No
362	12.45	224.49	76.71	147.77	0.84	0.083	1.38	0.061	1.00	1.00	0.061	No
363	12.47	224.84	76.91	147.93	0.84	0.083	1.38	0.061	1.00	1.00	0.061	No
364	12.49	225.19	77.11	148.08	0.84	0.083	1.38	0.061	1.00	1.00	0.061	No
365	12.51	225.55	77.30	148.25	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
366	12.53	225.91	77.50	148.41	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
367	12.55	226.26	77.70	148.57	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
368	12.57	226.61	77.89	148.72	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
369	12.59	226.96	78.09	148.87	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
370	12.61	227.30	78.28	149.02	0.84	0.083	1.38	0.060	1.00	1.00	0.060	No
371	12.63	227.64	78.48	149.16	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
372	12.65	227.98	78.68	149.30	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
373	12.67	228.32	78.87	149.45	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
374	12.69	228.66	79.07	149.59	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
375	12.71	229.01	79.26	149.75	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
376	12.73	229.36	79.46	149.90	0.84	0.083	1.38	0.060	1.00	1.00	2.000	Yes
377	12.75	229.71	79.66	150.05	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
378	12.77	230.06	79.85	150.21	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
379	12.79	230.41	80.05	150.36	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
380	12.81	230.76	80.25	150.51	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
381	12.83	231.10	80.44	150.66	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
382	12.85	231.45	80.64	150.81	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
383	12.87	231.79	80.83	150.96	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
384	12.89	232.14	81.03	151.11	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	12.91	232.49	81.23	151.26	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
386	12.93	232.84	81.42	151.41	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
387	12.95	233.18	81.62	151.57	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
388	12.97	233.54	81.82	151.72	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
389	12.99	233.89	82.01	151.88	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
390	13.01	234.24	82.21	152.03	0.83	0.083	1.38	0.060	1.00	1.00	2.000	Yes
391	13.03	234.59	82.40	152.18	0.83	0.083	1.38	0.060	1.00	1.00	0.060	No
392	13.05	234.94	82.60	152.34	0.83	0.083	1.38	0.060	1.00	1.00	0.060	No
393	13.07	235.29	82.80	152.49	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
394	13.09	235.64	82.99	152.65	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
395	13.11	235.99	83.19	152.80	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
396	13.13	236.33	83.39	152.95	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
397	13.15	236.68	83.58	153.10	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
398	13.17	237.03	83.78	153.25	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
399	13.19	237.38	83.97	153.41	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
400	13.21	237.73	84.17	153.56	0.82	0.083	1.38	0.060	1.00	1.00	0.060	No
401	13.23	238.08	84.37	153.72	0.82	0.082	1.38	0.060	1.00	1.00	0.060	No
402	13.25	238.43	84.56	153.87	0.82	0.082	1.38	0.060	1.00	1.00	0.060	No
403	13.27	238.78	84.76	154.02	0.82	0.082	1.38	0.060	1.00	1.00	2.000	Yes
404	13.29	239.13	84.95	154.18	0.82	0.082	1.38	0.060	1.00	1.00	2.000	Yes
405	13.31	239.48	85.15	154.33	0.82	0.082	1.38	0.060	1.00	1.00	2.000	Yes
406	13.33	239.84	85.35	154.49	0.82	0.082	1.38	0.060	1.00	1.00	2.000	Yes
407	13.35	240.20	85.54	154.65	0.82	0.082	1.38	0.060	1.00	1.00	2.000	Yes
408	13.37	240.55	85.74	154.81	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
409	13.39	240.91	85.94	154.97	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
410	13.41	241.26	86.13	155.13	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
411	13.43	241.62	86.33	155.29	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
412	13.45	241.98	86.52	155.45	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
413	13.47	242.34	86.72	155.61	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
414	13.49	242.70	86.92	155.78	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
415	13.51	243.06	87.11	155.94	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
416	13.53	243.42	87.31	156.11	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
417	13.55	243.78	87.51	156.27	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
418	13.57	244.13	87.70	156.43	0.81	0.082	1.38	0.060	1.00	1.00	0.060	No
419	13.59	244.49	87.90	156.59	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
420	13.61	244.84	88.09	156.75	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
421	13.63	245.20	88.29	156.91	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
422	13.65	245.56	88.49	157.07	0.81	0.082	1.38	0.060	1.00	1.00	2.000	Yes
423	13.67	245.92	88.68	157.24	0.81	0.082	1.38	0.059	1.00	1.00	2.000	Yes
424	13.69	246.28	88.88	157.40	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
425	13.71	246.63	89.07	157.56	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
426	13.73	246.99	89.27	157.72	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
427	13.75	247.35	89.47	157.89	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
428	13.77	247.72	89.66	158.05	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
429	13.79	248.08	89.86	158.22	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
430	13.81	248.44	90.06	158.39	0.80	0.082	1.38	0.059	1.00	1.00	2.000	Yes
431	13.83	248.80	90.25	158.55	0.80	0.082	1.38	0.059	1.00	1.00	0.059	No
432	13.85	249.16	90.45	158.71	0.80	0.082	1.38	0.059	1.00	1.00	0.059	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
433	13.87	249.51	90.64	158.87	0.80	0.082	1.38	0.059	1.00	1.00	0.059	No
434	13.89	249.87	90.84	159.03	0.80	0.081	1.38	0.059	1.00	1.00	0.059	No
435	13.91	250.22	91.04	159.19	0.80	0.081	1.38	0.059	1.00	1.00	0.059	No
436	13.93	250.58	91.23	159.35	0.80	0.081	1.38	0.059	1.00	1.00	0.059	No
437	13.95	250.94	91.43	159.51	0.80	0.081	1.38	0.059	1.00	1.00	0.059	No
438	13.97	251.30	91.63	159.68	0.80	0.081	1.38	0.059	1.00	1.00	0.059	No
439	13.99	251.66	91.82	159.84	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
440	14.01	252.02	92.02	160.01	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
441	14.03	252.39	92.21	160.17	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
442	14.05	252.75	92.41	160.34	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
443	14.07	253.11	92.61	160.50	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
444	14.09	253.47	92.80	160.67	0.79	0.081	1.38	0.059	1.00	1.00	2.000	Yes
445	14.11	253.83	93.00	160.83	0.79	0.081	1.38	0.059	1.00	1.00	2.000	Yes
446	14.13	254.19	93.20	161.00	0.79	0.081	1.38	0.059	1.00	1.00	2.000	Yes
447	14.15	254.56	93.39	161.17	0.79	0.081	1.38	0.059	1.00	1.00	2.000	Yes
448	14.17	254.92	93.59	161.33	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
449	14.19	255.29	93.78	161.50	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
450	14.21	255.65	93.98	161.67	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
451	14.23	256.02	94.18	161.84	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
452	14.25	256.38	94.37	162.01	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
453	14.27	256.74	94.57	162.17	0.79	0.081	1.38	0.059	1.00	1.00	0.059	No
454	14.29	257.10	94.76	162.34	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
455	14.31	257.46	94.96	162.50	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
456	14.33	257.82	95.16	162.67	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
457	14.35	258.18	95.35	162.83	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
458	14.37	258.54	95.55	163.00	0.78	0.081	1.38	0.059	1.00	1.00	0.059	No
459	14.39	258.91	95.75	163.16	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
460	14.41	259.27	95.94	163.32	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
461	14.43	259.63	96.14	163.49	0.78	0.081	1.38	0.059	1.00	1.00	2.000	Yes
462	14.45	259.99	96.33	163.66	0.78	0.080	1.38	0.058	1.00	1.00	2.000	Yes
463	14.47	260.36	96.53	163.83	0.78	0.080	1.38	0.058	1.00	1.00	2.000	Yes
464	14.49	260.72	96.73	163.99	0.78	0.080	1.38	0.058	1.00	1.00	2.000	Yes
465	14.51	261.09	96.92	164.16	0.78	0.080	1.38	0.058	1.00	1.00	2.000	Yes
466	14.53	261.45	97.12	164.33	0.78	0.080	1.38	0.058	1.00	1.00	0.058	No
467	14.55	261.81	97.32	164.50	0.78	0.080	1.38	0.058	1.00	1.00	0.058	No
468	14.57	262.18	97.51	164.67	0.78	0.080	1.38	0.058	1.00	1.00	0.058	No
469	14.59	262.54	97.71	164.83	0.77	0.080	1.38	0.058	1.00	1.00	0.058	No
470	14.61	262.90	97.90	164.99	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
471	14.63	263.26	98.10	165.16	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
472	14.65	263.62	98.30	165.32	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
473	14.67	263.98	98.49	165.49	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
474	14.69	264.34	98.69	165.66	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
475	14.71	264.70	98.88	165.82	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
476	14.73	265.07	99.08	165.98	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
477	14.75	265.43	99.28	166.15	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
478	14.77	265.79	99.47	166.31	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
479	14.79	266.15	99.67	166.48	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
480	14.81	266.50	99.87	166.64	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
481	14.83	266.86	100.06	166.80	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
482	14.85	267.22	100.26	166.96	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
483	14.87	267.58	100.45	167.13	0.77	0.080	1.38	0.058	1.00	1.00	2.000	Yes
484	14.89	267.94	100.65	167.29	0.76	0.080	1.38	0.058	1.00	1.00	2.000	Yes
485	14.91	268.31	100.85	167.46	0.76	0.080	1.38	0.058	1.00	1.00	2.000	Yes
486	14.93	268.67	101.04	167.63	0.76	0.080	1.38	0.058	1.00	1.00	2.000	Yes
487	14.95	269.04	101.24	167.80	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
488	14.97	269.41	101.44	167.97	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
489	14.99	269.77	101.63	168.14	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
490	15.01	270.13	101.83	168.31	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
491	15.03	270.49	102.02	168.47	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
492	15.05	270.85	102.22	168.63	0.76	0.079	1.38	0.058	1.00	1.00	2.000	Yes
493	15.07	271.21	102.42	168.79	0.76	0.079	1.38	0.058	1.00	1.00	0.058	No
494	15.09	271.57	102.61	168.96	0.76	0.079	1.38	0.058	1.00	1.00	0.058	No
495	15.11	271.93	102.81	169.12	0.76	0.079	1.38	0.058	1.00	1.00	0.058	No
496	15.13	272.29	103.01	169.28	0.76	0.079	1.38	0.057	1.00	1.00	0.057	No
497	15.15	272.64	103.20	169.44	0.76	0.079	1.38	0.057	1.00	1.00	0.057	No
498	15.17	273.00	103.40	169.60	0.76	0.079	1.38	0.057	1.00	1.00	0.057	No
499	15.19	273.35	103.59	169.76	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
500	15.21	273.71	103.79	169.92	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
501	15.23	274.06	103.99	170.07	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
502	15.25	274.41	104.18	170.23	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
503	15.27	274.76	104.38	170.38	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
504	15.29	275.10	104.57	170.53	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
505	15.31	275.45	104.77	170.68	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
506	15.33	275.80	104.97	170.83	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
507	15.35	276.14	105.16	170.98	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
508	15.37	276.49	105.36	171.13	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
509	15.39	276.83	105.56	171.28	0.75	0.079	1.38	0.057	1.00	1.00	0.057	No
510	15.41	277.17	105.75	171.42	0.75	0.079	1.38	0.057	1.00	1.00	2.000	Yes
511	15.43	277.52	105.95	171.57	0.75	0.078	1.38	0.057	1.00	1.00	2.000	Yes
512	15.45	277.86	106.14	171.71	0.75	0.078	1.38	0.057	1.00	1.00	2.000	Yes
513	15.47	278.21	106.34	171.86	0.75	0.078	1.38	0.057	1.00	1.00	2.000	Yes
514	15.49	278.55	106.54	172.02	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
515	15.51	278.90	106.73	172.17	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
516	15.53	279.26	106.93	172.33	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
517	15.55	279.61	107.13	172.49	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
518	15.57	279.97	107.32	172.65	0.74	0.078	1.38	0.057	1.00	1.00	0.057	No
519	15.59	280.33	107.52	172.81	0.74	0.078	1.38	0.057	1.00	1.00	0.057	No
520	15.61	280.68	107.71	172.97	0.74	0.078	1.38	0.057	1.00	1.00	0.057	No
521	15.63	281.04	107.91	173.13	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
522	15.65	281.40	108.11	173.30	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
523	15.67	281.76	108.30	173.46	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
524	15.69	282.12	108.50	173.63	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
525	15.71	282.48	108.69	173.79	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
526	15.73	282.84	108.89	173.95	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
527	15.75	283.20	109.09	174.12	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes
528	15.77	283.56	109.28	174.28	0.74	0.078	1.38	0.057	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
529	15.79	283.91	109.48	174.43	0.73	0.078	1.38	0.056	1.00	1.00	2.000	Yes
530	15.81	284.27	109.68	174.59	0.73	0.078	1.38	0.056	1.00	1.00	2.000	Yes
531	15.83	284.61	109.87	174.74	0.73	0.078	1.38	0.056	1.00	1.00	2.000	Yes
532	15.85	284.96	110.07	174.89	0.73	0.078	1.38	0.056	1.00	1.00	2.000	Yes
533	15.87	285.31	110.26	175.05	0.73	0.078	1.38	0.056	1.00	1.00	2.000	Yes
534	15.89	285.66	110.46	175.20	0.73	0.077	1.38	0.056	1.00	1.00	2.000	Yes
535	15.91	286.01	110.66	175.35	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
536	15.93	286.36	110.85	175.51	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
537	15.95	286.71	111.05	175.66	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
538	15.97	287.06	111.25	175.82	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
539	15.99	287.41	111.44	175.97	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
540	16.01	287.76	111.64	176.12	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
541	16.03	288.10	111.83	176.27	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
542	16.05	288.45	112.03	176.42	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
543	16.07	288.79	112.23	176.57	0.73	0.077	1.38	0.056	1.00	1.00	0.056	No
544	16.09	289.14	112.42	176.72	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
545	16.11	289.48	112.62	176.86	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
546	16.13	289.82	112.82	177.01	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
547	16.15	290.16	113.01	177.15	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
548	16.17	290.50	113.21	177.29	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
549	16.19	290.84	113.40	177.43	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
550	16.21	291.17	113.60	177.57	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
551	16.23	291.51	113.80	177.72	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
552	16.25	291.85	113.99	177.85	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
553	16.27	292.18	114.19	177.99	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
554	16.29	292.52	114.38	178.13	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
555	16.31	292.85	114.58	178.27	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
556	16.33	293.19	114.78	178.41	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
557	16.35	293.52	114.97	178.55	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
558	16.37	293.86	115.17	178.69	0.72	0.077	1.38	0.056	1.00	1.00	0.056	No
559	16.39	294.20	115.37	178.83	0.72	0.076	1.38	0.056	1.00	1.00	0.056	No
560	16.41	294.54	115.56	178.98	0.71	0.076	1.38	0.056	1.00	1.00	0.056	No
561	16.43	294.88	115.76	179.12	0.71	0.076	1.38	0.056	1.00	1.00	0.056	No
562	16.45	295.22	115.95	179.27	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
563	16.47	295.57	116.15	179.41	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
564	16.49	295.91	116.35	179.57	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
565	16.51	296.26	116.54	179.72	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
566	16.53	296.61	116.74	179.87	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
567	16.55	296.96	116.94	180.02	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
568	16.57	297.30	117.13	180.17	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
569	16.59	297.64	117.33	180.31	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
570	16.61	297.97	117.52	180.45	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
571	16.63	298.31	117.72	180.59	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
572	16.65	298.66	117.92	180.74	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
573	16.67	299.00	118.11	180.89	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
574	16.69	299.34	118.31	181.04	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
575	16.71	299.69	118.50	181.18	0.71	0.076	1.38	0.055	1.00	1.00	0.055	No
576	16.73	300.03	118.70	181.33	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
577	16.75	300.37	118.90	181.47	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
578	16.77	300.70	119.09	181.61	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
579	16.79	301.03	119.29	181.74	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
580	16.81	301.36	119.49	181.87	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
581	16.83	301.69	119.68	182.01	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
582	16.85	302.02	119.88	182.14	0.70	0.076	1.38	0.055	1.00	1.00	0.055	No
583	16.87	302.35	120.07	182.28	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
584	16.89	302.68	120.27	182.41	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
585	16.91	303.01	120.47	182.54	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
586	16.93	303.34	120.66	182.67	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
587	16.95	303.67	120.86	182.81	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
588	16.97	303.99	121.06	182.94	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
589	16.99	304.32	121.25	183.07	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
590	17.01	304.65	121.45	183.21	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
591	17.03	304.98	121.64	183.34	0.70	0.075	1.38	0.055	1.00	1.00	0.055	No
592	17.05	305.31	121.84	183.47	0.69	0.075	1.38	0.055	1.00	1.00	0.055	No
593	17.07	305.64	122.04	183.61	0.69	0.075	1.38	0.055	1.00	1.00	0.055	No
594	17.09	305.98	122.23	183.74	0.69	0.075	1.38	0.055	1.00	1.00	0.055	No
595	17.11	306.31	122.43	183.88	0.69	0.075	1.38	0.055	1.00	1.00	0.055	No
596	17.13	306.64	122.63	184.01	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
597	17.15	306.97	122.82	184.15	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
598	17.17	307.30	123.02	184.28	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
599	17.19	307.63	123.21	184.41	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
600	17.21	307.95	123.41	184.54	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
601	17.23	308.28	123.61	184.68	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
602	17.25	308.61	123.80	184.81	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
603	17.27	308.94	124.00	184.94	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
604	17.29	309.27	124.19	185.07	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
605	17.31	309.60	124.39	185.21	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
606	17.33	309.93	124.59	185.34	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
607	17.35	310.26	124.78	185.47	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
608	17.37	310.58	124.98	185.60	0.69	0.075	1.38	0.054	1.00	1.00	0.054	No
609	17.39	310.91	125.18	185.74	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
610	17.41	311.24	125.37	185.87	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
611	17.43	311.57	125.57	186.00	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
612	17.45	311.90	125.76	186.14	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
613	17.47	312.23	125.96	186.27	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
614	17.49	312.56	126.16	186.41	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
615	17.51	312.89	126.35	186.54	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
616	17.53	313.23	126.55	186.68	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
617	17.55	313.56	126.75	186.81	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
618	17.57	313.89	126.94	186.95	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
619	17.59	314.23	127.14	187.09	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
620	17.61	314.57	127.33	187.23	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
621	17.63	314.91	127.53	187.38	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
622	17.65	315.25	127.73	187.52	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
623	17.67	315.58	127.92	187.66	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
624	17.69	315.93	128.12	187.81	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
625	17.71	316.28	128.31	187.96	0.68	0.074	1.38	0.054	1.00	1.00	0.054	No
626	17.73	316.64	128.51	188.13	0.67	0.074	1.38	0.054	1.00	1.00	0.054	No
627	17.75	317.01	128.71	188.30	0.67	0.074	1.38	0.054	1.00	1.00	0.054	No
628	17.77	317.38	128.90	188.48	0.67	0.074	1.38	0.054	1.00	1.00	0.054	No
629	17.79	317.76	129.10	188.66	0.67	0.074	1.38	0.054	1.00	1.00	0.054	No
630	17.81	318.14	129.30	188.85	0.67	0.074	1.38	0.054	1.00	1.00	0.054	No
631	17.83	318.53	129.49	189.04	0.67	0.074	1.38	0.053	1.00	1.00	0.053	No
632	17.85	318.92	129.69	189.23	0.67	0.074	1.38	0.053	1.00	1.00	0.053	No
633	17.87	319.30	129.88	189.42	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
634	17.89	319.69	130.08	189.61	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
635	17.91	320.08	130.28	189.80	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
636	17.93	320.47	130.47	189.99	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
637	17.95	320.86	130.67	190.19	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
638	17.97	321.26	130.87	190.39	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
639	17.99	321.66	131.06	190.60	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
640	18.01	322.06	131.26	190.80	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
641	18.03	322.46	131.45	191.01	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
642	18.05	322.86	131.65	191.21	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
643	18.07	323.26	131.85	191.41	0.67	0.073	1.38	0.053	1.00	1.00	0.053	No
644	18.09	323.66	132.04	191.61	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
645	18.11	324.05	132.24	191.82	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
646	18.13	324.45	132.44	192.02	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
647	18.15	324.85	132.63	192.22	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
648	18.17	325.25	132.83	192.43	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
649	18.19	325.65	133.02	192.63	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
650	18.21	326.05	133.22	192.83	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
651	18.23	326.45	133.42	193.03	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
652	18.25	326.84	133.61	193.23	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
653	18.27	327.24	133.81	193.43	0.66	0.073	1.38	0.053	1.00	1.00	0.053	No
654	18.29	327.64	134.00	193.63	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
655	18.31	328.04	134.20	193.84	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
656	18.33	328.44	134.40	194.04	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
657	18.35	328.84	134.59	194.25	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
658	18.37	329.25	134.79	194.46	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
659	18.39	329.66	134.99	194.67	0.66	0.072	1.38	0.053	1.00	1.00	0.053	No
660	18.41	330.08	135.18	194.89	0.66	0.072	1.38	0.052	1.00	1.00	0.052	No
661	18.43	330.50	135.38	195.12	0.66	0.072	1.38	0.052	1.00	1.00	0.052	No
662	18.45	330.92	135.57	195.35	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
663	18.47	331.35	135.77	195.58	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
664	18.49	331.79	135.97	195.82	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
665	18.51	332.22	136.16	196.05	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
666	18.53	332.65	136.36	196.29	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
667	18.55	333.08	136.56	196.52	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
668	18.57	333.51	136.75	196.76	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No
669	18.59	333.94	136.95	197.00	0.65	0.072	1.38	0.052	1.00	1.00	0.052	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	5.23	0.20	3.52	5.98	1.00	3.73	22.06	82.29	0.178	No	Yes	2.00
2	5.25	0.25	3.47	6.42	1.00	4.57	20.15	92.03	0.218	No	Yes	2.00
3	5.27	0.27	3.43	6.43	1.00	5.00	19.10	95.55	0.239	No	Yes	2.00
4	5.29	0.30	3.39	6.21	1.00	5.59	17.61	98.38	0.267	No	Yes	2.00
5	5.31	0.29	3.37	5.63	1.00	5.40	17.21	92.99	0.258	No	Yes	2.00
6	5.33	0.52	3.00	3.08	1.00	10.04	8.81	88.51	0.479	No	Yes	2.00
7	5.35	1.05	2.62	1.83	0.85	20.47	6.12	125.21	4.000	Yes	No	2.00
8	5.37	1.69	2.38	1.37	0.76	33.12	2.25	74.64	4.000	Yes	No	2.00
9	5.39	2.23	2.25	1.22	0.71	43.77	1.75	76.46	4.000	Yes	No	2.00
10	5.41	2.56	2.18	1.14	0.69	50.17	1.57	78.80	4.000	Yes	No	2.00
11	5.43	2.75	2.16	1.17	0.68	53.97	1.53	82.54	4.000	Yes	No	2.00
12	5.45	2.78	2.19	1.33	0.69	54.56	1.59	87.02	4.000	Yes	No	2.00
13	5.47	2.62	2.28	1.69	0.72	51.27	1.85	94.69	4.000	Yes	No	2.00
14	5.49	2.42	2.37	2.11	0.76	47.34	2.21	104.73	4.000	Yes	No	2.00
15	5.51	2.27	2.44	2.51	0.78	44.41	2.59	114.91	4.000	Yes	No	2.00
16	5.53	2.18	2.48	2.80	0.80	42.75	2.86	122.35	4.000	Yes	No	2.00
17	5.55	2.10	2.53	3.11	0.82	41.13	3.32	136.53	4.000	Yes	No	2.00
18	5.57	1.98	2.57	3.36	0.83	38.75	4.36	168.99	4.000	Yes	No	2.00
19	5.59	1.90	2.59	3.42	0.84	37.21	4.92	183.12	0.651	No	No	2.00
20	5.61	1.88	2.57	3.24	0.84	36.64	4.60	168.42	0.524	No	No	2.00
21	5.63	1.86	2.57	3.11	0.83	36.33	4.31	156.60	0.437	No	No	2.00
22	5.65	1.88	2.55	2.94	0.83	36.74	3.80	139.61	0.333	No	No	2.00
23	5.67	1.94	2.52	2.81	0.82	37.94	3.24	123.06	0.253	No	No	2.00
24	5.69	2.05	2.50	2.79	0.81	40.12	2.83	113.44	0.216	No	No	2.00
25	5.71	2.13	2.50	2.93	0.81	41.53	2.89	120.17	0.241	No	No	2.00
26	5.73	2.15	2.53	3.21	0.82	41.92	3.40	142.58	0.350	No	No	2.00
27	5.75	2.05	2.59	3.71	0.84	40.01	4.96	198.55	0.808	No	No	2.00
28	5.77	2.03	2.62	4.05	0.85	39.63	6.00	237.85	3.600	No	No	2.00
29	5.79	2.02	2.64	4.30	0.86	39.39	6.81	268.11	3.600	No	No	2.00
30	5.81	2.04	2.63	4.29	0.86	39.86	6.63	264.31	3.600	No	No	2.00
31	5.83	2.00	2.64	4.37	0.86	39.01	7.18	279.99	3.600	No	No	2.00
32	5.85	1.97	2.64	4.25	0.86	38.50	6.98	268.57	3.600	No	No	2.00
33	5.87	1.93	2.64	4.16	0.86	37.64	7.01	263.73	3.600	No	No	2.00
34	5.89	1.86	2.65	4.06	0.86	36.17	7.22	261.15	3.600	No	No	2.00
35	5.91	1.77	2.67	4.23	0.87	34.40	8.62	296.42	3.600	No	No	2.00
36	5.93	1.77	2.67	4.22	0.87	34.44	8.58	295.38	3.600	No	No	2.00
37	5.95	1.85	2.65	4.16	0.87	35.93	7.67	275.61	3.600	No	No	2.00
38	5.97	1.99	2.61	3.93	0.85	38.77	5.91	228.93	3.600	No	No	2.00
39	5.99	2.10	2.58	3.76	0.84	40.98	4.85	198.61	0.809	No	No	2.00
40	6.01	2.18	2.56	3.64	0.83	42.56	4.22	179.41	0.617	No	No	2.00
41	6.03	2.23	2.54	3.51	0.83	43.47	3.75	162.80	0.481	No	No	2.00
42	6.05	2.33	2.52	3.45	0.82	45.42	3.31	150.19	0.395	No	No	2.00
43	6.07	2.35	2.52	3.46	0.82	45.82	3.28	150.23	0.395	No	No	2.00
44	6.09	2.29	2.55	3.66	0.83	44.64	3.86	172.20	0.555	No	No	2.00
45	6.11	2.14	2.60	3.98	0.85	41.57	5.26	218.83	4.000	No	No	2.00
46	6.13	2.01	2.64	4.32	0.86	39.08	6.99	273.14	3.600	No	No	2.00
47	6.15	1.90	2.68	4.69	0.88	36.89	9.17	338.25	3.600	No	No	2.00
48	6.17	1.80	2.71	4.92	0.89	34.97	4.85	169.77	1.668	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	6.19	1.70	2.75	5.16	0.90	33.02	5.21	172.15	1.575	No	Yes	2.00
50	6.21	1.64	2.77	5.35	0.91	31.67	5.49	173.99	1.511	No	Yes	2.00
51	6.23	1.57	2.79	5.55	0.92	30.42	5.78	175.74	1.451	No	Yes	2.00
52	6.25	1.50	2.82	5.75	0.93	29.04	6.09	176.97	1.385	No	Yes	2.00
53	6.27	1.40	2.85	5.99	0.95	27.04	6.55	177.11	1.290	No	Yes	2.00
54	6.29	1.31	2.89	6.30	0.96	25.30	7.05	178.41	1.207	No	Yes	2.00
55	6.31	1.24	2.93	6.70	0.97	23.92	7.59	181.49	1.141	No	Yes	2.00
56	6.33	1.17	2.97	7.22	0.99	22.46	8.25	185.35	1.072	No	Yes	2.00
57	6.35	1.13	2.99	7.55	1.00	21.59	8.68	187.36	1.030	No	Yes	2.00
58	6.37	1.12	3.00	7.66	1.00	21.43	8.79	188.42	1.022	No	Yes	2.00
59	6.39	1.13	3.00	7.80	1.00	21.59	8.85	191.04	1.030	No	Yes	2.00
60	6.41	1.09	3.02	8.02	1.00	20.84	9.19	191.42	0.994	No	Yes	2.00
61	6.43	1.03	3.05	8.14	1.00	19.59	9.61	188.22	0.935	No	Yes	2.00
62	6.45	0.99	3.04	7.75	1.00	18.85	9.56	180.11	0.899	No	Yes	2.00
63	6.47	1.00	3.02	7.13	1.00	18.98	9.07	172.23	0.905	No	Yes	2.00
64	6.49	1.03	2.98	6.42	0.99	19.55	8.39	164.00	4.000	Yes	Yes	2.00
65	6.51	1.09	2.91	5.42	0.97	20.89	7.28	152.16	4.000	Yes	Yes	2.00
66	6.53	1.24	2.80	4.30	0.93	23.65	5.83	137.92	4.000	Yes	Yes	2.00
67	6.55	1.47	2.67	3.31	0.87	28.20	8.22	231.71	4.000	Yes	No	2.00
68	6.57	1.81	2.52	2.57	0.82	34.96	3.27	114.33	4.000	Yes	No	2.00
69	6.59	2.08	2.44	2.27	0.79	40.40	2.60	104.91	4.000	Yes	No	2.00
70	6.61	2.25	2.41	2.25	0.78	43.61	2.45	106.65	4.000	Yes	No	2.00
71	6.63	2.22	2.46	2.60	0.80	43.12	2.71	116.75	4.000	Yes	No	2.00
72	6.65	2.12	2.52	3.08	0.82	41.12	3.27	134.32	4.000	Yes	No	2.00
73	6.67	2.04	2.57	3.47	0.84	39.40	4.51	177.53	4.000	Yes	No	2.00
74	6.69	1.81	2.67	4.27	0.88	35.03	8.49	297.39	4.000	Yes	No	2.00
75	6.71	1.59	2.78	5.32	0.92	30.54	5.60	171.11	4.000	Yes	Yes	2.00
76	6.73	1.34	2.90	6.58	0.96	25.65	7.18	184.23	4.000	Yes	Yes	2.00
77	6.75	1.28	2.91	6.55	0.97	24.54	7.36	180.75	1.171	No	Yes	2.00
78	6.77	1.34	2.86	5.83	0.95	25.71	6.65	170.98	1.226	No	Yes	2.00
79	6.79	1.35	2.85	5.61	0.95	25.80	6.48	167.23	1.230	No	Yes	2.00
80	6.81	1.30	2.87	5.70	0.95	24.82	6.71	166.65	1.184	No	Yes	2.00
81	6.83	1.18	2.91	5.92	0.97	22.42	7.33	164.43	1.069	No	Yes	2.00
82	6.85	1.11	2.92	5.72	0.97	21.08	7.48	157.65	4.000	Yes	Yes	2.00
83	6.87	1.10	2.90	5.22	0.96	20.83	7.14	148.63	4.000	Yes	Yes	2.00
84	6.89	1.30	2.76	4.02	0.91	24.79	5.41	134.20	4.000	Yes	Yes	2.00
85	6.91	2.64	2.31	1.87	0.74	51.20	1.96	100.16	4.000	Yes	No	2.00
86	6.93	4.69	1.96	1.09	0.61	91.71	1.28	117.25	4.000	Yes	No	2.00
87	6.95	7.72	1.69	0.74	0.50	151.54	1.00	151.54	0.404	No	No	2.00
88	6.97	10.30	1.53	0.58	0.44	199.97	1.00	199.97	0.824	No	No	2.00
89	6.99	12.56	1.42	0.47	0.40	228.50	1.00	228.50	4.000	No	No	2.00
90	7.01	14.22	1.35	0.38	0.37	246.57	1.00	246.57	4.000	No	No	2.00
91	7.03	15.52	1.31	0.36	0.36	262.16	1.00	262.16	4.000	No	No	2.00
92	7.05	16.71	1.28	0.35	0.35	277.73	1.00	277.73	4.000	No	No	2.00
93	7.07	17.67	1.27	0.35	0.34	290.44	1.00	290.44	4.000	No	No	2.00
94	7.09	18.65	1.25	0.36	0.34	303.37	1.00	303.37	4.000	No	No	2.00
95	7.11	19.61	1.24	0.36	0.33	316.56	1.00	316.56	4.000	No	No	2.00
96	7.13	20.67	1.24	0.37	0.33	331.69	1.00	331.69	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	7.15	21.55	1.24	0.39	0.33	344.99	1.00	344.99	4.000	No	No	2.00
98	7.17	22.23	1.24	0.41	0.33	355.69	1.00	355.69	4.000	No	No	2.00
99	7.19	22.45	1.26	0.44	0.34	361.69	1.00	361.69	4.000	No	No	2.00
100	7.21	22.55	1.27	0.46	0.34	364.62	1.00	364.62	4.000	No	No	2.00
101	7.23	22.52	1.28	0.49	0.35	366.23	1.00	366.23	4.000	No	No	2.00
102	7.25	21.28	1.34	0.57	0.37	355.82	1.00	355.82	4.000	No	No	2.00
103	7.27	21.05	1.35	0.57	0.37	352.02	1.00	352.02	4.000	No	No	2.00
104	7.29	20.93	1.34	0.56	0.37	348.53	1.00	348.53	4.000	No	No	2.00
105	7.31	22.09	1.28	0.47	0.35	355.48	1.00	355.48	4.000	No	No	2.00
106	7.33	22.14	1.29	0.48	0.35	356.31	1.00	356.31	4.000	No	No	2.00
107	7.35	21.80	1.30	0.50	0.36	352.20	1.00	352.20	4.000	No	No	2.00
108	7.37	21.20	1.32	0.52	0.37	345.04	1.00	345.04	4.000	No	No	2.00
109	7.39	20.43	1.34	0.54	0.37	334.90	1.00	334.90	4.000	No	No	2.00
110	7.41	19.71	1.36	0.56	0.38	325.50	1.00	325.50	4.000	No	No	2.00
111	7.43	18.90	1.38	0.58	0.39	314.92	1.00	314.92	4.000	No	No	2.00
112	7.45	17.99	1.41	0.60	0.40	302.50	1.00	302.50	4.000	No	No	2.00
113	7.47	16.29	1.45	0.64	0.42	279.56	1.00	279.56	4.000	No	No	2.00
114	7.49	14.18	1.52	0.72	0.44	250.93	1.00	250.93	4.000	No	No	2.00
115	7.51	11.67	1.61	0.85	0.48	216.37	1.00	216.37	4.000	No	No	2.00
116	7.53	9.54	1.72	1.04	0.52	185.80	1.04	192.71	4.000	Yes	No	2.00
117	7.55	7.59	1.87	1.33	0.58	148.75	1.21	180.62	4.000	Yes	No	2.00
118	7.57	6.06	2.02	1.76	0.63	118.54	1.33	157.41	4.000	Yes	No	2.00
119	7.59	4.78	2.19	2.40	0.70	93.26	1.60	149.01	4.000	Yes	No	2.00
120	7.61	3.95	2.34	3.16	0.75	76.92	2.08	159.79	4.000	Yes	No	2.00
121	7.63	3.40	2.45	3.89	0.80	65.97	2.65	175.07	4.000	Yes	No	2.00
122	7.65	3.16	2.50	4.28	0.82	61.19	2.85	174.25	4.000	Yes	No	2.00
123	7.67	2.90	2.56	4.72	0.84	56.09	4.15	232.84	4.000	Yes	No	2.00
124	7.69	2.63	2.62	5.27	0.86	50.74	6.31	320.40	4.000	Yes	No	2.00
125	7.71	2.42	2.68	5.76	0.88	46.66	8.82	411.52	4.000	Yes	No	2.00
126	7.73	2.29	2.70	5.87	0.89	44.10	10.15	447.50	4.000	Yes	No	2.00
127	7.75	2.21	2.70	5.59	0.89	42.47	9.88	419.84	3.600	No	No	2.00
128	7.77	2.15	2.66	4.81	0.88	41.33	7.72	319.24	3.600	No	No	2.00
129	7.79	2.10	2.61	4.02	0.86	40.24	5.73	230.71	3.600	No	No	2.00
130	7.81	2.05	2.56	3.34	0.84	39.22	4.21	165.00	0.498	No	No	2.00
131	7.83	2.02	2.54	3.00	0.83	38.59	3.56	137.25	0.320	No	No	2.00
132	7.85	2.00	2.51	2.76	0.82	38.27	3.08	117.95	0.233	No	No	2.00
133	7.87	1.98	2.50	2.61	0.82	37.92	2.81	106.72	0.193	No	No	2.00
134	7.89	1.93	2.51	2.61	0.82	36.85	3.00	110.61	0.206	No	No	2.00
135	7.91	1.84	2.54	2.73	0.83	35.11	3.63	127.32	0.272	No	No	2.00
136	7.93	1.80	2.56	2.87	0.84	34.36	4.19	144.10	0.358	No	No	2.00
137	7.95	1.80	2.57	3.00	0.85	34.26	4.56	156.16	0.434	No	No	2.00
138	7.97	1.79	2.59	3.11	0.85	34.12	4.94	168.61	0.526	No	No	2.00
139	7.99	1.75	2.61	3.25	0.86	33.29	5.62	187.11	0.620	No	No	2.00
140	8.01	1.69	2.63	3.41	0.87	32.14	6.62	212.86	3.600	No	No	2.00
141	8.03	1.68	2.64	3.48	0.87	31.79	7.02	223.28	3.600	No	No	2.00
142	8.05	1.68	2.64	3.47	0.87	31.94	6.92	220.92	3.600	No	No	2.00
143	8.07	1.66	2.65	3.50	0.87	31.45	7.28	229.08	3.600	No	No	2.00
144	8.09	1.56	2.68	3.69	0.89	29.54	9.07	267.93	3.600	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	8.11	1.42	2.74	3.99	0.91	26.64	5.12	136.39	1.271	No	Yes	2.00
146	8.13	1.31	2.78	4.24	0.93	24.48	5.64	138.02	1.168	No	Yes	2.00
147	8.15	1.26	2.80	4.34	0.93	23.56	5.88	138.52	4.000	Yes	Yes	2.00
148	8.17	1.45	2.71	3.73	0.90	27.25	4.82	131.46	4.000	Yes	Yes	2.00
149	8.19	2.05	2.49	2.61	0.82	39.06	2.92	114.06	4.000	Yes	No	2.00
150	8.21	2.74	2.31	1.97	0.75	52.78	1.98	104.25	4.000	Yes	No	2.00
151	8.23	3.21	2.23	1.76	0.71	62.07	1.69	104.64	4.000	Yes	No	2.00
152	8.25	3.19	2.26	1.93	0.73	61.56	1.77	109.15	4.000	Yes	No	2.00
153	8.27	2.92	2.33	2.22	0.75	56.35	2.03	114.25	4.000	Yes	No	2.00
154	8.29	2.53	2.43	2.70	0.79	48.52	2.54	123.31	4.000	Yes	No	2.00
155	8.31	2.10	2.55	3.24	0.84	40.11	3.79	152.10	4.000	Yes	No	2.00
156	8.33	1.68	2.69	4.15	0.89	31.76	9.76	309.82	4.000	Yes	No	2.00
157	8.35	1.35	2.85	5.44	0.95	25.23	6.45	162.84	4.000	Yes	Yes	2.00
158	8.37	1.10	3.00	7.23	1.00	20.35	8.77	178.48	4.000	Yes	Yes	2.00
159	8.39	0.98	3.09	8.57	1.00	17.96	10.41	186.96	0.857	No	Yes	2.00
160	8.41	0.92	3.14	9.33	1.00	16.66	11.39	189.85	0.795	No	Yes	2.00
161	8.43	0.88	3.16	9.47	1.00	15.86	11.81	187.37	0.757	No	Yes	2.00
162	8.45	0.82	3.19	9.61	1.00	14.73	12.41	182.86	0.703	No	Yes	2.00
163	8.47	0.69	3.24	9.43	1.00	12.22	13.66	166.83	0.583	No	Yes	2.00
164	8.49	0.67	3.21	8.06	1.00	11.73	12.89	151.18	0.559	No	Yes	2.00
165	8.51	0.68	3.14	6.41	1.00	11.91	11.36	135.27	0.568	No	Yes	2.00
166	8.53	0.80	3.02	5.22	1.00	14.32	9.09	130.26	0.683	No	Yes	2.00
167	8.55	0.89	2.93	4.33	0.98	16.06	7.62	122.38	0.766	No	Yes	2.00
168	8.57	1.05	2.80	3.36	0.93	19.30	5.81	112.19	0.921	No	Yes	2.00
169	8.59	1.22	2.70	2.82	0.89	22.64	9.90	224.15	3.600	No	No	2.00
170	8.61	1.35	2.64	2.65	0.87	25.18	7.09	178.56	0.549	No	No	2.00
171	8.63	1.39	2.65	2.82	0.88	25.92	7.38	191.41	0.659	No	No	2.00
172	8.65	1.39	2.67	3.01	0.88	25.95	8.26	214.40	3.600	No	No	2.00
173	8.67	1.38	2.68	3.16	0.89	25.75	9.13	235.26	3.600	No	No	2.00
174	8.69	1.39	2.68	3.21	0.89	25.98	9.24	239.98	3.600	No	No	2.00
175	8.71	1.42	2.67	3.18	0.89	26.58	8.67	230.31	3.600	No	No	2.00
176	8.73	1.47	2.66	3.11	0.88	27.43	7.79	213.69	3.600	No	No	2.00
177	8.75	1.50	2.64	3.01	0.87	28.06	7.00	196.39	0.706	No	No	2.00
178	8.77	1.51	2.63	2.89	0.87	28.23	6.46	182.48	0.581	No	No	2.00
179	8.79	1.50	2.61	2.74	0.86	28.04	5.94	166.66	0.459	No	No	2.00
180	8.81	1.49	2.59	2.53	0.86	27.88	5.22	145.50	0.366	No	No	2.00
181	8.83	1.49	2.57	2.34	0.85	27.85	4.58	127.44	0.272	No	No	2.00
182	8.85	1.49	2.56	2.20	0.84	27.83	4.13	114.97	0.221	No	No	2.00
183	8.87	1.48	2.56	2.19	0.84	27.55	4.17	114.91	0.221	No	No	2.00
184	8.89	1.45	2.57	2.21	0.85	27.08	4.41	119.42	0.238	No	No	2.00
185	8.91	1.42	2.58	2.26	0.85	26.50	4.82	127.82	0.274	No	No	2.00
186	8.93	1.40	2.59	2.29	0.86	26.05	5.12	133.35	0.301	No	No	2.00
187	8.95	1.39	2.60	2.31	0.86	25.77	5.31	136.72	0.318	No	No	2.00
188	8.97	1.38	2.60	2.29	0.86	25.64	5.32	136.38	0.316	No	No	2.00
189	8.99	1.39	2.59	2.25	0.86	25.84	5.05	130.57	0.287	No	No	2.00
190	9.01	1.41	2.57	2.17	0.85	26.28	4.58	120.27	0.242	No	No	2.00
191	9.03	1.44	2.56	2.08	0.84	26.83	4.08	109.41	0.202	No	No	2.00
192	9.05	1.46	2.54	2.01	0.84	27.11	3.74	101.34	0.177	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	9.07	1.46	2.54	1.97	0.84	27.16	3.59	97.53	0.166	No	No	2.00
194	9.09	1.46	2.53	1.94	0.83	27.13	3.52	95.39	0.161	No	No	2.00
195	9.11	1.45	2.54	1.96	0.84	27.06	3.61	97.72	0.167	No	No	2.00
196	9.13	1.44	2.55	2.03	0.84	26.85	3.88	104.10	0.185	No	No	2.00
197	9.15	1.43	2.56	2.11	0.85	26.59	4.25	113.04	0.214	No	No	2.00
198	9.17	1.43	2.57	2.19	0.85	26.62	4.50	119.78	0.240	No	No	2.00
199	9.19	1.46	2.57	2.24	0.85	27.14	4.49	121.76	0.248	No	No	2.00
200	9.21	1.50	2.57	2.27	0.85	27.94	4.31	120.50	0.243	No	No	2.00
201	9.23	1.53	2.56	2.29	0.85	28.55	4.16	118.75	0.236	No	No	2.00
202	9.25	1.55	2.55	2.27	0.84	28.82	4.04	116.29	0.226	No	No	2.00
203	9.27	1.54	2.56	2.33	0.85	28.77	4.23	121.82	0.248	No	No	2.00
204	9.29	1.54	2.57	2.40	0.85	28.69	4.49	128.84	0.279	No	No	2.00
205	9.31	1.54	2.58	2.47	0.85	28.75	4.68	134.56	0.307	No	No	2.00
206	9.33	1.54	2.58	2.47	0.85	28.75	4.71	135.29	0.310	No	No	2.00
207	9.35	1.54	2.58	2.50	0.85	28.57	4.85	138.54	0.327	No	No	2.00
208	9.37	1.52	2.59	2.52	0.86	28.22	5.07	143.14	0.353	No	No	2.00
209	9.39	1.51	2.59	2.50	0.86	28.13	5.04	141.70	0.345	No	No	2.00
210	9.41	1.52	2.58	2.43	0.85	28.32	4.71	133.52	0.301	No	No	2.00
211	9.43	1.55	2.56	2.34	0.85	28.81	4.24	122.13	0.249	No	No	2.00
212	9.45	1.60	2.54	2.23	0.84	29.78	3.61	107.57	0.196	No	No	2.00
213	9.47	1.66	2.51	2.13	0.83	30.92	3.06	94.58	0.159	No	No	2.00
214	9.49	1.71	2.49	2.07	0.82	31.98	2.93	93.86	0.157	No	No	2.00
215	9.51	1.75	2.48	2.03	0.82	32.66	2.85	93.24	0.155	No	No	2.00
216	9.53	1.77	2.47	2.00	0.81	33.14	2.80	92.70	0.154	No	No	2.00
217	9.55	1.79	2.46	1.96	0.81	33.45	2.74	91.79	0.152	No	No	2.00
218	9.57	1.78	2.47	1.96	0.81	33.28	2.76	91.75	0.152	No	No	2.00
219	9.59	1.75	2.48	2.00	0.81	32.79	2.82	92.58	4.000	Yes	No	2.00
220	9.61	1.71	2.50	2.09	0.82	31.91	2.96	94.58	4.000	Yes	No	2.00
221	9.63	1.66	2.53	2.25	0.83	30.95	3.37	104.29	4.000	Yes	No	2.00
222	9.65	1.60	2.56	2.45	0.85	29.76	4.29	127.56	4.000	Yes	No	2.00
223	9.67	1.54	2.60	2.67	0.86	28.54	5.47	156.16	4.000	Yes	No	2.00
224	9.69	1.55	2.60	2.66	0.86	28.68	5.38	154.16	0.421	No	No	2.00
225	9.71	1.54	2.60	2.65	0.86	28.63	5.36	153.52	0.416	No	No	2.00
226	9.73	1.53	2.60	2.61	0.86	28.28	5.38	152.10	0.407	No	No	2.00
227	9.75	1.44	2.64	2.75	0.88	26.52	6.77	179.55	0.556	No	No	2.00
228	9.77	1.37	2.66	2.84	0.89	25.13	8.00	200.96	3.600	No	No	2.00
229	9.79	1.31	2.68	2.89	0.89	24.03	9.05	217.47	3.600	No	No	2.00
230	9.81	1.27	2.69	2.89	0.90	23.21	9.74	226.11	3.600	No	No	2.00
231	9.83	1.24	2.70	2.85	0.90	22.53	10.17	229.12	3.600	No	No	2.00
232	9.85	1.21	2.70	2.81	0.90	22.04	4.74	104.47	1.051	No	Yes	2.00
233	9.87	1.18	2.72	2.83	0.91	21.41	4.87	104.28	1.021	No	Yes	2.00
234	9.89	1.14	2.74	2.92	0.92	20.54	5.11	105.02	0.980	No	Yes	2.00
235	9.91	1.09	2.76	3.04	0.93	19.59	5.43	106.33	0.934	No	Yes	2.00
236	9.93	1.02	2.80	3.17	0.94	18.30	5.85	107.00	0.873	No	Yes	2.00
237	9.95	0.95	2.84	3.31	0.95	16.89	6.35	107.23	0.806	No	Yes	2.00
238	9.97	0.83	2.92	3.74	0.99	14.54	7.54	109.58	0.693	No	Yes	2.00
239	9.99	0.72	3.03	4.45	1.00	12.21	9.27	113.19	0.582	No	Yes	2.00
240	10.01	0.61	3.15	5.41	1.00	10.05	11.57	116.32	0.480	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	10.03	0.61	3.13	5.18	1.00	10.10	11.29	114.09	0.482	No	Yes	2.00
242	10.05	0.70	3.02	4.09	1.00	11.79	9.09	107.21	0.562	No	Yes	2.00
243	10.07	0.81	2.89	3.11	0.97	14.08	6.99	98.42	0.671	No	Yes	2.00
244	10.09	0.88	2.82	2.72	0.95	15.43	6.08	93.82	0.736	No	Yes	2.00
245	10.11	0.90	2.81	2.65	0.94	15.69	5.93	93.00	0.748	No	Yes	2.00
246	10.13	0.92	2.79	2.58	0.94	16.11	5.72	92.20	0.768	No	Yes	2.00
247	10.15	0.95	2.76	2.40	0.92	16.84	5.32	89.68	0.803	No	Yes	2.00
248	10.17	1.00	2.72	2.22	0.91	17.74	4.90	86.84	0.846	No	Yes	2.00
249	10.19	1.02	2.72	2.29	0.91	18.13	4.89	88.68	0.865	No	Yes	2.00
250	10.21	1.02	2.75	2.56	0.92	18.17	5.21	94.63	0.867	No	Yes	2.00
251	10.23	1.01	2.79	2.94	0.94	17.87	5.70	101.84	0.852	No	Yes	2.00
252	10.25	1.01	2.80	3.06	0.94	17.86	5.83	104.15	0.852	No	Yes	2.00
253	10.27	1.01	2.79	3.00	0.94	17.99	5.74	103.21	0.858	No	Yes	2.00
254	10.29	1.03	2.77	2.84	0.93	18.26	5.50	100.44	0.871	No	Yes	2.00
255	10.31	1.04	2.76	2.76	0.93	18.35	5.39	98.89	0.875	No	Yes	2.00
256	10.33	1.07	2.74	2.64	0.92	18.70	5.18	96.94	0.892	No	Yes	2.00
257	10.35	1.11	2.71	2.44	0.91	19.32	4.84	93.41	0.921	No	Yes	2.00
258	10.37	1.18	2.68	2.28	0.89	20.37	8.72	177.66	0.541	No	No	2.00
259	10.39	1.23	2.65	2.18	0.88	21.24	7.41	157.32	0.398	No	No	2.00
260	10.41	1.26	2.65	2.29	0.89	21.73	7.64	165.96	0.455	No	No	2.00
261	10.43	1.25	2.69	2.60	0.90	21.58	9.57	206.54	3.600	No	No	2.00
262	10.45	1.22	2.73	2.94	0.91	21.31	5.00	106.44	1.016	No	Yes	2.00
263	10.47	1.21	2.75	3.22	0.92	21.12	5.31	112.06	1.008	No	Yes	2.00
264	10.49	1.20	2.78	3.46	0.93	20.96	5.57	116.70	1.000	No	Yes	2.00
265	10.51	1.19	2.81	3.83	0.94	20.84	5.94	123.80	0.994	No	Yes	2.00
266	10.53	1.18	2.83	4.17	0.95	20.80	6.25	130.03	0.992	No	Yes	2.00
267	10.55	1.20	2.84	4.39	0.96	21.11	6.39	134.80	1.007	No	Yes	2.00
268	10.57	1.23	2.83	4.33	0.95	21.62	6.23	134.73	1.031	No	Yes	2.00
269	10.59	1.26	2.82	4.25	0.95	22.12	6.07	134.18	1.055	No	Yes	2.00
270	10.61	1.26	2.82	4.33	0.95	22.01	6.15	135.36	1.050	No	Yes	2.00
271	10.63	1.25	2.84	4.54	0.96	21.78	6.37	138.78	1.039	No	Yes	2.00
272	10.65	1.23	2.85	4.62	0.96	21.50	6.50	139.78	1.026	No	Yes	2.00
273	10.67	1.24	2.84	4.43	0.96	21.56	6.33	136.47	1.028	No	Yes	2.00
274	10.69	1.25	2.83	4.34	0.95	21.53	6.25	134.65	1.027	No	Yes	2.00
275	10.71	1.30	2.81	4.17	0.95	22.32	5.96	133.02	1.065	No	Yes	2.00
276	10.73	1.38	2.77	3.89	0.93	23.59	5.49	129.64	1.125	No	Yes	2.00
277	10.75	1.39	2.76	3.70	0.93	23.56	5.33	125.48	1.124	No	Yes	2.00
278	10.77	1.29	2.79	3.77	0.94	21.76	5.71	124.22	1.038	No	Yes	2.00
279	10.79	1.12	2.84	3.82	0.96	18.84	6.36	119.87	0.899	No	Yes	2.00
280	10.81	1.01	2.88	3.80	0.97	16.89	6.85	115.73	0.805	No	Yes	2.00
281	10.83	0.94	2.91	3.87	0.98	15.66	7.29	114.20	0.747	No	Yes	2.00
282	10.85	0.90	2.95	4.33	1.00	14.99	7.99	119.78	0.715	No	Yes	2.00
283	10.87	0.88	2.99	4.77	1.00	14.55	8.58	124.82	0.694	No	Yes	2.00
284	10.89	0.88	3.01	5.14	1.00	14.58	8.92	130.01	0.695	No	Yes	2.00
285	10.91	0.89	3.01	5.24	1.00	14.66	8.97	131.61	0.699	No	Yes	2.00
286	10.93	0.94	2.98	4.98	1.00	15.54	8.41	130.74	0.741	No	Yes	2.00
287	10.95	0.98	2.94	4.49	0.99	16.21	7.73	125.38	0.773	No	Yes	2.00
288	10.97	0.99	2.93	4.40	0.99	16.32	7.61	124.20	0.779	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	10.99	0.96	2.95	4.64	1.00	15.79	8.01	126.50	0.753	No	Yes	2.00
290	11.01	0.91	3.00	5.11	1.00	14.84	8.79	130.51	0.708	No	Yes	2.00
291	11.03	0.88	3.03	5.40	1.00	14.25	9.30	132.46	0.680	No	Yes	2.00
292	11.05	0.84	3.07	5.70	1.00	13.39	9.94	133.18	0.639	No	Yes	2.00
293	11.07	0.80	3.09	5.69	1.00	12.57	10.34	129.95	0.600	No	Yes	2.00
294	11.09	0.75	3.11	5.74	1.00	11.74	10.83	127.14	0.560	No	Yes	2.00
295	11.11	0.71	3.14	5.82	1.00	11.01	11.34	124.91	0.525	No	Yes	2.00
296	11.13	0.68	3.17	6.16	1.00	10.39	12.10	125.68	0.495	No	Yes	2.00
297	11.15	0.67	3.19	6.34	1.00	10.06	12.51	125.80	0.480	No	Yes	2.00
298	11.17	0.66	3.19	6.15	1.00	9.88	12.46	123.14	0.471	No	Yes	2.00
299	11.19	0.63	3.20	6.09	1.00	9.38	12.80	120.03	0.447	No	Yes	2.00
300	11.21	0.58	3.25	6.42	1.00	8.48	13.95	118.25	0.404	No	Yes	2.00
301	11.23	0.53	3.32	6.98	1.00	7.45	15.66	116.70	0.356	No	Yes	2.00
302	11.25	0.50	3.34	7.03	1.00	6.96	16.36	113.84	0.332	No	Yes	2.00
303	11.27	0.50	3.32	6.43	1.00	6.85	15.85	108.56	0.327	No	Yes	2.00
304	11.29	0.50	3.30	5.88	1.00	6.90	15.16	104.53	0.329	No	Yes	2.00
305	11.31	0.52	3.26	5.24	1.00	7.14	14.08	100.53	0.341	No	Yes	2.00
306	11.33	0.53	3.23	4.89	1.00	7.37	13.38	98.58	0.352	No	Yes	2.00
307	11.35	0.55	3.19	4.42	1.00	7.61	12.53	95.27	0.363	No	Yes	2.00
308	11.37	0.56	3.17	4.18	1.00	7.77	12.04	93.59	0.371	No	Yes	2.00
309	11.39	0.58	3.13	3.81	1.00	8.07	11.27	91.00	0.385	No	Yes	2.00
310	11.41	0.60	3.09	3.53	1.00	8.56	10.47	89.58	0.408	No	Yes	2.00
311	11.43	0.63	3.05	3.29	1.00	9.08	9.74	88.46	0.433	No	Yes	2.00
312	11.45	0.66	3.03	3.20	1.00	9.43	9.38	88.44	0.450	No	Yes	2.00
313	11.47	0.66	3.04	3.27	1.00	9.43	9.47	89.25	0.450	No	Yes	2.00
314	11.49	0.64	3.06	3.35	1.00	9.13	9.78	89.33	0.436	No	Yes	2.00
315	11.51	0.63	3.07	3.36	1.00	8.85	10.01	88.58	0.422	No	Yes	2.00
316	11.53	0.62	3.06	3.23	1.00	8.74	9.91	86.59	0.417	No	Yes	2.00
317	11.55	0.63	3.05	3.06	1.00	8.85	9.59	84.85	0.422	No	Yes	2.00
318	11.57	0.64	3.04	3.00	1.00	8.92	9.45	84.24	0.425	No	Yes	2.00
319	11.59	0.64	3.04	2.99	1.00	8.97	9.40	84.34	0.428	No	Yes	2.00
320	11.61	0.64	3.04	3.00	1.00	8.98	9.41	84.49	0.428	No	Yes	2.00
321	11.63	0.65	3.02	2.92	1.00	9.17	9.15	83.97	0.438	No	Yes	2.00
322	11.65	0.68	2.99	2.76	1.00	9.64	8.61	83.04	0.460	No	Yes	2.00
323	11.67	0.72	2.95	2.62	1.00	10.32	8.01	82.69	0.492	No	Yes	2.00
324	11.69	0.75	2.94	2.63	1.00	10.67	7.83	83.54	0.509	No	Yes	2.00
325	11.71	0.75	2.96	2.80	1.00	10.69	8.07	86.21	0.510	No	Yes	2.00
326	11.73	0.74	2.96	2.79	1.00	10.52	8.13	85.58	0.502	No	Yes	2.00
327	11.75	0.76	2.93	2.62	1.00	10.87	7.71	83.80	0.519	No	Yes	2.00
328	11.77	0.82	2.88	2.34	0.98	11.71	6.91	80.96	0.559	No	Yes	2.00
329	11.79	0.89	2.84	2.27	0.96	12.79	6.38	81.60	0.610	No	Yes	2.00
330	11.81	0.95	2.82	2.28	0.95	13.62	6.09	83.03	0.650	No	Yes	2.00
331	11.83	0.99	2.81	2.30	0.95	14.19	5.93	84.13	0.677	No	Yes	2.00
332	11.85	1.01	2.80	2.33	0.95	14.48	5.88	85.12	0.691	No	Yes	2.00
333	11.87	1.02	2.81	2.41	0.95	14.57	5.96	86.87	0.695	No	Yes	2.00
334	11.89	1.00	2.82	2.50	0.96	14.29	6.16	88.04	0.682	No	Yes	2.00
335	11.91	0.96	2.85	2.59	0.96	13.76	6.45	88.81	0.657	No	Yes	2.00
336	11.93	0.93	2.87	2.67	0.97	13.20	6.77	89.30	0.630	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	11.95	0.90	2.89	2.83	0.98	12.84	7.11	91.23	0.612	No	Yes	2.00
338	11.97	0.90	2.91	2.97	0.99	12.70	7.34	93.21	0.606	No	Yes	2.00
339	11.99	0.90	2.91	2.96	0.99	12.80	7.29	93.39	0.611	No	Yes	2.00
340	12.01	0.93	2.89	2.85	0.98	13.12	7.02	92.16	0.626	No	Yes	2.00
341	12.03	0.97	2.86	2.69	0.97	13.68	6.62	90.51	0.653	No	Yes	2.00
342	12.05	1.00	2.84	2.63	0.96	14.06	6.41	90.10	0.671	No	Yes	2.00
343	12.07	1.02	2.84	2.62	0.96	14.31	6.31	90.21	0.682	No	Yes	2.00
344	12.09	1.00	2.85	2.75	0.97	14.10	6.54	92.26	0.672	No	Yes	2.00
345	12.11	1.00	2.84	2.64	0.96	14.02	6.43	90.10	4.000	Yes	Yes	2.00
346	12.13	1.12	2.76	2.20	0.93	15.69	5.36	84.17	4.000	Yes	Yes	2.00
347	12.15	1.41	2.62	1.72	0.88	19.64	6.07	119.25	4.000	Yes	No	2.00
348	12.17	2.07	2.42	1.30	0.80	28.56	2.45	70.11	4.000	Yes	No	2.00
349	12.19	2.54	2.33	1.22	0.77	34.87	2.04	71.04	4.000	Yes	No	2.00
350	12.21	2.78	2.30	1.22	0.76	38.09	1.91	72.74	4.000	Yes	No	2.00
351	12.23	2.55	2.36	1.39	0.78	35.15	2.17	76.11	4.000	Yes	No	2.00
352	12.25	2.30	2.44	1.70	0.81	31.95	2.61	83.38	4.000	Yes	No	2.00
353	12.27	2.03	2.55	2.22	0.85	28.44	3.98	113.09	4.000	Yes	No	2.00
354	12.29	1.84	2.65	2.80	0.89	25.98	7.29	189.37	4.000	Yes	No	2.00
355	12.31	1.76	2.69	3.10	0.91	24.97	9.44	235.72	4.000	Yes	No	2.00
356	12.33	1.88	2.67	3.10	0.90	26.62	8.24	219.35	3.600	No	No	2.00
357	12.35	2.08	2.62	2.99	0.88	29.25	6.34	185.34	0.605	No	No	2.00
358	12.37	2.21	2.60	2.94	0.87	31.01	5.46	169.26	0.478	No	No	2.00
359	12.39	2.07	2.62	2.97	0.88	29.09	6.33	184.27	0.596	No	No	2.00
360	12.41	1.84	2.67	3.03	0.90	25.70	8.52	218.98	3.600	No	No	2.00
361	12.43	1.63	2.72	3.07	0.92	22.68	4.89	110.89	1.082	No	Yes	2.00
362	12.45	1.60	2.72	2.98	0.92	22.12	4.89	108.25	1.055	No	Yes	2.00
363	12.47	1.66	2.70	2.96	0.91	22.95	4.74	108.86	1.095	No	Yes	2.00
364	12.49	1.83	2.67	2.90	0.90	25.29	8.20	207.42	3.600	No	No	2.00
365	12.51	2.04	2.62	2.84	0.88	28.23	6.27	176.94	0.536	No	No	2.00
366	12.53	2.10	2.62	2.88	0.88	28.94	6.07	175.69	0.526	No	No	2.00
367	12.55	1.93	2.66	2.98	0.89	26.59	7.71	205.01	3.600	No	No	2.00
368	12.57	1.61	2.73	3.10	0.92	22.09	5.02	110.85	1.054	No	Yes	2.00
369	12.59	1.36	2.79	3.07	0.94	18.42	5.71	105.22	0.879	No	Yes	2.00
370	12.61	1.22	2.82	2.97	0.96	16.33	6.12	99.91	0.779	No	Yes	2.00
371	12.63	1.20	2.82	2.87	0.96	16.06	6.08	97.64	4.000	Yes	Yes	2.00
372	12.65	1.28	2.77	2.60	0.94	17.05	5.51	94.01	4.000	Yes	Yes	2.00
373	12.67	1.48	2.68	2.17	0.90	19.70	8.74	172.17	4.000	Yes	No	2.00
374	12.69	1.85	2.55	1.80	0.85	24.49	3.94	96.59	4.000	Yes	No	2.00
375	12.71	2.27	2.45	1.59	0.82	29.98	2.65	79.32	4.000	Yes	No	2.00
376	12.73	2.61	2.39	1.51	0.79	34.42	2.30	79.31	4.000	Yes	No	2.00
377	12.75	2.67	2.38	1.52	0.79	35.17	2.28	80.08	4.000	Yes	No	2.00
378	12.77	2.51	2.42	1.62	0.80	33.02	2.47	81.62	4.000	Yes	No	2.00
379	12.79	2.18	2.51	1.94	0.84	28.78	3.05	87.85	4.000	Yes	No	2.00
380	12.81	1.83	2.60	2.17	0.87	24.22	5.49	132.96	4.000	Yes	No	2.00
381	12.83	1.70	2.63	2.16	0.89	22.29	6.56	146.15	4.000	Yes	No	2.00
382	12.85	2.06	2.48	1.54	0.83	26.78	2.85	76.31	4.000	Yes	No	2.00
383	12.87	2.63	2.34	1.25	0.78	34.02	2.10	71.53	4.000	Yes	No	2.00
384	12.89	2.99	2.28	1.17	0.75	38.44	1.87	71.75	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	12.91	2.83	2.32	1.25	0.77	36.35	2.00	72.63	4.000	Yes	No	2.00
386	12.93	2.47	2.39	1.38	0.79	31.85	2.33	74.21	4.000	Yes	No	2.00
387	12.95	2.20	2.48	1.70	0.83	28.53	2.86	81.49	4.000	Yes	No	2.00
388	12.97	2.02	2.57	2.16	0.86	26.26	4.54	119.08	4.000	Yes	No	2.00
389	12.99	1.81	2.67	2.72	0.90	23.59	8.53	201.25	4.000	Yes	No	2.00
390	13.01	1.66	2.72	2.99	0.92	21.70	4.97	107.92	4.000	Yes	Yes	2.00
391	13.03	1.60	2.74	3.02	0.93	20.86	5.16	107.59	0.995	No	Yes	2.00
392	13.05	1.66	2.72	2.89	0.92	21.54	4.91	105.73	1.027	No	Yes	2.00
393	13.07	1.70	2.70	2.79	0.91	22.03	4.72	104.08	1.051	No	Yes	2.00
394	13.09	1.68	2.70	2.72	0.91	21.69	4.71	102.21	1.035	No	Yes	2.00
395	13.11	1.69	2.67	2.44	0.90	21.71	8.49	184.27	0.596	No	No	2.00
396	13.13	1.79	2.62	2.14	0.88	22.85	6.12	139.75	0.300	No	No	2.00
397	13.15	1.97	2.57	1.97	0.86	25.12	4.32	108.53	0.199	No	No	2.00
398	13.17	2.13	2.54	1.99	0.85	27.10	3.69	99.94	0.173	No	No	2.00
399	13.19	2.13	2.56	2.12	0.86	27.14	4.10	111.18	0.208	No	No	2.00
400	13.21	2.03	2.59	2.25	0.87	25.81	5.07	130.90	0.289	No	No	2.00
401	13.23	1.86	2.63	2.36	0.89	23.54	6.73	158.52	0.405	No	No	2.00
402	13.25	1.81	2.65	2.40	0.89	22.89	7.37	168.80	0.475	No	No	2.00
403	13.27	1.85	2.64	2.37	0.89	23.41	6.89	161.35	4.000	Yes	No	2.00
404	13.29	1.95	2.62	2.34	0.88	24.60	6.03	148.38	4.000	Yes	No	2.00
405	13.31	2.06	2.60	2.33	0.87	25.96	5.30	137.54	4.000	Yes	No	2.00
406	13.33	2.47	2.50	2.08	0.84	31.13	2.88	89.77	4.000	Yes	No	2.00
407	13.35	3.06	2.37	1.60	0.79	38.18	2.20	84.01	4.000	Yes	No	2.00
408	13.37	3.57	2.26	1.32	0.75	44.20	1.80	79.55	4.000	Yes	No	2.00
409	13.39	3.63	2.22	1.13	0.73	44.70	1.67	74.62	4.000	Yes	No	2.00
410	13.41	3.37	2.28	1.29	0.75	41.61	1.85	76.95	4.000	Yes	No	2.00
411	13.43	3.02	2.36	1.53	0.78	37.44	2.18	81.57	4.000	Yes	No	2.00
412	13.45	2.72	2.46	1.96	0.82	33.93	2.72	92.16	4.000	Yes	No	2.00
413	13.47	2.55	2.53	2.35	0.85	31.91	3.40	108.39	4.000	Yes	No	2.00
414	13.49	2.42	2.59	2.72	0.87	30.25	4.97	150.47	4.000	Yes	No	2.00
415	13.51	2.21	2.65	3.04	0.89	27.70	7.35	203.52	4.000	Yes	No	2.00
416	13.53	2.02	2.70	3.28	0.91	25.26	10.17	257.01	4.000	Yes	No	2.00
417	13.55	1.88	2.73	3.39	0.93	23.39	5.08	118.90	4.000	Yes	Yes	2.00
418	13.57	1.85	2.74	3.36	0.93	22.86	5.14	117.38	1.090	No	Yes	2.00
419	13.59	1.84	2.72	3.15	0.92	22.68	4.97	112.75	4.000	Yes	Yes	2.00
420	13.61	1.92	2.68	2.84	0.91	23.59	9.14	215.58	4.000	Yes	No	2.00
421	13.63	2.28	2.58	2.41	0.87	27.93	4.78	133.40	4.000	Yes	No	2.00
422	13.65	2.71	2.49	2.17	0.84	33.18	2.94	97.67	4.000	Yes	No	2.00
423	13.67	2.94	2.44	1.94	0.81	35.92	2.58	92.72	4.000	Yes	No	2.00
424	13.69	2.85	2.44	1.91	0.82	34.73	2.62	91.05	4.000	Yes	No	2.00
425	13.71	2.65	2.48	1.98	0.83	32.14	2.85	91.55	4.000	Yes	No	2.00
426	13.73	2.50	2.55	2.36	0.86	30.51	3.78	115.46	4.000	Yes	No	2.00
427	13.75	2.30	2.63	2.93	0.89	28.05	6.70	188.06	4.000	Yes	No	2.00
428	13.77	2.08	2.72	3.60	0.92	25.41	4.96	125.99	4.000	Yes	Yes	2.00
429	13.79	1.87	2.80	4.12	0.95	22.82	5.82	132.78	4.000	Yes	Yes	2.00
430	13.81	1.76	2.82	4.19	0.96	21.37	6.16	131.63	4.000	Yes	Yes	2.00
431	13.83	1.70	2.82	4.01	0.96	20.53	6.16	126.54	0.979	No	Yes	2.00
432	13.85	1.69	2.81	3.70	0.96	20.29	5.93	120.26	0.968	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	13.87	1.75	2.76	3.30	0.94	20.93	5.42	113.42	0.998	No	Yes	2.00
434	13.89	2.03	2.67	2.77	0.90	24.30	8.26	200.66	3.600	No	No	2.00
435	13.91	2.35	2.58	2.41	0.87	28.08	4.74	132.99	0.299	No	No	2.00
436	13.93	2.61	2.52	2.20	0.85	31.18	3.19	99.52	0.172	No	No	2.00
437	13.95	2.69	2.50	2.14	0.84	32.09	2.84	90.99	0.150	No	No	2.00
438	13.97	2.77	2.49	2.12	0.84	32.95	2.91	95.94	0.162	No	No	2.00
439	13.99	2.88	2.48	2.11	0.83	34.24	2.81	96.40	0.163	No	No	2.00
440	14.01	2.95	2.47	2.08	0.83	34.95	2.75	96.20	0.163	No	No	2.00
441	14.03	2.93	2.47	2.10	0.83	34.71	2.78	96.38	0.163	No	No	2.00
442	14.05	2.83	2.49	2.15	0.84	33.44	2.90	97.13	0.165	No	No	2.00
443	14.07	2.66	2.53	2.33	0.85	31.44	3.47	109.13	0.201	No	No	2.00
444	14.09	2.54	2.57	2.52	0.87	29.98	4.42	132.62	4.000	Yes	No	2.00
445	14.11	2.71	2.53	2.39	0.85	31.90	3.51	111.93	4.000	Yes	No	2.00
446	14.13	2.93	2.49	2.26	0.84	34.41	2.93	100.90	4.000	Yes	No	2.00
447	14.15	3.04	2.47	2.15	0.83	35.66	2.76	98.46	4.000	Yes	No	2.00
448	14.17	2.91	2.51	2.35	0.84	34.11	2.94	100.21	0.174	No	No	2.00
449	14.19	2.84	2.54	2.55	0.85	33.35	3.59	119.82	0.240	No	No	2.00
450	14.21	2.86	2.54	2.64	0.86	33.50	3.78	126.63	0.269	No	No	2.00
451	14.23	2.70	2.58	2.80	0.87	31.60	4.79	151.28	0.402	No	No	2.00
452	14.25	2.43	2.63	2.94	0.89	28.29	6.60	186.78	0.617	No	No	2.00
453	14.27	2.22	2.68	3.15	0.91	25.76	9.08	233.87	3.600	No	No	2.00
454	14.29	2.24	2.67	3.02	0.91	25.83	8.40	217.09	3.600	No	No	2.00
455	14.31	2.30	2.65	2.93	0.90	26.49	7.55	199.92	0.741	No	No	2.00
456	14.33	2.25	2.66	2.96	0.90	25.86	8.11	209.60	3.600	No	No	2.00
457	14.35	2.14	2.70	3.13	0.92	24.49	9.97	244.24	3.600	No	No	2.00
458	14.37	2.08	2.71	3.21	0.92	23.73	4.86	115.28	1.132	No	Yes	2.00
459	14.39	2.11	2.71	3.19	0.92	24.15	4.78	115.33	4.000	Yes	Yes	2.00
460	14.41	2.28	2.66	2.95	0.90	26.03	7.93	206.31	4.000	Yes	No	2.00
461	14.43	2.50	2.60	2.69	0.88	28.61	5.53	158.27	4.000	Yes	No	2.00
462	14.45	2.80	2.54	2.45	0.86	32.02	3.63	116.33	4.000	Yes	No	2.00
463	14.47	3.12	2.48	2.23	0.83	35.61	2.83	100.71	4.000	Yes	No	2.00
464	14.49	3.28	2.44	2.09	0.82	37.37	2.62	97.94	4.000	Yes	No	2.00
465	14.51	3.36	2.42	2.00	0.81	38.22	2.50	95.73	4.000	Yes	No	2.00
466	14.53	3.38	2.41	1.92	0.81	38.32	2.44	93.48	0.156	No	No	2.00
467	14.55	3.50	2.39	1.82	0.80	39.53	2.31	91.31	0.151	No	No	2.00
468	14.57	3.59	2.37	1.73	0.79	40.49	2.20	89.23	0.146	No	No	2.00
469	14.59	3.48	2.36	1.64	0.79	39.18	2.19	85.61	0.138	No	No	2.00
470	14.61	3.35	2.36	1.56	0.79	37.48	2.20	82.40	4.000	Yes	No	2.00
471	14.63	2.95	2.46	1.93	0.83	33.07	2.74	90.71	4.000	Yes	No	2.00
472	14.65	2.63	2.58	2.56	0.87	29.46	4.73	139.24	4.000	Yes	No	2.00
473	14.67	2.21	2.72	3.44	0.93	24.66	4.93	121.52	4.000	Yes	Yes	2.00
474	14.69	2.06	2.75	3.52	0.94	22.83	5.29	120.69	4.000	Yes	Yes	2.00
475	14.71	2.08	2.73	3.27	0.93	23.02	5.02	115.65	4.000	Yes	Yes	2.00
476	14.73	2.34	2.65	2.82	0.90	25.85	7.45	192.56	4.000	Yes	No	2.00
477	14.75	2.67	2.56	2.42	0.87	29.65	4.23	125.33	4.000	Yes	No	2.00
478	14.77	2.96	2.49	2.06	0.84	32.72	2.88	94.19	4.000	Yes	No	2.00
479	14.79	2.94	2.46	1.89	0.83	32.49	2.74	89.15	4.000	Yes	No	2.00
480	14.81	2.79	2.49	1.91	0.84	30.61	2.90	88.73	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	14.83	2.56	2.55	2.19	0.86	28.12	3.98	111.97	4.000	Yes	No	2.00
482	14.85	2.47	2.60	2.51	0.88	27.08	5.49	148.57	4.000	Yes	No	2.00
483	14.87	2.32	2.66	2.89	0.91	25.38	8.09	205.25	4.000	Yes	No	2.00
484	14.89	2.18	2.72	3.21	0.93	23.70	4.87	115.39	4.000	Yes	Yes	2.00
485	14.91	2.45	2.64	2.88	0.90	26.76	7.17	191.75	4.000	Yes	No	2.00
486	14.93	2.98	2.53	2.40	0.85	32.61	3.38	110.34	4.000	Yes	No	2.00
487	14.95	3.53	2.44	2.15	0.82	38.79	2.59	100.47	4.000	Yes	No	2.00
488	14.97	3.59	2.43	2.09	0.82	39.29	2.52	99.19	4.000	Yes	No	2.00
489	14.99	3.31	2.46	2.12	0.83	36.11	2.71	97.85	4.000	Yes	No	2.00
490	15.01	2.86	2.51	2.10	0.85	30.94	2.99	92.59	4.000	Yes	No	2.00
491	15.03	2.31	2.64	2.54	0.90	24.82	6.80	168.72	4.000	Yes	No	2.00
492	15.05	2.06	2.72	2.95	0.93	21.91	4.91	107.51	4.000	Yes	Yes	2.00
493	15.07	2.07	2.74	3.17	0.93	22.01	5.10	112.23	1.050	No	Yes	2.00
494	15.09	2.24	2.68	2.89	0.91	23.94	9.12	218.38	3.600	No	No	2.00
495	15.11	2.21	2.69	2.90	0.92	23.56	9.53	224.59	3.600	No	No	2.00
496	15.13	2.13	2.70	2.88	0.92	22.60	4.72	106.60	1.078	No	Yes	2.00
497	15.15	2.15	2.69	2.74	0.92	22.70	9.36	212.35	3.600	No	No	2.00
498	15.17	2.16	2.67	2.58	0.91	22.76	8.44	192.09	0.665	No	No	2.00
499	15.19	2.04	2.70	2.66	0.92	21.41	10.07	215.69	3.600	No	No	2.00
500	15.21	1.87	2.75	2.88	0.94	19.48	5.28	102.88	0.929	No	Yes	2.00
501	15.23	1.63	2.84	3.30	0.97	16.70	6.39	106.71	0.797	No	Yes	2.00
502	15.25	1.44	2.91	3.56	1.00	14.58	7.33	106.79	0.695	No	Yes	2.00
503	15.27	1.27	2.98	3.82	1.00	12.51	8.44	105.63	0.597	No	Yes	2.00
504	15.29	1.33	2.92	3.30	1.00	13.29	7.51	99.79	0.634	No	Yes	2.00
505	15.31	1.52	2.83	2.84	0.97	15.34	6.26	95.99	0.732	No	Yes	2.00
506	15.33	1.72	2.75	2.46	0.94	17.49	5.24	91.71	0.834	No	Yes	2.00
507	15.35	1.73	2.74	2.44	0.94	17.65	5.19	91.52	0.842	No	Yes	2.00
508	15.37	1.56	2.81	2.64	0.96	15.67	5.92	92.79	0.748	No	Yes	2.00
509	15.39	1.34	2.90	2.98	1.00	13.24	7.15	94.60	0.632	No	Yes	2.00
510	15.41	1.24	2.94	3.05	1.00	12.02	7.75	93.08	4.000	Yes	Yes	2.00
511	15.43	1.36	2.86	2.58	0.98	13.31	6.61	87.98	4.000	Yes	Yes	2.00
512	15.45	1.70	2.72	2.11	0.93	17.12	4.89	83.74	4.000	Yes	Yes	2.00
513	15.47	2.15	2.58	1.73	0.88	21.97	4.74	104.04	4.000	Yes	No	2.00
514	15.49	2.38	2.53	1.68	0.86	24.48	3.49	85.56	4.000	Yes	No	2.00
515	15.51	2.51	2.51	1.64	0.85	25.83	2.98	77.10	4.000	Yes	No	2.00
516	15.53	2.77	2.45	1.53	0.83	28.62	2.68	76.83	4.000	Yes	No	2.00
517	15.55	3.14	2.40	1.45	0.81	32.56	2.35	76.47	4.000	Yes	No	2.00
518	15.57	3.31	2.38	1.45	0.80	34.33	2.26	77.56	0.123	No	No	2.00
519	15.59	3.26	2.40	1.54	0.81	33.76	2.36	79.77	0.127	No	No	2.00
520	15.61	3.28	2.40	1.59	0.81	33.92	2.40	81.29	0.130	No	No	2.00
521	15.63	3.29	2.42	1.70	0.82	34.01	2.49	84.57	4.000	Yes	No	2.00
522	15.65	3.07	2.48	1.90	0.84	31.66	2.81	89.10	4.000	Yes	No	2.00
523	15.67	2.64	2.58	2.31	0.88	27.00	4.81	129.76	4.000	Yes	No	2.00
524	15.69	2.24	2.70	2.88	0.92	22.62	4.72	106.78	4.000	Yes	Yes	2.00
525	15.71	1.94	2.82	3.68	0.97	19.37	6.11	118.37	4.000	Yes	Yes	2.00
526	15.73	1.80	2.87	3.97	0.99	17.83	6.77	120.67	4.000	Yes	Yes	2.00
527	15.75	1.93	2.80	3.34	0.96	19.26	5.80	111.74	4.000	Yes	Yes	2.00
528	15.77	2.15	2.69	2.62	0.92	21.55	9.74	209.82	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
529	15.79	2.57	2.54	1.90	0.86	25.94	3.78	97.97	4.000	Yes	No	2.00
530	15.81	2.65	2.49	1.61	0.84	26.72	2.93	78.26	4.000	Yes	No	2.00
531	15.83	2.59	2.48	1.45	0.84	25.97	2.83	73.40	4.000	Yes	No	2.00
532	15.85	2.18	2.59	1.74	0.88	21.57	5.02	108.22	4.000	Yes	No	2.00
533	15.87	1.98	2.67	2.07	0.91	19.44	8.34	162.13	4.000	Yes	No	2.00
534	15.89	1.97	2.69	2.26	0.92	19.27	9.75	187.99	4.000	Yes	No	2.00
535	15.91	2.00	2.70	2.35	0.92	19.62	9.98	195.78	0.700	No	No	2.00
536	15.93	1.87	2.75	2.63	0.94	18.16	5.28	95.96	0.866	No	Yes	2.00
537	15.95	1.60	2.86	3.15	0.98	15.30	6.63	101.40	0.730	No	Yes	2.00
538	15.97	1.40	2.95	3.60	1.00	13.15	7.92	104.06	0.627	No	Yes	2.00
539	15.99	1.30	3.00	3.83	1.00	11.98	8.70	104.25	0.571	No	Yes	2.00
540	16.01	1.30	2.99	3.75	1.00	11.99	8.61	103.22	0.572	No	Yes	2.00
541	16.03	1.33	2.97	3.55	1.00	12.22	8.26	100.93	0.583	No	Yes	2.00
542	16.05	1.40	2.92	3.21	1.00	12.96	7.53	97.66	0.618	No	Yes	2.00
543	16.07	1.50	2.85	2.72	0.98	14.09	6.51	91.65	0.672	No	Yes	2.00
544	16.09	1.50	2.84	2.57	0.98	14.00	6.35	88.86	0.668	No	Yes	2.00
545	16.11	1.40	2.88	2.68	0.99	12.90	6.90	88.96	0.615	No	Yes	2.00
546	16.13	1.25	2.95	2.95	1.00	11.27	7.96	89.71	0.537	No	Yes	2.00
547	16.15	1.18	2.99	3.11	1.00	10.50	8.59	90.20	0.501	No	Yes	2.00
548	16.17	1.15	3.00	3.10	1.00	10.20	8.74	89.23	0.487	No	Yes	2.00
549	16.19	1.13	3.01	3.19	1.00	9.97	9.00	89.79	0.476	No	Yes	2.00
550	16.21	1.12	3.01	3.12	1.00	9.82	9.01	88.49	0.469	No	Yes	2.00
551	16.23	1.12	3.00	2.96	1.00	9.79	8.80	86.18	0.467	No	Yes	2.00
552	16.25	1.12	2.99	2.81	1.00	9.77	8.60	84.03	0.466	No	Yes	2.00
553	16.27	1.13	2.98	2.70	1.00	9.82	8.41	82.59	0.469	No	Yes	2.00
554	16.29	1.14	2.97	2.67	1.00	9.92	8.31	82.45	0.473	No	Yes	2.00
555	16.31	1.16	2.96	2.62	1.00	10.19	8.08	82.29	0.486	No	Yes	2.00
556	16.33	1.20	2.95	2.62	1.00	10.53	7.90	83.11	0.502	No	Yes	2.00
557	16.35	1.22	2.94	2.62	1.00	10.77	7.76	83.54	0.514	No	Yes	2.00
558	16.37	1.25	2.93	2.63	1.00	10.99	7.66	84.19	0.524	No	Yes	2.00
559	16.39	1.28	2.92	2.59	1.00	11.34	7.44	84.42	0.541	No	Yes	2.00
560	16.41	1.33	2.90	2.59	1.00	11.82	7.22	85.35	0.564	No	Yes	2.00
561	16.43	1.37	2.89	2.62	1.00	12.22	7.09	86.61	0.583	No	Yes	2.00
562	16.45	1.48	2.85	2.50	0.98	13.34	6.48	86.45	0.636	No	Yes	2.00
563	16.47	1.65	2.79	2.31	0.96	15.06	5.68	85.55	0.718	No	Yes	2.00
564	16.49	1.84	2.73	2.20	0.94	17.02	5.03	85.61	0.812	No	Yes	2.00
565	16.51	1.94	2.72	2.29	0.93	18.11	4.90	88.76	0.864	No	Yes	2.00
566	16.53	1.92	2.73	2.38	0.94	17.85	5.06	90.40	0.852	No	Yes	2.00
567	16.55	1.72	2.79	2.53	0.96	15.70	5.78	90.68	0.749	No	Yes	2.00
568	16.57	1.48	2.85	2.48	0.98	13.19	6.51	85.87	0.629	No	Yes	2.00
569	16.59	1.26	2.93	2.58	1.00	10.89	7.64	83.20	0.520	No	Yes	2.00
570	16.61	1.16	2.98	2.74	1.00	9.90	8.42	83.31	0.472	No	Yes	2.00
571	16.63	1.08	3.08	3.57	1.00	9.02	10.17	91.74	0.430	No	Yes	2.00
572	16.65	1.02	3.16	4.51	1.00	8.34	11.92	99.49	0.398	No	Yes	2.00
573	16.67	0.97	3.23	5.32	1.00	7.83	13.40	104.95	0.374	No	Yes	2.00
574	16.69	0.94	3.26	5.52	1.00	7.46	14.04	104.70	0.356	No	Yes	2.00
575	16.71	0.92	3.26	5.48	1.00	7.29	14.19	103.41	0.348	No	Yes	2.00
576	16.73	0.92	3.23	4.95	1.00	7.31	13.52	98.85	0.349	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
577	16.75	0.93	3.20	4.28	1.00	7.34	12.63	92.75	0.350	No	Yes	2.00
578	16.77	0.93	3.15	3.54	1.00	7.33	11.61	85.08	0.350	No	Yes	2.00
579	16.79	0.92	3.13	3.18	1.00	7.27	11.14	80.94	0.347	No	Yes	2.00
580	16.81	0.93	3.11	3.02	1.00	7.30	10.85	79.21	0.348	No	Yes	2.00
581	16.83	0.93	3.11	3.01	1.00	7.32	10.82	79.24	0.349	No	Yes	2.00
582	16.85	0.93	3.11	3.00	1.00	7.29	10.83	78.96	0.348	No	Yes	2.00
583	16.87	0.92	3.12	3.04	1.00	7.22	10.96	79.11	0.344	No	Yes	2.00
584	16.89	0.91	3.13	3.07	1.00	7.08	11.15	78.95	0.338	No	Yes	2.00
585	16.91	0.92	3.12	3.02	1.00	7.13	11.02	78.58	0.340	No	Yes	2.00
586	16.93	0.94	3.10	2.88	1.00	7.30	10.63	77.62	0.348	No	Yes	2.00
587	16.95	0.96	3.08	2.75	1.00	7.54	10.20	76.90	0.360	No	Yes	2.00
588	16.97	0.97	3.07	2.70	1.00	7.62	10.03	76.48	0.364	No	Yes	2.00
589	16.99	0.95	3.09	2.81	1.00	7.42	10.39	77.12	0.354	No	Yes	2.00
590	17.01	0.94	3.10	2.90	1.00	7.33	10.63	77.95	0.350	No	Yes	2.00
591	17.03	0.94	3.11	2.99	1.00	7.29	10.82	78.91	0.348	No	Yes	2.00
592	17.05	0.96	3.10	3.00	1.00	7.43	10.71	79.50	0.354	No	Yes	2.00
593	17.07	0.97	3.10	2.99	1.00	7.54	10.57	79.68	0.360	No	Yes	2.00
594	17.09	0.97	3.09	2.97	1.00	7.58	10.51	79.69	0.362	No	Yes	2.00
595	17.11	0.99	3.08	2.89	1.00	7.75	10.22	79.22	0.370	No	Yes	2.00
596	17.13	1.01	3.07	2.79	1.00	7.88	9.95	78.48	0.376	No	Yes	2.00
597	17.15	1.02	3.05	2.67	1.00	7.99	9.67	77.28	0.381	No	Yes	2.00
598	17.17	1.02	3.04	2.55	1.00	8.01	9.45	75.74	0.382	No	Yes	2.00
599	17.19	1.04	3.02	2.41	1.00	8.15	9.11	74.25	0.389	No	Yes	2.00
600	17.21	1.07	3.00	2.29	1.00	8.41	8.71	73.23	0.401	No	Yes	2.00
601	17.23	1.08	2.99	2.26	1.00	8.52	8.58	73.09	0.406	No	Yes	2.00
602	17.25	1.07	3.00	2.30	1.00	8.41	8.73	73.43	0.401	No	Yes	2.00
603	17.27	1.05	3.01	2.38	1.00	8.25	8.98	74.10	0.394	No	Yes	2.00
604	17.29	1.06	3.01	2.38	1.00	8.31	8.94	74.26	0.396	No	Yes	2.00
605	17.31	1.07	3.00	2.35	1.00	8.42	8.80	74.06	0.402	No	Yes	2.00
606	17.33	1.08	3.00	2.30	1.00	8.45	8.70	73.53	0.403	No	Yes	2.00
607	17.35	1.08	2.99	2.27	1.00	8.46	8.65	73.15	0.403	No	Yes	2.00
608	17.37	1.10	2.98	2.24	1.00	8.60	8.48	72.96	0.410	No	Yes	2.00
609	17.39	1.12	2.97	2.19	1.00	8.81	8.25	72.68	0.420	No	Yes	2.00
610	17.41	1.14	2.95	2.13	1.00	8.98	8.04	72.16	0.428	No	Yes	2.00
611	17.43	1.15	2.94	2.09	1.00	9.13	7.87	71.85	0.435	No	Yes	2.00
612	17.45	1.18	2.93	2.05	1.00	9.35	7.67	71.71	0.446	No	Yes	2.00
613	17.47	1.23	2.90	1.99	1.00	9.88	7.26	71.75	0.471	No	Yes	2.00
614	17.49	1.29	2.87	1.90	1.00	10.43	6.83	71.24	0.498	No	Yes	2.00
615	17.51	1.34	2.85	1.85	0.99	10.86	6.53	70.90	0.518	No	Yes	2.00
616	17.53	1.34	2.86	1.90	0.99	10.89	6.60	71.89	0.520	No	Yes	2.00
617	17.55	1.32	2.89	2.08	1.00	10.66	7.00	74.68	0.509	No	Yes	2.00
618	17.57	1.28	2.93	2.33	1.00	10.25	7.61	78.02	0.489	No	Yes	2.00
619	17.59	1.22	2.98	2.63	1.00	9.67	8.40	81.26	0.461	No	Yes	2.00
620	17.61	1.18	3.02	2.92	1.00	9.19	9.14	84.01	0.438	No	Yes	2.00
621	17.63	1.16	3.05	3.14	1.00	9.00	9.59	86.23	0.429	No	Yes	2.00
622	17.65	1.19	3.03	3.08	1.00	9.31	9.28	86.42	0.444	No	Yes	2.00
623	17.67	1.30	2.96	2.76	1.00	10.36	8.19	84.77	0.494	No	Yes	2.00
624	17.69	2.35	2.54	1.32	0.87	20.57	3.66	75.23	0.120	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
625	17.71	7.63	1.79	0.36	0.58	72.10	1.00	72.10	0.115	No	No	2.00
626	17.73	14.13	1.46	0.24	0.46	135.74	1.00	135.74	0.313	No	No	2.00
627	17.75	19.99	1.30	0.21	0.40	193.07	1.00	193.07	0.749	No	No	2.00
628	17.77	21.46	1.31	0.25	0.40	207.31	1.00	207.31	4.000	No	No	2.00
629	17.79	22.52	1.31	0.27	0.40	217.50	1.00	217.50	4.000	No	No	2.00
630	17.81	23.03	1.33	0.32	0.41	222.23	1.00	222.23	4.000	No	No	2.00
631	17.83	24.20	1.34	0.34	0.41	233.41	1.00	233.41	4.000	No	No	2.00
632	17.85	24.57	1.35	0.37	0.42	236.87	1.00	236.87	4.000	No	No	2.00
633	17.87	25.04	1.33	0.35	0.41	241.30	1.00	241.30	4.000	No	No	2.00
634	17.89	24.41	1.34	0.36	0.41	234.93	1.00	234.93	4.000	No	No	2.00
635	17.91	23.39	1.37	0.37	0.42	224.72	1.00	224.72	4.000	No	No	2.00
636	17.93	21.92	1.44	0.45	0.45	210.10	1.00	210.10	4.000	No	No	2.00
637	17.95	20.63	1.52	0.56	0.48	197.12	1.00	197.12	0.792	No	No	2.00
638	17.97	19.93	1.63	0.77	0.52	189.90	1.00	189.90	0.717	No	No	2.00
639	17.99	20.16	1.66	0.87	0.53	191.76	1.00	191.76	0.736	No	No	2.00
640	18.01	21.35	1.64	0.86	0.53	203.06	1.00	203.06	4.000	No	No	2.00
641	18.03	22.40	1.58	0.75	0.50	213.18	1.00	213.18	4.000	No	No	2.00
642	18.05	23.27	1.53	0.67	0.49	221.59	1.00	221.59	4.000	No	No	2.00
643	18.07	23.65	1.51	0.63	0.48	225.13	1.00	225.13	4.000	No	No	2.00
644	18.09	23.73	1.48	0.57	0.47	225.84	1.00	225.84	4.000	No	No	2.00
645	18.11	23.82	1.50	0.60	0.47	226.37	1.00	226.37	4.000	No	No	2.00
646	18.13	23.94	1.50	0.60	0.47	227.37	1.00	227.37	4.000	No	No	2.00
647	18.15	24.34	1.52	0.66	0.48	230.90	1.00	230.90	4.000	No	No	2.00
648	18.17	24.59	1.51	0.65	0.48	233.07	1.00	233.07	4.000	No	No	2.00
649	18.19	24.12	1.52	0.66	0.48	228.27	1.00	228.27	4.000	No	No	2.00
650	18.21	23.37	1.52	0.63	0.48	220.96	1.00	220.96	4.000	No	No	2.00
651	18.23	21.83	1.53	0.60	0.49	205.97	1.00	205.97	4.000	No	No	2.00
652	18.25	20.91	1.54	0.59	0.49	197.01	1.00	197.01	0.791	No	No	2.00
653	18.27	20.17	1.58	0.66	0.51	189.56	1.00	189.56	0.713	No	No	2.00
654	18.29	20.46	1.61	0.75	0.52	191.97	1.00	191.97	0.738	No	No	2.00
655	18.31	20.50	1.65	0.84	0.53	191.91	1.00	191.91	0.737	No	No	2.00
656	18.33	19.87	1.67	0.87	0.54	185.69	1.00	185.69	0.675	No	No	2.00
657	18.35	19.03	1.72	0.99	0.56	177.20	1.04	184.01	0.659	No	No	2.00
658	18.37	17.66	1.83	1.30	0.60	163.59	1.19	193.98	0.759	No	No	2.00
659	18.39	17.23	1.93	1.74	0.64	158.78	1.26	199.99	0.824	No	No	2.00
660	18.41	17.40	2.00	2.13	0.67	159.86	1.31	208.94	4.000	No	No	2.00
661	18.43	19.78	1.98	2.20	0.66	181.91	1.29	234.44	4.000	No	No	2.00
662	18.45	22.16	1.95	2.22	0.65	203.98	1.27	259.07	4.000	No	No	2.00
663	18.47	24.17	1.93	2.26	0.64	222.54	1.26	280.04	4.000	No	No	2.00
664	18.49	25.39	1.94	2.41	0.65	233.41	1.27	295.59	4.000	No	No	2.00
665	18.51	27.27	1.93	2.46	0.64	250.60	1.26	315.59	4.000	No	No	2.00
666	18.53	28.51	1.94	2.54	0.64	261.74	1.26	329.95	4.000	No	No	2.00
667	18.55	30.77	1.89	2.36	0.63	282.81	1.23	348.12	4.000	No	No	2.00
668	18.57	32.47	1.86	2.26	0.61	298.51	1.21	361.11	4.000	No	No	2.00
669	18.59	34.57	1.82	2.10	0.60	318.01	1.17	373.32	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
5.23	2.00	0.00	0.00	0.02	0.00	5.25	2.00	0.00	0.00	0.02	0.00
5.27	2.00	0.00	0.00	0.02	0.00	5.29	2.00	0.00	0.00	0.02	0.00
5.31	2.00	0.00	0.00	0.02	0.00	5.33	2.00	0.00	0.00	0.02	0.00
5.35	2.00	0.00	0.00	0.02	0.00	5.37	2.00	0.00	0.00	0.02	0.00
5.39	2.00	0.00	0.00	0.02	0.00	5.41	2.00	0.00	0.00	0.02	0.00
5.43	2.00	0.00	0.00	0.02	0.00	5.45	2.00	0.00	0.00	0.02	0.00
5.47	2.00	0.00	0.00	0.02	0.00	5.49	2.00	0.00	0.00	0.02	0.00
5.51	2.00	0.00	0.00	0.02	0.00	5.53	2.00	0.00	0.00	0.02	0.00
5.55	2.00	0.00	0.00	0.02	0.00	5.57	2.00	0.00	0.00	0.02	0.00
5.59	2.00	0.00	0.00	0.02	0.00	5.61	2.00	0.00	0.00	0.02	0.00
5.63	2.00	0.00	0.00	0.02	0.00	5.65	2.00	0.00	0.00	0.02	0.00
5.67	2.00	0.00	0.00	0.02	0.00	5.69	2.00	0.00	0.00	0.02	0.00
5.71	2.00	0.00	0.00	0.02	0.00	5.73	2.00	0.00	0.00	0.02	0.00
5.75	2.00	0.00	0.00	0.02	0.00	5.77	2.00	0.00	0.00	0.02	0.00
5.79	2.00	0.00	0.00	0.02	0.00	5.81	2.00	0.00	0.00	0.02	0.00
5.83	2.00	0.00	0.00	0.02	0.00	5.85	2.00	0.00	0.00	0.02	0.00
5.87	2.00	0.00	0.00	0.02	0.00	5.89	2.00	0.00	0.00	0.02	0.00
5.91	2.00	0.00	0.00	0.02	0.00	5.93	2.00	0.00	0.00	0.02	0.00
5.95	2.00	0.00	0.00	0.02	0.00	5.97	2.00	0.00	0.00	0.02	0.00
5.99	2.00	0.00	0.00	0.02	0.00	6.01	2.00	0.00	0.00	0.02	0.00
6.03	2.00	0.00	0.00	0.02	0.00	6.05	2.00	0.00	0.00	0.02	0.00
6.07	2.00	0.00	0.00	0.02	0.00	6.09	2.00	0.00	0.00	0.02	0.00
6.11	2.00	0.00	0.00	0.02	0.00	6.13	2.00	0.00	0.00	0.02	0.00
6.15	2.00	0.00	0.00	0.02	0.00	6.17	2.00	0.00	0.00	0.02	0.00
6.19	2.00	0.00	0.00	0.02	0.00	6.21	2.00	0.00	0.00	0.02	0.00
6.23	2.00	0.00	0.00	0.02	0.00	6.25	2.00	0.00	0.00	0.02	0.00
6.27	2.00	0.00	0.00	0.02	0.00	6.29	2.00	0.00	0.00	0.02	0.00
6.31	2.00	0.00	0.00	0.02	0.00	6.33	2.00	0.00	0.00	0.02	0.00
6.35	2.00	0.00	0.00	0.02	0.00	6.37	2.00	0.00	0.00	0.02	0.00
6.39	2.00	0.00	0.00	0.02	0.00	6.41	2.00	0.00	0.00	0.02	0.00
6.43	2.00	0.00	0.00	0.02	0.00	6.45	2.00	0.00	0.00	0.02	0.00
6.47	2.00	0.00	0.00	0.02	0.00	6.49	2.00	0.00	0.00	0.02	0.00
6.51	2.00	0.00	0.00	0.02	0.00	6.53	2.00	0.00	0.00	0.02	0.00
6.55	2.00	0.00	0.00	0.02	0.00	6.57	2.00	0.00	0.00	0.02	0.00
6.59	2.00	0.00	0.00	0.02	0.00	6.61	2.00	0.00	0.00	0.02	0.00
6.63	2.00	0.00	0.00	0.02	0.00	6.65	2.00	0.00	0.00	0.02	0.00
6.67	2.00	0.00	0.00	0.02	0.00	6.69	2.00	0.00	0.00	0.02	0.00
6.71	2.00	0.00	0.00	0.02	0.00	6.73	2.00	0.00	0.00	0.02	0.00
6.75	2.00	0.00	0.00	0.02	0.00	6.77	2.00	0.00	0.00	0.02	0.00
6.79	2.00	0.00	0.00	0.02	0.00	6.81	2.00	0.00	0.00	0.02	0.00
6.83	2.00	0.00	0.00	0.02	0.00	6.85	2.00	0.00	0.00	0.02	0.00
6.87	2.00	0.00	0.00	0.02	0.00	6.89	2.00	0.00	0.00	0.02	0.00
6.91	2.00	0.00	0.00	0.02	0.00	6.93	2.00	0.00	0.00	0.02	0.00
6.95	2.00	0.00	0.00	0.02	0.00	6.97	2.00	0.00	0.00	0.02	0.00
6.99	2.00	0.00	0.00	0.02	0.00	7.01	2.00	0.00	0.00	0.02	0.00
7.03	2.00	0.00	0.00	0.02	0.00	7.05	2.00	0.00	0.00	0.02	0.00
7.07	2.00	0.00	0.00	0.02	0.00	7.09	2.00	0.00	0.00	0.02	0.00
7.11	2.00	0.00	0.00	0.02	0.00	7.13	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
7.15	2.00	0.00	0.00	0.02	0.00	7.17	2.00	0.00	0.00	0.02	0.00
7.19	2.00	0.00	0.00	0.02	0.00	7.21	2.00	0.00	0.00	0.02	0.00
7.23	2.00	0.00	0.00	0.02	0.00	7.25	2.00	0.00	0.00	0.02	0.00
7.27	2.00	0.00	0.00	0.02	0.00	7.29	2.00	0.00	0.00	0.02	0.00
7.31	2.00	0.00	0.00	0.02	0.00	7.33	2.00	0.00	0.00	0.02	0.00
7.35	2.00	0.00	0.00	0.02	0.00	7.37	2.00	0.00	0.00	0.02	0.00
7.39	2.00	0.00	0.00	0.02	0.00	7.41	2.00	0.00	0.00	0.02	0.00
7.43	2.00	0.00	0.00	0.02	0.00	7.45	2.00	0.00	0.00	0.02	0.00
7.47	2.00	0.00	0.00	0.02	0.00	7.49	2.00	0.00	0.00	0.02	0.00
7.51	2.00	0.00	0.00	0.02	0.00	7.53	2.00	0.00	0.00	0.02	0.00
7.55	2.00	0.00	0.00	0.02	0.00	7.57	2.00	0.00	0.00	0.02	0.00
7.59	2.00	0.00	0.00	0.02	0.00	7.61	2.00	0.00	0.00	0.02	0.00
7.63	2.00	0.00	0.00	0.02	0.00	7.65	2.00	0.00	0.00	0.02	0.00
7.67	2.00	0.00	0.00	0.02	0.00	7.69	2.00	0.00	0.00	0.02	0.00
7.71	2.00	0.00	0.00	0.02	0.00	7.73	2.00	0.00	0.00	0.02	0.00
7.75	2.00	0.00	0.00	0.02	0.00	7.77	2.00	0.00	0.00	0.02	0.00
7.79	2.00	0.00	0.00	0.02	0.00	7.81	2.00	0.00	0.00	0.02	0.00
7.83	2.00	0.00	0.00	0.02	0.00	7.85	2.00	0.00	0.00	0.02	0.00
7.87	2.00	0.00	0.00	0.02	0.00	7.89	2.00	0.00	0.00	0.02	0.00
7.91	2.00	0.00	0.00	0.02	0.00	7.93	2.00	0.00	0.00	0.02	0.00
7.95	2.00	0.00	0.00	0.02	0.00	7.97	2.00	0.00	0.00	0.02	0.00
7.99	2.00	0.00	0.00	0.02	0.00	8.01	2.00	0.00	0.00	0.02	0.00
8.03	2.00	0.00	0.00	0.02	0.00	8.05	2.00	0.00	0.00	0.02	0.00
8.07	2.00	0.00	0.00	0.02	0.00	8.09	2.00	0.00	0.00	0.02	0.00
8.11	2.00	0.00	0.00	0.02	0.00	8.13	2.00	0.00	0.00	0.02	0.00
8.15	2.00	0.00	0.00	0.02	0.00	8.17	2.00	0.00	0.00	0.02	0.00
8.19	2.00	0.00	0.00	0.02	0.00	8.21	2.00	0.00	0.00	0.02	0.00
8.23	2.00	0.00	0.00	0.02	0.00	8.25	2.00	0.00	0.00	0.02	0.00
8.27	2.00	0.00	0.00	0.02	0.00	8.29	2.00	0.00	0.00	0.02	0.00
8.31	2.00	0.00	0.00	0.02	0.00	8.33	2.00	0.00	0.00	0.02	0.00
8.35	2.00	0.00	0.00	0.02	0.00	8.37	2.00	0.00	0.00	0.02	0.00
8.39	2.00	0.00	0.00	0.02	0.00	8.41	2.00	0.00	0.00	0.02	0.00
8.43	2.00	0.00	0.00	0.02	0.00	8.45	2.00	0.00	0.00	0.02	0.00
8.47	2.00	0.00	0.00	0.02	0.00	8.49	2.00	0.00	0.00	0.02	0.00
8.51	2.00	0.00	0.00	0.02	0.00	8.53	2.00	0.00	0.00	0.02	0.00
8.55	2.00	0.00	0.00	0.02	0.00	8.57	2.00	0.00	0.00	0.02	0.00
8.59	2.00	0.00	0.00	0.02	0.00	8.61	2.00	0.00	0.00	0.02	0.00
8.63	2.00	0.00	0.00	0.02	0.00	8.65	2.00	0.00	0.00	0.02	0.00
8.67	2.00	0.00	0.00	0.02	0.00	8.69	2.00	0.00	0.00	0.02	0.00
8.71	2.00	0.00	0.00	0.02	0.00	8.73	2.00	0.00	0.00	0.02	0.00
8.75	2.00	0.00	0.00	0.02	0.00	8.77	2.00	0.00	0.00	0.02	0.00
8.79	2.00	0.00	0.00	0.02	0.00	8.81	2.00	0.00	0.00	0.02	0.00
8.83	2.00	0.00	0.00	0.02	0.00	8.85	2.00	0.00	0.00	0.02	0.00
8.87	2.00	0.00	0.00	0.02	0.00	8.89	2.00	0.00	0.00	0.02	0.00
8.91	2.00	0.00	0.00	0.02	0.00	8.93	2.00	0.00	0.00	0.02	0.00
8.95	2.00	0.00	0.00	0.02	0.00	8.97	2.00	0.00	0.00	0.02	0.00
8.99	2.00	0.00	0.00	0.02	0.00	9.01	2.00	0.00	0.00	0.02	0.00
9.03	2.00	0.00	0.00	0.02	0.00	9.05	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
9.07	2.00	0.00	0.00	0.02	0.00	9.09	2.00	0.00	0.00	0.02	0.00
9.11	2.00	0.00	0.00	0.02	0.00	9.13	2.00	0.00	0.00	0.02	0.00
9.15	2.00	0.00	0.00	0.02	0.00	9.17	2.00	0.00	0.00	0.02	0.00
9.19	2.00	0.00	0.00	0.02	0.00	9.21	2.00	0.00	0.00	0.02	0.00
9.23	2.00	0.00	0.00	0.02	0.00	9.25	2.00	0.00	0.00	0.02	0.00
9.27	2.00	0.00	0.00	0.02	0.00	9.29	2.00	0.00	0.00	0.02	0.00
9.31	2.00	0.00	0.00	0.02	0.00	9.33	2.00	0.00	0.00	0.02	0.00
9.35	2.00	0.00	0.00	0.02	0.00	9.37	2.00	0.00	0.00	0.02	0.00
9.39	2.00	0.00	0.00	0.02	0.00	9.41	2.00	0.00	0.00	0.02	0.00
9.43	2.00	0.00	0.00	0.02	0.00	9.45	2.00	0.00	0.00	0.02	0.00
9.47	2.00	0.00	0.00	0.02	0.00	9.49	2.00	0.00	0.00	0.02	0.00
9.51	2.00	0.00	0.00	0.02	0.00	9.53	2.00	0.00	0.00	0.02	0.00
9.55	2.00	0.00	0.00	0.02	0.00	9.57	2.00	0.00	0.00	0.02	0.00
9.59	2.00	0.00	0.00	0.02	0.00	9.61	2.00	0.00	0.00	0.02	0.00
9.63	2.00	0.00	0.00	0.02	0.00	9.65	2.00	0.00	0.00	0.02	0.00
9.67	2.00	0.00	0.00	0.02	0.00	9.69	2.00	0.00	0.00	0.02	0.00
9.71	2.00	0.00	0.00	0.02	0.00	9.73	2.00	0.00	0.00	0.02	0.00
9.75	2.00	0.00	0.00	0.02	0.00	9.77	2.00	0.00	0.00	0.02	0.00
9.79	2.00	0.00	0.00	0.02	0.00	9.81	2.00	0.00	0.00	0.02	0.00
9.83	2.00	0.00	0.00	0.02	0.00	9.85	2.00	0.00	0.00	0.02	0.00
9.87	2.00	0.00	0.00	0.02	0.00	9.89	2.00	0.00	0.00	0.02	0.00
9.91	2.00	0.00	0.00	0.02	0.00	9.93	2.00	0.00	0.00	0.02	0.00
9.95	2.00	0.00	0.00	0.02	0.00	9.97	2.00	0.00	0.00	0.02	0.00
9.99	2.00	0.00	0.00	0.02	0.00	10.01	2.00	0.00	0.00	0.02	0.00
10.03	2.00	0.00	0.00	0.02	0.00	10.05	2.00	0.00	0.00	0.02	0.00
10.07	2.00	0.00	0.00	0.02	0.00	10.09	2.00	0.00	0.00	0.02	0.00
10.11	2.00	0.00	0.00	0.02	0.00	10.13	2.00	0.00	0.00	0.02	0.00
10.15	2.00	0.00	0.00	0.02	0.00	10.17	2.00	0.00	0.00	0.02	0.00
10.19	2.00	0.00	0.00	0.02	0.00	10.21	2.00	0.00	0.00	0.02	0.00
10.23	2.00	0.00	0.00	0.02	0.00	10.25	2.00	0.00	0.00	0.02	0.00
10.27	2.00	0.00	0.00	0.02	0.00	10.29	2.00	0.00	0.00	0.02	0.00
10.31	2.00	0.00	0.00	0.02	0.00	10.33	2.00	0.00	0.00	0.02	0.00
10.35	2.00	0.00	0.00	0.02	0.00	10.37	2.00	0.00	0.00	0.02	0.00
10.39	2.00	0.00	0.00	0.02	0.00	10.41	2.00	0.00	0.00	0.02	0.00
10.43	2.00	0.00	0.00	0.02	0.00	10.45	2.00	0.00	0.00	0.02	0.00
10.47	2.00	0.00	0.00	0.02	0.00	10.49	2.00	0.00	0.00	0.02	0.00
10.51	2.00	0.00	0.00	0.02	0.00	10.53	2.00	0.00	0.00	0.02	0.00
10.55	2.00	0.00	0.00	0.02	0.00	10.57	2.00	0.00	0.00	0.02	0.00
10.59	2.00	0.00	0.00	0.02	0.00	10.61	2.00	0.00	0.00	0.02	0.00
10.63	2.00	0.00	0.00	0.02	0.00	10.65	2.00	0.00	0.00	0.02	0.00
10.67	2.00	0.00	0.00	0.02	0.00	10.69	2.00	0.00	0.00	0.02	0.00
10.71	2.00	0.00	0.00	0.02	0.00	10.73	2.00	0.00	0.00	0.02	0.00
10.75	2.00	0.00	0.00	0.02	0.00	10.77	2.00	0.00	0.00	0.02	0.00
10.79	2.00	0.00	0.00	0.02	0.00	10.81	2.00	0.00	0.00	0.02	0.00
10.83	2.00	0.00	0.00	0.02	0.00	10.85	2.00	0.00	0.00	0.02	0.00
10.87	2.00	0.00	0.00	0.02	0.00	10.89	2.00	0.00	0.00	0.02	0.00
10.91	2.00	0.00	0.00	0.02	0.00	10.93	2.00	0.00	0.00	0.02	0.00
10.95	2.00	0.00	0.00	0.02	0.00	10.97	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.99	2.00	0.00	0.00	0.02	0.00	11.01	2.00	0.00	0.00	0.02	0.00
11.03	2.00	0.00	0.00	0.02	0.00	11.05	2.00	0.00	0.00	0.02	0.00
11.07	2.00	0.00	0.00	0.02	0.00	11.09	2.00	0.00	0.00	0.02	0.00
11.11	2.00	0.00	0.00	0.02	0.00	11.13	2.00	0.00	0.00	0.02	0.00
11.15	2.00	0.00	0.00	0.02	0.00	11.17	2.00	0.00	0.00	0.02	0.00
11.19	2.00	0.00	0.00	0.02	0.00	11.21	2.00	0.00	0.00	0.02	0.00
11.23	2.00	0.00	0.00	0.02	0.00	11.25	2.00	0.00	0.00	0.02	0.00
11.27	2.00	0.00	0.00	0.02	0.00	11.29	2.00	0.00	0.00	0.02	0.00
11.31	2.00	0.00	0.00	0.02	0.00	11.33	2.00	0.00	0.00	0.02	0.00
11.35	2.00	0.00	0.00	0.02	0.00	11.37	2.00	0.00	0.00	0.02	0.00
11.39	2.00	0.00	0.00	0.02	0.00	11.41	2.00	0.00	0.00	0.02	0.00
11.43	2.00	0.00	0.00	0.02	0.00	11.45	2.00	0.00	0.00	0.02	0.00
11.47	2.00	0.00	0.00	0.02	0.00	11.49	2.00	0.00	0.00	0.02	0.00
11.51	2.00	0.00	0.00	0.02	0.00	11.53	2.00	0.00	0.00	0.02	0.00
11.55	2.00	0.00	0.00	0.02	0.00	11.57	2.00	0.00	0.00	0.02	0.00
11.59	2.00	0.00	0.00	0.02	0.00	11.61	2.00	0.00	0.00	0.02	0.00
11.63	2.00	0.00	0.00	0.02	0.00	11.65	2.00	0.00	0.00	0.02	0.00
11.67	2.00	0.00	0.00	0.02	0.00	11.69	2.00	0.00	0.00	0.02	0.00
11.71	2.00	0.00	0.00	0.02	0.00	11.73	2.00	0.00	0.00	0.02	0.00
11.75	2.00	0.00	0.00	0.02	0.00	11.77	2.00	0.00	0.00	0.02	0.00
11.79	2.00	0.00	0.00	0.02	0.00	11.81	2.00	0.00	0.00	0.02	0.00
11.83	2.00	0.00	0.00	0.02	0.00	11.85	2.00	0.00	0.00	0.02	0.00
11.87	2.00	0.00	0.00	0.02	0.00	11.89	2.00	0.00	0.00	0.02	0.00
11.91	2.00	0.00	0.00	0.02	0.00	11.93	2.00	0.00	0.00	0.02	0.00
11.95	2.00	0.00	0.00	0.02	0.00	11.97	2.00	0.00	0.00	0.02	0.00
11.99	2.00	0.00	0.00	0.02	0.00	12.01	2.00	0.00	0.00	0.02	0.00
12.03	2.00	0.00	0.00	0.02	0.00	12.05	2.00	0.00	0.00	0.02	0.00
12.07	2.00	0.00	0.00	0.02	0.00	12.09	2.00	0.00	0.00	0.02	0.00
12.11	2.00	0.00	0.00	0.02	0.00	12.13	2.00	0.00	0.00	0.02	0.00
12.15	2.00	0.00	0.00	0.02	0.00	12.17	2.00	0.00	0.00	0.02	0.00
12.19	2.00	0.00	0.00	0.02	0.00	12.21	2.00	0.00	0.00	0.02	0.00
12.23	2.00	0.00	0.00	0.02	0.00	12.25	2.00	0.00	0.00	0.02	0.00
12.27	2.00	0.00	0.00	0.02	0.00	12.29	2.00	0.00	0.00	0.02	0.00
12.31	2.00	0.00	0.00	0.02	0.00	12.33	2.00	0.00	0.00	0.02	0.00
12.35	2.00	0.00	0.00	0.02	0.00	12.37	2.00	0.00	0.00	0.02	0.00
12.39	2.00	0.00	0.00	0.02	0.00	12.41	2.00	0.00	0.00	0.02	0.00
12.43	2.00	0.00	0.00	0.02	0.00	12.45	2.00	0.00	0.00	0.02	0.00
12.47	2.00	0.00	0.00	0.02	0.00	12.49	2.00	0.00	0.00	0.02	0.00
12.51	2.00	0.00	0.00	0.02	0.00	12.53	2.00	0.00	0.00	0.02	0.00
12.55	2.00	0.00	0.00	0.02	0.00	12.57	2.00	0.00	0.00	0.02	0.00
12.59	2.00	0.00	0.00	0.02	0.00	12.61	2.00	0.00	0.00	0.02	0.00
12.63	2.00	0.00	0.00	0.02	0.00	12.65	2.00	0.00	0.00	0.02	0.00
12.67	2.00	0.00	0.00	0.02	0.00	12.69	2.00	0.00	0.00	0.02	0.00
12.71	2.00	0.00	0.00	0.02	0.00	12.73	2.00	0.00	0.00	0.02	0.00
12.75	2.00	0.00	0.00	0.02	0.00	12.77	2.00	0.00	0.00	0.02	0.00
12.79	2.00	0.00	0.00	0.02	0.00	12.81	2.00	0.00	0.00	0.02	0.00
12.83	2.00	0.00	0.00	0.02	0.00	12.85	2.00	0.00	0.00	0.02	0.00
12.87	2.00	0.00	0.00	0.02	0.00	12.89	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
12.91	2.00	0.00	0.00	0.02	0.00	12.93	2.00	0.00	0.00	0.02	0.00
12.95	2.00	0.00	0.00	0.02	0.00	12.97	2.00	0.00	0.00	0.02	0.00
12.99	2.00	0.00	0.00	0.02	0.00	13.01	2.00	0.00	0.00	0.02	0.00
13.03	2.00	0.00	0.00	0.02	0.00	13.05	2.00	0.00	0.00	0.02	0.00
13.07	2.00	0.00	0.00	0.02	0.00	13.09	2.00	0.00	0.00	0.02	0.00
13.11	2.00	0.00	0.00	0.02	0.00	13.13	2.00	0.00	0.00	0.02	0.00
13.15	2.00	0.00	0.00	0.02	0.00	13.17	2.00	0.00	0.00	0.02	0.00
13.19	2.00	0.00	0.00	0.02	0.00	13.21	2.00	0.00	0.00	0.02	0.00
13.23	2.00	0.00	0.00	0.02	0.00	13.25	2.00	0.00	0.00	0.02	0.00
13.27	2.00	0.00	0.00	0.02	0.00	13.29	2.00	0.00	0.00	0.02	0.00
13.31	2.00	0.00	0.00	0.02	0.00	13.33	2.00	0.00	0.00	0.02	0.00
13.35	2.00	0.00	0.00	0.02	0.00	13.37	2.00	0.00	0.00	0.02	0.00
13.39	2.00	0.00	0.00	0.02	0.00	13.41	2.00	0.00	0.00	0.02	0.00
13.43	2.00	0.00	0.00	0.02	0.00	13.45	2.00	0.00	0.00	0.02	0.00
13.47	2.00	0.00	0.00	0.02	0.00	13.49	2.00	0.00	0.00	0.02	0.00
13.51	2.00	0.00	0.00	0.02	0.00	13.53	2.00	0.00	0.00	0.02	0.00
13.55	2.00	0.00	0.00	0.02	0.00	13.57	2.00	0.00	0.00	0.02	0.00
13.59	2.00	0.00	0.00	0.02	0.00	13.61	2.00	0.00	0.00	0.02	0.00
13.63	2.00	0.00	0.00	0.02	0.00	13.65	2.00	0.00	0.00	0.02	0.00
13.67	2.00	0.00	0.00	0.02	0.00	13.69	2.00	0.00	0.00	0.02	0.00
13.71	2.00	0.00	0.00	0.02	0.00	13.73	2.00	0.00	0.00	0.02	0.00
13.75	2.00	0.00	0.00	0.02	0.00	13.77	2.00	0.00	0.00	0.02	0.00
13.79	2.00	0.00	0.00	0.02	0.00	13.81	2.00	0.00	0.00	0.02	0.00
13.83	2.00	0.00	0.00	0.02	0.00	13.85	2.00	0.00	0.00	0.02	0.00
13.87	2.00	0.00	0.00	0.02	0.00	13.89	2.00	0.00	0.00	0.02	0.00
13.91	2.00	0.00	0.00	0.02	0.00	13.93	2.00	0.00	0.00	0.02	0.00
13.95	2.00	0.00	0.00	0.02	0.00	13.97	2.00	0.00	0.00	0.02	0.00
13.99	2.00	0.00	0.00	0.02	0.00	14.01	2.00	0.00	0.00	0.02	0.00
14.03	2.00	0.00	0.00	0.02	0.00	14.05	2.00	0.00	0.00	0.02	0.00
14.07	2.00	0.00	0.00	0.02	0.00	14.09	2.00	0.00	0.00	0.02	0.00
14.11	2.00	0.00	0.00	0.02	0.00	14.13	2.00	0.00	0.00	0.02	0.00
14.15	2.00	0.00	0.00	0.02	0.00	14.17	2.00	0.00	0.00	0.02	0.00
14.19	2.00	0.00	0.00	0.02	0.00	14.21	2.00	0.00	0.00	0.02	0.00
14.23	2.00	0.00	0.00	0.02	0.00	14.25	2.00	0.00	0.00	0.02	0.00
14.27	2.00	0.00	0.00	0.02	0.00	14.29	2.00	0.00	0.00	0.02	0.00
14.31	2.00	0.00	0.00	0.02	0.00	14.33	2.00	0.00	0.00	0.02	0.00
14.35	2.00	0.00	0.00	0.02	0.00	14.37	2.00	0.00	0.00	0.02	0.00
14.39	2.00	0.00	0.00	0.02	0.00	14.41	2.00	0.00	0.00	0.02	0.00
14.43	2.00	0.00	0.00	0.02	0.00	14.45	2.00	0.00	0.00	0.02	0.00
14.47	2.00	0.00	0.00	0.02	0.00	14.49	2.00	0.00	0.00	0.02	0.00
14.51	2.00	0.00	0.00	0.02	0.00	14.53	2.00	0.00	0.00	0.02	0.00
14.55	2.00	0.00	0.00	0.02	0.00	14.57	2.00	0.00	0.00	0.02	0.00
14.59	2.00	0.00	0.00	0.02	0.00	14.61	2.00	0.00	0.00	0.02	0.00
14.63	2.00	0.00	0.00	0.02	0.00	14.65	2.00	0.00	0.00	0.02	0.00
14.67	2.00	0.00	0.00	0.02	0.00	14.69	2.00	0.00	0.00	0.02	0.00
14.71	2.00	0.00	0.00	0.02	0.00	14.73	2.00	0.00	0.00	0.02	0.00
14.75	2.00	0.00	0.00	0.02	0.00	14.77	2.00	0.00	0.00	0.02	0.00
14.79	2.00	0.00	0.00	0.02	0.00	14.81	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
14.83	2.00	0.00	0.00	0.02	0.00	14.85	2.00	0.00	0.00	0.02	0.00
14.87	2.00	0.00	0.00	0.02	0.00	14.89	2.00	0.00	0.00	0.02	0.00
14.91	2.00	0.00	0.00	0.02	0.00	14.93	2.00	0.00	0.00	0.02	0.00
14.95	2.00	0.00	0.00	0.02	0.00	14.97	2.00	0.00	0.00	0.02	0.00
14.99	2.00	0.00	0.00	0.02	0.00	15.01	2.00	0.00	0.00	0.02	0.00
15.03	2.00	0.00	0.00	0.02	0.00	15.05	2.00	0.00	0.00	0.02	0.00
15.07	2.00	0.00	0.00	0.02	0.00	15.09	2.00	0.00	0.00	0.02	0.00
15.11	2.00	0.00	0.00	0.02	0.00	15.13	2.00	0.00	0.00	0.02	0.00
15.15	2.00	0.00	0.00	0.02	0.00	15.17	2.00	0.00	0.00	0.02	0.00
15.19	2.00	0.00	0.00	0.02	0.00	15.21	2.00	0.00	0.00	0.02	0.00
15.23	2.00	0.00	0.00	0.02	0.00	15.25	2.00	0.00	0.00	0.02	0.00
15.27	2.00	0.00	0.00	0.02	0.00	15.29	2.00	0.00	0.00	0.02	0.00
15.31	2.00	0.00	0.00	0.02	0.00	15.33	2.00	0.00	0.00	0.02	0.00
15.35	2.00	0.00	0.00	0.02	0.00	15.37	2.00	0.00	0.00	0.02	0.00
15.39	2.00	0.00	0.00	0.02	0.00	15.41	2.00	0.00	0.00	0.02	0.00
15.43	2.00	0.00	0.00	0.02	0.00	15.45	2.00	0.00	0.00	0.02	0.00
15.47	2.00	0.00	0.00	0.02	0.00	15.49	2.00	0.00	0.00	0.02	0.00
15.51	2.00	0.00	0.00	0.02	0.00	15.53	2.00	0.00	0.00	0.02	0.00
15.55	2.00	0.00	0.00	0.02	0.00	15.57	2.00	0.00	0.00	0.02	0.00
15.59	2.00	0.00	0.00	0.02	0.00	15.61	2.00	0.00	0.00	0.02	0.00
15.63	2.00	0.00	0.00	0.02	0.00	15.65	2.00	0.00	0.00	0.02	0.00
15.67	2.00	0.00	0.00	0.02	0.00	15.69	2.00	0.00	0.00	0.02	0.00
15.71	2.00	0.00	0.00	0.02	0.00	15.73	2.00	0.00	0.00	0.02	0.00
15.75	2.00	0.00	0.00	0.02	0.00	15.77	2.00	0.00	0.00	0.02	0.00
15.79	2.00	0.00	0.00	0.02	0.00	15.81	2.00	0.00	0.00	0.02	0.00
15.83	2.00	0.00	0.00	0.02	0.00	15.85	2.00	0.00	0.00	0.02	0.00
15.87	2.00	0.00	0.00	0.02	0.00	15.89	2.00	0.00	0.00	0.02	0.00
15.91	2.00	0.00	0.00	0.02	0.00	15.93	2.00	0.00	0.00	0.02	0.00
15.95	2.00	0.00	0.00	0.02	0.00	15.97	2.00	0.00	0.00	0.02	0.00
15.99	2.00	0.00	0.00	0.02	0.00	16.01	2.00	0.00	0.00	0.02	0.00
16.03	2.00	0.00	0.00	0.02	0.00	16.05	2.00	0.00	0.00	0.02	0.00
16.07	2.00	0.00	0.00	0.02	0.00	16.09	2.00	0.00	0.00	0.02	0.00
16.11	2.00	0.00	0.00	0.02	0.00	16.13	2.00	0.00	0.00	0.02	0.00
16.15	2.00	0.00	0.00	0.02	0.00	16.17	2.00	0.00	0.00	0.02	0.00
16.19	2.00	0.00	0.00	0.02	0.00	16.21	2.00	0.00	0.00	0.02	0.00
16.23	2.00	0.00	0.00	0.02	0.00	16.25	2.00	0.00	0.00	0.02	0.00
16.27	2.00	0.00	0.00	0.02	0.00	16.29	2.00	0.00	0.00	0.02	0.00
16.31	2.00	0.00	0.00	0.02	0.00	16.33	2.00	0.00	0.00	0.02	0.00
16.35	2.00	0.00	0.00	0.02	0.00	16.37	2.00	0.00	0.00	0.02	0.00
16.39	2.00	0.00	0.00	0.02	0.00	16.41	2.00	0.00	0.00	0.02	0.00
16.43	2.00	0.00	0.00	0.02	0.00	16.45	2.00	0.00	0.00	0.02	0.00
16.47	2.00	0.00	0.00	0.02	0.00	16.49	2.00	0.00	0.00	0.02	0.00
16.51	2.00	0.00	0.00	0.02	0.00	16.53	2.00	0.00	0.00	0.02	0.00
16.55	2.00	0.00	0.00	0.02	0.00	16.57	2.00	0.00	0.00	0.02	0.00
16.59	2.00	0.00	0.00	0.02	0.00	16.61	2.00	0.00	0.00	0.02	0.00
16.63	2.00	0.00	0.00	0.02	0.00	16.65	2.00	0.00	0.00	0.02	0.00
16.67	2.00	0.00	0.00	0.02	0.00	16.69	2.00	0.00	0.00	0.02	0.00
16.71	2.00	0.00	0.00	0.02	0.00	16.73	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
16.75	2.00	0.00	0.00	0.02	0.00	16.77	2.00	0.00	0.00	0.02	0.00
16.79	2.00	0.00	0.00	0.02	0.00	16.81	2.00	0.00	0.00	0.02	0.00
16.83	2.00	0.00	0.00	0.02	0.00	16.85	2.00	0.00	0.00	0.02	0.00
16.87	2.00	0.00	0.00	0.02	0.00	16.89	2.00	0.00	0.00	0.02	0.00
16.91	2.00	0.00	0.00	0.02	0.00	16.93	2.00	0.00	0.00	0.02	0.00
16.95	2.00	0.00	0.00	0.02	0.00	16.97	2.00	0.00	0.00	0.02	0.00
16.99	2.00	0.00	0.00	0.02	0.00	17.01	2.00	0.00	0.00	0.02	0.00
17.03	2.00	0.00	0.00	0.02	0.00	17.05	2.00	0.00	0.00	0.02	0.00
17.07	2.00	0.00	0.00	0.02	0.00	17.09	2.00	0.00	0.00	0.02	0.00
17.11	2.00	0.00	0.00	0.02	0.00	17.13	2.00	0.00	0.00	0.02	0.00
17.15	2.00	0.00	0.00	0.02	0.00	17.17	2.00	0.00	0.00	0.02	0.00
17.19	2.00	0.00	0.00	0.02	0.00	17.21	2.00	0.00	0.00	0.02	0.00
17.23	2.00	0.00	0.00	0.02	0.00	17.25	2.00	0.00	0.00	0.02	0.00
17.27	2.00	0.00	0.00	0.02	0.00	17.29	2.00	0.00	0.00	0.02	0.00
17.31	2.00	0.00	0.00	0.02	0.00	17.33	2.00	0.00	0.00	0.02	0.00
17.35	2.00	0.00	0.00	0.02	0.00	17.37	2.00	0.00	0.00	0.02	0.00
17.39	2.00	0.00	0.00	0.02	0.00	17.41	2.00	0.00	0.00	0.02	0.00
17.43	2.00	0.00	0.00	0.02	0.00	17.45	2.00	0.00	0.00	0.02	0.00
17.47	2.00	0.00	0.00	0.02	0.00	17.49	2.00	0.00	0.00	0.02	0.00
17.51	2.00	0.00	0.00	0.02	0.00	17.53	2.00	0.00	0.00	0.02	0.00
17.55	2.00	0.00	0.00	0.02	0.00	17.57	2.00	0.00	0.00	0.02	0.00
17.59	2.00	0.00	0.00	0.02	0.00	17.61	2.00	0.00	0.00	0.02	0.00
17.63	2.00	0.00	0.00	0.02	0.00	17.65	2.00	0.00	0.00	0.02	0.00
17.67	2.00	0.00	0.00	0.02	0.00	17.69	2.00	0.00	0.00	0.02	0.00
17.71	2.00	0.00	0.00	0.02	0.00	17.73	2.00	0.00	0.00	0.02	0.00
17.75	2.00	0.00	0.00	0.02	0.00	17.77	2.00	0.00	0.00	0.02	0.00
17.79	2.00	0.00	0.00	0.02	0.00	17.81	2.00	0.00	0.00	0.02	0.00
17.83	2.00	0.00	0.00	0.02	0.00	17.85	2.00	0.00	0.00	0.02	0.00
17.87	2.00	0.00	0.00	0.02	0.00	17.89	2.00	0.00	0.00	0.02	0.00
17.91	2.00	0.00	0.00	0.02	0.00	17.93	2.00	0.00	0.00	0.02	0.00
17.95	2.00	0.00	0.00	0.02	0.00	17.97	2.00	0.00	0.00	0.02	0.00
17.99	2.00	0.00	0.00	0.02	0.00	18.01	2.00	0.00	0.00	0.02	0.00
18.03	2.00	0.00	0.00	0.02	0.00	18.05	2.00	0.00	0.00	0.02	0.00
18.07	2.00	0.00	0.00	0.02	0.00	18.09	2.00	0.00	0.00	0.02	0.00
18.11	2.00	0.00	0.00	0.02	0.00	18.13	2.00	0.00	0.00	0.02	0.00
18.15	2.00	0.00	0.00	0.02	0.00	18.17	2.00	0.00	0.00	0.02	0.00
18.19	2.00	0.00	0.00	0.02	0.00	18.21	2.00	0.00	0.00	0.02	0.00
18.23	2.00	0.00	0.00	0.02	0.00	18.25	2.00	0.00	0.00	0.02	0.00
18.27	2.00	0.00	0.00	0.02	0.00	18.29	2.00	0.00	0.00	0.02	0.00
18.31	2.00	0.00	0.00	0.02	0.00	18.33	2.00	0.00	0.00	0.02	0.00
18.35	2.00	0.00	0.00	0.02	0.00	18.37	2.00	0.00	0.00	0.02	0.00
18.39	2.00	0.00	0.00	0.02	0.00	18.41	2.00	0.00	0.00	0.02	0.00
18.43	2.00	0.00	0.00	0.02	0.00	18.45	2.00	0.00	0.00	0.02	0.00
18.47	2.00	0.00	0.00	0.02	0.00	18.49	2.00	0.00	0.00	0.02	0.00
18.51	2.00	0.00	0.00	0.02	0.00	18.53	2.00	0.00	0.00	0.02	0.00
18.55	2.00	0.00	0.00	0.02	0.00	18.57	2.00	0.00	0.00	0.02	0.00
18.59	2.00	0.00	0.00	0.02	0.00						

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

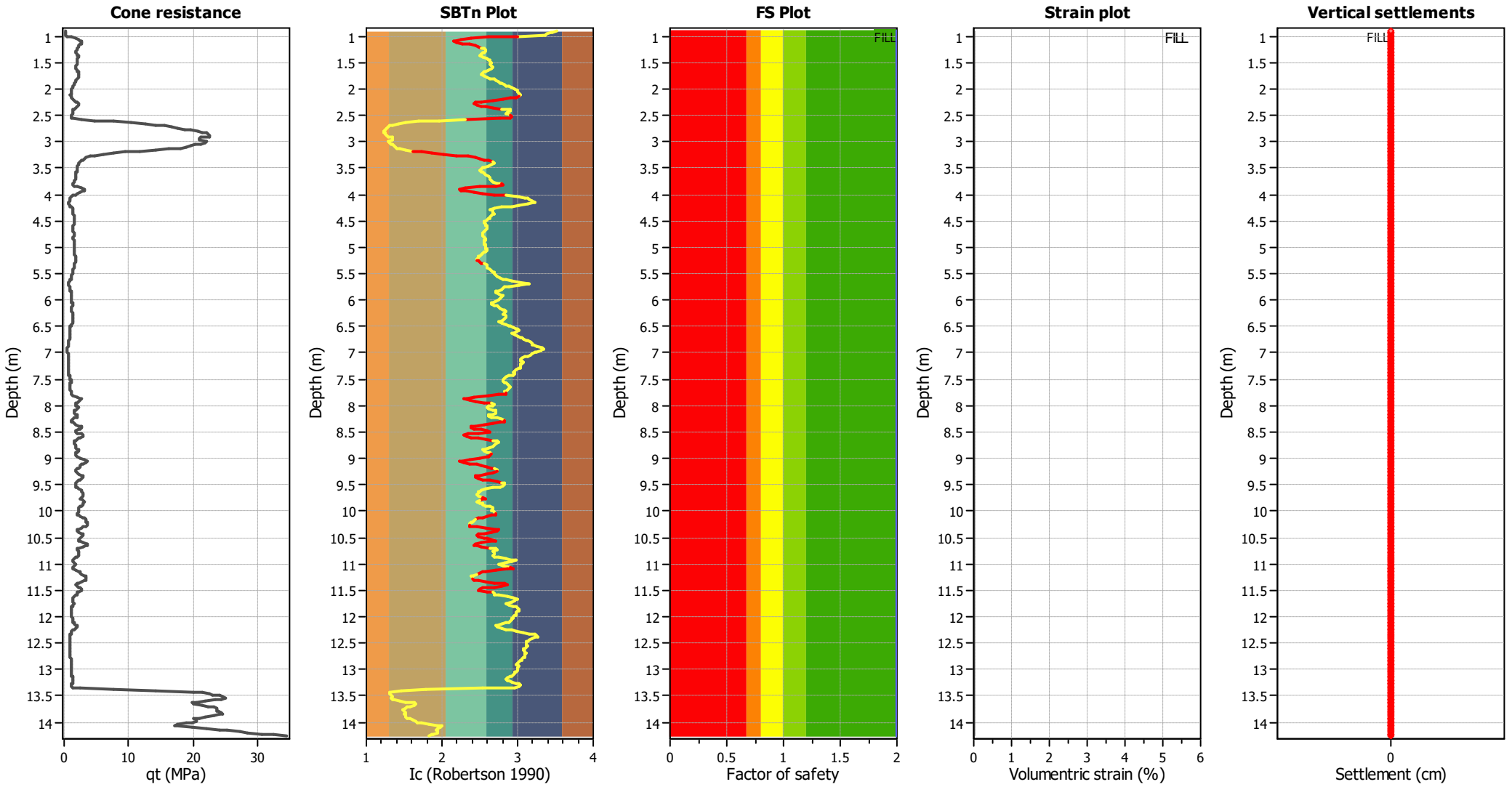
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
5.23	82.29	2.00	0.00	0.71	0.00	5.25	92.03	2.00	0.00	0.71	0.00
5.27	95.55	2.00	0.00	0.71	0.00	5.29	98.38	2.00	0.00	0.71	0.00
5.31	92.99	2.00	0.00	0.70	0.00	5.33	88.51	2.00	0.00	0.70	0.00
5.35	125.21	2.00	0.00	0.70	0.00	5.37	74.64	2.00	0.00	0.70	0.00
5.39	76.46	2.00	0.00	0.70	0.00	5.41	78.80	2.00	0.00	0.70	0.00
5.43	82.54	2.00	0.00	0.70	0.00	5.45	87.02	2.00	0.00	0.70	0.00
5.47	94.69	2.00	0.00	0.70	0.00	5.49	104.73	2.00	0.00	0.69	0.00
5.51	114.91	2.00	0.00	0.69	0.00	5.53	122.35	2.00	0.00	0.69	0.00
5.55	136.53	2.00	0.00	0.69	0.00	5.57	168.99	2.00	0.00	0.69	0.00
5.59	183.12	2.00	0.00	0.69	0.00	5.61	168.42	2.00	0.00	0.69	0.00
5.63	156.60	2.00	0.00	0.69	0.00	5.65	139.61	2.00	0.00	0.69	0.00
5.67	123.06	2.00	0.00	0.69	0.00	5.69	113.44	2.00	0.00	0.68	0.00
5.71	120.17	2.00	0.00	0.68	0.00	5.73	142.58	2.00	0.00	0.68	0.00
5.75	198.55	2.00	0.00	0.68	0.00	5.77	237.85	2.00	0.00	0.68	0.00
5.79	268.11	2.00	0.00	0.68	0.00	5.81	264.31	2.00	0.00	0.68	0.00
5.83	279.99	2.00	0.00	0.68	0.00	5.85	268.57	2.00	0.00	0.68	0.00
5.87	263.73	2.00	0.00	0.67	0.00	5.89	261.15	2.00	0.00	0.67	0.00
5.91	296.42	2.00	0.00	0.67	0.00	5.93	295.38	2.00	0.00	0.67	0.00
5.95	275.61	2.00	0.00	0.67	0.00	5.97	228.93	2.00	0.00	0.67	0.00
5.99	198.61	2.00	0.00	0.67	0.00	6.01	179.41	2.00	0.00	0.67	0.00
6.03	162.80	2.00	0.00	0.67	0.00	6.05	150.19	2.00	0.00	0.66	0.00
6.07	150.23	2.00	0.00	0.66	0.00	6.09	172.20	2.00	0.00	0.66	0.00
6.11	218.83	2.00	0.00	0.66	0.00	6.13	273.14	2.00	0.00	0.66	0.00
6.15	338.25	2.00	0.00	0.66	0.00	6.17	169.77	2.00	0.00	0.66	0.00
6.19	172.15	2.00	0.00	0.66	0.00	6.21	173.99	2.00	0.00	0.66	0.00
6.23	175.74	2.00	0.00	0.65	0.00	6.25	176.97	2.00	0.00	0.65	0.00
6.27	177.11	2.00	0.00	0.65	0.00	6.29	178.41	2.00	0.00	0.65	0.00
6.31	181.49	2.00	0.00	0.65	0.00	6.33	185.35	2.00	0.00	0.65	0.00
6.35	187.36	2.00	0.00	0.65	0.00	6.37	188.42	2.00	0.00	0.65	0.00
6.39	191.04	2.00	0.00	0.65	0.00	6.41	191.42	2.00	0.00	0.64	0.00
6.43	188.22	2.00	0.00	0.64	0.00	6.45	180.11	2.00	0.00	0.64	0.00
6.47	172.23	2.00	0.00	0.64	0.00	6.49	164.00	2.00	0.00	0.64	0.00
6.51	152.16	2.00	0.00	0.64	0.00	6.53	137.92	2.00	0.00	0.64	0.00
6.55	231.71	2.00	0.00	0.64	0.00	6.57	114.33	2.00	0.00	0.64	0.00
6.59	104.91	2.00	0.00	0.63	0.00	6.61	106.65	2.00	0.00	0.63	0.00
6.63	116.75	2.00	0.00	0.63	0.00	6.65	134.32	2.00	0.00	0.63	0.00
6.67	177.53	2.00	0.00	0.63	0.00	6.69	297.39	2.00	0.00	0.63	0.00
6.71	171.11	2.00	0.00	0.63	0.00	6.73	184.23	2.00	0.00	0.63	0.00
6.75	180.75	2.00	0.00	0.63	0.00	6.77	170.98	2.00	0.00	0.62	0.00
6.79	167.23	2.00	0.00	0.62	0.00	6.81	166.65	2.00	0.00	0.62	0.00
6.83	164.43	2.00	0.00	0.62	0.00	6.85	157.65	2.00	0.00	0.62	0.00
6.87	148.63	2.00	0.00	0.62	0.00	6.89	134.20	2.00	0.00	0.62	0.00
6.91	100.16	2.00	0.00	0.62	0.00	6.93	117.25	2.00	0.00	0.61	0.00
6.95	151.54	2.00	0.00	0.61	0.00	6.97	199.97	2.00	0.00	0.61	0.00
6.99	228.50	2.00	0.00	0.61	0.00	7.01	246.57	2.00	0.00	0.61	0.00
7.03	262.16	2.00	0.00	0.61	0.00	7.05	277.73	2.00	0.00	0.61	0.00
7.07	290.44	2.00	0.00	0.61	0.00	7.09	303.37	2.00	0.00	0.61	0.00
7.11	316.56	2.00	0.00	0.60	0.00	7.13	331.69	2.00	0.00	0.60	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
7.15	344.99	2.00	0.00	0.60	0.00	7.17	355.69	2.00	0.00	0.60	0.00
7.19	361.69	2.00	0.00	0.60	0.00	7.21	364.62	2.00	0.00	0.60	0.00
7.23	366.23	2.00	0.00	0.60	0.00	7.25	355.82	2.00	0.00	0.60	0.00
7.27	352.02	2.00	0.00	0.60	0.00	7.29	348.53	2.00	0.00	0.59	0.00
7.31	355.48	2.00	0.00	0.59	0.00	7.33	356.31	2.00	0.00	0.59	0.00
7.35	352.20	2.00	0.00	0.59	0.00	7.37	345.04	2.00	0.00	0.59	0.00
7.39	334.90	2.00	0.00	0.59	0.00	7.41	325.50	2.00	0.00	0.59	0.00
7.43	314.92	2.00	0.00	0.59	0.00	7.45	302.50	2.00	0.00	0.59	0.00
7.47	279.56	2.00	0.00	0.58	0.00	7.49	250.93	2.00	0.00	0.58	0.00
7.51	216.37	2.00	0.00	0.58	0.00	7.53	192.71	2.00	0.00	0.58	0.00
7.55	180.62	2.00	0.00	0.58	0.00	7.57	157.41	2.00	0.00	0.58	0.00
7.59	149.01	2.00	0.00	0.58	0.00	7.61	159.79	2.00	0.00	0.58	0.00
7.63	175.07	2.00	0.00	0.58	0.00	7.65	174.25	2.00	0.00	0.57	0.00
7.67	232.84	2.00	0.00	0.57	0.00	7.69	320.40	2.00	0.00	0.57	0.00
7.71	411.52	2.00	0.00	0.57	0.00	7.73	447.50	2.00	0.00	0.57	0.00
7.75	419.84	2.00	0.00	0.57	0.00	7.77	319.24	2.00	0.00	0.57	0.00
7.79	230.71	2.00	0.00	0.57	0.00	7.81	165.00	2.00	0.00	0.57	0.00
7.83	137.25	2.00	0.00	0.56	0.00	7.85	117.95	2.00	0.00	0.56	0.00
7.87	106.72	2.00	0.00	0.56	0.00	7.89	110.61	2.00	0.00	0.56	0.00
7.91	127.32	2.00	0.00	0.56	0.00	7.93	144.10	2.00	0.00	0.56	0.00
7.95	156.16	2.00	0.00	0.56	0.00	7.97	168.61	2.00	0.00	0.56	0.00
7.99	187.11	2.00	0.00	0.56	0.00	8.01	212.86	2.00	0.00	0.56	0.00
8.03	223.28	2.00	0.00	0.55	0.00	8.05	220.92	2.00	0.00	0.55	0.00
8.07	229.08	2.00	0.00	0.55	0.00	8.09	267.93	2.00	0.00	0.55	0.00
8.11	136.39	2.00	0.00	0.55	0.00	8.13	138.02	2.00	0.00	0.55	0.00
8.15	138.52	2.00	0.00	0.55	0.00	8.17	131.46	2.00	0.00	0.55	0.00
8.19	114.06	2.00	0.00	0.55	0.00	8.21	104.25	2.00	0.00	0.54	0.00
8.23	104.64	2.00	0.00	0.54	0.00	8.25	109.15	2.00	0.00	0.54	0.00
8.27	114.25	2.00	0.00	0.54	0.00	8.29	123.31	2.00	0.00	0.54	0.00
8.31	152.10	2.00	0.00	0.54	0.00	8.33	309.82	2.00	0.00	0.54	0.00
8.35	162.84	2.00	0.00	0.54	0.00	8.37	178.48	2.00	0.00	0.54	0.00
8.39	186.96	2.00	0.00	0.53	0.00	8.41	189.85	2.00	0.00	0.53	0.00
8.43	187.37	2.00	0.00	0.53	0.00	8.45	182.86	2.00	0.00	0.53	0.00
8.47	166.83	2.00	0.00	0.53	0.00	8.49	151.18	2.00	0.00	0.53	0.00
8.51	135.27	2.00	0.00	0.53	0.00	8.53	130.26	2.00	0.00	0.53	0.00
8.55	122.38	2.00	0.00	0.53	0.00	8.57	112.19	2.00	0.00	0.52	0.00
8.59	224.15	2.00	0.00	0.52	0.00	8.61	178.56	2.00	0.00	0.52	0.00
8.63	191.41	2.00	0.00	0.52	0.00	8.65	214.40	2.00	0.00	0.52	0.00
8.67	235.26	2.00	0.00	0.52	0.00	8.69	239.98	2.00	0.00	0.52	0.00
8.71	230.31	2.00	0.00	0.52	0.00	8.73	213.69	2.00	0.00	0.52	0.00
8.75	196.39	2.00	0.00	0.51	0.00	8.77	182.48	2.00	0.00	0.51	0.00
8.79	166.66	2.00	0.00	0.51	0.00	8.81	145.50	2.00	0.00	0.51	0.00
8.83	127.44	2.00	0.00	0.51	0.00	8.85	114.97	2.00	0.00	0.51	0.00
8.87	114.91	2.00	0.00	0.51	0.00	8.89	119.42	2.00	0.00	0.51	0.00
8.91	127.82	2.00	0.00	0.51	0.00	8.93	133.35	2.00	0.00	0.50	0.00
8.95	136.72	2.00	0.00	0.50	0.00	8.97	136.38	2.00	0.00	0.50	0.00
8.99	130.57	2.00	0.00	0.50	0.00	9.01	120.27	2.00	0.00	0.50	0.00
9.03	109.41	2.00	0.00	0.50	0.00	9.05	101.34	2.00	0.00	0.50	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
9.07	97.53	2.00	0.00	0.50	0.00	9.09	95.39	2.00	0.00	0.49	0.00
9.11	97.72	2.00	0.00	0.49	0.00	9.13	104.10	2.00	0.00	0.49	0.00
9.15	113.04	2.00	0.00	0.49	0.00	9.17	119.78	2.00	0.00	0.49	0.00
9.19	121.76	2.00	0.00	0.49	0.00	9.21	120.50	2.00	0.00	0.49	0.00
9.23	118.75	2.00	0.00	0.49	0.00	9.25	116.29	2.00	0.00	0.49	0.00
9.27	121.82	2.00	0.00	0.48	0.00	9.29	128.84	2.00	0.00	0.48	0.00
9.31	134.56	2.00	0.00	0.48	0.00	9.33	135.29	2.00	0.00	0.48	0.00
9.35	138.54	2.00	0.00	0.48	0.00	9.37	143.14	2.00	0.00	0.48	0.00
9.39	141.70	2.00	0.00	0.48	0.00	9.41	133.52	2.00	0.00	0.48	0.00
9.43	122.13	2.00	0.00	0.48	0.00	9.45	107.57	2.00	0.00	0.47	0.00
9.47	94.58	2.00	0.00	0.47	0.00	9.49	93.86	2.00	0.00	0.47	0.00
9.51	93.24	2.00	0.00	0.47	0.00	9.53	92.70	2.00	0.00	0.47	0.00
9.55	91.79	2.00	0.00	0.47	0.00	9.57	91.75	2.00	0.00	0.47	0.00
9.59	92.58	2.00	0.00	0.47	0.00	9.61	94.58	2.00	0.00	0.47	0.00
9.63	104.29	2.00	0.00	0.47	0.00	9.65	127.56	2.00	0.00	0.46	0.00
9.67	156.16	2.00	0.00	0.46	0.00	9.69	154.16	2.00	0.00	0.46	0.00
9.71	153.52	2.00	0.00	0.46	0.00	9.73	152.10	2.00	0.00	0.46	0.00
9.75	179.55	2.00	0.00	0.46	0.00	9.77	200.96	2.00	0.00	0.46	0.00
9.79	217.47	2.00	0.00	0.46	0.00	9.81	226.11	2.00	0.00	0.46	0.00
9.83	229.12	2.00	0.00	0.45	0.00	9.85	104.47	2.00	0.00	0.45	0.00
9.87	104.28	2.00	0.00	0.45	0.00	9.89	105.02	2.00	0.00	0.45	0.00
9.91	106.33	2.00	0.00	0.45	0.00	9.93	107.00	2.00	0.00	0.45	0.00
9.95	107.23	2.00	0.00	0.45	0.00	9.97	109.58	2.00	0.00	0.45	0.00
9.99	113.19	2.00	0.00	0.45	0.00	10.01	116.32	2.00	0.00	0.44	0.00
10.03	114.09	2.00	0.00	0.44	0.00	10.05	107.21	2.00	0.00	0.44	0.00
10.07	98.42	2.00	0.00	0.44	0.00	10.09	93.82	2.00	0.00	0.44	0.00
10.11	93.00	2.00	0.00	0.44	0.00	10.13	92.20	2.00	0.00	0.44	0.00
10.15	89.68	2.00	0.00	0.44	0.00	10.17	86.84	2.00	0.00	0.43	0.00
10.19	88.68	2.00	0.00	0.43	0.00	10.21	94.63	2.00	0.00	0.43	0.00
10.23	101.84	2.00	0.00	0.43	0.00	10.25	104.15	2.00	0.00	0.43	0.00
10.27	103.21	2.00	0.00	0.43	0.00	10.29	100.44	2.00	0.00	0.43	0.00
10.31	98.89	2.00	0.00	0.43	0.00	10.33	96.94	2.00	0.00	0.43	0.00
10.35	93.41	2.00	0.00	0.42	0.00	10.37	177.66	2.00	0.00	0.42	0.00
10.39	157.32	2.00	0.00	0.42	0.00	10.41	165.96	2.00	0.00	0.42	0.00
10.43	206.54	2.00	0.00	0.42	0.00	10.45	106.44	2.00	0.00	0.42	0.00
10.47	112.06	2.00	0.00	0.42	0.00	10.49	116.70	2.00	0.00	0.42	0.00
10.51	123.80	2.00	0.00	0.42	0.00	10.53	130.03	2.00	0.00	0.41	0.00
10.55	134.80	2.00	0.00	0.41	0.00	10.57	134.73	2.00	0.00	0.41	0.00
10.59	134.18	2.00	0.00	0.41	0.00	10.61	135.36	2.00	0.00	0.41	0.00
10.63	138.78	2.00	0.00	0.41	0.00	10.65	139.78	2.00	0.00	0.41	0.00
10.67	136.47	2.00	0.00	0.41	0.00	10.69	134.65	2.00	0.00	0.41	0.00
10.71	133.02	2.00	0.00	0.41	0.00	10.73	129.64	2.00	0.00	0.40	0.00
10.75	125.48	2.00	0.00	0.40	0.00	10.77	124.22	2.00	0.00	0.40	0.00
10.79	119.87	2.00	0.00	0.40	0.00	10.81	115.73	2.00	0.00	0.40	0.00
10.83	114.20	2.00	0.00	0.40	0.00	10.85	119.78	2.00	0.00	0.40	0.00
10.87	124.82	2.00	0.00	0.40	0.00	10.89	130.01	2.00	0.00	0.40	0.00
10.91	131.61	2.00	0.00	0.39	0.00	10.93	130.74	2.00	0.00	0.39	0.00
10.95	125.38	2.00	0.00	0.39	0.00	10.97	124.20	2.00	0.00	0.39	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.99	126.50	2.00	0.00	0.39	0.00	11.01	130.51	2.00	0.00	0.39	0.00
11.03	132.46	2.00	0.00	0.39	0.00	11.05	133.18	2.00	0.00	0.39	0.00
11.07	129.95	2.00	0.00	0.39	0.00	11.09	127.14	2.00	0.00	0.38	0.00
11.11	124.91	2.00	0.00	0.38	0.00	11.13	125.68	2.00	0.00	0.38	0.00
11.15	125.80	2.00	0.00	0.38	0.00	11.17	123.14	2.00	0.00	0.38	0.00
11.19	120.03	2.00	0.00	0.38	0.00	11.21	118.25	2.00	0.00	0.38	0.00
11.23	116.70	2.00	0.00	0.38	0.00	11.25	113.84	2.00	0.00	0.38	0.00
11.27	108.56	2.00	0.00	0.37	0.00	11.29	104.53	2.00	0.00	0.37	0.00
11.31	100.53	2.00	0.00	0.37	0.00	11.33	98.58	2.00	0.00	0.37	0.00
11.35	95.27	2.00	0.00	0.37	0.00	11.37	93.59	2.00	0.00	0.37	0.00
11.39	91.00	2.00	0.00	0.37	0.00	11.41	89.58	2.00	0.00	0.37	0.00
11.43	88.46	2.00	0.00	0.36	0.00	11.45	88.44	2.00	0.00	0.36	0.00
11.47	89.25	2.00	0.00	0.36	0.00	11.49	89.33	2.00	0.00	0.36	0.00
11.51	88.58	2.00	0.00	0.36	0.00	11.53	86.59	2.00	0.00	0.36	0.00
11.55	84.85	2.00	0.00	0.36	0.00	11.57	84.24	2.00	0.00	0.36	0.00
11.59	84.34	2.00	0.00	0.36	0.00	11.61	84.49	2.00	0.00	0.35	0.00
11.63	83.97	2.00	0.00	0.35	0.00	11.65	83.04	2.00	0.00	0.35	0.00
11.67	82.69	2.00	0.00	0.35	0.00	11.69	83.54	2.00	0.00	0.35	0.00
11.71	86.21	2.00	0.00	0.35	0.00	11.73	85.58	2.00	0.00	0.35	0.00
11.75	83.80	2.00	0.00	0.35	0.00	11.77	80.96	2.00	0.00	0.35	0.00
11.79	81.60	2.00	0.00	0.34	0.00	11.81	83.03	2.00	0.00	0.34	0.00
11.83	84.13	2.00	0.00	0.34	0.00	11.85	85.12	2.00	0.00	0.34	0.00
11.87	86.87	2.00	0.00	0.34	0.00	11.89	88.04	2.00	0.00	0.34	0.00
11.91	88.81	2.00	0.00	0.34	0.00	11.93	89.30	2.00	0.00	0.34	0.00
11.95	91.23	2.00	0.00	0.34	0.00	11.97	93.21	2.00	0.00	0.34	0.00
11.99	93.39	2.00	0.00	0.33	0.00	12.01	92.16	2.00	0.00	0.33	0.00
12.03	90.51	2.00	0.00	0.33	0.00	12.05	90.10	2.00	0.00	0.33	0.00
12.07	90.21	2.00	0.00	0.33	0.00	12.09	92.26	2.00	0.00	0.33	0.00
12.11	90.10	2.00	0.00	0.33	0.00	12.13	84.17	2.00	0.00	0.33	0.00
12.15	119.25	2.00	0.00	0.33	0.00	12.17	70.11	2.00	0.00	0.32	0.00
12.19	71.04	2.00	0.00	0.32	0.00	12.21	72.74	2.00	0.00	0.32	0.00
12.23	76.11	2.00	0.00	0.32	0.00	12.25	83.38	2.00	0.00	0.32	0.00
12.27	113.09	2.00	0.00	0.32	0.00	12.29	189.37	2.00	0.00	0.32	0.00
12.31	235.72	2.00	0.00	0.32	0.00	12.33	219.35	2.00	0.00	0.32	0.00
12.35	185.34	2.00	0.00	0.31	0.00	12.37	169.26	2.00	0.00	0.31	0.00
12.39	184.27	2.00	0.00	0.31	0.00	12.41	218.98	2.00	0.00	0.31	0.00
12.43	110.89	2.00	0.00	0.31	0.00	12.45	108.25	2.00	0.00	0.31	0.00
12.47	108.86	2.00	0.00	0.31	0.00	12.49	207.42	2.00	0.00	0.31	0.00
12.51	176.94	2.00	0.00	0.30	0.00	12.53	175.69	2.00	0.00	0.30	0.00
12.55	205.01	2.00	0.00	0.30	0.00	12.57	110.85	2.00	0.00	0.30	0.00
12.59	105.22	2.00	0.00	0.30	0.00	12.61	99.91	2.00	0.00	0.30	0.00
12.63	97.64	2.00	0.00	0.30	0.00	12.65	94.01	2.00	0.00	0.30	0.00
12.67	172.17	2.00	0.00	0.30	0.00	12.69	96.59	2.00	0.00	0.29	0.00
12.71	79.32	2.00	0.00	0.29	0.00	12.73	79.31	2.00	0.00	0.29	0.00
12.75	80.08	2.00	0.00	0.29	0.00	12.77	81.62	2.00	0.00	0.29	0.00
12.79	87.85	2.00	0.00	0.29	0.00	12.81	132.96	2.00	0.00	0.29	0.00
12.83	146.15	2.00	0.00	0.29	0.00	12.85	76.31	2.00	0.00	0.29	0.00
12.87	71.53	2.00	0.00	0.28	0.00	12.89	71.75	2.00	0.00	0.28	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
12.91	72.63	2.00	0.00	0.28	0.00	12.93	74.21	2.00	0.00	0.28	0.00
12.95	81.49	2.00	0.00	0.28	0.00	12.97	119.08	2.00	0.00	0.28	0.00
12.99	201.25	2.00	0.00	0.28	0.00	13.01	107.92	2.00	0.00	0.28	0.00
13.03	107.59	2.00	0.00	0.28	0.00	13.05	105.73	2.00	0.00	0.28	0.00
13.07	104.08	2.00	0.00	0.27	0.00	13.09	102.21	2.00	0.00	0.27	0.00
13.11	184.27	2.00	0.00	0.27	0.00	13.13	139.75	2.00	0.00	0.27	0.00
13.15	108.53	2.00	0.00	0.27	0.00	13.17	99.94	2.00	0.00	0.27	0.00
13.19	111.18	2.00	0.00	0.27	0.00	13.21	130.90	2.00	0.00	0.27	0.00
13.23	158.52	2.00	0.00	0.27	0.00	13.25	168.80	2.00	0.00	0.26	0.00
13.27	161.35	2.00	0.00	0.26	0.00	13.29	148.38	2.00	0.00	0.26	0.00
13.31	137.54	2.00	0.00	0.26	0.00	13.33	89.77	2.00	0.00	0.26	0.00
13.35	84.01	2.00	0.00	0.26	0.00	13.37	79.55	2.00	0.00	0.26	0.00
13.39	74.62	2.00	0.00	0.26	0.00	13.41	76.95	2.00	0.00	0.26	0.00
13.43	81.57	2.00	0.00	0.25	0.00	13.45	92.16	2.00	0.00	0.25	0.00
13.47	108.39	2.00	0.00	0.25	0.00	13.49	150.47	2.00	0.00	0.25	0.00
13.51	203.52	2.00	0.00	0.25	0.00	13.53	257.01	2.00	0.00	0.25	0.00
13.55	118.90	2.00	0.00	0.25	0.00	13.57	117.38	2.00	0.00	0.25	0.00
13.59	112.75	2.00	0.00	0.24	0.00	13.61	215.58	2.00	0.00	0.24	0.00
13.63	133.40	2.00	0.00	0.24	0.00	13.65	97.67	2.00	0.00	0.24	0.00
13.67	92.72	2.00	0.00	0.24	0.00	13.69	91.05	2.00	0.00	0.24	0.00
13.71	91.55	2.00	0.00	0.24	0.00	13.73	115.46	2.00	0.00	0.24	0.00
13.75	188.06	2.00	0.00	0.24	0.00	13.77	125.99	2.00	0.00	0.23	0.00
13.79	132.78	2.00	0.00	0.23	0.00	13.81	131.63	2.00	0.00	0.23	0.00
13.83	126.54	2.00	0.00	0.23	0.00	13.85	120.26	2.00	0.00	0.23	0.00
13.87	113.42	2.00	0.00	0.23	0.00	13.89	200.66	2.00	0.00	0.23	0.00
13.91	132.99	2.00	0.00	0.23	0.00	13.93	99.52	2.00	0.00	0.23	0.00
13.95	90.99	2.00	0.00	0.23	0.00	13.97	95.94	2.00	0.00	0.22	0.00
13.99	96.40	2.00	0.00	0.22	0.00	14.01	96.20	2.00	0.00	0.22	0.00
14.03	96.38	2.00	0.00	0.22	0.00	14.05	97.13	2.00	0.00	0.22	0.00
14.07	109.13	2.00	0.00	0.22	0.00	14.09	132.62	2.00	0.00	0.22	0.00
14.11	111.93	2.00	0.00	0.22	0.00	14.13	100.90	2.00	0.00	0.21	0.00
14.15	98.46	2.00	0.00	0.21	0.00	14.17	100.21	2.00	0.00	0.21	0.00
14.19	119.82	2.00	0.00	0.21	0.00	14.21	126.63	2.00	0.00	0.21	0.00
14.23	151.28	2.00	0.00	0.21	0.00	14.25	186.78	2.00	0.00	0.21	0.00
14.27	233.87	2.00	0.00	0.21	0.00	14.29	217.09	2.00	0.00	0.21	0.00
14.31	199.92	2.00	0.00	0.20	0.00	14.33	209.60	2.00	0.00	0.20	0.00
14.35	244.24	2.00	0.00	0.20	0.00	14.37	115.28	2.00	0.00	0.20	0.00
14.39	115.33	2.00	0.00	0.20	0.00	14.41	206.31	2.00	0.00	0.20	0.00
14.43	158.27	2.00	0.00	0.20	0.00	14.45	116.33	2.00	0.00	0.20	0.00
14.47	100.71	2.00	0.00	0.20	0.00	14.49	97.94	2.00	0.00	0.20	0.00
14.51	95.73	2.00	0.00	0.19	0.00	14.53	93.48	2.00	0.00	0.19	0.00
14.55	91.31	2.00	0.00	0.19	0.00	14.57	89.23	2.00	0.00	0.19	0.00
14.59	85.61	2.00	0.00	0.19	0.00	14.61	82.40	2.00	0.00	0.19	0.00
14.63	90.71	2.00	0.00	0.19	0.00	14.65	139.24	2.00	0.00	0.19	0.00
14.67	121.52	2.00	0.00	0.18	0.00	14.69	120.69	2.00	0.00	0.18	0.00
14.71	115.65	2.00	0.00	0.18	0.00	14.73	192.56	2.00	0.00	0.18	0.00
14.75	125.33	2.00	0.00	0.18	0.00	14.77	94.19	2.00	0.00	0.18	0.00
14.79	89.15	2.00	0.00	0.18	0.00	14.81	88.73	2.00	0.00	0.18	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
14.83	111.97	2.00	0.00	0.18	0.00	14.85	148.57	2.00	0.00	0.17	0.00
14.87	205.25	2.00	0.00	0.17	0.00	14.89	115.39	2.00	0.00	0.17	0.00
14.91	191.75	2.00	0.00	0.17	0.00	14.93	110.34	2.00	0.00	0.17	0.00
14.95	100.47	2.00	0.00	0.17	0.00	14.97	99.19	2.00	0.00	0.17	0.00
14.99	97.85	2.00	0.00	0.17	0.00	15.01	92.59	2.00	0.00	0.17	0.00
15.03	168.72	2.00	0.00	0.17	0.00	15.05	107.51	2.00	0.00	0.16	0.00
15.07	112.23	2.00	0.00	0.16	0.00	15.09	218.38	2.00	0.00	0.16	0.00
15.11	224.59	2.00	0.00	0.16	0.00	15.13	106.60	2.00	0.00	0.16	0.00
15.15	212.35	2.00	0.00	0.16	0.00	15.17	192.09	2.00	0.00	0.16	0.00
15.19	215.69	2.00	0.00	0.16	0.00	15.21	102.88	2.00	0.00	0.15	0.00
15.23	106.71	2.00	0.00	0.15	0.00	15.25	106.79	2.00	0.00	0.15	0.00
15.27	105.63	2.00	0.00	0.15	0.00	15.29	99.79	2.00	0.00	0.15	0.00
15.31	95.99	2.00	0.00	0.15	0.00	15.33	91.71	2.00	0.00	0.15	0.00
15.35	91.52	2.00	0.00	0.15	0.00	15.37	92.79	2.00	0.00	0.15	0.00
15.39	94.60	2.00	0.00	0.14	0.00	15.41	93.08	2.00	0.00	0.14	0.00
15.43	87.98	2.00	0.00	0.14	0.00	15.45	83.74	2.00	0.00	0.14	0.00
15.47	104.04	2.00	0.00	0.14	0.00	15.49	85.56	2.00	0.00	0.14	0.00
15.51	77.10	2.00	0.00	0.14	0.00	15.53	76.83	2.00	0.00	0.14	0.00
15.55	76.47	2.00	0.00	0.14	0.00	15.57	77.56	2.00	0.00	0.14	0.00
15.59	79.77	2.00	0.00	0.13	0.00	15.61	81.29	2.00	0.00	0.13	0.00
15.63	84.57	2.00	0.00	0.13	0.00	15.65	89.10	2.00	0.00	0.13	0.00
15.67	129.76	2.00	0.00	0.13	0.00	15.69	106.78	2.00	0.00	0.13	0.00
15.71	118.37	2.00	0.00	0.13	0.00	15.73	120.67	2.00	0.00	0.13	0.00
15.75	111.74	2.00	0.00	0.13	0.00	15.77	209.82	2.00	0.00	0.12	0.00
15.79	97.97	2.00	0.00	0.12	0.00	15.81	78.26	2.00	0.00	0.12	0.00
15.83	73.40	2.00	0.00	0.12	0.00	15.85	108.22	2.00	0.00	0.12	0.00
15.87	162.13	2.00	0.00	0.12	0.00	15.89	187.99	2.00	0.00	0.12	0.00
15.91	195.78	2.00	0.00	0.12	0.00	15.93	95.96	2.00	0.00	0.12	0.00
15.95	101.40	2.00	0.00	0.11	0.00	15.97	104.06	2.00	0.00	0.11	0.00
15.99	104.25	2.00	0.00	0.11	0.00	16.01	103.22	2.00	0.00	0.11	0.00
16.03	100.93	2.00	0.00	0.11	0.00	16.05	97.66	2.00	0.00	0.11	0.00
16.07	91.65	2.00	0.00	0.11	0.00	16.09	88.86	2.00	0.00	0.11	0.00
16.11	88.96	2.00	0.00	0.10	0.00	16.13	89.71	2.00	0.00	0.10	0.00
16.15	90.20	2.00	0.00	0.10	0.00	16.17	89.23	2.00	0.00	0.10	0.00
16.19	89.79	2.00	0.00	0.10	0.00	16.21	88.49	2.00	0.00	0.10	0.00
16.23	86.18	2.00	0.00	0.10	0.00	16.25	84.03	2.00	0.00	0.10	0.00
16.27	82.59	2.00	0.00	0.10	0.00	16.29	82.45	2.00	0.00	0.10	0.00
16.31	82.29	2.00	0.00	0.09	0.00	16.33	83.11	2.00	0.00	0.09	0.00
16.35	83.54	2.00	0.00	0.09	0.00	16.37	84.19	2.00	0.00	0.09	0.00
16.39	84.42	2.00	0.00	0.09	0.00	16.41	85.35	2.00	0.00	0.09	0.00
16.43	86.61	2.00	0.00	0.09	0.00	16.45	86.45	2.00	0.00	0.09	0.00
16.47	85.55	2.00	0.00	0.09	0.00	16.49	85.61	2.00	0.00	0.08	0.00
16.51	88.76	2.00	0.00	0.08	0.00	16.53	90.40	2.00	0.00	0.08	0.00
16.55	90.68	2.00	0.00	0.08	0.00	16.57	85.87	2.00	0.00	0.08	0.00
16.59	83.20	2.00	0.00	0.08	0.00	16.61	83.31	2.00	0.00	0.08	0.00
16.63	91.74	2.00	0.00	0.08	0.00	16.65	99.49	2.00	0.00	0.08	0.00
16.67	104.95	2.00	0.00	0.07	0.00	16.69	104.70	2.00	0.00	0.07	0.00
16.71	103.41	2.00	0.00	0.07	0.00	16.73	98.85	2.00	0.00	0.07	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
16.75	92.75	2.00	0.00	0.07	0.00	16.77	85.08	2.00	0.00	0.07	0.00
16.79	80.94	2.00	0.00	0.07	0.00	16.81	79.21	2.00	0.00	0.07	0.00
16.83	79.24	2.00	0.00	0.07	0.00	16.85	78.96	2.00	0.00	0.06	0.00
16.87	79.11	2.00	0.00	0.06	0.00	16.89	78.95	2.00	0.00	0.06	0.00
16.91	78.58	2.00	0.00	0.06	0.00	16.93	77.62	2.00	0.00	0.06	0.00
16.95	76.90	2.00	0.00	0.06	0.00	16.97	76.48	2.00	0.00	0.06	0.00
16.99	77.12	2.00	0.00	0.06	0.00	17.01	77.95	2.00	0.00	0.06	0.00
17.03	78.91	2.00	0.00	0.05	0.00	17.05	79.50	2.00	0.00	0.05	0.00
17.07	79.68	2.00	0.00	0.05	0.00	17.09	79.69	2.00	0.00	0.05	0.00
17.11	79.22	2.00	0.00	0.05	0.00	17.13	78.48	2.00	0.00	0.05	0.00
17.15	77.28	2.00	0.00	0.05	0.00	17.17	75.74	2.00	0.00	0.05	0.00
17.19	74.25	2.00	0.00	0.05	0.00	17.21	73.23	2.00	0.00	0.04	0.00
17.23	73.09	2.00	0.00	0.04	0.00	17.25	73.43	2.00	0.00	0.04	0.00
17.27	74.10	2.00	0.00	0.04	0.00	17.29	74.26	2.00	0.00	0.04	0.00
17.31	74.06	2.00	0.00	0.04	0.00	17.33	73.53	2.00	0.00	0.04	0.00
17.35	73.15	2.00	0.00	0.04	0.00	17.37	72.96	2.00	0.00	0.04	0.00
17.39	72.68	2.00	0.00	0.03	0.00	17.41	72.16	2.00	0.00	0.03	0.00
17.43	71.85	2.00	0.00	0.03	0.00	17.45	71.71	2.00	0.00	0.03	0.00
17.47	71.75	2.00	0.00	0.03	0.00	17.49	71.24	2.00	0.00	0.03	0.00
17.51	70.90	2.00	0.00	0.03	0.00	17.53	71.89	2.00	0.00	0.03	0.00
17.55	74.68	2.00	0.00	0.03	0.00	17.57	78.02	2.00	0.00	0.02	0.00
17.59	81.26	2.00	0.00	0.02	0.00	17.61	84.01	2.00	0.00	0.02	0.00
17.63	86.23	2.00	0.00	0.02	0.00	17.65	86.42	2.00	0.00	0.02	0.00
17.67	84.77	2.00	0.00	0.02	0.00	17.69	75.23	2.00	0.00	0.02	0.00
17.71	72.10	2.00	0.00	0.02	0.00	17.73	135.74	2.00	0.00	0.01	0.00
17.75	193.07	2.00	0.00	0.01	0.00	17.77	207.31	2.00	0.00	0.01	0.00
17.79	217.50	2.00	0.00	0.01	0.00	17.81	222.23	2.00	0.00	0.01	0.00
17.83	233.41	2.00	0.00	0.01	0.00	17.85	236.87	2.00	0.00	0.01	0.00
17.87	241.30	2.00	0.00	0.01	0.00	17.89	234.93	2.00	0.00	0.01	0.00
17.91	224.72	2.00	0.00	0.00	0.00	17.93	210.10	2.00	0.00	0.00	0.00
17.95	197.12	2.00	0.00	0.00	0.00	17.97	189.90	2.00	0.00	0.00	0.00
17.99	191.76	2.00	0.00	0.00	0.00	18.01	203.06	2.00	0.00	0.00	0.00
18.03	213.18	2.00	0.00	0.00	0.00	18.05	221.59	2.00	0.00	0.00	0.00
18.07	225.13	2.00	0.00	0.00	0.00	18.09	225.84	2.00	0.00	0.00	0.00
18.11	226.37	2.00	0.00	0.00	0.00	18.13	227.37	2.00	0.00	0.00	0.00
18.15	230.90	2.00	0.00	0.00	0.00	18.17	233.07	2.00	0.00	0.00	0.00
18.19	228.27	2.00	0.00	0.00	0.00	18.21	220.96	2.00	0.00	0.00	0.00
18.23	205.97	2.00	0.00	0.00	0.00	18.25	197.01	2.00	0.00	0.00	0.00
18.27	189.56	2.00	0.00	0.00	0.00	18.29	191.97	2.00	0.00	0.00	0.00
18.31	191.91	2.00	0.00	0.00	0.00	18.33	185.69	2.00	0.00	0.00	0.00
18.35	184.01	2.00	0.00	0.00	0.00	18.37	193.98	2.00	0.00	0.00	0.00
18.39	199.99	2.00	0.00	0.00	0.00	18.41	208.94	2.00	0.00	0.00	0.00
18.43	234.44	2.00	0.00	0.00	0.00	18.45	259.07	2.00	0.00	0.00	0.00
18.47	280.04	2.00	0.00	0.00	0.00	18.49	295.59	2.00	0.00	0.00	0.00
18.51	315.59	2.00	0.00	0.00	0.00	18.53	329.95	2.00	0.00	0.00	0.00
18.55	348.12	2.00	0.00	0.00	0.00	18.57	361.11	2.00	0.00	0.00	0.00
18.59	373.32	2.00	0.00	0.00	0.00						

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)

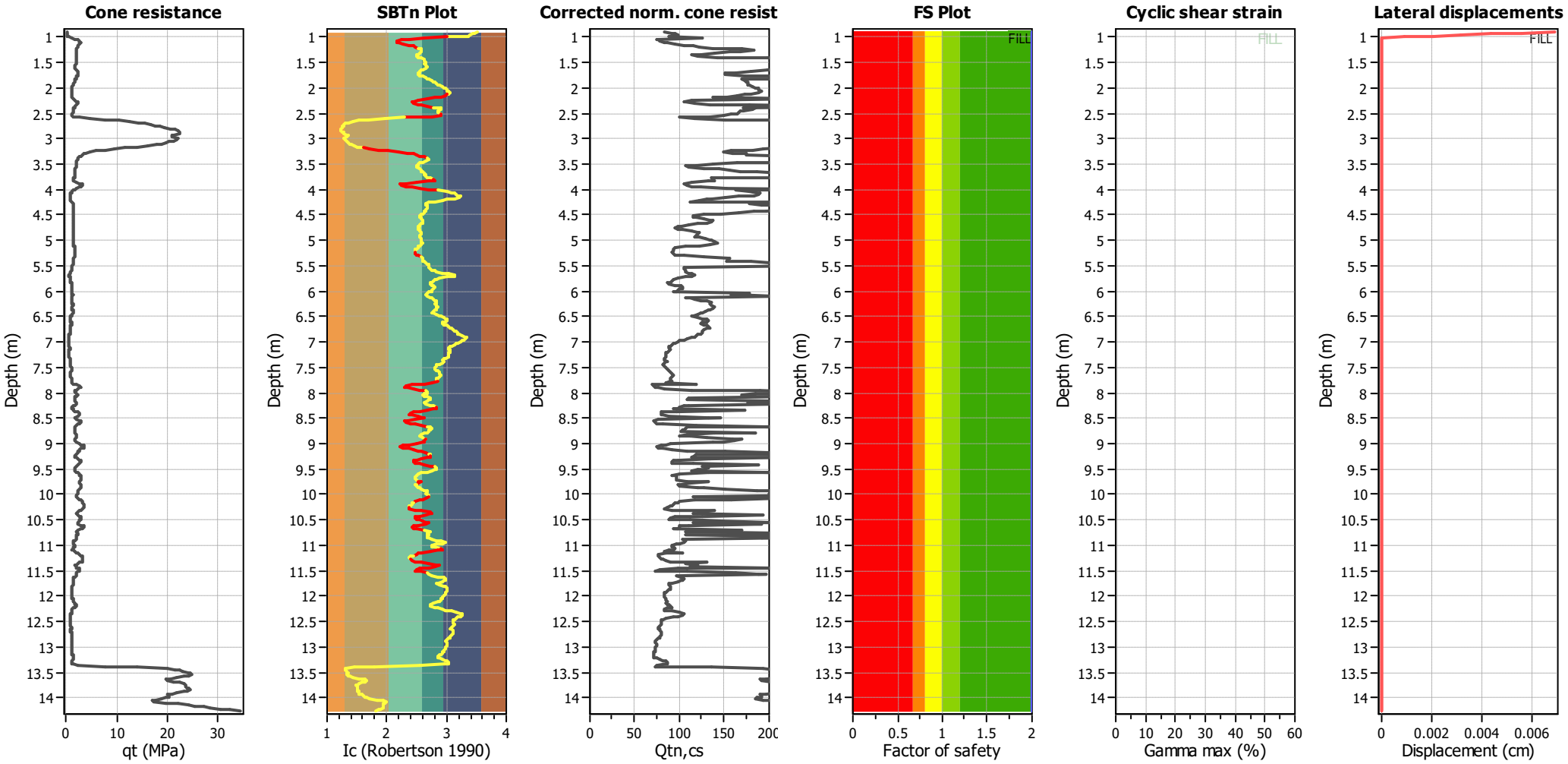
Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements

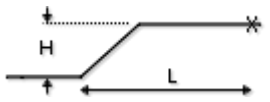
Geometric parameters: Level ground (or gently sloping) with free face (L: 67.00 m - H: 2.90 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
5.23	0.20	3.73	5.58	82.29	2.00	0.00	0.14	0.00
5.25	0.25	4.57	6.06	92.03	2.00	0.00	0.13	0.00
5.27	0.27	5.00	6.09	95.55	2.00	0.00	0.12	0.00
5.29	0.30	5.59	5.90	98.38	2.00	0.00	0.12	0.00
5.31	0.29	5.40	5.34	92.99	2.00	0.00	0.12	0.00
5.33	0.52	10.04	2.99	88.51	2.00	0.00	0.09	0.00
5.35	1.05	20.47	1.81	125.21	2.00	14.64	0.00	0.00
5.37	1.69	33.12	1.36	74.64	2.00	30.53	0.00	0.00
5.39	2.23	43.77	1.21	76.46	2.00	39.73	0.00	0.00
5.41	2.56	50.17	1.13	78.80	2.00	44.23	0.00	0.00
5.43	2.75	53.97	1.16	82.54	2.00	46.65	0.00	0.00
5.45	2.78	54.56	1.32	87.02	2.00	47.00	0.00	0.00
5.47	2.62	51.27	1.67	94.69	2.00	44.95	0.00	0.00
5.49	2.42	47.34	2.09	104.73	2.00	42.32	0.00	0.00
5.51	2.27	44.41	2.49	114.91	2.00	40.21	0.00	0.00
5.53	2.18	42.75	2.78	122.35	2.00	38.95	0.00	0.00
5.55	2.10	41.13	3.08	136.53	2.00	37.68	0.00	0.00
5.57	1.98	38.75	3.32	168.99	2.00	35.71	0.00	0.00
5.59	1.90	37.21	3.38	183.12	2.00	34.37	0.00	0.00
5.61	1.88	36.64	3.21	168.42	2.00	33.86	0.00	0.00
5.63	1.86	36.33	3.07	156.60	2.00	33.58	0.00	0.00
5.65	1.88	36.74	2.91	139.61	2.00	33.95	0.00	0.00
5.67	1.94	37.94	2.78	123.06	2.00	35.01	0.00	0.00
5.69	2.05	40.12	2.76	113.44	2.00	36.86	0.00	0.00
5.71	2.13	41.53	2.90	120.17	2.00	38.00	0.00	0.00
5.73	2.15	41.92	3.18	142.58	2.00	38.30	0.00	0.00
5.75	2.05	40.01	3.67	198.55	2.00	36.76	0.00	0.00
5.77	2.03	39.63	4.01	237.85	2.00	36.45	0.00	0.00
5.79	2.02	39.39	4.25	268.11	2.00	36.25	0.00	0.00
5.81	2.04	39.86	4.24	264.31	2.00	36.64	0.00	0.00
5.83	2.00	39.01	4.32	279.99	2.00	35.93	0.00	0.00
5.85	1.97	38.50	4.20	268.57	2.00	35.49	0.00	0.00
5.87	1.93	37.64	4.11	263.73	2.00	34.75	0.00	0.00
5.89	1.86	36.17	4.00	261.15	2.00	33.44	0.00	0.00
5.91	1.77	34.40	4.17	296.42	2.00	31.77	0.00	0.00
5.93	1.77	34.44	4.16	295.38	2.00	31.82	0.00	0.00
5.95	1.85	35.93	4.10	275.61	2.00	33.22	0.00	0.00
5.97	1.99	38.77	3.87	228.93	2.00	35.72	0.00	0.00
5.99	2.10	40.98	3.71	198.61	2.00	37.56	0.00	0.00
6.01	2.18	42.56	3.59	179.41	2.00	38.80	0.00	0.00
6.03	2.23	43.47	3.46	162.80	2.00	39.50	0.00	0.00
6.05	2.33	45.42	3.40	150.19	2.00	40.95	0.00	0.00
6.07	2.35	45.82	3.42	150.23	2.00	41.24	0.00	0.00
6.09	2.29	44.64	3.61	172.20	2.00	40.38	0.00	0.00
6.11	2.14	41.57	3.92	218.83	2.00	38.02	0.00	0.00
6.13	2.01	39.08	4.26	273.14	2.00	35.99	0.00	0.00
6.15	1.90	36.89	4.62	338.25	2.00	34.08	0.00	0.00
6.17	1.80	34.97	4.84	169.77	2.00	32.32	0.03	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.19	1.70	33.02	5.07	172.15	2.00	30.43	0.04	0.00
6.21	1.64	31.67	5.25	173.99	2.00	29.05	0.04	0.00
6.23	1.57	30.42	5.44	175.74	2.00	27.72	0.04	0.00
6.25	1.50	29.04	5.63	176.97	2.00	26.19	0.04	0.00
6.27	1.40	27.04	5.85	177.11	2.00	23.83	0.05	0.00
6.29	1.31	25.30	6.14	178.41	2.00	21.63	0.05	0.00
6.31	1.24	23.92	6.52	181.49	2.00	19.78	0.05	0.00
6.33	1.17	22.46	7.01	185.35	2.00	17.71	0.05	0.00
6.35	1.13	21.59	7.32	187.36	2.00	16.40	0.06	0.00
6.37	1.12	21.43	7.43	188.42	2.00	16.16	0.06	0.00
6.39	1.13	21.59	7.56	191.04	2.00	16.40	0.06	0.00
6.41	1.09	20.84	7.77	191.42	2.00	15.24	0.06	0.00
6.43	1.03	19.59	7.86	188.22	2.00	13.20	0.06	0.00
6.45	0.99	18.85	7.47	180.11	2.00	11.92	0.06	0.00
6.47	1.00	18.98	6.88	172.23	2.00	12.15	0.06	0.00
6.49	1.03	19.55	6.19	164.00	2.00	13.13	0.06	0.00
6.51	1.09	20.89	5.24	152.16	2.00	15.31	0.06	0.00
6.53	1.24	23.65	4.18	137.92	2.00	19.41	0.05	0.00
6.55	1.47	28.20	3.22	231.71	2.00	25.22	0.00	0.00
6.57	1.81	34.96	2.51	114.33	2.00	32.31	0.00	0.00
6.59	2.08	40.40	2.22	104.91	2.00	37.09	0.00	0.00
6.61	2.25	43.61	2.22	106.65	2.00	39.61	0.00	0.00
6.63	2.22	43.12	2.56	116.75	2.00	39.23	0.00	0.00
6.65	2.12	41.12	3.03	134.32	2.00	37.67	0.00	0.00
6.67	2.04	39.40	3.41	177.53	2.00	36.25	0.00	0.00
6.69	1.81	35.03	4.18	297.39	2.00	32.38	0.00	0.00
6.71	1.59	30.54	5.18	171.11	2.00	27.86	0.04	0.00
6.73	1.34	25.65	6.38	184.23	2.00	22.09	0.05	0.00
6.75	1.28	24.54	6.34	180.75	2.00	20.64	0.05	0.00
6.77	1.34	25.71	5.65	170.98	2.00	22.16	0.05	0.00
6.79	1.35	25.80	5.44	167.23	2.00	22.28	0.05	0.00
6.81	1.30	24.82	5.52	166.65	2.00	21.01	0.05	0.00
6.83	1.18	22.42	5.71	164.43	2.00	17.65	0.05	0.00
6.85	1.11	21.08	5.50	157.65	2.00	15.61	0.06	0.00
6.87	1.10	20.83	5.01	148.63	2.00	15.22	0.06	0.00
6.89	1.30	24.79	3.89	134.20	2.00	20.96	0.05	0.00
6.91	2.64	51.20	1.84	100.16	2.00	44.91	0.00	0.00
6.93	4.69	91.71	1.08	117.25	2.00	64.14	0.00	0.00
6.95	7.72	151.54	0.74	151.54	2.00	80.72	0.00	0.00
6.97	10.30	199.97	0.58	199.97	2.00	89.87	0.00	0.00
6.99	12.56	228.50	0.47	228.50	2.00	94.27	0.00	0.00
7.01	14.22	246.57	0.38	246.57	2.00	96.79	0.00	0.00
7.03	15.52	262.16	0.36	262.16	2.00	98.81	0.00	0.00
7.05	16.71	277.73	0.35	277.73	2.00	100.00	0.00	0.00
7.07	17.67	290.44	0.35	290.44	2.00	100.00	0.00	0.00
7.09	18.65	303.37	0.35	303.37	2.00	100.00	0.00	0.00
7.11	19.61	316.56	0.36	316.56	2.00	100.00	0.00	0.00
7.13	20.67	331.69	0.37	331.69	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.15	21.55	344.99	0.39	344.99	2.00	100.00	0.00	0.00
7.17	22.23	355.69	0.41	355.69	2.00	100.00	0.00	0.00
7.19	22.45	361.69	0.44	361.69	2.00	100.00	0.00	0.00
7.21	22.55	364.62	0.46	364.62	2.00	100.00	0.00	0.00
7.23	22.52	366.23	0.49	366.23	2.00	100.00	0.00	0.00
7.25	21.28	355.82	0.57	355.82	2.00	100.00	0.00	0.00
7.27	21.05	352.02	0.57	352.02	2.00	100.00	0.00	0.00
7.29	20.93	348.53	0.56	348.53	2.00	100.00	0.00	0.00
7.31	22.09	355.48	0.47	355.48	2.00	100.00	0.00	0.00
7.33	22.14	356.31	0.48	356.31	2.00	100.00	0.00	0.00
7.35	21.80	352.20	0.50	352.20	2.00	100.00	0.00	0.00
7.37	21.20	345.04	0.52	345.04	2.00	100.00	0.00	0.00
7.39	20.43	334.90	0.54	334.90	2.00	100.00	0.00	0.00
7.41	19.71	325.50	0.56	325.50	2.00	100.00	0.00	0.00
7.43	18.90	314.92	0.58	314.92	2.00	100.00	0.00	0.00
7.45	17.99	302.50	0.60	302.50	2.00	100.00	0.00	0.00
7.47	16.29	279.56	0.64	279.56	2.00	100.00	0.00	0.00
7.49	14.18	250.93	0.71	250.93	2.00	97.37	0.00	0.00
7.51	11.67	216.37	0.84	216.37	2.00	92.48	0.00	0.00
7.53	9.54	185.80	1.03	192.71	2.00	87.45	0.00	0.00
7.55	7.59	148.75	1.32	180.62	2.00	80.11	0.00	0.00
7.57	6.06	118.54	1.74	157.41	2.00	72.61	0.00	0.00
7.59	4.78	93.26	2.37	149.01	2.00	64.70	0.00	0.00
7.61	3.95	76.92	3.11	159.79	2.00	58.34	0.00	0.00
7.63	3.40	65.97	3.82	175.07	2.00	53.27	0.00	0.00
7.65	3.16	61.19	4.20	174.25	2.00	50.79	0.00	0.00
7.67	2.90	56.09	4.63	232.84	2.00	47.91	0.00	0.00
7.69	2.63	50.74	5.16	320.40	2.00	44.61	0.00	0.00
7.71	2.42	46.66	5.62	411.52	2.00	41.84	0.00	0.00
7.73	2.29	44.10	5.72	447.50	2.00	39.98	0.00	0.00
7.75	2.21	42.47	5.44	419.84	2.00	38.74	0.00	0.00
7.77	2.15	41.33	4.67	319.24	2.00	37.84	0.00	0.00
7.79	2.10	40.24	3.90	230.71	2.00	36.95	0.00	0.00
7.81	2.05	39.22	3.24	165.00	2.00	36.11	0.00	0.00
7.83	2.02	38.59	2.91	137.25	2.00	35.57	0.00	0.00
7.85	2.00	38.27	2.68	117.95	2.00	35.30	0.00	0.00
7.87	1.98	37.92	2.52	106.72	2.00	34.99	0.00	0.00
7.89	1.93	36.85	2.52	110.61	2.00	34.05	0.00	0.00
7.91	1.84	35.11	2.63	127.32	2.00	32.45	0.00	0.00
7.93	1.80	34.36	2.77	144.10	2.00	31.74	0.00	0.00
7.95	1.80	34.26	2.89	156.16	2.00	31.64	0.00	0.00
7.97	1.79	34.12	3.00	168.61	2.00	31.51	0.00	0.00
7.99	1.75	33.29	3.13	187.11	2.00	30.69	0.00	0.00
8.01	1.69	32.14	3.28	212.86	2.00	29.54	0.00	0.00
8.03	1.68	31.79	3.34	223.28	2.00	29.17	0.00	0.00
8.05	1.68	31.94	3.33	220.92	2.00	29.33	0.00	0.00
8.07	1.66	31.45	3.37	229.08	2.00	28.81	0.00	0.00
8.09	1.56	29.54	3.53	267.93	2.00	26.75	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.11	1.42	26.64	3.81	136.39	2.00	23.35	0.05	0.00
8.13	1.31	24.48	4.02	138.02	2.00	20.55	0.05	0.00
8.15	1.26	23.56	4.11	138.52	2.00	19.29	0.05	0.00
8.17	1.45	27.25	3.56	131.46	2.00	24.09	0.05	0.00
8.19	2.05	39.06	2.52	114.06	2.00	35.97	0.00	0.00
8.21	2.74	52.78	1.93	104.25	2.00	45.91	0.00	0.00
8.23	3.21	62.07	1.72	104.64	2.00	51.26	0.00	0.00
8.25	3.19	61.56	1.89	109.15	2.00	50.99	0.00	0.00
8.27	2.92	56.35	2.17	114.25	2.00	48.07	0.00	0.00
8.29	2.53	48.52	2.62	123.31	2.00	43.13	0.00	0.00
8.31	2.10	40.11	3.13	152.10	2.00	36.85	0.00	0.00
8.33	1.68	31.76	3.98	309.82	2.00	29.14	0.00	0.00
8.35	1.35	25.23	5.16	162.84	2.00	21.54	0.05	0.00
8.37	1.10	20.35	6.77	178.48	2.00	14.44	0.06	0.00
8.39	0.98	17.96	7.95	186.96	2.00	10.33	0.06	0.00
8.41	0.92	16.66	8.60	189.85	2.00	7.86	0.07	0.00
8.43	0.88	15.86	8.69	187.37	2.00	6.22	0.07	0.00
8.45	0.82	14.73	8.76	182.86	2.00	3.78	0.07	0.00
8.47	0.69	12.22	8.44	166.83	2.00	0.00	0.08	0.00
8.49	0.67	11.73	7.18	151.18	2.00	0.00	0.08	0.00
8.51	0.68	11.91	5.71	135.27	2.00	0.00	0.08	0.00
8.53	0.80	14.32	4.74	130.26	2.00	2.86	0.07	0.00
8.55	0.89	16.06	3.96	122.38	2.00	6.65	0.07	0.00
8.57	1.05	19.30	3.12	112.19	2.00	12.70	0.06	0.00
8.59	1.22	22.64	2.65	224.15	2.00	17.97	0.00	0.00
8.61	1.35	25.18	2.50	178.56	2.00	21.48	0.00	0.00
8.63	1.39	25.92	2.66	191.41	2.00	22.44	0.00	0.00
8.65	1.39	25.95	2.84	214.40	2.00	22.47	0.00	0.00
8.67	1.38	25.75	2.98	235.26	2.00	22.23	0.00	0.00
8.69	1.39	25.98	3.03	239.98	2.00	22.51	0.00	0.00
8.71	1.42	26.58	3.01	230.31	2.00	23.27	0.00	0.00
8.73	1.47	27.43	2.95	213.69	2.00	24.31	0.00	0.00
8.75	1.50	28.06	2.85	196.39	2.00	25.06	0.00	0.00
8.77	1.51	28.23	2.75	182.48	2.00	25.25	0.00	0.00
8.79	1.50	28.04	2.60	166.66	2.00	25.03	0.00	0.00
8.81	1.49	27.88	2.39	145.50	2.00	24.84	0.00	0.00
8.83	1.49	27.85	2.22	127.44	2.00	24.80	0.00	0.00
8.85	1.49	27.83	2.09	114.97	2.00	24.78	0.00	0.00
8.87	1.48	27.55	2.07	114.91	2.00	24.45	0.00	0.00
8.89	1.45	27.08	2.09	119.42	2.00	23.88	0.00	0.00
8.91	1.42	26.50	2.13	127.82	2.00	23.17	0.00	0.00
8.93	1.40	26.05	2.16	133.35	2.00	22.61	0.00	0.00
8.95	1.39	25.77	2.17	136.72	2.00	22.24	0.00	0.00
8.97	1.38	25.64	2.16	136.38	2.00	22.08	0.00	0.00
8.99	1.39	25.84	2.12	130.57	2.00	22.33	0.00	0.00
9.01	1.41	26.28	2.04	120.27	2.00	22.90	0.00	0.00
9.03	1.44	26.83	1.97	109.41	2.00	23.57	0.00	0.00
9.05	1.46	27.11	1.90	101.34	2.00	23.92	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.07	1.46	27.16	1.86	97.53	2.00	23.98	0.00	0.00
9.09	1.46	27.13	1.83	95.39	2.00	23.94	0.00	0.00
9.11	1.45	27.06	1.85	97.72	2.00	23.86	0.00	0.00
9.13	1.44	26.85	1.91	104.10	2.00	23.60	0.00	0.00
9.15	1.43	26.59	1.99	113.04	2.00	23.28	0.00	0.00
9.17	1.43	26.62	2.06	119.78	2.00	23.31	0.00	0.00
9.19	1.46	27.14	2.11	121.76	2.00	23.96	0.00	0.00
9.21	1.50	27.94	2.14	120.50	2.00	24.91	0.00	0.00
9.23	1.53	28.55	2.16	118.75	2.00	25.63	0.00	0.00
9.25	1.55	28.82	2.15	116.29	2.00	25.93	0.00	0.00
9.27	1.54	28.77	2.20	121.82	2.00	25.88	0.00	0.00
9.29	1.54	28.69	2.27	128.84	2.00	25.79	0.00	0.00
9.31	1.54	28.75	2.33	134.56	2.00	25.86	0.00	0.00
9.33	1.54	28.75	2.33	135.29	2.00	25.86	0.00	0.00
9.35	1.54	28.57	2.35	138.54	2.00	25.65	0.00	0.00
9.37	1.52	28.22	2.38	143.14	2.00	25.25	0.00	0.00
9.39	1.51	28.13	2.36	141.70	2.00	25.14	0.00	0.00
9.41	1.52	28.32	2.29	133.52	2.00	25.36	0.00	0.00
9.43	1.55	28.81	2.20	122.13	2.00	25.93	0.00	0.00
9.45	1.60	29.78	2.10	107.57	2.00	27.02	0.00	0.00
9.47	1.66	30.92	2.01	94.58	2.00	28.26	0.00	0.00
9.49	1.71	31.98	1.96	93.86	2.00	29.37	0.00	0.00
9.51	1.75	32.66	1.92	93.24	2.00	30.07	0.00	0.00
9.53	1.77	33.14	1.90	92.70	2.00	30.55	0.00	0.00
9.55	1.79	33.45	1.86	91.79	2.00	30.86	0.00	0.00
9.57	1.78	33.28	1.86	91.75	2.00	30.69	0.00	0.00
9.59	1.75	32.79	1.90	92.58	2.00	30.19	0.00	0.00
9.61	1.71	31.91	1.98	94.58	2.00	29.30	0.00	0.00
9.63	1.66	30.95	2.12	104.29	2.00	28.29	0.00	0.00
9.65	1.60	29.76	2.31	127.56	2.00	26.99	0.00	0.00
9.67	1.54	28.54	2.51	156.16	2.00	25.61	0.00	0.00
9.69	1.55	28.68	2.50	154.16	2.00	25.77	0.00	0.00
9.71	1.54	28.63	2.49	153.52	2.00	25.72	0.00	0.00
9.73	1.53	28.28	2.45	152.10	2.00	25.32	0.00	0.00
9.75	1.44	26.52	2.57	179.55	2.00	23.19	0.00	0.00
9.77	1.37	25.13	2.64	200.96	2.00	21.42	0.00	0.00
9.79	1.31	24.03	2.68	217.47	2.00	19.94	0.00	0.00
9.81	1.27	23.21	2.67	226.11	2.00	18.79	0.00	0.00
9.83	1.24	22.53	2.63	229.12	2.00	17.82	0.00	0.00
9.85	1.21	22.04	2.59	104.47	2.00	17.09	0.06	0.00
9.87	1.18	21.41	2.60	104.28	2.00	16.12	0.06	0.00
9.89	1.14	20.54	2.67	105.02	2.00	14.76	0.06	0.00
9.91	1.09	19.59	2.77	106.33	2.00	13.19	0.06	0.00
9.93	1.02	18.30	2.87	107.00	2.00	10.95	0.06	0.00
9.95	0.95	16.89	2.97	107.23	2.00	8.31	0.07	0.00
9.97	0.83	14.54	3.30	109.58	2.00	3.35	0.07	0.00
9.99	0.72	12.21	3.83	113.19	2.00	0.00	0.08	0.00
10.01	0.61	10.05	4.53	116.32	2.00	0.00	0.09	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.03	0.61	10.10	4.34	114.09	2.00	0.00	0.09	0.00
10.05	0.70	11.79	3.51	107.21	2.00	0.00	0.08	0.00
10.07	0.81	14.08	2.73	98.42	2.00	2.28	0.08	0.00
10.09	0.88	15.43	2.41	93.82	2.00	5.33	0.07	0.00
10.11	0.90	15.69	2.35	93.00	2.00	5.86	0.07	0.00
10.13	0.92	16.11	2.29	92.20	2.00	6.74	0.07	0.00
10.15	0.95	16.84	2.15	89.68	2.00	8.21	0.07	0.00
10.17	1.00	17.74	1.99	86.84	2.00	9.92	0.06	0.00
10.19	1.02	18.13	2.06	88.68	2.00	10.64	0.06	0.00
10.21	1.02	18.17	2.31	94.63	2.00	10.71	0.06	0.00
10.23	1.01	17.87	2.64	101.84	2.00	10.16	0.06	0.00
10.25	1.01	17.86	2.75	104.15	2.00	10.14	0.06	0.00
10.27	1.01	17.99	2.70	103.21	2.00	10.38	0.06	0.00
10.29	1.03	18.26	2.56	100.44	2.00	10.87	0.06	0.00
10.31	1.04	18.35	2.48	98.89	2.00	11.04	0.06	0.00
10.33	1.07	18.70	2.38	96.94	2.00	11.66	0.06	0.00
10.35	1.11	19.32	2.21	93.41	2.00	12.73	0.06	0.00
10.37	1.18	20.37	2.07	177.66	2.00	14.49	0.00	0.00
10.39	1.23	21.24	1.99	157.32	2.00	15.86	0.00	0.00
10.41	1.26	21.73	2.10	165.96	2.00	16.62	0.00	0.00
10.43	1.25	21.58	2.38	206.54	2.00	16.39	0.00	0.00
10.45	1.22	21.31	2.68	106.44	2.00	15.97	0.06	0.00
10.47	1.21	21.12	2.93	112.06	2.00	15.68	0.06	0.00
10.49	1.20	20.96	3.15	116.70	2.00	15.43	0.06	0.00
10.51	1.19	20.84	3.48	123.80	2.00	15.23	0.06	0.00
10.53	1.18	20.80	3.79	130.03	2.00	15.17	0.06	0.00
10.55	1.20	21.11	4.00	134.80	2.00	15.66	0.06	0.00
10.57	1.23	21.62	3.95	134.73	2.00	16.45	0.06	0.00
10.59	1.26	22.12	3.89	134.18	2.00	17.20	0.05	0.00
10.61	1.26	22.01	3.95	135.36	2.00	17.04	0.06	0.00
10.63	1.25	21.78	4.14	138.78	2.00	16.69	0.06	0.00
10.65	1.23	21.50	4.21	139.78	2.00	16.27	0.06	0.00
10.67	1.24	21.56	4.04	136.47	2.00	16.36	0.06	0.00
10.69	1.25	21.53	3.95	134.65	2.00	16.31	0.06	0.00
10.71	1.30	22.32	3.82	133.02	2.00	17.50	0.05	0.00
10.73	1.38	23.59	3.58	129.64	2.00	19.33	0.05	0.00
10.75	1.39	23.56	3.40	125.48	2.00	19.29	0.05	0.00
10.77	1.29	21.76	3.44	124.22	2.00	16.67	0.06	0.00
10.79	1.12	18.84	3.43	119.87	2.00	11.91	0.06	0.00
10.81	1.01	16.89	3.38	115.73	2.00	8.29	0.07	0.00
10.83	0.94	15.66	3.40	114.20	2.00	5.80	0.07	0.00
10.85	0.90	14.99	3.79	119.78	2.00	4.37	0.07	0.00
10.87	0.88	14.55	4.15	124.82	2.00	3.38	0.07	0.00
10.89	0.88	14.58	4.47	130.01	2.00	3.43	0.07	0.00
10.91	0.89	14.66	4.56	131.61	2.00	3.63	0.07	0.00
10.93	0.94	15.54	4.37	130.74	2.00	5.54	0.07	0.00
10.95	0.98	16.21	3.97	125.38	2.00	6.95	0.07	0.00
10.97	0.99	16.32	3.89	124.20	2.00	7.17	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.99	0.96	15.79	4.08	126.50	2.00	6.09	0.07	0.00
11.01	0.91	14.84	4.46	130.51	2.00	4.04	0.07	0.00
11.03	0.88	14.25	4.69	132.46	2.00	2.69	0.07	0.00
11.05	0.84	13.39	4.91	133.18	2.00	0.64	0.08	0.00
11.07	0.80	12.57	4.86	129.95	2.00	0.00	0.08	0.00
11.09	0.75	11.74	4.84	127.14	2.00	0.00	0.08	0.00
11.11	0.71	11.01	4.86	124.91	2.00	0.00	0.09	0.00
11.13	0.68	10.39	5.10	125.68	2.00	0.00	0.09	0.00
11.15	0.67	10.06	5.21	125.80	2.00	0.00	0.09	0.00
11.17	0.66	9.88	5.04	123.14	2.00	0.00	0.09	0.00
11.19	0.63	9.38	4.95	120.03	2.00	0.00	0.09	0.00
11.21	0.58	8.48	5.11	118.25	2.00	0.00	0.10	0.00
11.23	0.53	7.45	5.40	116.70	2.00	0.00	0.10	0.00
11.25	0.50	6.96	5.36	113.84	2.00	0.00	0.11	0.00
11.27	0.50	6.85	4.88	108.56	2.00	0.00	0.11	0.00
11.29	0.50	6.90	4.47	104.53	2.00	0.00	0.11	0.00
11.31	0.52	7.14	4.02	100.53	2.00	0.00	0.11	0.00
11.33	0.53	7.37	3.77	98.58	2.00	0.00	0.11	0.00
11.35	0.55	7.61	3.43	95.27	2.00	0.00	0.10	0.00
11.37	0.56	7.77	3.26	93.59	2.00	0.00	0.10	0.00
11.39	0.58	8.07	3.00	91.00	2.00	0.00	0.10	0.00
11.41	0.60	8.56	2.81	89.58	2.00	0.00	0.10	0.00
11.43	0.63	9.08	2.65	88.46	2.00	0.00	0.10	0.00
11.45	0.66	9.43	2.60	88.44	2.00	0.00	0.09	0.00
11.47	0.66	9.43	2.65	89.25	2.00	0.00	0.09	0.00
11.49	0.64	9.13	2.70	89.33	2.00	0.00	0.10	0.00
11.51	0.63	8.85	2.70	88.58	2.00	0.00	0.10	0.00
11.53	0.62	8.74	2.58	86.59	2.00	0.00	0.10	0.00
11.55	0.63	8.85	2.46	84.85	2.00	0.00	0.10	0.00
11.57	0.64	8.92	2.41	84.24	2.00	0.00	0.10	0.00
11.59	0.64	8.97	2.41	84.34	2.00	0.00	0.10	0.00
11.61	0.64	8.98	2.41	84.49	2.00	0.00	0.10	0.00
11.63	0.65	9.17	2.36	83.97	2.00	0.00	0.10	0.00
11.65	0.68	9.64	2.25	83.04	2.00	0.00	0.09	0.00
11.67	0.72	10.32	2.16	82.69	2.00	0.00	0.09	0.00
11.69	0.75	10.67	2.18	83.54	2.00	0.00	0.09	0.00
11.71	0.75	10.69	2.33	86.21	2.00	0.00	0.09	0.00
11.73	0.74	10.52	2.31	85.58	2.00	0.00	0.09	0.00
11.75	0.76	10.87	2.18	83.80	2.00	0.00	0.09	0.00
11.77	0.82	11.71	1.97	80.96	2.00	0.00	0.08	0.00
11.79	0.89	12.79	1.95	81.60	2.00	0.00	0.08	0.00
11.81	0.95	13.62	1.97	83.03	2.00	1.21	0.08	0.00
11.83	0.99	14.19	2.00	84.13	2.00	2.54	0.08	0.00
11.85	1.01	14.48	2.03	85.12	2.00	3.22	0.07	0.00
11.87	1.02	14.57	2.10	86.87	2.00	3.43	0.07	0.00
11.89	1.00	14.29	2.17	88.04	2.00	2.78	0.07	0.00
11.91	0.96	13.76	2.24	88.81	2.00	1.55	0.08	0.00
11.93	0.93	13.20	2.29	89.30	2.00	0.16	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
11.95	0.90	12.84	2.42	91.23	2.00	0.00	0.08	0.00
11.97	0.90	12.70	2.53	93.21	2.00	0.00	0.08	0.00
11.99	0.90	12.80	2.53	93.39	2.00	0.00	0.08	0.00
12.01	0.93	13.12	2.44	92.16	2.00	0.00	0.08	0.00
12.03	0.97	13.68	2.32	90.51	2.00	1.35	0.08	0.00
12.05	1.00	14.06	2.28	90.10	2.00	2.26	0.08	0.00
12.07	1.02	14.31	2.27	90.21	2.00	2.82	0.07	0.00
12.09	1.00	14.10	2.38	92.26	2.00	2.34	0.08	0.00
12.11	1.00	14.02	2.28	90.10	2.00	2.15	0.08	0.00
12.13	1.12	15.69	1.94	84.17	2.00	5.87	0.07	0.00
12.15	1.41	19.64	1.55	119.25	2.00	13.28	0.00	0.00
12.17	2.07	28.56	1.21	70.11	2.00	25.64	0.00	0.00
12.19	2.54	34.87	1.15	71.04	2.00	32.23	0.00	0.00
12.21	2.78	38.09	1.16	72.74	2.00	35.14	0.00	0.00
12.23	2.55	35.15	1.31	76.11	2.00	32.49	0.00	0.00
12.25	2.30	31.95	1.60	83.38	2.00	29.34	0.00	0.00
12.27	2.03	28.44	2.07	113.09	2.00	25.50	0.00	0.00
12.29	1.84	25.98	2.59	189.37	2.00	22.51	0.00	0.00
12.31	1.76	24.97	2.86	235.72	2.00	21.20	0.00	0.00
12.33	1.88	26.62	2.87	219.35	2.00	23.32	0.00	0.00
12.35	2.08	29.25	2.79	185.34	2.00	26.42	0.00	0.00
12.37	2.21	31.01	2.76	169.26	2.00	28.35	0.00	0.00
12.39	2.07	29.09	2.77	184.27	2.00	26.24	0.00	0.00
12.41	1.84	25.70	2.80	218.98	2.00	22.15	0.00	0.00
12.43	1.63	22.68	2.80	110.89	2.00	18.03	0.05	0.00
12.45	1.60	22.12	2.72	108.25	2.00	17.21	0.05	0.00
12.47	1.66	22.95	2.71	108.86	2.00	18.41	0.05	0.00
12.49	1.83	25.29	2.68	207.42	2.00	21.62	0.00	0.00
12.51	2.04	28.23	2.65	176.94	2.00	25.25	0.00	0.00
12.53	2.10	28.94	2.68	175.69	2.00	26.07	0.00	0.00
12.55	1.93	26.59	2.76	205.01	2.00	23.28	0.00	0.00
12.57	1.61	22.09	2.83	110.85	2.00	17.16	0.05	0.00
12.59	1.36	18.42	2.75	105.22	2.00	11.16	0.06	0.00
12.61	1.22	16.33	2.62	99.91	2.00	7.19	0.07	0.00
12.63	1.20	16.06	2.53	97.64	2.00	6.63	0.07	0.00
12.65	1.28	17.05	2.31	94.01	2.00	8.61	0.07	0.00
12.67	1.48	19.70	1.96	172.17	2.00	13.38	0.00	0.00
12.69	1.85	24.49	1.66	96.59	2.00	20.57	0.00	0.00
12.71	2.27	29.98	1.49	79.32	2.00	27.24	0.00	0.00
12.73	2.61	34.42	1.43	79.31	2.00	31.80	0.00	0.00
12.75	2.67	35.17	1.44	80.08	2.00	32.51	0.00	0.00
12.77	2.51	33.02	1.52	81.62	2.00	30.43	0.00	0.00
12.79	2.18	28.78	1.81	87.85	2.00	25.90	0.00	0.00
12.81	1.83	24.22	1.99	132.96	2.00	20.19	0.00	0.00
12.83	1.70	22.29	1.97	146.15	2.00	17.45	0.00	0.00
12.85	2.06	26.78	1.43	76.31	2.00	23.51	0.00	0.00
12.87	2.63	34.02	1.18	71.53	2.00	31.41	0.00	0.00
12.89	2.99	38.44	1.12	71.75	2.00	35.44	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
12.91	2.83	36.35	1.18	72.63	2.00	33.60	0.00	0.00
12.93	2.47	31.85	1.30	74.21	2.00	29.24	0.00	0.00
12.95	2.20	28.53	1.58	81.49	2.00	25.60	0.00	0.00
12.97	2.02	26.26	2.00	119.08	2.00	22.86	0.00	0.00
12.99	1.81	23.59	2.50	201.25	2.00	19.33	0.00	0.00
13.01	1.66	21.70	2.72	107.92	2.00	16.57	0.06	0.00
13.03	1.60	20.86	2.74	107.59	2.00	15.26	0.06	0.00
13.05	1.66	21.54	2.63	105.73	2.00	16.33	0.06	0.00
13.07	1.70	22.03	2.54	104.08	2.00	17.07	0.06	0.00
13.09	1.68	21.69	2.48	102.21	2.00	16.56	0.06	0.00
13.11	1.69	21.71	2.22	184.27	2.00	16.58	0.00	0.00
13.13	1.79	22.85	1.96	139.75	2.00	18.28	0.00	0.00
13.15	1.97	25.12	1.82	108.53	2.00	21.40	0.00	0.00
13.17	2.13	27.10	1.85	99.94	2.00	23.90	0.00	0.00
13.19	2.13	27.14	1.97	111.18	2.00	23.95	0.00	0.00
13.21	2.03	25.81	2.08	130.90	2.00	22.29	0.00	0.00
13.23	1.86	23.54	2.16	158.52	2.00	19.25	0.00	0.00
13.25	1.81	22.89	2.20	168.80	2.00	18.34	0.00	0.00
13.27	1.85	23.41	2.18	161.35	2.00	19.08	0.00	0.00
13.29	1.95	24.60	2.15	148.38	2.00	20.71	0.00	0.00
13.31	2.06	25.96	2.15	137.54	2.00	22.49	0.00	0.00
13.33	2.47	31.13	1.95	89.77	2.00	28.49	0.00	0.00
13.35	3.06	38.18	1.52	84.01	2.00	35.22	0.00	0.00
13.37	3.57	44.20	1.26	79.55	2.00	40.05	0.00	0.00
13.39	3.63	44.70	1.08	74.62	2.00	40.42	0.00	0.00
13.41	3.37	41.61	1.23	76.95	2.00	38.06	0.00	0.00
13.43	3.02	37.44	1.45	81.57	2.00	34.57	0.00	0.00
13.45	2.72	33.93	1.85	92.16	2.00	31.33	0.00	0.00
13.47	2.55	31.91	2.20	108.39	2.00	29.30	0.00	0.00
13.49	2.42	30.25	2.54	150.47	2.00	27.54	0.00	0.00
13.51	2.21	27.70	2.82	203.52	2.00	24.63	0.00	0.00
13.53	2.02	25.26	3.03	257.01	2.00	21.59	0.00	0.00
13.55	1.88	23.39	3.11	118.90	2.00	19.04	0.05	0.00
13.57	1.85	22.86	3.07	117.38	2.00	18.28	0.05	0.00
13.59	1.84	22.68	2.88	112.75	2.00	18.03	0.05	0.00
13.61	1.92	23.59	2.60	215.58	2.00	19.32	0.00	0.00
13.63	2.28	27.93	2.24	133.40	2.00	24.90	0.00	0.00
13.65	2.71	33.18	2.04	97.67	2.00	30.59	0.00	0.00
13.67	2.94	35.92	1.84	92.72	2.00	33.20	0.00	0.00
13.69	2.85	34.73	1.80	91.05	2.00	32.10	0.00	0.00
13.71	2.65	32.14	1.86	91.55	2.00	29.54	0.00	0.00
13.73	2.50	30.51	2.20	115.46	2.00	27.81	0.00	0.00
13.75	2.30	28.05	2.72	188.06	2.00	25.04	0.00	0.00
13.77	2.08	25.41	3.31	125.99	2.00	21.77	0.05	0.00
13.79	1.87	22.82	3.76	132.78	2.00	18.23	0.05	0.00
13.81	1.76	21.37	3.80	131.63	2.00	16.07	0.06	0.00
13.83	1.70	20.53	3.62	126.54	2.00	14.75	0.06	0.00
13.85	1.69	20.29	3.34	120.26	2.00	14.35	0.06	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
13.87	1.75	20.93	2.99	113.42	2.00	15.38	0.06	0.00
13.89	2.03	24.30	2.55	200.66	2.00	20.30	0.00	0.00
13.91	2.35	28.08	2.24	132.99	2.00	25.07	0.00	0.00
13.93	2.61	31.18	2.06	99.52	2.00	28.53	0.00	0.00
13.95	2.69	32.09	2.01	90.99	2.00	29.48	0.00	0.00
13.97	2.77	32.95	1.99	95.94	2.00	30.35	0.00	0.00
13.99	2.88	34.24	1.98	96.40	2.00	31.63	0.00	0.00
14.01	2.95	34.95	1.97	96.20	2.00	32.30	0.00	0.00
14.03	2.93	34.71	1.98	96.38	2.00	32.08	0.00	0.00
14.05	2.83	33.44	2.02	97.13	2.00	30.84	0.00	0.00
14.07	2.66	31.44	2.18	109.13	2.00	28.81	0.00	0.00
14.09	2.54	29.98	2.35	132.62	2.00	27.24	0.00	0.00
14.11	2.71	31.90	2.24	111.93	2.00	29.29	0.00	0.00
14.13	2.93	34.41	2.13	100.90	2.00	31.79	0.00	0.00
14.15	3.04	35.66	2.03	98.46	2.00	32.97	0.00	0.00
14.17	2.91	34.11	2.21	100.21	2.00	31.50	0.00	0.00
14.19	2.84	33.35	2.40	119.82	2.00	30.75	0.00	0.00
14.21	2.86	33.50	2.48	126.63	2.00	30.90	0.00	0.00
14.23	2.70	31.60	2.62	151.28	2.00	28.98	0.00	0.00
14.25	2.43	28.29	2.73	186.78	2.00	25.33	0.00	0.00
14.27	2.22	25.76	2.90	233.87	2.00	22.23	0.00	0.00
14.29	2.24	25.83	2.79	217.09	2.00	22.32	0.00	0.00
14.31	2.30	26.49	2.71	199.92	2.00	23.16	0.00	0.00
14.33	2.25	25.86	2.73	209.60	2.00	22.36	0.00	0.00
14.35	2.14	24.49	2.87	244.24	2.00	20.56	0.00	0.00
14.37	2.08	23.73	2.94	115.28	2.00	19.52	0.05	0.00
14.39	2.11	24.15	2.92	115.33	2.00	20.10	0.05	0.00
14.41	2.28	26.03	2.72	206.31	2.00	22.58	0.00	0.00
14.43	2.50	28.61	2.51	158.27	2.00	25.69	0.00	0.00
14.45	2.80	32.02	2.29	116.33	2.00	29.41	0.00	0.00
14.47	3.12	35.61	2.10	100.71	2.00	32.92	0.00	0.00
14.49	3.28	37.37	1.98	97.94	2.00	34.51	0.00	0.00
14.51	3.36	38.22	1.89	95.73	2.00	35.25	0.00	0.00
14.53	3.38	38.32	1.82	93.48	2.00	35.34	0.00	0.00
14.55	3.50	39.53	1.73	91.31	2.00	36.36	0.00	0.00
14.57	3.59	40.49	1.65	89.23	2.00	37.16	0.00	0.00
14.59	3.48	39.18	1.55	85.61	2.00	36.07	0.00	0.00
14.61	3.35	37.48	1.48	82.40	2.00	34.61	0.00	0.00
14.63	2.95	33.07	1.81	90.71	2.00	30.48	0.00	0.00
14.65	2.63	29.46	2.38	139.24	2.00	26.66	0.00	0.00
14.67	2.21	24.66	3.16	121.52	2.00	20.79	0.05	0.00
14.69	2.06	22.83	3.21	120.69	2.00	18.25	0.05	0.00
14.71	2.08	23.02	2.98	115.65	2.00	18.52	0.05	0.00
14.73	2.34	25.85	2.60	192.56	2.00	22.35	0.00	0.00
14.75	2.67	29.65	2.26	125.33	2.00	26.87	0.00	0.00
14.77	2.96	32.72	1.93	94.19	2.00	30.13	0.00	0.00
14.79	2.94	32.49	1.77	89.15	2.00	29.89	0.00	0.00
14.81	2.79	30.61	1.79	88.73	2.00	27.93	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
14.83	2.56	28.12	2.03	111.97	2.00	25.12	0.00	0.00
14.85	2.47	27.08	2.32	148.57	2.00	23.88	0.00	0.00
14.87	2.32	25.38	2.66	205.25	2.00	21.74	0.00	0.00
14.89	2.18	23.70	2.94	115.39	2.00	19.48	0.05	0.00
14.91	2.45	26.76	2.66	191.75	2.00	23.49	0.00	0.00
14.93	2.98	32.61	2.26	110.34	2.00	30.01	0.00	0.00
14.95	3.53	38.79	2.04	100.47	2.00	35.75	0.00	0.00
14.97	3.59	39.29	1.99	99.19	2.00	36.16	0.00	0.00
14.99	3.31	36.11	2.00	97.85	2.00	33.38	0.00	0.00
15.01	2.86	30.94	1.97	92.59	2.00	28.28	0.00	0.00
15.03	2.31	24.82	2.34	168.72	2.00	21.00	0.00	0.00
15.05	2.06	21.91	2.69	107.51	2.00	16.89	0.06	0.00
15.07	2.07	22.01	2.88	112.23	2.00	17.03	0.06	0.00
15.09	2.24	23.94	2.64	218.38	2.00	19.81	0.00	0.00
15.11	2.21	23.56	2.66	224.59	2.00	19.29	0.00	0.00
15.13	2.13	22.60	2.62	106.60	2.00	17.92	0.05	0.00
15.15	2.15	22.70	2.50	212.35	2.00	18.05	0.00	0.00
15.17	2.16	22.76	2.36	192.09	2.00	18.15	0.00	0.00
15.19	2.04	21.41	2.41	215.69	2.00	16.13	0.00	0.00
15.21	1.87	19.48	2.59	102.88	2.00	13.01	0.06	0.00
15.23	1.63	16.70	2.92	106.71	2.00	7.93	0.07	0.00
15.25	1.44	14.58	3.09	106.79	2.00	3.44	0.07	0.00
15.27	1.27	12.51	3.25	105.63	2.00	0.00	0.08	0.00
15.29	1.33	13.29	2.83	99.79	2.00	0.38	0.08	0.00
15.31	1.52	15.34	2.48	95.99	2.00	5.12	0.07	0.00
15.33	1.72	17.49	2.19	91.71	2.00	9.45	0.07	0.00
15.35	1.73	17.65	2.17	91.52	2.00	9.75	0.07	0.00
15.37	1.56	15.67	2.32	92.79	2.00	5.83	0.07	0.00
15.39	1.34	13.24	2.56	94.60	2.00	0.26	0.08	0.00
15.41	1.24	12.02	2.58	93.08	2.00	0.00	0.08	0.00
15.43	1.36	13.31	2.22	87.98	2.00	0.45	0.08	0.00
15.45	1.70	17.12	1.87	83.74	2.00	8.74	0.07	0.00
15.47	2.15	21.97	1.57	104.04	2.00	16.98	0.00	0.00
15.49	2.38	24.48	1.54	85.56	2.00	20.55	0.00	0.00
15.51	2.51	25.83	1.52	77.10	2.00	22.33	0.00	0.00
15.53	2.77	28.62	1.42	76.83	2.00	25.71	0.00	0.00
15.55	3.14	32.56	1.36	76.47	2.00	29.97	0.00	0.00
15.57	3.31	34.33	1.37	77.56	2.00	31.71	0.00	0.00
15.59	3.26	33.76	1.45	79.77	2.00	31.15	0.00	0.00
15.61	3.28	33.92	1.49	81.29	2.00	31.31	0.00	0.00
15.63	3.29	34.01	1.60	84.57	2.00	31.41	0.00	0.00
15.65	3.07	31.66	1.78	89.10	2.00	29.04	0.00	0.00
15.67	2.64	27.00	2.14	129.76	2.00	23.78	0.00	0.00
15.69	2.24	22.62	2.63	106.78	2.00	17.94	0.05	0.00
15.71	1.94	19.37	3.30	118.37	2.00	12.83	0.06	0.00
15.73	1.80	17.83	3.54	120.67	2.00	10.08	0.06	0.00
15.75	1.93	19.26	3.00	111.74	2.00	12.63	0.06	0.00
15.77	2.15	21.55	2.38	209.82	2.00	16.34	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
15.79	2.57	25.94	1.76	97.97	2.00	22.46	0.00	0.00
15.81	2.65	26.72	1.49	78.26	2.00	23.44	0.00	0.00
15.83	2.59	25.97	1.34	73.40	2.00	22.50	0.00	0.00
15.85	2.18	21.57	1.58	108.22	2.00	16.37	0.00	0.00
15.87	1.98	19.44	1.86	162.13	2.00	12.94	0.00	0.00
15.89	1.97	19.27	2.03	187.99	2.00	12.66	0.00	0.00
15.91	2.00	19.62	2.11	195.78	2.00	13.24	0.00	0.00
15.93	1.87	18.16	2.34	95.96	2.00	10.69	0.06	0.00
15.95	1.60	15.30	2.75	101.40	2.00	5.03	0.07	0.00
15.97	1.40	13.15	3.08	104.06	2.00	0.03	0.08	0.00
15.99	1.30	11.98	3.23	104.25	2.00	0.00	0.08	0.00
16.01	1.30	11.99	3.17	103.22	2.00	0.00	0.08	0.00
16.03	1.33	12.22	3.00	100.93	2.00	0.00	0.08	0.00
16.05	1.40	12.96	2.74	97.66	2.00	0.00	0.08	0.00
16.07	1.50	14.09	2.35	91.65	2.00	2.31	0.08	0.00
16.09	1.50	14.00	2.22	88.86	2.00	2.10	0.08	0.00
16.11	1.40	12.90	2.29	88.96	2.00	0.00	0.08	0.00
16.13	1.25	11.27	2.46	89.71	2.00	0.00	0.09	0.00
16.15	1.18	10.50	2.57	90.20	2.00	0.00	0.09	0.00
16.17	1.15	10.20	2.55	89.23	2.00	0.00	0.09	0.00
16.19	1.13	9.97	2.61	89.79	2.00	0.00	0.09	0.00
16.21	1.12	9.82	2.55	88.49	2.00	0.00	0.09	0.00
16.23	1.12	9.79	2.41	86.18	2.00	0.00	0.09	0.00
16.25	1.12	9.77	2.29	84.03	2.00	0.00	0.09	0.00
16.27	1.13	9.82	2.20	82.59	2.00	0.00	0.09	0.00
16.29	1.14	9.92	2.18	82.45	2.00	0.00	0.09	0.00
16.31	1.16	10.19	2.15	82.29	2.00	0.00	0.09	0.00
16.33	1.20	10.53	2.16	83.11	2.00	0.00	0.09	0.00
16.35	1.22	10.77	2.17	83.54	2.00	0.00	0.09	0.00
16.37	1.25	10.99	2.18	84.19	2.00	0.00	0.09	0.00
16.39	1.28	11.34	2.17	84.42	2.00	0.00	0.09	0.00
16.41	1.33	11.82	2.18	85.35	2.00	0.00	0.08	0.00
16.43	1.37	12.22	2.22	86.61	2.00	0.00	0.08	0.00
16.45	1.48	13.34	2.14	86.45	2.00	0.50	0.08	0.00
16.47	1.65	15.06	2.01	85.55	2.00	4.52	0.07	0.00
16.49	1.84	17.02	1.94	85.61	2.00	8.56	0.07	0.00
16.51	1.94	18.11	2.04	88.76	2.00	10.59	0.06	0.00
16.53	1.92	17.85	2.12	90.40	2.00	10.13	0.06	0.00
16.55	1.72	15.70	2.22	90.68	2.00	5.89	0.07	0.00
16.57	1.48	13.19	2.12	85.87	2.00	0.13	0.08	0.00
16.59	1.26	10.89	2.14	83.20	2.00	0.00	0.09	0.00
16.61	1.16	9.90	2.23	83.31	2.00	0.00	0.09	0.00
16.63	1.08	9.02	2.87	91.74	2.00	0.00	0.10	0.00
16.65	1.02	8.34	3.56	99.49	2.00	0.00	0.10	0.00
16.67	0.97	7.83	4.15	104.95	2.00	0.00	0.10	0.00
16.69	0.94	7.46	4.25	104.70	2.00	0.00	0.10	0.00
16.71	0.92	7.29	4.20	103.41	2.00	0.00	0.11	0.00
16.73	0.92	7.31	3.80	98.85	2.00	0.00	0.11	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
16.75	0.93	7.34	3.29	92.75	2.00	0.00	0.11	0.00
16.77	0.93	7.33	2.71	85.08	2.00	0.00	0.11	0.00
16.79	0.92	7.27	2.44	80.94	2.00	0.00	0.11	0.00
16.81	0.93	7.30	2.31	79.21	2.00	0.00	0.11	0.00
16.83	0.93	7.32	2.31	79.24	2.00	0.00	0.11	0.00
16.85	0.93	7.29	2.30	78.96	2.00	0.00	0.11	0.00
16.87	0.92	7.22	2.32	79.11	2.00	0.00	0.11	0.00
16.89	0.91	7.08	2.33	78.95	2.00	0.00	0.11	0.00
16.91	0.92	7.13	2.30	78.58	2.00	0.00	0.11	0.00
16.93	0.94	7.30	2.21	77.62	2.00	0.00	0.11	0.00
16.95	0.96	7.54	2.13	76.90	2.00	0.00	0.10	0.00
16.97	0.97	7.62	2.09	76.48	2.00	0.00	0.10	0.00
16.99	0.95	7.42	2.16	77.12	2.00	0.00	0.10	0.00
17.01	0.94	7.33	2.22	77.95	2.00	0.00	0.11	0.00
17.03	0.94	7.29	2.29	78.91	2.00	0.00	0.11	0.00
17.05	0.96	7.43	2.31	79.50	2.00	0.00	0.10	0.00
17.07	0.97	7.54	2.30	79.68	2.00	0.00	0.10	0.00
17.09	0.97	7.58	2.30	79.69	2.00	0.00	0.10	0.00
17.11	0.99	7.75	2.24	79.22	2.00	0.00	0.10	0.00
17.13	1.01	7.88	2.18	78.48	2.00	0.00	0.10	0.00
17.15	1.02	7.99	2.09	77.28	2.00	0.00	0.10	0.00
17.17	1.02	8.01	1.99	75.74	2.00	0.00	0.10	0.00
17.19	1.04	8.15	1.89	74.25	2.00	0.00	0.10	0.00
17.21	1.07	8.41	1.81	73.23	2.00	0.00	0.10	0.00
17.23	1.08	8.52	1.79	73.09	2.00	0.00	0.10	0.00
17.25	1.07	8.41	1.82	73.43	2.00	0.00	0.10	0.00
17.27	1.05	8.25	1.87	74.10	2.00	0.00	0.10	0.00
17.29	1.06	8.31	1.88	74.26	2.00	0.00	0.10	0.00
17.31	1.07	8.42	1.85	74.06	2.00	0.00	0.10	0.00
17.33	1.08	8.45	1.82	73.53	2.00	0.00	0.10	0.00
17.35	1.08	8.46	1.80	73.15	2.00	0.00	0.10	0.00
17.37	1.10	8.60	1.78	72.96	2.00	0.00	0.10	0.00
17.39	1.12	8.81	1.74	72.68	2.00	0.00	0.10	0.00
17.41	1.14	8.98	1.70	72.16	2.00	0.00	0.10	0.00
17.43	1.15	9.13	1.68	71.85	2.00	0.00	0.10	0.00
17.45	1.18	9.35	1.65	71.71	2.00	0.00	0.09	0.00
17.47	1.23	9.88	1.62	71.75	2.00	0.00	0.09	0.00
17.49	1.29	10.43	1.57	71.24	2.00	0.00	0.09	0.00
17.51	1.34	10.86	1.53	70.90	2.00	0.00	0.09	0.00
17.53	1.34	10.89	1.57	71.89	2.00	0.00	0.09	0.00
17.55	1.32	10.66	1.72	74.68	2.00	0.00	0.09	0.00
17.57	1.28	10.25	1.91	78.02	2.00	0.00	0.09	0.00
17.59	1.22	9.67	2.14	81.26	2.00	0.00	0.09	0.00
17.61	1.18	9.19	2.35	84.01	2.00	0.00	0.09	0.00
17.63	1.16	9.00	2.51	86.23	2.00	0.00	0.10	0.00
17.65	1.19	9.31	2.48	86.42	2.00	0.00	0.09	0.00
17.67	1.30	10.36	2.27	84.77	2.00	0.00	0.09	0.00
17.69	2.35	20.57	1.19	75.23	2.00	14.81	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
17.71	7.63	72.10	0.35	72.10	2.00	56.20	0.00	0.00
17.73	14.13	135.74	0.23	135.74	2.00	77.09	0.00	0.00
17.75	19.99	193.07	0.20	193.07	2.00	88.71	0.00	0.00
17.77	21.46	207.31	0.24	207.31	2.00	91.06	0.00	0.00
17.79	22.52	217.50	0.27	217.50	2.00	92.65	0.00	0.00
17.81	23.03	222.23	0.31	222.23	2.00	93.36	0.00	0.00
17.83	24.20	233.41	0.34	233.41	2.00	94.98	0.00	0.00
17.85	24.57	236.87	0.36	236.87	2.00	95.46	0.00	0.00
17.87	25.04	241.30	0.35	241.30	2.00	96.07	0.00	0.00
17.89	24.41	234.93	0.36	234.93	2.00	95.19	0.00	0.00
17.91	23.39	224.72	0.37	224.72	2.00	93.72	0.00	0.00
17.93	21.92	210.10	0.45	210.10	2.00	91.50	0.00	0.00
17.95	20.63	197.12	0.56	197.12	2.00	89.40	0.00	0.00
17.97	19.93	189.90	0.76	189.90	2.00	88.17	0.00	0.00
17.99	20.16	191.76	0.86	191.76	2.00	88.49	0.00	0.00
18.01	21.35	203.06	0.85	203.06	2.00	90.38	0.00	0.00
18.03	22.40	213.18	0.74	213.18	2.00	91.99	0.00	0.00
18.05	23.27	221.59	0.66	221.59	2.00	93.26	0.00	0.00
18.07	23.65	225.13	0.63	225.13	2.00	93.79	0.00	0.00
18.09	23.73	225.84	0.57	225.84	2.00	93.89	0.00	0.00
18.11	23.82	226.37	0.59	226.37	2.00	93.97	0.00	0.00
18.13	23.94	227.37	0.60	227.37	2.00	94.11	0.00	0.00
18.15	24.34	230.90	0.65	230.90	2.00	94.62	0.00	0.00
18.17	24.59	233.07	0.64	233.07	2.00	94.93	0.00	0.00
18.19	24.12	228.27	0.65	228.27	2.00	94.24	0.00	0.00
18.21	23.37	220.96	0.63	220.96	2.00	93.17	0.00	0.00
18.23	21.83	205.97	0.59	205.97	2.00	90.85	0.00	0.00
18.25	20.91	197.01	0.58	197.01	2.00	89.38	0.00	0.00
18.27	20.17	189.56	0.65	189.56	2.00	88.11	0.00	0.00
18.29	20.46	191.97	0.74	191.97	2.00	88.53	0.00	0.00
18.31	20.50	191.91	0.83	191.91	2.00	88.52	0.00	0.00
18.33	19.87	185.69	0.86	185.69	2.00	87.43	0.00	0.00
18.35	19.03	177.20	0.98	184.01	2.00	85.88	0.00	0.00
18.37	17.66	163.59	1.28	193.98	2.00	83.25	0.00	0.00
18.39	17.23	158.78	1.71	199.99	2.00	82.26	0.00	0.00
18.41	17.40	159.86	2.10	208.94	2.00	82.48	0.00	0.00
18.43	19.78	181.91	2.17	234.44	2.00	86.75	0.00	0.00
18.45	22.16	203.98	2.20	259.07	2.00	90.53	0.00	0.00
18.47	24.17	222.54	2.23	280.04	2.00	93.40	0.00	0.00
18.49	25.39	233.41	2.39	295.59	2.00	94.98	0.00	0.00
18.51	27.27	250.60	2.43	315.59	2.00	97.32	0.00	0.00
18.53	28.51	261.74	2.52	329.95	2.00	98.76	0.00	0.00
18.55	30.77	282.81	2.34	348.12	2.00	100.00	0.00	0.00
18.57	32.47	298.51	2.24	361.11	2.00	100.00	0.00	0.00
18.59	34.57	318.01	2.08	373.32	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)

Total estimated displacement: 0.01

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
5.23	0.20	3.73	22.06	82.29	3.52	0.12	1.74
5.25	0.25	4.57	20.15	92.03	3.47	0.12	2.10
5.27	0.27	5.00	19.10	95.55	3.43	0.24	2.26
5.29	0.30	5.59	17.61	98.38	3.39	0.17	2.49
5.31	0.29	5.40	17.21	92.99	3.37	0.16	2.38
5.33	0.52	10.04	8.81	88.51	3.00	0.17	4.35
5.35	1.05	20.47	3.92	80.26	2.62	0.79	0.79
5.37	1.69	33.12	2.25	74.64	2.38	0.37	0.69
5.39	2.23	43.77	1.75	76.46	2.25	0.43	0.70
5.41	2.56	50.17	1.57	78.80	2.18	0.53	0.70
5.43	2.75	53.97	1.53	82.54	2.16	0.71	0.71
5.45	2.78	54.56	1.59	87.02	2.19	0.72	0.72
5.47	2.62	51.27	1.85	94.69	2.28	0.74	0.74
5.49	2.42	47.34	2.21	104.73	2.37	0.76	0.76
5.51	2.27	44.41	2.59	114.91	2.44	0.77	0.77
5.53	2.18	42.75	2.86	122.35	2.48	0.79	0.79
5.55	2.10	41.13	3.16	129.91	2.53	0.81	0.81
5.57	1.98	38.75	3.48	134.70	2.57	0.85	0.85
5.59	1.90	37.21	3.63	135.00	2.59	0.87	0.87
5.61	1.88	36.64	3.54	129.76	2.57	0.85	0.85
5.63	1.86	36.33	3.46	125.77	2.57	0.84	0.84
5.65	1.88	36.74	3.31	121.66	2.55	0.81	0.81
5.67	1.94	37.94	3.13	118.86	2.52	0.79	0.79
5.69	2.05	40.12	2.99	119.87	2.50	0.77	0.77
5.71	2.13	41.53	3.01	125.06	2.50	0.78	0.78
5.73	2.15	41.92	3.19	133.52	2.53	0.82	0.82
5.75	2.05	40.01	3.64	145.59	2.59	0.89	0.89
5.77	2.03	39.63	3.89	154.32	2.62	0.92	0.92
5.79	2.02	39.39	4.07	160.46	2.64	0.95	0.95
5.81	2.04	39.86	4.04	160.87	2.63	0.95	0.95
5.83	2.00	39.01	4.15	161.96	2.64	0.96	0.96
5.85	1.97	38.50	4.11	158.21	2.64	0.95	0.95
5.87	1.93	37.64	4.12	154.94	2.64	0.95	0.95
5.89	1.86	36.17	4.16	150.50	2.65	0.95	0.95
5.91	1.77	34.40	4.43	152.48	2.67	0.98	0.98
5.93	1.77	34.44	4.43	152.41	2.67	0.97	0.97
5.95	1.85	35.93	4.25	152.78	2.65	0.96	0.96
5.97	1.99	38.77	3.87	150.10	2.61	0.92	0.92
5.99	2.10	40.98	3.61	147.89	2.58	0.89	0.89
6.01	2.18	42.56	3.43	146.18	2.56	0.86	0.86
6.03	2.23	43.47	3.29	143.21	2.54	0.84	0.84
6.05	2.33	45.42	3.15	143.25	2.52	0.83	0.83
6.07	2.35	45.82	3.14	144.10	2.52	0.83	0.83
6.09	2.29	44.64	3.33	148.61	2.55	0.86	0.86
6.11	2.14	41.57	3.72	154.48	2.60	0.91	0.91
6.13	2.01	39.08	4.11	160.71	2.64	0.96	0.96
6.15	1.90	36.89	4.53	167.21	2.68	1.01	1.01
6.17	1.80	34.97	4.85	169.77	2.71	0.85	0.85

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.19	1.70	33.02	5.21	172.15	2.75	0.86	0.86
6.21	1.64	31.67	5.49	173.99	2.77	0.86	0.86
6.23	1.57	30.42	5.78	175.74	2.79	0.86	0.86
6.25	1.50	29.04	6.09	176.97	2.82	0.86	0.86
6.27	1.40	27.04	6.55	177.11	2.85	0.86	0.86
6.29	1.31	25.30	7.05	178.41	2.89	0.86	0.86
6.31	1.24	23.92	7.59	181.49	2.93	0.87	0.87
6.33	1.17	22.46	8.25	185.35	2.97	0.87	0.87
6.35	1.13	21.59	8.68	187.36	2.99	0.87	0.87
6.37	1.12	21.43	8.79	188.42	3.00	0.81	4.58
6.39	1.13	21.59	8.85	191.04	3.00	0.84	4.57
6.41	1.09	20.84	9.19	191.42	3.02	0.87	4.37
6.43	1.03	19.59	9.61	188.22	3.05	0.79	4.07
6.45	0.99	18.85	9.56	180.11	3.04	0.72	3.88
6.47	1.00	18.98	9.07	172.23	3.02	0.67	3.87
6.49	1.03	19.55	8.39	164.00	2.98	0.85	0.85
6.51	1.09	20.89	7.28	152.16	2.91	0.83	0.83
6.53	1.24	23.65	5.83	137.92	2.80	0.81	0.81
6.55	1.47	28.20	4.36	122.89	2.67	0.92	0.92
6.57	1.81	34.96	3.14	109.85	2.52	0.77	0.77
6.59	2.08	40.40	2.60	104.91	2.44	0.76	0.76
6.61	2.25	43.61	2.45	106.65	2.41	0.76	0.76
6.63	2.22	43.12	2.71	116.75	2.46	0.78	0.78
6.65	2.12	41.12	3.14	129.15	2.52	0.80	0.80
6.67	2.04	39.40	3.52	138.54	2.57	0.86	0.86
6.69	1.81	35.03	4.41	154.47	2.67	0.98	0.98
6.71	1.59	30.54	5.60	171.11	2.78	0.85	0.85
6.73	1.34	25.65	7.18	184.23	2.90	0.87	0.87
6.75	1.28	24.54	7.36	180.75	2.91	0.87	0.87
6.77	1.34	25.71	6.65	170.98	2.86	0.85	0.85
6.79	1.35	25.80	6.48	167.23	2.85	0.85	0.85
6.81	1.30	24.82	6.71	166.65	2.87	0.85	0.85
6.83	1.18	22.42	7.33	164.43	2.91	0.85	0.85
6.85	1.11	21.08	7.48	157.65	2.92	0.84	0.84
6.87	1.10	20.83	7.14	148.63	2.90	0.83	0.83
6.89	1.30	24.79	5.41	134.20	2.76	0.80	0.80
6.91	2.64	51.20	1.96	100.16	2.31	0.75	0.75
6.93	4.69	91.71	1.28	117.25	1.96	0.78	0.78
6.95	7.72	151.54	1.00	151.54	1.69	0.83	0.83
6.97	10.30	199.97	1.00	199.97	1.53	0.89	0.89
6.99	12.56	228.50	1.00	228.50	1.42	0.92	0.92
7.01	14.22	246.57	1.00	246.57	1.35	0.93	0.93
7.03	15.52	262.16	1.00	262.16	1.31	0.95	0.95
7.05	16.71	277.73	1.00	277.73	1.28	0.96	0.96
7.07	17.67	290.44	1.00	290.44	1.27	0.97	0.97
7.09	18.65	303.37	1.00	303.37	1.25	0.98	0.98
7.11	19.61	316.56	1.00	316.56	1.24	0.99	0.99
7.13	20.67	331.69	1.00	331.69	1.24	1.00	1.00

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.15	21.55	344.99	1.00	344.99	1.24	1.01	1.01
7.17	22.23	355.69	1.00	355.69	1.24	1.02	1.02
7.19	22.45	361.69	1.00	361.69	1.26	1.02	1.02
7.21	22.55	364.62	1.00	364.62	1.27	1.02	1.02
7.23	22.52	366.23	1.00	366.23	1.28	1.03	1.03
7.25	21.28	355.82	1.00	355.82	1.34	1.02	1.02
7.27	21.05	352.02	1.00	352.02	1.35	1.02	1.02
7.29	20.93	348.53	1.00	348.53	1.34	1.01	1.01
7.31	22.09	355.48	1.00	355.48	1.28	1.02	1.02
7.33	22.14	356.31	1.00	356.31	1.29	1.02	1.02
7.35	21.80	352.20	1.00	352.20	1.30	1.02	1.02
7.37	21.20	345.04	1.00	345.04	1.32	1.01	1.01
7.39	20.43	334.90	1.00	334.90	1.34	1.00	1.00
7.41	19.71	325.50	1.00	325.50	1.36	1.00	1.00
7.43	18.90	314.92	1.00	314.92	1.38	0.99	0.99
7.45	17.99	302.50	1.00	302.50	1.41	0.98	0.98
7.47	16.29	279.56	1.00	279.56	1.45	0.96	0.96
7.49	14.18	250.93	1.00	250.93	1.52	0.94	0.94
7.51	11.67	216.37	1.00	216.37	1.61	0.90	0.90
7.53	9.54	185.80	1.04	192.71	1.72	0.88	0.88
7.55	7.59	148.75	1.21	180.62	1.87	0.87	0.87
7.57	6.06	118.54	1.33	157.41	2.02	0.84	0.84
7.59	4.78	93.26	1.60	149.01	2.19	0.83	0.83
7.61	3.95	76.92	2.08	159.79	2.34	0.84	0.84
7.63	3.40	65.97	2.65	175.07	2.45	0.86	0.86
7.65	3.16	61.19	2.99	183.25	2.50	0.86	0.86
7.67	2.90	56.09	3.42	191.60	2.56	0.92	0.92
7.69	2.63	50.74	3.97	201.23	2.62	0.99	0.99
7.71	2.42	46.66	4.47	208.59	2.68	1.05	1.05
7.73	2.29	44.10	4.70	207.31	2.70	1.08	1.08
7.75	2.21	42.47	4.66	197.79	2.70	1.06	1.06
7.77	2.15	41.33	4.26	176.17	2.66	0.99	0.99
7.79	2.10	40.24	3.83	154.16	2.61	0.92	0.92
7.81	2.05	39.22	3.43	134.62	2.56	0.85	0.85
7.83	2.02	38.59	3.24	124.85	2.54	0.81	0.81
7.85	2.00	38.27	3.08	117.80	2.51	0.78	0.78
7.87	1.98	37.92	2.98	113.10	2.50	0.76	0.76
7.89	1.93	36.85	3.05	112.39	2.51	0.77	0.77
7.91	1.84	35.11	3.26	114.37	2.54	0.79	0.79
7.93	1.80	34.36	3.43	117.79	2.56	0.82	0.82
7.95	1.80	34.26	3.53	120.97	2.57	0.84	0.84
7.97	1.79	34.12	3.63	123.98	2.59	0.85	0.85
7.99	1.75	33.29	3.80	126.63	2.61	0.87	0.87
8.01	1.69	32.14	4.03	129.66	2.63	0.90	0.90
8.03	1.68	31.79	4.12	130.95	2.64	0.91	0.91
8.05	1.68	31.94	4.10	130.86	2.64	0.91	0.91
8.07	1.66	31.45	4.17	131.25	2.65	0.92	0.92
8.09	1.56	29.54	4.52	133.38	2.68	0.95	0.95

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.11	1.42	26.64	5.12	136.39	2.74	0.81	0.81
8.13	1.31	24.48	5.64	138.02	2.78	0.81	0.81
8.15	1.26	23.56	5.88	138.52	2.80	0.81	0.81
8.17	1.45	27.25	4.82	131.46	2.71	0.80	0.80
8.19	2.05	39.06	2.92	114.06	2.49	0.77	0.77
8.21	2.74	52.78	1.98	104.25	2.31	0.76	0.76
8.23	3.21	62.07	1.69	104.64	2.23	0.76	0.76
8.25	3.19	61.56	1.77	109.15	2.26	0.76	0.76
8.27	2.92	56.35	2.03	114.25	2.33	0.77	0.77
8.29	2.53	48.52	2.54	123.31	2.43	0.79	0.79
8.31	2.10	40.11	3.31	132.72	2.55	0.83	0.83
8.33	1.68	31.76	4.64	147.19	2.69	0.99	0.99
8.35	1.35	25.23	6.45	162.84	2.85	0.84	0.84
8.37	1.10	20.35	8.77	178.48	3.00	0.86	0.86
8.39	0.98	17.96	10.41	186.96	3.09	0.68	1.89
8.41	0.92	16.66	11.39	189.85	3.14	0.66	1.75
8.43	0.88	15.86	11.81	187.37	3.16	0.65	1.66
8.45	0.82	14.73	12.41	182.86	3.19	0.61	1.53
8.47	0.69	12.22	13.66	166.83	3.24	0.55	1.26
8.49	0.67	11.73	12.89	151.18	3.21	0.31	1.21
8.51	0.68	11.91	11.36	135.27	3.14	0.34	1.22
8.53	0.80	14.32	9.09	130.26	3.02	0.31	1.46
8.55	0.89	16.06	7.62	122.38	2.93	0.79	0.79
8.57	1.05	19.30	5.81	112.19	2.80	0.77	0.77
8.59	1.22	22.64	4.66	105.50	2.70	0.91	0.91
8.61	1.35	25.18	4.13	104.09	2.64	0.86	0.86
8.63	1.39	25.92	4.19	108.72	2.65	0.88	0.88
8.65	1.39	25.95	4.37	113.31	2.67	0.90	0.90
8.67	1.38	25.75	4.53	116.59	2.68	0.92	0.92
8.69	1.39	25.98	4.54	118.08	2.68	0.93	0.93
8.71	1.42	26.58	4.44	118.06	2.67	0.92	0.92
8.73	1.47	27.43	4.28	117.28	2.66	0.90	0.90
8.75	1.50	28.06	4.11	115.46	2.64	0.88	0.88
8.77	1.51	28.23	4.00	112.89	2.63	0.87	0.87
8.79	1.50	28.04	3.88	108.82	2.61	0.85	0.85
8.81	1.49	27.88	3.70	103.29	2.59	0.82	0.82
8.83	1.49	27.85	3.54	98.47	2.57	0.79	0.79
8.85	1.49	27.83	3.41	94.90	2.56	0.77	0.77
8.87	1.48	27.55	3.42	94.28	2.56	0.77	0.77
8.89	1.45	27.08	3.49	94.50	2.57	0.78	0.78
8.91	1.42	26.50	3.60	95.47	2.58	0.80	0.80
8.93	1.40	26.05	3.68	95.86	2.59	0.80	0.80
8.95	1.39	25.77	3.73	96.03	2.60	0.81	0.81
8.97	1.38	25.64	3.73	95.64	2.60	0.81	0.81
8.99	1.39	25.84	3.66	94.63	2.59	0.80	0.80
9.01	1.41	26.28	3.54	92.94	2.57	0.78	0.78
9.03	1.44	26.83	3.39	91.07	2.56	0.77	0.77
9.05	1.46	27.11	3.29	89.26	2.54	0.75	0.75

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.07	1.46	27.16	3.25	88.16	2.54	0.74	0.74
9.09	1.46	27.13	3.22	87.42	2.53	0.74	0.74
9.11	1.45	27.06	3.25	88.02	2.54	0.74	0.74
9.13	1.44	26.85	3.33	89.55	2.55	0.76	0.76
9.15	1.43	26.59	3.44	91.60	2.56	0.77	0.77
9.17	1.43	26.62	3.51	93.56	2.57	0.78	0.78
9.19	1.46	27.14	3.51	95.30	2.57	0.79	0.79
9.21	1.50	27.94	3.46	96.74	2.57	0.78	0.78
9.23	1.53	28.55	3.42	97.59	2.56	0.78	0.78
9.25	1.55	28.82	3.38	97.46	2.55	0.78	0.78
9.27	1.54	28.77	3.44	98.98	2.56	0.79	0.79
9.29	1.54	28.69	3.51	100.78	2.57	0.80	0.80
9.31	1.54	28.75	3.56	102.48	2.58	0.81	0.81
9.33	1.54	28.75	3.57	102.67	2.58	0.81	0.81
9.35	1.54	28.57	3.61	103.11	2.58	0.81	0.81
9.37	1.52	28.22	3.67	103.50	2.59	0.82	0.82
9.39	1.51	28.13	3.66	102.92	2.59	0.82	0.82
9.41	1.52	28.32	3.57	101.20	2.58	0.80	0.80
9.43	1.55	28.81	3.44	99.16	2.56	0.79	0.79
9.45	1.60	29.78	3.25	96.88	2.54	0.76	0.76
9.47	1.66	30.92	3.07	94.92	2.51	0.74	0.74
9.49	1.71	31.98	2.93	93.86	2.49	0.74	0.74
9.51	1.75	32.66	2.85	93.24	2.48	0.74	0.74
9.53	1.77	33.14	2.80	92.70	2.47	0.73	0.73
9.55	1.79	33.45	2.74	91.79	2.46	0.73	0.73
9.57	1.78	33.28	2.76	91.75	2.47	0.73	0.73
9.59	1.75	32.79	2.82	92.58	2.48	0.73	0.73
9.61	1.71	31.91	2.96	94.58	2.50	0.74	0.74
9.63	1.66	30.95	3.17	98.27	2.53	0.76	0.76
9.65	1.60	29.76	3.46	102.81	2.56	0.79	0.79
9.67	1.54	28.54	3.77	107.53	2.60	0.84	0.84
9.69	1.55	28.68	3.74	107.38	2.60	0.83	0.83
9.71	1.54	28.63	3.74	107.10	2.60	0.83	0.83
9.73	1.53	28.28	3.74	105.91	2.60	0.83	0.83
9.75	1.44	26.52	4.07	107.82	2.64	0.86	0.86
9.77	1.37	25.13	4.32	108.46	2.66	0.89	0.89
9.79	1.31	24.03	4.51	108.42	2.68	0.90	0.90
9.81	1.27	23.21	4.63	107.52	2.69	0.91	0.91
9.83	1.24	22.53	4.70	106.00	2.70	0.92	0.92
9.85	1.21	22.04	4.74	104.47	2.70	0.76	0.76
9.87	1.18	21.41	4.87	104.28	2.72	0.76	0.76
9.89	1.14	20.54	5.11	105.02	2.74	0.76	0.76
9.91	1.09	19.59	5.43	106.33	2.76	0.76	0.76
9.93	1.02	18.30	5.85	107.00	2.80	0.76	0.76
9.95	0.95	16.89	6.35	107.23	2.84	0.76	0.76
9.97	0.83	14.54	7.54	109.58	2.92	0.77	0.77
9.99	0.72	12.21	9.27	113.19	3.03	0.21	0.96
10.01	0.61	10.05	11.57	116.32	3.15	0.22	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.03	0.61	10.10	11.29	114.09	3.13	0.21	0.79
10.05	0.70	11.79	9.09	107.21	3.02	0.18	0.92
10.07	0.81	14.08	6.99	98.42	2.89	0.75	0.75
10.09	0.88	15.43	6.08	93.82	2.82	0.74	0.74
10.11	0.90	15.69	5.93	93.00	2.81	0.73	0.73
10.13	0.92	16.11	5.72	92.20	2.79	0.73	0.73
10.15	0.95	16.84	5.32	89.68	2.76	0.73	0.73
10.17	1.00	17.74	4.90	86.84	2.72	0.72	0.72
10.19	1.02	18.13	4.89	88.68	2.72	0.73	0.73
10.21	1.02	18.17	5.21	94.63	2.75	0.74	0.74
10.23	1.01	17.87	5.70	101.84	2.79	0.75	0.75
10.25	1.01	17.86	5.83	104.15	2.80	0.76	0.76
10.27	1.01	17.99	5.74	103.21	2.79	0.75	0.75
10.29	1.03	18.26	5.50	100.44	2.77	0.75	0.75
10.31	1.04	18.35	5.39	98.89	2.76	0.75	0.75
10.33	1.07	18.70	5.18	96.94	2.74	0.74	0.74
10.35	1.11	19.32	4.84	93.41	2.71	0.74	0.74
10.37	1.18	20.37	4.45	90.71	2.68	0.86	0.86
10.39	1.23	21.24	4.20	89.18	2.65	0.84	0.84
10.41	1.26	21.73	4.24	92.26	2.65	0.85	0.85
10.43	1.25	21.58	4.60	99.35	2.69	0.89	0.89
10.45	1.22	21.31	5.00	106.44	2.73	0.76	0.76
10.47	1.21	21.12	5.31	112.06	2.75	0.77	0.77
10.49	1.20	20.96	5.57	116.70	2.78	0.78	0.78
10.51	1.19	20.84	5.94	123.80	2.81	0.79	0.79
10.53	1.18	20.80	6.25	130.03	2.83	0.80	0.80
10.55	1.20	21.11	6.39	134.80	2.84	0.81	0.81
10.57	1.23	21.62	6.23	134.73	2.83	0.81	0.81
10.59	1.26	22.12	6.07	134.18	2.82	0.80	0.80
10.61	1.26	22.01	6.15	135.36	2.82	0.81	0.81
10.63	1.25	21.78	6.37	138.78	2.84	0.81	0.81
10.65	1.23	21.50	6.50	139.78	2.85	0.81	0.81
10.67	1.24	21.56	6.33	136.47	2.84	0.81	0.81
10.69	1.25	21.53	6.25	134.65	2.83	0.81	0.81
10.71	1.30	22.32	5.96	133.02	2.81	0.80	0.80
10.73	1.38	23.59	5.49	129.64	2.77	0.80	0.80
10.75	1.39	23.56	5.33	125.48	2.76	0.79	0.79
10.77	1.29	21.76	5.71	124.22	2.79	0.79	0.79
10.79	1.12	18.84	6.36	119.87	2.84	0.78	0.78
10.81	1.01	16.89	6.85	115.73	2.88	0.78	0.78
10.83	0.94	15.66	7.29	114.20	2.91	0.77	0.77
10.85	0.90	14.99	7.99	119.78	2.95	0.78	0.78
10.87	0.88	14.55	8.58	124.82	2.99	0.79	0.79
10.89	0.88	14.58	8.92	130.01	3.01	0.28	1.04
10.91	0.89	14.66	8.97	131.61	3.01	0.32	1.05
10.93	0.94	15.54	8.41	130.74	2.98	0.80	0.80
10.95	0.98	16.21	7.73	125.38	2.94	0.79	0.79
10.97	0.99	16.32	7.61	124.20	2.93	0.79	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.99	0.96	15.79	8.01	126.50	2.95	0.79	0.79
11.01	0.91	14.84	8.79	130.51	3.00	0.30	1.06
11.03	0.88	14.25	9.30	132.46	3.03	0.31	1.02
11.05	0.84	13.39	9.94	133.18	3.07	0.29	0.96
11.07	0.80	12.57	10.34	129.95	3.09	0.29	0.90
11.09	0.75	11.74	10.83	127.14	3.11	0.25	0.84
11.11	0.71	11.01	11.34	124.91	3.14	0.24	0.79
11.13	0.68	10.39	12.10	125.68	3.17	0.26	0.74
11.15	0.67	10.06	12.51	125.80	3.19	0.25	0.72
11.17	0.66	9.88	12.46	123.14	3.19	0.24	0.71
11.19	0.63	9.38	12.80	120.03	3.20	0.22	0.67
11.21	0.58	8.48	13.95	118.25	3.25	0.21	0.61
11.23	0.53	7.45	15.66	116.70	3.32	0.21	0.53
11.25	0.50	6.96	16.36	113.84	3.34	0.19	0.50
11.27	0.50	6.85	15.85	108.56	3.32	0.18	0.49
11.29	0.50	6.90	15.16	104.53	3.30	0.15	0.49
11.31	0.52	7.14	14.08	100.53	3.26	0.15	0.51
11.33	0.53	7.37	13.38	98.58	3.23	0.14	0.53
11.35	0.55	7.61	12.53	95.27	3.19	0.14	0.54
11.37	0.56	7.77	12.04	93.59	3.17	0.13	0.56
11.39	0.58	8.07	11.27	91.00	3.13	0.13	0.58
11.41	0.60	8.56	10.47	89.58	3.09	0.12	0.61
11.43	0.63	9.08	9.74	88.46	3.05	0.12	0.65
11.45	0.66	9.43	9.38	88.44	3.03	0.12	0.67
11.47	0.66	9.43	9.47	89.25	3.04	0.12	0.67
11.49	0.64	9.13	9.78	89.33	3.06	0.13	0.65
11.51	0.63	8.85	10.01	88.58	3.07	0.12	0.63
11.53	0.62	8.74	9.91	86.59	3.06	0.11	0.62
11.55	0.63	8.85	9.59	84.85	3.05	0.11	0.63
11.57	0.64	8.92	9.45	84.24	3.04	0.11	0.64
11.59	0.64	8.97	9.40	84.34	3.04	0.11	0.64
11.61	0.64	8.98	9.41	84.49	3.04	0.11	0.64
11.63	0.65	9.17	9.15	83.97	3.02	0.11	0.66
11.65	0.68	9.64	8.61	83.04	2.99	0.71	0.71
11.67	0.72	10.32	8.01	82.69	2.95	0.71	0.71
11.69	0.75	10.67	7.83	83.54	2.94	0.71	0.71
11.71	0.75	10.69	8.07	86.21	2.96	0.72	0.72
11.73	0.74	10.52	8.13	85.58	2.96	0.72	0.72
11.75	0.76	10.87	7.71	83.80	2.93	0.72	0.72
11.77	0.82	11.71	6.91	80.96	2.88	0.63	0.71
11.79	0.89	12.79	6.38	81.60	2.84	0.67	0.71
11.81	0.95	13.62	6.09	83.03	2.82	0.71	0.71
11.83	0.99	14.19	5.93	84.13	2.81	0.72	0.72
11.85	1.01	14.48	5.88	85.12	2.80	0.72	0.72
11.87	1.02	14.57	5.96	86.87	2.81	0.72	0.72
11.89	1.00	14.29	6.16	88.04	2.82	0.72	0.72
11.91	0.96	13.76	6.45	88.81	2.85	0.73	0.73
11.93	0.93	13.20	6.77	89.30	2.87	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.95	0.90	12.84	7.11	91.23	2.89	0.73	0.73
11.97	0.90	12.70	7.34	93.21	2.91	0.74	0.74
11.99	0.90	12.80	7.29	93.39	2.91	0.74	0.74
12.01	0.93	13.12	7.02	92.16	2.89	0.73	0.73
12.03	0.97	13.68	6.62	90.51	2.86	0.73	0.73
12.05	1.00	14.06	6.41	90.10	2.84	0.73	0.73
12.07	1.02	14.31	6.31	90.21	2.84	0.73	0.73
12.09	1.00	14.10	6.54	92.26	2.85	0.73	0.73
12.11	1.00	14.02	6.43	90.10	2.84	0.73	0.73
12.13	1.12	15.69	5.36	84.17	2.76	0.72	0.72
12.15	1.41	19.64	3.91	76.81	2.62	0.78	0.78
12.17	2.07	28.56	2.45	70.11	2.42	0.26	0.68
12.19	2.54	34.87	2.04	71.04	2.33	0.28	0.69
12.21	2.78	38.09	1.91	72.74	2.30	0.32	0.69
12.23	2.55	35.15	2.17	76.11	2.36	0.42	0.70
12.25	2.30	31.95	2.61	83.38	2.44	0.71	0.71
12.27	2.03	28.44	3.36	95.69	2.55	0.77	0.77
12.29	1.84	25.98	4.17	108.47	2.65	0.88	0.88
12.31	1.76	24.97	4.58	114.36	2.69	0.92	0.92
12.33	1.88	26.62	4.36	116.14	2.67	0.91	0.91
12.35	2.08	29.25	3.97	116.13	2.62	0.87	0.87
12.37	2.21	31.01	3.76	116.74	2.60	0.85	0.85
12.39	2.07	29.09	3.97	115.49	2.62	0.87	0.87
12.41	1.84	25.70	4.42	113.46	2.67	0.91	0.91
12.43	1.63	22.68	4.89	110.89	2.72	0.77	0.77
12.45	1.60	22.12	4.89	108.25	2.72	0.76	0.76
12.47	1.66	22.95	4.74	108.86	2.70	0.76	0.76
12.49	1.83	25.29	4.36	110.14	2.67	0.89	0.89
12.51	2.04	28.23	3.96	111.65	2.62	0.86	0.86
12.53	2.10	28.94	3.91	113.16	2.62	0.86	0.86
12.55	1.93	26.59	4.26	113.27	2.66	0.89	0.89
12.57	1.61	22.09	5.02	110.85	2.73	0.77	0.77
12.59	1.36	18.42	5.71	105.22	2.79	0.76	0.76
12.61	1.22	16.33	6.12	99.91	2.82	0.75	0.75
12.63	1.20	16.06	6.08	97.64	2.82	0.74	0.74
12.65	1.28	17.05	5.51	94.01	2.77	0.74	0.74
12.67	1.48	19.70	4.46	87.78	2.68	0.86	0.86
12.69	1.85	24.49	3.35	82.17	2.55	0.74	0.74
12.71	2.27	29.98	2.65	79.32	2.45	0.55	0.71
12.73	2.61	34.42	2.30	79.31	2.39	0.55	0.71
12.75	2.67	35.17	2.28	80.08	2.38	0.59	0.71
12.77	2.51	33.02	2.47	81.62	2.42	0.67	0.71
12.79	2.18	28.78	3.07	88.29	2.51	0.72	0.72
12.81	1.83	24.22	3.77	91.36	2.60	0.80	0.80
12.83	1.70	22.29	4.02	89.59	2.63	0.82	0.82
12.85	2.06	26.78	2.85	76.31	2.48	0.43	0.70
12.87	2.63	34.02	2.10	71.53	2.34	0.29	0.69
12.89	2.99	38.44	1.87	71.75	2.28	0.29	0.69

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.91	2.83	36.35	2.00	72.63	2.32	0.32	0.69
12.93	2.47	31.85	2.33	74.21	2.39	0.36	0.69
12.95	2.20	28.53	2.86	81.49	2.48	0.66	0.71
12.97	2.02	26.26	3.52	92.54	2.57	0.78	0.78
12.99	1.81	23.59	4.42	104.20	2.67	0.89	0.89
13.01	1.66	21.70	4.97	107.92	2.72	0.76	0.76
13.03	1.60	20.86	5.16	107.59	2.74	0.76	0.76
13.05	1.66	21.54	4.91	105.73	2.72	0.76	0.76
13.07	1.70	22.03	4.72	104.08	2.70	0.76	0.76
13.09	1.68	21.69	4.71	102.21	2.70	0.75	0.75
13.11	1.69	21.71	4.41	95.72	2.67	0.87	0.87
13.13	1.79	22.85	3.92	89.59	2.62	0.81	0.81
13.15	1.97	25.12	3.46	87.03	2.57	0.76	0.76
13.17	2.13	27.10	3.28	88.80	2.54	0.75	0.75
13.19	2.13	27.14	3.40	92.27	2.56	0.77	0.77
13.21	2.03	25.81	3.67	94.64	2.59	0.80	0.80
13.23	1.86	23.54	4.06	95.52	2.63	0.84	0.84
13.25	1.81	22.89	4.19	95.97	2.65	0.85	0.85
13.27	1.85	23.41	4.09	95.80	2.64	0.84	0.84
13.29	1.95	24.60	3.90	95.97	2.62	0.82	0.82
13.31	2.06	25.96	3.72	96.70	2.60	0.81	0.81
13.33	2.47	31.13	3.01	93.64	2.50	0.73	0.73
13.35	3.06	38.18	2.20	84.01	2.37	0.72	0.72
13.37	3.57	44.20	1.80	79.55	2.26	0.56	0.71
13.39	3.63	44.70	1.67	74.62	2.22	0.37	0.69
13.41	3.37	41.61	1.85	76.95	2.28	0.45	0.70
13.43	3.02	37.44	2.18	81.57	2.36	0.67	0.71
13.45	2.72	33.93	2.72	92.16	2.46	0.73	0.73
13.47	2.55	31.91	3.18	101.60	2.53	0.76	0.76
13.49	2.42	30.25	3.64	110.18	2.59	0.83	0.83
13.51	2.21	27.70	4.19	115.98	2.65	0.89	0.89
13.53	2.02	25.26	4.71	118.86	2.70	0.94	0.94
13.55	1.88	23.39	5.08	118.90	2.73	0.78	0.78
13.57	1.85	22.86	5.14	117.38	2.74	0.78	0.78
13.59	1.84	22.68	4.97	112.75	2.72	0.77	0.77
13.61	1.92	23.59	4.53	106.80	2.68	0.90	0.90
13.63	2.28	27.93	3.59	100.26	2.58	0.80	0.80
13.65	2.71	33.18	2.94	97.67	2.49	0.74	0.74
13.67	2.94	35.92	2.58	92.72	2.44	0.73	0.73
13.69	2.85	34.73	2.62	91.05	2.44	0.73	0.73
13.71	2.65	32.14	2.85	91.55	2.48	0.73	0.73
13.73	2.50	30.51	3.31	100.87	2.55	0.78	0.78
13.75	2.30	28.05	4.05	113.65	2.63	0.87	0.87
13.77	2.08	25.41	4.96	125.99	2.72	0.79	0.79
13.79	1.87	22.82	5.82	132.78	2.80	0.80	0.80
13.81	1.76	21.37	6.16	131.63	2.82	0.80	0.80
13.83	1.70	20.53	6.16	126.54	2.82	0.79	0.79
13.85	1.69	20.29	5.93	120.26	2.81	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.87	1.75	20.93	5.42	113.42	2.76	0.77	0.77
13.89	2.03	24.30	4.37	106.08	2.67	0.89	0.89
13.91	2.35	28.08	3.58	100.50	2.58	0.80	0.80
13.93	2.61	31.18	3.12	97.14	2.52	0.75	0.75
13.95	2.69	32.09	2.99	95.96	2.50	0.73	0.73
13.97	2.77	32.95	2.91	95.94	2.49	0.74	0.74
13.99	2.88	34.24	2.81	96.40	2.48	0.74	0.74
14.01	2.95	34.95	2.75	96.20	2.47	0.74	0.74
14.03	2.93	34.71	2.78	96.38	2.47	0.74	0.74
14.05	2.83	33.44	2.90	97.13	2.49	0.74	0.74
14.07	2.66	31.44	3.21	100.85	2.53	0.76	0.76
14.09	2.54	29.98	3.49	104.74	2.57	0.80	0.80
14.11	2.71	31.90	3.22	102.72	2.53	0.77	0.77
14.13	2.93	34.41	2.93	100.90	2.49	0.75	0.75
14.15	3.04	35.66	2.76	98.46	2.47	0.75	0.75
14.17	2.91	34.11	3.03	103.27	2.51	0.75	0.75
14.19	2.84	33.35	3.25	108.27	2.54	0.78	0.78
14.21	2.86	33.50	3.31	110.73	2.54	0.79	0.79
14.23	2.70	31.60	3.59	113.54	2.58	0.83	0.83
14.25	2.43	28.29	4.03	114.00	2.63	0.87	0.87
14.27	2.22	25.76	4.52	116.35	2.68	0.92	0.92
14.29	2.24	25.83	4.39	113.48	2.67	0.90	0.90
14.31	2.30	26.49	4.23	111.99	2.65	0.89	0.89
14.33	2.25	25.86	4.34	112.14	2.66	0.90	0.90
14.35	2.14	24.49	4.67	114.41	2.70	0.93	0.93
14.37	2.08	23.73	4.86	115.28	2.71	0.78	0.78
14.39	2.11	24.15	4.78	115.33	2.71	0.78	0.78
14.41	2.28	26.03	4.30	111.99	2.66	0.89	0.89
14.43	2.50	28.61	3.78	108.22	2.60	0.84	0.84
14.45	2.80	32.02	3.26	104.37	2.54	0.78	0.78
14.47	3.12	35.61	2.83	100.71	2.48	0.75	0.75
14.49	3.28	37.37	2.62	97.94	2.44	0.74	0.74
14.51	3.36	38.22	2.50	95.73	2.42	0.74	0.74
14.53	3.38	38.32	2.44	93.48	2.41	0.74	0.74
14.55	3.50	39.53	2.31	91.31	2.39	0.73	0.73
14.57	3.59	40.49	2.20	89.23	2.37	0.73	0.73
14.59	3.48	39.18	2.19	85.61	2.36	0.72	0.72
14.61	3.35	37.48	2.20	82.40	2.36	0.71	0.71
14.63	2.95	33.07	2.74	90.71	2.46	0.73	0.73
14.65	2.63	29.46	3.58	105.36	2.58	0.81	0.81
14.67	2.21	24.66	4.93	121.52	2.72	0.79	0.79
14.69	2.06	22.83	5.29	120.69	2.75	0.78	0.78
14.71	2.08	23.02	5.02	115.65	2.73	0.78	0.78
14.73	2.34	25.85	4.21	108.77	2.65	0.88	0.88
14.75	2.67	29.65	3.44	101.94	2.56	0.79	0.79
14.77	2.96	32.72	2.88	94.19	2.49	0.74	0.74
14.79	2.94	32.49	2.74	89.15	2.46	0.73	0.73
14.81	2.79	30.61	2.90	88.73	2.49	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
14.83	2.56	28.12	3.37	94.66	2.55	0.77	0.77
14.85	2.47	27.08	3.77	102.14	2.60	0.83	0.83
14.87	2.32	25.38	4.33	109.98	2.66	0.89	0.89
14.89	2.18	23.70	4.87	115.39	2.72	0.78	0.78
14.91	2.45	26.76	4.15	111.04	2.64	0.88	0.88
14.93	2.98	32.61	3.18	103.68	2.53	0.77	0.77
14.95	3.53	38.79	2.59	100.47	2.44	0.75	0.75
14.97	3.59	39.29	2.52	99.19	2.43	0.75	0.75
14.99	3.31	36.11	2.71	97.85	2.46	0.74	0.74
15.01	2.86	30.94	3.05	94.25	2.51	0.73	0.73
15.03	2.31	24.82	4.07	101.06	2.64	0.85	0.85
15.05	2.06	21.91	4.91	107.51	2.72	0.76	0.76
15.07	2.07	22.01	5.10	112.23	2.74	0.77	0.77
15.09	2.24	23.94	4.52	108.31	2.68	0.91	0.91
15.11	2.21	23.56	4.60	108.30	2.69	0.91	0.91
15.13	2.13	22.60	4.72	106.60	2.70	0.76	0.76
15.15	2.15	22.70	4.57	103.63	2.69	0.90	0.90
15.17	2.16	22.76	4.40	100.15	2.67	0.88	0.88
15.19	2.04	21.41	4.69	100.38	2.70	0.90	0.90
15.21	1.87	19.48	5.28	102.88	2.75	0.75	0.75
15.23	1.63	16.70	6.39	106.71	2.84	0.76	0.76
15.25	1.44	14.58	7.33	106.79	2.91	0.76	0.76
15.27	1.27	12.51	8.44	105.63	2.98	0.76	0.76
15.29	1.33	13.29	7.51	99.79	2.92	0.75	0.75
15.31	1.52	15.34	6.26	95.99	2.83	0.74	0.74
15.33	1.72	17.49	5.24	91.71	2.75	0.73	0.73
15.35	1.73	17.65	5.19	91.52	2.74	0.73	0.73
15.37	1.56	15.67	5.92	92.79	2.81	0.73	0.73
15.39	1.34	13.24	7.15	94.60	2.90	0.74	0.74
15.41	1.24	12.02	7.75	93.08	2.94	0.73	0.73
15.43	1.36	13.31	6.61	87.98	2.86	0.72	0.72
15.45	1.70	17.12	4.89	83.74	2.72	0.72	0.72
15.47	2.15	21.97	3.58	78.63	2.58	0.76	0.76
15.49	2.38	24.48	3.22	78.72	2.53	0.72	0.72
15.51	2.51	25.83	3.04	78.64	2.51	0.46	0.70
15.53	2.77	28.62	2.68	76.83	2.45	0.45	0.70
15.55	3.14	32.56	2.35	76.47	2.40	0.44	0.70
15.57	3.31	34.33	2.26	77.56	2.38	0.48	0.70
15.59	3.26	33.76	2.36	79.77	2.40	0.57	0.71
15.61	3.28	33.92	2.40	81.29	2.40	0.65	0.71
15.63	3.29	34.01	2.49	84.57	2.42	0.72	0.72
15.65	3.07	31.66	2.81	89.10	2.48	0.73	0.73
15.67	2.64	27.00	3.60	97.14	2.58	0.80	0.80
15.69	2.24	22.62	4.72	106.78	2.70	0.76	0.76
15.71	1.94	19.37	6.11	118.37	2.82	0.78	0.78
15.73	1.80	17.83	6.77	120.67	2.87	0.78	0.78
15.75	1.93	19.26	5.80	111.74	2.80	0.77	0.77
15.77	2.15	21.55	4.63	99.81	2.69	0.90	0.90

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.79	2.57	25.94	3.30	85.71	2.54	0.74	0.74
15.81	2.65	26.72	2.93	78.26	2.49	0.51	0.70
15.83	2.59	25.97	2.83	73.40	2.48	0.34	0.69
15.85	2.18	21.57	3.65	78.80	2.59	0.76	0.76
15.87	1.98	19.44	4.38	85.18	2.67	0.84	0.84
15.89	1.97	19.27	4.63	89.33	2.69	0.87	0.87
15.91	2.00	19.62	4.67	91.66	2.70	0.88	0.88
15.93	1.87	18.16	5.28	95.96	2.75	0.74	0.74
15.95	1.60	15.30	6.63	101.40	2.86	0.75	0.75
15.97	1.40	13.15	7.92	104.06	2.95	0.76	0.76
15.99	1.30	11.98	8.70	104.25	3.00	0.76	0.76
16.01	1.30	11.99	8.61	103.22	2.99	0.75	0.75
16.03	1.33	12.22	8.26	100.93	2.97	0.75	0.75
16.05	1.40	12.96	7.53	97.66	2.92	0.74	0.74
16.07	1.50	14.09	6.51	91.65	2.85	0.73	0.73
16.09	1.50	14.00	6.35	88.86	2.84	0.73	0.73
16.11	1.40	12.90	6.90	88.96	2.88	0.73	0.73
16.13	1.25	11.27	7.96	89.71	2.95	0.73	0.73
16.15	1.18	10.50	8.59	90.20	2.99	0.73	0.73
16.17	1.15	10.20	8.74	89.23	3.00	0.73	0.73
16.19	1.13	9.97	9.00	89.79	3.01	0.17	0.71
16.21	1.12	9.82	9.01	88.49	3.01	0.16	0.70
16.23	1.12	9.79	8.80	86.18	3.00	0.15	0.70
16.25	1.12	9.77	8.60	84.03	2.99	0.72	0.72
16.27	1.13	9.82	8.41	82.59	2.98	0.71	0.71
16.29	1.14	9.92	8.31	82.45	2.97	0.71	0.71
16.31	1.16	10.19	8.08	82.29	2.96	0.71	0.71
16.33	1.20	10.53	7.90	83.11	2.95	0.71	0.71
16.35	1.22	10.77	7.76	83.54	2.94	0.71	0.71
16.37	1.25	10.99	7.66	84.19	2.93	0.72	0.72
16.39	1.28	11.34	7.44	84.42	2.92	0.72	0.72
16.41	1.33	11.82	7.22	85.35	2.90	0.72	0.72
16.43	1.37	12.22	7.09	86.61	2.89	0.72	0.72
16.45	1.48	13.34	6.48	86.45	2.85	0.72	0.72
16.47	1.65	15.06	5.68	85.55	2.79	0.72	0.72
16.49	1.84	17.02	5.03	85.61	2.73	0.72	0.72
16.51	1.94	18.11	4.90	88.76	2.72	0.73	0.73
16.53	1.92	17.85	5.06	90.40	2.73	0.73	0.73
16.55	1.72	15.70	5.78	90.68	2.79	0.73	0.73
16.57	1.48	13.19	6.51	85.87	2.85	0.72	0.72
16.59	1.26	10.89	7.64	83.20	2.93	0.71	0.71
16.61	1.16	9.90	8.42	83.31	2.98	0.71	0.71
16.63	1.08	9.02	10.17	91.74	3.08	0.16	0.64
16.65	1.02	8.34	11.92	99.49	3.16	0.22	0.60
16.67	0.97	7.83	13.40	104.95	3.23	0.23	0.56
16.69	0.94	7.46	14.04	104.70	3.26	0.22	0.53
16.71	0.92	7.29	14.19	103.41	3.26	0.21	0.52
16.73	0.92	7.31	13.52	98.85	3.23	0.21	0.52

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.75	0.93	7.34	12.63	92.75	3.20	0.16	0.52
16.77	0.93	7.33	11.61	85.08	3.15	0.13	0.52
16.79	0.92	7.27	11.14	80.94	3.13	0.12	0.52
16.81	0.93	7.30	10.85	79.21	3.11	0.12	0.52
16.83	0.93	7.32	10.82	79.24	3.11	0.12	0.52
16.85	0.93	7.29	10.83	78.96	3.11	0.12	0.52
16.87	0.92	7.22	10.96	79.11	3.12	0.12	0.52
16.89	0.91	7.08	11.15	78.95	3.13	0.12	0.51
16.91	0.92	7.13	11.02	78.58	3.12	0.12	0.51
16.93	0.94	7.30	10.63	77.62	3.10	0.11	0.52
16.95	0.96	7.54	10.20	76.90	3.08	0.11	0.54
16.97	0.97	7.62	10.03	76.48	3.07	0.11	0.54
16.99	0.95	7.42	10.39	77.12	3.09	0.11	0.53
17.01	0.94	7.33	10.63	77.95	3.10	0.11	0.52
17.03	0.94	7.29	10.82	78.91	3.11	0.12	0.52
17.05	0.96	7.43	10.71	79.50	3.10	0.12	0.53
17.07	0.97	7.54	10.57	79.68	3.10	0.12	0.54
17.09	0.97	7.58	10.51	79.69	3.09	0.12	0.54
17.11	0.99	7.75	10.22	79.22	3.08	0.12	0.55
17.13	1.01	7.88	9.95	78.48	3.07	0.12	0.56
17.15	1.02	7.99	9.67	77.28	3.05	0.12	0.57
17.17	1.02	8.01	9.45	75.74	3.04	0.11	0.57
17.19	1.04	8.15	9.11	74.25	3.02	0.11	0.58
17.21	1.07	8.41	8.71	73.23	3.00	0.33	0.69
17.23	1.08	8.52	8.58	73.09	2.99	0.33	0.69
17.25	1.07	8.41	8.73	73.43	3.00	0.34	0.69
17.27	1.05	8.25	8.98	74.10	3.01	0.11	0.59
17.29	1.06	8.31	8.94	74.26	3.01	0.11	0.59
17.31	1.07	8.42	8.80	74.06	3.00	0.11	0.60
17.33	1.08	8.45	8.70	73.53	3.00	0.34	0.69
17.35	1.08	8.46	8.65	73.15	2.99	0.33	0.69
17.37	1.10	8.60	8.48	72.96	2.98	0.33	0.69
17.39	1.12	8.81	8.25	72.68	2.97	0.32	0.69
17.41	1.14	8.98	8.04	72.16	2.95	0.30	0.69
17.43	1.15	9.13	7.87	71.85	2.94	0.30	0.69
17.45	1.18	9.35	7.67	71.71	2.93	0.29	0.69
17.47	1.23	9.88	7.26	71.75	2.90	0.29	0.69
17.49	1.29	10.43	6.83	71.24	2.87	0.28	0.69
17.51	1.34	10.86	6.53	70.90	2.85	0.27	0.69
17.53	1.34	10.89	6.60	71.89	2.86	0.30	0.69
17.55	1.32	10.66	7.00	74.68	2.89	0.38	0.69
17.57	1.28	10.25	7.61	78.02	2.93	0.50	0.70
17.59	1.22	9.67	8.40	81.26	2.98	0.65	0.71
17.61	1.18	9.19	9.14	84.01	3.02	0.15	0.66
17.63	1.16	9.00	9.59	86.23	3.05	0.16	0.64
17.65	1.19	9.31	9.28	86.42	3.03	0.16	0.66
17.67	1.30	10.36	8.19	84.77	2.96	0.72	0.72
17.69	2.35	20.57	3.27	67.21	2.54	0.39	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
17.71	7.63	72.10	1.00	72.10	1.79	0.30	0.69
17.73	14.13	135.74	1.00	135.74	1.46	0.81	0.81
17.75	19.99	193.07	1.00	193.07	1.30	0.88	0.88
17.77	21.46	207.31	1.00	207.31	1.31	0.89	0.89
17.79	22.52	217.50	1.00	217.50	1.31	0.91	0.91
17.81	23.03	222.23	1.00	222.23	1.33	0.91	0.91
17.83	24.20	233.41	1.00	233.41	1.34	0.92	0.92
17.85	24.57	236.87	1.00	236.87	1.35	0.92	0.92
17.87	25.04	241.30	1.00	241.30	1.33	0.93	0.93
17.89	24.41	234.93	1.00	234.93	1.34	0.92	0.92
17.91	23.39	224.72	1.00	224.72	1.37	0.91	0.91
17.93	21.92	210.10	1.00	210.10	1.44	0.90	0.90
17.95	20.63	197.12	1.00	197.12	1.52	0.88	0.88
17.97	19.93	189.90	1.00	189.90	1.63	0.88	0.88
17.99	20.16	191.76	1.00	191.76	1.66	0.88	0.88
18.01	21.35	203.06	1.00	203.06	1.64	0.89	0.89
18.03	22.40	213.18	1.00	213.18	1.58	0.90	0.90
18.05	23.27	221.59	1.00	221.59	1.53	0.91	0.91
18.07	23.65	225.13	1.00	225.13	1.51	0.91	0.91
18.09	23.73	225.84	1.00	225.84	1.48	0.91	0.91
18.11	23.82	226.37	1.00	226.37	1.50	0.91	0.91
18.13	23.94	227.37	1.00	227.37	1.50	0.91	0.91
18.15	24.34	230.90	1.00	230.90	1.52	0.92	0.92
18.17	24.59	233.07	1.00	233.07	1.51	0.92	0.92
18.19	24.12	228.27	1.00	228.27	1.52	0.92	0.92
18.21	23.37	220.96	1.00	220.96	1.52	0.91	0.91
18.23	21.83	205.97	1.00	205.97	1.53	0.89	0.89
18.25	20.91	197.01	1.00	197.01	1.54	0.88	0.88
18.27	20.17	189.56	1.00	189.56	1.58	0.88	0.88
18.29	20.46	191.97	1.00	191.97	1.61	0.88	0.88
18.31	20.50	191.91	1.00	191.91	1.65	0.88	0.88
18.33	19.87	185.69	1.00	185.69	1.67	0.87	0.87
18.35	19.03	177.20	1.04	184.01	1.72	0.87	0.87
18.37	17.66	163.59	1.19	193.98	1.83	0.88	0.88
18.39	17.23	158.78	1.26	199.99	1.93	0.89	0.89
18.41	17.40	159.86	1.31	208.94	2.00	0.90	0.90
18.43	19.78	181.91	1.29	234.44	1.98	0.92	0.92
18.45	22.16	203.98	1.27	259.07	1.95	0.94	0.94
18.47	24.17	222.54	1.26	280.04	1.93	0.96	0.96
18.49	25.39	233.41	1.27	295.59	1.94	0.97	0.97
18.51	27.27	250.60	1.26	315.59	1.93	0.99	0.99
18.53	28.51	261.74	1.26	329.95	1.94	1.00	1.00
18.55	30.77	282.81	1.23	348.12	1.89	1.01	1.01
18.57	32.47	298.51	1.21	361.11	1.86	1.02	1.02
18.59	34.57	318.01	1.17	373.32	1.82	1.03	1.03

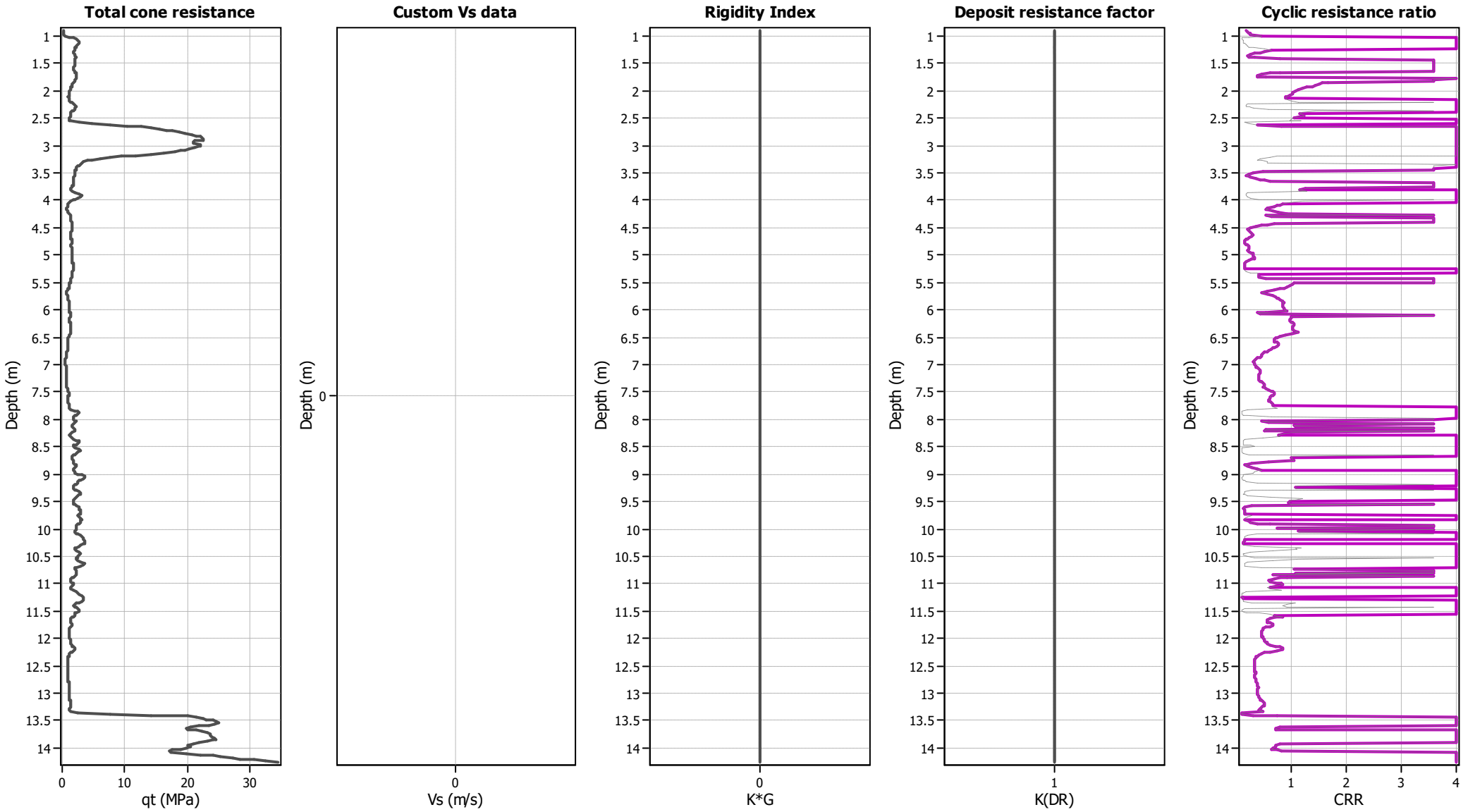
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

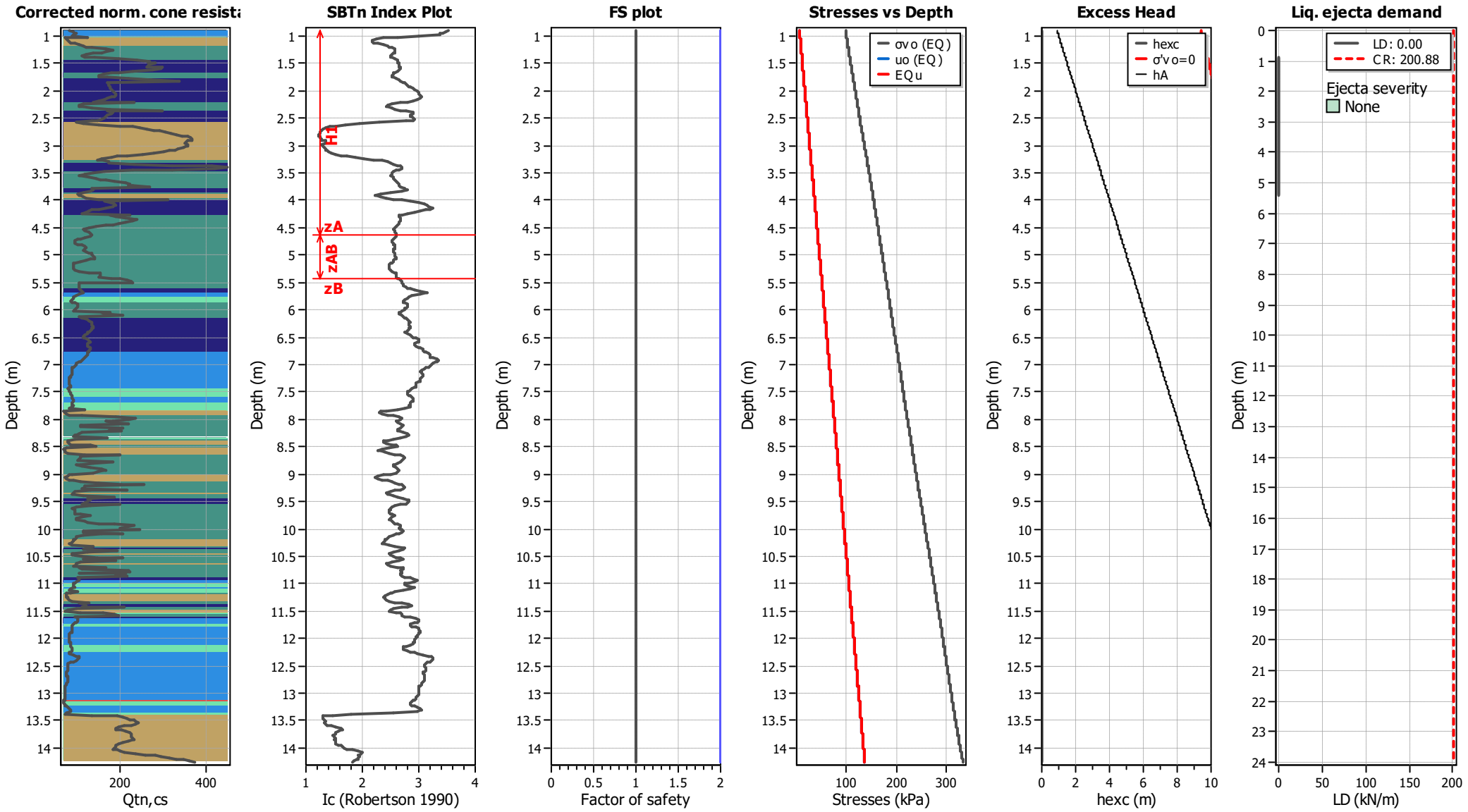
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

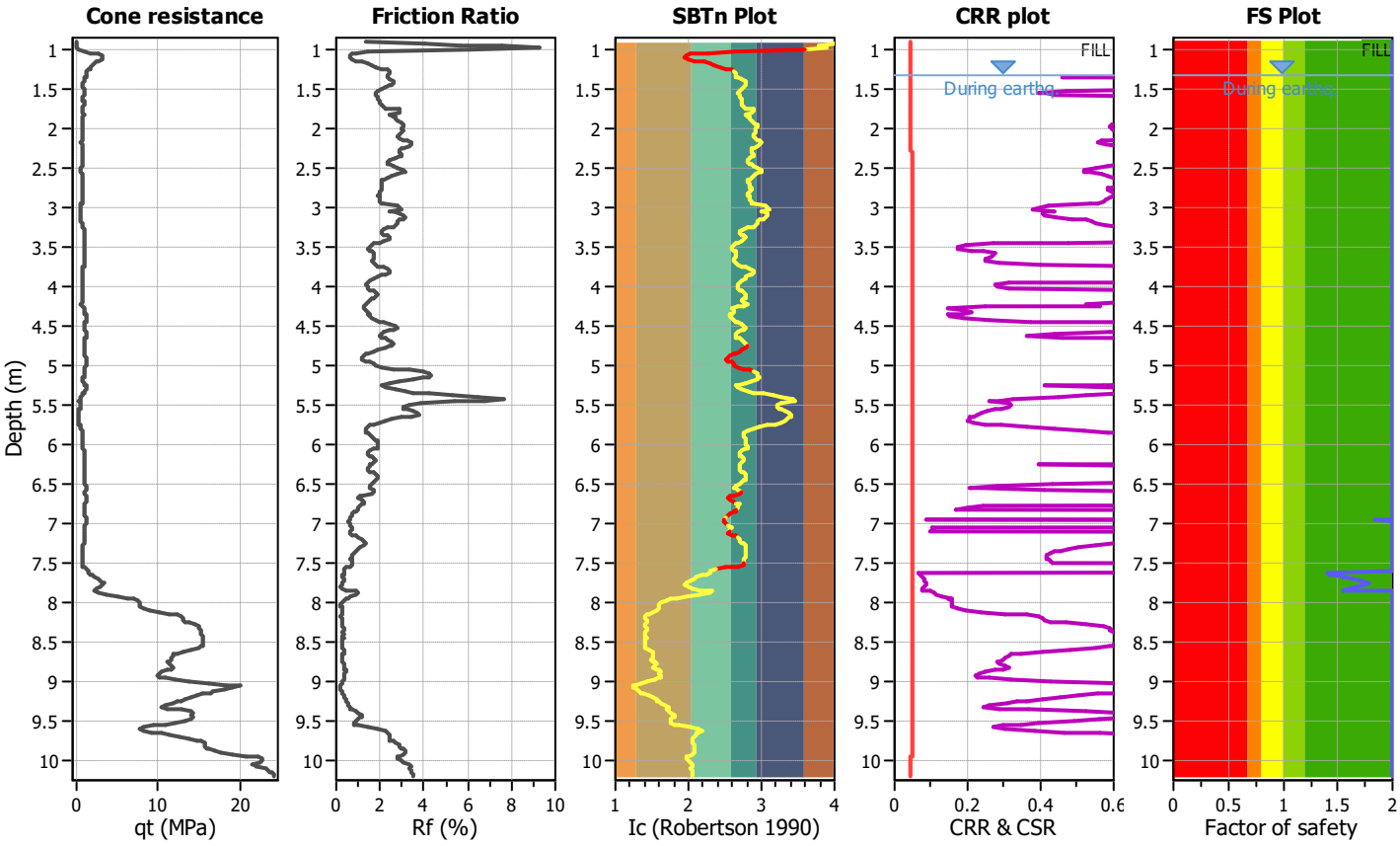
Project title : CWLP Liquefaction Analysis

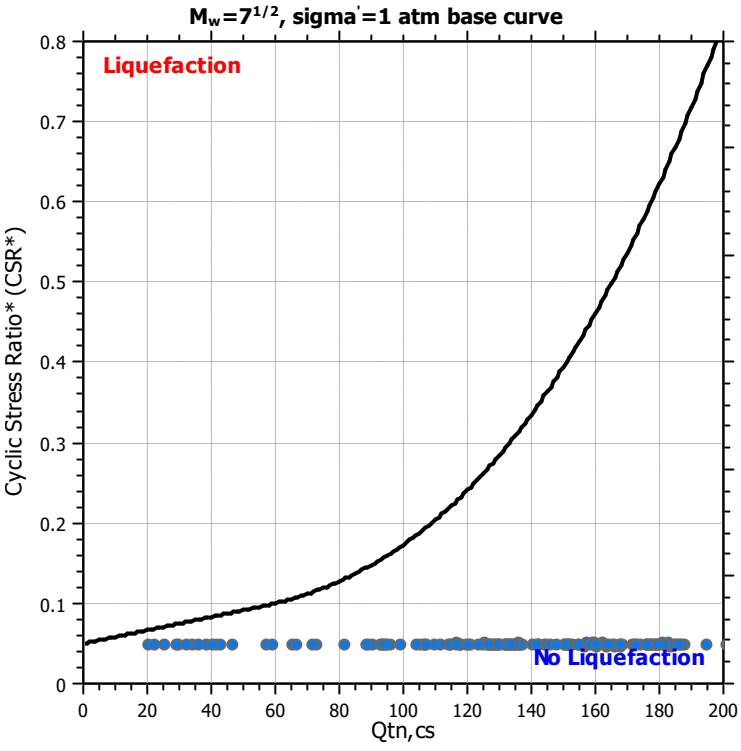
Location : East Lake Shore Drive, Springfield, Illinois

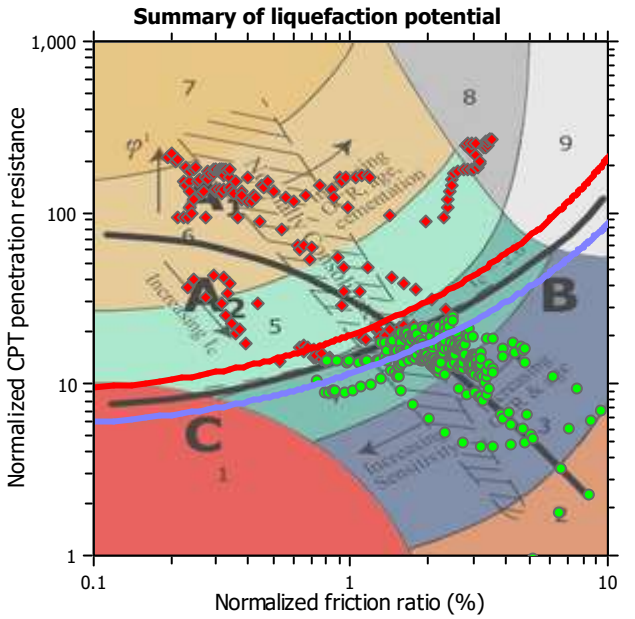
CPT file : CWLP CPT-6L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.70 m	Use fill:	Yes	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	8.23 m	Fill height:	6.90 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	20.20 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No		

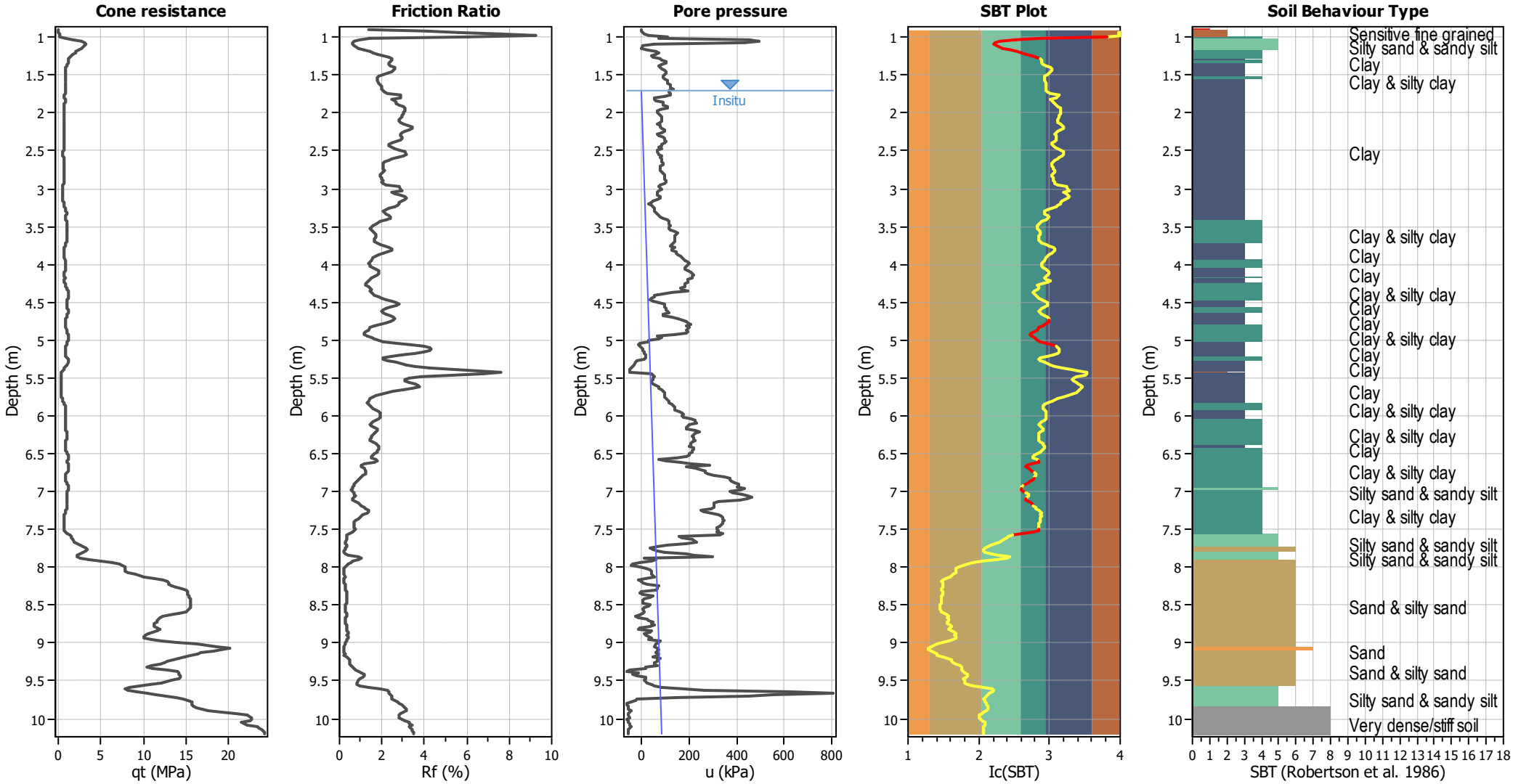






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



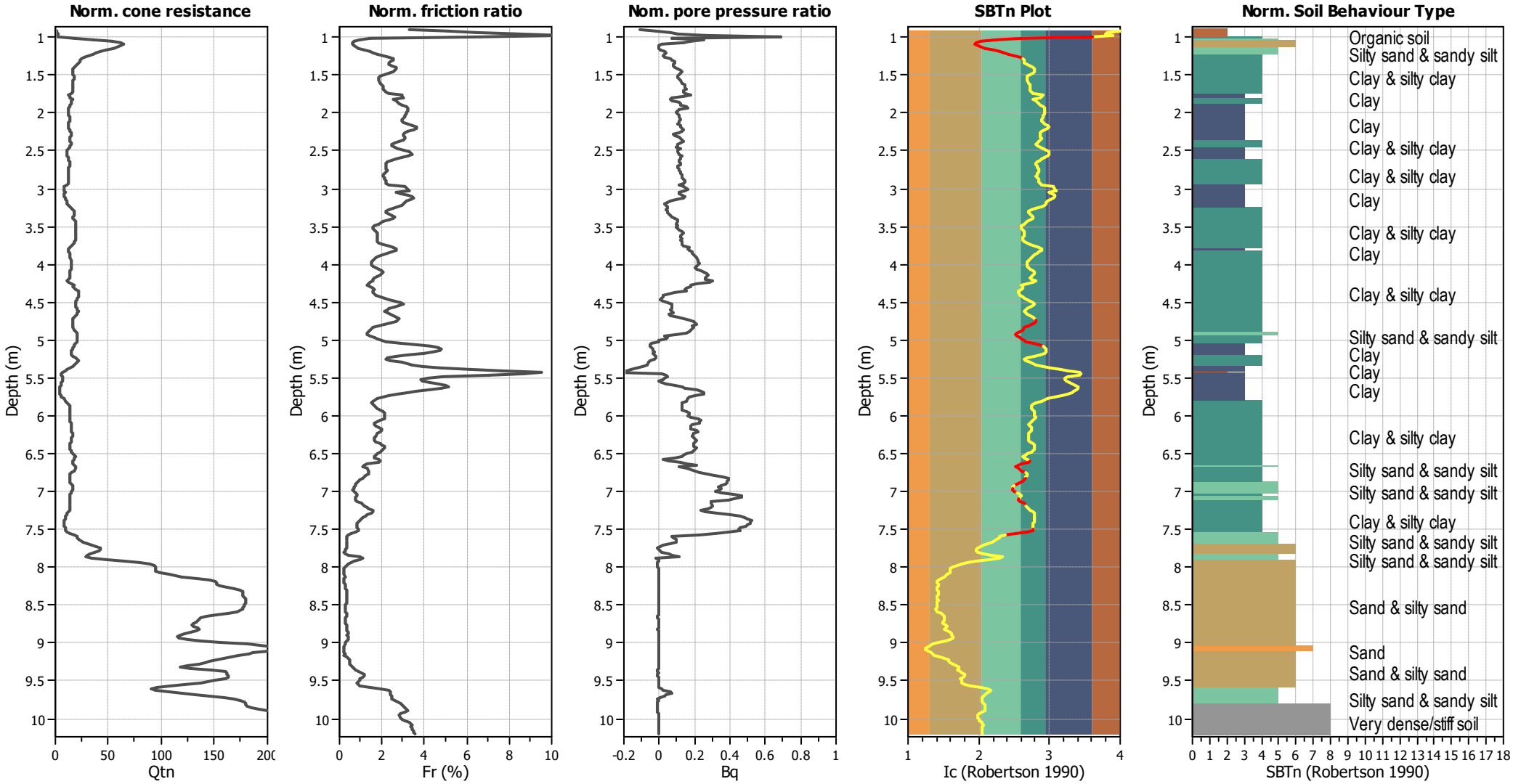
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



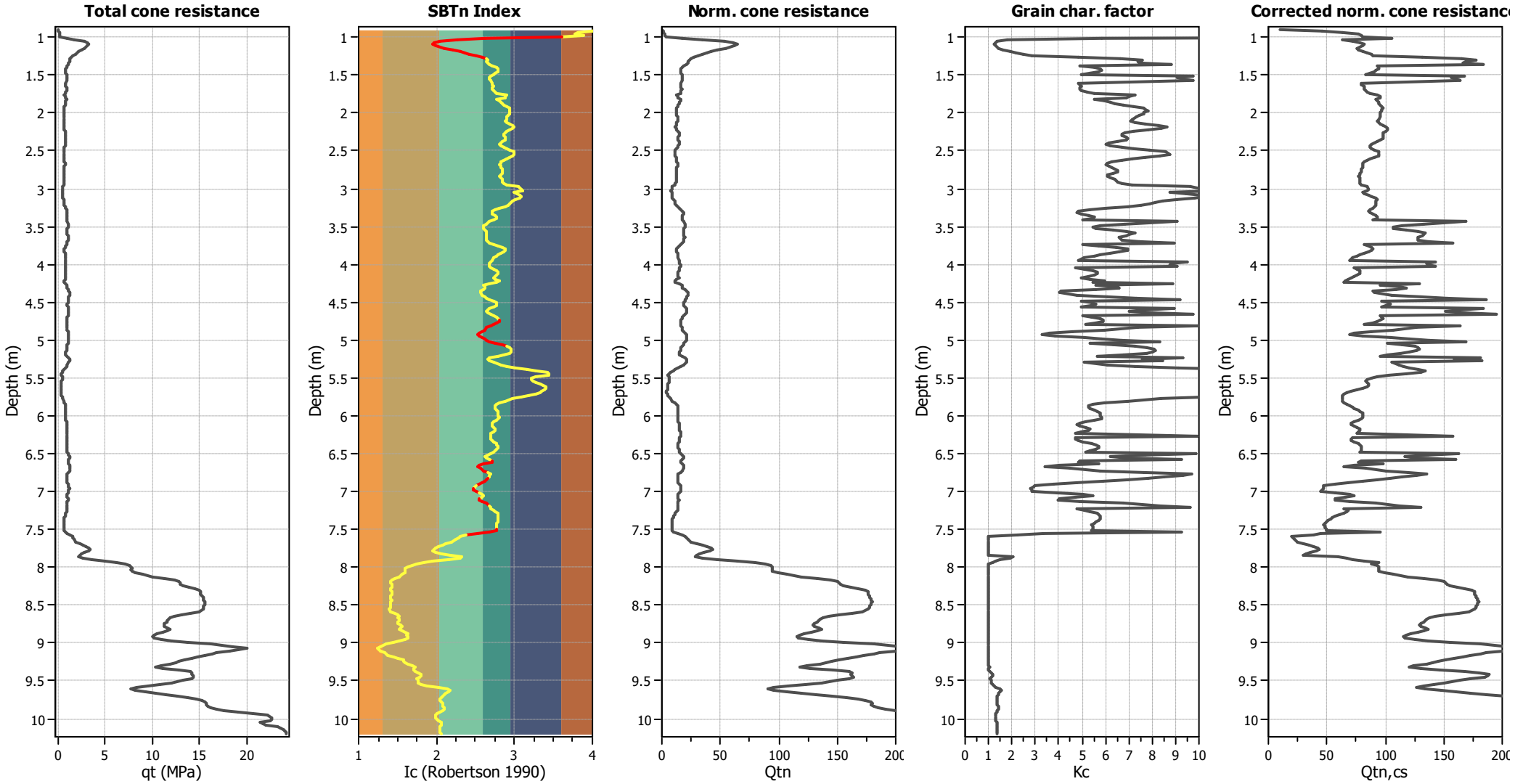
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

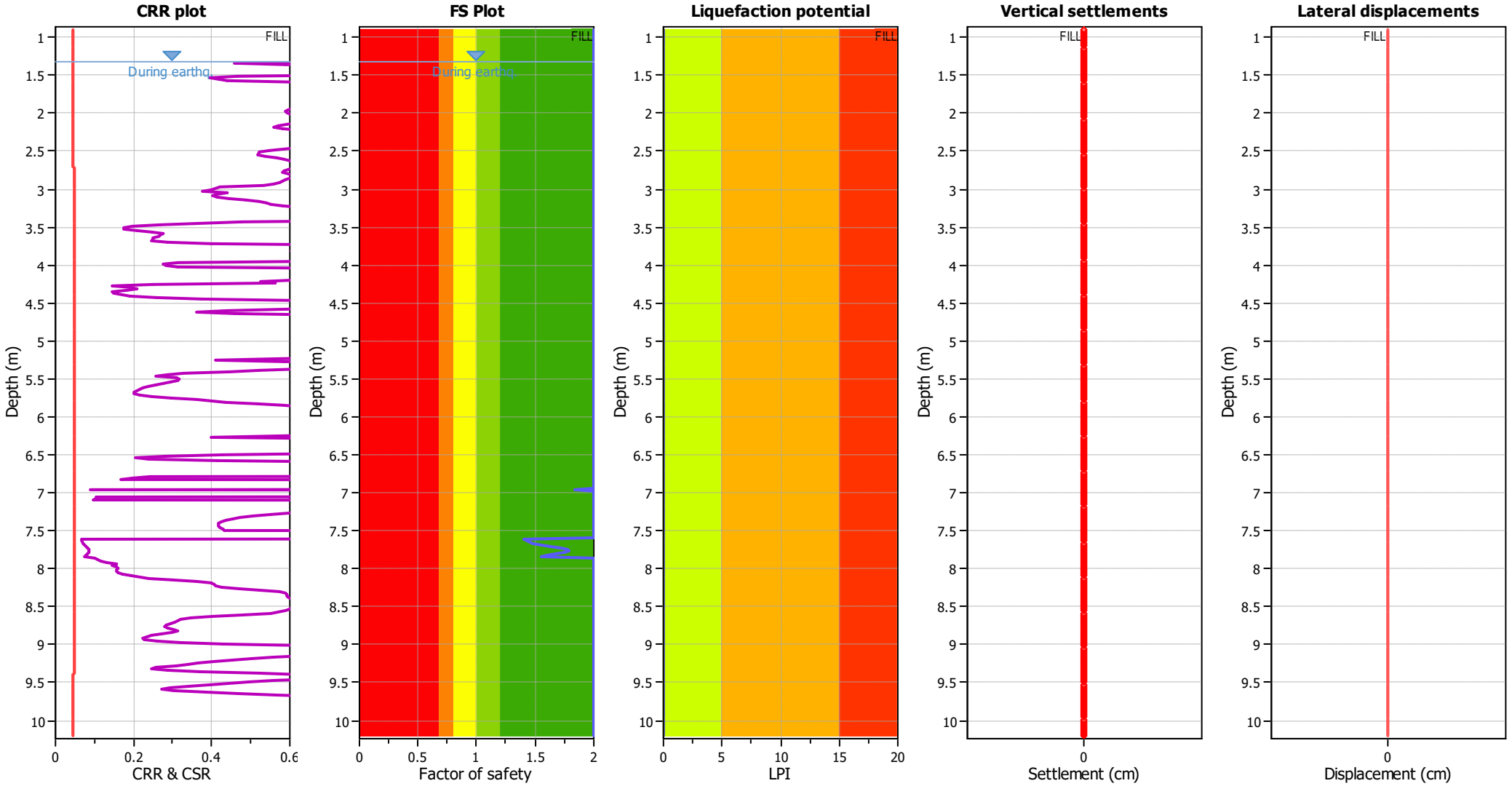
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

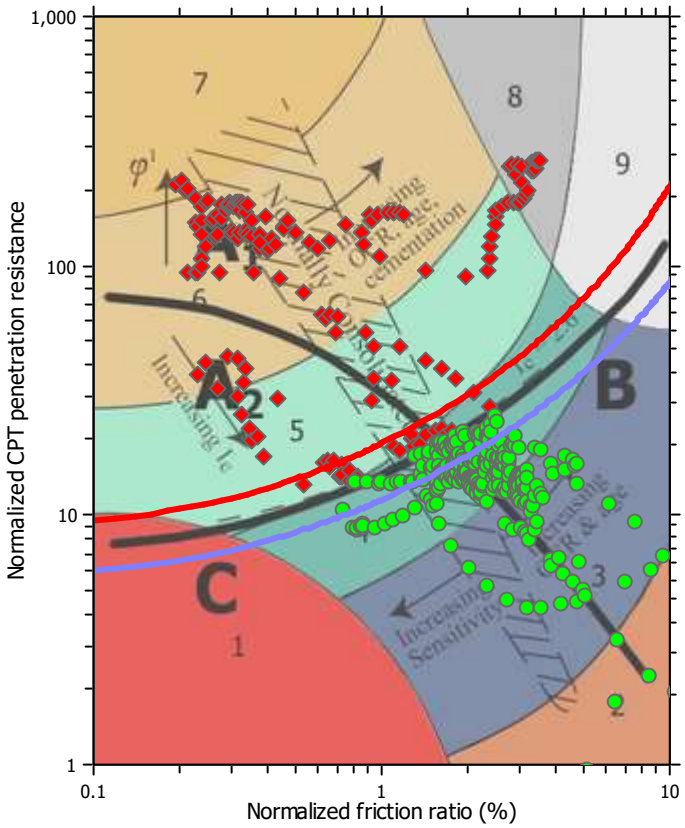
F.S. color scheme

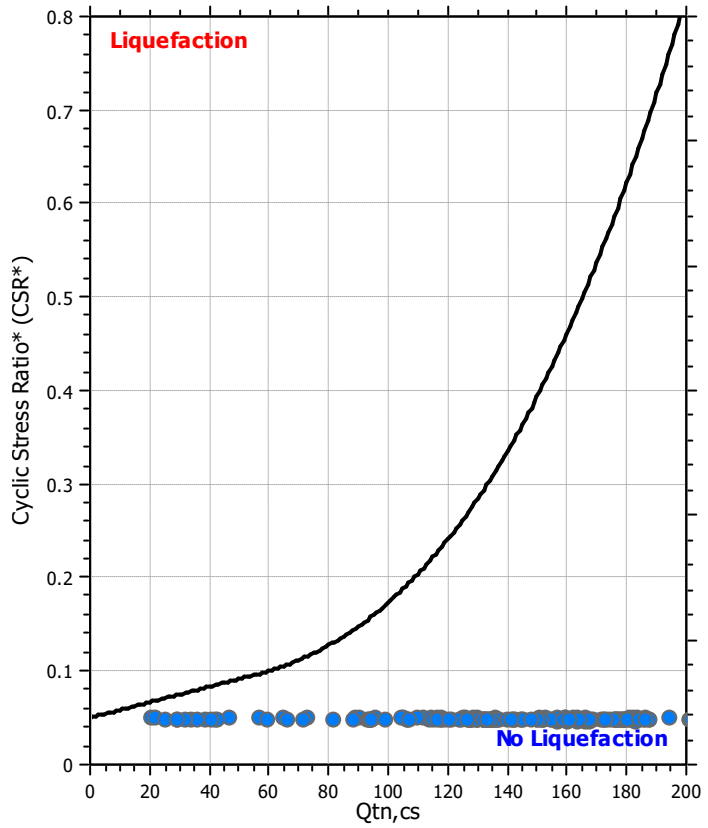
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

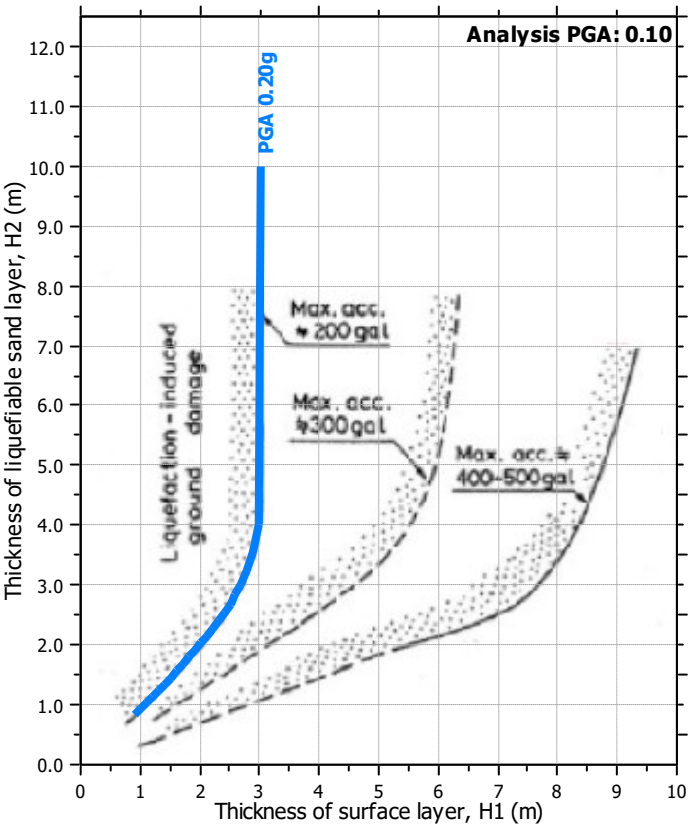
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



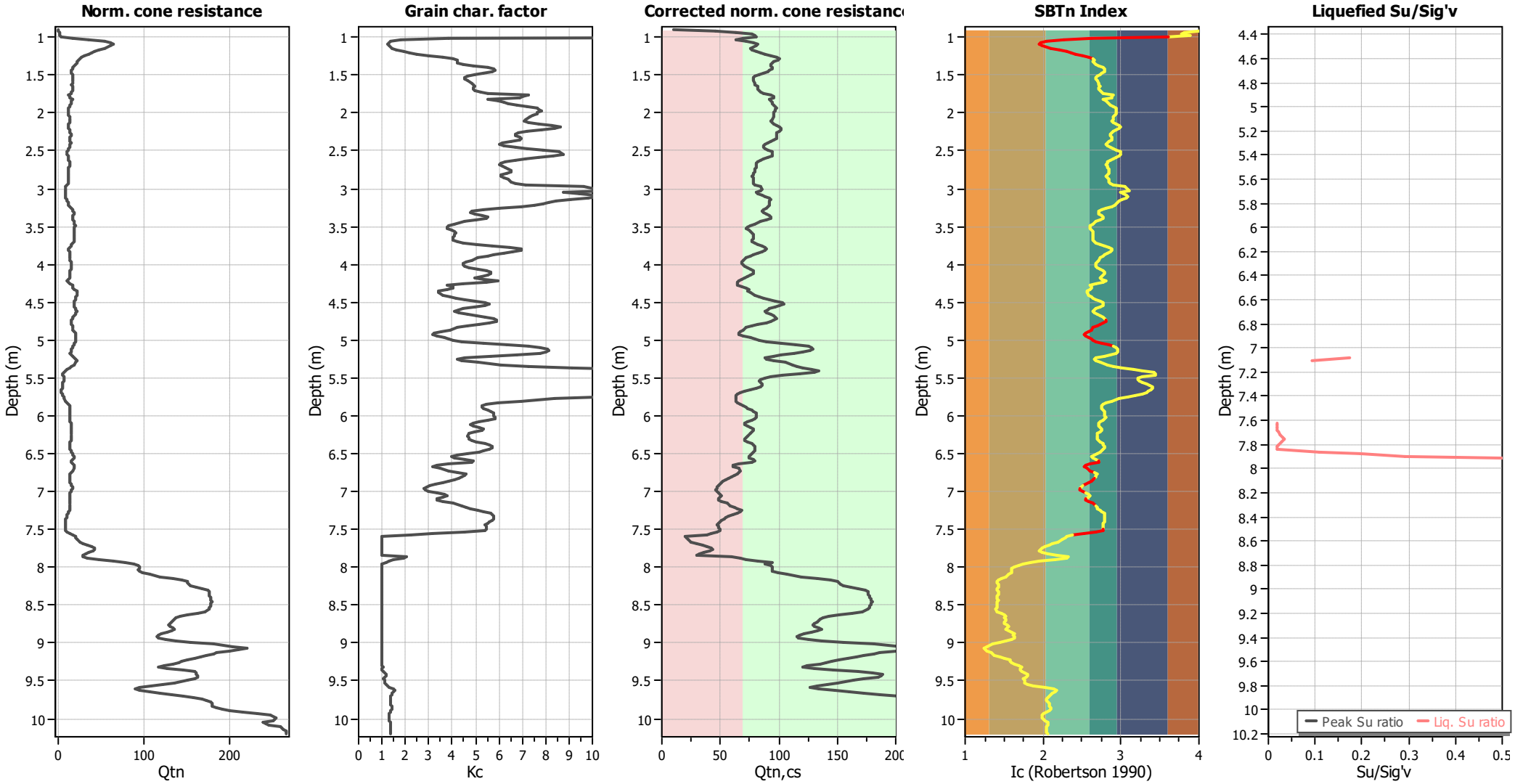




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

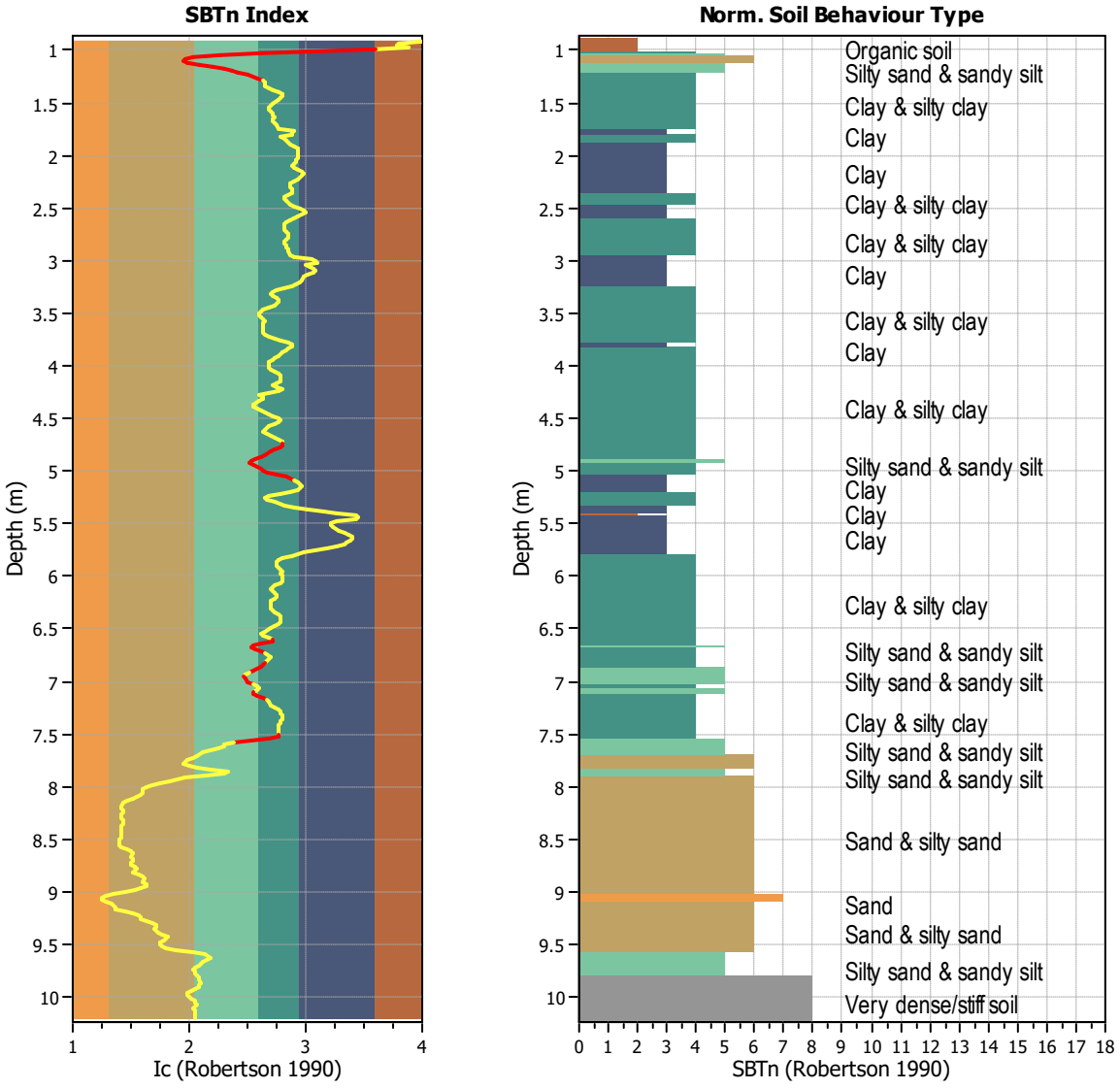
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.23 m	Fill weight:	20.20 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.70 m	Fill height:	6.90 m	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	466
I_c maximum check value:	3.00	Total points excluded:	63
I_c change ratio value:	0.0100	Exclusion percentage:	13.52%
Minimum number of points in layer:	4	Number of layers detected:	10

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	5	Start depth: 1.02 (m)	4	Clay & silty clay
		End depth: 1.10 (m)	6	Sand & silty sand
Transition layer 2	11	Start depth: 1.10 (m)	6	Sand & silty sand
		End depth: 1.30 (m)	4	Clay & silty clay
Transition layer 3	8	Start depth: 4.76 (m)	4	Clay & silty clay
		End depth: 4.90 (m)	5	Silty sand & sandy silt
Transition layer 4	10	Start depth: 4.92 (m)	5	Silty sand & sandy silt
		End depth: 5.10 (m)	3	Clay
Transition layer 5	4	Start depth: 6.62 (m)	4	Clay & silty clay
		End depth: 6.68 (m)	5	Silty sand & sandy silt
Transition layer 6	5	Start depth: 6.68 (m)	5	Silty sand & sandy silt
		End depth: 6.76 (m)	4	Clay & silty clay
Transition layer 7	6	Start depth: 6.84 (m)	4	Clay & silty clay
		End depth: 6.94 (m)	5	Silty sand & sandy silt
Transition layer 8	4	Start depth: 6.98 (m)	5	Silty sand & sandy silt
		End depth: 7.04 (m)	4	Clay & silty clay
Transition layer 9	5	Start depth: 7.12 (m)	5	Silty sand & sandy silt
		End depth: 7.20 (m)	4	Clay & silty clay
Transition layer 10	5	Start depth: 7.52 (m)	4	Clay & silty clay
		End depth: 7.60 (m)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.02	0.30	-1.00	100.00	13.73
2	0.92	0.02	0.30	-1.00	100.00	13.73
3	0.94	0.14	6.80	5.60	100.00	14.14
4	0.96	0.15	10.30	11.80	100.00	14.81
5	0.98	0.09	11.90	25.50	100.00	14.84
6	1.00	0.07	8.90	109.60	100.00	15.03
7	1.02	0.32	10.90	68.20	35.95	15.93
8	1.04	2.27	20.00	448.60	21.18	16.44
9	1.06	2.61	18.90	490.60	13.98	16.76
10	1.08	3.12	18.20	433.00	12.18	16.85
11	1.10	3.43	22.10	51.80	11.52	16.90
12	1.12	3.19	20.30	1.70	12.60	16.99
13	1.14	2.86	23.80	-3.20	15.53	17.05
14	1.16	2.25	28.90	21.80	19.17	17.15
15	1.18	2.14	30.60	57.40	22.68	17.21
16	1.20	2.00	31.60	72.60	24.79	17.22
17	1.22	1.79	32.50	60.30	27.38	17.21
18	1.24	1.59	32.40	40.00	30.83	17.19
19	1.26	1.39	33.70	44.70	34.49	17.13
20	1.28	1.21	32.00	76.90	36.95	17.05
21	1.30	1.19	28.70	82.50	37.99	16.96
22	1.32	1.17	28.50	98.90	37.79	16.88
23	1.34	1.13	26.60	99.80	37.86	16.81
24	1.36	1.11	24.30	81.30	39.24	16.71
25	1.38	0.94	23.70	73.50	41.51	16.62
26	1.40	0.86	23.20	77.50	44.42	16.55
27	1.42	0.83	22.10	83.60	45.67	16.49
28	1.44	0.80	21.00	96.90	45.79	16.41
29	1.46	0.80	19.70	100.40	45.35	16.37
30	1.48	0.82	19.70	100.40	43.68	16.31
31	1.50	0.86	17.70	96.60	41.79	16.26
32	1.52	0.88	16.40	91.70	40.11	16.18
33	1.54	0.88	15.90	91.50	39.50	16.14
34	1.56	0.88	16.00	94.90	39.71	16.15
35	1.58	0.87	16.70	105.90	40.09	16.11
36	1.60	0.82	14.50	105.90	41.04	16.13
37	1.62	0.83	17.20	118.00	41.47	16.13
38	1.64	0.84	16.90	117.80	41.84	16.19
39	1.66	0.84	17.10	122.90	41.43	16.21
40	1.68	0.87	17.70	129.60	41.42	16.23
41	1.70	0.85	17.60	115.00	41.87	16.24
42	1.72	0.83	17.90	115.70	43.06	16.25
43	1.74	0.80	18.70	118.30	44.36	16.27
44	1.76	0.78	19.00	119.50	52.25	16.25
45	1.78	0.39	20.40	97.70	51.10	16.33
46	1.80	0.92	21.90	54.30	50.58	16.38
47	1.82	0.86	21.20	51.40	44.61	16.47
48	1.84	0.81	21.60	60.40	46.50	16.44

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	0.77	21.30	86.90	47.73	16.41
50	1.88	0.76	20.50	88.80	48.53	16.39
51	1.90	0.74	20.90	89.10	50.17	16.38
52	1.92	0.68	21.90	106.60	52.10	16.37
53	1.94	0.66	21.00	107.30	53.88	16.33
54	1.96	0.64	19.80	74.20	54.18	16.29
55	1.98	0.65	20.00	66.60	54.53	16.28
56	2.00	0.64	20.60	64.90	53.92	16.26
57	2.02	0.66	18.80	72.10	53.87	16.29
58	2.04	0.67	21.30	77.30	53.02	16.30
59	2.06	0.69	20.70	80.90	52.55	16.33
60	2.08	0.69	19.80	84.00	51.63	16.30
61	2.10	0.69	19.50	81.90	51.44	16.28
62	2.12	0.68	19.50	77.40	52.35	16.27
63	2.14	0.65	20.00	67.60	54.20	16.28
64	2.16	0.62	20.80	78.30	56.32	16.30
65	2.18	0.60	21.30	78.40	57.79	16.34
66	2.20	0.61	22.40	85.80	56.81	16.39
67	2.22	0.69	23.20	95.10	54.54	16.45
68	2.24	0.73	22.90	97.50	51.93	16.47
69	2.26	0.75	22.40	86.10	50.35	16.46
70	2.28	0.77	22.00	66.60	49.77	16.47
71	2.30	0.77	22.70	73.20	49.93	16.47
72	2.32	0.75	22.90	86.70	50.74	16.46
73	2.34	0.71	21.80	93.50	51.04	16.43
74	2.36	0.73	21.30	97.40	50.57	16.39
75	2.38	0.75	20.60	103.80	48.97	16.35
76	2.40	0.77	19.10	94.30	47.30	16.29
77	2.42	0.78	18.00	82.90	46.88	16.23
78	2.44	0.73	17.50	83.80	47.61	16.16
79	2.46	0.69	16.70	72.30	49.78	16.11
80	2.48	0.64	16.90	82.50	52.06	16.09
81	2.50	0.61	17.50	66.40	54.99	16.10
82	2.52	0.58	18.30	65.50	57.72	16.13
83	2.54	0.55	18.90	70.20	58.41	16.15
84	2.56	0.60	18.70	82.00	56.74	16.15
85	2.58	0.64	17.60	80.20	53.99	16.12
86	2.60	0.65	16.80	85.10	51.65	16.06
87	2.62	0.66	15.20	80.40	49.93	16.01
88	2.64	0.69	15.20	84.80	47.88	15.96
89	2.66	0.72	14.40	90.10	46.98	15.97
90	2.68	0.71	15.00	91.60	46.79	15.96
91	2.70	0.69	14.90	77.10	47.44	15.95
92	2.72	0.68	14.20	75.70	47.85	15.91
93	2.74	0.66	13.80	80.20	48.51	15.87
94	2.76	0.64	14.00	79.10	49.12	15.85
95	2.78	0.64	13.80	84.80	49.06	15.84
96	2.80	0.66	13.30	89.60	48.08	15.84

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	0.68	13.60	96.60	47.17	15.82
98	2.84	0.67	13.10	94.10	46.96	15.83
99	2.86	0.67	13.30	95.30	47.68	15.82
100	2.88	0.65	13.60	96.40	48.38	15.82
101	2.90	0.64	13.40	99.20	48.81	15.81
102	2.92	0.64	13.10	100.00	49.06	15.79
103	2.94	0.62	13.00	94.50	49.98	15.77
104	2.96	0.60	13.20	78.20	51.83	15.78
105	2.98	0.57	13.70	73.80	61.72	15.74
106	3.00	0.27	14.50	81.10	63.93	15.70
107	3.02	0.53	12.70	69.70	65.62	15.64
108	3.04	0.51	12.20	64.60	58.48	15.63
109	3.06	0.47	12.50	62.40	60.98	15.63
110	3.08	0.45	13.30	67.60	63.49	15.71
111	3.10	0.47	15.10	76.80	64.22	15.83
112	3.12	0.50	16.70	79.00	62.59	15.96
113	3.14	0.56	17.60	65.30	59.59	16.05
114	3.16	0.61	17.60	47.90	57.04	16.09
115	3.18	0.62	17.60	41.60	55.78	16.11
116	3.20	0.62	17.70	30.50	54.99	16.13
117	3.22	0.65	18.10	39.30	53.35	16.16
118	3.24	0.70	18.30	45.60	50.80	16.21
119	3.26	0.77	18.90	50.00	46.74	16.28
120	3.28	0.91	19.30	50.20	43.52	16.35
121	3.30	0.95	19.70	55.00	41.00	16.40
122	3.32	0.99	20.20	59.50	40.81	16.45
123	3.34	0.97	21.50	62.70	41.63	16.49
124	3.36	0.92	21.90	72.10	43.33	16.50
125	3.38	0.87	21.50	78.80	44.51	16.50
126	3.40	0.88	22.20	90.00	44.24	16.50
127	3.42	0.93	21.80	106.60	42.09	16.46
128	3.44	0.98	18.60	112.60	39.46	16.40
129	3.46	1.03	18.10	114.60	37.16	16.32
130	3.48	1.04	17.10	119.20	35.87	16.25
131	3.50	1.03	15.10	116.40	35.43	16.18
132	3.52	1.00	15.10	116.90	35.62	16.11
133	3.54	0.97	14.90	120.90	36.56	16.13
134	3.56	0.96	16.20	139.20	37.24	16.17
135	3.58	0.97	16.80	147.60	37.64	16.23
136	3.60	0.98	17.10	144.90	37.37	16.27
137	3.62	1.02	17.70	139.60	37.21	16.29
138	3.64	1.01	17.70	138.10	36.90	16.30
139	3.66	1.02	17.30	141.20	36.98	16.28
140	3.68	1.00	16.80	137.80	37.01	16.25
141	3.70	0.99	16.70	138.80	37.85	16.22
142	3.72	0.92	16.40	134.50	39.37	16.21
143	3.74	0.87	17.00	125.70	42.17	16.20
144	3.76	0.79	17.50	121.50	45.38	16.20

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	0.72	17.90	139.50	48.63	16.18
146	3.80	0.68	17.60	124.90	50.81	16.16
147	3.82	0.66	17.30	128.20	51.03	16.12
148	3.84	0.69	16.50	143.20	49.40	16.06
149	3.86	0.72	14.70	146.30	47.58	16.00
150	3.88	0.71	14.40	152.40	45.65	15.90
151	3.90	0.72	12.40	160.20	44.43	15.83
152	3.92	0.74	12.10	170.80	42.47	15.76
153	3.94	0.77	11.80	180.70	41.04	15.74
154	3.96	0.79	11.40	190.70	39.89	15.72
155	3.98	0.80	11.40	196.60	39.23	15.74
156	4.00	0.83	12.00	192.90	39.18	15.79
157	4.02	0.83	12.70	189.90	39.49	15.84
158	4.04	0.82	13.10	182.30	40.68	15.89
159	4.06	0.79	13.90	182.80	42.35	15.93
160	4.08	0.75	14.50	193.80	44.18	15.96
161	4.10	0.73	14.80	203.00	45.15	15.95
162	4.12	0.72	13.90	211.30	45.16	15.92
163	4.14	0.73	13.40	217.50	44.61	15.86
164	4.16	0.72	12.60	213.80	43.31	15.81
165	4.18	0.76	12.00	210.90	41.77	15.76
166	4.20	0.79	11.50	196.10	43.45	15.54
167	4.22	0.49	7.30	193.10	46.45	15.30
168	4.24	0.49	7.30	193.10	44.18	15.31
169	4.26	0.90	11.40	182.20	39.32	15.55
170	4.28	0.90	11.40	182.20	35.63	15.76
171	4.30	0.90	11.40	182.20	36.82	15.88
172	4.32	0.90	15.10	163.80	36.86	16.04
173	4.34	1.03	16.40	169.70	35.60	16.22
174	4.36	1.16	17.10	194.50	33.33	16.31
175	4.38	1.22	17.60	126.80	33.26	16.39
176	4.40	1.14	19.60	51.10	34.47	16.46
177	4.42	1.14	21.00	53.70	36.30	16.54
178	4.44	1.14	22.20	42.90	37.72	16.61
179	4.46	1.09	24.00	35.90	39.60	16.68
180	4.48	1.04	25.70	48.40	41.79	16.76
181	4.50	1.03	28.30	71.30	43.94	16.82
182	4.52	0.97	29.40	95.00	44.82	16.83
183	4.54	0.98	26.80	96.70	43.85	16.78
184	4.56	1.05	24.60	94.90	41.90	16.74
185	4.58	1.08	25.60	102.20	39.34	16.70
186	4.60	1.15	22.90	99.40	38.15	16.69
187	4.62	1.15	23.30	104.80	37.39	16.67
188	4.64	1.13	23.70	115.10	38.40	16.67
189	4.66	1.07	23.70	87.30	40.08	16.68
190	4.68	1.02	24.90	91.40	42.20	16.68
191	4.70	0.96	25.20	124.30	43.96	16.66
192	4.72	0.91	23.60	147.60	45.52	16.62

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.86	23.30	166.80	46.21	16.55
194	4.76	0.84	21.60	188.40	46.08	16.46
195	4.78	0.84	19.30	193.40	44.81	16.35
196	4.80	0.85	17.50	205.00	42.61	16.21
197	4.82	0.88	14.60	187.60	40.27	16.08
198	4.84	0.90	13.40	196.60	37.79	15.98
199	4.86	0.95	13.10	190.20	36.11	15.95
200	4.88	0.99	13.20	196.50	34.14	15.99
201	4.90	1.13	13.80	188.30	32.41	16.02
202	4.92	1.18	13.10	141.00	31.81	16.09
203	4.94	1.16	15.30	66.40	32.91	16.19
204	4.96	1.12	17.80	82.10	34.87	16.32
205	4.98	1.10	18.90	71.80	35.95	16.43
206	5.00	1.16	20.40	30.10	37.03	16.52
207	5.02	1.12	22.60	30.70	38.79	16.62
208	5.04	1.04	24.90	-8.70	43.62	16.83
209	5.06	0.98	35.90	-17.50	48.32	17.01
210	5.08	0.96	38.30	-9.80	52.28	17.14
211	5.10	0.92	38.80	-4.20	54.31	17.16
212	5.12	0.88	39.10	3.90	55.60	17.14
213	5.14	0.87	37.60	3.00	55.97	17.09
214	5.16	0.85	34.90	10.20	55.38	16.95
215	5.18	0.80	27.30	10.80	54.40	16.78
216	5.20	0.79	24.40	13.70	50.19	16.61
217	5.22	0.95	22.40	17.00	45.20	16.57
218	5.24	1.07	22.50	17.10	39.71	16.60
219	5.26	1.26	22.60	7.60	37.98	16.72
220	5.28	1.25	27.50	-19.30	38.91	16.87
221	5.30	1.14	31.90	-27.90	42.36	16.99
222	5.32	1.07	33.70	-30.50	46.98	16.98
223	5.34	0.86	30.20	-36.90	52.19	16.92
224	5.36	0.77	31.00	-46.20	59.91	16.86
225	5.38	0.65	34.10	-52.60	69.44	16.88
226	5.40	0.53	37.50	-52.40	78.30	16.90
227	5.42	0.53	37.50	-52.40	92.53	16.69
228	5.44	0.25	23.80	40.00	94.06	16.40
229	5.46	0.39	18.30	47.90	92.66	16.00
230	5.48	0.41	15.90	52.60	78.48	15.84
231	5.50	0.42	13.80	48.40	74.78	15.70
232	5.52	0.42	12.60	44.70	73.94	15.59
233	5.54	0.39	12.00	37.60	75.79	15.52
234	5.56	0.37	12.20	42.80	79.47	15.51
235	5.58	0.35	13.00	49.50	83.47	15.52
236	5.60	0.33	13.00	60.80	87.08	15.51
237	5.62	0.31	12.40	68.40	89.51	15.45
238	5.64	0.30	11.50	72.10	89.51	15.30
239	5.66	0.30	8.80	85.00	87.99	15.11
240	5.68	0.29	7.80	89.80	85.47	14.90

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.29	6.90	94.70	83.22	14.77
242	5.72	0.30	6.20	97.40	78.18	14.68
243	5.74	0.34	6.00	93.70	71.55	14.68
244	5.76	0.38	6.20	94.80	64.36	14.78
245	5.78	0.45	7.00	103.00	56.97	14.92
246	5.80	0.55	7.30	114.40	51.01	15.11
247	5.82	0.65	8.60	114.50	46.46	15.34
248	5.84	0.76	10.60	126.40	44.22	15.56
249	5.86	0.79	11.70	131.50	43.14	15.73
250	5.88	0.82	12.50	136.90	43.18	15.85
251	5.90	0.83	14.00	139.10	43.47	15.93
252	5.92	0.83	14.30	137.30	44.37	16.02
253	5.94	0.82	15.80	155.50	45.05	16.08
254	5.96	0.83	16.50	168.10	45.67	16.14
255	5.98	0.83	16.50	173.90	45.51	16.14
256	6.00	0.84	15.90	168.50	45.72	16.15
257	6.02	0.83	16.90	175.50	45.98	16.14
258	6.04	0.80	16.10	207.60	45.85	16.11
259	6.06	0.82	14.80	221.20	44.61	16.04
260	6.08	0.86	13.90	223.20	42.69	15.98
261	6.10	0.89	13.40	228.60	41.32	15.96
262	6.12	0.91	13.40	200.70	40.78	15.97
263	6.14	0.91	14.00	191.70	41.31	16.03
264	6.16	0.91	15.60	189.90	42.58	16.09
265	6.18	0.86	15.90	189.10	43.54	16.16
266	6.20	0.90	17.10	221.60	43.36	16.20
267	6.22	0.94	17.00	241.30	41.81	16.23
268	6.24	1.00	16.20	225.50	40.67	16.21
269	6.26	0.98	15.80	211.30	40.27	16.15
270	6.28	0.94	14.60	216.20	40.56	16.08
271	6.30	0.92	13.80	220.40	40.64	16.01
272	6.32	0.92	13.60	223.40	41.17	16.00
273	6.34	0.90	14.60	211.80	42.20	16.04
274	6.36	0.88	15.50	206.90	43.79	16.11
275	6.38	0.86	16.50	203.50	44.80	16.15
276	6.40	0.86	16.50	202.60	45.45	16.19
277	6.42	0.87	17.20	216.70	45.25	16.20
278	6.44	0.89	16.90	216.90	44.71	16.23
279	6.46	0.92	17.30	212.50	43.67	16.24
280	6.48	0.96	17.20	209.70	42.67	16.27
281	6.50	0.99	17.50	198.00	40.18	16.32
282	6.52	1.18	18.20	196.60	38.10	16.38
283	6.54	1.22	18.90	190.20	36.44	16.42
284	6.56	1.21	18.00	144.70	37.23	16.41
285	6.58	1.11	18.30	68.40	39.67	16.43
286	6.60	1.02	21.00	99.00	41.52	16.38
287	6.62	1.00	16.60	165.60	41.09	16.30
288	6.64	1.06	14.90	204.70	35.78	16.06

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.27	9.80	287.40	33.20	16.01
290	6.68	1.24	14.00	185.70	32.06	16.04
291	6.70	1.24	15.50	225.10	33.92	16.19
292	6.72	1.20	15.50	266.70	35.87	16.14
293	6.74	0.96	13.10	264.10	38.09	15.99
294	6.76	0.88	11.50	279.10	40.02	15.79
295	6.78	0.87	10.10	302.50	39.72	15.66
296	6.80	0.89	9.70	347.40	38.96	15.57
297	6.82	0.86	9.10	369.30	38.25	15.47
298	6.84	0.85	7.70	372.50	37.33	15.36
299	6.86	0.89	7.40	378.00	36.06	15.29
300	6.88	0.93	7.50	391.80	34.39	15.30
301	6.90	1.00	7.40	407.90	32.75	15.31
302	6.92	1.07	7.30	409.30	31.10	15.34
303	6.94	1.13	7.50	404.20	30.12	15.34
304	6.96	1.12	7.10	432.80	29.52	15.30
305	6.98	1.11	6.50	415.50	29.69	15.22
306	7.00	1.05	6.30	369.80	30.81	15.20
307	7.02	0.98	7.00	381.20	32.95	15.21
308	7.04	0.89	7.10	417.80	34.84	15.21
309	7.06	0.87	6.80	447.40	35.41	15.21
310	7.08	0.91	7.00	461.80	34.37	15.18
311	7.10	0.97	6.50	445.70	33.18	15.17
312	7.12	0.98	6.30	415.30	33.10	15.20
313	7.14	0.97	7.40	319.20	34.67	15.31
314	7.16	0.92	8.80	303.40	37.11	15.45
315	7.18	0.88	9.60	306.30	38.79	15.59
316	7.20	0.92	10.70	302.80	39.97	15.73
317	7.22	0.94	12.70	292.60	40.70	15.84
318	7.24	0.92	12.80	249.40	42.39	15.92
319	7.26	0.86	13.60	258.60	43.69	15.83
320	7.28	0.79	10.40	291.70	45.07	15.66
321	7.30	0.70	8.40	321.80	45.26	15.37
322	7.32	0.68	7.20	336.20	45.65	15.18
323	7.34	0.65	6.70	341.10	45.66	15.03
324	7.36	0.63	5.90	342.90	45.75	14.89
325	7.38	0.61	5.20	345.70	45.45	14.76
326	7.40	0.61	4.80	342.10	44.82	14.64
327	7.42	0.61	4.40	340.80	44.39	14.58
328	7.44	0.61	4.50	332.50	43.99	14.55
329	7.46	0.62	4.40	331.00	44.17	14.61
330	7.48	0.64	5.10	315.90	44.08	14.67
331	7.50	0.65	5.10	313.70	44.21	14.70
332	7.52	0.63	4.80	322.00	43.94	14.71
333	7.54	0.66	5.20	318.40	39.67	14.74
334	7.56	0.91	4.90	341.70	31.90	14.79
335	7.58	1.30	4.20	325.60	25.47	14.84
336	7.60	1.55	4.70	156.60	5.00	14.98

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.57	5.90	170.90	5.00	15.10
338	7.64	1.52	5.50	213.60	5.00	15.15
339	7.66	1.92	5.10	231.80	5.00	15.28
340	7.68	2.26	7.10	187.80	5.00	15.52
341	7.70	2.59	8.40	109.60	5.00	15.80
342	7.72	2.98	9.50	63.70	5.00	16.01
343	7.74	3.35	11.00	31.40	5.00	16.10
344	7.76	3.47	9.60	43.50	5.00	16.03
345	7.78	3.21	7.70	65.10	5.00	15.76
346	7.80	2.84	5.30	93.20	5.00	15.51
347	7.82	2.45	5.90	189.70	5.00	15.50
348	7.84	2.18	8.30	217.00	5.00	15.86
349	7.86	2.05	13.60	297.40	23.72	16.68
350	7.88	2.23	35.40	6.80	22.54	17.13
351	7.90	3.45	30.70	55.90	17.51	17.49
352	7.92	5.09	31.70	40.40	11.88	17.59
353	7.94	6.44	33.60	-9.40	8.92	17.71
354	7.96	7.24	33.10	-41.30	5.00	17.69
355	7.98	7.70	26.60	-48.20	5.00	17.56
356	8.00	7.86	21.30	-7.60	4.88	17.27
357	8.02	7.82	14.90	18.80	4.38	17.06
358	8.04	7.73	15.70	34.20	4.26	16.99
359	8.06	7.80	18.30	38.60	4.41	17.09
360	8.08	8.01	19.40	40.30	4.21	17.21
361	8.10	8.86	20.40	40.30	3.67	17.33
362	8.12	10.00	22.90	55.50	3.12	17.55
363	8.14	11.29	30.10	14.70	2.44	17.69
364	8.16	12.59	26.90	-13.10	1.93	17.79
365	8.18	13.07	27.10	-4.50	1.69	17.83
366	8.20	12.93	31.90	3.10	1.74	17.90
367	8.22	12.98	32.00	19.70	1.91	17.99
368	8.24	13.17	34.80	68.80	1.89	18.04
369	8.26	13.52	35.60	62.90	1.78	18.15
370	8.28	14.71	40.70	63.40	1.71	18.28
371	8.30	15.03	46.00	58.50	1.75	18.42
372	8.32	15.17	50.60	-3.80	1.92	18.53
373	8.34	15.10	53.30	-10.60	1.97	18.56
374	8.36	15.18	49.70	4.10	1.88	18.52
375	8.38	15.23	45.70	45.80	1.70	18.47
376	8.40	15.43	46.30	33.60	1.75	18.50
377	8.42	15.40	53.80	11.80	1.68	18.49
378	8.44	15.56	44.30	2.60	1.79	18.55
379	8.46	15.48	52.80	1.10	1.65	18.51
380	8.48	15.70	48.40	5.80	1.65	18.49
381	8.50	15.41	42.50	33.00	1.55	18.44
382	8.52	15.45	46.50	25.30	1.57	18.43
383	8.54	15.52	48.10	7.40	1.54	18.42
384	8.56	15.39	40.50	2.40	1.44	18.35

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	15.21	38.70	7.90	1.67	18.36
386	8.60	14.30	50.20	4.60	2.36	18.44
387	8.62	12.83	53.40	-10.70	2.86	18.38
388	8.64	12.16	34.40	-24.30	3.07	18.23
389	8.66	11.87	36.20	-12.70	2.89	18.04
390	8.68	11.66	35.50	23.20	3.02	18.05
391	8.70	11.77	35.70	30.10	3.02	18.01
392	8.72	11.49	32.60	49.00	2.80	17.87
393	8.74	11.29	23.90	39.90	2.84	17.82
394	8.76	11.20	32.30	54.50	3.37	17.99
395	8.78	11.09	47.90	32.50	3.68	18.15
396	8.80	11.62	38.20	-7.30	3.43	18.15
397	8.82	12.20	31.90	-11.70	3.13	18.11
398	8.84	11.77	42.40	39.30	3.79	18.25
399	8.86	10.60	54.20	35.50	4.39	18.30
400	8.88	10.76	39.90	11.40	4.77	18.24
401	8.90	10.12	38.00	18.50	4.49	18.06
402	8.92	9.83	35.60	27.40	4.87	18.09
403	8.94	9.99	44.20	38.60	4.86	18.15
404	8.96	10.62	43.00	25.90	4.16	18.16
405	8.98	12.05	34.50	77.90	3.26	18.19
406	9.00	13.40	43.10	69.40	2.05	18.17
407	9.02	15.80	36.10	58.70	1.00	18.27
408	9.04	19.44	38.10	55.20	0.21	18.31
409	9.06	20.22	41.90	62.80	0.00	18.38
410	9.08	20.40	39.80	68.80	0.00	18.26
411	9.10	16.69	28.20	67.70	0.26	18.28
412	9.12	17.62	45.90	58.30	0.74	18.25
413	9.14	16.02	39.50	73.00	1.04	18.32
414	9.16	15.52	36.80	64.20	1.16	18.18
415	9.18	15.07	33.20	48.80	2.12	18.46
416	9.20	13.90	72.40	76.00	2.99	18.63
417	9.22	13.39	61.30	63.80	3.85	18.74
418	9.24	12.93	53.90	65.00	3.97	18.63
419	9.26	12.17	57.80	54.60	4.20	18.59
420	9.28	12.17	57.80	54.60	4.81	18.64
421	9.30	11.38	62.70	63.80	5.81	18.62
422	9.32	9.14	60.40	13.30	6.47	18.62
423	9.34	10.48	60.40	13.30	6.44	18.85
424	9.36	13.90	98.30	-54.20	6.23	19.21
425	9.38	14.13	128.50	-60.90	6.72	19.57
426	9.40	14.04	153.20	-11.80	7.45	19.74
427	9.42	14.40	158.90	-40.90	8.30	19.89
428	9.44	13.96	188.10	-23.70	8.07	19.87
429	9.46	14.49	145.00	15.70	7.70	19.82
430	9.48	14.63	135.80	15.00	7.01	19.64
431	9.50	13.29	123.20	10.80	7.18	19.51
432	9.52	11.98	107.00	25.00	7.28	19.25

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	11.02	72.80	42.80	8.16	19.11
434	9.56	9.47	97.10	54.00	9.87	19.05
435	9.58	8.08	105.90	82.30	13.68	19.27
436	9.60	7.31	144.90	172.90	17.02	19.53
437	9.62	7.85	194.80	259.30	18.21	19.81
438	9.64	9.24	218.90	624.10	17.30	20.02
439	9.66	10.37	232.10	805.90	16.41	20.20
440	9.68	11.07	278.50	552.20	15.69	20.38
441	9.70	12.61	309.70	449.70	15.09	20.56
442	9.72	14.16	341.00	147.40	14.43	20.69
443	9.74	14.54	360.60	-21.80	14.09	20.80
444	9.76	15.29	385.30	-23.90	14.28	20.91
445	9.78	15.84	436.20	-47.50	14.52	21.00
446	9.80	15.82	448.30	-63.00	14.98	21.07
447	9.82	15.61	458.10	-63.70	15.29	21.10
448	9.84	15.81	474.90	-60.00	15.45	21.14
449	9.86	16.24	490.30	-58.00	15.59	21.20
450	9.88	16.72	532.90	-57.50	15.51	21.28
451	9.90	17.70	562.40	-46.40	15.31	21.36
452	9.92	18.51	578.50	-52.50	14.30	21.44
453	9.94	21.17	594.50	-54.70	13.28	21.50
454	9.96	22.50	616.50	-54.60	12.52	21.56
455	9.98	22.82	636.40	-52.50	12.53	21.58
456	10.00	22.88	673.10	-60.70	12.96	21.58
457	10.02	22.24	690.00	-56.40	13.39	21.58
458	10.04	22.33	697.50	-54.90	14.46	21.58
459	10.06	19.74	727.00	-49.20	14.47	21.58
460	10.08	23.21	741.90	-54.10	14.61	21.58
461	10.10	23.40	783.80	-47.60	14.02	21.58
462	10.12	23.48	798.60	-54.20	14.16	21.58
463	10.14	23.89	808.00	-57.30	14.19	21.58
464	10.16	24.11	825.30	-56.70	14.23	21.58
465	10.18	24.21	846.40	-58.20	14.35	21.58
466	10.20	24.21	851.00	-57.40	14.44	21.58

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	7.80	151.74	0.00	151.74	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
2	7.82	152.02	0.00	152.02	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
3	7.84	152.30	0.00	152.30	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
4	7.86	152.59	0.00	152.59	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
5	7.88	152.89	0.00	152.89	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
6	7.90	153.19	0.00	153.19	0.94	0.061	1.38	0.044	1.00	1.00	2.000	No
7	7.92	153.51	0.00	153.51	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
8	7.94	153.84	0.00	153.84	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
9	7.96	154.17	0.00	154.17	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
10	7.98	154.51	0.00	154.51	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
11	8.00	154.85	0.00	154.85	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
12	8.02	155.19	0.00	155.19	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
13	8.04	155.53	0.00	155.53	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
14	8.06	155.87	0.00	155.87	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
15	8.08	156.22	0.00	156.22	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
16	8.10	156.56	0.00	156.56	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
17	8.12	156.91	0.00	156.91	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
18	8.14	157.25	0.00	157.25	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
19	8.16	157.59	0.00	157.59	0.94	0.061	1.38	0.044	1.00	1.00	2.000	Yes
20	8.18	157.93	0.00	157.93	0.93	0.061	1.38	0.044	1.00	1.00	2.000	Yes
21	8.20	158.27	0.00	158.27	0.93	0.061	1.38	0.044	1.00	1.00	2.000	Yes
22	8.22	158.61	0.00	158.61	0.93	0.061	1.38	0.044	1.00	1.00	2.000	No
23	8.24	158.95	0.10	158.85	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
24	8.26	159.28	0.29	158.99	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
25	8.28	159.61	0.49	159.12	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
26	8.30	159.94	0.69	159.26	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
27	8.32	160.27	0.88	159.39	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
28	8.34	160.60	1.08	159.52	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
29	8.36	160.93	1.28	159.65	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
30	8.38	161.26	1.47	159.78	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
31	8.40	161.58	1.67	159.91	0.93	0.061	1.38	0.044	1.00	1.00	0.044	No
32	8.42	161.90	1.86	160.04	0.93	0.061	1.38	0.045	1.00	1.00	0.045	No
33	8.44	162.23	2.06	160.17	0.93	0.061	1.38	0.045	1.00	1.00	0.045	No
34	8.46	162.55	2.26	160.29	0.93	0.061	1.38	0.045	1.00	1.00	0.045	No
35	8.48	162.87	2.45	160.42	0.93	0.061	1.38	0.045	1.00	1.00	0.045	No
36	8.50	163.19	2.65	160.55	0.93	0.061	1.38	0.045	1.00	1.00	0.045	No
37	8.52	163.52	2.84	160.67	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
38	8.54	163.84	3.04	160.80	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
39	8.56	164.17	3.24	160.93	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
40	8.58	164.49	3.43	161.06	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
41	8.60	164.81	3.63	161.18	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
42	8.62	165.14	3.83	161.31	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
43	8.64	165.47	4.02	161.44	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
44	8.66	165.79	4.22	161.57	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
45	8.68	166.12	4.41	161.70	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
46	8.70	166.44	4.61	161.83	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
47	8.72	166.77	4.81	161.97	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
48	8.74	167.10	5.00	162.10	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.76	167.43	5.20	162.23	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
50	8.78	167.76	5.40	162.36	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
51	8.80	168.09	5.59	162.49	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
52	8.82	168.41	5.79	162.63	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
53	8.84	168.74	5.98	162.76	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
54	8.86	169.07	6.18	162.89	0.93	0.062	1.38	0.045	1.00	1.00	0.045	No
55	8.88	169.39	6.38	163.02	0.92	0.062	1.38	0.045	1.00	1.00	0.045	No
56	8.90	169.72	6.57	163.14	0.92	0.063	1.38	0.045	1.00	1.00	0.045	No
57	8.92	170.04	6.77	163.27	0.92	0.063	1.38	0.045	1.00	1.00	0.045	No
58	8.94	170.37	6.97	163.40	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
59	8.96	170.70	7.16	163.53	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
60	8.98	171.02	7.36	163.66	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
61	9.00	171.35	7.55	163.79	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
62	9.02	171.67	7.75	163.92	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
63	9.04	172.00	7.95	164.05	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
64	9.06	172.32	8.14	164.18	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
65	9.08	172.65	8.34	164.31	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
66	9.10	172.98	8.53	164.44	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
67	9.12	173.31	8.73	164.58	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
68	9.14	173.64	8.93	164.71	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
69	9.16	173.97	9.12	164.84	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
70	9.18	174.30	9.32	164.98	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
71	9.20	174.62	9.52	165.11	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
72	9.22	174.95	9.71	165.24	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
73	9.24	175.28	9.91	165.37	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
74	9.26	175.61	10.10	165.51	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
75	9.28	175.94	10.30	165.64	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
76	9.30	176.26	10.50	165.77	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
77	9.32	176.59	10.69	165.90	0.92	0.063	1.38	0.046	1.00	1.00	0.046	No
78	9.34	176.91	10.89	166.02	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
79	9.36	177.23	11.09	166.15	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
80	9.38	177.56	11.28	166.27	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
81	9.40	177.88	11.48	166.40	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
82	9.42	178.20	11.67	166.53	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
83	9.44	178.52	11.87	166.65	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
84	9.46	178.85	12.07	166.78	0.92	0.064	1.38	0.046	1.00	1.00	0.046	No
85	9.48	179.17	12.26	166.91	0.91	0.064	1.38	0.046	1.00	1.00	0.046	No
86	9.50	179.49	12.46	167.03	0.91	0.064	1.38	0.046	1.00	1.00	0.046	No
87	9.52	179.81	12.65	167.15	0.91	0.064	1.38	0.046	1.00	1.00	0.046	No
88	9.54	180.13	12.85	167.28	0.91	0.064	1.38	0.046	1.00	1.00	0.046	No
89	9.56	180.45	13.05	167.40	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
90	9.58	180.77	13.24	167.52	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
91	9.60	181.09	13.44	167.65	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
92	9.62	181.40	13.64	167.77	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
93	9.64	181.72	13.83	167.89	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
94	9.66	182.04	14.03	168.01	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
95	9.68	182.36	14.22	168.13	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
96	9.70	182.67	14.42	168.25	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	9.72	182.99	14.62	168.37	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
98	9.74	183.31	14.81	168.49	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
99	9.76	183.62	15.01	168.61	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
100	9.78	183.94	15.21	168.73	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
101	9.80	184.25	15.40	168.85	0.91	0.064	1.38	0.047	1.00	1.00	0.047	No
102	9.82	184.57	15.60	168.97	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
103	9.84	184.89	15.79	169.09	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
104	9.86	185.20	15.99	169.21	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
105	9.88	185.52	16.19	169.33	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
106	9.90	185.83	16.38	169.45	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
107	9.92	186.14	16.58	169.56	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
108	9.94	186.46	16.78	169.68	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
109	9.96	186.77	16.97	169.80	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
110	9.98	187.08	17.17	169.91	0.91	0.065	1.38	0.047	1.00	1.00	0.047	No
111	10.00	187.40	17.36	170.04	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
112	10.02	187.72	17.56	170.16	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
113	10.04	188.04	17.76	170.28	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
114	10.06	188.36	17.95	170.41	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
115	10.08	188.68	18.15	170.53	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
116	10.10	189.01	18.34	170.66	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
117	10.12	189.33	18.54	170.79	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
118	10.14	189.65	18.74	170.92	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
119	10.16	189.98	18.93	171.05	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
120	10.18	190.31	19.13	171.18	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
121	10.20	190.63	19.33	171.31	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
122	10.22	190.96	19.52	171.44	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
123	10.24	191.29	19.72	171.57	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
124	10.26	191.62	19.91	171.71	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
125	10.28	191.95	20.11	171.84	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
126	10.30	192.28	20.31	171.98	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
127	10.32	192.61	20.50	172.11	0.90	0.065	1.38	0.047	1.00	1.00	0.047	No
128	10.34	192.94	20.70	172.24	0.90	0.065	1.38	0.048	1.00	1.00	0.048	No
129	10.36	193.27	20.90	172.37	0.90	0.065	1.38	0.048	1.00	1.00	0.048	No
130	10.38	193.59	21.09	172.50	0.90	0.065	1.38	0.048	1.00	1.00	0.048	No
131	10.40	193.91	21.29	172.63	0.90	0.065	1.38	0.048	1.00	1.00	0.048	No
132	10.42	194.24	21.48	172.75	0.90	0.065	1.38	0.048	1.00	1.00	0.048	No
133	10.44	194.56	21.68	172.88	0.90	0.066	1.38	0.048	1.00	1.00	0.048	No
134	10.46	194.88	21.88	173.01	0.90	0.066	1.38	0.048	1.00	1.00	0.048	No
135	10.48	195.21	22.07	173.14	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
136	10.50	195.53	22.27	173.26	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
137	10.52	195.86	22.46	173.39	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
138	10.54	196.18	22.66	173.52	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
139	10.56	196.51	22.86	173.65	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
140	10.58	196.84	23.05	173.78	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
141	10.60	197.16	23.25	173.91	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
142	10.62	197.48	23.45	174.04	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
143	10.64	197.81	23.64	174.17	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
144	10.66	198.13	23.84	174.29	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	10.68	198.46	24.03	174.42	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
146	10.70	198.78	24.23	174.55	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
147	10.72	199.10	24.43	174.67	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
148	10.74	199.42	24.62	174.80	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
149	10.76	199.74	24.82	174.92	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
150	10.78	200.06	25.02	175.04	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
151	10.80	200.38	25.21	175.16	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
152	10.82	200.69	25.41	175.28	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
153	10.84	201.01	25.60	175.40	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
154	10.86	201.32	25.80	175.52	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
155	10.88	201.64	26.00	175.64	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
156	10.90	201.95	26.19	175.76	0.89	0.066	1.38	0.048	1.00	1.00	0.048	No
157	10.92	202.27	26.39	175.88	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
158	10.94	202.59	26.59	176.00	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
159	10.96	202.90	26.78	176.12	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
160	10.98	203.22	26.98	176.25	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
161	11.00	203.54	27.17	176.37	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
162	11.02	203.86	27.37	176.49	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
163	11.04	204.18	27.57	176.61	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
164	11.06	204.50	27.76	176.73	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
165	11.08	204.81	27.96	176.85	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
166	11.10	205.12	28.15	176.97	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
167	11.12	205.43	28.35	177.08	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
168	11.14	205.73	28.55	177.19	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
169	11.16	206.04	28.74	177.30	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
170	11.18	206.36	28.94	177.42	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
171	11.20	206.68	29.14	177.54	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
172	11.22	207.00	29.33	177.67	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
173	11.24	207.32	29.53	177.79	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
174	11.26	207.65	29.72	177.92	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
175	11.28	207.98	29.92	178.06	0.88	0.066	1.38	0.048	1.00	1.00	0.048	No
176	11.30	208.31	30.12	178.19	0.88	0.067	1.38	0.048	1.00	1.00	0.048	No
177	11.32	208.64	30.31	178.32	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
178	11.34	208.97	30.51	178.46	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
179	11.36	209.30	30.71	178.60	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
180	11.38	209.64	30.90	178.74	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
181	11.40	209.97	31.10	178.88	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
182	11.42	210.31	31.29	179.02	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
183	11.44	210.65	31.49	179.16	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
184	11.46	210.98	31.69	179.29	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
185	11.48	211.31	31.88	179.43	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
186	11.50	211.65	32.08	179.57	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
187	11.52	211.98	32.27	179.71	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
188	11.54	212.32	32.47	179.84	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
189	11.56	212.65	32.67	179.98	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
190	11.58	212.98	32.86	180.12	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
191	11.60	213.32	33.06	180.26	0.87	0.067	1.38	0.048	1.00	1.00	0.048	No
192	11.62	213.65	33.26	180.39	0.87	0.067	1.38	0.049	1.00	1.00	0.049	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	11.64	213.98	33.45	180.53	0.87	0.067	1.38	0.049	1.00	1.00	0.049	No
194	11.66	214.31	33.65	180.66	0.87	0.067	1.38	0.049	1.00	1.00	2.000	Yes
195	11.68	214.64	33.84	180.79	0.87	0.067	1.38	0.049	1.00	1.00	2.000	Yes
196	11.70	214.96	34.04	180.92	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
197	11.72	215.28	34.24	181.04	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
198	11.74	215.60	34.43	181.17	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
199	11.76	215.92	34.63	181.29	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
200	11.78	216.24	34.83	181.41	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
201	11.80	216.56	35.02	181.54	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
202	11.82	216.88	35.22	181.66	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
203	11.84	217.21	35.41	181.79	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
204	11.86	217.53	35.61	181.92	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
205	11.88	217.86	35.81	182.05	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
206	11.90	218.19	36.00	182.19	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
207	11.92	218.52	36.20	182.32	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
208	11.94	218.86	36.40	182.46	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
209	11.96	219.20	36.59	182.61	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
210	11.98	219.54	36.79	182.76	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
211	12.00	219.89	36.98	182.90	0.86	0.067	1.38	0.049	1.00	1.00	2.000	Yes
212	12.02	220.23	37.18	183.05	0.86	0.067	1.38	0.049	1.00	1.00	0.049	No
213	12.04	220.57	37.38	183.19	0.86	0.067	1.38	0.049	1.00	1.00	0.049	No
214	12.06	220.91	37.57	183.34	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
215	12.08	221.25	37.77	183.48	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
216	12.10	221.58	37.96	183.61	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
217	12.12	221.91	38.16	183.75	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
218	12.14	222.24	38.36	183.88	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
219	12.16	222.58	38.55	184.02	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
220	12.18	222.91	38.75	184.16	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
221	12.20	223.25	38.95	184.31	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
222	12.22	223.59	39.14	184.45	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
223	12.24	223.93	39.34	184.59	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
224	12.26	224.27	39.53	184.73	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
225	12.28	224.61	39.73	184.88	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
226	12.30	224.94	39.93	185.02	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
227	12.32	225.28	40.12	185.15	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
228	12.34	225.61	40.32	185.29	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
229	12.36	225.93	40.52	185.41	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
230	12.38	226.24	40.71	185.53	0.85	0.067	1.38	0.049	1.00	1.00	0.049	No
231	12.40	226.56	40.91	185.65	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
232	12.42	226.87	41.10	185.76	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
233	12.44	227.18	41.30	185.88	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
234	12.46	227.49	41.50	185.99	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
235	12.48	227.80	41.69	186.11	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
236	12.50	228.11	41.89	186.22	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
237	12.52	228.42	42.08	186.33	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
238	12.54	228.72	42.28	186.44	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
239	12.56	229.03	42.48	186.55	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
240	12.58	229.32	42.67	186.65	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	12.60	229.62	42.87	186.75	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
242	12.62	229.91	43.07	186.85	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
243	12.64	230.21	43.26	186.95	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
244	12.66	230.50	43.46	187.04	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
245	12.68	230.80	43.65	187.15	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
246	12.70	231.10	43.85	187.25	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
247	12.72	231.41	44.05	187.36	0.84	0.067	1.38	0.049	1.00	1.00	0.049	No
248	12.74	231.72	44.24	187.48	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
249	12.76	232.04	44.44	187.60	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
250	12.78	232.35	44.64	187.72	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
251	12.80	232.67	44.83	187.84	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
252	12.82	232.99	45.03	187.96	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
253	12.84	233.31	45.22	188.09	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
254	12.86	233.64	45.42	188.22	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
255	12.88	233.96	45.62	188.34	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
256	12.90	234.28	45.81	188.47	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
257	12.92	234.60	46.01	188.60	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
258	12.94	234.93	46.21	188.72	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
259	12.96	235.25	46.40	188.85	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
260	12.98	235.57	46.60	188.97	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
261	13.00	235.89	46.79	189.09	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
262	13.02	236.21	46.99	189.22	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
263	13.04	236.53	47.19	189.34	0.83	0.067	1.38	0.049	1.00	1.00	0.049	No
264	13.06	236.85	47.38	189.47	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
265	13.08	237.17	47.58	189.59	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
266	13.10	237.50	47.77	189.72	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
267	13.12	237.82	47.97	189.85	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
268	13.14	238.14	48.17	189.98	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
269	13.16	238.47	48.36	190.10	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
270	13.18	238.79	48.56	190.23	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
271	13.20	239.11	48.76	190.35	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
272	13.22	239.43	48.95	190.48	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
273	13.24	239.75	49.15	190.60	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
274	13.26	240.07	49.34	190.73	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
275	13.28	240.39	49.54	190.85	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
276	13.30	240.72	49.74	190.98	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
277	13.32	241.04	49.93	191.11	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
278	13.34	241.37	50.13	191.24	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
279	13.36	241.69	50.33	191.37	0.82	0.067	1.38	0.049	1.00	1.00	0.049	No
280	13.38	242.02	50.52	191.50	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
281	13.40	242.34	50.72	191.63	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
282	13.42	242.67	50.91	191.76	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
283	13.44	243.00	51.11	191.89	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
284	13.46	243.33	51.31	192.02	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
285	13.48	243.66	51.50	192.15	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
286	13.50	243.98	51.70	192.29	0.81	0.067	1.38	0.049	1.00	1.00	0.049	No
287	13.52	244.31	51.89	192.42	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
288	13.54	244.63	52.09	192.54	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	13.56	244.95	52.29	192.66	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
290	13.58	245.27	52.48	192.79	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
291	13.60	245.60	52.68	192.92	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
292	13.62	245.92	52.88	193.04	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
293	13.64	246.24	53.07	193.17	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
294	13.66	246.55	53.27	193.29	0.81	0.067	1.38	0.049	1.00	1.00	2.000	Yes
295	13.68	246.87	53.46	193.40	0.80	0.067	1.38	0.049	1.00	1.00	0.049	No
296	13.70	247.18	53.66	193.52	0.80	0.067	1.38	0.049	1.00	1.00	0.049	No
297	13.72	247.49	53.86	193.63	0.80	0.067	1.38	0.049	1.00	1.00	0.049	No
298	13.74	247.80	54.05	193.74	0.80	0.067	1.38	0.049	1.00	1.00	2.000	Yes
299	13.76	248.10	54.25	193.85	0.80	0.067	1.38	0.049	1.00	1.00	2.000	Yes
300	13.78	248.41	54.45	193.96	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
301	13.80	248.71	54.64	194.07	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
302	13.82	249.02	54.84	194.18	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
303	13.84	249.33	55.03	194.29	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
304	13.86	249.63	55.23	194.40	0.80	0.067	1.38	0.048	1.00	1.00	0.048	No
305	13.88	249.94	55.43	194.51	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
306	13.90	250.24	55.62	194.62	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
307	13.92	250.55	55.82	194.73	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
308	13.94	250.85	56.02	194.83	0.80	0.067	1.38	0.048	1.00	1.00	2.000	Yes
309	13.96	251.15	56.21	194.94	0.80	0.067	1.38	0.048	1.00	1.00	0.048	No
310	13.98	251.46	56.41	195.05	0.79	0.067	1.38	0.048	1.00	1.00	0.048	No
311	14.00	251.76	56.60	195.16	0.79	0.067	1.38	0.048	1.00	1.00	0.048	No
312	14.02	252.07	56.80	195.27	0.79	0.067	1.38	0.048	1.00	1.00	2.000	Yes
313	14.04	252.37	57.00	195.38	0.79	0.067	1.38	0.048	1.00	1.00	2.000	Yes
314	14.06	252.68	57.19	195.49	0.79	0.067	1.38	0.048	1.00	1.00	2.000	Yes
315	14.08	252.99	57.39	195.60	0.79	0.067	1.38	0.048	1.00	1.00	2.000	Yes
316	14.10	253.31	57.58	195.72	0.79	0.067	1.38	0.048	1.00	1.00	2.000	Yes
317	14.12	253.62	57.78	195.84	0.79	0.067	1.38	0.048	1.00	1.00	0.048	No
318	14.14	253.94	57.98	195.97	0.79	0.067	1.38	0.048	1.00	1.00	0.048	No
319	14.16	254.26	58.17	196.09	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
320	14.18	254.57	58.37	196.20	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
321	14.20	254.88	58.57	196.31	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
322	14.22	255.18	58.76	196.42	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
323	14.24	255.48	58.96	196.53	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
324	14.26	255.78	59.15	196.63	0.79	0.066	1.38	0.048	1.00	1.00	0.048	No
325	14.28	256.08	59.35	196.73	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
326	14.30	256.37	59.55	196.82	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
327	14.32	256.66	59.74	196.92	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
328	14.34	256.95	59.94	197.01	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
329	14.36	257.24	60.14	197.11	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
330	14.38	257.54	60.33	197.21	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
331	14.40	257.83	60.53	197.30	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
332	14.42	258.13	60.72	197.40	0.78	0.066	1.38	0.048	1.00	1.00	2.000	Yes
333	14.44	258.42	60.92	197.50	0.78	0.066	1.38	0.048	1.00	1.00	2.000	Yes
334	14.46	258.72	61.12	197.60	0.78	0.066	1.38	0.048	1.00	1.00	2.000	Yes
335	14.48	259.01	61.31	197.70	0.78	0.066	1.38	0.048	1.00	1.00	2.000	Yes
336	14.50	259.31	61.51	197.80	0.78	0.066	1.38	0.048	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	14.52	259.61	61.70	197.91	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
338	14.54	259.92	61.90	198.02	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
339	14.56	260.22	62.10	198.13	0.78	0.066	1.38	0.048	1.00	1.00	0.048	No
340	14.58	260.53	62.29	198.24	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
341	14.60	260.85	62.49	198.36	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
342	14.62	261.17	62.69	198.48	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
343	14.64	261.49	62.88	198.61	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
344	14.66	261.81	63.08	198.73	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
345	14.68	262.13	63.27	198.85	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
346	14.70	262.44	63.47	198.97	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
347	14.72	262.75	63.67	199.08	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
348	14.74	263.07	63.86	199.20	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
349	14.76	263.40	64.06	199.34	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
350	14.78	263.74	64.26	199.49	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
351	14.80	264.09	64.45	199.64	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
352	14.82	264.44	64.65	199.79	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
353	14.84	264.80	64.84	199.95	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
354	14.86	265.15	65.04	200.11	0.77	0.066	1.38	0.048	1.00	1.00	0.048	No
355	14.88	265.50	65.24	200.27	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
356	14.90	265.85	65.43	200.41	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
357	14.92	266.19	65.63	200.56	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
358	14.94	266.53	65.83	200.70	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
359	14.96	266.87	66.02	200.85	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
360	14.98	267.21	66.22	201.00	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
361	15.00	267.56	66.41	201.15	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
362	15.02	267.91	66.61	201.30	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
363	15.04	268.27	66.81	201.46	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
364	15.06	268.62	67.00	201.62	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
365	15.08	268.98	67.20	201.78	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
366	15.10	269.34	67.39	201.94	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
367	15.12	269.70	67.59	202.10	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
368	15.14	270.06	67.79	202.27	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
369	15.16	270.42	67.98	202.44	0.76	0.066	1.38	0.048	1.00	1.00	0.048	No
370	15.18	270.78	68.18	202.61	0.75	0.066	1.38	0.048	1.00	1.00	0.048	No
371	15.20	271.15	68.38	202.78	0.75	0.066	1.38	0.048	1.00	1.00	0.048	No
372	15.22	271.52	68.57	202.95	0.75	0.066	1.38	0.048	1.00	1.00	0.048	No
373	15.24	271.89	68.77	203.13	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
374	15.26	272.27	68.96	203.30	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
375	15.28	272.63	69.16	203.47	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
376	15.30	273.00	69.36	203.65	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
377	15.32	273.37	69.55	203.82	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
378	15.34	273.75	69.75	204.00	0.75	0.065	1.38	0.048	1.00	1.00	0.048	No
379	15.36	274.12	69.95	204.17	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No
380	15.38	274.49	70.14	204.34	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No
381	15.40	274.85	70.34	204.52	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No
382	15.42	275.22	70.53	204.69	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No
383	15.44	275.59	70.73	204.86	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No
384	15.46	275.96	70.93	205.03	0.75	0.065	1.38	0.047	1.00	1.00	0.047	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	15.48	276.33	71.12	205.20	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
386	15.50	276.69	71.32	205.38	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
387	15.52	277.06	71.51	205.55	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
388	15.54	277.43	71.71	205.72	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
389	15.56	277.79	71.91	205.88	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
390	15.58	278.15	72.10	206.04	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
391	15.60	278.51	72.30	206.21	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
392	15.62	278.87	72.50	206.37	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
393	15.64	279.22	72.69	206.53	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
394	15.66	279.58	72.89	206.69	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
395	15.68	279.94	73.08	206.86	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
396	15.70	280.31	73.28	207.03	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
397	15.72	280.67	73.48	207.19	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
398	15.74	281.03	73.67	207.36	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
399	15.76	281.40	73.87	207.53	0.74	0.065	1.38	0.047	1.00	1.00	0.047	No
400	15.78	281.77	74.07	207.70	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
401	15.80	282.13	74.26	207.87	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
402	15.82	282.49	74.46	208.03	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
403	15.84	282.85	74.65	208.20	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
404	15.86	283.21	74.85	208.36	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
405	15.88	283.58	75.05	208.53	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
406	15.90	283.94	75.24	208.70	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
407	15.92	284.31	75.44	208.87	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
408	15.94	284.67	75.64	209.04	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
409	15.96	285.04	75.83	209.21	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
410	15.98	285.41	76.03	209.38	0.73	0.065	1.38	0.047	1.00	1.00	0.047	No
411	16.00	285.77	76.22	209.55	0.73	0.064	1.38	0.047	1.00	1.00	0.047	No
412	16.02	286.14	76.42	209.72	0.73	0.064	1.38	0.047	1.00	1.00	0.047	No
413	16.04	286.50	76.62	209.89	0.73	0.064	1.38	0.047	1.00	1.00	0.047	No
414	16.06	286.87	76.81	210.06	0.73	0.064	1.38	0.047	1.00	1.00	0.047	No
415	16.08	287.24	77.01	210.23	0.73	0.064	1.38	0.047	1.00	1.00	0.047	No
416	16.10	287.61	77.20	210.40	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
417	16.12	287.98	77.40	210.58	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
418	16.14	288.36	77.60	210.76	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
419	16.16	288.73	77.79	210.94	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
420	16.18	289.10	77.99	211.11	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
421	16.20	289.47	78.19	211.29	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
422	16.22	289.85	78.38	211.46	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
423	16.24	290.22	78.58	211.64	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
424	16.26	290.61	78.77	211.83	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
425	16.28	291.00	78.97	212.03	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
426	16.30	291.39	79.17	212.23	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
427	16.32	291.79	79.36	212.43	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
428	16.34	292.19	79.56	212.63	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
429	16.36	292.59	79.76	212.83	0.72	0.064	1.38	0.047	1.00	1.00	0.047	No
430	16.38	292.98	79.95	213.03	0.72	0.064	1.38	0.046	1.00	1.00	0.046	No
431	16.40	293.37	80.15	213.22	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
432	16.42	293.75	80.34	213.41	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
433	16.44	294.14	80.54	213.60	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
434	16.46	294.52	80.74	213.78	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
435	16.48	294.90	80.93	213.97	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
436	16.50	295.29	81.13	214.16	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
437	16.52	295.69	81.32	214.36	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
438	16.54	296.09	81.52	214.57	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
439	16.56	296.49	81.72	214.78	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
440	16.58	296.90	81.91	214.99	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
441	16.60	297.31	82.11	215.20	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
442	16.62	297.73	82.31	215.42	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
443	16.64	298.14	82.50	215.64	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
444	16.66	298.56	82.70	215.86	0.71	0.064	1.38	0.046	1.00	1.00	0.046	No
445	16.68	298.98	82.89	216.08	0.71	0.063	1.38	0.046	1.00	1.00	0.046	No
446	16.70	299.40	83.09	216.31	0.71	0.063	1.38	0.046	1.00	1.00	0.046	No
447	16.72	299.82	83.29	216.54	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
448	16.74	300.25	83.48	216.76	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
449	16.76	300.67	83.68	216.99	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
450	16.78	301.10	83.88	217.22	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
451	16.80	301.52	84.07	217.45	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
452	16.82	301.95	84.27	217.68	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
453	16.84	302.38	84.46	217.92	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
454	16.86	302.81	84.66	218.15	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
455	16.88	303.24	84.86	218.39	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
456	16.90	303.68	85.05	218.62	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
457	16.92	304.11	85.25	218.86	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
458	16.94	304.54	85.45	219.09	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
459	16.96	304.97	85.64	219.33	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
460	16.98	305.40	85.84	219.56	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
461	17.00	305.83	86.03	219.80	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
462	17.02	306.27	86.23	220.04	0.70	0.063	1.38	0.046	1.00	1.00	0.046	No
463	17.04	306.70	86.43	220.27	0.69	0.063	1.38	0.046	1.00	1.00	0.046	No
464	17.06	307.13	86.62	220.51	0.69	0.063	1.38	0.046	1.00	1.00	0.046	No
465	17.08	307.56	86.82	220.74	0.69	0.063	1.38	0.046	1.00	1.00	0.046	No
466	17.10	307.99	87.01	220.98	0.69	0.063	1.38	0.046	1.00	1.00	0.046	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	7.80	0.02	4.06	3.27	1.00	0.18	54.25	9.82	4.000	No	Yes	2.00
2	7.82	0.06	3.99	5.17	1.00	0.94	48.66	45.85	4.000	No	Yes	2.00
3	7.84	0.10	3.81	6.46	1.00	1.77	35.64	63.18	4.000	No	Yes	2.00
4	7.86	0.13	3.79	8.47	1.00	2.25	34.35	77.39	4.000	No	Yes	2.00
5	7.88	0.11	3.89	10.51	1.00	1.95	40.95	79.72	4.000	No	Yes	2.00
6	7.90	0.17	3.61	6.64	1.00	3.14	25.54	80.17	4.000	No	Yes	2.00
7	7.92	0.92	2.61	1.46	0.85	17.97	5.85	105.04	4.000	Yes	No	2.00
8	7.94	1.79	2.26	0.93	0.72	35.09	1.79	62.98	4.000	Yes	No	2.00
9	7.96	2.75	2.04	0.70	0.63	53.93	1.34	72.36	4.000	Yes	No	2.00
10	7.98	3.11	1.97	0.64	0.61	61.10	1.28	78.50	4.000	Yes	No	2.00
11	8.00	3.27	1.95	0.62	0.60	64.33	1.27	81.51	4.000	Yes	No	2.00
12	8.02	3.16	1.99	0.70	0.61	62.10	1.30	80.53	4.000	Yes	No	2.00
13	8.04	2.77	2.09	0.88	0.65	54.31	1.41	76.34	4.000	Yes	No	2.00
14	8.06	2.42	2.21	1.16	0.70	47.44	1.63	77.20	4.000	Yes	No	2.00
15	8.08	2.14	2.30	1.43	0.74	41.85	1.94	81.22	4.000	Yes	No	2.00
16	8.10	1.99	2.36	1.60	0.76	38.86	2.17	84.47	4.000	Yes	No	2.00
17	8.12	1.80	2.42	1.80	0.78	35.27	2.50	88.21	4.000	Yes	No	2.00
18	8.14	1.60	2.50	2.08	0.81	31.22	2.87	89.53	4.000	Yes	No	2.00
19	8.16	1.41	2.58	2.36	0.84	27.38	4.82	131.86	4.000	Yes	No	2.00
20	8.18	1.27	2.63	2.50	0.86	24.80	6.65	164.85	4.000	Yes	No	2.00
21	8.20	1.20	2.65	2.51	0.87	23.39	7.57	177.10	4.000	Yes	No	2.00
22	8.22	1.18	2.65	2.41	0.87	22.91	7.39	169.24	4.000	No	No	2.00
23	8.24	1.15	2.65	2.34	0.87	22.34	7.45	166.37	0.457	No	No	2.00
24	8.26	1.07	2.68	2.36	0.88	20.82	8.81	183.48	0.589	No	No	2.00
25	8.28	0.98	2.72	2.46	0.90	19.01	4.92	93.51	0.907	No	Yes	2.00
26	8.30	0.89	2.77	2.64	0.92	17.21	5.52	94.91	0.821	No	Yes	2.00
27	8.32	0.85	2.79	2.67	0.92	16.32	5.78	94.35	0.778	No	Yes	2.00
28	8.34	0.83	2.80	2.60	0.93	15.89	5.81	92.33	0.758	No	Yes	2.00
29	8.36	0.82	2.79	2.51	0.92	15.84	5.71	90.50	0.755	No	Yes	2.00
30	8.38	0.85	2.76	2.31	0.91	16.25	5.36	87.10	0.775	No	Yes	2.00
31	8.40	0.87	2.72	2.11	0.90	16.78	4.97	83.46	0.801	No	Yes	2.00
32	8.42	0.89	2.69	1.92	0.89	17.16	9.78	167.82	0.468	No	No	2.00
33	8.44	0.90	2.68	1.84	0.88	17.26	9.09	156.91	0.395	No	No	2.00
34	8.46	0.89	2.69	1.86	0.88	17.18	9.33	160.32	0.417	No	No	2.00
35	8.48	0.87	2.69	1.85	0.89	16.78	9.76	163.76	0.440	No	No	2.00
36	8.50	0.86	2.71	1.94	0.89	16.46	4.82	79.36	0.785	No	Yes	2.00
37	8.52	0.85	2.72	1.97	0.90	16.26	4.91	79.85	0.776	No	Yes	2.00
38	8.54	0.86	2.73	2.05	0.90	16.42	4.98	81.84	0.783	No	Yes	2.00
39	8.56	0.87	2.72	2.04	0.90	16.70	4.90	81.82	0.797	No	Yes	2.00
40	8.58	0.88	2.72	2.05	0.90	16.79	4.90	82.26	0.801	No	Yes	2.00
41	8.60	0.87	2.73	2.10	0.90	16.66	4.99	83.15	0.795	No	Yes	2.00
42	8.62	0.85	2.75	2.20	0.91	16.20	5.23	84.77	0.773	No	Yes	2.00
43	8.64	0.82	2.77	2.32	0.92	15.75	5.50	86.69	0.751	No	Yes	2.00
44	8.66	0.68	2.90	2.97	0.97	12.88	7.26	93.59	0.615	No	Yes	2.00
45	8.68	0.71	2.89	2.97	0.96	13.58	7.00	95.04	0.648	No	Yes	2.00
46	8.70	0.74	2.88	2.99	0.96	13.98	6.88	96.14	0.667	No	Yes	2.00
47	8.72	0.87	2.78	2.56	0.92	16.65	5.56	92.53	0.794	No	Yes	2.00
48	8.74	0.82	2.81	2.68	0.93	15.71	5.96	93.67	0.749	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.76	0.79	2.83	2.76	0.94	15.10	6.23	94.15	0.720	No	Yes	2.00
50	8.78	0.77	2.84	2.81	0.95	14.71	6.41	94.27	0.702	No	Yes	2.00
51	8.80	0.74	2.87	2.95	0.96	14.12	6.78	95.75	0.673	No	Yes	2.00
52	8.82	0.71	2.90	3.12	0.97	13.45	7.23	97.26	0.642	No	Yes	2.00
53	8.84	0.68	2.93	3.24	0.98	12.75	7.65	97.54	0.608	No	Yes	2.00
54	8.86	0.66	2.93	3.20	0.98	12.49	7.72	96.45	0.596	No	Yes	2.00
55	8.88	0.66	2.94	3.22	0.98	12.34	7.81	96.36	0.589	No	Yes	2.00
56	8.90	0.66	2.93	3.14	0.98	12.45	7.66	95.37	0.594	No	Yes	2.00
57	8.92	0.67	2.93	3.17	0.98	12.58	7.65	96.22	0.600	No	Yes	2.00
58	8.94	0.68	2.92	3.11	0.97	12.87	7.45	95.82	0.614	No	Yes	2.00
59	8.96	0.70	2.91	3.10	0.97	13.12	7.34	96.22	0.626	No	Yes	2.00
60	8.98	0.70	2.89	2.97	0.97	13.27	7.12	94.50	0.633	No	Yes	2.00
61	9.00	0.70	2.89	2.92	0.97	13.23	7.07	93.59	0.631	No	Yes	2.00
62	9.02	0.69	2.91	3.00	0.97	12.93	7.29	94.25	0.617	No	Yes	2.00
63	9.04	0.66	2.93	3.19	0.98	12.44	7.73	96.12	0.593	No	Yes	2.00
64	9.06	0.64	2.97	3.42	0.99	11.93	8.24	98.38	0.569	No	Yes	2.00
65	9.08	0.63	2.99	3.63	1.00	11.69	8.61	100.66	0.558	No	Yes	2.00
66	9.10	0.65	2.97	3.62	1.00	12.17	8.37	101.78	0.580	No	Yes	2.00
67	9.12	0.69	2.94	3.46	0.98	13.01	7.81	101.65	0.621	No	Yes	2.00
68	9.14	0.74	2.90	3.24	0.97	13.93	7.19	100.14	0.664	No	Yes	2.00
69	9.16	0.77	2.87	3.07	0.96	14.42	6.82	98.38	0.688	No	Yes	2.00
70	9.18	0.78	2.86	3.02	0.96	14.63	6.69	97.87	0.698	No	Yes	2.00
71	9.20	0.78	2.87	3.04	0.96	14.61	6.73	98.29	0.697	No	Yes	2.00
72	9.22	0.76	2.88	3.11	0.96	14.28	6.91	98.70	0.681	No	Yes	2.00
73	9.24	0.75	2.88	3.09	0.96	14.04	6.98	98.01	0.670	No	Yes	2.00
74	9.26	0.75	2.88	2.99	0.96	14.00	6.87	96.26	0.668	No	Yes	2.00
75	9.28	0.76	2.85	2.79	0.95	14.36	6.51	93.49	0.685	No	Yes	2.00
76	9.30	0.78	2.82	2.58	0.94	14.70	6.14	90.22	0.701	No	Yes	2.00
77	9.32	0.77	2.82	2.47	0.94	14.54	6.04	87.89	0.694	No	Yes	2.00
78	9.34	0.75	2.83	2.46	0.94	13.98	6.21	86.77	0.667	No	Yes	2.00
79	9.36	0.70	2.86	2.58	0.96	13.05	6.69	87.37	0.623	No	Yes	2.00
80	9.38	0.66	2.90	2.74	0.97	12.28	7.22	88.65	0.586	No	Yes	2.00
81	9.40	0.62	2.95	3.01	0.99	11.52	7.92	91.25	0.550	No	Yes	2.00
82	9.42	0.59	2.99	3.29	1.00	10.93	8.59	93.88	0.521	No	Yes	2.00
83	9.44	0.59	3.00	3.39	1.00	10.84	8.77	95.02	0.517	No	Yes	2.00
84	9.46	0.61	2.97	3.23	1.00	11.24	8.35	93.82	0.536	No	Yes	2.00
85	9.48	0.64	2.93	2.95	0.98	11.86	7.68	91.06	0.566	No	Yes	2.00
86	9.50	0.66	2.89	2.66	0.97	12.26	7.12	87.35	0.585	No	Yes	2.00
87	9.52	0.68	2.87	2.47	0.96	12.59	6.73	84.68	0.600	No	Yes	2.00
88	9.54	0.70	2.83	2.26	0.94	13.04	6.27	81.73	0.622	No	Yes	2.00
89	9.56	0.72	2.82	2.20	0.94	13.36	6.07	81.03	0.637	No	Yes	2.00
90	9.58	0.72	2.81	2.18	0.94	13.39	6.03	80.69	0.639	No	Yes	2.00
91	9.60	0.71	2.82	2.21	0.94	13.12	6.17	80.95	0.626	No	Yes	2.00
92	9.62	0.69	2.83	2.20	0.94	12.83	6.26	80.31	0.612	No	Yes	2.00
93	9.64	0.68	2.84	2.21	0.95	12.49	6.41	80.02	0.596	No	Yes	2.00
94	9.66	0.66	2.85	2.24	0.95	12.23	6.54	80.06	0.584	No	Yes	2.00
95	9.68	0.66	2.85	2.22	0.95	12.20	6.53	79.64	0.582	No	Yes	2.00
96	9.70	0.68	2.84	2.14	0.95	12.48	6.31	78.78	0.596	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	9.72	0.69	2.82	2.07	0.94	12.72	6.11	77.72	0.607	No	Yes	2.00
98	9.74	0.69	2.82	2.06	0.94	12.80	6.06	77.60	0.610	No	Yes	2.00
99	9.76	0.68	2.83	2.10	0.94	12.54	6.22	78.02	0.598	No	Yes	2.00
100	9.78	0.67	2.84	2.15	0.95	12.33	6.38	78.64	0.588	No	Yes	2.00
101	9.80	0.66	2.85	2.17	0.95	12.16	6.47	78.73	0.580	No	Yes	2.00
102	9.82	0.65	2.85	2.16	0.95	12.00	6.53	78.40	0.573	No	Yes	2.00
103	9.84	0.64	2.87	2.21	0.96	11.68	6.74	78.72	0.557	No	Yes	2.00
104	9.86	0.61	2.90	2.35	0.97	11.18	7.17	80.12	0.533	No	Yes	2.00
105	9.88	0.49	3.05	3.08	1.00	8.85	9.61	85.05	0.422	No	Yes	2.00
106	9.90	0.47	3.08	3.22	1.00	8.36	10.20	85.23	0.399	No	Yes	2.00
107	9.92	0.45	3.10	3.27	1.00	7.92	10.65	84.36	0.378	No	Yes	2.00
108	9.94	0.51	3.00	2.68	1.00	9.19	8.78	80.69	0.438	No	Yes	2.00
109	9.96	0.49	3.04	2.87	1.00	8.70	9.42	81.97	0.415	No	Yes	2.00
110	9.98	0.48	3.07	3.19	1.00	8.44	10.08	85.12	0.403	No	Yes	2.00
111	10.00	0.49	3.08	3.43	1.00	8.64	10.27	88.76	0.412	No	Yes	2.00
112	10.02	0.52	3.06	3.49	1.00	9.32	9.84	91.69	0.444	No	Yes	2.00
113	10.04	0.57	3.02	3.34	1.00	10.21	9.06	92.57	0.487	No	Yes	2.00
114	10.06	0.60	2.98	3.17	1.00	10.95	8.42	92.23	0.522	No	Yes	2.00
115	10.08	0.62	2.96	3.08	0.99	11.31	8.11	91.75	0.540	No	Yes	2.00
116	10.10	0.64	2.95	3.03	0.99	11.59	7.92	91.75	0.553	No	Yes	2.00
117	10.12	0.67	2.92	2.93	0.98	12.15	7.53	91.44	0.580	No	Yes	2.00
118	10.14	0.71	2.88	2.77	0.96	13.12	6.93	90.87	0.626	No	Yes	2.00
119	10.16	0.80	2.81	2.51	0.94	14.80	6.02	89.04	0.706	No	Yes	2.00
120	10.18	0.88	2.76	2.32	0.92	16.42	5.33	87.48	0.783	No	Yes	2.00
121	10.20	0.96	2.71	2.18	0.90	17.88	4.81	86.10	0.853	No	Yes	2.00
122	10.22	0.98	2.71	2.21	0.90	18.26	4.78	87.23	0.871	No	Yes	2.00
123	10.24	0.97	2.72	2.32	0.90	18.07	4.94	89.28	0.862	No	Yes	2.00
124	10.26	0.93	2.75	2.47	0.92	17.31	5.29	91.57	0.826	No	Yes	2.00
125	10.28	0.90	2.77	2.57	0.92	16.80	5.54	92.99	0.801	No	Yes	2.00
126	10.30	0.91	2.77	2.55	0.92	16.92	5.48	92.70	0.807	No	Yes	2.00
127	10.32	0.95	2.73	2.33	0.91	17.70	5.03	89.11	0.844	No	Yes	2.00
128	10.34	1.00	2.68	2.06	0.89	18.67	9.05	169.05	0.476	No	No	2.00
129	10.36	1.04	2.64	1.82	0.87	19.43	6.83	132.70	0.268	No	No	2.00
130	10.38	1.05	2.61	1.68	0.86	19.74	5.79	114.28	0.197	No	No	2.00
131	10.40	1.05	2.60	1.59	0.86	19.56	5.46	106.76	0.174	No	No	2.00
132	10.42	1.02	2.61	1.56	0.86	19.07	5.60	106.79	0.174	No	No	2.00
133	10.44	1.00	2.62	1.63	0.87	18.65	6.33	118.02	0.210	No	No	2.00
134	10.46	0.99	2.64	1.70	0.87	18.50	6.89	127.53	0.246	No	No	2.00
135	10.48	1.00	2.65	1.77	0.88	18.59	7.25	134.72	0.277	No	No	2.00
136	10.50	1.02	2.64	1.79	0.87	18.98	7.01	132.97	0.269	No	No	2.00
137	10.52	1.03	2.64	1.80	0.87	19.21	6.87	131.91	0.264	No	No	2.00
138	10.54	1.04	2.63	1.78	0.87	19.44	6.61	128.40	0.249	No	No	2.00
139	10.56	1.03	2.63	1.77	0.87	19.25	6.67	128.48	0.250	No	No	2.00
140	10.58	1.02	2.63	1.75	0.87	19.09	6.69	127.77	0.247	No	No	2.00
141	10.60	0.99	2.65	1.78	0.88	18.43	7.44	137.16	0.288	No	No	2.00
142	10.62	0.95	2.68	1.88	0.89	17.58	8.96	157.51	0.399	No	No	2.00
143	10.64	0.88	2.73	2.06	0.91	16.22	5.05	81.92	0.774	No	Yes	2.00
144	10.66	0.81	2.79	2.31	0.93	14.92	5.72	85.37	0.712	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	10.68	0.75	2.84	2.55	0.95	13.68	6.43	87.98	0.652	No	Yes	2.00
146	10.70	0.71	2.88	2.70	0.97	12.87	6.93	89.15	0.614	No	Yes	2.00
147	10.72	0.70	2.88	2.67	0.97	12.65	6.98	88.30	0.603	No	Yes	2.00
148	10.74	0.71	2.86	2.47	0.96	12.91	6.61	85.31	0.616	No	Yes	2.00
149	10.76	0.73	2.83	2.26	0.95	13.25	6.20	82.13	0.632	No	Yes	2.00
150	10.78	0.74	2.79	2.03	0.93	13.48	5.78	77.92	0.643	No	Yes	2.00
151	10.80	0.75	2.77	1.88	0.93	13.62	5.52	75.18	0.650	No	Yes	2.00
152	10.82	0.77	2.74	1.70	0.91	14.06	5.11	71.90	0.671	No	Yes	2.00
153	10.84	0.80	2.71	1.60	0.90	14.54	4.82	70.14	0.694	No	Yes	2.00
154	10.86	0.82	2.69	1.52	0.89	14.97	9.53	142.63	0.315	No	No	2.00
155	10.88	0.84	2.68	1.49	0.89	15.32	8.80	134.87	0.277	No	No	2.00
156	10.90	0.85	2.68	1.53	0.89	15.56	8.75	136.20	0.283	No	No	2.00
157	10.92	0.86	2.68	1.59	0.89	15.68	9.08	142.44	0.314	No	No	2.00
158	10.94	0.84	2.70	1.70	0.90	15.39	4.75	73.12	0.734	No	Yes	2.00
159	10.96	0.82	2.74	1.84	0.91	14.87	5.09	75.65	0.709	No	Yes	2.00
160	10.98	0.79	2.77	1.99	0.92	14.30	5.47	78.17	0.682	No	Yes	2.00
161	11.00	0.77	2.79	2.04	0.93	13.90	5.67	78.83	0.663	No	Yes	2.00
162	11.02	0.76	2.79	2.01	0.93	13.75	5.67	78.04	0.656	No	Yes	2.00
163	11.04	0.76	2.78	1.92	0.93	13.69	5.56	76.05	0.653	No	Yes	2.00
164	11.06	0.77	2.75	1.79	0.92	13.96	5.28	73.76	0.666	No	Yes	2.00
165	11.08	0.79	2.72	1.66	0.91	14.34	4.97	71.27	0.684	No	Yes	2.00
166	11.10	0.72	2.76	1.58	0.92	12.83	5.31	68.17	0.612	No	Yes	2.00
167	11.12	0.63	2.81	1.56	0.94	11.04	5.95	65.70	0.526	No	Yes	2.00
168	11.14	0.66	2.77	1.45	0.93	11.79	5.47	64.43	0.562	No	Yes	2.00
169	11.16	0.80	2.68	1.37	0.89	14.47	8.90	128.77	0.251	No	No	2.00
170	11.18	0.94	2.61	1.31	0.86	17.15	5.61	96.13	0.146	No	No	2.00
171	11.20	0.93	2.63	1.46	0.87	17.12	6.54	112.01	0.190	No	No	2.00
172	11.22	0.98	2.63	1.57	0.87	17.94	6.57	117.88	0.209	No	No	2.00
173	11.24	1.06	2.61	1.63	0.86	19.65	5.59	109.81	0.183	No	No	2.00
174	11.26	1.17	2.56	1.55	0.85	21.69	4.11	89.14	0.146	No	No	2.00
175	11.28	1.20	2.56	1.60	0.84	22.28	4.07	90.64	0.149	No	No	2.00
176	11.30	1.18	2.58	1.74	0.85	21.96	4.81	105.58	0.189	No	No	2.00
177	11.32	1.15	2.62	1.94	0.87	21.30	6.11	130.23	0.257	No	No	2.00
178	11.34	1.13	2.65	2.11	0.88	20.91	7.32	153.12	0.372	No	No	2.00
179	11.36	1.10	2.68	2.34	0.89	20.26	9.21	186.57	0.616	No	No	2.00
180	11.38	1.06	2.72	2.62	0.91	19.60	4.97	97.50	0.935	No	Yes	2.00
181	11.40	1.03	2.76	2.90	0.92	18.93	5.42	102.50	0.903	No	Yes	2.00
182	11.42	1.01	2.78	3.00	0.93	18.56	5.60	103.92	0.885	No	Yes	2.00
183	11.44	1.02	2.76	2.84	0.92	18.72	5.40	101.02	0.893	No	Yes	2.00
184	11.46	1.06	2.73	2.61	0.91	19.43	4.99	97.06	0.927	No	Yes	2.00
185	11.48	1.11	2.68	2.34	0.89	20.57	8.93	183.65	0.590	No	No	2.00
186	11.50	1.15	2.66	2.23	0.88	21.20	7.73	163.82	0.440	No	No	2.00
187	11.52	1.16	2.64	2.14	0.88	21.49	7.03	150.97	0.360	No	No	2.00
188	11.54	1.13	2.66	2.23	0.89	20.90	7.97	166.44	0.458	No	No	2.00
189	11.56	1.09	2.69	2.38	0.90	20.01	9.74	194.88	0.691	No	No	2.00
190	11.58	1.03	2.73	2.57	0.91	18.91	5.06	95.62	0.902	No	Yes	2.00
191	11.60	0.98	2.76	2.70	0.93	17.94	5.42	97.20	0.856	No	Yes	2.00
192	11.62	0.93	2.79	2.79	0.94	16.98	5.75	97.65	0.810	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	11.64	0.90	2.80	2.77	0.94	16.29	5.90	96.10	0.777	No	Yes	2.00
194	11.66	0.88	2.80	2.66	0.94	15.91	5.87	93.41	4.000	Yes	Yes	2.00
195	11.68	0.88	2.78	2.42	0.93	15.86	5.60	88.82	4.000	Yes	Yes	2.00
196	11.70	0.89	2.74	2.10	0.92	16.07	5.14	82.60	4.000	Yes	Yes	2.00
197	11.72	0.91	2.70	1.82	0.90	16.44	9.97	163.93	4.000	Yes	No	2.00
198	11.74	0.94	2.65	1.58	0.88	17.11	7.38	126.36	4.000	Yes	No	2.00
199	11.76	0.98	2.62	1.46	0.87	17.85	5.97	106.58	4.000	Yes	No	2.00
200	11.78	1.06	2.57	1.36	0.85	19.09	4.59	87.65	4.000	Yes	No	2.00
201	11.80	1.13	2.54	1.27	0.84	20.19	3.61	72.89	4.000	Yes	No	2.00
202	11.82	1.18	2.52	1.28	0.84	21.00	3.31	69.51	4.000	Yes	No	2.00
203	11.84	1.17	2.55	1.41	0.84	20.93	3.88	81.14	4.000	Yes	No	2.00
204	11.86	1.14	2.59	1.64	0.86	20.56	5.07	104.26	4.000	Yes	No	2.00
205	11.88	1.14	2.61	1.80	0.87	20.61	5.85	120.54	4.000	Yes	No	2.00
206	11.90	1.13	2.63	1.96	0.88	20.59	6.71	138.20	4.000	Yes	No	2.00
207	11.92	1.11	2.67	2.20	0.89	20.28	8.35	169.31	4.000	Yes	No	2.00
208	11.94	1.05	2.76	2.87	0.92	19.10	5.35	102.19	4.000	Yes	Yes	2.00
209	11.96	0.99	2.84	3.62	0.96	18.03	6.36	114.75	4.000	Yes	Yes	2.00
210	11.98	0.95	2.90	4.32	0.98	17.20	7.27	125.09	4.000	Yes	Yes	2.00
211	12.00	0.92	2.94	4.62	0.99	16.53	7.76	128.21	4.000	Yes	Yes	2.00
212	12.02	0.89	2.96	4.76	1.00	15.96	8.07	128.75	0.761	No	Yes	2.00
213	12.04	0.87	2.96	4.72	1.00	15.57	8.16	127.00	0.743	No	Yes	2.00
214	12.06	0.84	2.95	4.37	1.00	15.02	8.01	120.39	0.716	No	Yes	2.00
215	12.08	0.81	2.94	3.94	0.99	14.46	7.78	112.45	0.690	No	Yes	2.00
216	12.10	0.85	2.87	3.23	0.97	15.09	6.79	102.40	0.720	No	Yes	2.00
217	12.12	0.94	2.79	2.71	0.94	16.85	5.68	95.75	0.804	No	Yes	2.00
218	12.14	1.09	2.69	2.23	0.90	19.45	9.33	181.51	0.573	No	No	2.00
219	12.16	1.19	2.65	2.18	0.88	21.09	7.56	159.43	0.411	No	No	2.00
220	12.18	1.22	2.67	2.42	0.89	21.58	8.47	182.87	0.584	No	No	2.00
221	12.20	1.15	2.74	2.91	0.92	20.64	5.09	105.02	0.984	No	Yes	2.00
222	12.22	1.02	2.82	3.42	0.95	18.43	6.07	111.85	0.879	No	Yes	2.00
223	12.24	0.89	2.90	3.92	0.98	15.94	7.25	115.59	0.760	No	Yes	2.00
224	12.26	0.75	3.02	4.76	1.00	13.17	9.15	120.43	0.628	No	Yes	2.00
225	12.28	0.64	3.15	6.16	1.00	10.96	11.71	128.32	0.523	No	Yes	2.00
226	12.30	0.56	3.27	7.66	1.00	9.37	14.32	134.18	0.447	No	Yes	2.00
227	12.32	0.43	3.43	9.50	1.00	6.84	19.02	130.07	0.326	No	Yes	2.00
228	12.34	0.39	3.45	8.67	1.00	6.04	19.56	118.13	0.288	No	Yes	2.00
229	12.36	0.36	3.43	7.08	1.00	5.39	19.07	102.76	0.257	No	Yes	2.00
230	12.38	0.42	3.27	4.85	1.00	6.52	14.38	93.71	0.311	No	Yes	2.00
231	12.40	0.43	3.22	4.17	1.00	6.67	13.26	88.47	0.318	No	Yes	2.00
232	12.42	0.42	3.21	3.87	1.00	6.53	13.01	84.94	0.311	No	Yes	2.00
233	12.44	0.40	3.24	3.92	1.00	6.17	13.56	83.72	0.295	No	Yes	2.00
234	12.46	0.38	3.28	4.26	1.00	5.75	14.69	84.47	0.274	No	Yes	2.00
235	12.48	0.36	3.33	4.68	1.00	5.37	15.96	85.71	0.256	No	Yes	2.00
236	12.50	0.34	3.37	5.03	1.00	5.02	17.14	86.12	0.240	No	Yes	2.00
237	12.52	0.33	3.40	5.14	1.00	4.72	17.97	84.85	0.225	No	Yes	2.00
238	12.54	0.32	3.40	4.78	1.00	4.50	17.97	80.77	0.214	No	Yes	2.00
239	12.56	0.31	3.38	4.24	1.00	4.35	17.45	75.91	0.208	No	Yes	2.00
240	12.58	0.31	3.35	3.62	1.00	4.25	16.61	70.66	0.203	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	12.60	0.31	3.33	3.22	1.00	4.25	15.87	67.43	0.203	No	Yes	2.00
242	12.62	0.32	3.26	2.74	1.00	4.54	14.28	64.90	0.217	No	Yes	2.00
243	12.64	0.35	3.18	2.32	1.00	5.16	12.31	63.48	0.246	No	Yes	2.00
244	12.66	0.41	3.08	2.03	1.00	6.16	10.31	63.54	0.294	No	Yes	2.00
245	12.68	0.48	2.98	1.76	1.00	7.56	8.40	63.51	0.360	No	Yes	2.00
246	12.70	0.57	2.88	1.59	0.97	9.14	6.98	63.77	0.436	No	Yes	2.00
247	12.72	0.67	2.81	1.52	0.95	10.88	5.95	64.75	0.519	No	Yes	2.00
248	12.74	0.76	2.77	1.55	0.93	12.24	5.47	67.00	0.584	No	Yes	2.00
249	12.76	0.81	2.75	1.61	0.92	13.19	5.25	69.21	0.629	No	Yes	2.00
250	12.78	0.84	2.75	1.71	0.92	13.63	5.26	71.69	0.650	No	Yes	2.00
251	12.80	0.85	2.76	1.79	0.93	13.86	5.32	73.70	0.661	No	Yes	2.00
252	12.82	0.85	2.77	1.93	0.93	13.92	5.51	76.64	0.664	No	Yes	2.00
253	12.84	0.86	2.78	2.04	0.94	13.95	5.65	78.81	0.665	No	Yes	2.00
254	12.86	0.86	2.79	2.14	0.94	13.96	5.78	80.71	0.666	No	Yes	2.00
255	12.88	0.86	2.79	2.13	0.94	14.02	5.75	80.57	0.669	No	Yes	2.00
256	12.90	0.86	2.80	2.15	0.94	13.97	5.79	80.93	0.666	No	Yes	2.00
257	12.92	0.85	2.80	2.15	0.94	13.81	5.85	80.81	0.659	No	Yes	2.00
258	12.94	0.85	2.80	2.11	0.94	13.73	5.82	79.91	0.655	No	Yes	2.00
259	12.96	0.86	2.78	1.95	0.93	13.83	5.56	76.85	0.660	No	Yes	2.00
260	12.98	0.89	2.74	1.76	0.92	14.24	5.16	73.41	0.679	No	Yes	2.00
261	13.00	0.92	2.72	1.65	0.91	14.61	4.88	71.27	0.697	No	Yes	2.00
262	13.02	0.94	2.71	1.62	0.91	14.85	4.77	70.82	0.708	No	Yes	2.00
263	13.04	0.94	2.72	1.70	0.91	14.90	4.88	72.67	0.711	No	Yes	2.00
264	13.06	0.93	2.74	1.83	0.92	14.67	5.13	75.32	0.700	No	Yes	2.00
265	13.08	0.92	2.76	1.96	0.93	14.64	5.33	78.06	0.698	No	Yes	2.00
266	13.10	0.94	2.75	1.98	0.93	14.87	5.29	78.72	0.709	No	Yes	2.00
267	13.12	0.99	2.73	1.89	0.92	15.57	4.98	77.47	0.742	No	Yes	2.00
268	13.14	1.01	2.70	1.79	0.91	15.91	4.75	75.57	0.759	No	Yes	2.00
269	13.16	1.01	2.70	1.71	0.90	15.78	9.96	157.20	0.397	No	No	2.00
270	13.18	0.98	2.70	1.67	0.91	15.31	4.73	72.38	0.730	No	Yes	2.00
271	13.20	0.96	2.70	1.62	0.91	14.96	4.74	70.99	0.714	No	Yes	2.00
272	13.22	0.95	2.71	1.65	0.91	14.72	4.85	71.37	0.702	No	Yes	2.00
273	13.24	0.94	2.73	1.74	0.92	14.49	5.06	73.29	0.691	No	Yes	2.00
274	13.26	0.92	2.76	1.91	0.93	14.19	5.38	76.41	0.677	No	Yes	2.00
275	13.28	0.90	2.78	2.02	0.94	14.00	5.60	78.38	0.668	No	Yes	2.00
276	13.30	0.90	2.79	2.10	0.94	13.93	5.74	79.92	0.665	No	Yes	2.00
277	13.32	0.91	2.79	2.09	0.94	14.04	5.69	79.94	0.670	No	Yes	2.00
278	13.34	0.93	2.78	2.07	0.94	14.33	5.58	79.93	0.684	No	Yes	2.00
279	13.36	0.96	2.76	2.00	0.93	14.74	5.36	79.00	0.703	No	Yes	2.00
280	13.38	0.99	2.74	1.95	0.92	15.22	5.15	78.43	0.726	No	Yes	2.00
281	13.40	1.08	2.69	1.81	0.90	16.47	9.86	162.33	0.430	No	No	2.00
282	13.42	1.16	2.65	1.72	0.89	17.74	7.67	136.16	0.283	No	No	2.00
283	13.44	1.24	2.62	1.62	0.88	18.74	6.22	116.62	0.205	No	No	2.00
284	13.46	1.21	2.64	1.67	0.88	18.27	6.88	125.79	0.239	No	No	2.00
285	13.48	1.13	2.69	1.86	0.90	17.20	9.28	159.70	0.413	No	No	2.00
286	13.50	1.06	2.72	1.95	0.91	16.12	4.92	79.26	0.769	No	Yes	2.00
287	13.52	1.05	2.71	1.85	0.91	15.90	4.83	76.85	4.000	Yes	Yes	2.00
288	13.54	1.15	2.61	1.32	0.87	17.06	5.72	97.56	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	13.56	1.23	2.55	1.15	0.85	18.14	4.03	73.17	4.000	Yes	No	2.00
290	13.58	1.29	2.53	1.11	0.84	18.96	3.43	65.10	4.000	Yes	No	2.00
291	13.60	1.27	2.57	1.29	0.86	18.70	4.46	83.31	4.000	Yes	No	2.00
292	13.62	1.18	2.61	1.37	0.87	17.39	5.78	100.58	4.000	Yes	No	2.00
293	13.64	1.06	2.65	1.40	0.89	15.63	7.66	119.75	4.000	Yes	No	2.00
294	13.66	0.95	2.69	1.37	0.90	13.94	9.68	134.93	4.000	Yes	No	2.00
295	13.68	0.93	2.69	1.26	0.90	13.55	9.33	126.43	0.241	No	No	2.00
296	13.70	0.93	2.67	1.17	0.90	13.47	8.52	114.77	0.199	No	No	2.00
297	13.72	0.93	2.66	1.08	0.89	13.35	7.82	104.40	0.167	No	No	2.00
298	13.74	0.93	2.64	0.98	0.88	13.32	6.98	92.89	4.000	Yes	No	2.00
299	13.76	0.95	2.61	0.89	0.87	13.56	5.93	80.37	4.000	Yes	No	2.00
300	13.78	1.01	2.58	0.83	0.86	14.27	4.76	67.88	4.000	Yes	No	2.00
301	13.80	1.07	2.55	0.77	0.85	15.09	3.79	57.13	4.000	Yes	No	2.00
302	13.82	1.13	2.51	0.72	0.83	16.01	2.98	47.76	4.000	Yes	No	2.00
303	13.84	1.17	2.49	0.69	0.83	16.53	2.89	47.80	4.000	Yes	No	2.00
304	13.86	1.19	2.47	0.65	0.82	16.70	2.80	46.81	0.089	No	No	1.84
305	13.88	1.16	2.48	0.63	0.82	16.28	2.83	46.05	4.000	Yes	No	2.00
306	13.90	1.11	2.50	0.66	0.83	15.57	2.86	44.52	4.000	Yes	No	2.00
307	13.92	1.04	2.55	0.73	0.85	14.53	3.90	56.64	4.000	Yes	No	2.00
308	13.94	0.98	2.59	0.80	0.87	13.71	5.05	69.18	4.000	Yes	No	2.00
309	13.96	0.96	2.60	0.82	0.87	13.44	5.44	73.16	0.105	No	No	2.00
310	13.98	0.99	2.58	0.77	0.86	13.79	4.74	65.35	0.106	No	No	2.00
311	14.00	1.03	2.55	0.72	0.85	14.25	4.02	57.33	0.098	No	No	2.00
312	14.02	1.04	2.55	0.73	0.85	14.38	3.98	57.22	4.000	Yes	No	2.00
313	14.04	1.02	2.59	0.83	0.86	14.09	4.93	69.51	4.000	Yes	No	2.00
314	14.06	0.98	2.64	1.00	0.88	13.59	6.78	92.15	4.000	Yes	No	2.00
315	14.08	0.96	2.67	1.14	0.90	13.42	8.35	112.07	4.000	Yes	No	2.00
316	14.10	0.97	2.69	1.29	0.91	13.53	9.61	130.06	4.000	Yes	No	2.00
317	14.12	0.98	2.70	1.40	0.91	13.68	4.75	65.03	0.652	No	Yes	2.00
318	14.14	0.95	2.74	1.55	0.92	13.37	5.10	68.16	0.638	No	Yes	2.00
319	14.16	0.90	2.76	1.56	0.93	12.58	5.36	67.49	0.600	No	Yes	2.00
320	14.18	0.83	2.78	1.50	0.94	11.53	5.65	65.21	0.550	No	Yes	2.00
321	14.20	0.78	2.79	1.31	0.94	10.59	5.70	60.31	0.505	No	Yes	2.00
322	14.22	0.73	2.79	1.20	0.94	9.92	5.78	57.32	0.473	No	Yes	2.00
323	14.24	0.71	2.79	1.11	0.94	9.52	5.78	55.03	0.454	No	Yes	2.00
324	14.26	0.69	2.80	1.04	0.95	9.16	5.80	53.12	0.437	No	Yes	2.00
325	14.28	0.68	2.79	0.95	0.94	8.90	5.74	51.04	0.425	No	Yes	2.00
326	14.30	0.67	2.78	0.87	0.94	8.78	5.60	49.18	0.419	No	Yes	2.00
327	14.32	0.67	2.77	0.83	0.94	8.75	5.51	48.22	0.417	No	Yes	2.00
328	14.34	0.67	2.76	0.80	0.93	8.77	5.43	47.60	0.418	No	Yes	2.00
329	14.36	0.68	2.77	0.83	0.94	8.86	5.46	48.42	0.423	No	Yes	2.00
330	14.38	0.69	2.77	0.85	0.93	9.00	5.45	49.00	0.429	No	Yes	2.00
331	14.40	0.69	2.77	0.87	0.94	9.03	5.47	49.45	0.431	No	Yes	2.00
332	14.42	0.70	2.76	0.87	0.93	9.12	5.42	49.41	4.000	Yes	Yes	2.00
333	14.44	0.79	2.69	0.74	0.90	10.37	9.28	96.22	4.000	Yes	No	2.00
334	14.46	1.01	2.53	0.53	0.84	13.39	3.36	44.95	4.000	Yes	No	2.00
335	14.48	1.30	2.38	0.39	0.79	17.20	2.26	38.79	4.000	Yes	No	2.00
336	14.50	1.51	2.30	0.35	0.76	19.91	1.00	19.91	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	14.52	1.58	2.29	0.37	0.75	20.76	1.00	20.76	0.067	No	No	1.40
338	14.54	1.70	2.25	0.35	0.74	22.39	1.00	22.39	0.069	No	No	1.43
339	14.56	1.94	2.19	0.32	0.72	25.37	1.00	25.37	0.071	No	No	1.48
340	14.58	2.29	2.12	0.32	0.69	29.86	1.00	29.86	0.075	No	No	1.56
341	14.60	2.63	2.07	0.33	0.67	34.23	1.00	34.23	0.079	No	No	1.63
342	14.62	2.99	2.03	0.34	0.65	38.67	1.00	38.67	0.082	No	No	1.71
343	14.64	3.28	1.98	0.32	0.64	42.19	1.00	42.19	0.085	No	No	1.77
344	14.66	3.35	1.96	0.29	0.63	42.98	1.00	42.98	0.086	No	No	1.79
345	14.68	3.19	1.96	0.25	0.63	40.69	1.00	40.69	0.084	No	No	1.75
346	14.70	2.85	2.00	0.23	0.64	36.48	1.00	36.48	0.080	No	No	1.67
347	14.72	2.52	2.07	0.27	0.67	32.39	1.00	32.39	0.077	No	No	1.60
348	14.74	2.27	2.18	0.43	0.71	29.50	1.00	29.50	0.075	No	No	1.55
349	14.76	2.18	2.33	0.93	0.77	29.06	2.05	59.62	0.100	No	No	2.00
350	14.78	2.59	2.30	1.08	0.76	34.65	1.93	66.75	0.108	No	No	2.00
351	14.80	3.60	2.15	0.94	0.70	47.36	1.51	71.67	0.114	No	No	2.00
352	14.82	5.00	1.96	0.66	0.63	64.18	1.28	81.93	0.131	No	No	2.00
353	14.84	6.26	1.84	0.53	0.58	78.89	1.19	93.84	0.157	No	No	2.00
354	14.86	7.12	1.75	0.44	0.55	88.58	1.00	88.58	0.145	No	No	2.00
355	14.88	7.59	1.69	0.36	0.53	93.43	1.00	93.43	0.156	No	No	2.00
356	14.90	7.79	1.63	0.27	0.50	94.83	1.00	94.83	0.159	No	No	2.00
357	14.92	7.81	1.60	0.23	0.49	94.43	1.00	94.43	0.158	No	No	2.00
358	14.94	7.79	1.59	0.21	0.49	93.98	1.00	93.98	0.157	No	No	2.00
359	14.96	7.85	1.60	0.23	0.49	94.82	1.00	94.82	0.159	No	No	2.00
360	14.98	8.23	1.59	0.24	0.49	99.15	1.00	99.15	0.171	No	No	2.00
361	15.00	8.97	1.56	0.24	0.48	107.40	1.00	107.40	0.195	No	No	2.00
362	15.02	10.06	1.52	0.25	0.46	119.80	1.00	119.80	0.240	No	No	2.00
363	15.04	11.30	1.47	0.24	0.44	133.53	1.00	133.53	0.301	No	No	2.00
364	15.06	12.32	1.43	0.23	0.43	144.66	1.00	144.66	0.362	No	No	2.00
365	15.08	12.87	1.41	0.22	0.42	150.52	1.00	150.52	0.397	No	No	2.00
366	15.10	13.00	1.42	0.24	0.42	152.02	1.00	152.02	0.407	No	No	2.00
367	15.12	13.03	1.43	0.25	0.43	152.64	1.00	152.64	0.411	No	No	2.00
368	15.14	13.23	1.43	0.26	0.43	154.80	1.00	154.80	0.425	No	No	2.00
369	15.16	13.81	1.42	0.27	0.42	161.27	1.00	161.27	0.470	No	No	2.00
370	15.18	14.43	1.42	0.29	0.42	168.24	1.00	168.24	0.523	No	No	2.00
371	15.20	14.98	1.42	0.31	0.42	174.51	1.00	174.51	0.574	No	No	2.00
372	15.22	15.10	1.43	0.33	0.43	176.20	1.00	176.20	0.589	No	No	2.00
373	15.24	15.15	1.44	0.34	0.43	176.64	1.00	176.64	0.593	No	No	2.00
374	15.26	15.17	1.43	0.33	0.43	176.52	1.00	176.52	0.592	No	No	2.00
375	15.28	15.28	1.41	0.31	0.42	177.25	1.00	177.25	0.598	No	No	2.00
376	15.30	15.36	1.42	0.32	0.42	178.01	1.00	178.01	0.605	No	No	2.00
377	15.32	15.47	1.41	0.31	0.42	178.95	1.00	178.95	0.613	No	No	2.00
378	15.34	15.48	1.42	0.33	0.43	179.20	1.00	179.20	0.615	No	No	2.00
379	15.36	15.58	1.41	0.31	0.42	179.88	1.00	179.88	0.621	No	No	2.00
380	15.38	15.53	1.41	0.31	0.42	179.09	1.00	179.09	0.614	No	No	2.00
381	15.40	15.52	1.40	0.30	0.42	178.56	1.00	178.56	0.609	No	No	2.00
382	15.42	15.46	1.40	0.30	0.42	177.72	1.00	177.72	0.602	No	No	2.00
383	15.44	15.45	1.40	0.29	0.42	177.38	1.00	177.38	0.599	No	No	2.00
384	15.46	15.37	1.39	0.28	0.41	176.05	1.00	176.05	0.587	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	15.48	14.97	1.41	0.29	0.42	171.64	1.00	171.64	0.550	No	No	2.00
386	15.50	14.11	1.47	0.34	0.44	162.84	1.00	162.84	0.482	No	No	2.00
387	15.52	13.10	1.50	0.35	0.46	151.63	1.00	151.63	0.404	No	No	2.00
388	15.54	12.29	1.52	0.34	0.46	142.29	1.00	142.29	0.348	No	No	2.00
389	15.56	11.90	1.50	0.30	0.46	137.35	1.00	137.35	0.321	No	No	2.00
390	15.58	11.77	1.51	0.31	0.46	135.87	1.00	135.87	0.313	No	No	2.00
391	15.60	11.65	1.51	0.30	0.46	134.28	1.00	134.28	0.305	No	No	2.00
392	15.62	11.52	1.50	0.27	0.46	132.43	1.00	132.43	0.296	No	No	2.00
393	15.64	11.34	1.50	0.26	0.46	130.14	1.00	130.14	0.285	No	No	2.00
394	15.66	11.20	1.54	0.31	0.47	129.06	1.00	129.06	0.280	No	No	2.00
395	15.68	11.30	1.56	0.35	0.48	130.51	1.00	130.51	0.287	No	No	2.00
396	15.70	11.64	1.54	0.34	0.47	133.93	1.00	133.93	0.303	No	No	2.00
397	15.72	11.86	1.52	0.32	0.46	136.09	1.00	136.09	0.314	No	No	2.00
398	15.74	11.53	1.56	0.38	0.48	132.82	1.00	132.82	0.298	No	No	2.00
399	15.76	11.05	1.60	0.42	0.50	127.72	1.00	127.72	0.274	No	No	2.00
400	15.78	10.50	1.62	0.43	0.50	121.49	1.00	121.49	0.247	No	No	2.00
401	15.80	10.24	1.61	0.37	0.50	118.05	1.00	118.05	0.233	No	No	2.00
402	15.82	9.98	1.63	0.40	0.51	115.26	1.00	115.26	0.222	No	No	2.00
403	15.84	10.15	1.63	0.41	0.51	117.05	1.00	117.05	0.229	No	No	2.00
404	15.86	10.89	1.59	0.38	0.49	124.93	1.00	124.93	0.261	No	No	2.00
405	15.88	12.03	1.53	0.34	0.47	137.00	1.00	137.00	0.319	No	No	2.00
406	15.90	13.76	1.44	0.28	0.44	155.07	1.00	155.07	0.427	No	No	2.00
407	15.92	16.23	1.36	0.24	0.40	180.99	1.00	180.99	0.631	No	No	2.00
408	15.94	18.50	1.28	0.21	0.37	204.49	1.00	204.49	4.000	No	No	2.00
409	15.96	20.03	1.24	0.20	0.36	220.34	1.00	220.34	4.000	No	No	2.00
410	15.98	19.12	1.25	0.19	0.36	210.30	1.00	210.30	4.000	No	No	2.00
411	16.00	18.25	1.29	0.21	0.38	201.28	1.00	201.28	4.000	No	No	2.00
412	16.02	16.79	1.33	0.23	0.39	185.92	1.00	185.92	0.678	No	No	2.00
413	16.04	16.40	1.36	0.25	0.40	181.97	1.00	181.97	0.640	No	No	2.00
414	16.06	15.55	1.37	0.24	0.41	172.48	1.00	172.48	0.557	No	No	2.00
415	16.08	14.84	1.45	0.32	0.44	165.91	1.00	165.91	0.505	No	No	2.00
416	16.10	14.13	1.51	0.40	0.46	158.91	1.00	158.91	0.453	No	No	2.00
417	16.12	13.42	1.57	0.47	0.48	151.67	1.00	151.67	0.404	No	No	2.00
418	16.14	12.84	1.58	0.45	0.49	145.03	1.00	145.03	0.364	No	No	2.00
419	16.16	12.43	1.59	0.46	0.49	140.45	1.00	140.45	0.338	No	No	2.00
420	16.18	11.92	1.63	0.51	0.51	134.96	1.00	134.96	0.309	No	No	2.00
421	16.20	10.91	1.68	0.56	0.53	123.97	1.00	123.97	0.257	No	No	2.00
422	16.22	10.34	1.72	0.60	0.54	117.76	1.03	120.91	0.244	No	No	2.00
423	16.24	11.17	1.72	0.66	0.54	127.20	1.02	130.21	0.285	No	No	2.00
424	16.26	12.83	1.71	0.76	0.54	145.97	1.00	145.97	0.369	No	No	2.00
425	16.28	14.02	1.73	0.91	0.55	159.84	1.05	168.11	0.522	No	No	2.00
426	16.30	14.18	1.77	1.05	0.56	162.16	1.11	180.29	0.625	No	No	2.00
427	16.32	14.13	1.81	1.19	0.58	161.99	1.16	188.25	0.700	No	No	2.00
428	16.34	14.28	1.80	1.16	0.57	163.32	1.15	187.81	0.696	No	No	2.00
429	16.36	14.36	1.78	1.10	0.57	163.70	1.13	184.77	0.667	No	No	2.00
430	16.38	14.14	1.75	0.96	0.55	160.34	1.08	172.85	0.560	No	No	2.00
431	16.40	13.30	1.75	0.93	0.56	150.68	1.09	164.58	0.495	No	No	2.00
432	16.42	12.10	1.76	0.85	0.56	136.78	1.10	150.37	0.396	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	16.44	10.83	1.80	0.86	0.57	122.60	1.16	141.61	0.344	No	No	2.00
434	16.46	9.53	1.88	0.98	0.60	108.38	1.22	132.42	0.296	No	No	2.00
435	16.48	8.30	2.03	1.42	0.66	95.42	1.33	126.99	0.270	No	No	2.00
436	16.50	7.78	2.14	1.95	0.70	90.08	1.48	133.62	0.302	No	No	2.00
437	16.52	8.19	2.18	2.32	0.72	95.19	1.56	148.33	0.383	No	No	2.00
438	16.54	9.25	2.15	2.37	0.71	107.22	1.50	160.83	0.467	No	No	2.00
439	16.56	10.34	2.12	2.39	0.70	119.52	1.45	173.22	0.563	No	No	2.00
440	16.58	11.45	2.10	2.42	0.69	132.03	1.41	186.56	0.684	No	No	2.00
441	16.60	12.68	2.08	2.47	0.68	145.80	1.39	202.02	4.000	No	No	2.00
442	16.62	13.80	2.05	2.47	0.67	158.26	1.36	215.00	4.000	No	No	2.00
443	16.64	14.67	2.04	2.50	0.67	167.84	1.35	225.81	4.000	No	No	2.00
444	16.66	15.22	2.05	2.62	0.67	173.97	1.35	235.31	4.000	No	No	2.00
445	16.68	15.64	2.06	2.73	0.67	178.66	1.36	243.32	4.000	No	No	2.00
446	16.70	15.75	2.07	2.87	0.68	179.75	1.38	248.18	4.000	No	No	2.00
447	16.72	15.74	2.08	2.96	0.68	179.47	1.39	250.25	4.000	No	No	2.00
448	16.74	15.88	2.09	3.02	0.69	180.83	1.40	253.49	4.000	No	No	2.00
449	16.76	16.25	2.09	3.10	0.69	184.79	1.41	260.20	4.000	No	No	2.00
450	16.78	16.88	2.09	3.16	0.69	191.60	1.40	269.15	4.000	No	No	2.00
451	16.80	17.63	2.08	3.19	0.68	199.78	1.40	278.80	4.000	No	No	2.00
452	16.82	19.12	2.05	3.05	0.67	215.70	1.35	291.92	4.000	No	No	2.00
453	16.84	20.71	2.01	2.90	0.66	232.78	1.32	306.70	4.000	No	No	2.00
454	16.86	22.15	1.98	2.80	0.65	248.06	1.29	321.10	4.000	No	No	2.00
455	16.88	22.73	1.98	2.85	0.65	254.05	1.29	328.91	4.000	No	No	2.00
456	16.90	22.64	2.00	2.97	0.65	252.94	1.31	330.73	4.000	No	No	2.00
457	16.92	22.48	2.02	3.08	0.66	250.93	1.32	331.49	4.000	No	No	2.00
458	16.94	21.43	2.05	3.31	0.67	239.37	1.36	325.42	4.000	No	No	2.00
459	16.96	21.75	2.05	3.35	0.67	242.55	1.36	329.84	4.000	No	No	2.00
460	16.98	22.11	2.06	3.42	0.68	246.16	1.37	336.17	4.000	No	No	2.00
461	17.00	23.35	2.04	3.34	0.67	259.28	1.34	348.23	4.000	No	No	2.00
462	17.02	23.58	2.04	3.40	0.67	261.42	1.35	352.46	4.000	No	No	2.00
463	17.04	23.82	2.04	3.43	0.67	263.59	1.35	355.62	4.000	No	No	2.00
464	17.06	24.06	2.05	3.46	0.67	265.84	1.35	359.10	4.000	No	No	2.00
465	17.08	24.17	2.05	3.50	0.67	266.62	1.36	361.33	4.000	No	No	2.00
466	17.10	24.20	2.05	3.53	0.67	266.55	1.36	362.23	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
7.80	2.00	0.00	0.00	0.02	0.00	7.82	2.00	0.00	0.00	0.02	0.00
7.84	2.00	0.00	0.00	0.02	0.00	7.86	2.00	0.00	0.00	0.02	0.00
7.88	2.00	0.00	0.00	0.02	0.00	7.90	2.00	0.00	0.00	0.02	0.00
7.92	2.00	0.00	0.00	0.02	0.00	7.94	2.00	0.00	0.00	0.02	0.00
7.96	2.00	0.00	0.00	0.02	0.00	7.98	2.00	0.00	0.00	0.02	0.00
8.00	2.00	0.00	0.00	0.02	0.00	8.02	2.00	0.00	0.00	0.02	0.00
8.04	2.00	0.00	0.00	0.02	0.00	8.06	2.00	0.00	0.00	0.02	0.00
8.08	2.00	0.00	0.00	0.02	0.00	8.10	2.00	0.00	0.00	0.02	0.00
8.12	2.00	0.00	0.00	0.02	0.00	8.14	2.00	0.00	0.00	0.02	0.00
8.16	2.00	0.00	0.00	0.02	0.00	8.18	2.00	0.00	0.00	0.02	0.00
8.20	2.00	0.00	0.00	0.02	0.00	8.22	2.00	0.00	0.00	0.02	0.00
8.24	2.00	0.00	0.00	0.02	0.00	8.26	2.00	0.00	0.00	0.02	0.00
8.28	2.00	0.00	0.00	0.02	0.00	8.30	2.00	0.00	0.00	0.02	0.00
8.32	2.00	0.00	0.00	0.02	0.00	8.34	2.00	0.00	0.00	0.02	0.00
8.36	2.00	0.00	0.00	0.02	0.00	8.38	2.00	0.00	0.00	0.02	0.00
8.40	2.00	0.00	0.00	0.02	0.00	8.42	2.00	0.00	0.00	0.02	0.00
8.44	2.00	0.00	0.00	0.02	0.00	8.46	2.00	0.00	0.00	0.02	0.00
8.48	2.00	0.00	0.00	0.02	0.00	8.50	2.00	0.00	0.00	0.02	0.00
8.52	2.00	0.00	0.00	0.02	0.00	8.54	2.00	0.00	0.00	0.02	0.00
8.56	2.00	0.00	0.00	0.02	0.00	8.58	2.00	0.00	0.00	0.02	0.00
8.60	2.00	0.00	0.00	0.02	0.00	8.62	2.00	0.00	0.00	0.02	0.00
8.64	2.00	0.00	0.00	0.02	0.00	8.66	2.00	0.00	0.00	0.02	0.00
8.68	2.00	0.00	0.00	0.02	0.00	8.70	2.00	0.00	0.00	0.02	0.00
8.72	2.00	0.00	0.00	0.02	0.00	8.74	2.00	0.00	0.00	0.02	0.00
8.76	2.00	0.00	0.00	0.02	0.00	8.78	2.00	0.00	0.00	0.02	0.00
8.80	2.00	0.00	0.00	0.02	0.00	8.82	2.00	0.00	0.00	0.02	0.00
8.84	2.00	0.00	0.00	0.02	0.00	8.86	2.00	0.00	0.00	0.02	0.00
8.88	2.00	0.00	0.00	0.02	0.00	8.90	2.00	0.00	0.00	0.02	0.00
8.92	2.00	0.00	0.00	0.02	0.00	8.94	2.00	0.00	0.00	0.02	0.00
8.96	2.00	0.00	0.00	0.02	0.00	8.98	2.00	0.00	0.00	0.02	0.00
9.00	2.00	0.00	0.00	0.02	0.00	9.02	2.00	0.00	0.00	0.02	0.00
9.04	2.00	0.00	0.00	0.02	0.00	9.06	2.00	0.00	0.00	0.02	0.00
9.08	2.00	0.00	0.00	0.02	0.00	9.10	2.00	0.00	0.00	0.02	0.00
9.12	2.00	0.00	0.00	0.02	0.00	9.14	2.00	0.00	0.00	0.02	0.00
9.16	2.00	0.00	0.00	0.02	0.00	9.18	2.00	0.00	0.00	0.02	0.00
9.20	2.00	0.00	0.00	0.02	0.00	9.22	2.00	0.00	0.00	0.02	0.00
9.24	2.00	0.00	0.00	0.02	0.00	9.26	2.00	0.00	0.00	0.02	0.00
9.28	2.00	0.00	0.00	0.02	0.00	9.30	2.00	0.00	0.00	0.02	0.00
9.32	2.00	0.00	0.00	0.02	0.00	9.34	2.00	0.00	0.00	0.02	0.00
9.36	2.00	0.00	0.00	0.02	0.00	9.38	2.00	0.00	0.00	0.02	0.00
9.40	2.00	0.00	0.00	0.02	0.00	9.42	2.00	0.00	0.00	0.02	0.00
9.44	2.00	0.00	0.00	0.02	0.00	9.46	2.00	0.00	0.00	0.02	0.00
9.48	2.00	0.00	0.00	0.02	0.00	9.50	2.00	0.00	0.00	0.02	0.00
9.52	2.00	0.00	0.00	0.02	0.00	9.54	2.00	0.00	0.00	0.02	0.00
9.56	2.00	0.00	0.00	0.02	0.00	9.58	2.00	0.00	0.00	0.02	0.00
9.60	2.00	0.00	0.00	0.02	0.00	9.62	2.00	0.00	0.00	0.02	0.00
9.64	2.00	0.00	0.00	0.02	0.00	9.66	2.00	0.00	0.00	0.02	0.00
9.68	2.00	0.00	0.00	0.02	0.00	9.70	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
9.72	2.00	0.00	0.00	0.02	0.00	9.74	2.00	0.00	0.00	0.02	0.00
9.76	2.00	0.00	0.00	0.02	0.00	9.78	2.00	0.00	0.00	0.02	0.00
9.80	2.00	0.00	0.00	0.02	0.00	9.82	2.00	0.00	0.00	0.02	0.00
9.84	2.00	0.00	0.00	0.02	0.00	9.86	2.00	0.00	0.00	0.02	0.00
9.88	2.00	0.00	0.00	0.02	0.00	9.90	2.00	0.00	0.00	0.02	0.00
9.92	2.00	0.00	0.00	0.02	0.00	9.94	2.00	0.00	0.00	0.02	0.00
9.96	2.00	0.00	0.00	0.02	0.00	9.98	2.00	0.00	0.00	0.02	0.00
10.00	2.00	0.00	0.00	0.02	0.00	10.02	2.00	0.00	0.00	0.02	0.00
10.04	2.00	0.00	0.00	0.02	0.00	10.06	2.00	0.00	0.00	0.02	0.00
10.08	2.00	0.00	0.00	0.02	0.00	10.10	2.00	0.00	0.00	0.02	0.00
10.12	2.00	0.00	0.00	0.02	0.00	10.14	2.00	0.00	0.00	0.02	0.00
10.16	2.00	0.00	0.00	0.02	0.00	10.18	2.00	0.00	0.00	0.02	0.00
10.20	2.00	0.00	0.00	0.02	0.00	10.22	2.00	0.00	0.00	0.02	0.00
10.24	2.00	0.00	0.00	0.02	0.00	10.26	2.00	0.00	0.00	0.02	0.00
10.28	2.00	0.00	0.00	0.02	0.00	10.30	2.00	0.00	0.00	0.02	0.00
10.32	2.00	0.00	0.00	0.02	0.00	10.34	2.00	0.00	0.00	0.02	0.00
10.36	2.00	0.00	0.00	0.02	0.00	10.38	2.00	0.00	0.00	0.02	0.00
10.40	2.00	0.00	0.00	0.02	0.00	10.42	2.00	0.00	0.00	0.02	0.00
10.44	2.00	0.00	0.00	0.02	0.00	10.46	2.00	0.00	0.00	0.02	0.00
10.48	2.00	0.00	0.00	0.02	0.00	10.50	2.00	0.00	0.00	0.02	0.00
10.52	2.00	0.00	0.00	0.02	0.00	10.54	2.00	0.00	0.00	0.02	0.00
10.56	2.00	0.00	0.00	0.02	0.00	10.58	2.00	0.00	0.00	0.02	0.00
10.60	2.00	0.00	0.00	0.02	0.00	10.62	2.00	0.00	0.00	0.02	0.00
10.64	2.00	0.00	0.00	0.02	0.00	10.66	2.00	0.00	0.00	0.02	0.00
10.68	2.00	0.00	0.00	0.02	0.00	10.70	2.00	0.00	0.00	0.02	0.00
10.72	2.00	0.00	0.00	0.02	0.00	10.74	2.00	0.00	0.00	0.02	0.00
10.76	2.00	0.00	0.00	0.02	0.00	10.78	2.00	0.00	0.00	0.02	0.00
10.80	2.00	0.00	0.00	0.02	0.00	10.82	2.00	0.00	0.00	0.02	0.00
10.84	2.00	0.00	0.00	0.02	0.00	10.86	2.00	0.00	0.00	0.02	0.00
10.88	2.00	0.00	0.00	0.02	0.00	10.90	2.00	0.00	0.00	0.02	0.00
10.92	2.00	0.00	0.00	0.02	0.00	10.94	2.00	0.00	0.00	0.02	0.00
10.96	2.00	0.00	0.00	0.02	0.00	10.98	2.00	0.00	0.00	0.02	0.00
11.00	2.00	0.00	0.00	0.02	0.00	11.02	2.00	0.00	0.00	0.02	0.00
11.04	2.00	0.00	0.00	0.02	0.00	11.06	2.00	0.00	0.00	0.02	0.00
11.08	2.00	0.00	0.00	0.02	0.00	11.10	2.00	0.00	0.00	0.02	0.00
11.12	2.00	0.00	0.00	0.02	0.00	11.14	2.00	0.00	0.00	0.02	0.00
11.16	2.00	0.00	0.00	0.02	0.00	11.18	2.00	0.00	0.00	0.02	0.00
11.20	2.00	0.00	0.00	0.02	0.00	11.22	2.00	0.00	0.00	0.02	0.00
11.24	2.00	0.00	0.00	0.02	0.00	11.26	2.00	0.00	0.00	0.02	0.00
11.28	2.00	0.00	0.00	0.02	0.00	11.30	2.00	0.00	0.00	0.02	0.00
11.32	2.00	0.00	0.00	0.02	0.00	11.34	2.00	0.00	0.00	0.02	0.00
11.36	2.00	0.00	0.00	0.02	0.00	11.38	2.00	0.00	0.00	0.02	0.00
11.40	2.00	0.00	0.00	0.02	0.00	11.42	2.00	0.00	0.00	0.02	0.00
11.44	2.00	0.00	0.00	0.02	0.00	11.46	2.00	0.00	0.00	0.02	0.00
11.48	2.00	0.00	0.00	0.02	0.00	11.50	2.00	0.00	0.00	0.02	0.00
11.52	2.00	0.00	0.00	0.02	0.00	11.54	2.00	0.00	0.00	0.02	0.00
11.56	2.00	0.00	0.00	0.02	0.00	11.58	2.00	0.00	0.00	0.02	0.00
11.60	2.00	0.00	0.00	0.02	0.00	11.62	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
11.64	2.00	0.00	0.00	0.02	0.00	11.66	2.00	0.00	0.00	0.02	0.00
11.68	2.00	0.00	0.00	0.02	0.00	11.70	2.00	0.00	0.00	0.02	0.00
11.72	2.00	0.00	0.00	0.02	0.00	11.74	2.00	0.00	0.00	0.02	0.00
11.76	2.00	0.00	0.00	0.02	0.00	11.78	2.00	0.00	0.00	0.02	0.00
11.80	2.00	0.00	0.00	0.02	0.00	11.82	2.00	0.00	0.00	0.02	0.00
11.84	2.00	0.00	0.00	0.02	0.00	11.86	2.00	0.00	0.00	0.02	0.00
11.88	2.00	0.00	0.00	0.02	0.00	11.90	2.00	0.00	0.00	0.02	0.00
11.92	2.00	0.00	0.00	0.02	0.00	11.94	2.00	0.00	0.00	0.02	0.00
11.96	2.00	0.00	0.00	0.02	0.00	11.98	2.00	0.00	0.00	0.02	0.00
12.00	2.00	0.00	0.00	0.02	0.00	12.02	2.00	0.00	0.00	0.02	0.00
12.04	2.00	0.00	0.00	0.02	0.00	12.06	2.00	0.00	0.00	0.02	0.00
12.08	2.00	0.00	0.00	0.02	0.00	12.10	2.00	0.00	0.00	0.02	0.00
12.12	2.00	0.00	0.00	0.02	0.00	12.14	2.00	0.00	0.00	0.02	0.00
12.16	2.00	0.00	0.00	0.02	0.00	12.18	2.00	0.00	0.00	0.02	0.00
12.20	2.00	0.00	0.00	0.02	0.00	12.22	2.00	0.00	0.00	0.02	0.00
12.24	2.00	0.00	0.00	0.02	0.00	12.26	2.00	0.00	0.00	0.02	0.00
12.28	2.00	0.00	0.00	0.02	0.00	12.30	2.00	0.00	0.00	0.02	0.00
12.32	2.00	0.00	0.00	0.02	0.00	12.34	2.00	0.00	0.00	0.02	0.00
12.36	2.00	0.00	0.00	0.02	0.00	12.38	2.00	0.00	0.00	0.02	0.00
12.40	2.00	0.00	0.00	0.02	0.00	12.42	2.00	0.00	0.00	0.02	0.00
12.44	2.00	0.00	0.00	0.02	0.00	12.46	2.00	0.00	0.00	0.02	0.00
12.48	2.00	0.00	0.00	0.02	0.00	12.50	2.00	0.00	0.00	0.02	0.00
12.52	2.00	0.00	0.00	0.02	0.00	12.54	2.00	0.00	0.00	0.02	0.00
12.56	2.00	0.00	0.00	0.02	0.00	12.58	2.00	0.00	0.00	0.02	0.00
12.60	2.00	0.00	0.00	0.02	0.00	12.62	2.00	0.00	0.00	0.02	0.00
12.64	2.00	0.00	0.00	0.02	0.00	12.66	2.00	0.00	0.00	0.02	0.00
12.68	2.00	0.00	0.00	0.02	0.00	12.70	2.00	0.00	0.00	0.02	0.00
12.72	2.00	0.00	0.00	0.02	0.00	12.74	2.00	0.00	0.00	0.02	0.00
12.76	2.00	0.00	0.00	0.02	0.00	12.78	2.00	0.00	0.00	0.02	0.00
12.80	2.00	0.00	0.00	0.02	0.00	12.82	2.00	0.00	0.00	0.02	0.00
12.84	2.00	0.00	0.00	0.02	0.00	12.86	2.00	0.00	0.00	0.02	0.00
12.88	2.00	0.00	0.00	0.02	0.00	12.90	2.00	0.00	0.00	0.02	0.00
12.92	2.00	0.00	0.00	0.02	0.00	12.94	2.00	0.00	0.00	0.02	0.00
12.96	2.00	0.00	0.00	0.02	0.00	12.98	2.00	0.00	0.00	0.02	0.00
13.00	2.00	0.00	0.00	0.02	0.00	13.02	2.00	0.00	0.00	0.02	0.00
13.04	2.00	0.00	0.00	0.02	0.00	13.06	2.00	0.00	0.00	0.02	0.00
13.08	2.00	0.00	0.00	0.02	0.00	13.10	2.00	0.00	0.00	0.02	0.00
13.12	2.00	0.00	0.00	0.02	0.00	13.14	2.00	0.00	0.00	0.02	0.00
13.16	2.00	0.00	0.00	0.02	0.00	13.18	2.00	0.00	0.00	0.02	0.00
13.20	2.00	0.00	0.00	0.02	0.00	13.22	2.00	0.00	0.00	0.02	0.00
13.24	2.00	0.00	0.00	0.02	0.00	13.26	2.00	0.00	0.00	0.02	0.00
13.28	2.00	0.00	0.00	0.02	0.00	13.30	2.00	0.00	0.00	0.02	0.00
13.32	2.00	0.00	0.00	0.02	0.00	13.34	2.00	0.00	0.00	0.02	0.00
13.36	2.00	0.00	0.00	0.02	0.00	13.38	2.00	0.00	0.00	0.02	0.00
13.40	2.00	0.00	0.00	0.02	0.00	13.42	2.00	0.00	0.00	0.02	0.00
13.44	2.00	0.00	0.00	0.02	0.00	13.46	2.00	0.00	0.00	0.02	0.00
13.48	2.00	0.00	0.00	0.02	0.00	13.50	2.00	0.00	0.00	0.02	0.00
13.52	2.00	0.00	0.00	0.02	0.00	13.54	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
13.56	2.00	0.00	0.00	0.02	0.00	13.58	2.00	0.00	0.00	0.02	0.00
13.60	2.00	0.00	0.00	0.02	0.00	13.62	2.00	0.00	0.00	0.02	0.00
13.64	2.00	0.00	0.00	0.02	0.00	13.66	2.00	0.00	0.00	0.02	0.00
13.68	2.00	0.00	0.00	0.02	0.00	13.70	2.00	0.00	0.00	0.02	0.00
13.72	2.00	0.00	0.00	0.02	0.00	13.74	2.00	0.00	0.00	0.02	0.00
13.76	2.00	0.00	0.00	0.02	0.00	13.78	2.00	0.00	0.00	0.02	0.00
13.80	2.00	0.00	0.00	0.02	0.00	13.82	2.00	0.00	0.00	0.02	0.00
13.84	2.00	0.00	0.00	0.02	0.00	13.86	1.84	0.00	0.00	0.02	0.00
13.88	2.00	0.00	0.00	0.02	0.00	13.90	2.00	0.00	0.00	0.02	0.00
13.92	2.00	0.00	0.00	0.02	0.00	13.94	2.00	0.00	0.00	0.02	0.00
13.96	2.00	0.00	0.00	0.02	0.00	13.98	2.00	0.00	0.00	0.02	0.00
14.00	2.00	0.00	0.00	0.02	0.00	14.02	2.00	0.00	0.00	0.02	0.00
14.04	2.00	0.00	0.00	0.02	0.00	14.06	2.00	0.00	0.00	0.02	0.00
14.08	2.00	0.00	0.00	0.02	0.00	14.10	2.00	0.00	0.00	0.02	0.00
14.12	2.00	0.00	0.00	0.02	0.00	14.14	2.00	0.00	0.00	0.02	0.00
14.16	2.00	0.00	0.00	0.02	0.00	14.18	2.00	0.00	0.00	0.02	0.00
14.20	2.00	0.00	0.00	0.02	0.00	14.22	2.00	0.00	0.00	0.02	0.00
14.24	2.00	0.00	0.00	0.02	0.00	14.26	2.00	0.00	0.00	0.02	0.00
14.28	2.00	0.00	0.00	0.02	0.00	14.30	2.00	0.00	0.00	0.02	0.00
14.32	2.00	0.00	0.00	0.02	0.00	14.34	2.00	0.00	0.00	0.02	0.00
14.36	2.00	0.00	0.00	0.02	0.00	14.38	2.00	0.00	0.00	0.02	0.00
14.40	2.00	0.00	0.00	0.02	0.00	14.42	2.00	0.00	0.00	0.02	0.00
14.44	2.00	0.00	0.00	0.02	0.00	14.46	2.00	0.00	0.00	0.02	0.00
14.48	2.00	0.00	0.00	0.02	0.00	14.50	2.00	0.00	0.00	0.02	0.00
14.52	1.40	0.00	0.00	0.02	0.00	14.54	1.43	0.00	0.00	0.02	0.00
14.56	1.48	0.00	0.00	0.02	0.00	14.58	1.56	0.00	0.00	0.02	0.00
14.60	1.63	0.00	0.00	0.02	0.00	14.62	1.71	0.00	0.00	0.02	0.00
14.64	1.77	0.00	0.00	0.02	0.00	14.66	1.79	0.00	0.00	0.02	0.00
14.68	1.75	0.00	0.00	0.02	0.00	14.70	1.67	0.00	0.00	0.02	0.00
14.72	1.60	0.00	0.00	0.02	0.00	14.74	1.55	0.00	0.00	0.02	0.00
14.76	2.00	0.00	0.00	0.02	0.00	14.78	2.00	0.00	0.00	0.02	0.00
14.80	2.00	0.00	0.00	0.02	0.00	14.82	2.00	0.00	0.00	0.02	0.00
14.84	2.00	0.00	0.00	0.02	0.00	14.86	2.00	0.00	0.00	0.02	0.00
14.88	2.00	0.00	0.00	0.02	0.00	14.90	2.00	0.00	0.00	0.02	0.00
14.92	2.00	0.00	0.00	0.02	0.00	14.94	2.00	0.00	0.00	0.02	0.00
14.96	2.00	0.00	0.00	0.02	0.00	14.98	2.00	0.00	0.00	0.02	0.00
15.00	2.00	0.00	0.00	0.02	0.00	15.02	2.00	0.00	0.00	0.02	0.00
15.04	2.00	0.00	0.00	0.02	0.00	15.06	2.00	0.00	0.00	0.02	0.00
15.08	2.00	0.00	0.00	0.02	0.00	15.10	2.00	0.00	0.00	0.02	0.00
15.12	2.00	0.00	0.00	0.02	0.00	15.14	2.00	0.00	0.00	0.02	0.00
15.16	2.00	0.00	0.00	0.02	0.00	15.18	2.00	0.00	0.00	0.02	0.00
15.20	2.00	0.00	0.00	0.02	0.00	15.22	2.00	0.00	0.00	0.02	0.00
15.24	2.00	0.00	0.00	0.02	0.00	15.26	2.00	0.00	0.00	0.02	0.00
15.28	2.00	0.00	0.00	0.02	0.00	15.30	2.00	0.00	0.00	0.02	0.00
15.32	2.00	0.00	0.00	0.02	0.00	15.34	2.00	0.00	0.00	0.02	0.00
15.36	2.00	0.00	0.00	0.02	0.00	15.38	2.00	0.00	0.00	0.02	0.00
15.40	2.00	0.00	0.00	0.02	0.00	15.42	2.00	0.00	0.00	0.02	0.00
15.44	2.00	0.00	0.00	0.02	0.00	15.46	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
15.48	2.00	0.00	0.00	0.02	0.00	15.50	2.00	0.00	0.00	0.02	0.00
15.52	2.00	0.00	0.00	0.02	0.00	15.54	2.00	0.00	0.00	0.02	0.00
15.56	2.00	0.00	0.00	0.02	0.00	15.58	2.00	0.00	0.00	0.02	0.00
15.60	2.00	0.00	0.00	0.02	0.00	15.62	2.00	0.00	0.00	0.02	0.00
15.64	2.00	0.00	0.00	0.02	0.00	15.66	2.00	0.00	0.00	0.02	0.00
15.68	2.00	0.00	0.00	0.02	0.00	15.70	2.00	0.00	0.00	0.02	0.00
15.72	2.00	0.00	0.00	0.02	0.00	15.74	2.00	0.00	0.00	0.02	0.00
15.76	2.00	0.00	0.00	0.02	0.00	15.78	2.00	0.00	0.00	0.02	0.00
15.80	2.00	0.00	0.00	0.02	0.00	15.82	2.00	0.00	0.00	0.02	0.00
15.84	2.00	0.00	0.00	0.02	0.00	15.86	2.00	0.00	0.00	0.02	0.00
15.88	2.00	0.00	0.00	0.02	0.00	15.90	2.00	0.00	0.00	0.02	0.00
15.92	2.00	0.00	0.00	0.02	0.00	15.94	2.00	0.00	0.00	0.02	0.00
15.96	2.00	0.00	0.00	0.02	0.00	15.98	2.00	0.00	0.00	0.02	0.00
16.00	2.00	0.00	0.00	0.02	0.00	16.02	2.00	0.00	0.00	0.02	0.00
16.04	2.00	0.00	0.00	0.02	0.00	16.06	2.00	0.00	0.00	0.02	0.00
16.08	2.00	0.00	0.00	0.02	0.00	16.10	2.00	0.00	0.00	0.02	0.00
16.12	2.00	0.00	0.00	0.02	0.00	16.14	2.00	0.00	0.00	0.02	0.00
16.16	2.00	0.00	0.00	0.02	0.00	16.18	2.00	0.00	0.00	0.02	0.00
16.20	2.00	0.00	0.00	0.02	0.00	16.22	2.00	0.00	0.00	0.02	0.00
16.24	2.00	0.00	0.00	0.02	0.00	16.26	2.00	0.00	0.00	0.02	0.00
16.28	2.00	0.00	0.00	0.02	0.00	16.30	2.00	0.00	0.00	0.02	0.00
16.32	2.00	0.00	0.00	0.02	0.00	16.34	2.00	0.00	0.00	0.02	0.00
16.36	2.00	0.00	0.00	0.02	0.00	16.38	2.00	0.00	0.00	0.02	0.00
16.40	2.00	0.00	0.00	0.02	0.00	16.42	2.00	0.00	0.00	0.02	0.00
16.44	2.00	0.00	0.00	0.02	0.00	16.46	2.00	0.00	0.00	0.02	0.00
16.48	2.00	0.00	0.00	0.02	0.00	16.50	2.00	0.00	0.00	0.02	0.00
16.52	2.00	0.00	0.00	0.02	0.00	16.54	2.00	0.00	0.00	0.02	0.00
16.56	2.00	0.00	0.00	0.02	0.00	16.58	2.00	0.00	0.00	0.02	0.00
16.60	2.00	0.00	0.00	0.02	0.00	16.62	2.00	0.00	0.00	0.02	0.00
16.64	2.00	0.00	0.00	0.02	0.00	16.66	2.00	0.00	0.00	0.02	0.00
16.68	2.00	0.00	0.00	0.02	0.00	16.70	2.00	0.00	0.00	0.02	0.00
16.72	2.00	0.00	0.00	0.02	0.00	16.74	2.00	0.00	0.00	0.02	0.00
16.76	2.00	0.00	0.00	0.02	0.00	16.78	2.00	0.00	0.00	0.02	0.00
16.80	2.00	0.00	0.00	0.02	0.00	16.82	2.00	0.00	0.00	0.02	0.00
16.84	2.00	0.00	0.00	0.02	0.00	16.86	2.00	0.00	0.00	0.02	0.00
16.88	2.00	0.00	0.00	0.02	0.00	16.90	2.00	0.00	0.00	0.02	0.00
16.92	2.00	0.00	0.00	0.02	0.00	16.94	2.00	0.00	0.00	0.02	0.00
16.96	2.00	0.00	0.00	0.02	0.00	16.98	2.00	0.00	0.00	0.02	0.00
17.00	2.00	0.00	0.00	0.02	0.00	17.02	2.00	0.00	0.00	0.02	0.00
17.04	2.00	0.00	0.00	0.02	0.00	17.06	2.00	0.00	0.00	0.02	0.00
17.08	2.00	0.00	0.00	0.02	0.00	17.10	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI

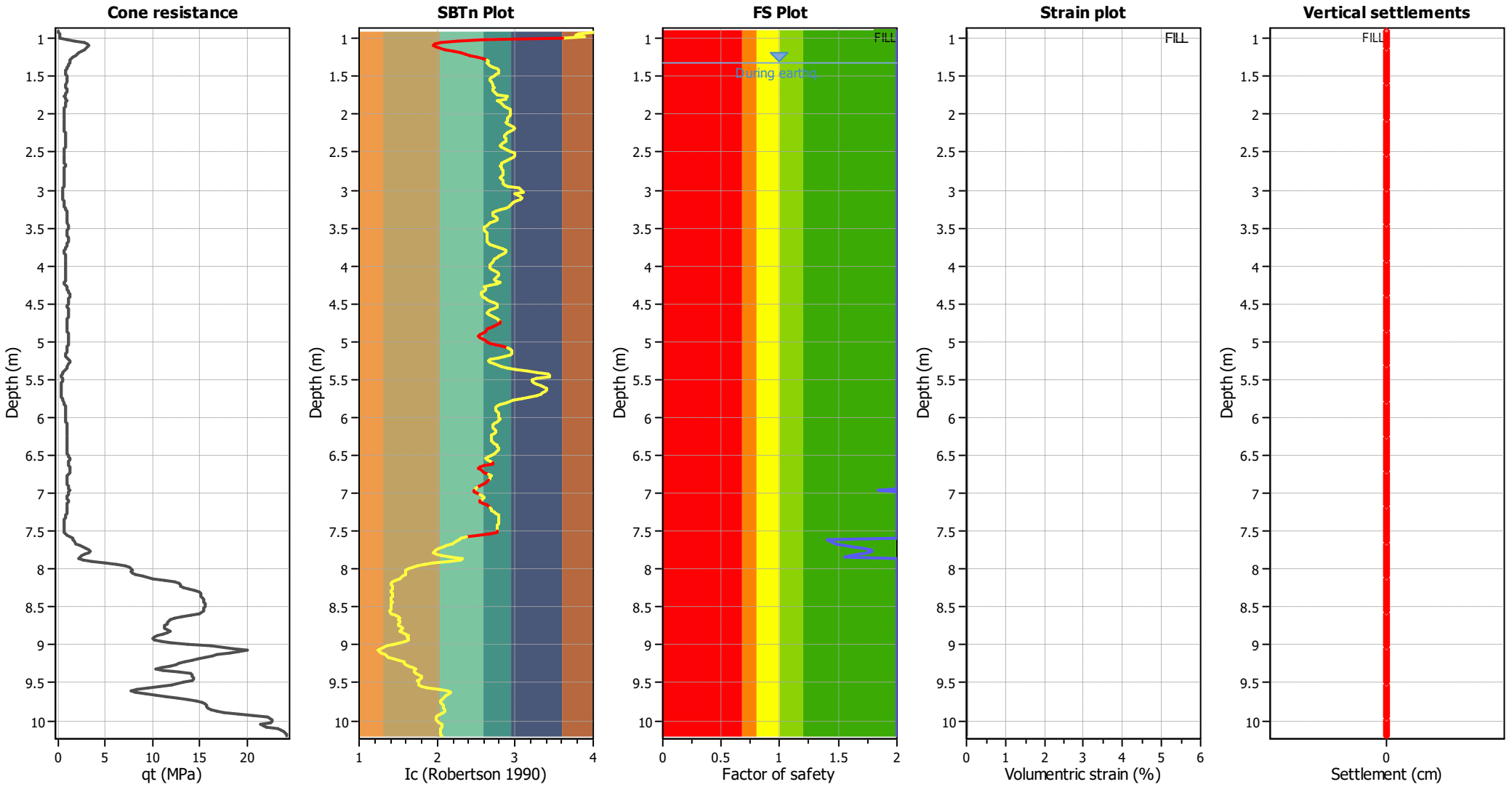
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.24	166.37	2.00	0.00	0.54	0.00	8.26	183.48	2.00	0.00	0.54	0.00
8.28	93.51	2.00	0.00	0.54	0.00	8.30	94.91	2.00	0.00	0.54	0.00
8.32	94.35	2.00	0.00	0.54	0.00	8.34	92.33	2.00	0.00	0.54	0.00
8.36	90.50	2.00	0.00	0.54	0.00	8.38	87.10	2.00	0.00	0.53	0.00
8.40	83.46	2.00	0.00	0.53	0.00	8.42	167.82	2.00	0.00	0.53	0.00
8.44	156.91	2.00	0.00	0.53	0.00	8.46	160.32	2.00	0.00	0.53	0.00
8.48	163.76	2.00	0.00	0.53	0.00	8.50	79.36	2.00	0.00	0.53	0.00
8.52	79.85	2.00	0.00	0.53	0.00	8.54	81.84	2.00	0.00	0.53	0.00
8.56	81.82	2.00	0.00	0.52	0.00	8.58	82.26	2.00	0.00	0.52	0.00
8.60	83.15	2.00	0.00	0.52	0.00	8.62	84.77	2.00	0.00	0.52	0.00
8.64	86.69	2.00	0.00	0.52	0.00	8.66	93.59	2.00	0.00	0.52	0.00
8.68	95.04	2.00	0.00	0.52	0.00	8.70	96.14	2.00	0.00	0.52	0.00
8.72	92.53	2.00	0.00	0.52	0.00	8.74	93.67	2.00	0.00	0.51	0.00
8.76	94.15	2.00	0.00	0.51	0.00	8.78	94.27	2.00	0.00	0.51	0.00
8.80	95.75	2.00	0.00	0.51	0.00	8.82	97.26	2.00	0.00	0.51	0.00
8.84	97.54	2.00	0.00	0.51	0.00	8.86	96.45	2.00	0.00	0.51	0.00
8.88	96.36	2.00	0.00	0.51	0.00	8.90	95.37	2.00	0.00	0.51	0.00
8.92	96.22	2.00	0.00	0.50	0.00	8.94	95.82	2.00	0.00	0.50	0.00
8.96	96.22	2.00	0.00	0.50	0.00	8.98	94.50	2.00	0.00	0.50	0.00
9.00	93.59	2.00	0.00	0.50	0.00	9.02	94.25	2.00	0.00	0.50	0.00
9.04	96.12	2.00	0.00	0.50	0.00	9.06	98.38	2.00	0.00	0.50	0.00
9.08	100.66	2.00	0.00	0.50	0.00	9.10	101.78	2.00	0.00	0.49	0.00
9.12	101.65	2.00	0.00	0.49	0.00	9.14	100.14	2.00	0.00	0.49	0.00
9.16	98.38	2.00	0.00	0.49	0.00	9.18	97.87	2.00	0.00	0.49	0.00
9.20	98.29	2.00	0.00	0.49	0.00	9.22	98.70	2.00	0.00	0.49	0.00
9.24	98.01	2.00	0.00	0.49	0.00	9.26	96.26	2.00	0.00	0.49	0.00
9.28	93.49	2.00	0.00	0.48	0.00	9.30	90.22	2.00	0.00	0.48	0.00
9.32	87.89	2.00	0.00	0.48	0.00	9.34	86.77	2.00	0.00	0.48	0.00
9.36	87.37	2.00	0.00	0.48	0.00	9.38	88.65	2.00	0.00	0.48	0.00
9.40	91.25	2.00	0.00	0.48	0.00	9.42	93.88	2.00	0.00	0.48	0.00
9.44	95.02	2.00	0.00	0.48	0.00	9.46	93.82	2.00	0.00	0.47	0.00
9.48	91.06	2.00	0.00	0.47	0.00	9.50	87.35	2.00	0.00	0.47	0.00
9.52	84.68	2.00	0.00	0.47	0.00	9.54	81.73	2.00	0.00	0.47	0.00
9.56	81.03	2.00	0.00	0.47	0.00	9.58	80.69	2.00	0.00	0.47	0.00
9.60	80.95	2.00	0.00	0.47	0.00	9.62	80.31	2.00	0.00	0.47	0.00
9.64	80.02	2.00	0.00	0.46	0.00	9.66	80.06	2.00	0.00	0.46	0.00
9.68	79.64	2.00	0.00	0.46	0.00	9.70	78.78	2.00	0.00	0.46	0.00
9.72	77.72	2.00	0.00	0.46	0.00	9.74	77.60	2.00	0.00	0.46	0.00
9.76	78.02	2.00	0.00	0.46	0.00	9.78	78.64	2.00	0.00	0.46	0.00
9.80	78.73	2.00	0.00	0.46	0.00	9.82	78.40	2.00	0.00	0.45	0.00
9.84	78.72	2.00	0.00	0.45	0.00	9.86	80.12	2.00	0.00	0.45	0.00
9.88	85.05	2.00	0.00	0.45	0.00	9.90	85.23	2.00	0.00	0.45	0.00
9.92	84.36	2.00	0.00	0.45	0.00	9.94	80.69	2.00	0.00	0.45	0.00
9.96	81.97	2.00	0.00	0.45	0.00	9.98	85.12	2.00	0.00	0.45	0.00
10.00	88.76	2.00	0.00	0.44	0.00	10.02	91.69	2.00	0.00	0.44	0.00
10.04	92.57	2.00	0.00	0.44	0.00	10.06	92.23	2.00	0.00	0.44	0.00
10.08	91.75	2.00	0.00	0.44	0.00	10.10	91.75	2.00	0.00	0.44	0.00
10.12	91.44	2.00	0.00	0.44	0.00	10.14	90.87	2.00	0.00	0.44	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.16	89.04	2.00	0.00	0.44	0.00	10.18	87.48	2.00	0.00	0.43	0.00
10.20	86.10	2.00	0.00	0.43	0.00	10.22	87.23	2.00	0.00	0.43	0.00
10.24	89.28	2.00	0.00	0.43	0.00	10.26	91.57	2.00	0.00	0.43	0.00
10.28	92.99	2.00	0.00	0.43	0.00	10.30	92.70	2.00	0.00	0.43	0.00
10.32	89.11	2.00	0.00	0.43	0.00	10.34	169.05	2.00	0.00	0.43	0.00
10.36	132.70	2.00	0.00	0.42	0.00	10.38	114.28	2.00	0.00	0.42	0.00
10.40	106.76	2.00	0.00	0.42	0.00	10.42	106.79	2.00	0.00	0.42	0.00
10.44	118.02	2.00	0.00	0.42	0.00	10.46	127.53	2.00	0.00	0.42	0.00
10.48	134.72	2.00	0.00	0.42	0.00	10.50	132.97	2.00	0.00	0.42	0.00
10.52	131.91	2.00	0.00	0.42	0.00	10.54	128.40	2.00	0.00	0.41	0.00
10.56	128.48	2.00	0.00	0.41	0.00	10.58	127.77	2.00	0.00	0.41	0.00
10.60	137.16	2.00	0.00	0.41	0.00	10.62	157.51	2.00	0.00	0.41	0.00
10.64	81.92	2.00	0.00	0.41	0.00	10.66	85.37	2.00	0.00	0.41	0.00
10.68	87.98	2.00	0.00	0.41	0.00	10.70	89.15	2.00	0.00	0.41	0.00
10.72	88.30	2.00	0.00	0.40	0.00	10.74	85.31	2.00	0.00	0.40	0.00
10.76	82.13	2.00	0.00	0.40	0.00	10.78	77.92	2.00	0.00	0.40	0.00
10.80	75.18	2.00	0.00	0.40	0.00	10.82	71.90	2.00	0.00	0.40	0.00
10.84	70.14	2.00	0.00	0.40	0.00	10.86	142.63	2.00	0.00	0.40	0.00
10.88	134.87	2.00	0.00	0.40	0.00	10.90	136.20	2.00	0.00	0.39	0.00
10.92	142.44	2.00	0.00	0.39	0.00	10.94	73.12	2.00	0.00	0.39	0.00
10.96	75.65	2.00	0.00	0.39	0.00	10.98	78.17	2.00	0.00	0.39	0.00
11.00	78.83	2.00	0.00	0.39	0.00	11.02	78.04	2.00	0.00	0.39	0.00
11.04	76.05	2.00	0.00	0.39	0.00	11.06	73.76	2.00	0.00	0.39	0.00
11.08	71.27	2.00	0.00	0.38	0.00	11.10	68.17	2.00	0.00	0.38	0.00
11.12	65.70	2.00	0.00	0.38	0.00	11.14	64.43	2.00	0.00	0.38	0.00
11.16	128.77	2.00	0.00	0.38	0.00	11.18	96.13	2.00	0.00	0.38	0.00
11.20	112.01	2.00	0.00	0.38	0.00	11.22	117.88	2.00	0.00	0.38	0.00
11.24	109.81	2.00	0.00	0.38	0.00	11.26	89.14	2.00	0.00	0.37	0.00
11.28	90.64	2.00	0.00	0.37	0.00	11.30	105.58	2.00	0.00	0.37	0.00
11.32	130.23	2.00	0.00	0.37	0.00	11.34	153.12	2.00	0.00	0.37	0.00
11.36	186.57	2.00	0.00	0.37	0.00	11.38	97.50	2.00	0.00	0.37	0.00
11.40	102.50	2.00	0.00	0.37	0.00	11.42	103.92	2.00	0.00	0.37	0.00
11.44	101.02	2.00	0.00	0.36	0.00	11.46	97.06	2.00	0.00	0.36	0.00
11.48	183.65	2.00	0.00	0.36	0.00	11.50	163.82	2.00	0.00	0.36	0.00
11.52	150.97	2.00	0.00	0.36	0.00	11.54	166.44	2.00	0.00	0.36	0.00
11.56	194.88	2.00	0.00	0.36	0.00	11.58	95.62	2.00	0.00	0.36	0.00
11.60	97.20	2.00	0.00	0.36	0.00	11.62	97.65	2.00	0.00	0.35	0.00
11.64	96.10	2.00	0.00	0.35	0.00	11.66	93.41	2.00	0.00	0.35	0.00
11.68	88.82	2.00	0.00	0.35	0.00	11.70	82.60	2.00	0.00	0.35	0.00
11.72	163.93	2.00	0.00	0.35	0.00	11.74	126.36	2.00	0.00	0.35	0.00
11.76	106.58	2.00	0.00	0.35	0.00	11.78	87.65	2.00	0.00	0.35	0.00
11.80	72.89	2.00	0.00	0.34	0.00	11.82	69.51	2.00	0.00	0.34	0.00
11.84	81.14	2.00	0.00	0.34	0.00	11.86	104.26	2.00	0.00	0.34	0.00
11.88	120.54	2.00	0.00	0.34	0.00	11.90	138.20	2.00	0.00	0.34	0.00
11.92	169.31	2.00	0.00	0.34	0.00	11.94	102.19	2.00	0.00	0.34	0.00
11.96	114.75	2.00	0.00	0.34	0.00	11.98	125.09	2.00	0.00	0.33	0.00
12.00	128.21	2.00	0.00	0.33	0.00	12.02	128.75	2.00	0.00	0.33	0.00
12.04	127.00	2.00	0.00	0.33	0.00	12.06	120.39	2.00	0.00	0.33	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
12.08	112.45	2.00	0.00	0.33	0.00	12.10	102.40	2.00	0.00	0.33	0.00
12.12	95.75	2.00	0.00	0.33	0.00	12.14	181.51	2.00	0.00	0.33	0.00
12.16	159.43	2.00	0.00	0.32	0.00	12.18	182.87	2.00	0.00	0.32	0.00
12.20	105.02	2.00	0.00	0.32	0.00	12.22	111.85	2.00	0.00	0.32	0.00
12.24	115.59	2.00	0.00	0.32	0.00	12.26	120.43	2.00	0.00	0.32	0.00
12.28	128.32	2.00	0.00	0.32	0.00	12.30	134.18	2.00	0.00	0.32	0.00
12.32	130.07	2.00	0.00	0.32	0.00	12.34	118.13	2.00	0.00	0.31	0.00
12.36	102.76	2.00	0.00	0.31	0.00	12.38	93.71	2.00	0.00	0.31	0.00
12.40	88.47	2.00	0.00	0.31	0.00	12.42	84.94	2.00	0.00	0.31	0.00
12.44	83.72	2.00	0.00	0.31	0.00	12.46	84.47	2.00	0.00	0.31	0.00
12.48	85.71	2.00	0.00	0.31	0.00	12.50	86.12	2.00	0.00	0.31	0.00
12.52	84.85	2.00	0.00	0.30	0.00	12.54	80.77	2.00	0.00	0.30	0.00
12.56	75.91	2.00	0.00	0.30	0.00	12.58	70.66	2.00	0.00	0.30	0.00
12.60	67.43	2.00	0.00	0.30	0.00	12.62	64.90	2.00	0.00	0.30	0.00
12.64	63.48	2.00	0.00	0.30	0.00	12.66	63.54	2.00	0.00	0.30	0.00
12.68	63.51	2.00	0.00	0.30	0.00	12.70	63.77	2.00	0.00	0.29	0.00
12.72	64.75	2.00	0.00	0.29	0.00	12.74	67.00	2.00	0.00	0.29	0.00
12.76	69.21	2.00	0.00	0.29	0.00	12.78	71.69	2.00	0.00	0.29	0.00
12.80	73.70	2.00	0.00	0.29	0.00	12.82	76.64	2.00	0.00	0.29	0.00
12.84	78.81	2.00	0.00	0.29	0.00	12.86	80.71	2.00	0.00	0.29	0.00
12.88	80.57	2.00	0.00	0.28	0.00	12.90	80.93	2.00	0.00	0.28	0.00
12.92	80.81	2.00	0.00	0.28	0.00	12.94	79.91	2.00	0.00	0.28	0.00
12.96	76.85	2.00	0.00	0.28	0.00	12.98	73.41	2.00	0.00	0.28	0.00
13.00	71.27	2.00	0.00	0.28	0.00	13.02	70.82	2.00	0.00	0.28	0.00
13.04	72.67	2.00	0.00	0.28	0.00	13.06	75.32	2.00	0.00	0.27	0.00
13.08	78.06	2.00	0.00	0.27	0.00	13.10	78.72	2.00	0.00	0.27	0.00
13.12	77.47	2.00	0.00	0.27	0.00	13.14	75.57	2.00	0.00	0.27	0.00
13.16	157.20	2.00	0.00	0.27	0.00	13.18	72.38	2.00	0.00	0.27	0.00
13.20	70.99	2.00	0.00	0.27	0.00	13.22	71.37	2.00	0.00	0.27	0.00
13.24	73.29	2.00	0.00	0.26	0.00	13.26	76.41	2.00	0.00	0.26	0.00
13.28	78.38	2.00	0.00	0.26	0.00	13.30	79.92	2.00	0.00	0.26	0.00
13.32	79.94	2.00	0.00	0.26	0.00	13.34	79.93	2.00	0.00	0.26	0.00
13.36	79.00	2.00	0.00	0.26	0.00	13.38	78.43	2.00	0.00	0.26	0.00
13.40	162.33	2.00	0.00	0.26	0.00	13.42	136.16	2.00	0.00	0.25	0.00
13.44	116.62	2.00	0.00	0.25	0.00	13.46	125.79	2.00	0.00	0.25	0.00
13.48	159.70	2.00	0.00	0.25	0.00	13.50	79.26	2.00	0.00	0.25	0.00
13.52	76.85	2.00	0.00	0.25	0.00	13.54	97.56	2.00	0.00	0.25	0.00
13.56	73.17	2.00	0.00	0.25	0.00	13.58	65.10	2.00	0.00	0.25	0.00
13.60	83.31	2.00	0.00	0.24	0.00	13.62	100.58	2.00	0.00	0.24	0.00
13.64	119.75	2.00	0.00	0.24	0.00	13.66	134.93	2.00	0.00	0.24	0.00
13.68	126.43	2.00	0.00	0.24	0.00	13.70	114.77	2.00	0.00	0.24	0.00
13.72	104.40	2.00	0.00	0.24	0.00	13.74	92.89	2.00	0.00	0.24	0.00
13.76	80.37	2.00	0.00	0.24	0.00	13.78	67.88	2.00	0.00	0.23	0.00
13.80	57.13	2.00	0.00	0.23	0.00	13.82	47.76	2.00	0.00	0.23	0.00
13.84	47.80	2.00	0.00	0.23	0.00	13.86	46.81	1.84	0.00	0.23	0.00
13.88	46.05	2.00	0.00	0.23	0.00	13.90	44.52	2.00	0.00	0.23	0.00
13.92	56.64	2.00	0.00	0.23	0.00	13.94	69.18	2.00	0.00	0.23	0.00
13.96	73.16	2.00	0.00	0.22	0.00	13.98	65.35	2.00	0.00	0.22	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
14.00	57.33	2.00	0.00	0.22	0.00	14.02	57.22	2.00	0.00	0.22	0.00
14.04	69.51	2.00	0.00	0.22	0.00	14.06	92.15	2.00	0.00	0.22	0.00
14.08	112.07	2.00	0.00	0.22	0.00	14.10	130.06	2.00	0.00	0.22	0.00
14.12	65.03	2.00	0.00	0.22	0.00	14.14	68.16	2.00	0.00	0.21	0.00
14.16	67.49	2.00	0.00	0.21	0.00	14.18	65.21	2.00	0.00	0.21	0.00
14.20	60.31	2.00	0.00	0.21	0.00	14.22	57.32	2.00	0.00	0.21	0.00
14.24	55.03	2.00	0.00	0.21	0.00	14.26	53.12	2.00	0.00	0.21	0.00
14.28	51.04	2.00	0.00	0.21	0.00	14.30	49.18	2.00	0.00	0.21	0.00
14.32	48.22	2.00	0.00	0.20	0.00	14.34	47.60	2.00	0.00	0.20	0.00
14.36	48.42	2.00	0.00	0.20	0.00	14.38	49.00	2.00	0.00	0.20	0.00
14.40	49.45	2.00	0.00	0.20	0.00	14.42	49.41	2.00	0.00	0.20	0.00
14.44	96.22	2.00	0.00	0.20	0.00	14.46	44.95	2.00	0.00	0.20	0.00
14.48	38.79	2.00	0.00	0.20	0.00	14.50	19.91	2.00	0.00	0.19	0.00
14.52	20.76	1.40	0.00	0.19	0.00	14.54	22.39	1.43	0.00	0.19	0.00
14.56	25.37	1.48	0.00	0.19	0.00	14.58	29.86	1.56	0.00	0.19	0.00
14.60	34.23	1.63	0.00	0.19	0.00	14.62	38.67	1.71	0.00	0.19	0.00
14.64	42.19	1.77	0.00	0.19	0.00	14.66	42.98	1.79	0.00	0.19	0.00
14.68	40.69	1.75	0.00	0.18	0.00	14.70	36.48	1.67	0.00	0.18	0.00
14.72	32.39	1.60	0.00	0.18	0.00	14.74	29.50	1.55	0.00	0.18	0.00
14.76	59.62	2.00	0.00	0.18	0.00	14.78	66.75	2.00	0.00	0.18	0.00
14.80	71.67	2.00	0.00	0.18	0.00	14.82	81.93	2.00	0.00	0.18	0.00
14.84	93.84	2.00	0.00	0.18	0.00	14.86	88.58	2.00	0.00	0.17	0.00
14.88	93.43	2.00	0.00	0.17	0.00	14.90	94.83	2.00	0.00	0.17	0.00
14.92	94.43	2.00	0.00	0.17	0.00	14.94	93.98	2.00	0.00	0.17	0.00
14.96	94.82	2.00	0.00	0.17	0.00	14.98	99.15	2.00	0.00	0.17	0.00
15.00	107.40	2.00	0.00	0.17	0.00	15.02	119.80	2.00	0.00	0.17	0.00
15.04	133.53	2.00	0.00	0.16	0.00	15.06	144.66	2.00	0.00	0.16	0.00
15.08	150.52	2.00	0.00	0.16	0.00	15.10	152.02	2.00	0.00	0.16	0.00
15.12	152.64	2.00	0.00	0.16	0.00	15.14	154.80	2.00	0.00	0.16	0.00
15.16	161.27	2.00	0.00	0.16	0.00	15.18	168.24	2.00	0.00	0.16	0.00
15.20	174.51	2.00	0.00	0.16	0.00	15.22	176.20	2.00	0.00	0.15	0.00
15.24	176.64	2.00	0.00	0.15	0.00	15.26	176.52	2.00	0.00	0.15	0.00
15.28	177.25	2.00	0.00	0.15	0.00	15.30	178.01	2.00	0.00	0.15	0.00
15.32	178.95	2.00	0.00	0.15	0.00	15.34	179.20	2.00	0.00	0.15	0.00
15.36	179.88	2.00	0.00	0.15	0.00	15.38	179.09	2.00	0.00	0.15	0.00
15.40	178.56	2.00	0.00	0.14	0.00	15.42	177.72	2.00	0.00	0.14	0.00
15.44	177.38	2.00	0.00	0.14	0.00	15.46	176.05	2.00	0.00	0.14	0.00
15.48	171.64	2.00	0.00	0.14	0.00	15.50	162.84	2.00	0.00	0.14	0.00
15.52	151.63	2.00	0.00	0.14	0.00	15.54	142.29	2.00	0.00	0.14	0.00
15.56	137.35	2.00	0.00	0.14	0.00	15.58	135.87	2.00	0.00	0.13	0.00
15.60	134.28	2.00	0.00	0.13	0.00	15.62	132.43	2.00	0.00	0.13	0.00
15.64	130.14	2.00	0.00	0.13	0.00	15.66	129.06	2.00	0.00	0.13	0.00
15.68	130.51	2.00	0.00	0.13	0.00	15.70	133.93	2.00	0.00	0.13	0.00
15.72	136.09	2.00	0.00	0.13	0.00	15.74	132.82	2.00	0.00	0.13	0.00
15.76	127.72	2.00	0.00	0.12	0.00	15.78	121.49	2.00	0.00	0.12	0.00
15.80	118.05	2.00	0.00	0.12	0.00	15.82	115.26	2.00	0.00	0.12	0.00
15.84	117.05	2.00	0.00	0.12	0.00	15.86	124.93	2.00	0.00	0.12	0.00
15.88	137.00	2.00	0.00	0.12	0.00	15.90	155.07	2.00	0.00	0.12	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
15.92	180.99	2.00	0.00	0.12	0.00	15.94	204.49	2.00	0.00	0.11	0.00
15.96	220.34	2.00	0.00	0.11	0.00	15.98	210.30	2.00	0.00	0.11	0.00
16.00	201.28	2.00	0.00	0.11	0.00	16.02	185.92	2.00	0.00	0.11	0.00
16.04	181.97	2.00	0.00	0.11	0.00	16.06	172.48	2.00	0.00	0.11	0.00
16.08	165.91	2.00	0.00	0.11	0.00	16.10	158.91	2.00	0.00	0.11	0.00
16.12	151.67	2.00	0.00	0.10	0.00	16.14	145.03	2.00	0.00	0.10	0.00
16.16	140.45	2.00	0.00	0.10	0.00	16.18	134.96	2.00	0.00	0.10	0.00
16.20	123.97	2.00	0.00	0.10	0.00	16.22	120.91	2.00	0.00	0.10	0.00
16.24	130.21	2.00	0.00	0.10	0.00	16.26	145.97	2.00	0.00	0.10	0.00
16.28	168.11	2.00	0.00	0.10	0.00	16.30	180.29	2.00	0.00	0.09	0.00
16.32	188.25	2.00	0.00	0.09	0.00	16.34	187.81	2.00	0.00	0.09	0.00
16.36	184.77	2.00	0.00	0.09	0.00	16.38	172.85	2.00	0.00	0.09	0.00
16.40	164.58	2.00	0.00	0.09	0.00	16.42	150.37	2.00	0.00	0.09	0.00
16.44	141.61	2.00	0.00	0.09	0.00	16.46	132.42	2.00	0.00	0.09	0.00
16.48	126.99	2.00	0.00	0.08	0.00	16.50	133.62	2.00	0.00	0.08	0.00
16.52	148.33	2.00	0.00	0.08	0.00	16.54	160.83	2.00	0.00	0.08	0.00
16.56	173.22	2.00	0.00	0.08	0.00	16.58	186.56	2.00	0.00	0.08	0.00
16.60	202.02	2.00	0.00	0.08	0.00	16.62	215.00	2.00	0.00	0.08	0.00
16.64	225.81	2.00	0.00	0.08	0.00	16.66	235.31	2.00	0.00	0.07	0.00
16.68	243.32	2.00	0.00	0.07	0.00	16.70	248.18	2.00	0.00	0.07	0.00
16.72	250.25	2.00	0.00	0.07	0.00	16.74	253.49	2.00	0.00	0.07	0.00
16.76	260.20	2.00	0.00	0.07	0.00	16.78	269.15	2.00	0.00	0.07	0.00
16.80	278.80	2.00	0.00	0.07	0.00	16.82	291.92	2.00	0.00	0.07	0.00
16.84	306.70	2.00	0.00	0.06	0.00	16.86	321.10	2.00	0.00	0.06	0.00
16.88	328.91	2.00	0.00	0.06	0.00	16.90	330.73	2.00	0.00	0.06	0.00
16.92	331.49	2.00	0.00	0.06	0.00	16.94	325.42	2.00	0.00	0.06	0.00
16.96	329.84	2.00	0.00	0.06	0.00	16.98	336.17	2.00	0.00	0.06	0.00
17.00	348.23	2.00	0.00	0.06	0.00	17.02	352.46	2.00	0.00	0.05	0.00
17.04	355.62	2.00	0.00	0.05	0.00	17.06	359.10	2.00	0.00	0.05	0.00
17.08	361.33	2.00	0.00	0.05	0.00	17.10	362.23	2.00	0.00	0.05	0.00

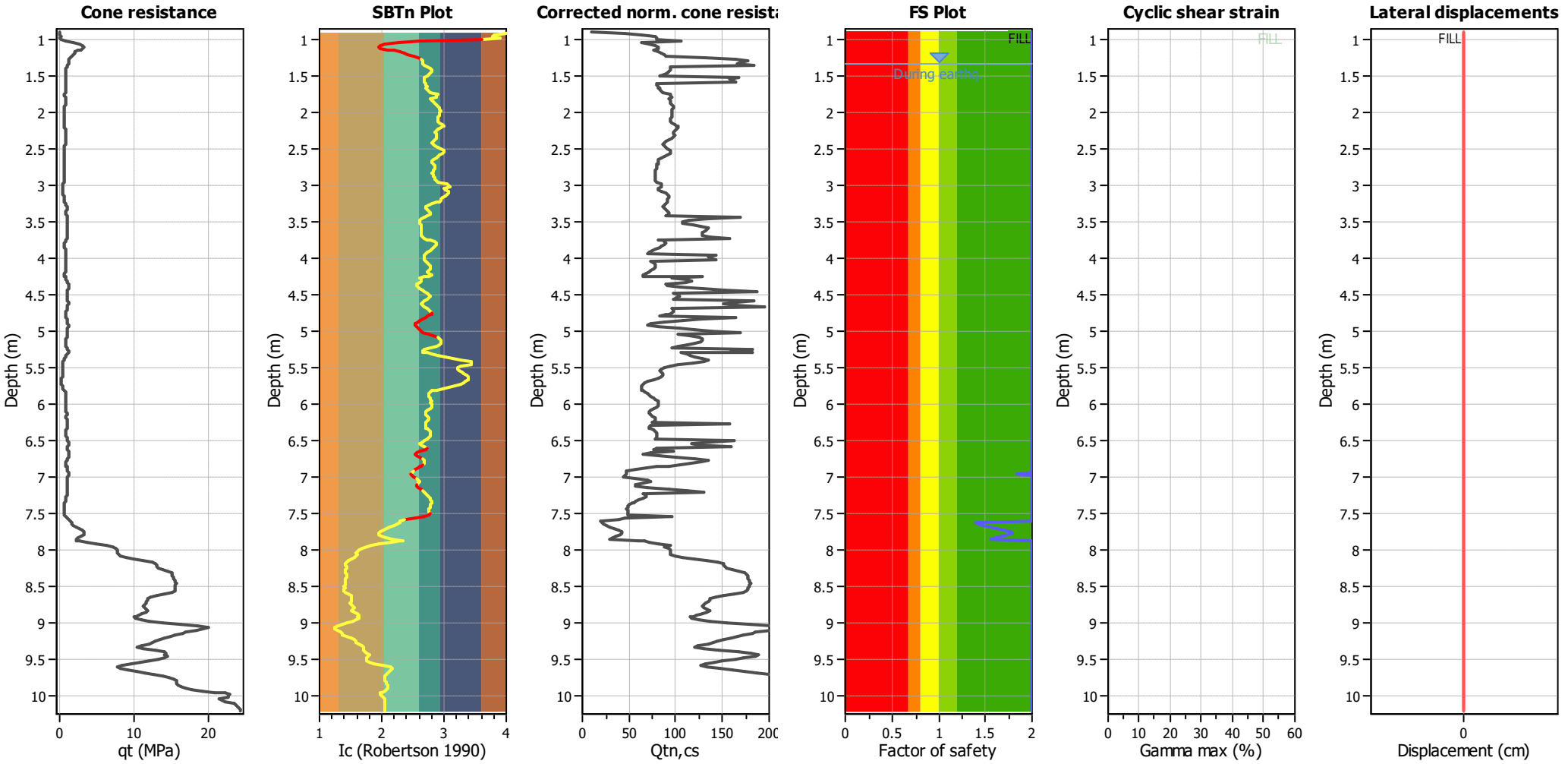
Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Estimation of post-earthquake lateral Displacements

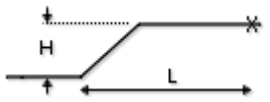
Geometric parameters: Level ground (or gently sloping) with free face (L: 41.50 m - H: 2.80 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.24	1.15	22.34	2.30	166.37	2.00	17.53	0.00	0.00
8.26	1.07	20.82	2.31	183.48	2.00	15.20	0.00	0.00
8.28	0.98	19.01	2.41	93.51	2.00	12.21	0.06	0.00
8.30	0.89	17.21	2.58	94.91	2.00	8.91	0.07	0.00
8.32	0.85	16.32	2.61	94.35	2.00	7.16	0.07	0.00
8.34	0.83	15.89	2.53	92.33	2.00	6.29	0.07	0.00
8.36	0.82	15.84	2.44	90.50	2.00	6.18	0.07	0.00
8.38	0.85	16.25	2.25	87.10	2.00	7.02	0.07	0.00
8.40	0.87	16.78	2.06	83.46	2.00	8.09	0.07	0.00
8.42	0.89	17.16	1.87	167.82	2.00	8.83	0.00	0.00
8.44	0.90	17.26	1.79	156.91	2.00	9.01	0.00	0.00
8.46	0.89	17.18	1.81	160.32	2.00	8.86	0.00	0.00
8.48	0.87	16.78	1.80	163.76	2.00	8.08	0.00	0.00
8.50	0.86	16.46	1.88	79.36	2.00	7.44	0.07	0.00
8.52	0.85	16.26	1.91	79.85	2.00	7.05	0.07	0.00
8.54	0.86	16.42	1.99	81.84	2.00	7.38	0.07	0.00
8.56	0.87	16.70	1.98	81.82	2.00	7.92	0.07	0.00
8.58	0.88	16.79	1.99	82.26	2.00	8.11	0.07	0.00
8.60	0.87	16.66	2.04	83.15	2.00	7.85	0.07	0.00
8.62	0.85	16.20	2.13	84.77	2.00	6.92	0.07	0.00
8.64	0.82	15.75	2.25	86.69	2.00	6.00	0.07	0.00
8.66	0.68	12.88	2.85	93.59	2.00	0.00	0.08	0.00
8.68	0.71	13.58	2.86	95.04	2.00	1.11	0.08	0.00
8.70	0.74	13.98	2.88	96.14	2.00	2.06	0.08	0.00
8.72	0.87	16.65	2.48	92.53	2.00	7.83	0.07	0.00
8.74	0.82	15.71	2.59	93.67	2.00	5.91	0.07	0.00
8.76	0.79	15.10	2.66	94.15	2.00	4.61	0.07	0.00
8.78	0.77	14.71	2.70	94.27	2.00	3.73	0.07	0.00
8.80	0.74	14.12	2.84	95.75	2.00	2.38	0.08	0.00
8.82	0.71	13.45	2.99	97.26	2.00	0.79	0.08	0.00
8.84	0.68	12.75	3.09	97.54	2.00	0.00	0.08	0.00
8.86	0.66	12.49	3.06	96.45	2.00	0.00	0.08	0.00
8.88	0.66	12.34	3.07	96.36	2.00	0.00	0.08	0.00
8.90	0.66	12.45	3.00	95.37	2.00	0.00	0.08	0.00
8.92	0.67	12.58	3.03	96.22	2.00	0.00	0.08	0.00
8.94	0.68	12.87	2.97	95.82	2.00	0.00	0.08	0.00
8.96	0.70	13.12	2.96	96.22	2.00	0.00	0.08	0.00
8.98	0.70	13.27	2.84	94.50	2.00	0.35	0.08	0.00
9.00	0.70	13.23	2.79	93.59	2.00	0.24	0.08	0.00
9.02	0.69	12.93	2.86	94.25	2.00	0.00	0.08	0.00
9.04	0.66	12.44	3.03	96.12	2.00	0.00	0.08	0.00
9.06	0.64	11.93	3.25	98.38	2.00	0.00	0.08	0.00
9.08	0.63	11.69	3.44	100.66	2.00	0.00	0.08	0.00
9.10	0.65	12.17	3.43	101.78	2.00	0.00	0.08	0.00
9.12	0.69	13.01	3.29	101.65	2.00	0.00	0.08	0.00
9.14	0.74	13.93	3.09	100.14	2.00	1.93	0.08	0.00
9.16	0.77	14.42	2.93	98.38	2.00	3.08	0.07	0.00
9.18	0.78	14.63	2.88	97.87	2.00	3.55	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.20	0.78	14.61	2.91	98.29	2.00	3.51	0.07	0.00
9.22	0.76	14.28	2.96	98.70	2.00	2.75	0.07	0.00
9.24	0.75	14.04	2.95	98.01	2.00	2.19	0.08	0.00
9.26	0.75	14.00	2.85	96.26	2.00	2.11	0.08	0.00
9.28	0.76	14.36	2.66	93.49	2.00	2.95	0.07	0.00
9.30	0.78	14.70	2.46	90.22	2.00	3.72	0.07	0.00
9.32	0.77	14.54	2.35	87.89	2.00	3.35	0.07	0.00
9.34	0.75	13.98	2.33	86.77	2.00	2.07	0.08	0.00
9.36	0.70	13.05	2.44	87.37	2.00	0.00	0.08	0.00
9.38	0.66	12.28	2.58	88.65	2.00	0.00	0.08	0.00
9.40	0.62	11.52	2.82	91.25	2.00	0.00	0.08	0.00
9.42	0.59	10.93	3.08	93.88	2.00	0.00	0.09	0.00
9.44	0.59	10.84	3.17	95.02	2.00	0.00	0.09	0.00
9.46	0.61	11.24	3.02	93.82	2.00	0.00	0.09	0.00
9.48	0.64	11.86	2.76	91.06	2.00	0.00	0.08	0.00
9.50	0.66	12.26	2.50	87.35	2.00	0.00	0.08	0.00
9.52	0.68	12.59	2.32	84.68	2.00	0.00	0.08	0.00
9.54	0.70	13.04	2.13	81.73	2.00	0.00	0.08	0.00
9.56	0.72	13.36	2.07	81.03	2.00	0.55	0.08	0.00
9.58	0.72	13.39	2.05	80.69	2.00	0.64	0.08	0.00
9.60	0.71	13.12	2.08	80.95	2.00	0.00	0.08	0.00
9.62	0.69	12.83	2.07	80.31	2.00	0.00	0.08	0.00
9.64	0.68	12.49	2.07	80.02	2.00	0.00	0.08	0.00
9.66	0.66	12.23	2.09	80.06	2.00	0.00	0.08	0.00
9.68	0.66	12.20	2.07	79.64	2.00	0.00	0.08	0.00
9.70	0.68	12.48	2.01	78.78	2.00	0.00	0.08	0.00
9.72	0.69	12.72	1.94	77.72	2.00	0.00	0.08	0.00
9.74	0.69	12.80	1.93	77.60	2.00	0.00	0.08	0.00
9.76	0.68	12.54	1.96	78.02	2.00	0.00	0.08	0.00
9.78	0.67	12.33	2.01	78.64	2.00	0.00	0.08	0.00
9.80	0.66	12.16	2.02	78.73	2.00	0.00	0.08	0.00
9.82	0.65	12.00	2.02	78.40	2.00	0.00	0.08	0.00
9.84	0.64	11.68	2.06	78.72	2.00	0.00	0.08	0.00
9.86	0.61	11.18	2.17	80.12	2.00	0.00	0.09	0.00
9.88	0.49	8.85	2.79	85.05	2.00	0.00	0.10	0.00
9.90	0.47	8.36	2.90	85.23	2.00	0.00	0.10	0.00
9.92	0.45	7.92	2.93	84.36	2.00	0.00	0.10	0.00
9.94	0.51	9.19	2.43	80.69	2.00	0.00	0.09	0.00
9.96	0.49	8.70	2.59	81.97	2.00	0.00	0.10	0.00
9.98	0.48	8.44	2.87	85.12	2.00	0.00	0.10	0.00
10.00	0.49	8.64	3.10	88.76	2.00	0.00	0.10	0.00
10.02	0.52	9.32	3.17	91.69	2.00	0.00	0.09	0.00
10.04	0.57	10.21	3.06	92.57	2.00	0.00	0.09	0.00
10.06	0.60	10.95	2.91	92.23	2.00	0.00	0.09	0.00
10.08	0.62	11.31	2.83	91.75	2.00	0.00	0.09	0.00
10.10	0.64	11.59	2.80	91.75	2.00	0.00	0.08	0.00
10.12	0.67	12.15	2.71	91.44	2.00	0.00	0.08	0.00
10.14	0.71	13.12	2.58	90.87	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.16	0.80	14.80	2.35	89.04	2.00	3.95	0.07	0.00
10.18	0.88	16.42	2.19	87.48	2.00	7.36	0.07	0.00
10.20	0.96	17.88	2.06	86.10	2.00	10.18	0.06	0.00
10.22	0.98	18.26	2.10	87.23	2.00	10.88	0.06	0.00
10.24	0.97	18.07	2.19	89.28	2.00	10.52	0.06	0.00
10.26	0.93	17.31	2.33	91.57	2.00	9.12	0.07	0.00
10.28	0.90	16.80	2.42	92.99	2.00	8.12	0.07	0.00
10.30	0.91	16.92	2.40	92.70	2.00	8.36	0.07	0.00
10.32	0.95	17.70	2.20	89.11	2.00	9.85	0.07	0.00
10.34	1.00	18.67	1.95	169.05	2.00	11.61	0.00	0.00
10.36	1.04	19.43	1.73	132.70	2.00	12.93	0.00	0.00
10.38	1.05	19.74	1.59	114.28	2.00	13.45	0.00	0.00
10.40	1.05	19.56	1.51	106.76	2.00	13.15	0.00	0.00
10.42	1.02	19.07	1.47	106.79	2.00	12.31	0.00	0.00
10.44	1.00	18.65	1.54	118.02	2.00	11.57	0.00	0.00
10.46	0.99	18.50	1.61	127.53	2.00	11.31	0.00	0.00
10.48	1.00	18.59	1.67	134.72	2.00	11.47	0.00	0.00
10.50	1.02	18.98	1.69	132.97	2.00	12.15	0.00	0.00
10.52	1.03	19.21	1.70	131.91	2.00	12.56	0.00	0.00
10.54	1.04	19.44	1.69	128.40	2.00	12.94	0.00	0.00
10.56	1.03	19.25	1.67	128.48	2.00	12.62	0.00	0.00
10.58	1.02	19.09	1.65	127.77	2.00	12.34	0.00	0.00
10.60	0.99	18.43	1.68	137.16	2.00	11.19	0.00	0.00
10.62	0.95	17.58	1.76	157.51	2.00	9.62	0.00	0.00
10.64	0.88	16.22	1.93	81.92	2.00	6.96	0.07	0.00
10.66	0.81	14.92	2.14	85.37	2.00	4.21	0.07	0.00
10.68	0.75	13.68	2.35	87.98	2.00	1.33	0.08	0.00
10.70	0.71	12.87	2.47	89.15	2.00	0.00	0.08	0.00
10.72	0.70	12.65	2.45	88.30	2.00	0.00	0.08	0.00
10.74	0.71	12.91	2.26	85.31	2.00	0.00	0.08	0.00
10.76	0.73	13.25	2.08	82.13	2.00	0.28	0.08	0.00
10.78	0.74	13.48	1.86	77.92	2.00	0.86	0.08	0.00
10.80	0.75	13.62	1.73	75.18	2.00	1.20	0.08	0.00
10.82	0.77	14.06	1.56	71.90	2.00	2.26	0.08	0.00
10.84	0.80	14.54	1.47	70.14	2.00	3.36	0.07	0.00
10.86	0.82	14.97	1.41	142.63	2.00	4.31	0.00	0.00
10.88	0.84	15.32	1.38	134.87	2.00	5.08	0.00	0.00
10.90	0.85	15.56	1.41	136.20	2.00	5.59	0.00	0.00
10.92	0.86	15.68	1.47	142.44	2.00	5.85	0.00	0.00
10.94	0.84	15.39	1.57	73.12	2.00	5.23	0.07	0.00
10.96	0.82	14.87	1.69	75.65	2.00	4.10	0.07	0.00
10.98	0.79	14.30	1.83	78.17	2.00	2.81	0.07	0.00
11.00	0.77	13.90	1.87	78.83	2.00	1.87	0.08	0.00
11.02	0.76	13.75	1.84	78.04	2.00	1.52	0.08	0.00
11.04	0.76	13.69	1.75	76.05	2.00	1.36	0.08	0.00
11.06	0.77	13.96	1.64	73.76	2.00	2.01	0.08	0.00
11.08	0.79	14.34	1.52	71.27	2.00	2.90	0.07	0.00
11.10	0.72	12.83	1.43	68.17	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
11.12	0.63	11.04	1.39	65.70	2.00	0.00	0.09	0.00
11.14	0.66	11.79	1.31	64.43	2.00	0.00	0.08	0.00
11.16	0.80	14.47	1.25	128.77	2.00	3.19	0.00	0.00
11.18	0.94	17.15	1.22	96.13	2.00	8.80	0.00	0.00
11.20	0.93	17.12	1.35	112.01	2.00	8.75	0.00	0.00
11.22	0.98	17.94	1.46	117.88	2.00	10.29	0.00	0.00
11.24	1.06	19.65	1.52	109.81	2.00	13.30	0.00	0.00
11.26	1.17	21.69	1.46	89.14	2.00	16.55	0.00	0.00
11.28	1.20	22.28	1.51	90.64	2.00	17.44	0.00	0.00
11.30	1.18	21.96	1.64	105.58	2.00	16.97	0.00	0.00
11.32	1.15	21.30	1.82	130.23	2.00	15.96	0.00	0.00
11.34	1.13	20.91	1.98	153.12	2.00	15.34	0.00	0.00
11.36	1.10	20.26	2.19	186.57	2.00	14.30	0.00	0.00
11.38	1.06	19.60	2.45	97.50	2.00	13.22	0.06	0.00
11.40	1.03	18.93	2.70	102.50	2.00	12.06	0.06	0.00
11.42	1.01	18.56	2.79	103.92	2.00	11.40	0.06	0.00
11.44	1.02	18.72	2.64	101.02	2.00	11.69	0.06	0.00
11.46	1.06	19.43	2.43	97.06	2.00	12.93	0.06	0.00
11.48	1.11	20.57	2.19	183.65	2.00	14.80	0.00	0.00
11.50	1.15	21.20	2.09	163.82	2.00	15.80	0.00	0.00
11.52	1.16	21.49	2.01	150.97	2.00	16.24	0.00	0.00
11.54	1.13	20.90	2.08	166.44	2.00	15.32	0.00	0.00
11.56	1.09	20.01	2.22	194.88	2.00	13.89	0.00	0.00
11.58	1.03	18.91	2.38	95.62	2.00	12.02	0.06	0.00
11.60	0.98	17.94	2.50	97.20	2.00	10.28	0.06	0.00
11.62	0.93	16.98	2.57	97.65	2.00	8.48	0.07	0.00
11.64	0.90	16.29	2.54	96.10	2.00	7.11	0.07	0.00
11.66	0.88	15.91	2.43	93.41	2.00	6.32	0.07	0.00
11.68	0.88	15.86	2.21	88.82	2.00	6.23	0.07	0.00
11.70	0.89	16.07	1.93	82.60	2.00	6.65	0.07	0.00
11.72	0.91	16.44	1.67	163.93	2.00	7.41	0.00	0.00
11.74	0.94	17.11	1.45	126.36	2.00	8.73	0.00	0.00
11.76	0.98	17.85	1.35	106.58	2.00	10.13	0.00	0.00
11.78	1.06	19.09	1.27	87.65	2.00	12.33	0.00	0.00
11.80	1.13	20.19	1.19	72.89	2.00	14.20	0.00	0.00
11.82	1.18	21.00	1.20	69.51	2.00	15.48	0.00	0.00
11.84	1.17	20.93	1.32	81.14	2.00	15.38	0.00	0.00
11.86	1.14	20.56	1.52	104.26	2.00	14.79	0.00	0.00
11.88	1.14	20.61	1.67	120.54	2.00	14.88	0.00	0.00
11.90	1.13	20.59	1.82	138.20	2.00	14.84	0.00	0.00
11.92	1.11	20.28	2.04	169.31	2.00	14.33	0.00	0.00
11.94	1.05	19.10	2.65	102.19	2.00	12.36	0.06	0.00
11.96	0.99	18.03	3.33	114.75	2.00	10.46	0.06	0.00
11.98	0.95	17.20	3.96	125.09	2.00	8.90	0.07	0.00
12.00	0.92	16.53	4.22	128.21	2.00	7.59	0.07	0.00
12.02	0.89	15.96	4.33	128.75	2.00	6.43	0.07	0.00
12.04	0.87	15.57	4.28	127.00	2.00	5.61	0.07	0.00
12.06	0.84	15.02	3.95	120.39	2.00	4.43	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
12.08	0.81	14.46	3.54	112.45	2.00	3.18	0.07	0.00
12.10	0.85	15.09	2.92	102.40	2.00	4.58	0.07	0.00
12.12	0.94	16.85	2.47	95.75	2.00	8.23	0.07	0.00
12.14	1.09	19.45	2.06	181.51	2.00	12.96	0.00	0.00
12.16	1.19	21.09	2.03	159.43	2.00	15.63	0.00	0.00
12.18	1.22	21.58	2.25	182.87	2.00	16.39	0.00	0.00
12.20	1.15	20.64	2.70	105.02	2.00	14.91	0.06	0.00
12.22	1.02	18.43	3.14	111.85	2.00	11.19	0.06	0.00
12.24	0.89	15.94	3.55	115.59	2.00	6.39	0.07	0.00
12.26	0.75	13.17	4.22	120.43	2.00	0.08	0.08	0.00
12.28	0.64	10.96	5.34	128.32	2.00	0.00	0.09	0.00
12.30	0.56	9.37	6.49	134.18	2.00	0.00	0.09	0.00
12.32	0.43	6.84	7.62	130.07	2.00	0.00	0.11	0.00
12.34	0.39	6.04	6.77	118.13	2.00	0.00	0.11	0.00
12.36	0.36	5.39	5.38	102.76	2.00	0.00	0.12	0.00
12.38	0.42	6.52	3.84	93.71	2.00	0.00	0.11	0.00
12.40	0.43	6.67	3.32	88.47	2.00	0.00	0.11	0.00
12.42	0.42	6.53	3.06	84.94	2.00	0.00	0.11	0.00
12.44	0.40	6.17	3.06	83.72	2.00	0.00	0.11	0.00
12.46	0.38	5.75	3.27	84.47	2.00	0.00	0.12	0.00
12.48	0.36	5.37	3.53	85.71	2.00	0.00	0.12	0.00
12.50	0.34	5.02	3.73	86.12	2.00	0.00	0.12	0.00
12.52	0.33	4.72	3.75	84.85	2.00	0.00	0.13	0.00
12.54	0.32	4.50	3.44	80.77	2.00	0.00	0.13	0.00
12.56	0.31	4.35	3.02	75.91	2.00	0.00	0.13	0.00
12.58	0.31	4.25	2.56	70.66	2.00	0.00	0.13	0.00
12.60	0.31	4.25	2.27	67.43	2.00	0.00	0.13	0.00
12.62	0.32	4.54	1.97	64.90	2.00	0.00	0.13	0.00
12.64	0.35	5.16	1.73	63.48	2.00	0.00	0.12	0.00
12.66	0.41	6.16	1.57	63.54	2.00	0.00	0.11	0.00
12.68	0.48	7.56	1.42	63.51	2.00	0.00	0.10	0.00
12.70	0.57	9.14	1.34	63.77	2.00	0.00	0.10	0.00
12.72	0.67	10.88	1.31	64.75	2.00	0.00	0.09	0.00
12.74	0.76	12.24	1.36	67.00	2.00	0.00	0.08	0.00
12.76	0.81	13.19	1.43	69.21	2.00	0.13	0.08	0.00
12.78	0.84	13.63	1.52	71.69	2.00	1.23	0.08	0.00
12.80	0.85	13.86	1.60	73.70	2.00	1.77	0.08	0.00
12.82	0.85	13.92	1.72	76.64	2.00	1.92	0.08	0.00
12.84	0.86	13.95	1.82	78.81	2.00	1.99	0.08	0.00
12.86	0.86	13.96	1.90	80.71	2.00	2.00	0.08	0.00
12.88	0.86	14.02	1.89	80.57	2.00	2.15	0.08	0.00
12.90	0.86	13.97	1.91	80.93	2.00	2.04	0.08	0.00
12.92	0.85	13.81	1.91	80.81	2.00	1.67	0.08	0.00
12.94	0.85	13.73	1.87	79.91	2.00	1.45	0.08	0.00
12.96	0.86	13.83	1.73	76.85	2.00	1.70	0.08	0.00
12.98	0.89	14.24	1.57	73.41	2.00	2.66	0.07	0.00
13.00	0.92	14.61	1.47	71.27	2.00	3.51	0.07	0.00
13.02	0.94	14.85	1.45	70.82	2.00	4.04	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
13.04	0.94	14.90	1.52	72.67	2.00	4.17	0.07	0.00
13.06	0.93	14.67	1.64	75.32	2.00	3.65	0.07	0.00
13.08	0.92	14.64	1.75	78.06	2.00	3.59	0.07	0.00
13.10	0.94	14.87	1.78	78.72	2.00	4.10	0.07	0.00
13.12	0.99	15.57	1.70	77.47	2.00	5.61	0.07	0.00
13.14	1.01	15.91	1.61	75.57	2.00	6.33	0.07	0.00
13.16	1.01	15.78	1.54	157.20	2.00	6.05	0.00	0.00
13.18	0.98	15.31	1.50	72.38	2.00	5.06	0.07	0.00
13.20	0.96	14.96	1.45	70.99	2.00	4.30	0.07	0.00
13.22	0.95	14.72	1.47	71.37	2.00	3.77	0.07	0.00
13.24	0.94	14.49	1.56	73.29	2.00	3.25	0.07	0.00
13.26	0.92	14.19	1.70	76.41	2.00	2.55	0.08	0.00
13.28	0.90	14.00	1.79	78.38	2.00	2.11	0.08	0.00
13.30	0.90	13.93	1.86	79.92	2.00	1.95	0.08	0.00
13.32	0.91	14.04	1.86	79.94	2.00	2.20	0.08	0.00
13.34	0.93	14.33	1.85	79.93	2.00	2.88	0.07	0.00
13.36	0.96	14.74	1.79	79.00	2.00	3.81	0.07	0.00
13.38	0.99	15.22	1.75	78.43	2.00	4.86	0.07	0.00
13.40	1.08	16.47	1.64	162.33	2.00	7.46	0.00	0.00
13.42	1.16	17.74	1.56	136.16	2.00	9.93	0.00	0.00
13.44	1.24	18.74	1.49	116.62	2.00	11.72	0.00	0.00
13.46	1.21	18.27	1.53	125.79	2.00	10.90	0.00	0.00
13.48	1.13	17.20	1.69	159.70	2.00	8.90	0.00	0.00
13.50	1.06	16.12	1.75	79.26	2.00	6.75	0.07	0.00
13.52	1.05	15.90	1.66	76.85	2.00	6.31	0.07	0.00
13.54	1.15	17.06	1.20	97.56	2.00	8.63	0.00	0.00
13.56	1.23	18.14	1.05	73.17	2.00	10.65	0.00	0.00
13.58	1.29	18.96	1.02	65.10	2.00	12.11	0.00	0.00
13.60	1.27	18.70	1.18	83.31	2.00	11.66	0.00	0.00
13.62	1.18	17.39	1.25	100.58	2.00	9.26	0.00	0.00
13.64	1.06	15.63	1.26	119.75	2.00	5.74	0.00	0.00
13.66	0.95	13.94	1.21	134.93	2.00	1.97	0.00	0.00
13.68	0.93	13.55	1.12	126.43	2.00	1.02	0.00	0.00
13.70	0.93	13.47	1.03	114.77	2.00	0.83	0.00	0.00
13.72	0.93	13.35	0.95	104.40	2.00	0.53	0.00	0.00
13.74	0.93	13.32	0.87	92.89	2.00	0.45	0.00	0.00
13.76	0.95	13.56	0.79	80.37	2.00	1.06	0.00	0.00
13.78	1.01	14.27	0.74	67.88	2.00	2.75	0.00	0.00
13.80	1.07	15.09	0.69	57.13	2.00	4.58	0.00	0.00
13.82	1.13	16.01	0.65	47.76	2.00	6.53	0.00	0.00
13.84	1.17	16.53	0.62	47.80	2.00	7.58	0.00	0.00
13.86	1.19	16.70	0.59	46.81	1.84	7.93	0.00	0.00
13.88	1.16	16.28	0.57	46.05	2.00	7.09	0.00	0.00
13.90	1.11	15.57	0.59	44.52	2.00	5.62	0.00	0.00
13.92	1.04	14.53	0.65	56.64	2.00	3.34	0.00	0.00
13.94	0.98	13.71	0.71	69.18	2.00	1.41	0.00	0.00
13.96	0.96	13.44	0.72	73.16	2.00	0.75	0.00	0.00
13.98	0.99	13.79	0.68	65.35	2.00	1.60	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
14.00	1.03	14.25	0.64	57.33	2.00	2.70	0.00	0.00
14.02	1.04	14.38	0.65	57.22	2.00	2.98	0.00	0.00
14.04	1.02	14.09	0.74	69.51	2.00	2.31	0.00	0.00
14.06	0.98	13.59	0.88	92.15	2.00	1.13	0.00	0.00
14.08	0.96	13.42	1.01	112.07	2.00	0.72	0.00	0.00
14.10	0.97	13.53	1.14	130.06	2.00	0.98	0.00	0.00
14.12	0.98	13.68	1.24	65.03	2.00	1.34	0.08	0.00
14.14	0.95	13.37	1.37	68.16	2.00	0.60	0.08	0.00
14.16	0.90	12.58	1.36	67.49	2.00	0.00	0.08	0.00
14.18	0.83	11.53	1.30	65.21	2.00	0.00	0.08	0.00
14.20	0.78	10.59	1.12	60.31	2.00	0.00	0.09	0.00
14.22	0.73	9.92	1.01	57.32	2.00	0.00	0.09	0.00
14.24	0.71	9.52	0.93	55.03	2.00	0.00	0.09	0.00
14.26	0.69	9.16	0.86	53.12	2.00	0.00	0.10	0.00
14.28	0.68	8.90	0.79	51.04	2.00	0.00	0.10	0.00
14.30	0.67	8.78	0.72	49.18	2.00	0.00	0.10	0.00
14.32	0.67	8.75	0.68	48.22	2.00	0.00	0.10	0.00
14.34	0.67	8.77	0.66	47.60	2.00	0.00	0.10	0.00
14.36	0.68	8.86	0.69	48.42	2.00	0.00	0.10	0.00
14.38	0.69	9.00	0.71	49.00	2.00	0.00	0.10	0.00
14.40	0.69	9.03	0.72	49.45	2.00	0.00	0.10	0.00
14.42	0.70	9.12	0.72	49.41	2.00	0.00	0.10	0.00
14.44	0.79	10.37	0.63	96.22	2.00	0.00	0.00	0.00
14.46	1.01	13.39	0.47	44.95	2.00	0.64	0.00	0.00
14.48	1.30	17.20	0.35	38.79	2.00	8.90	0.00	0.00
14.50	1.51	19.91	0.33	19.91	2.00	13.73	0.00	0.00
14.52	1.58	20.76	0.34	20.76	1.40	15.12	0.00	0.00
14.54	1.70	22.39	0.32	22.39	1.43	17.60	0.00	0.00
14.56	1.94	25.37	0.30	25.37	1.48	21.73	0.00	0.00
14.58	2.29	29.86	0.30	29.86	1.56	27.10	0.00	0.00
14.60	2.63	34.23	0.32	34.23	1.63	31.62	0.00	0.00
14.62	2.99	38.67	0.32	38.67	1.71	35.64	0.00	0.00
14.64	3.28	42.19	0.31	42.19	1.77	38.51	0.00	0.00
14.66	3.35	42.98	0.28	42.98	1.79	39.13	0.00	0.00
14.68	3.19	40.69	0.24	40.69	1.75	37.32	0.00	0.00
14.70	2.85	36.48	0.22	36.48	1.67	33.72	0.00	0.00
14.72	2.52	32.39	0.26	32.39	1.60	29.79	0.00	0.00
14.74	2.27	29.50	0.41	29.50	1.55	26.70	0.00	0.00
14.76	2.18	29.06	0.88	59.62	2.00	26.21	0.00	0.00
14.78	2.59	34.65	1.02	66.75	2.00	32.01	0.00	0.00
14.80	3.60	47.36	0.91	71.67	2.00	42.33	0.00	0.00
14.82	5.00	64.18	0.64	81.93	2.00	52.36	0.00	0.00
14.84	6.26	78.89	0.52	93.84	2.00	59.17	0.00	0.00
14.86	7.12	88.58	0.44	88.58	2.00	63.00	0.00	0.00
14.88	7.59	93.43	0.36	93.43	2.00	64.76	0.00	0.00
14.90	7.79	94.83	0.27	94.83	2.00	65.25	0.00	0.00
14.92	7.81	94.43	0.22	94.43	2.00	65.11	0.00	0.00
14.94	7.79	93.98	0.21	93.98	2.00	64.95	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
14.96	7.85	94.82	0.23	94.82	2.00	65.24	0.00	0.00
14.98	8.23	99.15	0.24	99.15	2.00	66.72	0.00	0.00
15.00	8.97	107.40	0.23	107.40	2.00	69.36	0.00	0.00
15.02	10.06	119.80	0.24	119.80	2.00	72.96	0.00	0.00
15.04	11.30	133.53	0.24	133.53	2.00	76.54	0.00	0.00
15.06	12.32	144.66	0.23	144.66	2.00	79.19	0.00	0.00
15.08	12.87	150.52	0.22	150.52	2.00	80.50	0.00	0.00
15.10	13.00	152.02	0.23	152.02	2.00	80.82	0.00	0.00
15.12	13.03	152.64	0.25	152.64	2.00	80.96	0.00	0.00
15.14	13.23	154.80	0.26	154.80	2.00	81.42	0.00	0.00
15.16	13.81	161.27	0.27	161.27	2.00	82.77	0.00	0.00
15.18	14.43	168.24	0.28	168.24	2.00	84.17	0.00	0.00
15.20	14.98	174.51	0.31	174.51	2.00	85.38	0.00	0.00
15.22	15.10	176.20	0.33	176.20	2.00	85.70	0.00	0.00
15.24	15.15	176.64	0.34	176.64	2.00	85.78	0.00	0.00
15.26	15.17	176.52	0.33	176.52	2.00	85.76	0.00	0.00
15.28	15.28	177.25	0.31	177.25	2.00	85.89	0.00	0.00
15.30	15.36	178.01	0.32	178.01	2.00	86.03	0.00	0.00
15.32	15.47	178.95	0.31	178.95	2.00	86.21	0.00	0.00
15.34	15.48	179.20	0.32	179.20	2.00	86.25	0.00	0.00
15.36	15.58	179.88	0.31	179.88	2.00	86.38	0.00	0.00
15.38	15.53	179.09	0.31	179.09	2.00	86.23	0.00	0.00
15.40	15.52	178.56	0.30	178.56	2.00	86.14	0.00	0.00
15.42	15.46	177.72	0.30	177.72	2.00	85.98	0.00	0.00
15.44	15.45	177.38	0.29	177.38	2.00	85.92	0.00	0.00
15.46	15.37	176.05	0.28	176.05	2.00	85.67	0.00	0.00
15.48	14.97	171.64	0.29	171.64	2.00	84.83	0.00	0.00
15.50	14.11	162.84	0.34	162.84	2.00	83.09	0.00	0.00
15.52	13.10	151.63	0.35	151.63	2.00	80.74	0.00	0.00
15.54	12.29	142.29	0.34	142.29	2.00	78.64	0.00	0.00
15.56	11.90	137.35	0.30	137.35	2.00	77.48	0.00	0.00
15.58	11.77	135.87	0.30	135.87	2.00	77.12	0.00	0.00
15.60	11.65	134.28	0.30	134.28	2.00	76.73	0.00	0.00
15.62	11.52	132.43	0.27	132.43	2.00	76.27	0.00	0.00
15.64	11.34	130.14	0.26	130.14	2.00	75.70	0.00	0.00
15.66	11.20	129.06	0.31	129.06	2.00	75.42	0.00	0.00
15.68	11.30	130.51	0.35	130.51	2.00	75.79	0.00	0.00
15.70	11.64	133.93	0.34	133.93	2.00	76.64	0.00	0.00
15.72	11.86	136.09	0.32	136.09	2.00	77.17	0.00	0.00
15.74	11.53	132.82	0.37	132.82	2.00	76.37	0.00	0.00
15.76	11.05	127.72	0.41	127.72	2.00	75.08	0.00	0.00
15.78	10.50	121.49	0.42	121.49	2.00	73.43	0.00	0.00
15.80	10.24	118.05	0.37	118.05	2.00	72.48	0.00	0.00
15.82	9.98	115.26	0.39	115.26	2.00	71.69	0.00	0.00
15.84	10.15	117.05	0.40	117.05	2.00	72.20	0.00	0.00
15.86	10.89	124.93	0.37	124.93	2.00	74.35	0.00	0.00
15.88	12.03	137.00	0.33	137.00	2.00	77.39	0.00	0.00
15.90	13.76	155.07	0.28	155.07	2.00	81.48	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
15.92	16.23	180.99	0.24	180.99	2.00	86.58	0.00	0.00
15.94	18.50	204.49	0.21	204.49	2.00	90.61	0.00	0.00
15.96	20.03	220.34	0.20	220.34	2.00	93.08	0.00	0.00
15.98	19.12	210.30	0.19	210.30	2.00	91.54	0.00	0.00
16.00	18.25	201.28	0.21	201.28	2.00	90.09	0.00	0.00
16.02	16.79	185.92	0.23	185.92	2.00	87.47	0.00	0.00
16.04	16.40	181.97	0.25	181.97	2.00	86.76	0.00	0.00
16.06	15.55	172.48	0.23	172.48	2.00	84.99	0.00	0.00
16.08	14.84	165.91	0.32	165.91	2.00	83.71	0.00	0.00
16.10	14.13	158.91	0.39	158.91	2.00	82.29	0.00	0.00
16.12	13.42	151.67	0.47	151.67	2.00	80.75	0.00	0.00
16.14	12.84	145.03	0.45	145.03	2.00	79.27	0.00	0.00
16.16	12.43	140.45	0.45	140.45	2.00	78.21	0.00	0.00
16.18	11.92	134.96	0.50	134.96	2.00	76.90	0.00	0.00
16.20	10.91	123.97	0.55	123.97	2.00	74.09	0.00	0.00
16.22	10.34	117.76	0.59	120.91	2.00	72.39	0.00	0.00
16.24	11.17	127.20	0.65	130.21	2.00	74.94	0.00	0.00
16.26	12.83	145.97	0.75	145.97	2.00	79.48	0.00	0.00
16.28	14.02	159.84	0.90	168.11	2.00	82.48	0.00	0.00
16.30	14.18	162.16	1.04	180.29	2.00	82.96	0.00	0.00
16.32	14.13	161.99	1.18	188.25	2.00	82.92	0.00	0.00
16.34	14.28	163.32	1.15	187.81	2.00	83.19	0.00	0.00
16.36	14.36	163.70	1.09	184.77	2.00	83.27	0.00	0.00
16.38	14.14	160.34	0.95	172.85	2.00	82.58	0.00	0.00
16.40	13.30	150.68	0.92	164.58	2.00	80.53	0.00	0.00
16.42	12.10	136.78	0.83	150.37	2.00	77.34	0.00	0.00
16.44	10.83	122.60	0.85	141.61	2.00	73.73	0.00	0.00
16.46	9.53	108.38	0.96	132.42	2.00	69.66	0.00	0.00
16.48	8.30	95.42	1.40	126.99	2.00	65.45	0.00	0.00
16.50	7.78	90.08	1.91	133.62	2.00	63.55	0.00	0.00
16.52	8.19	95.19	2.27	148.33	2.00	65.37	0.00	0.00
16.54	9.25	107.22	2.33	160.83	2.00	69.30	0.00	0.00
16.56	10.34	119.52	2.35	173.22	2.00	72.88	0.00	0.00
16.58	11.45	132.03	2.39	186.56	2.00	76.17	0.00	0.00
16.60	12.68	145.80	2.44	202.02	2.00	79.45	0.00	0.00
16.62	13.80	158.26	2.44	215.00	2.00	82.15	0.00	0.00
16.64	14.67	167.84	2.47	225.81	2.00	84.09	0.00	0.00
16.66	15.22	173.97	2.59	235.31	2.00	85.28	0.00	0.00
16.68	15.64	178.66	2.71	243.32	2.00	86.15	0.00	0.00
16.70	15.75	179.75	2.84	248.18	2.00	86.36	0.00	0.00
16.72	15.74	179.47	2.93	250.25	2.00	86.30	0.00	0.00
16.74	15.88	180.83	2.99	253.49	2.00	86.55	0.00	0.00
16.76	16.25	184.79	3.07	260.20	2.00	87.27	0.00	0.00
16.78	16.88	191.60	3.13	269.15	2.00	88.46	0.00	0.00
16.80	17.63	199.78	3.16	278.80	2.00	89.84	0.00	0.00
16.82	19.12	215.70	3.03	291.92	2.00	92.37	0.00	0.00
16.84	20.71	232.78	2.88	306.70	2.00	94.89	0.00	0.00
16.86	22.15	248.06	2.78	321.10	2.00	96.99	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
16.88	22.73	254.05	2.83	328.91	2.00	97.77	0.00	0.00
16.90	22.64	252.94	2.94	330.73	2.00	97.63	0.00	0.00
16.92	22.48	250.93	3.06	331.49	2.00	97.37	0.00	0.00
16.94	21.43	239.37	3.29	325.42	2.00	95.81	0.00	0.00
16.96	21.75	242.55	3.32	329.84	2.00	96.25	0.00	0.00
16.98	22.11	246.16	3.40	336.17	2.00	96.73	0.00	0.00
17.00	23.35	259.28	3.32	348.23	2.00	98.45	0.00	0.00
17.02	23.58	261.42	3.38	352.46	2.00	98.72	0.00	0.00
17.04	23.82	263.59	3.40	355.62	2.00	98.99	0.00	0.00
17.06	24.06	265.84	3.44	359.10	2.00	99.27	0.00	0.00
17.08	24.17	266.62	3.48	361.33	2.00	99.37	0.00	0.00
17.10	24.20	266.55	3.51	362.23	2.00	99.36	0.00	0.00

Total estimated displacement: 0.00

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.80	0.02	0.18	54.25	9.82	4.06	0.00	0.05
7.82	0.06	0.94	48.66	45.85	3.99	0.00	0.27
7.84	0.10	1.77	35.64	63.18	3.81	0.04	0.50
7.86	0.13	2.25	34.35	77.39	3.79	0.07	0.62
7.88	0.11	1.95	40.95	79.72	3.89	0.08	0.52
7.90	0.17	3.14	25.54	80.17	3.61	0.06	0.82
7.92	0.92	17.97	3.86	69.31	2.61	0.76	0.76
7.94	1.79	35.09	1.79	62.98	2.26	0.14	0.66
7.96	2.75	53.93	1.34	72.36	2.04	0.31	0.69
7.98	3.11	61.10	1.28	78.50	1.97	0.52	0.70
8.00	3.27	64.33	1.27	81.51	1.95	0.66	0.71
8.02	3.16	62.10	1.30	80.53	1.99	0.61	0.71
8.04	2.77	54.31	1.41	76.34	2.09	0.43	0.70
8.06	2.42	47.44	1.63	77.20	2.21	0.46	0.70
8.08	2.14	41.85	1.94	81.22	2.30	0.65	0.71
8.10	1.99	38.86	2.17	84.47	2.36	0.72	0.72
8.12	1.80	35.27	2.50	88.21	2.42	0.72	0.72
8.14	1.60	31.22	3.00	93.73	2.50	0.73	0.73
8.16	1.41	27.38	3.60	98.59	2.58	0.80	0.80
8.18	1.27	24.80	4.04	100.17	2.63	0.85	0.85
8.20	1.20	23.39	4.23	98.99	2.65	0.86	0.86
8.22	1.18	22.91	4.19	96.11	2.65	0.85	0.85
8.24	1.15	22.34	4.21	93.99	2.65	0.85	0.85
8.26	1.07	20.82	4.47	93.03	2.68	0.87	0.87
8.28	0.98	19.01	4.92	93.51	2.72	0.74	0.74
8.30	0.89	17.21	5.52	94.91	2.77	0.74	0.74
8.32	0.85	16.32	5.78	94.35	2.79	0.74	0.74
8.34	0.83	15.89	5.81	92.33	2.80	0.73	0.73
8.36	0.82	15.84	5.71	90.50	2.79	0.73	0.73
8.38	0.85	16.25	5.36	87.10	2.76	0.72	0.72
8.40	0.87	16.78	4.97	83.46	2.72	0.71	0.71
8.42	0.89	17.16	4.64	79.61	2.69	0.85	0.85
8.44	0.90	17.26	4.52	77.99	2.68	0.84	0.84
8.46	0.89	17.18	4.56	78.37	2.69	0.84	0.84
8.48	0.87	16.78	4.64	77.78	2.69	0.84	0.84
8.50	0.86	16.46	4.82	79.36	2.71	0.55	0.71
8.52	0.85	16.26	4.91	79.85	2.72	0.58	0.71
8.54	0.86	16.42	4.98	81.84	2.73	0.68	0.71
8.56	0.87	16.70	4.90	81.82	2.72	0.68	0.71
8.58	0.88	16.79	4.90	82.26	2.72	0.71	0.71
8.60	0.87	16.66	4.99	83.15	2.73	0.71	0.71
8.62	0.85	16.20	5.23	84.77	2.75	0.72	0.72
8.64	0.82	15.75	5.50	86.69	2.77	0.72	0.72
8.66	0.68	12.88	7.26	93.59	2.90	0.74	0.74
8.68	0.71	13.58	7.00	95.04	2.89	0.74	0.74
8.70	0.74	13.98	6.88	96.14	2.88	0.74	0.74
8.72	0.87	16.65	5.56	92.53	2.78	0.73	0.73
8.74	0.82	15.71	5.96	93.67	2.81	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.76	0.79	15.10	6.23	94.15	2.83	0.74	0.74
8.78	0.77	14.71	6.41	94.27	2.84	0.74	0.74
8.80	0.74	14.12	6.78	95.75	2.87	0.74	0.74
8.82	0.71	13.45	7.23	97.26	2.90	0.74	0.74
8.84	0.68	12.75	7.65	97.54	2.93	0.74	0.74
8.86	0.66	12.49	7.72	96.45	2.93	0.74	0.74
8.88	0.66	12.34	7.81	96.36	2.94	0.74	0.74
8.90	0.66	12.45	7.66	95.37	2.93	0.74	0.74
8.92	0.67	12.58	7.65	96.22	2.93	0.74	0.74
8.94	0.68	12.87	7.45	95.82	2.92	0.74	0.74
8.96	0.70	13.12	7.34	96.22	2.91	0.74	0.74
8.98	0.70	13.27	7.12	94.50	2.89	0.74	0.74
9.00	0.70	13.23	7.07	93.59	2.89	0.74	0.74
9.02	0.69	12.93	7.29	94.25	2.91	0.74	0.74
9.04	0.66	12.44	7.73	96.12	2.93	0.74	0.74
9.06	0.64	11.93	8.24	98.38	2.97	0.75	0.75
9.08	0.63	11.69	8.61	100.66	2.99	0.75	0.75
9.10	0.65	12.17	8.37	101.78	2.97	0.75	0.75
9.12	0.69	13.01	7.81	101.65	2.94	0.75	0.75
9.14	0.74	13.93	7.19	100.14	2.90	0.75	0.75
9.16	0.77	14.42	6.82	98.38	2.87	0.75	0.75
9.18	0.78	14.63	6.69	97.87	2.86	0.74	0.74
9.20	0.78	14.61	6.73	98.29	2.87	0.74	0.74
9.22	0.76	14.28	6.91	98.70	2.88	0.75	0.75
9.24	0.75	14.04	6.98	98.01	2.88	0.74	0.74
9.26	0.75	14.00	6.87	96.26	2.88	0.74	0.74
9.28	0.76	14.36	6.51	93.49	2.85	0.74	0.74
9.30	0.78	14.70	6.14	90.22	2.82	0.73	0.73
9.32	0.77	14.54	6.04	87.89	2.82	0.72	0.72
9.34	0.75	13.98	6.21	86.77	2.83	0.72	0.72
9.36	0.70	13.05	6.69	87.37	2.86	0.72	0.72
9.38	0.66	12.28	7.22	88.65	2.90	0.73	0.73
9.40	0.62	11.52	7.92	91.25	2.95	0.73	0.73
9.42	0.59	10.93	8.59	93.88	2.99	0.74	0.74
9.44	0.59	10.84	8.77	95.02	3.00	0.74	0.74
9.46	0.61	11.24	8.35	93.82	2.97	0.74	0.74
9.48	0.64	11.86	7.68	91.06	2.93	0.73	0.73
9.50	0.66	12.26	7.12	87.35	2.89	0.72	0.72
9.52	0.68	12.59	6.73	84.68	2.87	0.72	0.72
9.54	0.70	13.04	6.27	81.73	2.83	0.67	0.71
9.56	0.72	13.36	6.07	81.03	2.82	0.64	0.71
9.58	0.72	13.39	6.03	80.69	2.81	0.62	0.71
9.60	0.71	13.12	6.17	80.95	2.82	0.63	0.71
9.62	0.69	12.83	6.26	80.31	2.83	0.60	0.71
9.64	0.68	12.49	6.41	80.02	2.84	0.58	0.71
9.66	0.66	12.23	6.54	80.06	2.85	0.59	0.71
9.68	0.66	12.20	6.53	79.64	2.85	0.57	0.71
9.70	0.68	12.48	6.31	78.78	2.84	0.53	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.72	0.69	12.72	6.11	77.72	2.82	0.48	0.70
9.74	0.69	12.80	6.06	77.60	2.82	0.48	0.70
9.76	0.68	12.54	6.22	78.02	2.83	0.50	0.70
9.78	0.67	12.33	6.38	78.64	2.84	0.52	0.70
9.80	0.66	12.16	6.47	78.73	2.85	0.53	0.70
9.82	0.65	12.00	6.53	78.40	2.85	0.51	0.70
9.84	0.64	11.68	6.74	78.72	2.87	0.53	0.70
9.86	0.61	11.18	7.17	80.12	2.90	0.59	0.71
9.88	0.49	8.85	9.61	85.05	3.05	0.08	0.95
9.90	0.47	8.36	10.20	85.23	3.08	0.09	0.90
9.92	0.45	7.92	10.65	84.36	3.10	0.07	0.85
9.94	0.51	9.19	8.78	80.69	3.00	0.62	0.71
9.96	0.49	8.70	9.42	81.97	3.04	0.07	0.92
9.98	0.48	8.44	10.08	85.12	3.07	0.08	0.89
10.00	0.49	8.64	10.27	88.76	3.08	0.09	0.91
10.02	0.52	9.32	9.84	91.69	3.06	0.10	0.98
10.04	0.57	10.21	9.06	92.57	3.02	0.10	1.07
10.06	0.60	10.95	8.42	92.23	2.98	0.73	0.73
10.08	0.62	11.31	8.11	91.75	2.96	0.73	0.73
10.10	0.64	11.59	7.92	91.75	2.95	0.73	0.73
10.12	0.67	12.15	7.53	91.44	2.92	0.73	0.73
10.14	0.71	13.12	6.93	90.87	2.88	0.73	0.73
10.16	0.80	14.80	6.02	89.04	2.81	0.73	0.73
10.18	0.88	16.42	5.33	87.48	2.76	0.72	0.72
10.20	0.96	17.88	4.81	86.10	2.71	0.72	0.72
10.22	0.98	18.26	4.78	87.23	2.71	0.72	0.72
10.24	0.97	18.07	4.94	89.28	2.72	0.73	0.73
10.26	0.93	17.31	5.29	91.57	2.75	0.73	0.73
10.28	0.90	16.80	5.54	92.99	2.77	0.73	0.73
10.30	0.91	16.92	5.48	92.70	2.77	0.73	0.73
10.32	0.95	17.70	5.03	89.11	2.73	0.73	0.73
10.34	1.00	18.67	4.51	84.25	2.68	0.85	0.85
10.36	1.04	19.43	4.08	79.25	2.64	0.80	0.80
10.38	1.05	19.74	3.84	75.90	2.61	0.77	0.77
10.40	1.05	19.56	3.76	73.64	2.60	0.76	0.76
10.42	1.02	19.07	3.80	72.46	2.61	0.76	0.76
10.44	1.00	18.65	3.97	74.02	2.62	0.78	0.78
10.46	0.99	18.50	4.09	75.71	2.64	0.79	0.79
10.48	1.00	18.59	4.17	77.45	2.65	0.81	0.81
10.50	1.02	18.98	4.12	78.12	2.64	0.80	0.80
10.52	1.03	19.21	4.09	78.51	2.64	0.80	0.80
10.54	1.04	19.44	4.03	78.34	2.63	0.80	0.80
10.56	1.03	19.25	4.04	77.87	2.63	0.80	0.80
10.58	1.02	19.09	4.05	77.29	2.63	0.80	0.80
10.60	0.99	18.43	4.21	77.53	2.65	0.81	0.81
10.62	0.95	17.58	4.50	79.03	2.68	0.84	0.84
10.64	0.88	16.22	5.05	81.92	2.73	0.69	0.71
10.66	0.81	14.92	5.72	85.37	2.79	0.72	0.72

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.68	0.75	13.68	6.43	87.98	2.84	0.72	0.72
10.70	0.71	12.87	6.93	89.15	2.88	0.73	0.73
10.72	0.70	12.65	6.98	88.30	2.88	0.73	0.73
10.74	0.71	12.91	6.61	85.31	2.86	0.72	0.72
10.76	0.73	13.25	6.20	82.13	2.83	0.70	0.71
10.78	0.74	13.48	5.78	77.92	2.79	0.49	0.70
10.80	0.75	13.62	5.52	75.18	2.77	0.39	0.70
10.82	0.77	14.06	5.11	71.90	2.74	0.30	0.69
10.84	0.80	14.54	4.82	70.14	2.71	0.26	0.68
10.86	0.82	14.97	4.60	68.78	2.69	0.82	0.82
10.88	0.84	15.32	4.47	68.44	2.68	0.81	0.81
10.90	0.85	15.56	4.46	69.37	2.68	0.81	0.81
10.92	0.86	15.68	4.52	70.84	2.68	0.82	0.82
10.94	0.84	15.39	4.75	73.12	2.70	0.33	0.69
10.96	0.82	14.87	5.09	75.65	2.74	0.41	0.70
10.98	0.79	14.30	5.47	78.17	2.77	0.50	0.70
11.00	0.77	13.90	5.67	78.83	2.79	0.53	0.70
11.02	0.76	13.75	5.67	78.04	2.79	0.50	0.70
11.04	0.76	13.69	5.56	76.05	2.78	0.42	0.70
11.06	0.77	13.96	5.28	73.76	2.75	0.35	0.69
11.08	0.79	14.34	4.97	71.27	2.72	0.28	0.69
11.10	0.72	12.83	5.31	68.17	2.76	0.22	0.68
11.12	0.63	11.04	5.95	65.70	2.81	0.18	0.67
11.14	0.66	11.79	5.47	64.43	2.77	0.16	0.67
11.16	0.80	14.47	4.48	64.89	2.68	0.80	0.80
11.18	0.94	17.15	3.80	65.17	2.61	0.74	0.74
11.20	0.93	17.12	4.02	68.76	2.63	0.77	0.77
11.22	0.98	17.94	4.02	72.16	2.63	0.78	0.78
11.24	1.06	19.65	3.80	74.61	2.61	0.77	0.77
11.26	1.17	21.69	3.40	73.83	2.56	0.73	0.73
11.28	1.20	22.28	3.39	75.57	2.56	0.73	0.73
11.30	1.18	21.96	3.60	79.03	2.58	0.76	0.76
11.32	1.15	21.30	3.92	83.51	2.62	0.80	0.80
11.34	1.13	20.91	4.18	87.43	2.65	0.83	0.83
11.36	1.10	20.26	4.54	91.97	2.68	0.87	0.87
11.38	1.06	19.60	4.97	97.50	2.72	0.74	0.74
11.40	1.03	18.93	5.42	102.50	2.76	0.75	0.75
11.42	1.01	18.56	5.60	103.92	2.78	0.76	0.76
11.44	1.02	18.72	5.40	101.02	2.76	0.75	0.75
11.46	1.06	19.43	4.99	97.06	2.73	0.74	0.74
11.48	1.11	20.57	4.49	92.34	2.68	0.87	0.87
11.50	1.15	21.20	4.26	90.37	2.66	0.84	0.84
11.52	1.16	21.49	4.12	88.53	2.64	0.83	0.83
11.54	1.13	20.90	4.31	90.05	2.66	0.85	0.85
11.56	1.09	20.01	4.63	92.68	2.69	0.88	0.88
11.58	1.03	18.91	5.06	95.62	2.73	0.74	0.74
11.60	0.98	17.94	5.42	97.20	2.76	0.74	0.74
11.62	0.93	16.98	5.75	97.65	2.79	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.64	0.90	16.29	5.90	96.10	2.80	0.74	0.74
11.66	0.88	15.91	5.87	93.41	2.80	0.74	0.74
11.68	0.88	15.86	5.60	88.82	2.78	0.73	0.73
11.70	0.89	16.07	5.14	82.60	2.74	0.71	0.71
11.72	0.91	16.44	4.67	76.81	2.70	0.85	0.85
11.74	0.94	17.11	4.19	71.77	2.65	0.79	0.79
11.76	0.98	17.85	3.89	69.39	2.62	0.76	0.76
11.78	1.06	19.09	3.54	67.57	2.57	0.72	0.72
11.80	1.13	20.19	3.25	65.68	2.54	0.32	0.69
11.82	1.18	21.00	3.16	66.25	2.52	0.24	0.68
11.84	1.17	20.93	3.33	69.80	2.55	0.64	0.71
11.86	1.14	20.56	3.67	75.39	2.59	0.76	0.76
11.88	1.14	20.61	3.86	79.53	2.61	0.78	0.78
11.90	1.13	20.59	4.05	83.46	2.63	0.81	0.81
11.92	1.11	20.28	4.38	88.88	2.67	0.85	0.85
11.94	1.05	19.10	5.35	102.19	2.76	0.75	0.75
11.96	0.99	18.03	6.36	114.75	2.84	0.77	0.77
11.98	0.95	17.20	7.27	125.09	2.90	0.79	0.79
12.00	0.92	16.53	7.76	128.21	2.94	0.80	0.80
12.02	0.89	15.96	8.07	128.75	2.96	0.80	0.80
12.04	0.87	15.57	8.16	127.00	2.96	0.79	0.79
12.06	0.84	15.02	8.01	120.39	2.95	0.78	0.78
12.08	0.81	14.46	7.78	112.45	2.94	0.77	0.77
12.10	0.85	15.09	6.79	102.40	2.87	0.75	0.75
12.12	0.94	16.85	5.68	95.75	2.79	0.74	0.74
12.14	1.09	19.45	4.56	88.73	2.69	0.87	0.87
12.16	1.19	21.09	4.23	89.20	2.65	0.84	0.84
12.18	1.22	21.58	4.41	95.09	2.67	0.87	0.87
12.20	1.15	20.64	5.09	105.02	2.74	0.76	0.76
12.22	1.02	18.43	6.07	111.85	2.82	0.77	0.77
12.24	0.89	15.94	7.25	115.59	2.90	0.78	0.78
12.26	0.75	13.17	9.15	120.43	3.02	0.17	0.97
12.28	0.64	10.96	11.71	128.32	3.15	0.18	0.81
12.30	0.56	9.37	14.32	134.18	3.27	0.20	0.69
12.32	0.43	6.84	19.02	130.07	3.43	0.20	0.50
12.34	0.39	6.04	19.56	118.13	3.45	0.13	0.44
12.36	0.36	5.39	19.07	102.76	3.43	0.10	0.39
12.38	0.42	6.52	14.38	93.71	3.27	0.09	0.47
12.40	0.43	6.67	13.26	88.47	3.22	0.07	0.48
12.42	0.42	6.53	13.01	84.94	3.21	0.07	0.47
12.44	0.40	6.17	13.56	83.72	3.24	0.06	0.45
12.46	0.38	5.75	14.69	84.47	3.28	0.07	0.41
12.48	0.36	5.37	15.96	85.71	3.33	0.07	0.39
12.50	0.34	5.02	17.14	86.12	3.37	0.07	0.36
12.52	0.33	4.72	17.97	84.85	3.40	0.07	0.34
12.54	0.32	4.50	17.97	80.77	3.40	0.06	0.32
12.56	0.31	4.35	17.45	75.91	3.38	0.05	0.31
12.58	0.31	4.25	16.61	70.66	3.35	0.04	0.30

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.60	0.31	4.25	15.87	67.43	3.33	0.04	0.30
12.62	0.32	4.54	14.28	64.90	3.26	0.03	0.32
12.64	0.35	5.16	12.31	63.48	3.18	0.03	0.37
12.66	0.41	6.16	10.31	63.54	3.08	0.03	0.44
12.68	0.48	7.56	8.40	63.51	2.98	0.15	0.67
12.70	0.57	9.14	6.98	63.77	2.88	0.15	0.67
12.72	0.67	10.88	5.95	64.75	2.81	0.17	0.67
12.74	0.76	12.24	5.47	67.00	2.77	0.20	0.68
12.76	0.81	13.19	5.25	69.21	2.75	0.24	0.68
12.78	0.84	13.63	5.26	71.69	2.75	0.29	0.69
12.80	0.85	13.86	5.32	73.70	2.76	0.35	0.69
12.82	0.85	13.92	5.51	76.64	2.77	0.44	0.70
12.84	0.86	13.95	5.65	78.81	2.78	0.53	0.70
12.86	0.86	13.96	5.78	80.71	2.79	0.62	0.71
12.88	0.86	14.02	5.75	80.57	2.79	0.61	0.71
12.90	0.86	13.97	5.79	80.93	2.80	0.63	0.71
12.92	0.85	13.81	5.85	80.81	2.80	0.62	0.71
12.94	0.85	13.73	5.82	79.91	2.80	0.58	0.71
12.96	0.86	13.83	5.56	76.85	2.78	0.45	0.70
12.98	0.89	14.24	5.16	73.41	2.74	0.34	0.69
13.00	0.92	14.61	4.88	71.27	2.72	0.28	0.69
13.02	0.94	14.85	4.77	70.82	2.71	0.27	0.69
13.04	0.94	14.90	4.88	72.67	2.72	0.32	0.69
13.06	0.93	14.67	5.13	75.32	2.74	0.40	0.70
13.08	0.92	14.64	5.33	78.06	2.76	0.50	0.70
13.10	0.94	14.87	5.29	78.72	2.75	0.52	0.70
13.12	0.99	15.57	4.98	77.47	2.73	0.47	0.70
13.14	1.01	15.91	4.75	75.57	2.70	0.40	0.70
13.16	1.01	15.78	4.67	73.68	2.70	0.84	0.84
13.18	0.98	15.31	4.73	72.38	2.70	0.31	0.69
13.20	0.96	14.96	4.74	70.99	2.70	0.28	0.69
13.22	0.95	14.72	4.85	71.37	2.71	0.29	0.69
13.24	0.94	14.49	5.06	73.29	2.73	0.33	0.69
13.26	0.92	14.19	5.38	76.41	2.76	0.43	0.70
13.28	0.90	14.00	5.60	78.38	2.78	0.51	0.70
13.30	0.90	13.93	5.74	79.92	2.79	0.58	0.71
13.32	0.91	14.04	5.69	79.94	2.79	0.58	0.71
13.34	0.93	14.33	5.58	79.93	2.78	0.58	0.71
13.36	0.96	14.74	5.36	79.00	2.76	0.54	0.70
13.38	0.99	15.22	5.15	78.43	2.74	0.51	0.70
13.40	1.08	16.47	4.65	76.61	2.69	0.84	0.84
13.42	1.16	17.74	4.25	75.45	2.65	0.81	0.81
13.44	1.24	18.74	3.95	73.92	2.62	0.78	0.78
13.46	1.21	18.27	4.09	74.74	2.64	0.79	0.79
13.48	1.13	17.20	4.55	78.32	2.69	0.84	0.84
13.50	1.06	16.12	4.92	79.26	2.72	0.55	0.71
13.52	1.05	15.90	4.83	76.85	2.71	0.45	0.70
13.54	1.15	17.06	3.83	65.30	2.61	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.56	1.23	18.14	3.38	61.34	2.55	0.33	0.69
13.58	1.29	18.96	3.20	60.59	2.53	0.17	0.67
13.60	1.27	18.70	3.50	65.49	2.57	0.71	0.71
13.62	1.18	17.39	3.84	66.83	2.61	0.75	0.75
13.64	1.06	15.63	4.25	66.42	2.65	0.78	0.78
13.66	0.95	13.94	4.62	64.44	2.69	0.81	0.81
13.68	0.93	13.55	4.56	61.79	2.69	0.79	0.79
13.70	0.93	13.47	4.42	59.47	2.67	0.77	0.77
13.72	0.93	13.35	4.28	57.15	2.66	0.76	0.76
13.74	0.93	13.32	4.11	54.72	2.64	0.73	0.73
13.76	0.95	13.56	3.88	52.58	2.61	0.60	0.71
13.78	1.01	14.27	3.58	51.17	2.58	0.21	0.68
13.80	1.07	15.09	3.31	49.91	2.55	0.09	0.65
13.82	1.13	16.01	3.04	48.72	2.51	0.04	0.62
13.84	1.17	16.53	2.89	47.80	2.49	0.05	0.62
13.86	1.19	16.70	2.80	46.81	2.47	0.04	0.62
13.88	1.16	16.28	2.83	46.05	2.48	0.04	0.62
13.90	1.11	15.57	3.00	46.70	2.50	0.04	0.62
13.92	1.04	14.53	3.34	48.56	2.55	0.09	0.65
13.94	0.98	13.71	3.66	50.18	2.59	0.24	0.68
13.96	0.96	13.44	3.76	50.54	2.60	0.33	0.69
13.98	0.99	13.79	3.58	49.36	2.58	0.17	0.67
14.00	1.03	14.25	3.38	48.15	2.55	0.09	0.65
14.02	1.04	14.38	3.37	48.39	2.55	0.09	0.65
14.04	1.02	14.09	3.63	51.16	2.59	0.24	0.68
14.06	0.98	13.59	4.07	55.29	2.64	0.73	0.73
14.08	0.96	13.42	4.38	58.84	2.67	0.77	0.77
14.10	0.97	13.53	4.61	62.38	2.69	0.80	0.80
14.12	0.98	13.68	4.75	65.03	2.70	0.17	0.67
14.14	0.95	13.37	5.10	68.16	2.74	0.22	0.68
14.16	0.90	12.58	5.36	67.49	2.76	0.21	0.68
14.18	0.83	11.53	5.65	65.21	2.78	0.17	0.67
14.20	0.78	10.59	5.70	60.31	2.79	0.12	0.66
14.22	0.73	9.92	5.78	57.32	2.79	0.09	0.65
14.24	0.71	9.52	5.78	55.03	2.79	0.08	0.64
14.26	0.69	9.16	5.80	53.12	2.80	0.07	0.64
14.28	0.68	8.90	5.74	51.04	2.79	0.06	0.63
14.30	0.67	8.78	5.60	49.18	2.78	0.05	0.62
14.32	0.67	8.75	5.51	48.22	2.77	0.05	0.62
14.34	0.67	8.77	5.43	47.60	2.76	0.04	0.62
14.36	0.68	8.86	5.46	48.42	2.77	0.05	0.62
14.38	0.69	9.00	5.45	49.00	2.77	0.05	0.62
14.40	0.69	9.03	5.47	49.45	2.77	0.05	0.62
14.42	0.70	9.12	5.42	49.41	2.76	0.05	0.62
14.44	0.79	10.37	4.55	47.20	2.69	0.74	0.74
14.46	1.01	13.39	3.17	42.46	2.53	0.04	0.62
14.48	1.30	17.20	2.26	38.79	2.38	0.03	0.62
14.50	1.51	19.91	1.00	19.91	2.30	0.02	0.62

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
14.52	1.58	20.76	1.00	20.76	2.29	0.02	0.62
14.54	1.70	22.39	1.00	22.39	2.25	0.02	0.62
14.56	1.94	25.37	1.00	25.37	2.19	0.02	0.62
14.58	2.29	29.86	1.00	29.86	2.12	0.02	0.62
14.60	2.63	34.23	1.00	34.23	2.07	0.02	0.62
14.62	2.99	38.67	1.00	38.67	2.03	0.03	0.62
14.64	3.28	42.19	1.00	42.19	1.98	0.03	0.62
14.66	3.35	42.98	1.00	42.98	1.96	0.03	0.62
14.68	3.19	40.69	1.00	40.69	1.96	0.03	0.62
14.70	2.85	36.48	1.00	36.48	2.00	0.02	0.62
14.72	2.52	32.39	1.00	32.39	2.07	0.02	0.62
14.74	2.27	29.50	1.00	29.50	2.18	0.02	0.62
14.76	2.18	29.06	2.05	59.62	2.33	0.11	0.66
14.78	2.59	34.65	1.93	66.75	2.30	0.20	0.68
14.80	3.60	47.36	1.51	71.67	2.15	0.29	0.69
14.82	5.00	64.18	1.28	81.93	1.96	0.69	0.71
14.84	6.26	78.89	1.19	93.84	1.84	0.74	0.74
14.86	7.12	88.58	1.00	88.58	1.75	0.73	0.73
14.88	7.59	93.43	1.00	93.43	1.69	0.74	0.74
14.90	7.79	94.83	1.00	94.83	1.63	0.74	0.74
14.92	7.81	94.43	1.00	94.43	1.60	0.74	0.74
14.94	7.79	93.98	1.00	93.98	1.59	0.74	0.74
14.96	7.85	94.82	1.00	94.82	1.60	0.74	0.74
14.98	8.23	99.15	1.00	99.15	1.59	0.75	0.75
15.00	8.97	107.40	1.00	107.40	1.56	0.76	0.76
15.02	10.06	119.80	1.00	119.80	1.52	0.78	0.78
15.04	11.30	133.53	1.00	133.53	1.47	0.80	0.80
15.06	12.32	144.66	1.00	144.66	1.43	0.82	0.82
15.08	12.87	150.52	1.00	150.52	1.41	0.83	0.83
15.10	13.00	152.02	1.00	152.02	1.42	0.83	0.83
15.12	13.03	152.64	1.00	152.64	1.43	0.83	0.83
15.14	13.23	154.80	1.00	154.80	1.43	0.83	0.83
15.16	13.81	161.27	1.00	161.27	1.42	0.84	0.84
15.18	14.43	168.24	1.00	168.24	1.42	0.85	0.85
15.20	14.98	174.51	1.00	174.51	1.42	0.86	0.86
15.22	15.10	176.20	1.00	176.20	1.43	0.86	0.86
15.24	15.15	176.64	1.00	176.64	1.44	0.86	0.86
15.26	15.17	176.52	1.00	176.52	1.43	0.86	0.86
15.28	15.28	177.25	1.00	177.25	1.41	0.86	0.86
15.30	15.36	178.01	1.00	178.01	1.42	0.86	0.86
15.32	15.47	178.95	1.00	178.95	1.41	0.86	0.86
15.34	15.48	179.20	1.00	179.20	1.42	0.86	0.86
15.36	15.58	179.88	1.00	179.88	1.41	0.86	0.86
15.38	15.53	179.09	1.00	179.09	1.41	0.86	0.86
15.40	15.52	178.56	1.00	178.56	1.40	0.86	0.86
15.42	15.46	177.72	1.00	177.72	1.40	0.86	0.86
15.44	15.45	177.38	1.00	177.38	1.40	0.86	0.86
15.46	15.37	176.05	1.00	176.05	1.39	0.86	0.86

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.48	14.97	171.64	1.00	171.64	1.41	0.85	0.85
15.50	14.11	162.84	1.00	162.84	1.47	0.84	0.84
15.52	13.10	151.63	1.00	151.63	1.50	0.83	0.83
15.54	12.29	142.29	1.00	142.29	1.52	0.82	0.82
15.56	11.90	137.35	1.00	137.35	1.50	0.81	0.81
15.58	11.77	135.87	1.00	135.87	1.51	0.81	0.81
15.60	11.65	134.28	1.00	134.28	1.51	0.80	0.80
15.62	11.52	132.43	1.00	132.43	1.50	0.80	0.80
15.64	11.34	130.14	1.00	130.14	1.50	0.80	0.80
15.66	11.20	129.06	1.00	129.06	1.54	0.80	0.80
15.68	11.30	130.51	1.00	130.51	1.56	0.80	0.80
15.70	11.64	133.93	1.00	133.93	1.54	0.80	0.80
15.72	11.86	136.09	1.00	136.09	1.52	0.81	0.81
15.74	11.53	132.82	1.00	132.82	1.56	0.80	0.80
15.76	11.05	127.72	1.00	127.72	1.60	0.79	0.79
15.78	10.50	121.49	1.00	121.49	1.62	0.79	0.79
15.80	10.24	118.05	1.00	118.05	1.61	0.78	0.78
15.82	9.98	115.26	1.00	115.26	1.63	0.78	0.78
15.84	10.15	117.05	1.00	117.05	1.63	0.78	0.78
15.86	10.89	124.93	1.00	124.93	1.59	0.79	0.79
15.88	12.03	137.00	1.00	137.00	1.53	0.81	0.81
15.90	13.76	155.07	1.00	155.07	1.44	0.83	0.83
15.92	16.23	180.99	1.00	180.99	1.36	0.87	0.87
15.94	18.50	204.49	1.00	204.49	1.28	0.89	0.89
15.96	20.03	220.34	1.00	220.34	1.24	0.91	0.91
15.98	19.12	210.30	1.00	210.30	1.25	0.90	0.90
16.00	18.25	201.28	1.00	201.28	1.29	0.89	0.89
16.02	16.79	185.92	1.00	185.92	1.33	0.87	0.87
16.04	16.40	181.97	1.00	181.97	1.36	0.87	0.87
16.06	15.55	172.48	1.00	172.48	1.37	0.86	0.86
16.08	14.84	165.91	1.00	165.91	1.45	0.85	0.85
16.10	14.13	158.91	1.00	158.91	1.51	0.84	0.84
16.12	13.42	151.67	1.00	151.67	1.57	0.83	0.83
16.14	12.84	145.03	1.00	145.03	1.58	0.82	0.82
16.16	12.43	140.45	1.00	140.45	1.59	0.81	0.81
16.18	11.92	134.96	1.00	134.96	1.63	0.81	0.81
16.20	10.91	123.97	1.00	123.97	1.68	0.79	0.79
16.22	10.34	117.76	1.03	120.91	1.72	0.78	0.78
16.24	11.17	127.20	1.02	130.21	1.72	0.80	0.80
16.26	12.83	145.97	1.00	145.97	1.71	0.82	0.82
16.28	14.02	159.84	1.05	168.11	1.73	0.85	0.85
16.30	14.18	162.16	1.11	180.29	1.77	0.86	0.86
16.32	14.13	161.99	1.16	188.25	1.81	0.87	0.87
16.34	14.28	163.32	1.15	187.81	1.80	0.87	0.87
16.36	14.36	163.70	1.13	184.77	1.78	0.87	0.87
16.38	14.14	160.34	1.08	172.85	1.75	0.86	0.86
16.40	13.30	150.68	1.09	164.58	1.75	0.85	0.85
16.42	12.10	136.78	1.10	150.37	1.76	0.83	0.83

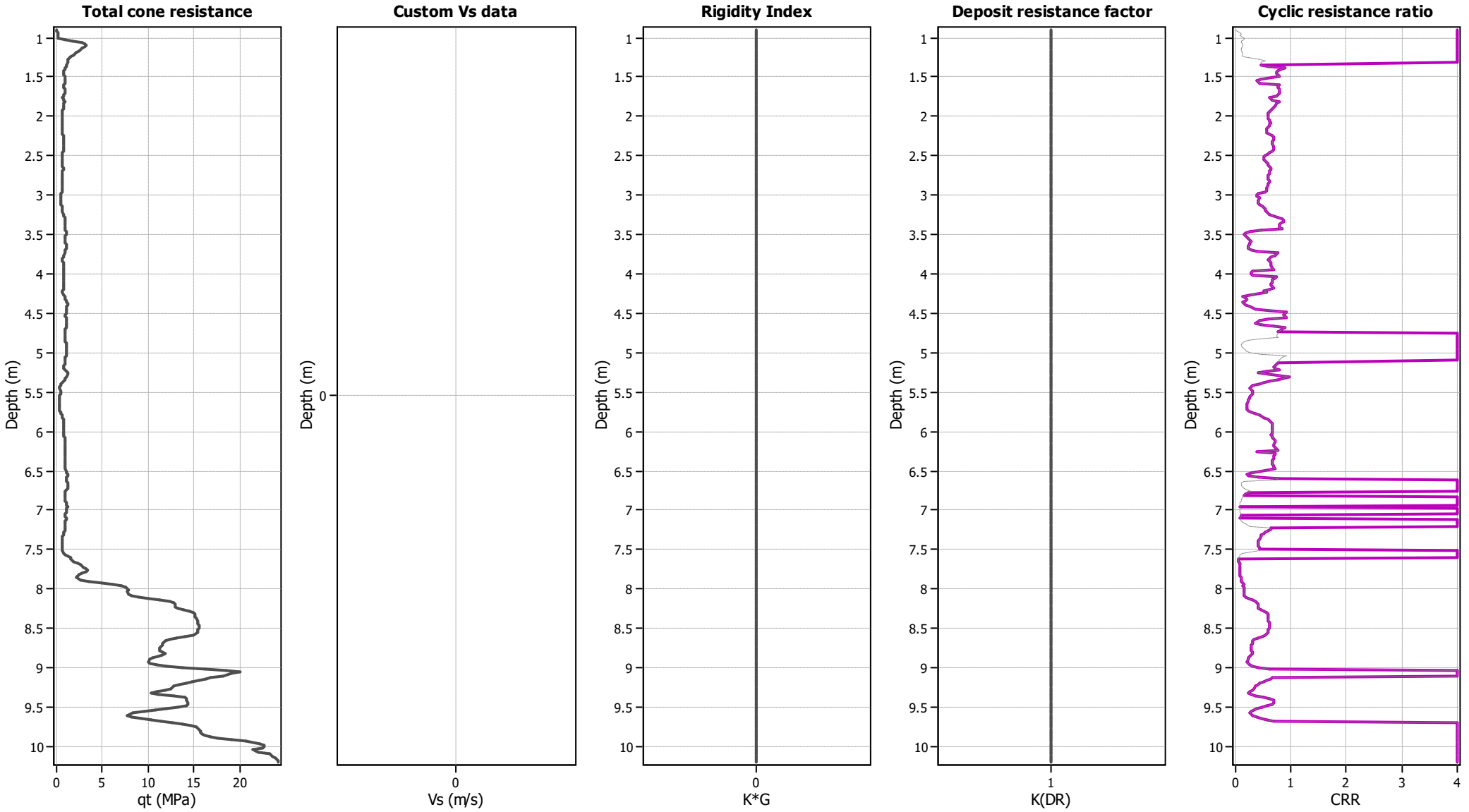
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.44	10.83	122.60	1.16	141.61	1.80	0.82	0.82
16.46	9.53	108.38	1.22	132.42	1.88	0.80	0.80
16.48	8.30	95.42	1.33	126.99	2.03	0.79	0.79
16.50	7.78	90.08	1.48	133.62	2.14	0.80	0.80
16.52	8.19	95.19	1.56	148.33	2.18	0.82	0.82
16.54	9.25	107.22	1.50	160.83	2.15	0.84	0.84
16.56	10.34	119.52	1.45	173.22	2.12	0.86	0.86
16.58	11.45	132.03	1.41	186.56	2.10	0.87	0.87
16.60	12.68	145.80	1.39	202.02	2.08	0.89	0.89
16.62	13.80	158.26	1.36	215.00	2.05	0.90	0.90
16.64	14.67	167.84	1.35	225.81	2.04	0.91	0.91
16.66	15.22	173.97	1.35	235.31	2.05	0.92	0.92
16.68	15.64	178.66	1.36	243.32	2.06	0.93	0.93
16.70	15.75	179.75	1.38	248.18	2.07	0.93	0.93
16.72	15.74	179.47	1.39	250.25	2.08	0.94	0.94
16.74	15.88	180.83	1.40	253.49	2.09	0.94	0.94
16.76	16.25	184.79	1.41	260.20	2.09	0.94	0.94
16.78	16.88	191.60	1.40	269.15	2.09	0.95	0.95
16.80	17.63	199.78	1.40	278.80	2.08	0.96	0.96
16.82	19.12	215.70	1.35	291.92	2.05	0.97	0.97
16.84	20.71	232.78	1.32	306.70	2.01	0.98	0.98
16.86	22.15	248.06	1.29	321.10	1.98	0.99	0.99
16.88	22.73	254.05	1.29	328.91	1.98	1.00	1.00
16.90	22.64	252.94	1.31	330.73	2.00	1.00	1.00
16.92	22.48	250.93	1.32	331.49	2.02	1.00	1.00
16.94	21.43	239.37	1.36	325.42	2.05	1.00	1.00
16.96	21.75	242.55	1.36	329.84	2.05	1.00	1.00
16.98	22.11	246.16	1.37	336.17	2.06	1.00	1.00
17.00	23.35	259.28	1.34	348.23	2.04	1.01	1.01
17.02	23.58	261.42	1.35	352.46	2.04	1.02	1.02
17.04	23.82	263.59	1.35	355.62	2.04	1.02	1.02
17.06	24.06	265.84	1.35	359.10	2.05	1.02	1.02
17.08	24.17	266.62	1.36	361.33	2.05	1.02	1.02
17.10	24.20	266.55	1.36	362.23	2.05	1.02	1.02

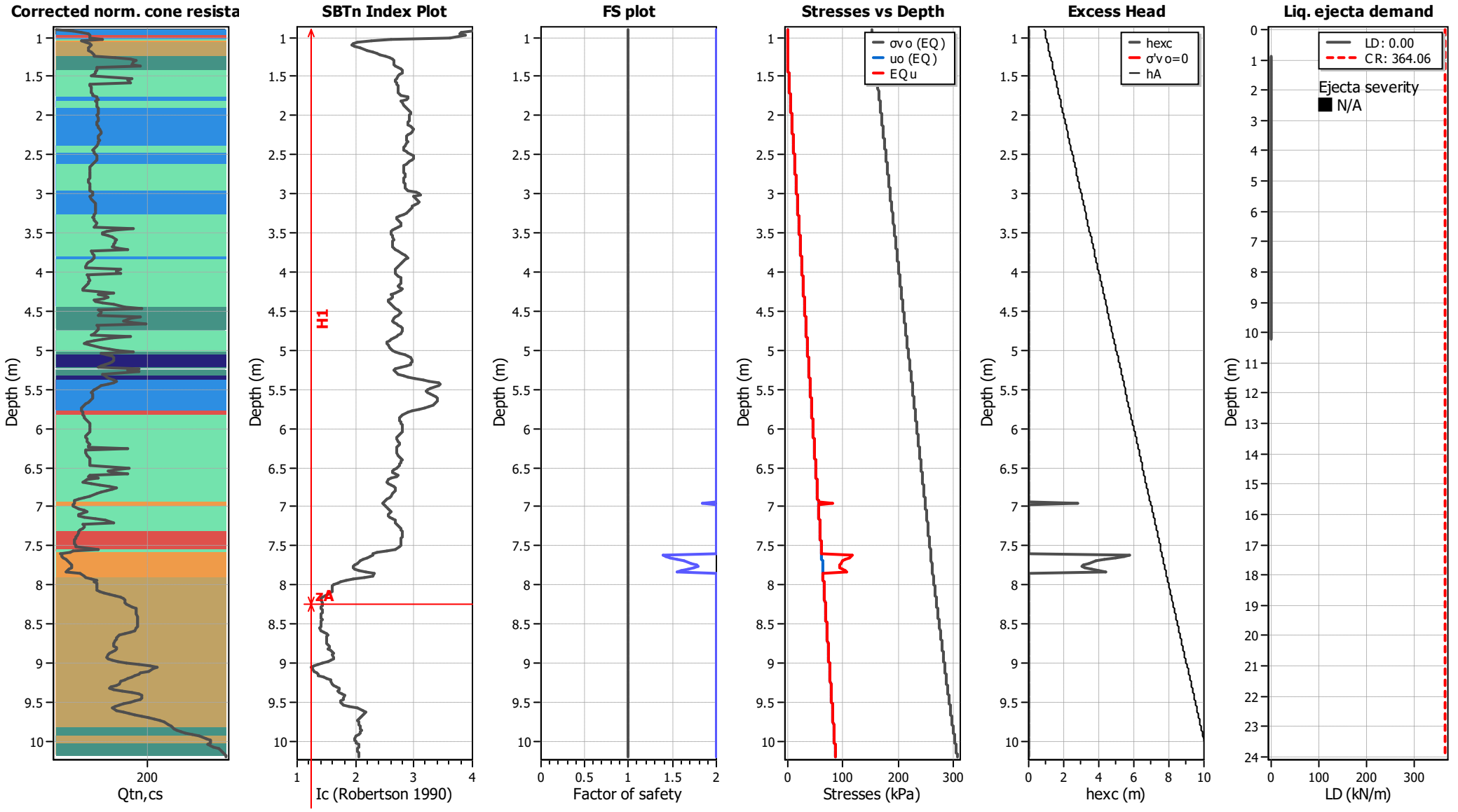
Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



Andrews Engineering, Inc.
3300 Ginger Creek Drive
Springfield, Illinois
http://www.andrews-eng.us

LIQUEFACTION ANALYSIS REPORT

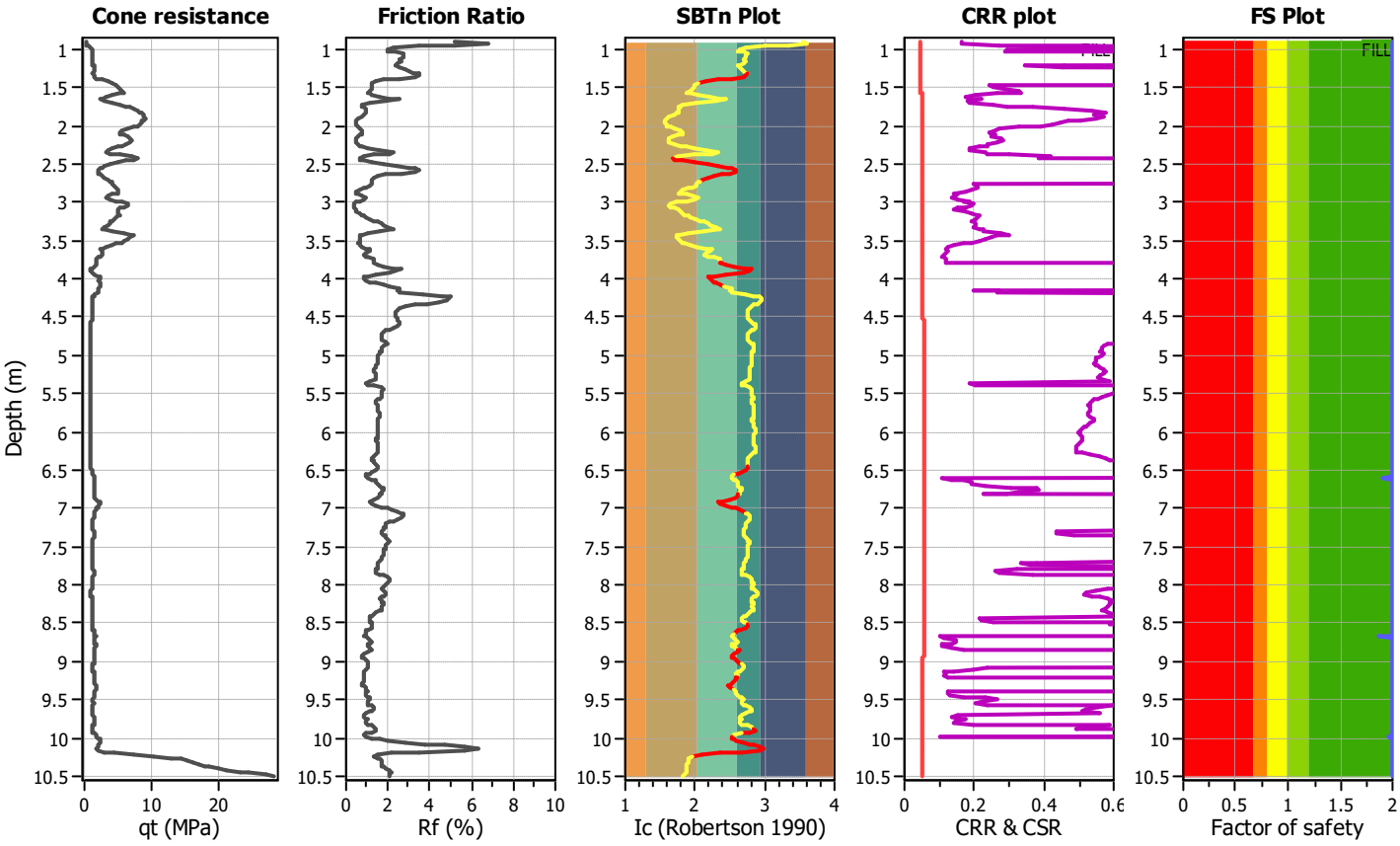
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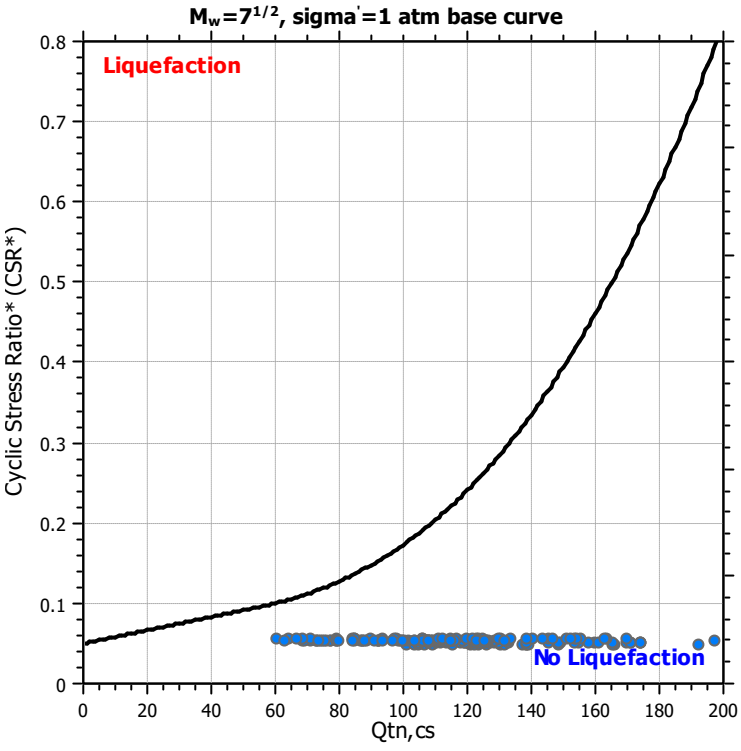
Location : East Lake Shore Drive, Springfield, Illinois

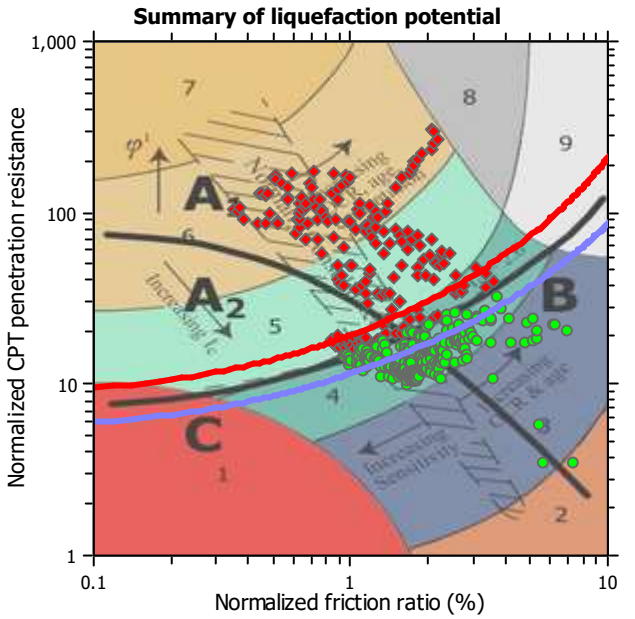
CPT file : CWLP CPT-7L

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.20 m	Use fill:	Yes	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	6.28 m	Fill height:	5.67 m	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	18.90 kN/m³	Limit depth:	N/A
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	No		

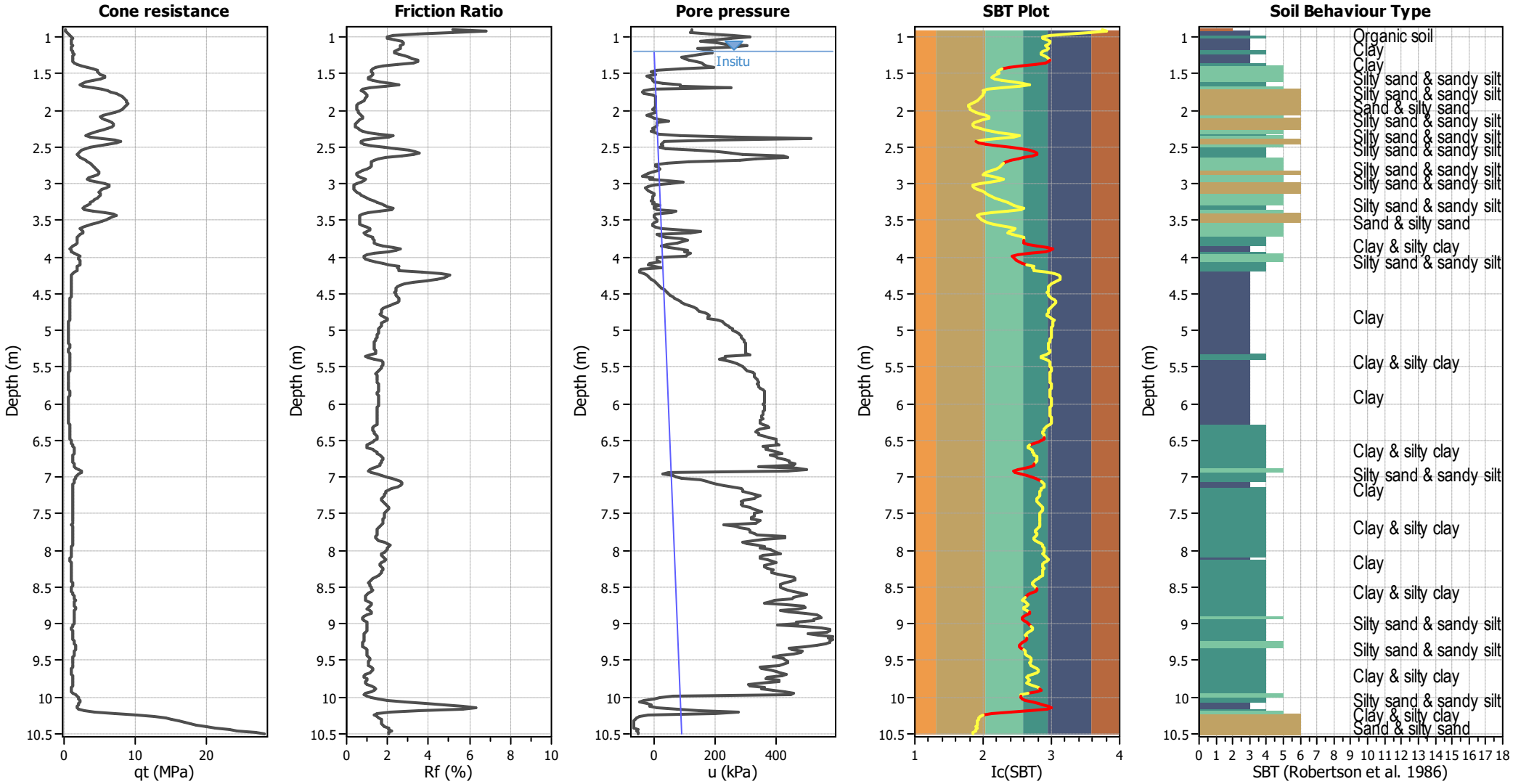






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



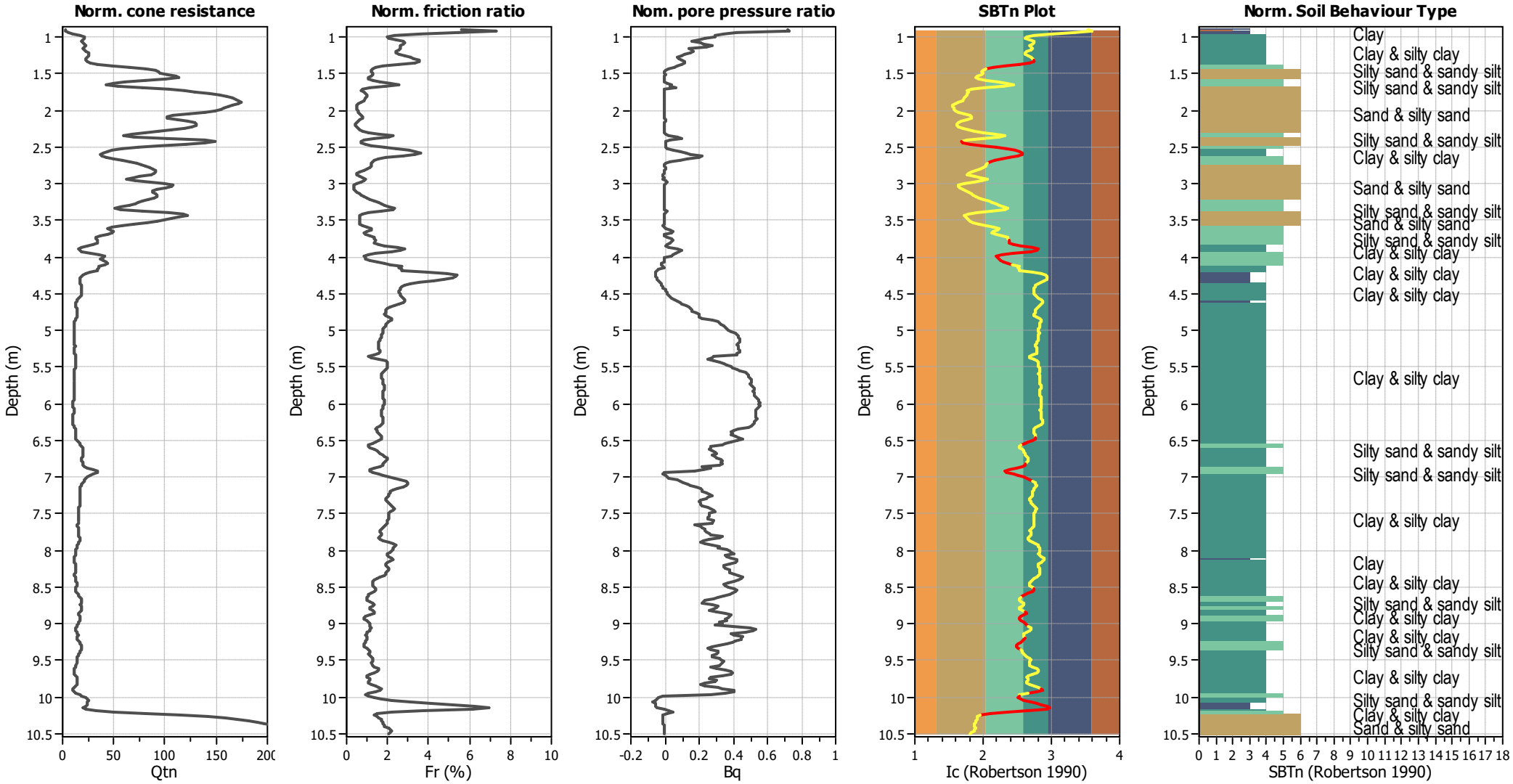
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



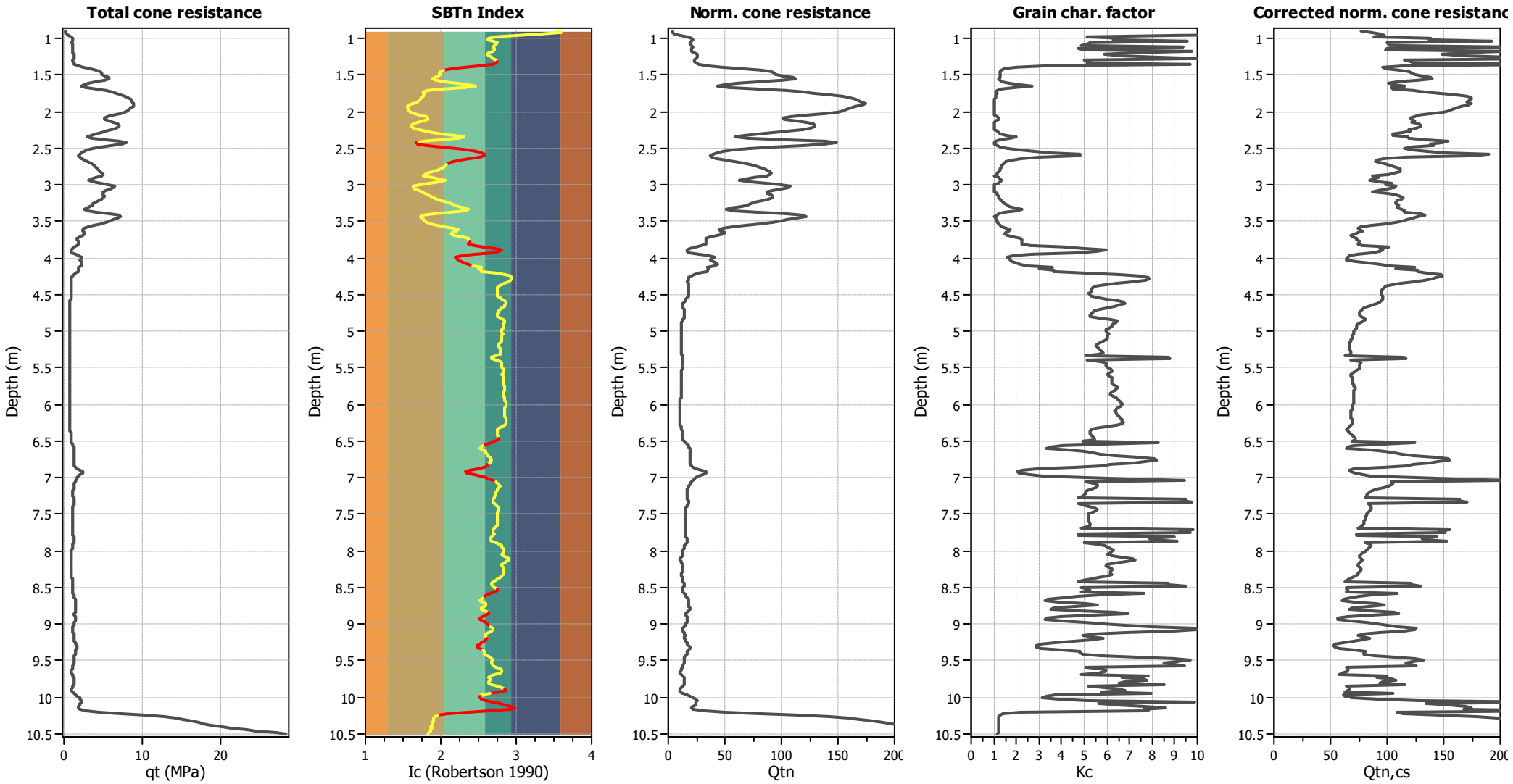
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

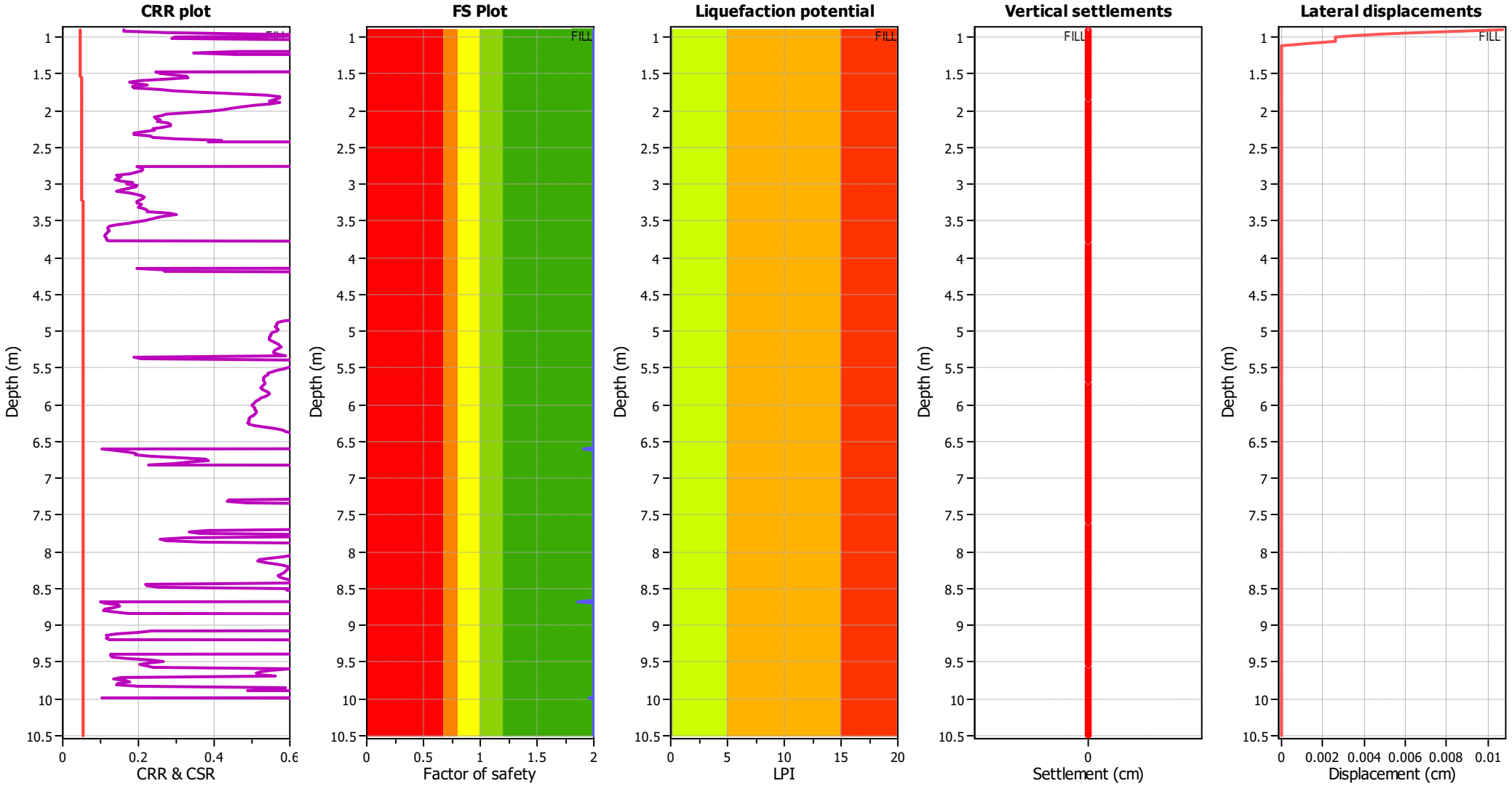
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m^3
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

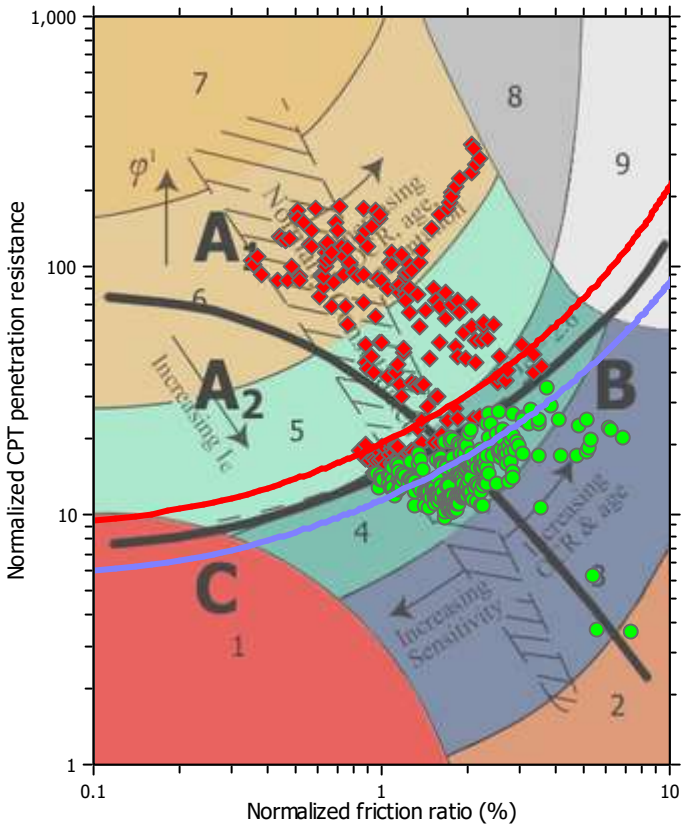
F.S. color scheme

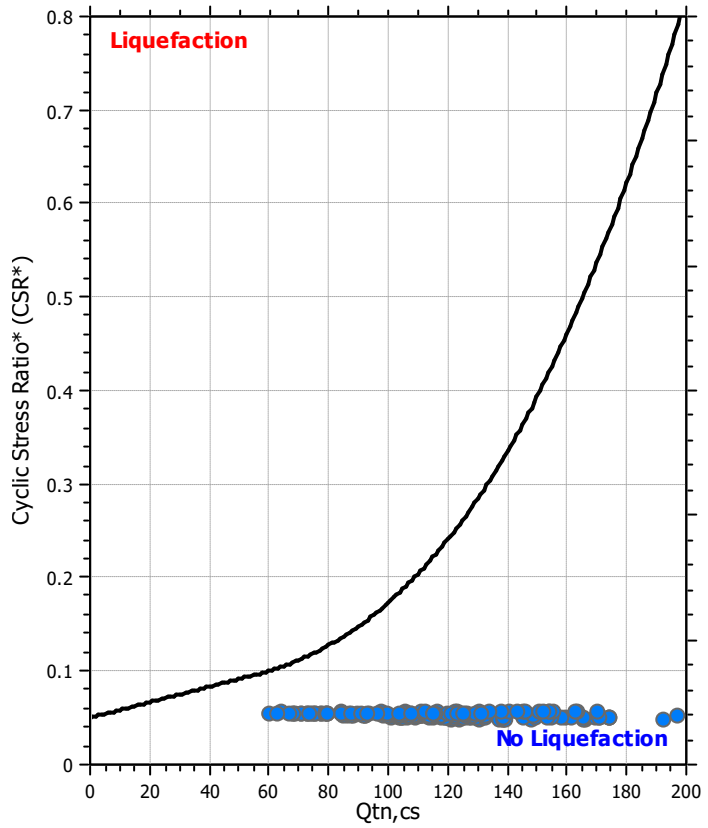
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

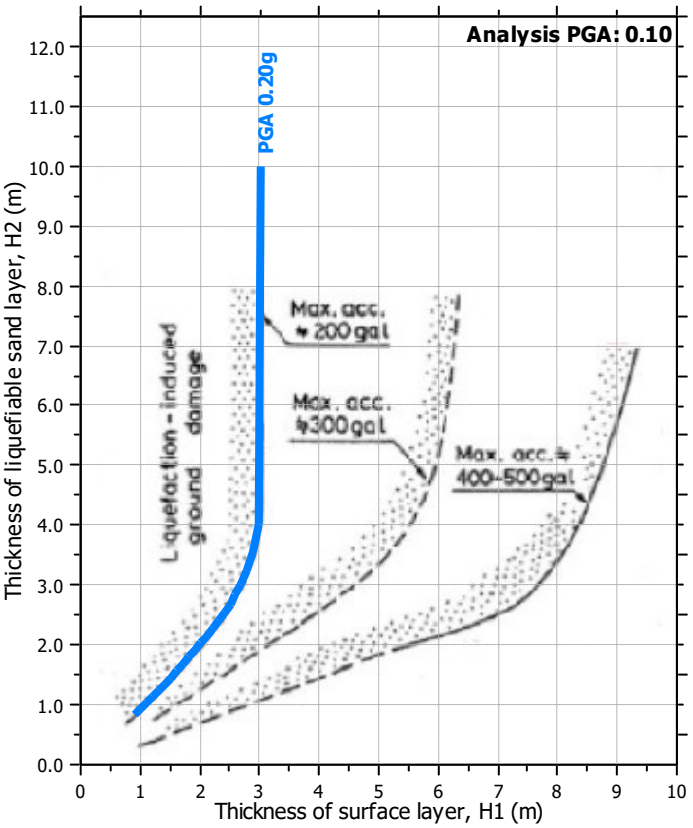
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



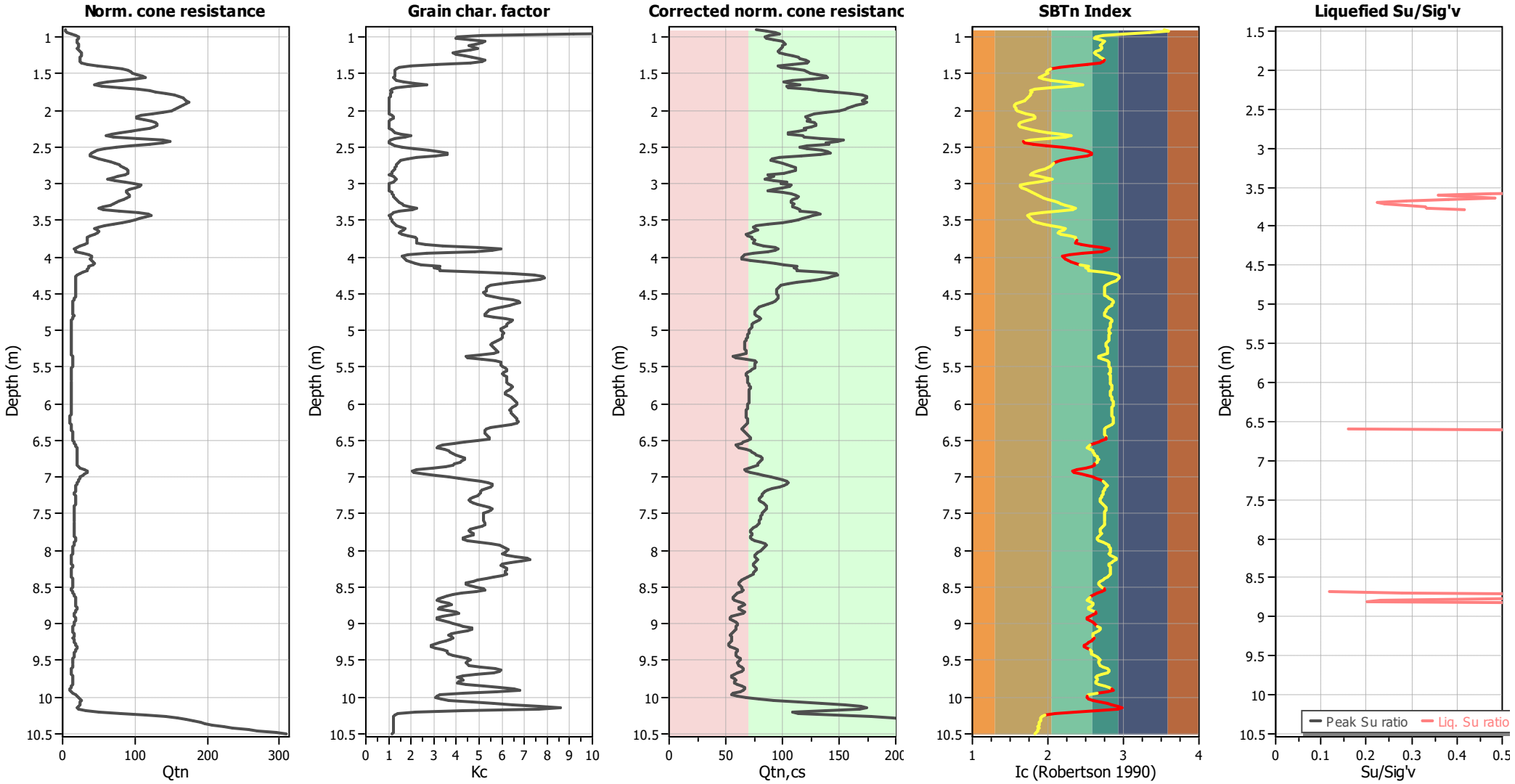




Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

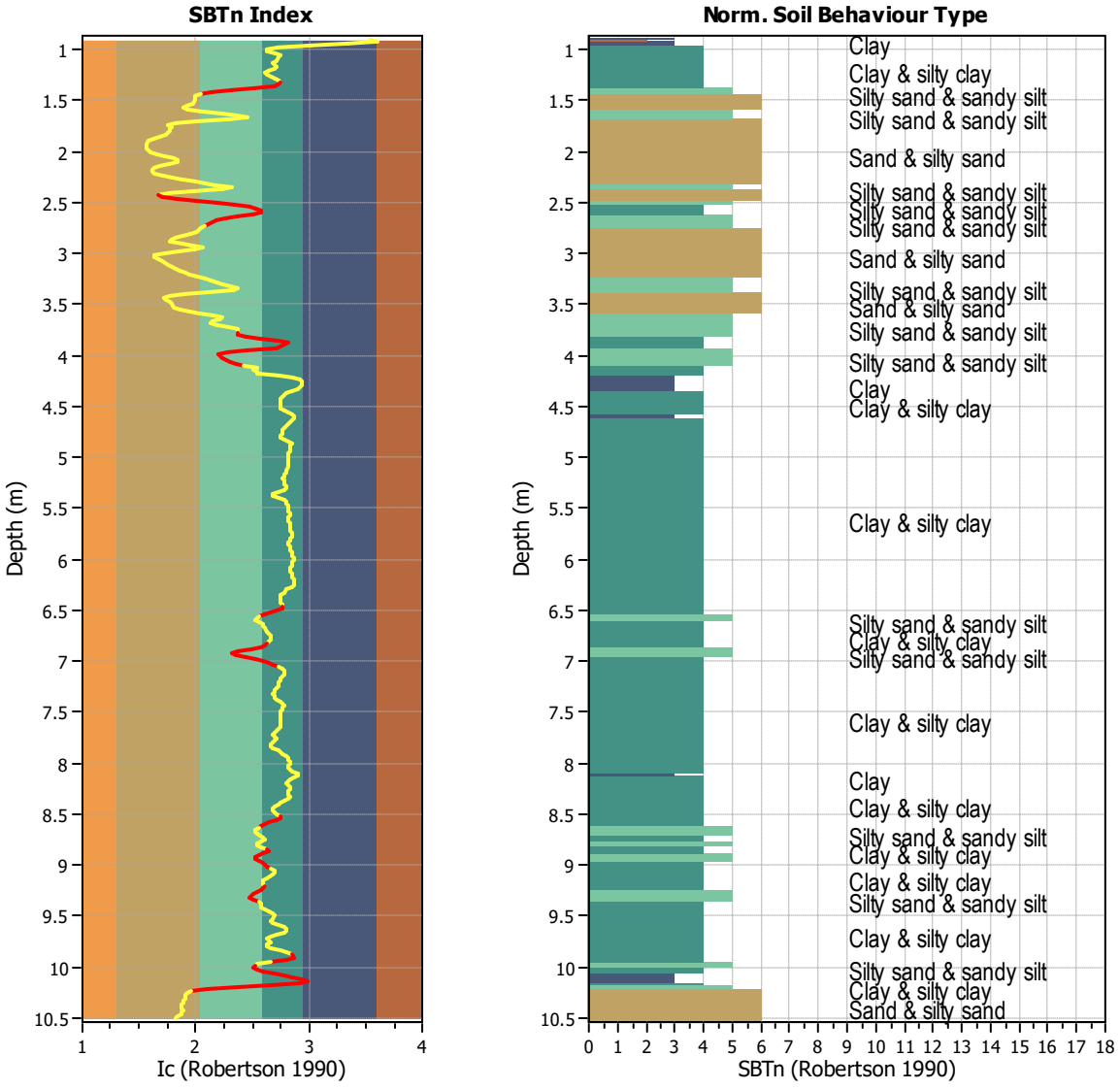
Analysis method:	Robertson (2009)	Depth to water table (erthq.):	6.28 m	Fill weight:	18.90 kN/m³
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.10	Use fill:	Yes	Limit depth applied:	No
Depth to water table (insitu):	1.20 m	Fill height:	5.67 m	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	481
I_c maximum check value:	3.00	Total points excluded:	107
I_c change ratio value:	0.0100	Exclusion percentage:	22.25%
Minimum number of points in layer:	4	Number of layers detected:	17

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	7	Start depth: 1.34 (m)	4	Clay & silty clay
		End depth: 1.46 (m)	6	Sand & silty sand
Transition layer 2	8	Start depth: 2.44 (m)	6	Sand & silty sand
		End depth: 2.58 (m)	4	Clay & silty clay
Transition layer 3	8	Start depth: 2.60 (m)	4	Clay & silty clay
		End depth: 2.74 (m)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 3.80 (m)	5	Silty sand & sandy silt
		End depth: 3.88 (m)	4	Clay & silty clay
Transition layer 5	6	Start depth: 3.88 (m)	4	Clay & silty clay
		End depth: 3.98 (m)	5	Silty sand & sandy silt
Transition layer 6	7	Start depth: 4.00 (m)	5	Silty sand & sandy silt
		End depth: 4.12 (m)	4	Clay & silty clay
Transition layer 7	6	Start depth: 6.48 (m)	4	Clay & silty clay
		End depth: 6.58 (m)	5	Silty sand & sandy silt
Transition layer 8	5	Start depth: 6.84 (m)	4	Clay & silty clay
		End depth: 6.92 (m)	5	Silty sand & sandy silt
Transition layer 9	9	Start depth: 6.92 (m)	5	Silty sand & sandy silt
		End depth: 7.08 (m)	4	Clay & silty clay
Transition layer 10	7	Start depth: 8.54 (m)	4	Clay & silty clay
		End depth: 8.66 (m)	5	Silty sand & sandy silt
Transition layer 11	4	Start depth: 8.86 (m)	4	Clay & silty clay
		End depth: 8.92 (m)	5	Silty sand & sandy silt
Transition layer 12	7	Start depth: 8.94 (m)	5	Silty sand & sandy silt
		End depth: 9.06 (m)	4	Clay & silty clay
Transition layer 13	5	Start depth: 9.22 (m)	4	Clay & silty clay
		End depth: 9.30 (m)	5	Silty sand & sandy silt
Transition layer 14	4	Start depth: 9.32 (m)	5	Silty sand & sandy silt
		End depth: 9.38 (m)	4	Clay & silty clay
Transition layer 15	4	Start depth: 9.90 (m)	4	Clay & silty clay
		End depth: 9.96 (m)	5	Silty sand & sandy silt
Transition layer 16	8	Start depth: 10.00 (m)	5	Silty sand & sandy silt
		End depth: 10.14 (m)	3	Clay
Transition layer 17	7	Start depth: 10.14 (m)	3	Clay
		End depth: 10.26 (m)	6	Sand & silty sand

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.90	0.17	9.70	125.20	100.00	14.96
2	0.92	0.17	9.70	125.20	100.00	15.27
3	0.94	0.17	18.70	121.80	84.99	15.70
4	0.96	0.50	18.80	183.70	59.88	16.17
5	0.98	0.90	20.70	259.20	42.61	16.41
6	1.00	1.14	21.40	315.20	36.85	16.55
7	1.02	1.09	22.40	254.50	36.52	16.62
8	1.04	1.01	24.00	208.10	39.90	16.68
9	1.06	0.92	26.70	152.90	43.25	16.75
10	1.08	0.90	28.90	206.70	42.61	16.84
11	1.10	1.14	29.10	237.00	41.34	16.92
12	1.12	1.08	30.90	304.40	39.72	16.93
13	1.14	1.05	28.20	260.40	40.69	16.85
14	1.16	0.99	24.70	142.60	41.55	16.78
15	1.18	0.96	27.50	170.90	40.07	16.81
16	1.20	1.21	28.90	191.50	37.56	16.90
17	1.22	1.31	28.20	190.90	36.00	17.02
18	1.24	1.28	34.40	153.50	36.72	17.13
19	1.26	1.29	37.70	123.60	38.57	17.23
20	1.28	1.25	37.70	92.30	40.42	17.26
21	1.30	1.14	38.70	101.30	41.84	17.26
22	1.32	1.16	39.20	116.80	43.23	17.32
23	1.34	1.20	45.00	138.70	42.42	17.40
24	1.36	1.30	45.20	159.50	40.00	17.47
25	1.38	1.49	43.40	165.10	31.91	17.56
26	1.40	2.40	43.60	171.80	23.29	17.68
27	1.42	3.36	44.40	195.10	17.34	17.89
28	1.44	4.20	54.00	85.90	14.12	18.08
29	1.46	4.84	57.20	8.30	12.88	18.21
30	1.48	4.83	57.10	-8.00	12.66	18.25
31	1.50	4.58	58.80	1.50	12.82	18.33
32	1.52	5.10	67.80	4.70	12.15	18.42
33	1.54	5.88	68.60	-21.80	10.96	18.47
34	1.56	5.92	61.70	-13.40	10.15	18.40
35	1.58	5.51	55.30	-5.70	11.22	18.23
36	1.60	3.89	49.50	-3.50	14.15	18.07
37	1.62	3.02	50.60	-1.00	19.45	17.96
38	1.64	2.50	54.80	29.70	24.44	17.94
39	1.66	2.17	56.60	84.50	28.60	17.92
40	1.68	1.95	56.60	84.50	22.63	17.93
41	1.70	4.04	44.80	256.00	13.74	17.92
42	1.72	5.99	35.90	-6.80	8.71	17.89
43	1.74	5.82	41.30	-31.40	7.32	18.03
44	1.76	6.47	54.40	-36.70	7.72	18.33
45	1.78	7.39	70.80	-31.20	7.56	18.59
46	1.80	7.92	76.60	-5.30	7.38	18.76
47	1.82	8.11	80.90	3.00	7.12	18.83
48	1.84	8.46	82.30	4.70	6.73	18.84

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	1.86	8.69	76.00	4.60	6.01	18.79
50	1.88	8.95	67.00	4.70	4.90	18.60
51	1.90	8.98	47.00	2.90	4.14	18.39
52	1.92	8.83	44.50	3.10	3.70	18.20
53	1.94	8.54	43.00	3.20	3.77	18.14
54	1.96	8.33	41.50	0.00	3.93	18.11
55	1.98	8.23	42.80	-3.00	4.08	18.09
56	2.00	7.96	41.10	3.30	4.45	18.07
57	2.02	7.28	41.10	3.70	5.17	18.00
58	2.04	6.20	39.70	-11.30	6.52	17.95
59	2.06	5.42	41.00	-23.50	8.10	17.90
60	2.08	4.98	40.30	-10.30	8.88	17.86
61	2.10	5.16	38.00	-0.90	8.87	17.87
62	2.12	5.51	42.60	21.20	7.35	17.84
63	2.14	6.48	33.60	48.50	5.93	17.79
64	2.16	6.81	29.50	8.20	4.89	17.72
65	2.18	7.08	33.80	8.20	4.59	17.69
66	2.20	6.94	30.10	8.30	4.52	17.68
67	2.22	6.95	28.80	4.30	4.89	17.66
68	2.24	6.22	33.70	-3.60	6.16	17.78
69	2.26	5.33	42.80	1.30	7.71	17.75
70	2.28	4.71	30.60	-8.60	9.81	17.77
71	2.30	4.26	40.80	4.90	12.82	17.84
72	2.32	3.37	56.10	14.90	17.91	18.08
73	2.34	2.85	68.30	85.10	23.17	18.27
74	2.36	2.82	80.10	268.10	20.19	18.41
75	2.38	4.93	70.80	514.80	12.70	18.52
76	2.40	7.74	60.40	213.50	7.44	18.49
77	2.42	8.49	55.60	34.70	5.66	18.39
78	2.44	7.69	48.90	30.30	6.15	18.29
79	2.46	5.96	49.70	22.70	8.45	18.28
80	2.48	4.76	63.80	30.90	12.63	18.28
81	2.50	3.73	63.00	20.70	18.54	18.35
82	2.52	2.74	77.10	39.50	24.19	18.33
83	2.54	2.46	75.80	132.50	29.34	18.31
84	2.56	2.23	73.60	211.50	31.99	18.26
85	2.58	1.99	74.60	253.80	34.50	18.18
86	2.60	1.77	67.80	291.00	34.49	18.01
87	2.62	1.84	47.30	427.50	31.29	17.81
88	2.64	2.10	42.70	440.20	25.54	17.60
89	2.66	2.50	36.70	337.10	21.56	17.58
90	2.68	2.86	39.40	282.10	18.28	17.62
91	2.70	3.38	41.40	113.50	16.28	17.74
92	2.72	3.76	43.70	41.60	15.00	17.85
93	2.74	3.93	47.40	4.60	14.33	17.95
94	2.76	4.16	50.30	7.20	13.84	18.02
95	2.78	4.35	50.20	16.80	13.14	18.04
96	2.80	4.46	48.00	20.60	11.72	17.93

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	2.82	4.67	34.90	13.40	10.21	17.76
98	2.84	4.86	30.70	-2.90	8.58	17.50
99	2.86	5.03	24.30	-17.50	7.75	17.31
100	2.88	4.84	20.90	-27.40	5.00	17.16
101	2.90	4.49	21.60	-38.20	9.93	17.17
102	2.92	2.66	29.40	-3.70	11.94	17.23
103	2.94	3.54	27.60	-13.60	14.56	17.35
104	2.96	3.45	32.90	43.30	12.60	17.45
105	2.98	4.01	33.30	93.70	9.55	17.52
106	3.00	6.28	26.90	55.30	5.00	17.44
107	3.02	6.51	21.00	1.10	5.02	17.34
108	3.04	6.39	23.00	-18.70	4.96	17.24
109	3.06	5.96	21.70	-30.00	5.00	17.18
110	3.08	5.44	18.80	-23.80	5.00	17.10
111	3.10	4.65	20.50	-18.80	5.00	17.13
112	3.12	4.93	25.00	-8.10	7.98	17.31
113	3.14	5.14	30.30	1.50	8.65	17.58
114	3.16	5.08	39.60	1.40	9.41	17.78
115	3.18	5.03	42.30	-5.40	10.43	17.92
116	3.20	4.76	46.00	-4.90	11.44	17.98
117	3.22	4.42	48.30	-5.70	13.20	18.03
118	3.24	3.84	53.00	-10.80	15.13	18.07
119	3.26	3.67	56.30	1.60	16.90	18.15
120	3.28	3.77	61.70	-3.60	18.41	18.23
121	3.30	3.43	67.80	20.50	19.91	18.18
122	3.32	2.84	53.20	-1.80	22.47	18.08
123	3.34	2.52	54.80	0.40	25.29	18.06
124	3.36	2.51	70.50	11.60	23.61	18.20
125	3.38	3.74	69.30	70.80	16.95	18.35
126	3.40	5.80	59.10	59.50	10.78	18.37
127	3.42	7.61	51.70	6.70	7.63	18.27
128	3.44	7.38	45.10	1.80	6.60	18.16
129	3.46	6.83	42.50	2.60	7.00	18.04
130	3.48	6.13	40.70	4.30	7.57	17.93
131	3.50	5.79	36.00	8.50	7.96	17.82
132	3.52	5.66	34.00	11.90	8.43	17.65
133	3.54	4.68	28.50	1.00	9.42	17.48
134	3.56	3.93	26.30	-5.80	11.32	17.25
135	3.58	3.10	22.80	-3.60	13.83	17.07
136	3.60	2.48	22.20	3.50	17.56	17.05
137	3.62	2.13	29.70	26.50	20.15	17.10
138	3.64	2.34	28.70	89.70	19.64	17.17
139	3.66	2.78	26.50	153.60	17.56	17.09
140	3.68	2.67	21.90	118.70	16.77	16.94
141	3.70	2.32	19.20	9.60	18.39	16.80
142	3.72	1.91	21.40	18.10	21.87	16.75
143	3.74	1.62	22.40	40.90	25.02	16.77
144	3.76	1.70	23.00	89.60	25.24	16.76

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
145	3.78	1.84	21.10	109.70	25.44	16.86
146	3.80	1.74	28.00	78.50	25.30	16.82
147	3.82	1.66	20.50	43.80	28.18	16.81
148	3.84	1.34	22.70	26.60	33.45	16.67
149	3.86	0.86	24.60	49.00	41.48	16.64
150	3.88	0.86	23.60	82.90	46.63	16.55
151	3.90	0.89	20.70	108.30	44.70	16.51
152	3.92	0.94	21.60	103.00	40.89	16.45
153	3.94	1.07	18.60	120.10	28.81	16.58
154	3.96	2.29	19.80	109.60	21.80	16.63
155	3.98	2.31	19.20	106.80	18.89	16.68
156	4.00	2.02	18.20	12.00	19.52	16.64
157	4.02	2.02	18.20	12.00	20.37	16.60
158	4.04	2.02	18.20	12.00	21.20	16.93
159	4.06	2.40	34.90	18.10	22.83	17.30
160	4.08	2.32	43.70	-12.80	24.65	17.56
161	4.10	2.12	43.10	-18.20	27.10	17.62
162	4.12	1.98	44.30	-0.40	32.35	17.66
163	4.14	1.41	54.90	25.90	31.11	17.65
164	4.16	2.32	40.50	-42.60	32.54	17.64
165	4.18	1.73	45.30	-48.60	32.54	17.64
166	4.20	1.42	54.40	-49.00	41.80	17.70
167	4.22	1.21	60.40	-35.30	48.76	17.70
168	4.24	1.07	54.00	-26.00	52.98	17.62
169	4.26	1.00	49.10	-20.70	54.52	17.48
170	4.28	0.96	45.70	-15.50	54.89	17.39
171	4.30	0.96	44.50	-10.40	53.94	17.27
172	4.32	0.94	35.70	-0.60	51.86	17.12
173	4.34	0.95	30.80	4.20	48.86	16.93
174	4.36	0.97	27.20	9.10	46.37	16.80
175	4.38	0.98	25.40	13.40	44.55	16.70
176	4.40	0.99	23.80	18.10	43.64	16.66
177	4.42	0.99	24.30	22.80	43.39	16.65
178	4.44	0.98	24.20	32.40	43.40	16.62
179	4.46	0.96	22.40	37.90	43.34	16.61
180	4.48	0.98	23.70	43.60	43.00	16.61
181	4.50	1.01	24.10	47.40	43.06	16.64
182	4.52	0.98	24.10	52.20	43.53	16.63
183	4.54	0.94	23.50	61.10	44.86	16.59
184	4.56	0.88	22.50	66.70	46.54	16.52
185	4.58	0.81	21.10	75.70	48.70	16.44
186	4.60	0.75	20.60	84.30	50.02	16.35
187	4.62	0.74	18.80	93.40	50.25	16.26
188	4.64	0.74	17.10	101.10	49.22	16.15
189	4.66	0.73	15.50	117.50	48.18	16.04
190	4.68	0.72	14.30	127.50	46.89	15.95
191	4.70	0.74	13.60	137.00	45.38	15.91
192	4.72	0.77	13.60	144.90	44.11	15.91

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
193	4.74	0.78	13.80	150.90	43.75	15.91
194	4.76	0.76	13.60	168.20	43.57	15.90
195	4.78	0.77	13.20	178.40	43.12	15.89
196	4.80	0.80	13.50	179.90	43.21	15.93
197	4.82	0.78	14.90	178.20	44.92	15.99
198	4.84	0.71	15.70	177.80	47.35	15.97
199	4.86	0.65	13.40	210.60	48.95	15.88
200	4.88	0.65	12.40	223.50	48.50	15.75
201	4.90	0.65	11.70	228.90	47.97	15.69
202	4.92	0.64	11.50	235.40	47.70	15.65
203	4.94	0.64	11.30	242.60	47.76	15.64
204	4.96	0.64	11.40	249.90	47.14	15.62
205	4.98	0.65	10.80	257.50	46.54	15.59
206	5.00	0.65	10.40	260.90	46.55	15.55
207	5.02	0.62	10.40	267.30	46.92	15.53
208	5.04	0.62	10.30	277.60	47.19	15.51
209	5.06	0.62	10.10	281.90	46.92	15.49
210	5.08	0.62	9.80	285.90	46.76	15.47
211	5.10	0.62	9.80	285.90	46.77	15.45
212	5.12	0.61	9.70	293.30	46.48	15.44
213	5.14	0.62	9.50	296.30	45.92	15.43
214	5.16	0.64	9.40	297.80	45.17	15.42
215	5.18	0.64	9.20	301.10	44.71	15.43
216	5.20	0.66	9.60	300.60	44.50	15.44
217	5.22	0.66	9.70	302.90	44.56	15.46
218	5.24	0.65	9.50	301.50	44.86	15.45
219	5.26	0.64	9.50	301.00	45.28	15.44
220	5.28	0.64	9.70	300.40	45.59	15.45
221	5.30	0.64	9.70	300.40	45.76	15.46
222	5.32	0.64	9.70	300.40	45.15	15.47
223	5.34	0.68	9.90	315.30	42.08	15.34
224	5.36	0.75	6.10	236.20	39.11	15.19
225	5.38	0.75	6.10	236.20	39.20	15.34
226	5.40	0.78	12.80	214.30	42.42	15.64
227	5.42	0.72	13.50	238.20	45.33	15.87
228	5.44	0.72	13.60	256.50	46.36	15.87
229	5.46	0.72	13.10	270.80	46.36	15.85
230	5.48	0.71	13.00	281.30	46.62	15.84
231	5.50	0.69	13.30	293.70	46.89	15.82
232	5.52	0.69	12.50	297.30	47.35	15.78
233	5.54	0.66	11.90	301.70	47.53	15.70
234	5.56	0.64	11.10	307.60	47.56	15.62
235	5.58	0.64	10.30	326.80	47.21	15.54
236	5.60	0.63	9.90	331.50	46.88	15.50
237	5.62	0.63	9.90	331.50	47.16	15.49
238	5.64	0.62	10.10	330.80	47.55	15.50
239	5.66	0.62	10.20	336.10	47.78	15.51
240	5.68	0.63	10.20	341.10	47.73	15.52

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
241	5.70	0.63	10.40	343.30	47.65	15.53
242	5.72	0.63	10.40	339.70	48.09	15.55
243	5.74	0.62	10.70	343.00	48.55	15.56
244	5.76	0.62	10.90	346.70	48.90	15.58
245	5.78	0.62	10.90	351.70	48.67	15.59
246	5.80	0.63	10.80	359.90	48.14	15.59
247	5.82	0.65	10.90	361.60	47.63	15.60
248	5.84	0.65	10.90	366.30	47.29	15.60
249	5.86	0.65	10.80	365.40	47.48	15.60
250	5.88	0.64	10.80	362.00	47.90	15.58
251	5.90	0.63	10.60	361.70	48.45	15.57
252	5.92	0.62	10.60	362.20	48.75	15.56
253	5.94	0.62	10.60	364.50	49.03	15.55
254	5.96	0.61	10.40	362.00	49.33	15.54
255	5.98	0.61	10.40	362.40	49.59	15.53
256	6.00	0.61	10.40	360.00	49.58	15.52
257	6.02	0.61	10.20	365.00	49.40	15.52
258	6.04	0.62	10.30	364.90	48.95	15.51
259	6.06	0.63	10.10	365.30	48.65	15.51
260	6.08	0.63	10.10	362.60	48.32	15.51
261	6.10	0.63	10.10	360.80	48.42	15.51
262	6.12	0.63	10.20	361.00	48.46	15.51
263	6.14	0.63	10.00	358.00	48.75	15.50
264	6.16	0.62	9.90	353.20	49.06	15.48
265	6.18	0.61	10.00	353.90	49.42	15.49
266	6.20	0.62	10.20	357.00	49.60	15.50
267	6.22	0.62	10.10	351.20	49.69	15.51
268	6.24	0.61	10.20	349.40	49.83	15.50
269	6.26	0.61	10.20	349.40	49.70	15.52
270	6.28	0.63	10.40	359.00	48.60	15.53
271	6.30	0.67	10.20	373.90	46.46	15.54
272	6.32	0.73	9.80	379.60	44.55	15.54
273	6.34	0.75	10.00	350.30	43.43	15.56
274	6.36	0.76	10.40	341.50	43.21	15.61
275	6.38	0.78	10.80	333.20	43.10	15.68
276	6.40	0.81	11.90	345.20	43.10	15.74
277	6.42	0.80	11.90	342.80	43.50	15.82
278	6.44	0.80	13.10	362.00	43.87	15.86
279	6.46	0.81	13.30	377.60	44.09	15.90
280	6.48	0.81	13.10	400.60	44.00	15.90
281	6.50	0.81	13.10	400.60	41.58	15.90
282	6.52	0.98	12.40	400.30	38.69	15.90
283	6.54	1.04	12.10	404.40	36.16	15.95
284	6.56	1.08	13.50	411.80	33.24	15.86
285	6.58	1.22	8.80	361.30	32.27	15.97
286	6.60	1.27	14.80	372.60	31.84	16.09
287	6.62	1.27	16.90	368.00	33.68	16.33
288	6.64	1.24	18.20	387.60	34.76	16.43

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
289	6.66	1.25	19.50	408.80	35.34	16.50
290	6.68	1.26	20.00	422.00	35.78	16.54
291	6.70	1.25	20.60	383.70	36.56	16.59
292	6.72	1.22	22.30	403.20	37.71	16.65
293	6.74	1.20	23.50	406.30	38.53	16.69
294	6.76	1.20	23.10	432.50	38.66	16.68
295	6.78	1.19	22.00	444.40	38.11	16.64
296	6.80	1.21	20.90	443.00	37.61	16.64
297	6.82	1.26	22.90	466.30	36.38	16.65
298	6.84	1.35	21.70	458.00	35.90	16.67
299	6.86	1.31	21.40	345.50	34.12	16.66
300	6.88	1.47	21.20	471.60	30.34	16.71
301	6.90	1.98	21.60	503.10	25.42	16.87
302	6.92	2.54	26.00	441.40	23.57	17.05
303	6.94	2.37	29.40	49.60	24.34	17.18
304	6.96	2.12	30.30	27.90	28.00	17.20
305	6.98	1.77	31.70	63.20	31.49	17.19
306	7.00	1.66	32.40	71.50	34.78	17.20
307	7.02	1.58	34.00	89.00	37.25	17.24
308	7.04	1.46	37.20	152.40	39.82	17.27
309	7.06	1.37	37.80	172.20	42.18	17.28
310	7.08	1.30	36.60	186.00	43.65	17.23
311	7.10	1.24	34.50	207.30	44.64	17.17
312	7.12	1.20	33.70	227.70	44.82	17.09
313	7.14	1.18	30.30	259.30	44.52	16.98
314	7.16	1.14	26.40	285.20	43.34	16.84
315	7.18	1.15	23.70	291.20	42.67	16.72
316	7.20	1.12	22.60	289.90	42.10	16.64
317	7.22	1.11	21.60	311.20	42.17	16.59
318	7.24	1.10	21.30	328.20	42.01	16.58
319	7.26	1.11	21.90	350.10	41.52	16.58
320	7.28	1.15	21.20	337.30	40.60	16.58
321	7.30	1.19	20.80	331.60	39.86	16.57
322	7.32	1.19	21.00	298.10	39.72	16.60
323	7.34	1.21	22.80	287.50	40.08	16.64
324	7.36	1.20	22.70	292.40	40.74	16.68
325	7.38	1.18	23.70	286.90	41.64	16.69
326	7.40	1.14	23.80	291.90	42.91	16.70
327	7.42	1.09	23.70	317.40	44.11	16.67
328	7.44	1.04	22.80	324.80	44.77	16.64
329	7.46	1.05	22.60	339.80	44.39	16.59
330	7.48	1.07	21.10	354.10	43.68	16.57
331	7.50	1.09	21.30	331.00	43.00	16.56
332	7.52	1.11	21.60	328.70	42.85	16.56
333	7.54	1.09	20.80	332.00	42.78	16.55
334	7.56	1.09	20.80	319.00	42.80	16.53
335	7.58	1.09	20.80	319.00	42.73	16.53
336	7.60	1.09	20.50	349.20	42.87	16.49

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
337	7.62	1.05	19.20	336.00	43.21	16.45
338	7.64	1.05	19.00	230.20	43.29	16.41
339	7.66	1.06	18.60	268.40	42.61	16.39
340	7.68	1.10	17.90	282.90	41.32	16.37
341	7.70	1.14	17.90	309.20	40.13	16.37
342	7.72	1.16	17.70	316.70	39.62	16.35
343	7.74	1.13	16.90	316.90	40.00	16.34
344	7.76	1.09	17.60	330.70	40.78	16.34
345	7.78	1.09	18.10	341.30	40.53	16.35
346	7.80	1.15	17.20	430.20	39.42	16.36
347	7.82	1.20	17.50	428.90	38.32	16.39
348	7.84	1.23	18.60	366.30	38.36	16.45
349	7.86	1.23	20.10	326.90	39.48	16.54
350	7.88	1.20	21.90	290.10	42.06	16.64
351	7.90	1.09	24.80	308.80	44.33	16.67
352	7.92	1.06	23.10	337.90	46.22	16.66
353	7.94	1.02	22.60	365.20	46.68	16.56
354	7.96	0.96	19.90	351.00	47.39	16.49
355	7.98	0.94	19.90	383.80	47.88	16.42
356	8.00	0.93	19.50	392.80	47.69	16.38
357	8.02	0.94	18.00	400.20	47.44	16.33
358	8.04	0.92	17.40	414.60	46.80	16.26
359	8.06	0.93	16.20	359.50	47.60	16.20
360	8.08	0.85	16.20	349.70	49.41	16.15
361	8.10	0.78	16.10	351.00	51.67	16.14
362	8.12	0.79	16.50	374.40	52.17	16.15
363	8.14	0.83	16.80	386.10	50.40	16.16
364	8.16	0.88	15.60	400.10	48.38	16.16
365	8.18	0.91	15.90	385.10	46.78	16.17
366	8.20	0.95	16.40	362.00	46.48	16.21
367	8.22	0.94	17.20	365.40	47.00	16.25
368	8.24	0.92	17.80	372.50	47.73	16.28
369	8.26	0.92	17.80	392.40	47.75	16.27
370	8.28	0.93	16.50	389.00	47.47	16.23
371	8.30	0.91	16.30	388.30	47.48	16.19
372	8.32	0.88	16.10	405.80	47.68	16.16
373	8.34	0.89	15.40	429.70	46.74	16.11
374	8.36	0.93	14.10	460.40	44.89	16.04
375	8.38	0.95	13.00	464.20	43.36	15.98
376	8.40	0.95	13.00	464.20	41.76	15.92
377	8.42	1.01	11.70	450.70	40.54	15.91
378	8.44	1.06	12.30	432.90	39.14	15.92
379	8.46	1.10	12.80	417.60	39.13	15.96
380	8.48	1.06	13.00	415.80	39.87	15.95
381	8.50	0.99	12.30	417.90	41.40	15.93
382	8.52	0.95	12.60	426.30	42.92	15.91
383	8.54	0.92	12.90	439.90	43.14	15.92
384	8.56	0.97	12.60	461.40	41.26	15.95

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
385	8.58	1.12	12.90	485.50	38.05	15.96
386	8.60	1.21	12.10	503.40	35.73	15.97
387	8.62	1.23	12.10	481.20	34.39	15.97
388	8.64	1.28	12.30	457.60	33.28	16.01
389	8.66	1.41	13.00	455.30	32.05	16.09
390	8.68	1.49	13.80	396.30	31.74	16.20
391	8.70	1.46	15.60	381.80	32.90	16.31
392	8.72	1.39	17.40	363.60	34.84	16.40
393	8.74	1.34	18.50	438.00	35.55	16.43
394	8.76	1.38	16.80	492.20	34.22	16.41
395	8.78	1.52	15.90	500.30	32.48	16.36
396	8.80	1.52	15.70	476.40	32.30	16.35
397	8.82	1.41	16.40	418.80	34.37	16.39
398	8.84	1.30	18.50	445.70	36.60	16.37
399	8.86	1.22	16.00	495.80	37.25	16.29
400	8.88	1.23	13.40	534.90	35.40	16.10
401	8.90	1.30	11.20	545.90	33.13	15.96
402	8.92	1.35	11.00	552.40	31.90	15.91
403	8.94	1.34	11.50	526.20	31.78	15.92
404	8.96	1.34	11.50	526.20	33.24	16.01
405	8.98	1.27	14.10	468.90	34.78	16.08
406	9.00	1.23	14.10	476.30	35.95	16.10
407	9.02	1.25	12.70	407.20	37.13	16.02
408	9.04	1.06	11.90	491.80	38.35	15.91
409	9.06	1.00	11.40	552.20	40.19	15.82
410	9.08	0.98	10.60	578.50	40.28	15.77
411	9.10	1.00	10.60	578.00	39.42	15.76
412	9.12	1.07	10.90	570.20	37.18	15.77
413	9.14	1.21	10.20	506.30	35.48	15.79
414	9.16	1.21	10.70	540.80	34.71	15.81
415	9.18	1.17	11.00	587.60	35.36	15.82
416	9.20	1.14	10.80	574.30	35.95	15.83
417	9.22	1.15	11.10	588.90	35.21	15.85
418	9.24	1.28	11.40	578.50	34.07	15.91
419	9.26	1.33	11.90	581.60	32.63	15.94
420	9.28	1.37	11.30	566.50	31.35	15.95
421	9.30	1.49	11.40	535.00	30.13	16.02
422	9.32	1.61	13.30	496.60	29.88	16.15
423	9.34	1.59	15.00	445.90	31.32	16.26
424	9.36	1.42	15.80	452.70	33.12	16.28
425	9.38	1.37	14.60	486.80	34.51	16.24
426	9.40	1.36	14.30	482.10	34.51	16.18
427	9.42	1.35	13.60	460.50	34.65	16.13
428	9.44	1.32	13.20	414.60	35.77	16.08
429	9.46	1.19	13.10	392.20	37.69	16.08
430	9.48	1.15	14.30	426.50	39.39	16.08
431	9.50	1.15	13.80	430.50	40.05	16.08
432	9.52	1.11	13.20	442.80	39.49	16.02

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
433	9.54	1.15	12.30	441.50	38.94	15.99
434	9.56	1.18	12.70	411.30	39.79	16.00
435	9.58	1.06	13.80	348.70	42.19	16.03
436	9.60	0.98	14.00	352.30	45.25	16.02
437	9.62	0.94	13.50	383.30	46.47	15.94
438	9.64	0.90	11.60	401.20	46.34	15.86
439	9.66	0.92	11.50	417.10	44.86	15.75
440	9.68	0.96	10.10	438.00	41.18	15.71
441	9.70	1.16	9.50	423.50	38.23	15.70
442	9.72	1.19	10.50	373.20	36.98	15.82
443	9.74	1.20	12.60	368.20	38.03	15.92
444	9.76	1.15	12.70	414.00	38.22	15.99
445	9.78	1.23	12.60	411.70	37.15	15.97
446	9.80	1.29	11.40	354.60	36.85	15.96
447	9.82	1.19	12.30	313.40	38.93	16.00
448	9.84	1.07	14.50	316.90	42.96	16.06
449	9.86	0.98	14.80	363.70	46.33	16.05
450	9.88	0.92	13.00	354.40	49.00	15.97
451	9.90	0.82	12.80	393.40	50.19	15.88
452	9.92	0.84	12.20	431.10	45.71	15.88
453	9.94	1.19	11.70	460.20	38.37	15.87
454	9.96	1.43	10.30	451.20	32.62	16.07
455	9.98	1.79	16.10	63.70	31.82	16.46
456	10.00	1.86	24.60	20.90	31.44	16.92
457	10.02	2.25	32.00	-0.20	32.83	17.30
458	10.04	2.23	43.00	-33.60	34.95	17.65
459	10.06	2.15	58.20	-48.00	40.17	18.01
460	10.08	2.06	81.90	-25.10	45.01	18.31
461	10.10	2.08	98.90	-10.60	48.91	18.55
462	10.12	2.10	115.80	-11.70	53.91	18.64
463	10.14	1.60	114.70	10.50	57.65	18.65
464	10.16	1.67	109.10	75.00	53.65	18.65
465	10.18	2.51	105.30	148.70	38.28	18.67
466	10.20	4.18	83.50	279.90	24.99	18.76
467	10.22	6.30	89.30	203.20	15.70	19.10
468	10.24	10.91	142.70	-16.90	11.87	19.56
469	10.26	13.51	185.80	-48.10	10.83	19.99
470	10.28	13.79	235.00	-58.90	10.51	20.23
471	10.30	15.49	251.50	-63.70	10.58	20.40
472	10.32	16.34	278.00	-64.50	10.26	20.52
473	10.34	16.91	299.60	-66.70	10.10	20.62
474	10.36	17.96	311.20	-66.30	9.80	20.68
475	10.38	18.52	311.20	-66.30	9.83	20.80
476	10.40	19.37	381.00	-66.20	9.65	20.95
477	10.42	22.42	430.70	-64.60	10.06	21.14
478	10.44	21.79	482.30	-54.50	9.73	21.31
479	10.46	25.62	544.50	-56.70	9.78	21.42
480	10.48	25.62	554.30	-52.40	8.93	21.53

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
481	10.50	29.52	584.80	-50.70	8.51	21.58

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_c:	Measured cone resistance (MPa)
f_s:	Sleeve friction resistance (kPa)
u:	Pore pressure (kPa)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	6.57	120.63	2.84	117.78	0.95	0.063	1.38	0.046	1.00	1.00	0.046	No
2	6.59	120.93	3.04	117.89	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
3	6.61	121.25	3.24	118.01	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
4	6.63	121.57	3.43	118.14	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
5	6.65	121.90	3.63	118.27	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
6	6.67	122.23	3.83	118.40	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
7	6.69	122.56	4.02	118.54	0.95	0.064	1.38	0.046	1.00	1.00	0.046	No
8	6.71	122.89	4.22	118.68	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
9	6.73	123.23	4.41	118.81	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
10	6.75	123.57	4.61	118.95	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
11	6.77	123.90	4.81	119.10	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
12	6.79	124.24	5.00	119.24	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
13	6.81	124.58	5.20	119.38	0.95	0.064	1.38	0.047	1.00	1.00	0.047	No
14	6.83	124.91	5.40	119.52	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
15	6.85	125.25	5.59	119.66	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
16	6.87	125.59	5.79	119.80	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
17	6.89	125.93	5.98	119.95	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
18	6.91	126.27	6.18	120.09	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
19	6.93	126.62	6.38	120.24	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
20	6.95	126.96	6.57	120.39	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
21	6.97	127.31	6.77	120.54	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
22	6.99	127.65	6.97	120.69	0.95	0.065	1.38	0.047	1.00	1.00	0.047	No
23	7.01	128.00	7.16	120.84	0.95	0.065	1.38	0.047	1.00	1.00	2.000	Yes
24	7.03	128.35	7.36	120.99	0.95	0.065	1.38	0.048	1.00	1.00	2.000	Yes
25	7.05	128.70	7.55	121.15	0.95	0.065	1.38	0.048	1.00	1.00	2.000	Yes
26	7.07	129.06	7.75	121.31	0.95	0.066	1.38	0.048	1.00	1.00	2.000	Yes
27	7.09	129.41	7.95	121.47	0.95	0.066	1.38	0.048	1.00	1.00	2.000	Yes
28	7.11	129.77	8.14	121.63	0.95	0.066	1.38	0.048	1.00	1.00	2.000	Yes
29	7.13	130.14	8.34	121.80	0.95	0.066	1.38	0.048	1.00	1.00	2.000	Yes
30	7.15	130.50	8.53	121.97	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
31	7.17	130.87	8.73	122.14	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
32	7.19	131.24	8.93	122.31	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
33	7.21	131.61	9.12	122.48	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
34	7.23	131.98	9.32	122.66	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
35	7.25	132.34	9.52	122.83	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
36	7.27	132.70	9.71	122.99	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
37	7.29	133.06	9.91	123.15	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
38	7.31	133.42	10.10	123.32	0.95	0.066	1.38	0.048	1.00	1.00	0.048	No
39	7.33	133.78	10.30	123.48	0.95	0.067	1.38	0.048	1.00	1.00	0.048	No
40	7.35	134.14	10.50	123.64	0.94	0.067	1.38	0.048	1.00	1.00	0.048	No
41	7.37	134.50	10.69	123.80	0.94	0.067	1.38	0.048	1.00	1.00	0.048	No
42	7.39	134.85	10.89	123.96	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
43	7.41	135.21	11.09	124.13	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
44	7.43	135.58	11.28	124.30	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
45	7.45	135.95	11.48	124.48	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
46	7.47	136.33	11.67	124.65	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
47	7.49	136.70	11.87	124.83	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
48	7.51	137.08	12.07	125.02	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	7.53	137.46	12.26	125.19	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
50	7.55	137.83	12.46	125.37	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
51	7.57	138.20	12.65	125.54	0.94	0.067	1.38	0.049	1.00	1.00	0.049	No
52	7.59	138.56	12.85	125.71	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
53	7.61	138.92	13.05	125.88	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
54	7.63	139.29	13.24	126.04	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
55	7.65	139.65	13.44	126.21	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
56	7.67	140.01	13.64	126.37	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
57	7.69	140.37	13.83	126.54	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
58	7.71	140.73	14.03	126.70	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
59	7.73	141.09	14.22	126.86	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
60	7.75	141.44	14.42	127.02	0.94	0.068	1.38	0.049	1.00	1.00	0.049	No
61	7.77	141.80	14.62	127.18	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
62	7.79	142.16	14.81	127.34	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
63	7.81	142.51	15.01	127.50	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
64	7.83	142.87	15.21	127.66	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
65	7.85	143.22	15.40	127.82	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
66	7.87	143.57	15.60	127.98	0.94	0.068	1.38	0.050	1.00	1.00	0.050	No
67	7.89	143.93	15.79	128.13	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
68	7.91	144.28	15.99	128.29	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
69	7.93	144.64	16.19	128.45	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
70	7.95	144.99	16.38	128.61	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
71	7.97	145.35	16.58	128.77	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
72	7.99	145.71	16.78	128.94	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
73	8.01	146.08	16.97	129.11	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
74	8.03	146.45	17.17	129.28	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
75	8.05	146.82	17.36	129.45	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
76	8.07	147.19	17.56	129.63	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
77	8.09	147.55	17.76	129.80	0.94	0.069	1.38	0.050	1.00	1.00	0.050	No
78	8.11	147.92	17.95	129.97	0.94	0.069	1.38	0.050	1.00	1.00	2.000	Yes
79	8.13	148.29	18.15	130.14	0.94	0.069	1.38	0.050	1.00	1.00	2.000	Yes
80	8.15	148.65	18.34	130.31	0.94	0.069	1.38	0.050	1.00	1.00	2.000	Yes
81	8.17	149.02	18.54	130.48	0.94	0.069	1.38	0.050	1.00	1.00	2.000	Yes
82	8.19	149.38	18.74	130.65	0.93	0.069	1.38	0.050	1.00	1.00	2.000	Yes
83	8.21	149.75	18.93	130.82	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
84	8.23	150.12	19.13	130.99	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
85	8.25	150.48	19.33	131.15	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
86	8.27	150.84	19.52	131.32	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
87	8.29	151.20	19.72	131.48	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
88	8.31	151.55	19.91	131.63	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
89	8.33	151.90	20.11	131.79	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
90	8.35	152.25	20.31	131.95	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
91	8.37	152.61	20.50	132.10	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
92	8.39	152.96	20.70	132.26	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
93	8.41	153.32	20.90	132.43	0.93	0.070	1.38	0.051	1.00	1.00	2.000	Yes
94	8.43	153.68	21.09	132.59	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No
95	8.45	154.04	21.29	132.76	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No
96	8.47	154.40	21.48	132.92	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	8.49	154.76	21.68	133.08	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No
98	8.51	155.11	21.88	133.23	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No
99	8.53	155.45	22.07	133.38	0.93	0.070	1.38	0.051	1.00	1.00	0.051	No
100	8.55	155.80	22.27	133.53	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
101	8.57	156.14	22.46	133.68	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
102	8.59	156.49	22.66	133.82	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
103	8.61	156.83	22.86	133.97	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
104	8.63	157.18	23.05	134.13	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
105	8.65	157.53	23.25	134.28	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
106	8.67	157.88	23.45	134.43	0.93	0.071	1.38	0.051	1.00	1.00	0.051	No
107	8.69	158.23	23.64	134.58	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
108	8.71	158.57	23.84	134.73	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
109	8.73	158.92	24.03	134.88	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
110	8.75	159.26	24.23	135.03	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
111	8.77	159.60	24.43	135.17	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
112	8.79	159.95	24.62	135.32	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
113	8.81	160.30	24.82	135.48	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
114	8.83	160.65	25.02	135.64	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
115	8.85	161.01	25.21	135.80	0.93	0.071	1.38	0.052	1.00	1.00	0.052	No
116	8.87	161.37	25.41	135.96	0.92	0.071	1.38	0.052	1.00	1.00	0.052	No
117	8.89	161.73	25.60	136.13	0.92	0.071	1.38	0.052	1.00	1.00	0.052	No
118	8.91	162.09	25.80	136.29	0.92	0.071	1.38	0.052	1.00	1.00	0.052	No
119	8.93	162.46	26.00	136.46	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
120	8.95	162.82	26.19	136.63	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
121	8.97	163.18	26.39	136.80	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
122	8.99	163.55	26.59	136.96	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
123	9.01	163.91	26.78	137.13	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
124	9.03	164.27	26.98	137.29	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
125	9.05	164.64	27.17	137.46	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
126	9.07	165.01	27.37	137.64	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
127	9.09	165.37	27.57	137.80	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
128	9.11	165.73	27.76	137.97	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
129	9.13	166.10	27.96	138.14	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
130	9.15	166.45	28.15	138.30	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
131	9.17	166.81	28.35	138.46	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
132	9.19	167.16	28.55	138.62	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
133	9.21	167.51	28.74	138.77	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
134	9.23	167.86	28.94	138.92	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
135	9.25	168.20	29.14	139.06	0.92	0.072	1.38	0.052	1.00	1.00	0.052	No
136	9.27	168.54	29.33	139.21	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
137	9.29	168.88	29.53	139.35	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
138	9.31	169.23	29.72	139.50	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
139	9.33	169.57	29.92	139.65	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
140	9.35	169.91	30.12	139.79	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
141	9.37	170.24	30.31	139.93	0.92	0.072	1.38	0.053	1.00	1.00	0.053	No
142	9.39	170.58	30.51	140.07	0.92	0.073	1.38	0.053	1.00	1.00	0.053	No
143	9.41	170.91	30.71	140.21	0.92	0.073	1.38	0.053	1.00	1.00	0.053	No
144	9.43	171.25	30.90	140.35	0.92	0.073	1.38	0.053	1.00	1.00	0.053	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	9.45	171.59	31.10	140.49	0.92	0.073	1.38	0.053	1.00	1.00	0.053	No
146	9.47	171.92	31.29	140.63	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
147	9.49	172.26	31.49	140.77	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
148	9.51	172.59	31.69	140.90	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
149	9.53	172.92	31.88	141.04	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
150	9.55	173.25	32.08	141.18	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
151	9.57	173.58	32.27	141.31	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
152	9.59	173.91	32.47	141.44	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
153	9.61	174.25	32.67	141.58	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
154	9.63	174.58	32.86	141.71	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
155	9.65	174.91	33.06	141.85	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
156	9.67	175.24	33.26	141.99	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
157	9.69	175.58	33.45	142.12	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
158	9.71	175.91	33.65	142.27	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
159	9.73	176.26	33.84	142.42	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
160	9.75	176.61	34.04	142.57	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
161	9.77	176.96	34.24	142.73	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
162	9.79	177.32	34.43	142.88	0.91	0.073	1.38	0.053	1.00	1.00	2.000	Yes
163	9.81	177.67	34.63	143.04	0.91	0.073	1.38	0.053	1.00	1.00	0.053	No
164	9.83	178.02	34.83	143.20	0.91	0.073	1.38	0.053	1.00	1.00	0.053	No
165	9.85	178.38	35.02	143.35	0.91	0.073	1.38	0.053	1.00	1.00	0.053	No
166	9.87	178.73	35.22	143.51	0.91	0.073	1.38	0.053	1.00	1.00	0.053	No
167	9.89	179.08	35.41	143.67	0.91	0.073	1.38	0.053	1.00	1.00	0.053	No
168	9.91	179.44	35.61	143.83	0.91	0.074	1.38	0.053	1.00	1.00	0.053	No
169	9.93	179.79	35.81	143.98	0.91	0.074	1.38	0.053	1.00	1.00	0.053	No
170	9.95	180.13	36.00	144.13	0.91	0.074	1.38	0.053	1.00	1.00	0.053	No
171	9.97	180.48	36.20	144.28	0.91	0.074	1.38	0.054	1.00	1.00	0.054	No
172	9.99	180.82	36.40	144.43	0.91	0.074	1.38	0.054	1.00	1.00	0.054	No
173	10.01	181.16	36.59	144.57	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
174	10.03	181.50	36.79	144.71	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
175	10.05	181.83	36.98	144.85	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
176	10.07	182.16	37.18	144.98	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
177	10.09	182.50	37.38	145.12	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
178	10.11	182.83	37.57	145.26	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
179	10.13	183.16	37.77	145.39	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
180	10.15	183.49	37.96	145.53	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
181	10.17	183.83	38.16	145.67	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
182	10.19	184.16	38.36	145.80	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
183	10.21	184.49	38.55	145.94	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
184	10.23	184.82	38.75	146.07	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
185	10.25	185.15	38.95	146.20	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
186	10.27	185.48	39.14	146.34	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
187	10.29	185.80	39.34	146.46	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
188	10.31	186.13	39.53	146.59	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
189	10.33	186.45	39.73	146.72	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
190	10.35	186.77	39.93	146.84	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
191	10.37	187.08	40.12	146.96	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
192	10.39	187.40	40.32	147.08	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	10.41	187.72	40.52	147.20	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
194	10.43	188.04	40.71	147.33	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
195	10.45	188.36	40.91	147.45	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
196	10.47	188.67	41.10	147.57	0.90	0.074	1.38	0.054	1.00	1.00	0.054	No
197	10.49	188.99	41.30	147.69	0.89	0.074	1.38	0.054	1.00	1.00	0.054	No
198	10.51	189.31	41.50	147.82	0.89	0.074	1.38	0.054	1.00	1.00	0.054	No
199	10.53	189.63	41.69	147.94	0.89	0.074	1.38	0.054	1.00	1.00	0.054	No
200	10.55	189.95	41.89	148.06	0.89	0.074	1.38	0.054	1.00	1.00	0.054	No
201	10.57	190.26	42.08	148.17	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
202	10.59	190.57	42.28	148.29	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
203	10.61	190.89	42.48	148.41	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
204	10.63	191.20	42.67	148.52	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
205	10.65	191.51	42.87	148.64	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
206	10.67	191.82	43.07	148.75	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
207	10.69	192.13	43.26	148.87	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
208	10.71	192.44	43.46	148.98	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
209	10.73	192.75	43.65	149.10	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
210	10.75	193.06	43.85	149.21	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
211	10.77	193.37	44.05	149.32	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
212	10.79	193.68	44.24	149.44	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
213	10.81	193.99	44.44	149.55	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
214	10.83	194.30	44.64	149.66	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
215	10.85	194.60	44.83	149.77	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
216	10.87	194.91	45.03	149.88	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
217	10.89	195.22	45.22	150.00	0.89	0.075	1.38	0.054	1.00	1.00	0.054	No
218	10.91	195.53	45.42	150.11	0.88	0.075	1.38	0.054	1.00	1.00	0.054	No
219	10.93	195.84	45.62	150.22	0.88	0.075	1.38	0.054	1.00	1.00	0.054	No
220	10.95	196.15	45.81	150.34	0.88	0.075	1.38	0.054	1.00	1.00	0.054	No
221	10.97	196.46	46.01	150.45	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
222	10.99	196.77	46.21	150.56	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
223	11.01	197.07	46.40	150.67	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
224	11.03	197.38	46.60	150.78	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
225	11.05	197.68	46.79	150.89	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
226	11.07	198.00	46.99	151.01	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
227	11.09	198.31	47.19	151.13	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
228	11.11	198.63	47.38	151.25	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
229	11.13	198.95	47.58	151.37	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
230	11.15	199.27	47.77	151.49	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
231	11.17	199.58	47.97	151.61	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
232	11.19	199.90	48.17	151.73	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
233	11.21	200.21	48.36	151.85	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
234	11.23	200.52	48.56	151.97	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
235	11.25	200.84	48.76	152.08	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
236	11.27	201.15	48.95	152.19	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
237	11.29	201.46	49.15	152.31	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
238	11.31	201.77	49.34	152.42	0.88	0.075	1.38	0.055	1.00	1.00	0.055	No
239	11.33	202.08	49.54	152.53	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
240	11.35	202.39	49.74	152.65	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	11.37	202.70	49.93	152.76	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
242	11.39	203.01	50.13	152.88	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
243	11.41	203.32	50.33	152.99	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
244	11.43	203.63	50.52	153.11	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
245	11.45	203.94	50.72	153.22	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
246	11.47	204.25	50.91	153.34	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
247	11.49	204.57	51.11	153.46	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
248	11.51	204.88	51.31	153.57	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
249	11.53	205.19	51.50	153.69	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
250	11.55	205.50	51.70	153.80	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
251	11.57	205.81	51.89	153.92	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
252	11.59	206.12	52.09	154.03	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
253	11.61	206.44	52.29	154.15	0.87	0.075	1.38	0.055	1.00	1.00	0.055	No
254	11.63	206.75	52.48	154.26	0.87	0.076	1.38	0.055	1.00	1.00	0.055	No
255	11.65	207.06	52.68	154.38	0.87	0.076	1.38	0.055	1.00	1.00	0.055	No
256	11.67	207.37	52.88	154.49	0.87	0.076	1.38	0.055	1.00	1.00	0.055	No
257	11.69	207.68	53.07	154.61	0.87	0.076	1.38	0.055	1.00	1.00	0.055	No
258	11.71	207.99	53.27	154.72	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
259	11.73	208.30	53.46	154.83	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
260	11.75	208.61	53.66	154.95	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
261	11.77	208.92	53.86	155.06	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
262	11.79	209.23	54.05	155.17	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
263	11.81	209.54	54.25	155.29	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
264	11.83	209.85	54.45	155.40	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
265	11.85	210.16	54.64	155.52	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
266	11.87	210.47	54.84	155.63	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
267	11.89	210.78	55.03	155.74	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
268	11.91	211.09	55.23	155.86	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
269	11.93	211.40	55.43	155.97	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
270	11.95	211.71	55.62	156.09	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
271	11.97	212.02	55.82	156.20	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
272	11.99	212.33	56.02	156.32	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
273	12.01	212.64	56.21	156.43	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
274	12.03	212.95	56.41	156.55	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
275	12.05	213.27	56.60	156.66	0.86	0.076	1.38	0.055	1.00	1.00	0.055	No
276	12.07	213.58	56.80	156.78	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
277	12.09	213.90	57.00	156.90	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
278	12.11	214.22	57.19	157.02	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
279	12.13	214.53	57.39	157.14	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
280	12.15	214.85	57.58	157.27	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
281	12.17	215.17	57.78	157.39	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
282	12.19	215.49	57.98	157.51	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
283	12.21	215.81	58.17	157.63	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
284	12.23	216.12	58.37	157.75	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
285	12.25	216.44	58.57	157.88	0.85	0.076	1.38	0.055	1.00	1.00	2.000	Yes
286	12.27	216.76	58.76	158.00	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
287	12.29	217.09	58.96	158.13	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
288	12.31	217.42	59.15	158.27	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	12.33	217.75	59.35	158.40	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
290	12.35	218.08	59.55	158.53	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
291	12.37	218.41	59.74	158.67	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
292	12.39	218.75	59.94	158.81	0.85	0.076	1.38	0.055	1.00	1.00	0.055	No
293	12.41	219.08	60.14	158.94	0.84	0.076	1.38	0.055	1.00	1.00	0.055	No
294	12.43	219.41	60.33	159.08	0.84	0.076	1.38	0.055	1.00	1.00	0.055	No
295	12.45	219.75	60.53	159.22	0.84	0.076	1.38	0.055	1.00	1.00	0.055	No
296	12.47	220.08	60.72	159.35	0.84	0.076	1.38	0.055	1.00	1.00	0.055	No
297	12.49	220.41	60.92	159.49	0.84	0.076	1.38	0.055	1.00	1.00	0.055	No
298	12.51	220.74	61.12	159.63	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
299	12.53	221.08	61.31	159.77	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
300	12.55	221.41	61.51	159.90	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
301	12.57	221.75	61.70	160.04	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
302	12.59	222.09	61.90	160.19	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
303	12.61	222.43	62.10	160.34	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
304	12.63	222.78	62.29	160.48	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
305	12.65	223.12	62.49	160.63	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
306	12.67	223.47	62.69	160.78	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
307	12.69	223.81	62.88	160.93	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
308	12.71	224.16	63.08	161.08	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
309	12.73	224.50	63.27	161.23	0.84	0.076	1.38	0.055	1.00	1.00	2.000	Yes
310	12.75	224.85	63.47	161.38	0.83	0.076	1.38	0.055	1.00	1.00	2.000	Yes
311	12.77	225.19	63.67	161.52	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
312	12.79	225.53	63.86	161.67	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
313	12.81	225.87	64.06	161.81	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
314	12.83	226.21	64.26	161.95	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
315	12.85	226.54	64.45	162.09	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
316	12.87	226.87	64.65	162.23	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
317	12.89	227.21	64.84	162.36	0.83	0.076	1.38	0.055	1.00	1.00	0.055	No
318	12.91	227.54	65.04	162.50	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
319	12.93	227.87	65.24	162.63	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
320	12.95	228.20	65.43	162.77	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
321	12.97	228.53	65.63	162.90	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
322	12.99	228.87	65.83	163.04	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
323	13.01	229.20	66.02	163.18	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
324	13.03	229.53	66.22	163.31	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
325	13.05	229.87	66.41	163.45	0.83	0.075	1.38	0.055	1.00	1.00	0.055	No
326	13.07	230.20	66.61	163.59	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
327	13.09	230.53	66.81	163.73	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
328	13.11	230.87	67.00	163.86	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
329	13.13	231.20	67.20	164.00	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
330	13.15	231.53	67.39	164.13	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
331	13.17	231.86	67.59	164.27	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
332	13.19	232.19	67.79	164.40	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
333	13.21	232.52	67.98	164.54	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
334	13.23	232.85	68.18	164.67	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
335	13.25	233.18	68.38	164.81	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
336	13.27	233.51	68.57	164.94	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	13.29	233.84	68.77	165.07	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
338	13.31	234.17	68.96	165.21	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
339	13.33	234.50	69.16	165.34	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
340	13.35	234.83	69.36	165.47	0.82	0.075	1.38	0.055	1.00	1.00	0.055	No
341	13.37	235.15	69.55	165.60	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
342	13.39	235.48	69.75	165.73	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
343	13.41	235.81	69.95	165.86	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
344	13.43	236.13	70.14	165.99	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
345	13.45	236.46	70.34	166.12	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
346	13.47	236.79	70.53	166.25	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
347	13.49	237.12	70.73	166.38	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
348	13.51	237.44	70.93	166.52	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
349	13.53	237.77	71.12	166.65	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
350	13.55	238.11	71.32	166.79	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
351	13.57	238.44	71.51	166.93	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
352	13.59	238.77	71.71	167.06	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
353	13.61	239.11	71.91	167.20	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
354	13.63	239.44	72.10	167.33	0.81	0.075	1.38	0.055	1.00	1.00	0.055	No
355	13.65	239.76	72.30	167.46	0.81	0.075	1.38	0.054	1.00	1.00	0.054	No
356	13.67	240.09	72.50	167.60	0.81	0.075	1.38	0.054	1.00	1.00	0.054	No
357	13.69	240.42	72.69	167.73	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
358	13.71	240.74	72.89	167.85	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
359	13.73	241.07	73.08	167.98	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
360	13.75	241.39	73.28	168.11	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
361	13.77	241.71	73.48	168.24	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
362	13.79	242.04	73.67	168.36	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
363	13.81	242.36	73.87	168.49	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
364	13.83	242.68	74.07	168.62	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
365	13.85	243.01	74.26	168.74	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
366	13.87	243.33	74.46	168.87	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
367	13.89	243.66	74.65	169.00	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
368	13.91	243.98	74.85	169.13	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
369	13.93	244.31	75.05	169.26	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
370	13.95	244.63	75.24	169.39	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
371	13.97	244.95	75.44	169.52	0.80	0.075	1.38	0.054	1.00	1.00	0.054	No
372	13.99	245.28	75.64	169.64	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
373	14.01	245.60	75.83	169.77	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
374	14.03	245.92	76.03	169.89	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
375	14.05	246.24	76.22	170.02	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
376	14.07	246.56	76.42	170.14	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
377	14.09	246.88	76.62	170.26	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
378	14.11	247.20	76.81	170.38	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
379	14.13	247.51	77.01	170.51	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
380	14.15	247.83	77.20	170.63	0.79	0.075	1.38	0.054	1.00	1.00	0.054	No
381	14.17	248.15	77.40	170.75	0.79	0.074	1.38	0.054	1.00	1.00	0.054	No
382	14.19	248.47	77.60	170.87	0.79	0.074	1.38	0.054	1.00	1.00	0.054	No
383	14.21	248.79	77.79	171.00	0.79	0.074	1.38	0.054	1.00	1.00	2.000	Yes
384	14.23	249.11	77.99	171.12	0.79	0.074	1.38	0.054	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
385	14.25	249.43	78.19	171.24	0.79	0.074	1.38	0.054	1.00	1.00	2.000	Yes
386	14.27	249.75	78.38	171.36	0.79	0.074	1.38	0.054	1.00	1.00	2.000	Yes
387	14.29	250.07	78.58	171.49	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
388	14.31	250.39	78.77	171.61	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
389	14.33	250.71	78.97	171.74	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
390	14.35	251.03	79.17	171.87	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
391	14.37	251.36	79.36	171.99	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
392	14.39	251.69	79.56	172.13	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
393	14.41	252.01	79.76	172.26	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
394	14.43	252.34	79.95	172.39	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
395	14.45	252.67	80.15	172.52	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
396	14.47	253.00	80.34	172.65	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
397	14.49	253.32	80.54	172.78	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
398	14.51	253.65	80.74	172.92	0.78	0.074	1.38	0.054	1.00	1.00	0.054	No
399	14.53	253.98	80.93	173.05	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
400	14.55	254.30	81.13	173.17	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
401	14.57	254.62	81.32	173.29	0.78	0.074	1.38	0.054	1.00	1.00	2.000	Yes
402	14.59	254.94	81.52	173.42	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
403	14.61	255.26	81.72	173.54	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
404	14.63	255.58	81.91	173.66	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
405	14.65	255.90	82.11	173.79	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
406	14.67	256.22	82.31	173.91	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
407	14.69	256.54	82.50	174.04	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
408	14.71	256.86	82.70	174.16	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
409	14.73	257.17	82.89	174.28	0.77	0.074	1.38	0.054	1.00	1.00	2.000	Yes
410	14.75	257.49	83.09	174.40	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
411	14.77	257.80	83.29	174.52	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
412	14.79	258.12	83.48	174.64	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
413	14.81	258.44	83.68	174.76	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
414	14.83	258.75	83.88	174.88	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
415	14.85	259.07	84.07	175.00	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
416	14.87	259.38	84.27	175.12	0.77	0.074	1.38	0.054	1.00	1.00	0.054	No
417	14.89	259.70	84.46	175.24	0.76	0.074	1.38	0.054	1.00	1.00	2.000	Yes
418	14.91	260.02	84.66	175.36	0.76	0.074	1.38	0.053	1.00	1.00	2.000	Yes
419	14.93	260.34	84.86	175.48	0.76	0.074	1.38	0.053	1.00	1.00	2.000	Yes
420	14.95	260.66	85.05	175.61	0.76	0.074	1.38	0.053	1.00	1.00	2.000	Yes
421	14.97	260.98	85.25	175.73	0.76	0.074	1.38	0.053	1.00	1.00	2.000	Yes
422	14.99	261.30	85.45	175.86	0.76	0.074	1.38	0.053	1.00	1.00	2.000	Yes
423	15.01	261.63	85.64	175.99	0.76	0.073	1.38	0.053	1.00	1.00	2.000	Yes
424	15.03	261.95	85.84	176.11	0.76	0.073	1.38	0.053	1.00	1.00	2.000	Yes
425	15.05	262.28	86.03	176.24	0.76	0.073	1.38	0.053	1.00	1.00	2.000	Yes
426	15.07	262.60	86.23	176.37	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
427	15.09	262.92	86.43	176.50	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
428	15.11	263.24	86.62	176.62	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
429	15.13	263.57	86.82	176.75	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
430	15.15	263.89	87.01	176.87	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
431	15.17	264.21	87.21	177.00	0.76	0.073	1.38	0.053	1.00	1.00	0.053	No
432	15.19	264.53	87.41	177.12	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
433	15.21	264.85	87.60	177.25	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
434	15.23	265.17	87.80	177.37	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
435	15.25	265.49	88.00	177.49	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
436	15.27	265.81	88.19	177.62	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
437	15.29	266.13	88.39	177.74	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
438	15.31	266.45	88.58	177.86	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
439	15.33	266.76	88.78	177.98	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
440	15.35	267.08	88.98	178.10	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
441	15.37	267.39	89.17	178.22	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
442	15.39	267.71	89.37	178.34	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
443	15.41	268.03	89.57	178.46	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
444	15.43	268.35	89.76	178.58	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
445	15.45	268.66	89.96	178.71	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
446	15.47	268.98	90.15	178.83	0.75	0.073	1.38	0.053	1.00	1.00	0.053	No
447	15.49	269.30	90.35	178.95	0.74	0.073	1.38	0.053	1.00	1.00	0.053	No
448	15.51	269.62	90.55	179.08	0.74	0.073	1.38	0.053	1.00	1.00	0.053	No
449	15.53	269.95	90.74	179.20	0.74	0.073	1.38	0.053	1.00	1.00	0.053	No
450	15.55	270.27	90.94	179.33	0.74	0.073	1.38	0.053	1.00	1.00	0.053	No
451	15.57	270.58	91.13	179.45	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
452	15.59	270.90	91.33	179.57	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
453	15.61	271.22	91.53	179.69	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
454	15.63	271.54	91.72	179.82	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
455	15.65	271.87	91.92	179.95	0.74	0.073	1.38	0.053	1.00	1.00	0.053	No
456	15.67	272.21	92.12	180.09	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
457	15.69	272.55	92.31	180.24	0.74	0.073	1.38	0.053	1.00	1.00	2.000	Yes
458	15.71	272.91	92.51	180.40	0.74	0.072	1.38	0.053	1.00	1.00	2.000	Yes
459	15.73	273.27	92.70	180.56	0.74	0.072	1.38	0.053	1.00	1.00	2.000	Yes
460	15.75	273.63	92.90	180.73	0.74	0.072	1.38	0.053	1.00	1.00	2.000	Yes
461	15.77	274.00	93.10	180.91	0.74	0.072	1.38	0.053	1.00	1.00	2.000	Yes
462	15.79	274.38	93.29	181.08	0.73	0.072	1.38	0.053	1.00	1.00	2.000	Yes
463	15.81	274.75	93.49	181.26	0.73	0.072	1.38	0.053	1.00	1.00	2.000	Yes
464	15.83	275.12	93.69	181.44	0.73	0.072	1.38	0.053	1.00	1.00	2.000	Yes
465	15.85	275.50	93.88	181.61	0.73	0.072	1.38	0.052	1.00	1.00	2.000	Yes
466	15.87	275.87	94.08	181.79	0.73	0.072	1.38	0.052	1.00	1.00	2.000	Yes
467	15.89	276.25	94.27	181.98	0.73	0.072	1.38	0.052	1.00	1.00	2.000	Yes
468	15.91	276.64	94.47	182.17	0.73	0.072	1.38	0.052	1.00	1.00	2.000	Yes
469	15.93	277.04	94.67	182.38	0.73	0.072	1.38	0.052	1.00	1.00	2.000	Yes
470	15.95	277.45	94.86	182.59	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
471	15.97	277.86	95.06	182.80	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
472	15.99	278.27	95.26	183.01	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
473	16.01	278.68	95.45	183.23	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
474	16.03	279.09	95.65	183.45	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
475	16.05	279.51	95.84	183.67	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
476	16.07	279.93	96.04	183.89	0.73	0.072	1.38	0.052	1.00	1.00	0.052	No
477	16.09	280.35	96.24	184.11	0.72	0.072	1.38	0.052	1.00	1.00	0.052	No
478	16.11	280.78	96.43	184.34	0.72	0.072	1.38	0.052	1.00	1.00	0.052	No
479	16.13	281.21	96.63	184.58	0.72	0.072	1.38	0.052	1.00	1.00	0.052	No
480	16.15	281.64	96.82	184.81	0.72	0.072	1.38	0.052	1.00	1.00	0.052	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (KPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
481	16.17	282.07	97.02	185.05	0.72	0.072	1.38	0.052	1.00	1.00	0.052	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	6.57	0.19	3.53	5.59	1.00	3.43	22.59	77.38	0.163	No	Yes	2.00
2	6.59	0.19	3.60	7.34	1.00	3.42	25.32	86.46	0.163	No	Yes	2.00
3	6.61	0.30	3.35	5.45	1.00	5.69	16.45	93.67	0.272	No	Yes	2.00
4	6.63	0.55	3.02	3.60	1.00	10.64	9.14	97.22	0.507	No	Yes	2.00
5	6.65	0.89	2.74	2.33	0.90	17.23	5.14	88.55	0.822	No	Yes	2.00
6	6.67	1.09	2.63	2.01	0.86	21.15	6.56	138.79	0.296	No	No	2.00
7	6.69	1.12	2.62	2.04	0.86	21.83	6.29	137.29	0.289	No	No	2.00
8	6.71	1.04	2.69	2.38	0.88	20.21	9.54	192.78	0.672	No	No	2.00
9	6.73	0.98	2.75	2.77	0.91	18.93	5.27	99.79	0.903	No	Yes	2.00
10	6.75	1.02	2.74	2.81	0.90	19.82	5.14	101.88	0.945	No	Yes	2.00
11	6.77	1.08	2.72	2.78	0.89	21.03	4.88	102.70	1.003	No	Yes	2.00
12	6.79	1.13	2.69	2.63	0.88	22.04	9.33	205.70	3.600	No	No	2.00
13	6.81	1.08	2.70	2.64	0.89	20.91	4.75	99.39	0.998	No	Yes	2.00
14	6.83	1.03	2.72	2.64	0.90	20.00	4.93	98.53	0.954	No	Yes	2.00
15	6.85	1.08	2.69	2.54	0.88	21.02	9.73	204.55	3.600	No	No	2.00
16	6.87	1.19	2.64	2.40	0.87	23.18	7.17	166.31	0.457	No	No	2.00
17	6.89	1.30	2.61	2.38	0.85	25.24	5.88	148.44	0.346	No	No	2.00
18	6.91	1.32	2.63	2.57	0.86	25.66	6.46	165.69	0.453	No	No	2.00
19	6.93	1.29	2.66	2.87	0.87	25.17	8.13	204.56	3.600	No	No	2.00
20	6.95	1.24	2.70	3.11	0.89	24.17	10.14	244.99	3.600	No	No	2.00
21	6.97	1.20	2.73	3.27	0.90	23.28	4.98	116.01	1.111	No	Yes	2.00
22	6.99	1.18	2.75	3.52	0.91	22.97	5.27	120.97	1.096	No	Yes	2.00
23	7.01	1.24	2.74	3.53	0.90	24.09	5.10	122.85	4.000	Yes	Yes	2.00
24	7.03	1.35	2.69	3.34	0.89	26.30	9.65	253.95	4.000	Yes	No	2.00
25	7.05	1.76	2.53	2.54	0.82	34.24	3.36	115.01	4.000	Yes	No	2.00
26	7.07	2.45	2.32	1.81	0.74	47.85	2.01	95.97	4.000	Yes	No	2.00
27	7.09	3.35	2.15	1.42	0.68	65.59	1.50	98.55	4.000	Yes	No	2.00
28	7.11	4.15	2.04	1.26	0.64	81.47	1.35	109.71	4.000	Yes	No	2.00
29	7.13	4.63	2.00	1.22	0.62	90.87	1.31	118.60	4.000	Yes	No	2.00
30	7.15	4.75	1.99	1.22	0.62	93.30	1.30	121.16	0.245	No	No	2.00
31	7.17	4.84	2.00	1.27	0.62	95.03	1.30	123.84	0.257	No	No	2.00
32	7.19	5.19	1.97	1.26	0.61	101.91	1.28	130.85	0.288	No	No	2.00
33	7.21	5.63	1.92	1.18	0.59	110.72	1.25	138.66	0.328	No	No	2.00
34	7.23	5.77	1.89	1.08	0.58	113.39	1.23	139.47	0.332	No	No	2.00
35	7.25	5.11	1.93	1.09	0.60	100.35	1.26	126.35	0.268	No	No	2.00
36	7.27	4.14	2.04	1.26	0.64	81.27	1.35	109.53	0.202	No	No	2.00
37	7.29	3.14	2.21	1.66	0.70	61.46	1.65	101.33	0.177	No	No	2.00
38	7.31	2.57	2.35	2.12	0.76	50.17	2.13	107.03	0.194	No	No	2.00
39	7.33	2.22	2.45	2.56	0.80	43.23	2.67	115.42	0.223	No	No	2.00
40	7.35	2.74	2.30	1.94	0.74	53.60	1.94	103.76	0.184	No	No	2.00
41	7.37	4.01	2.03	1.15	0.63	78.67	1.33	104.88	0.187	No	No	2.00
42	7.39	5.29	1.83	0.77	0.56	103.95	1.18	122.75	0.252	No	No	2.00
43	7.41	6.09	1.76	0.72	0.53	119.64	1.10	131.95	0.294	No	No	2.00
44	7.43	6.55	1.78	0.85	0.54	128.82	1.13	145.52	0.367	No	No	2.00
45	7.45	7.26	1.77	0.93	0.54	142.70	1.12	159.72	0.459	No	No	2.00
46	7.47	7.81	1.76	0.98	0.53	153.52	1.11	169.97	0.537	No	No	2.00
47	7.49	8.16	1.75	0.98	0.53	160.58	1.09	174.59	0.575	No	No	2.00
48	7.51	8.42	1.73	0.95	0.52	165.60	1.05	174.36	0.573	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	7.53	8.70	1.69	0.87	0.51	171.09	1.00	171.09	0.546	No	No	2.00
50	7.55	8.87	1.63	0.72	0.48	174.49	1.00	174.49	0.574	No	No	2.00
51	7.57	8.92	1.59	0.59	0.47	171.29	1.00	171.29	0.547	No	No	2.00
52	7.59	8.78	1.56	0.51	0.46	165.73	1.00	165.73	0.503	No	No	2.00
53	7.61	8.56	1.56	0.50	0.46	161.53	1.00	161.53	0.472	No	No	2.00
54	7.63	8.36	1.57	0.51	0.46	158.13	1.00	158.13	0.448	No	No	2.00
55	7.65	8.17	1.58	0.51	0.47	154.79	1.00	154.79	0.425	No	No	2.00
56	7.67	7.82	1.61	0.53	0.47	149.44	1.00	149.44	0.390	No	No	2.00
57	7.69	7.15	1.65	0.57	0.49	139.03	1.00	139.03	0.330	No	No	2.00
58	7.71	6.30	1.72	0.65	0.52	123.67	1.03	127.58	0.273	No	No	2.00
59	7.73	5.53	1.80	0.73	0.55	108.51	1.15	124.97	0.262	No	No	2.00
60	7.75	5.19	1.83	0.77	0.56	101.68	1.19	120.77	0.244	No	No	2.00
61	7.77	5.22	1.83	0.78	0.56	102.31	1.19	121.50	0.247	No	No	2.00
62	7.79	5.72	1.76	0.67	0.53	112.29	1.11	124.08	0.258	No	No	2.00
63	7.81	6.27	1.69	0.56	0.51	122.36	1.00	122.36	0.250	No	No	2.00
64	7.83	6.80	1.63	0.48	0.49	128.48	1.00	128.48	0.277	No	No	2.00
65	7.85	6.95	1.61	0.45	0.48	129.84	1.00	129.84	0.284	No	No	2.00
66	7.87	6.99	1.61	0.44	0.48	130.11	1.00	130.11	0.285	No	No	2.00
67	7.89	6.70	1.63	0.46	0.49	125.74	1.00	125.74	0.265	No	No	2.00
68	7.91	6.17	1.70	0.57	0.51	119.29	1.00	119.29	0.238	No	No	2.00
69	7.93	5.42	1.78	0.66	0.54	106.21	1.13	119.93	0.240	No	No	2.00
70	7.95	4.76	1.88	0.81	0.58	93.30	1.22	113.84	0.217	No	No	2.00
71	7.97	4.11	2.00	1.04	0.62	80.45	1.30	104.85	0.187	No	No	2.00
72	7.99	3.50	2.17	1.59	0.69	68.31	1.54	105.09	0.188	No	No	2.00
73	8.01	3.04	2.32	2.27	0.75	59.16	1.99	117.82	0.232	No	No	2.00
74	8.03	3.58	2.23	2.06	0.72	69.96	1.71	119.49	0.239	No	No	2.00
75	8.05	5.22	1.99	1.36	0.62	102.30	1.30	132.96	0.299	No	No	2.00
76	8.07	7.10	1.77	0.88	0.54	138.41	1.11	153.85	0.419	No	No	2.00
77	8.09	7.99	1.68	0.69	0.50	148.82	1.00	148.82	0.387	No	No	2.00
78	8.11	7.39	1.70	0.70	0.51	138.84	1.00	138.84	4.000	Yes	No	2.00
79	8.13	6.14	1.82	0.89	0.56	120.43	1.17	140.78	4.000	Yes	No	2.00
80	8.15	4.82	1.99	1.23	0.62	94.33	1.30	122.41	4.000	Yes	No	2.00
81	8.17	3.75	2.19	1.83	0.70	73.13	1.58	115.62	4.000	Yes	No	2.00
82	8.19	2.99	2.34	2.44	0.76	58.12	2.10	122.34	4.000	Yes	No	2.00
83	8.21	2.50	2.47	3.07	0.81	48.51	2.78	134.71	4.000	Yes	No	2.00
84	8.23	2.26	2.53	3.37	0.83	43.80	3.40	148.90	4.000	Yes	No	2.00
85	8.25	2.04	2.58	3.60	0.85	39.44	4.83	190.36	4.000	Yes	No	2.00
86	8.27	1.92	2.58	3.37	0.85	37.06	4.82	178.55	4.000	Yes	No	2.00
87	8.29	1.97	2.51	2.73	0.82	37.99	3.07	116.58	4.000	Yes	No	2.00
88	8.31	2.21	2.38	1.95	0.77	42.83	2.26	96.98	4.000	Yes	No	2.00
89	8.33	2.55	2.27	1.58	0.73	49.39	1.83	90.41	4.000	Yes	No	2.00
90	8.35	2.96	2.18	1.35	0.70	57.45	1.56	89.82	4.000	Yes	No	2.00
91	8.37	3.36	2.12	1.25	0.67	65.36	1.44	94.29	4.000	Yes	No	2.00
92	8.39	3.70	2.07	1.21	0.66	72.06	1.38	99.57	4.000	Yes	No	2.00
93	8.41	3.95	2.05	1.21	0.65	77.04	1.35	104.37	4.000	Yes	No	2.00
94	8.43	4.15	2.03	1.20	0.64	80.92	1.34	108.14	0.198	No	No	2.00
95	8.45	4.33	2.01	1.16	0.63	84.46	1.31	110.92	0.207	No	No	2.00
96	8.47	4.50	1.95	1.00	0.61	87.82	1.27	111.73	0.210	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	8.49	4.67	1.89	0.82	0.59	90.13	1.23	111.03	0.207	No	No	2.00
98	8.51	4.85	1.82	0.62	0.56	90.75	1.18	106.64	0.193	No	No	2.00
99	8.53	4.91	1.78	0.52	0.54	89.83	1.13	101.67	0.178	No	No	2.00
100	8.55	4.78	1.77	0.47	0.54	86.90	1.00	86.90	0.141	No	No	2.00
101	8.57	3.99	1.88	0.61	0.58	75.79	1.22	92.74	0.154	No	No	2.00
102	8.59	3.56	1.96	0.75	0.61	69.29	1.28	88.57	0.145	No	No	2.00
103	8.61	3.22	2.06	0.95	0.65	62.49	1.36	85.20	0.138	No	No	2.00
104	8.63	3.67	1.99	0.86	0.62	71.48	1.30	92.69	0.154	No	No	2.00
105	8.65	4.59	1.86	0.68	0.58	85.74	1.21	103.89	0.184	No	No	2.00
106	8.67	5.61	1.73	0.49	0.53	98.83	1.00	98.83	0.170	No	No	2.00
107	8.69	6.39	1.64	0.37	0.49	108.19	1.00	108.19	0.198	No	No	2.00
108	8.71	6.28	1.64	0.35	0.49	105.89	1.00	105.89	0.190	No	No	2.00
109	8.73	5.93	1.66	0.36	0.50	100.64	1.00	100.64	0.175	No	No	2.00
110	8.75	5.35	1.71	0.38	0.52	92.28	1.00	92.28	0.153	No	No	2.00
111	8.77	5.00	1.75	0.43	0.53	87.75	1.00	87.75	0.143	No	No	2.00
112	8.79	4.90	1.79	0.52	0.55	87.30	1.15	99.96	0.173	No	No	2.00
113	8.81	5.05	1.82	0.63	0.56	90.87	1.18	107.07	0.194	No	No	2.00
114	8.83	5.08	1.86	0.74	0.57	92.53	1.21	111.69	0.210	No	No	2.00
115	8.85	4.96	1.90	0.87	0.59	91.75	1.24	113.59	0.216	No	No	2.00
116	8.87	4.74	1.94	0.97	0.61	88.84	1.26	112.38	0.212	No	No	2.00
117	8.89	4.34	2.01	1.15	0.63	83.27	1.31	109.50	0.202	No	No	2.00
118	8.91	3.98	2.08	1.34	0.66	77.40	1.39	107.38	0.195	No	No	2.00
119	8.93	3.76	2.14	1.54	0.68	73.09	1.48	107.93	0.197	No	No	2.00
120	8.95	3.62	2.18	1.74	0.70	70.39	1.57	110.67	0.206	No	No	2.00
121	8.97	3.35	2.23	1.85	0.72	64.95	1.69	109.46	0.202	No	No	2.00
122	8.99	2.93	2.30	2.04	0.74	56.74	1.92	108.92	0.200	No	No	2.00
123	9.01	2.62	2.37	2.32	0.77	50.69	2.23	113.24	0.215	No	No	2.00
124	9.03	2.93	2.33	2.26	0.76	56.66	2.04	115.60	0.224	No	No	2.00
125	9.05	4.02	2.14	1.67	0.68	78.28	1.48	115.84	0.225	No	No	2.00
126	9.07	5.72	1.92	1.06	0.60	103.31	1.25	128.86	0.279	No	No	2.00
127	9.09	6.93	1.78	0.76	0.54	118.43	1.12	133.16	0.300	No	No	2.00
128	9.11	7.27	1.73	0.64	0.52	121.54	1.04	126.42	0.268	No	No	2.00
129	9.13	6.78	1.75	0.64	0.53	113.83	1.08	122.59	0.251	No	No	2.00
130	9.15	6.25	1.77	0.64	0.54	105.75	1.12	118.45	0.235	No	No	2.00
131	9.17	5.86	1.79	0.64	0.55	99.61	1.14	113.99	0.218	No	No	2.00
132	9.19	5.38	1.81	0.62	0.56	91.87	1.17	107.33	0.195	No	No	2.00
133	9.21	4.76	1.86	0.63	0.58	82.34	1.21	99.44	0.171	No	No	2.00
134	9.23	3.90	1.94	0.67	0.61	69.23	1.26	87.35	0.142	No	No	2.00
135	9.25	3.17	2.03	0.76	0.64	58.02	1.34	77.52	0.123	No	No	2.00
136	9.27	2.57	2.16	0.99	0.69	48.92	1.52	74.18	0.118	No	No	2.00
137	9.29	2.32	2.23	1.19	0.72	44.64	1.70	76.10	0.121	No	No	2.00
138	9.31	2.43	2.22	1.20	0.71	46.74	1.66	77.76	0.124	No	No	2.00
139	9.33	2.62	2.16	1.01	0.69	49.41	1.52	74.91	0.119	No	No	2.00
140	9.35	2.61	2.13	0.89	0.68	48.62	1.47	71.44	0.114	No	No	2.00
141	9.37	2.31	2.18	0.93	0.70	43.60	1.57	68.50	0.110	No	No	2.00
142	9.39	1.95	2.28	1.11	0.74	37.26	1.86	69.30	0.111	No	No	2.00
143	9.41	1.75	2.37	1.32	0.77	33.24	2.20	73.17	0.116	No	No	2.00
144	9.43	1.73	2.37	1.33	0.77	32.88	2.23	73.24	0.117	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	9.45	1.77	2.38	1.41	0.77	33.70	2.25	75.91	0.121	No	No	2.00
146	9.47	1.76	2.37	1.37	0.77	33.41	2.23	74.67	4.000	Yes	No	2.00
147	9.49	1.59	2.44	1.56	0.80	30.04	2.61	78.43	4.000	Yes	No	2.00
148	9.51	1.29	2.56	1.84	0.84	24.23	4.18	101.24	4.000	Yes	No	2.00
149	9.53	1.03	2.72	2.46	0.91	19.00	4.91	93.31	4.000	Yes	Yes	2.00
150	9.55	0.88	2.81	2.81	0.94	16.14	5.99	96.67	4.000	Yes	Yes	2.00
151	9.57	0.91	2.78	2.59	0.93	16.74	5.57	93.32	4.000	Yes	Yes	2.00
152	9.59	0.99	2.71	2.21	0.90	18.16	4.79	87.01	4.000	Yes	Yes	2.00
153	9.61	1.45	2.46	1.44	0.81	27.33	2.70	73.79	4.000	Yes	No	2.00
154	9.63	1.91	2.28	1.04	0.74	35.89	1.85	66.52	4.000	Yes	No	2.00
155	9.65	2.22	2.20	0.89	0.71	40.66	1.61	65.30	4.000	Yes	No	2.00
156	9.67	2.12	2.22	0.90	0.72	39.03	1.65	64.57	4.000	Yes	No	2.00
157	9.69	2.02	2.24	0.93	0.72	37.29	1.72	64.27	4.000	Yes	No	2.00
158	9.71	2.15	2.26	1.14	0.73	39.95	1.80	71.77	4.000	Yes	No	2.00
159	9.73	2.25	2.31	1.48	0.75	42.39	1.96	82.92	4.000	Yes	No	2.00
160	9.75	2.28	2.36	1.83	0.77	43.60	2.16	94.06	4.000	Yes	No	2.00
161	9.77	2.14	2.42	2.11	0.79	40.86	2.46	100.65	4.000	Yes	No	2.00
162	9.79	1.84	2.54	2.68	0.84	34.87	3.58	124.71	4.000	Yes	No	2.00
163	9.81	1.90	2.51	2.54	0.83	36.14	2.99	107.93	0.197	No	No	2.00
164	9.83	1.82	2.54	2.69	0.84	34.45	3.68	126.70	0.269	No	No	2.00
165	9.85	1.81	2.54	2.68	0.84	34.40	3.68	126.42	0.268	No	No	2.00
166	9.87	1.44	2.73	3.89	0.91	27.08	4.98	134.76	1.292	No	Yes	2.00
167	9.89	1.22	2.85	4.88	0.96	22.76	6.46	147.10	1.086	No	Yes	2.00
168	9.91	1.09	2.92	5.37	0.98	20.05	7.44	149.09	0.956	No	Yes	2.00
169	9.93	1.01	2.94	5.31	0.99	18.44	7.80	143.90	0.880	No	Yes	2.00
170	9.95	0.97	2.95	5.17	0.99	17.71	7.89	139.82	0.845	No	Yes	2.00
171	9.97	0.95	2.93	4.78	0.99	17.31	7.67	132.73	0.826	No	Yes	2.00
172	9.99	0.95	2.90	4.23	0.98	17.25	7.17	123.75	0.823	No	Yes	2.00
173	10.01	0.95	2.85	3.56	0.96	17.33	6.48	112.38	0.827	No	Yes	2.00
174	10.03	0.97	2.81	3.11	0.94	17.65	5.93	104.72	0.842	No	Yes	2.00
175	10.05	0.98	2.77	2.81	0.93	17.90	5.54	99.25	0.854	No	Yes	2.00
176	10.07	0.99	2.76	2.67	0.92	18.08	5.35	96.80	0.863	No	Yes	2.00
177	10.09	0.99	2.75	2.63	0.92	18.09	5.30	95.89	0.863	No	Yes	2.00
178	10.11	0.98	2.75	2.60	0.92	17.94	5.30	95.11	0.856	No	Yes	2.00
179	10.13	0.98	2.75	2.58	0.92	17.90	5.29	94.72	0.854	No	Yes	2.00
180	10.15	0.99	2.75	2.56	0.92	18.07	5.22	94.35	0.862	No	Yes	2.00
181	10.17	1.00	2.75	2.60	0.92	18.22	5.23	95.37	0.869	No	Yes	2.00
182	10.19	0.99	2.76	2.63	0.92	17.95	5.33	95.68	0.856	No	Yes	2.00
183	10.21	0.94	2.78	2.70	0.93	17.10	5.61	95.94	0.816	No	Yes	2.00
184	10.23	0.89	2.81	2.76	0.94	16.00	5.97	95.52	0.763	No	Yes	2.00
185	10.25	0.83	2.85	2.86	0.96	14.78	6.45	95.34	0.705	No	Yes	2.00
186	10.27	0.78	2.87	2.86	0.96	13.91	6.75	93.85	0.663	No	Yes	2.00
187	10.29	0.76	2.87	2.77	0.97	13.43	6.80	91.35	0.641	No	Yes	2.00
188	10.31	0.75	2.85	2.55	0.96	13.29	6.57	87.24	0.634	No	Yes	2.00
189	10.33	0.75	2.84	2.34	0.95	13.18	6.33	83.43	0.629	No	Yes	2.00
190	10.35	0.75	2.82	2.16	0.95	13.24	6.05	80.10	0.632	No	Yes	2.00
191	10.37	0.77	2.79	2.01	0.94	13.59	5.72	77.74	0.648	No	Yes	2.00
192	10.39	0.79	2.77	1.92	0.93	14.04	5.45	76.53	0.670	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	10.41	0.80	2.76	1.90	0.92	14.19	5.38	76.28	0.677	No	Yes	2.00
194	10.43	0.80	2.76	1.88	0.92	14.21	5.34	75.87	0.678	No	Yes	2.00
195	10.45	0.81	2.75	1.85	0.92	14.36	5.25	75.33	0.685	No	Yes	2.00
196	10.47	0.82	2.75	1.89	0.92	14.50	5.26	76.34	0.692	No	Yes	2.00
197	10.49	0.80	2.78	2.06	0.93	14.11	5.62	79.32	0.673	No	Yes	2.00
198	10.51	0.75	2.82	2.20	0.95	13.14	6.15	80.82	0.627	No	Yes	2.00
199	10.53	0.70	2.85	2.22	0.96	12.28	6.50	79.88	0.586	No	Yes	2.00
200	10.55	0.69	2.84	2.06	0.96	11.95	6.40	76.52	0.570	No	Yes	2.00
201	10.57	0.69	2.83	1.97	0.95	11.89	6.29	74.70	0.567	No	Yes	2.00
202	10.59	0.68	2.83	1.92	0.95	11.83	6.23	73.66	0.564	No	Yes	2.00
203	10.61	0.68	2.83	1.91	0.95	11.77	6.24	73.44	0.561	No	Yes	2.00
204	10.63	0.69	2.82	1.85	0.95	11.89	6.10	72.53	0.567	No	Yes	2.00
205	10.65	0.69	2.81	1.79	0.94	11.97	5.97	71.45	0.571	No	Yes	2.00
206	10.67	0.68	2.81	1.76	0.94	11.82	5.97	70.62	0.564	No	Yes	2.00
207	10.69	0.67	2.82	1.76	0.95	11.63	6.05	70.39	0.555	No	Yes	2.00
208	10.71	0.67	2.82	1.76	0.95	11.50	6.11	70.27	0.548	No	Yes	2.00
209	10.73	0.67	2.82	1.73	0.95	11.50	6.05	69.61	0.548	No	Yes	2.00
210	10.75	0.67	2.81	1.70	0.95	11.48	6.02	69.09	0.548	No	Yes	2.00
211	10.77	0.66	2.81	1.69	0.95	11.42	6.02	68.75	0.545	No	Yes	2.00
212	10.79	0.67	2.81	1.66	0.94	11.47	5.96	68.33	0.547	No	Yes	2.00
213	10.81	0.67	2.80	1.62	0.94	11.60	5.84	67.69	0.553	No	Yes	2.00
214	10.83	0.68	2.79	1.57	0.94	11.78	5.68	66.84	0.562	No	Yes	2.00
215	10.85	0.69	2.78	1.55	0.93	11.93	5.58	66.57	0.569	No	Yes	2.00
216	10.87	0.70	2.77	1.55	0.93	12.04	5.53	66.64	0.574	No	Yes	2.00
217	10.89	0.70	2.77	1.56	0.93	12.06	5.55	66.88	0.575	No	Yes	2.00
218	10.91	0.70	2.78	1.57	0.93	11.93	5.61	66.95	0.569	No	Yes	2.00
219	10.93	0.69	2.79	1.59	0.94	11.79	5.70	67.18	0.562	No	Yes	2.00
220	10.95	0.69	2.79	1.61	0.94	11.71	5.77	67.51	0.558	No	Yes	2.00
221	10.97	0.69	2.80	1.62	0.94	11.67	5.80	67.74	0.557	No	Yes	2.00
222	10.99	0.70	2.79	1.59	0.94	11.89	5.67	67.45	0.567	No	Yes	2.00
223	11.01	0.74	2.73	1.32	0.92	12.36	5.03	62.20	0.590	No	Yes	2.00
224	11.03	0.77	2.67	1.08	0.89	12.80	8.68	111.13	0.187	No	No	2.00
225	11.05	0.80	2.68	1.17	0.89	13.32	8.78	116.93	0.206	No	No	2.00
226	11.07	0.79	2.74	1.54	0.92	13.30	5.10	67.84	0.634	No	Yes	2.00
227	11.09	0.78	2.79	1.93	0.94	13.26	5.71	75.73	0.633	No	Yes	2.00
228	11.11	0.76	2.81	2.00	0.94	12.92	5.93	76.67	0.616	No	Yes	2.00
229	11.13	0.76	2.81	1.98	0.94	12.85	5.93	76.22	0.613	No	Yes	2.00
230	11.15	0.75	2.81	1.98	0.95	12.71	5.99	76.12	0.606	No	Yes	2.00
231	11.17	0.75	2.82	1.98	0.95	12.53	6.05	75.80	0.598	No	Yes	2.00
232	11.19	0.73	2.82	1.97	0.95	12.23	6.15	75.21	0.583	No	Yes	2.00
233	11.21	0.71	2.83	1.91	0.95	11.88	6.19	73.54	0.567	No	Yes	2.00
234	11.23	0.70	2.83	1.83	0.95	11.58	6.19	71.72	0.552	No	Yes	2.00
235	11.25	0.69	2.82	1.74	0.95	11.41	6.12	69.77	0.544	No	Yes	2.00
236	11.27	0.69	2.82	1.68	0.95	11.33	6.05	68.50	0.540	No	Yes	2.00
237	11.29	0.69	2.82	1.69	0.95	11.21	6.11	68.45	0.535	No	Yes	2.00
238	11.31	0.68	2.83	1.72	0.95	11.12	6.19	68.89	0.531	No	Yes	2.00
239	11.33	0.68	2.83	1.74	0.95	11.09	6.24	69.23	0.529	No	Yes	2.00
240	11.35	0.68	2.83	1.74	0.95	11.14	6.23	69.40	0.531	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	11.37	0.69	2.83	1.74	0.95	11.18	6.22	69.47	0.533	No	Yes	2.00
242	11.39	0.69	2.84	1.78	0.96	11.11	6.31	70.10	0.530	No	Yes	2.00
243	11.41	0.68	2.84	1.82	0.96	11.03	6.42	70.75	0.526	No	Yes	2.00
244	11.43	0.68	2.85	1.86	0.96	10.98	6.49	71.31	0.524	No	Yes	2.00
245	11.45	0.69	2.85	1.85	0.96	11.05	6.44	71.20	0.527	No	Yes	2.00
246	11.47	0.70	2.84	1.81	0.96	11.20	6.32	70.83	0.534	No	Yes	2.00
247	11.49	0.71	2.83	1.78	0.95	11.34	6.21	70.45	0.541	No	Yes	2.00
248	11.51	0.71	2.82	1.76	0.95	11.44	6.14	70.19	0.546	No	Yes	2.00
249	11.53	0.71	2.83	1.77	0.95	11.36	6.18	70.17	0.542	No	Yes	2.00
250	11.55	0.70	2.83	1.78	0.96	11.18	6.27	70.12	0.534	No	Yes	2.00
251	11.57	0.69	2.84	1.80	0.96	10.99	6.39	70.24	0.524	No	Yes	2.00
252	11.59	0.69	2.85	1.81	0.96	10.87	6.46	70.19	0.518	No	Yes	2.00
253	11.61	0.68	2.85	1.81	0.96	10.75	6.52	70.14	0.513	No	Yes	2.00
254	11.63	0.68	2.86	1.82	0.96	10.63	6.59	70.08	0.507	No	Yes	2.00
255	11.65	0.67	2.86	1.82	0.97	10.53	6.65	70.01	0.502	No	Yes	2.00
256	11.67	0.67	2.86	1.81	0.97	10.50	6.65	69.78	0.501	No	Yes	2.00
257	11.69	0.67	2.86	1.80	0.97	10.52	6.61	69.54	0.502	No	Yes	2.00
258	11.71	0.68	2.85	1.76	0.96	10.61	6.50	68.98	0.506	No	Yes	2.00
259	11.73	0.69	2.85	1.74	0.96	10.67	6.44	68.67	0.509	No	Yes	2.00
260	11.75	0.69	2.84	1.71	0.96	10.73	6.36	68.27	0.512	No	Yes	2.00
261	11.77	0.69	2.84	1.72	0.96	10.71	6.39	68.35	0.511	No	Yes	2.00
262	11.79	0.69	2.84	1.72	0.96	10.67	6.40	68.25	0.509	No	Yes	2.00
263	11.81	0.69	2.85	1.72	0.96	10.55	6.46	68.19	0.503	No	Yes	2.00
264	11.83	0.68	2.85	1.73	0.96	10.43	6.53	68.14	0.498	No	Yes	2.00
265	11.85	0.68	2.86	1.75	0.97	10.35	6.61	68.46	0.494	No	Yes	2.00
266	11.87	0.67	2.86	1.77	0.97	10.32	6.65	68.67	0.492	No	Yes	2.00
267	11.89	0.68	2.86	1.78	0.97	10.32	6.67	68.84	0.492	No	Yes	2.00
268	11.91	0.67	2.86	1.78	0.97	10.27	6.70	68.86	0.490	No	Yes	2.00
269	11.93	0.68	2.86	1.78	0.97	10.34	6.67	68.99	0.493	No	Yes	2.00
270	11.95	0.70	2.84	1.72	0.96	10.63	6.43	68.34	0.507	No	Yes	2.00
271	11.97	0.74	2.81	1.60	0.95	11.21	5.95	66.71	0.534	No	Yes	2.00
272	11.99	0.78	2.77	1.49	0.93	11.75	5.54	65.15	0.561	No	Yes	2.00
273	12.01	0.80	2.75	1.44	0.93	12.15	5.31	64.53	0.580	No	Yes	2.00
274	12.03	0.82	2.75	1.46	0.93	12.37	5.26	65.11	0.590	No	Yes	2.00
275	12.05	0.84	2.75	1.50	0.93	12.67	5.24	66.43	0.605	No	Yes	2.00
276	12.07	0.85	2.75	1.55	0.93	12.88	5.24	67.49	0.614	No	Yes	2.00
277	12.09	0.86	2.76	1.63	0.93	13.03	5.32	69.37	0.622	No	Yes	2.00
278	12.11	0.87	2.76	1.68	0.93	13.07	5.40	70.58	0.623	No	Yes	2.00
279	12.13	0.87	2.77	1.73	0.93	13.13	5.45	71.53	0.626	No	Yes	2.00
280	12.15	0.87	2.76	1.72	0.93	13.16	5.43	71.40	4.000	Yes	Yes	2.00
281	12.17	0.93	2.72	1.56	0.92	13.97	4.93	68.90	4.000	Yes	Yes	2.00
282	12.19	1.01	2.67	1.39	0.89	15.08	8.25	124.45	4.000	Yes	No	2.00
283	12.21	1.10	2.62	1.28	0.87	16.39	6.01	98.45	4.000	Yes	No	2.00
284	12.23	1.18	2.56	1.07	0.85	17.40	4.06	70.64	4.000	Yes	No	2.00
285	12.25	1.25	2.54	1.08	0.84	18.48	3.54	65.42	4.000	Yes	No	2.00
286	12.27	1.31	2.53	1.12	0.84	19.36	3.32	64.35	0.105	No	No	1.90
287	12.29	1.32	2.57	1.37	0.86	19.65	4.32	84.77	0.137	No	No	2.00
288	12.31	1.32	2.59	1.51	0.86	19.62	5.00	98.01	0.168	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	12.33	1.32	2.60	1.59	0.87	19.66	5.40	106.06	0.191	No	No	2.00
290	12.35	1.32	2.61	1.65	0.87	19.68	5.72	112.52	0.191	No	No	2.00
291	12.37	1.31	2.62	1.75	0.88	19.54	6.32	123.50	0.230	No	No	2.00
292	12.39	1.29	2.65	1.88	0.89	19.25	7.32	140.85	0.306	No	No	2.00
293	12.41	1.28	2.66	1.97	0.89	19.04	8.09	154.04	0.378	No	No	2.00
294	12.43	1.27	2.67	1.97	0.89	18.92	8.22	155.47	0.387	No	No	2.00
295	12.45	1.28	2.66	1.89	0.89	18.92	7.68	145.39	0.329	No	No	2.00
296	12.47	1.30	2.65	1.85	0.89	19.17	7.22	138.53	0.295	No	No	2.00
297	12.49	1.35	2.62	1.77	0.88	19.87	6.18	122.82	0.227	No	No	2.00
298	12.51	1.38	2.61	1.74	0.87	20.22	5.81	117.42	4.000	Yes	No	2.00
299	12.53	1.45	2.57	1.60	0.86	21.18	4.58	97.10	4.000	Yes	No	2.00
300	12.55	1.66	2.49	1.38	0.83	24.08	2.93	70.47	4.000	Yes	No	2.00
301	12.57	2.08	2.38	1.17	0.78	29.75	2.25	66.94	4.000	Yes	No	2.00
302	12.59	2.35	2.33	1.15	0.77	33.51	2.03	68.20	4.000	Yes	No	2.00
303	12.61	2.37	2.35	1.27	0.77	33.86	2.12	71.85	4.000	Yes	No	2.00
304	12.63	2.09	2.44	1.54	0.81	30.15	2.59	77.97	4.000	Yes	No	2.00
305	12.65	1.86	2.52	1.81	0.84	26.96	3.16	85.18	4.000	Yes	No	2.00
306	12.67	1.68	2.59	2.09	0.87	24.53	5.01	122.89	4.000	Yes	No	2.00
307	12.69	1.59	2.64	2.35	0.89	23.21	6.91	160.29	4.000	Yes	No	2.00
308	12.71	1.49	2.69	2.64	0.90	21.93	9.45	207.30	4.000	Yes	No	2.00
309	12.73	1.41	2.73	2.88	0.92	20.68	5.05	104.46	4.000	Yes	Yes	2.00
310	12.75	1.34	2.76	2.98	0.93	19.61	5.36	105.00	4.000	Yes	Yes	2.00
311	12.77	1.28	2.78	3.00	0.94	18.74	5.56	104.26	0.894	No	Yes	2.00
312	12.79	1.25	2.78	2.91	0.94	18.14	5.60	101.58	0.865	No	Yes	2.00
313	12.81	1.22	2.77	2.74	0.94	17.61	5.54	97.51	0.840	No	Yes	2.00
314	12.83	1.21	2.75	2.47	0.93	17.30	5.29	91.54	0.825	No	Yes	2.00
315	12.85	1.19	2.74	2.27	0.92	16.90	5.15	87.05	0.806	No	Yes	2.00
316	12.87	1.18	2.73	2.14	0.92	16.68	5.04	84.04	0.796	No	Yes	2.00
317	12.89	1.16	2.73	2.10	0.92	16.40	5.05	82.81	0.782	No	Yes	2.00
318	12.91	1.16	2.73	2.07	0.92	16.39	5.02	82.23	0.782	No	Yes	2.00
319	12.93	1.18	2.72	2.03	0.92	16.57	4.92	81.50	0.790	No	Yes	2.00
320	12.95	1.21	2.70	1.96	0.91	16.96	4.73	80.30	0.809	No	Yes	2.00
321	12.97	1.23	2.69	1.89	0.91	17.23	9.49	163.53	0.438	No	No	2.00
322	12.99	1.25	2.69	1.91	0.90	17.46	9.34	163.00	0.435	No	No	2.00
323	13.01	1.25	2.69	1.96	0.91	17.46	9.75	170.20	0.485	No	No	2.00
324	13.03	1.25	2.71	2.05	0.91	17.39	4.76	82.80	0.829	No	Yes	2.00
325	13.05	1.22	2.72	2.13	0.92	17.02	4.94	84.11	0.812	No	Yes	2.00
326	13.07	1.19	2.75	2.23	0.93	16.48	5.20	85.76	0.786	No	Yes	2.00
327	13.09	1.14	2.77	2.30	0.94	15.84	5.45	86.34	0.756	No	Yes	2.00
328	13.11	1.12	2.78	2.32	0.94	15.43	5.59	86.24	0.736	No	Yes	2.00
329	13.13	1.11	2.77	2.24	0.94	15.33	5.51	84.51	0.731	No	Yes	2.00
330	13.15	1.13	2.76	2.16	0.93	15.49	5.36	83.04	0.739	No	Yes	2.00
331	13.17	1.15	2.75	2.09	0.93	15.68	5.22	81.86	0.748	No	Yes	2.00
332	13.19	1.15	2.74	2.07	0.93	15.71	5.19	81.51	0.749	No	Yes	2.00
333	13.21	1.15	2.74	2.05	0.93	15.68	5.17	81.12	0.748	No	Yes	2.00
334	13.23	1.15	2.74	2.04	0.93	15.58	5.18	80.66	0.743	No	Yes	2.00
335	13.25	1.15	2.74	2.03	0.93	15.57	5.16	80.38	0.742	No	Yes	2.00
336	13.27	1.13	2.74	2.00	0.93	15.33	5.19	79.61	0.731	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	13.29	1.11	2.75	1.98	0.93	14.98	5.26	78.89	0.715	No	Yes	2.00
338	13.31	1.10	2.75	1.95	0.93	14.75	5.28	77.87	0.703	No	Yes	2.00
339	13.33	1.11	2.74	1.88	0.93	14.89	5.14	76.54	0.710	No	Yes	2.00
340	13.35	1.15	2.72	1.78	0.92	15.34	4.88	74.80	0.732	No	Yes	2.00
341	13.37	1.18	2.69	1.69	0.91	15.78	9.80	154.61	0.381	No	No	2.00
342	13.39	1.20	2.68	1.64	0.90	15.90	9.22	146.63	0.336	No	No	2.00
343	13.41	1.18	2.69	1.65	0.91	15.66	9.66	151.26	0.362	No	No	2.00
344	13.43	1.16	2.71	1.70	0.91	15.33	4.77	73.17	0.731	No	Yes	2.00
345	13.45	1.17	2.70	1.69	0.91	15.47	4.72	73.06	0.738	No	Yes	2.00
346	13.47	1.21	2.68	1.63	0.90	15.98	9.01	143.95	0.322	No	No	2.00
347	13.49	1.26	2.66	1.57	0.90	16.59	7.88	130.77	0.259	No	No	2.00
348	13.51	1.28	2.66	1.63	0.90	16.90	7.93	133.92	0.273	No	No	2.00
349	13.53	1.27	2.68	1.77	0.90	16.80	9.07	152.44	0.369	No	No	2.00
350	13.55	1.22	2.73	2.04	0.92	16.16	5.03	81.25	0.771	No	Yes	2.00
351	13.57	1.17	2.77	2.24	0.94	15.40	5.50	84.67	0.735	No	Yes	2.00
352	13.59	1.12	2.80	2.39	0.95	14.66	5.90	86.52	0.699	No	Yes	2.00
353	13.61	1.08	2.81	2.32	0.95	14.05	6.00	84.30	0.670	No	Yes	2.00
354	13.63	1.04	2.82	2.30	0.96	13.49	6.16	83.07	0.644	No	Yes	2.00
355	13.65	1.01	2.83	2.26	0.96	13.04	6.27	81.67	0.622	No	Yes	2.00
356	13.67	1.00	2.83	2.20	0.96	12.92	6.22	80.43	0.616	No	Yes	2.00
357	13.69	1.00	2.82	2.12	0.96	12.77	6.17	78.79	0.609	No	Yes	2.00
358	13.71	0.99	2.81	2.00	0.96	12.68	6.03	76.41	0.605	No	Yes	2.00
359	13.73	0.96	2.83	2.01	0.96	12.22	6.20	75.82	0.583	No	Yes	2.00
360	13.75	0.91	2.86	2.08	0.97	11.51	6.61	76.10	0.549	No	Yes	2.00
361	13.77	0.87	2.89	2.22	0.99	10.87	7.13	77.50	0.519	No	Yes	2.00
362	13.79	0.86	2.90	2.27	0.99	10.77	7.25	78.08	0.514	No	Yes	2.00
363	13.81	0.90	2.87	2.14	0.98	11.23	6.83	76.75	0.536	No	Yes	2.00
364	13.83	0.94	2.84	2.00	0.97	11.78	6.38	75.15	0.562	No	Yes	2.00
365	13.85	0.98	2.81	1.90	0.96	12.26	6.02	73.86	0.585	No	Yes	2.00
366	13.87	1.00	2.81	1.92	0.95	12.51	5.96	74.56	0.597	No	Yes	2.00
367	13.89	1.00	2.82	1.99	0.96	12.51	6.07	75.95	0.597	No	Yes	2.00
368	13.91	0.99	2.83	2.07	0.96	12.38	6.23	77.18	0.591	No	Yes	2.00
369	13.93	0.99	2.83	2.05	0.96	12.30	6.24	76.73	0.587	No	Yes	2.00
370	13.95	0.98	2.83	1.99	0.96	12.25	6.18	75.63	0.584	No	Yes	2.00
371	13.97	0.97	2.83	1.95	0.96	12.07	6.18	74.59	0.576	No	Yes	2.00
372	13.99	0.96	2.83	1.93	0.96	11.89	6.22	74.01	0.567	No	Yes	2.00
373	14.01	0.97	2.81	1.82	0.96	11.98	6.02	72.06	0.571	No	Yes	2.00
374	14.03	1.00	2.78	1.65	0.94	12.28	5.62	68.96	0.586	No	Yes	2.00
375	14.05	1.02	2.75	1.51	0.93	12.55	5.29	66.45	0.599	No	Yes	2.00
376	14.07	1.05	2.72	1.38	0.92	12.86	4.97	63.87	0.613	No	Yes	2.00
377	14.09	1.08	2.70	1.31	0.91	13.25	4.72	62.56	0.632	No	Yes	2.00
378	14.11	1.13	2.68	1.24	0.90	13.80	8.71	120.23	0.217	No	No	2.00
379	14.13	1.14	2.67	1.27	0.90	13.97	8.70	121.57	0.222	No	No	2.00
380	14.15	1.12	2.69	1.30	0.91	13.64	9.51	129.71	0.255	No	No	2.00
381	14.17	1.07	2.72	1.36	0.92	12.98	4.90	63.56	0.619	No	Yes	2.00
382	14.19	1.03	2.75	1.43	0.93	12.39	5.20	64.46	0.591	No	Yes	2.00
383	14.21	1.02	2.75	1.44	0.93	12.34	5.25	64.75	4.000	Yes	Yes	2.00
384	14.23	1.08	2.72	1.36	0.92	13.08	4.87	63.66	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
385	14.25	1.18	2.65	1.20	0.90	14.34	7.63	109.42	4.000	Yes	No	2.00
386	14.27	1.27	2.61	1.10	0.88	15.39	5.68	87.41	4.000	Yes	No	2.00
387	14.29	1.32	2.58	1.03	0.87	16.00	4.75	76.09	4.000	Yes	No	2.00
388	14.31	1.38	2.56	1.01	0.86	16.77	4.08	68.41	4.000	Yes	No	2.00
389	14.33	1.47	2.53	0.99	0.85	17.78	3.43	60.94	4.000	Yes	No	2.00
390	14.35	1.52	2.52	1.03	0.85	18.50	3.28	60.59	0.101	No	No	1.86
391	14.37	1.51	2.55	1.14	0.86	18.39	3.87	71.11	0.113	No	No	2.00
392	14.39	1.46	2.59	1.30	0.87	17.82	5.05	89.93	0.148	No	No	2.00
393	14.41	1.44	2.60	1.35	0.88	17.54	5.55	97.34	0.149	No	No	2.00
394	14.43	1.50	2.58	1.26	0.87	18.13	4.65	84.23	0.136	No	No	2.00
395	14.45	1.56	2.54	1.14	0.85	18.85	3.65	68.71	0.110	No	No	2.00
396	14.47	1.57	2.54	1.13	0.85	18.91	3.55	67.12	0.108	No	No	2.00
397	14.49	1.49	2.58	1.26	0.87	17.93	4.74	84.98	0.137	No	No	2.00
398	14.51	1.39	2.63	1.37	0.89	16.67	6.35	105.95	0.172	No	No	2.00
399	14.53	1.33	2.64	1.35	0.89	15.95	6.91	110.14	4.000	Yes	No	2.00
400	14.55	1.34	2.60	1.13	0.88	15.95	5.44	86.72	4.000	Yes	No	2.00
401	14.57	1.39	2.55	0.96	0.86	16.45	4.00	65.77	4.000	Yes	No	2.00
402	14.59	1.43	2.53	0.88	0.85	16.86	3.36	56.57	4.000	Yes	No	2.00
403	14.61	1.44	2.52	0.88	0.85	16.98	3.30	55.96	4.000	Yes	No	2.00
404	14.63	1.41	2.56	0.98	0.86	16.60	4.06	67.38	4.000	Yes	No	2.00
405	14.65	1.37	2.59	1.09	0.87	16.11	5.01	80.70	4.000	Yes	No	2.00
406	14.67	1.33	2.61	1.15	0.88	15.64	5.85	91.48	4.000	Yes	No	2.00
407	14.69	1.26	2.64	1.16	0.89	14.74	6.80	100.24	4.000	Yes	No	2.00
408	14.71	1.19	2.66	1.16	0.90	13.81	7.91	109.21	4.000	Yes	No	2.00
409	14.73	1.11	2.69	1.18	0.91	12.74	9.87	125.75	4.000	Yes	No	2.00
410	14.75	1.09	2.70	1.15	0.91	12.53	9.98	124.95	0.235	No	No	2.00
411	14.77	1.12	2.68	1.11	0.91	12.79	9.01	115.23	0.200	No	No	2.00
412	14.79	1.19	2.64	1.02	0.89	13.69	6.85	93.71	0.141	No	No	2.00
413	14.81	1.26	2.60	0.96	0.88	14.50	5.49	79.67	0.114	No	No	2.00
414	14.83	1.29	2.59	0.93	0.87	14.90	4.96	73.92	0.118	No	No	2.00
415	14.85	1.27	2.60	0.97	0.88	14.65	5.41	79.32	0.114	No	No	2.00
416	14.87	1.26	2.61	0.99	0.88	14.42	5.84	84.25	0.122	No	No	2.00
417	14.89	1.29	2.60	0.97	0.88	14.84	5.30	78.69	4.000	Yes	No	2.00
418	14.91	1.36	2.57	0.95	0.87	15.60	4.55	71.00	4.000	Yes	No	2.00
419	14.93	1.43	2.54	0.90	0.86	16.44	3.72	61.22	4.000	Yes	No	2.00
420	14.95	1.49	2.51	0.86	0.85	17.21	3.10	53.28	4.000	Yes	No	2.00
421	14.97	1.58	2.49	0.84	0.83	18.25	2.89	52.82	4.000	Yes	No	2.00
422	14.99	1.65	2.48	0.89	0.83	19.04	2.86	54.42	4.000	Yes	No	2.00
423	15.01	1.62	2.51	1.00	0.85	18.73	3.08	57.70	4.000	Yes	No	2.00
424	15.03	1.54	2.55	1.09	0.86	17.74	3.99	70.73	4.000	Yes	No	2.00
425	15.05	1.46	2.58	1.14	0.87	16.80	4.83	81.10	4.000	Yes	No	2.00
426	15.07	1.44	2.58	1.10	0.87	16.48	4.83	79.60	0.127	No	No	2.00
427	15.09	1.42	2.59	1.08	0.87	16.20	4.92	79.77	0.127	No	No	2.00
428	15.11	1.36	2.61	1.11	0.88	15.42	5.71	88.11	0.129	No	No	2.00
429	15.13	1.29	2.65	1.20	0.90	14.56	7.29	106.20	0.172	No	No	2.00
430	15.15	1.23	2.68	1.28	0.91	13.85	8.98	124.40	0.233	No	No	2.00
431	15.17	1.21	2.69	1.31	0.91	13.57	9.71	131.80	0.264	No	No	2.00
432	15.19	1.21	2.68	1.24	0.91	13.56	9.09	123.25	0.229	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
433	15.21	1.22	2.67	1.20	0.91	13.66	8.50	116.08	0.203	No	No	2.00
434	15.23	1.20	2.69	1.24	0.91	13.36	9.42	125.82	0.239	No	No	2.00
435	15.25	1.14	2.73	1.38	0.93	12.60	5.05	63.65	0.601	No	Yes	2.00
436	15.27	1.05	2.79	1.54	0.95	11.58	5.69	65.95	0.553	No	Yes	2.00
437	15.29	1.01	2.81	1.54	0.96	10.96	5.96	65.27	0.523	No	Yes	2.00
438	15.31	0.99	2.81	1.47	0.96	10.73	5.93	63.61	0.512	No	Yes	2.00
439	15.33	1.00	2.78	1.32	0.95	10.81	5.61	60.64	0.516	No	Yes	2.00
440	15.35	1.08	2.71	1.12	0.92	11.80	4.85	57.22	0.563	No	Yes	2.00
441	15.37	1.17	2.66	0.99	0.90	12.81	7.80	99.87	0.155	No	No	2.00
442	15.39	1.25	2.63	1.00	0.89	13.70	6.68	91.49	0.136	No	No	2.00
443	15.41	1.24	2.65	1.10	0.90	13.67	7.60	103.99	0.166	No	No	2.00
444	15.43	1.26	2.66	1.15	0.90	13.86	7.79	107.92	0.177	No	No	2.00
445	15.45	1.29	2.64	1.08	0.89	14.18	6.82	96.70	0.148	No	No	2.00
446	15.47	1.30	2.63	1.06	0.89	14.26	6.56	93.59	0.141	No	No	2.00
447	15.49	1.24	2.67	1.18	0.91	13.56	8.50	115.24	0.200	No	No	2.00
448	15.51	1.14	2.75	1.42	0.93	12.34	5.21	64.32	0.589	No	Yes	2.00
449	15.53	1.05	2.81	1.59	0.96	11.25	5.92	66.67	0.537	No	Yes	2.00
450	15.55	0.97	2.85	1.68	0.97	10.28	6.52	67.00	0.490	No	Yes	2.00
451	15.57	0.93	2.87	1.66	0.98	9.71	6.79	65.89	4.000	Yes	Yes	2.00
452	15.59	1.02	2.80	1.42	0.95	10.86	5.79	62.87	4.000	Yes	Yes	2.00
453	15.61	1.23	2.66	1.07	0.90	13.24	7.94	105.07	4.000	Yes	No	2.00
454	15.63	1.52	2.54	0.93	0.86	16.72	3.72	62.16	4.000	Yes	No	2.00
455	15.65	1.72	2.53	1.09	0.85	19.08	3.31	63.24	0.104	No	No	1.96
456	15.67	1.97	2.52	1.34	0.85	22.09	3.14	69.32	4.000	Yes	No	2.00
457	15.69	2.11	2.55	1.71	0.86	23.83	3.83	91.31	4.000	Yes	No	2.00
458	15.71	2.21	2.59	2.18	0.88	25.04	5.12	128.30	4.000	Yes	No	2.00
459	15.73	2.14	2.69	3.09	0.92	24.41	9.85	240.52	4.000	Yes	No	2.00
460	15.75	2.09	2.78	4.14	0.95	23.96	5.64	135.18	4.000	Yes	Yes	2.00
461	15.77	2.08	2.85	5.18	0.97	23.85	6.50	154.96	4.000	Yes	Yes	2.00
462	15.79	1.92	2.93	6.25	1.00	22.04	7.66	168.81	4.000	Yes	Yes	2.00
463	15.81	1.79	2.99	6.96	1.00	20.36	8.57	174.56	4.000	Yes	Yes	2.00
464	15.83	1.94	2.93	6.19	1.00	22.13	7.60	168.12	4.000	Yes	Yes	2.00
465	15.85	2.82	2.66	3.75	0.90	32.24	7.85	253.02	4.000	Yes	No	2.00
466	15.87	4.37	2.36	2.21	0.79	49.73	2.20	109.29	4.000	Yes	No	2.00
467	15.89	7.16	2.10	1.50	0.69	80.76	1.41	114.16	4.000	Yes	No	2.00
468	15.91	10.25	1.96	1.38	0.64	114.90	1.28	146.63	4.000	Yes	No	2.00
469	15.93	12.73	1.92	1.50	0.62	142.46	1.25	177.88	4.000	Yes	No	2.00
470	15.95	14.25	1.90	1.59	0.62	159.30	1.24	197.56	0.797	No	No	2.00
471	15.97	15.20	1.91	1.70	0.62	169.73	1.24	210.80	4.000	No	No	2.00
472	15.99	16.24	1.89	1.72	0.61	180.96	1.23	223.16	4.000	No	No	2.00
473	16.01	17.06	1.89	1.75	0.61	189.82	1.23	233.22	4.000	No	No	2.00
474	16.03	17.79	1.88	1.74	0.61	197.48	1.22	240.88	4.000	No	No	2.00
475	16.05	18.61	1.88	1.81	0.61	206.38	1.22	251.94	4.000	No	No	2.00
476	16.07	20.09	1.87	1.88	0.60	222.53	1.22	270.39	4.000	No	No	2.00
477	16.09	21.19	1.89	2.05	0.61	234.64	1.23	288.01	4.000	No	No	2.00
478	16.11	23.27	1.87	2.10	0.60	257.18	1.22	313.09	4.000	No	No	2.00
479	16.13	24.33	1.87	2.18	0.61	268.66	1.22	327.53	4.000	No	No	2.00
480	16.15	26.91	1.84	2.10	0.59	295.98	1.19	352.18	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
481	16.17	28.21	1.82	2.05	0.58	309.43	1.17	362.66	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
6.57	2.00	0.00	0.00	0.02	0.00	6.59	2.00	0.00	0.00	0.02	0.00
6.61	2.00	0.00	0.00	0.02	0.00	6.63	2.00	0.00	0.00	0.02	0.00
6.65	2.00	0.00	0.00	0.02	0.00	6.67	2.00	0.00	0.00	0.02	0.00
6.69	2.00	0.00	0.00	0.02	0.00	6.71	2.00	0.00	0.00	0.02	0.00
6.73	2.00	0.00	0.00	0.02	0.00	6.75	2.00	0.00	0.00	0.02	0.00
6.77	2.00	0.00	0.00	0.02	0.00	6.79	2.00	0.00	0.00	0.02	0.00
6.81	2.00	0.00	0.00	0.02	0.00	6.83	2.00	0.00	0.00	0.02	0.00
6.85	2.00	0.00	0.00	0.02	0.00	6.87	2.00	0.00	0.00	0.02	0.00
6.89	2.00	0.00	0.00	0.02	0.00	6.91	2.00	0.00	0.00	0.02	0.00
6.93	2.00	0.00	0.00	0.02	0.00	6.95	2.00	0.00	0.00	0.02	0.00
6.97	2.00	0.00	0.00	0.02	0.00	6.99	2.00	0.00	0.00	0.02	0.00
7.01	2.00	0.00	0.00	0.02	0.00	7.03	2.00	0.00	0.00	0.02	0.00
7.05	2.00	0.00	0.00	0.02	0.00	7.07	2.00	0.00	0.00	0.02	0.00
7.09	2.00	0.00	0.00	0.02	0.00	7.11	2.00	0.00	0.00	0.02	0.00
7.13	2.00	0.00	0.00	0.02	0.00	7.15	2.00	0.00	0.00	0.02	0.00
7.17	2.00	0.00	0.00	0.02	0.00	7.19	2.00	0.00	0.00	0.02	0.00
7.21	2.00	0.00	0.00	0.02	0.00	7.23	2.00	0.00	0.00	0.02	0.00
7.25	2.00	0.00	0.00	0.02	0.00	7.27	2.00	0.00	0.00	0.02	0.00
7.29	2.00	0.00	0.00	0.02	0.00	7.31	2.00	0.00	0.00	0.02	0.00
7.33	2.00	0.00	0.00	0.02	0.00	7.35	2.00	0.00	0.00	0.02	0.00
7.37	2.00	0.00	0.00	0.02	0.00	7.39	2.00	0.00	0.00	0.02	0.00
7.41	2.00	0.00	0.00	0.02	0.00	7.43	2.00	0.00	0.00	0.02	0.00
7.45	2.00	0.00	0.00	0.02	0.00	7.47	2.00	0.00	0.00	0.02	0.00
7.49	2.00	0.00	0.00	0.02	0.00	7.51	2.00	0.00	0.00	0.02	0.00
7.53	2.00	0.00	0.00	0.02	0.00	7.55	2.00	0.00	0.00	0.02	0.00
7.57	2.00	0.00	0.00	0.02	0.00	7.59	2.00	0.00	0.00	0.02	0.00
7.61	2.00	0.00	0.00	0.02	0.00	7.63	2.00	0.00	0.00	0.02	0.00
7.65	2.00	0.00	0.00	0.02	0.00	7.67	2.00	0.00	0.00	0.02	0.00
7.69	2.00	0.00	0.00	0.02	0.00	7.71	2.00	0.00	0.00	0.02	0.00
7.73	2.00	0.00	0.00	0.02	0.00	7.75	2.00	0.00	0.00	0.02	0.00
7.77	2.00	0.00	0.00	0.02	0.00	7.79	2.00	0.00	0.00	0.02	0.00
7.81	2.00	0.00	0.00	0.02	0.00	7.83	2.00	0.00	0.00	0.02	0.00
7.85	2.00	0.00	0.00	0.02	0.00	7.87	2.00	0.00	0.00	0.02	0.00
7.89	2.00	0.00	0.00	0.02	0.00	7.91	2.00	0.00	0.00	0.02	0.00
7.93	2.00	0.00	0.00	0.02	0.00	7.95	2.00	0.00	0.00	0.02	0.00
7.97	2.00	0.00	0.00	0.02	0.00	7.99	2.00	0.00	0.00	0.02	0.00
8.01	2.00	0.00	0.00	0.02	0.00	8.03	2.00	0.00	0.00	0.02	0.00
8.05	2.00	0.00	0.00	0.02	0.00	8.07	2.00	0.00	0.00	0.02	0.00
8.09	2.00	0.00	0.00	0.02	0.00	8.11	2.00	0.00	0.00	0.02	0.00
8.13	2.00	0.00	0.00	0.02	0.00	8.15	2.00	0.00	0.00	0.02	0.00
8.17	2.00	0.00	0.00	0.02	0.00	8.19	2.00	0.00	0.00	0.02	0.00
8.21	2.00	0.00	0.00	0.02	0.00	8.23	2.00	0.00	0.00	0.02	0.00
8.25	2.00	0.00	0.00	0.02	0.00	8.27	2.00	0.00	0.00	0.02	0.00
8.29	2.00	0.00	0.00	0.02	0.00	8.31	2.00	0.00	0.00	0.02	0.00
8.33	2.00	0.00	0.00	0.02	0.00	8.35	2.00	0.00	0.00	0.02	0.00
8.37	2.00	0.00	0.00	0.02	0.00	8.39	2.00	0.00	0.00	0.02	0.00
8.41	2.00	0.00	0.00	0.02	0.00	8.43	2.00	0.00	0.00	0.02	0.00
8.45	2.00	0.00	0.00	0.02	0.00	8.47	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
8.49	2.00	0.00	0.00	0.02	0.00	8.51	2.00	0.00	0.00	0.02	0.00
8.53	2.00	0.00	0.00	0.02	0.00	8.55	2.00	0.00	0.00	0.02	0.00
8.57	2.00	0.00	0.00	0.02	0.00	8.59	2.00	0.00	0.00	0.02	0.00
8.61	2.00	0.00	0.00	0.02	0.00	8.63	2.00	0.00	0.00	0.02	0.00
8.65	2.00	0.00	0.00	0.02	0.00	8.67	2.00	0.00	0.00	0.02	0.00
8.69	2.00	0.00	0.00	0.02	0.00	8.71	2.00	0.00	0.00	0.02	0.00
8.73	2.00	0.00	0.00	0.02	0.00	8.75	2.00	0.00	0.00	0.02	0.00
8.77	2.00	0.00	0.00	0.02	0.00	8.79	2.00	0.00	0.00	0.02	0.00
8.81	2.00	0.00	0.00	0.02	0.00	8.83	2.00	0.00	0.00	0.02	0.00
8.85	2.00	0.00	0.00	0.02	0.00	8.87	2.00	0.00	0.00	0.02	0.00
8.89	2.00	0.00	0.00	0.02	0.00	8.91	2.00	0.00	0.00	0.02	0.00
8.93	2.00	0.00	0.00	0.02	0.00	8.95	2.00	0.00	0.00	0.02	0.00
8.97	2.00	0.00	0.00	0.02	0.00	8.99	2.00	0.00	0.00	0.02	0.00
9.01	2.00	0.00	0.00	0.02	0.00	9.03	2.00	0.00	0.00	0.02	0.00
9.05	2.00	0.00	0.00	0.02	0.00	9.07	2.00	0.00	0.00	0.02	0.00
9.09	2.00	0.00	0.00	0.02	0.00	9.11	2.00	0.00	0.00	0.02	0.00
9.13	2.00	0.00	0.00	0.02	0.00	9.15	2.00	0.00	0.00	0.02	0.00
9.17	2.00	0.00	0.00	0.02	0.00	9.19	2.00	0.00	0.00	0.02	0.00
9.21	2.00	0.00	0.00	0.02	0.00	9.23	2.00	0.00	0.00	0.02	0.00
9.25	2.00	0.00	0.00	0.02	0.00	9.27	2.00	0.00	0.00	0.02	0.00
9.29	2.00	0.00	0.00	0.02	0.00	9.31	2.00	0.00	0.00	0.02	0.00
9.33	2.00	0.00	0.00	0.02	0.00	9.35	2.00	0.00	0.00	0.02	0.00
9.37	2.00	0.00	0.00	0.02	0.00	9.39	2.00	0.00	0.00	0.02	0.00
9.41	2.00	0.00	0.00	0.02	0.00	9.43	2.00	0.00	0.00	0.02	0.00
9.45	2.00	0.00	0.00	0.02	0.00	9.47	2.00	0.00	0.00	0.02	0.00
9.49	2.00	0.00	0.00	0.02	0.00	9.51	2.00	0.00	0.00	0.02	0.00
9.53	2.00	0.00	0.00	0.02	0.00	9.55	2.00	0.00	0.00	0.02	0.00
9.57	2.00	0.00	0.00	0.02	0.00	9.59	2.00	0.00	0.00	0.02	0.00
9.61	2.00	0.00	0.00	0.02	0.00	9.63	2.00	0.00	0.00	0.02	0.00
9.65	2.00	0.00	0.00	0.02	0.00	9.67	2.00	0.00	0.00	0.02	0.00
9.69	2.00	0.00	0.00	0.02	0.00	9.71	2.00	0.00	0.00	0.02	0.00
9.73	2.00	0.00	0.00	0.02	0.00	9.75	2.00	0.00	0.00	0.02	0.00
9.77	2.00	0.00	0.00	0.02	0.00	9.79	2.00	0.00	0.00	0.02	0.00
9.81	2.00	0.00	0.00	0.02	0.00	9.83	2.00	0.00	0.00	0.02	0.00
9.85	2.00	0.00	0.00	0.02	0.00	9.87	2.00	0.00	0.00	0.02	0.00
9.89	2.00	0.00	0.00	0.02	0.00	9.91	2.00	0.00	0.00	0.02	0.00
9.93	2.00	0.00	0.00	0.02	0.00	9.95	2.00	0.00	0.00	0.02	0.00
9.97	2.00	0.00	0.00	0.02	0.00	9.99	2.00	0.00	0.00	0.02	0.00
10.01	2.00	0.00	0.00	0.02	0.00	10.03	2.00	0.00	0.00	0.02	0.00
10.05	2.00	0.00	0.00	0.02	0.00	10.07	2.00	0.00	0.00	0.02	0.00
10.09	2.00	0.00	0.00	0.02	0.00	10.11	2.00	0.00	0.00	0.02	0.00
10.13	2.00	0.00	0.00	0.02	0.00	10.15	2.00	0.00	0.00	0.02	0.00
10.17	2.00	0.00	0.00	0.02	0.00	10.19	2.00	0.00	0.00	0.02	0.00
10.21	2.00	0.00	0.00	0.02	0.00	10.23	2.00	0.00	0.00	0.02	0.00
10.25	2.00	0.00	0.00	0.02	0.00	10.27	2.00	0.00	0.00	0.02	0.00
10.29	2.00	0.00	0.00	0.02	0.00	10.31	2.00	0.00	0.00	0.02	0.00
10.33	2.00	0.00	0.00	0.02	0.00	10.35	2.00	0.00	0.00	0.02	0.00
10.37	2.00	0.00	0.00	0.02	0.00	10.39	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
10.41	2.00	0.00	0.00	0.02	0.00	10.43	2.00	0.00	0.00	0.02	0.00
10.45	2.00	0.00	0.00	0.02	0.00	10.47	2.00	0.00	0.00	0.02	0.00
10.49	2.00	0.00	0.00	0.02	0.00	10.51	2.00	0.00	0.00	0.02	0.00
10.53	2.00	0.00	0.00	0.02	0.00	10.55	2.00	0.00	0.00	0.02	0.00
10.57	2.00	0.00	0.00	0.02	0.00	10.59	2.00	0.00	0.00	0.02	0.00
10.61	2.00	0.00	0.00	0.02	0.00	10.63	2.00	0.00	0.00	0.02	0.00
10.65	2.00	0.00	0.00	0.02	0.00	10.67	2.00	0.00	0.00	0.02	0.00
10.69	2.00	0.00	0.00	0.02	0.00	10.71	2.00	0.00	0.00	0.02	0.00
10.73	2.00	0.00	0.00	0.02	0.00	10.75	2.00	0.00	0.00	0.02	0.00
10.77	2.00	0.00	0.00	0.02	0.00	10.79	2.00	0.00	0.00	0.02	0.00
10.81	2.00	0.00	0.00	0.02	0.00	10.83	2.00	0.00	0.00	0.02	0.00
10.85	2.00	0.00	0.00	0.02	0.00	10.87	2.00	0.00	0.00	0.02	0.00
10.89	2.00	0.00	0.00	0.02	0.00	10.91	2.00	0.00	0.00	0.02	0.00
10.93	2.00	0.00	0.00	0.02	0.00	10.95	2.00	0.00	0.00	0.02	0.00
10.97	2.00	0.00	0.00	0.02	0.00	10.99	2.00	0.00	0.00	0.02	0.00
11.01	2.00	0.00	0.00	0.02	0.00	11.03	2.00	0.00	0.00	0.02	0.00
11.05	2.00	0.00	0.00	0.02	0.00	11.07	2.00	0.00	0.00	0.02	0.00
11.09	2.00	0.00	0.00	0.02	0.00	11.11	2.00	0.00	0.00	0.02	0.00
11.13	2.00	0.00	0.00	0.02	0.00	11.15	2.00	0.00	0.00	0.02	0.00
11.17	2.00	0.00	0.00	0.02	0.00	11.19	2.00	0.00	0.00	0.02	0.00
11.21	2.00	0.00	0.00	0.02	0.00	11.23	2.00	0.00	0.00	0.02	0.00
11.25	2.00	0.00	0.00	0.02	0.00	11.27	2.00	0.00	0.00	0.02	0.00
11.29	2.00	0.00	0.00	0.02	0.00	11.31	2.00	0.00	0.00	0.02	0.00
11.33	2.00	0.00	0.00	0.02	0.00	11.35	2.00	0.00	0.00	0.02	0.00
11.37	2.00	0.00	0.00	0.02	0.00	11.39	2.00	0.00	0.00	0.02	0.00
11.41	2.00	0.00	0.00	0.02	0.00	11.43	2.00	0.00	0.00	0.02	0.00
11.45	2.00	0.00	0.00	0.02	0.00	11.47	2.00	0.00	0.00	0.02	0.00
11.49	2.00	0.00	0.00	0.02	0.00	11.51	2.00	0.00	0.00	0.02	0.00
11.53	2.00	0.00	0.00	0.02	0.00	11.55	2.00	0.00	0.00	0.02	0.00
11.57	2.00	0.00	0.00	0.02	0.00	11.59	2.00	0.00	0.00	0.02	0.00
11.61	2.00	0.00	0.00	0.02	0.00	11.63	2.00	0.00	0.00	0.02	0.00
11.65	2.00	0.00	0.00	0.02	0.00	11.67	2.00	0.00	0.00	0.02	0.00
11.69	2.00	0.00	0.00	0.02	0.00	11.71	2.00	0.00	0.00	0.02	0.00
11.73	2.00	0.00	0.00	0.02	0.00	11.75	2.00	0.00	0.00	0.02	0.00
11.77	2.00	0.00	0.00	0.02	0.00	11.79	2.00	0.00	0.00	0.02	0.00
11.81	2.00	0.00	0.00	0.02	0.00	11.83	2.00	0.00	0.00	0.02	0.00
11.85	2.00	0.00	0.00	0.02	0.00	11.87	2.00	0.00	0.00	0.02	0.00
11.89	2.00	0.00	0.00	0.02	0.00	11.91	2.00	0.00	0.00	0.02	0.00
11.93	2.00	0.00	0.00	0.02	0.00	11.95	2.00	0.00	0.00	0.02	0.00
11.97	2.00	0.00	0.00	0.02	0.00	11.99	2.00	0.00	0.00	0.02	0.00
12.01	2.00	0.00	0.00	0.02	0.00	12.03	2.00	0.00	0.00	0.02	0.00
12.05	2.00	0.00	0.00	0.02	0.00	12.07	2.00	0.00	0.00	0.02	0.00
12.09	2.00	0.00	0.00	0.02	0.00	12.11	2.00	0.00	0.00	0.02	0.00
12.13	2.00	0.00	0.00	0.02	0.00	12.15	2.00	0.00	0.00	0.02	0.00
12.17	2.00	0.00	0.00	0.02	0.00	12.19	2.00	0.00	0.00	0.02	0.00
12.21	2.00	0.00	0.00	0.02	0.00	12.23	2.00	0.00	0.00	0.02	0.00
12.25	2.00	0.00	0.00	0.02	0.00	12.27	1.90	0.00	0.00	0.02	0.00
12.29	2.00	0.00	0.00	0.02	0.00	12.31	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
12.33	2.00	0.00	0.00	0.02	0.00	12.35	2.00	0.00	0.00	0.02	0.00
12.37	2.00	0.00	0.00	0.02	0.00	12.39	2.00	0.00	0.00	0.02	0.00
12.41	2.00	0.00	0.00	0.02	0.00	12.43	2.00	0.00	0.00	0.02	0.00
12.45	2.00	0.00	0.00	0.02	0.00	12.47	2.00	0.00	0.00	0.02	0.00
12.49	2.00	0.00	0.00	0.02	0.00	12.51	2.00	0.00	0.00	0.02	0.00
12.53	2.00	0.00	0.00	0.02	0.00	12.55	2.00	0.00	0.00	0.02	0.00
12.57	2.00	0.00	0.00	0.02	0.00	12.59	2.00	0.00	0.00	0.02	0.00
12.61	2.00	0.00	0.00	0.02	0.00	12.63	2.00	0.00	0.00	0.02	0.00
12.65	2.00	0.00	0.00	0.02	0.00	12.67	2.00	0.00	0.00	0.02	0.00
12.69	2.00	0.00	0.00	0.02	0.00	12.71	2.00	0.00	0.00	0.02	0.00
12.73	2.00	0.00	0.00	0.02	0.00	12.75	2.00	0.00	0.00	0.02	0.00
12.77	2.00	0.00	0.00	0.02	0.00	12.79	2.00	0.00	0.00	0.02	0.00
12.81	2.00	0.00	0.00	0.02	0.00	12.83	2.00	0.00	0.00	0.02	0.00
12.85	2.00	0.00	0.00	0.02	0.00	12.87	2.00	0.00	0.00	0.02	0.00
12.89	2.00	0.00	0.00	0.02	0.00	12.91	2.00	0.00	0.00	0.02	0.00
12.93	2.00	0.00	0.00	0.02	0.00	12.95	2.00	0.00	0.00	0.02	0.00
12.97	2.00	0.00	0.00	0.02	0.00	12.99	2.00	0.00	0.00	0.02	0.00
13.01	2.00	0.00	0.00	0.02	0.00	13.03	2.00	0.00	0.00	0.02	0.00
13.05	2.00	0.00	0.00	0.02	0.00	13.07	2.00	0.00	0.00	0.02	0.00
13.09	2.00	0.00	0.00	0.02	0.00	13.11	2.00	0.00	0.00	0.02	0.00
13.13	2.00	0.00	0.00	0.02	0.00	13.15	2.00	0.00	0.00	0.02	0.00
13.17	2.00	0.00	0.00	0.02	0.00	13.19	2.00	0.00	0.00	0.02	0.00
13.21	2.00	0.00	0.00	0.02	0.00	13.23	2.00	0.00	0.00	0.02	0.00
13.25	2.00	0.00	0.00	0.02	0.00	13.27	2.00	0.00	0.00	0.02	0.00
13.29	2.00	0.00	0.00	0.02	0.00	13.31	2.00	0.00	0.00	0.02	0.00
13.33	2.00	0.00	0.00	0.02	0.00	13.35	2.00	0.00	0.00	0.02	0.00
13.37	2.00	0.00	0.00	0.02	0.00	13.39	2.00	0.00	0.00	0.02	0.00
13.41	2.00	0.00	0.00	0.02	0.00	13.43	2.00	0.00	0.00	0.02	0.00
13.45	2.00	0.00	0.00	0.02	0.00	13.47	2.00	0.00	0.00	0.02	0.00
13.49	2.00	0.00	0.00	0.02	0.00	13.51	2.00	0.00	0.00	0.02	0.00
13.53	2.00	0.00	0.00	0.02	0.00	13.55	2.00	0.00	0.00	0.02	0.00
13.57	2.00	0.00	0.00	0.02	0.00	13.59	2.00	0.00	0.00	0.02	0.00
13.61	2.00	0.00	0.00	0.02	0.00	13.63	2.00	0.00	0.00	0.02	0.00
13.65	2.00	0.00	0.00	0.02	0.00	13.67	2.00	0.00	0.00	0.02	0.00
13.69	2.00	0.00	0.00	0.02	0.00	13.71	2.00	0.00	0.00	0.02	0.00
13.73	2.00	0.00	0.00	0.02	0.00	13.75	2.00	0.00	0.00	0.02	0.00
13.77	2.00	0.00	0.00	0.02	0.00	13.79	2.00	0.00	0.00	0.02	0.00
13.81	2.00	0.00	0.00	0.02	0.00	13.83	2.00	0.00	0.00	0.02	0.00
13.85	2.00	0.00	0.00	0.02	0.00	13.87	2.00	0.00	0.00	0.02	0.00
13.89	2.00	0.00	0.00	0.02	0.00	13.91	2.00	0.00	0.00	0.02	0.00
13.93	2.00	0.00	0.00	0.02	0.00	13.95	2.00	0.00	0.00	0.02	0.00
13.97	2.00	0.00	0.00	0.02	0.00	13.99	2.00	0.00	0.00	0.02	0.00
14.01	2.00	0.00	0.00	0.02	0.00	14.03	2.00	0.00	0.00	0.02	0.00
14.05	2.00	0.00	0.00	0.02	0.00	14.07	2.00	0.00	0.00	0.02	0.00
14.09	2.00	0.00	0.00	0.02	0.00	14.11	2.00	0.00	0.00	0.02	0.00
14.13	2.00	0.00	0.00	0.02	0.00	14.15	2.00	0.00	0.00	0.02	0.00
14.17	2.00	0.00	0.00	0.02	0.00	14.19	2.00	0.00	0.00	0.02	0.00
14.21	2.00	0.00	0.00	0.02	0.00	14.23	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
14.25	2.00	0.00	0.00	0.02	0.00	14.27	2.00	0.00	0.00	0.02	0.00
14.29	2.00	0.00	0.00	0.02	0.00	14.31	2.00	0.00	0.00	0.02	0.00
14.33	2.00	0.00	0.00	0.02	0.00	14.35	1.86	0.00	0.00	0.02	0.00
14.37	2.00	0.00	0.00	0.02	0.00	14.39	2.00	0.00	0.00	0.02	0.00
14.41	2.00	0.00	0.00	0.02	0.00	14.43	2.00	0.00	0.00	0.02	0.00
14.45	2.00	0.00	0.00	0.02	0.00	14.47	2.00	0.00	0.00	0.02	0.00
14.49	2.00	0.00	0.00	0.02	0.00	14.51	2.00	0.00	0.00	0.02	0.00
14.53	2.00	0.00	0.00	0.02	0.00	14.55	2.00	0.00	0.00	0.02	0.00
14.57	2.00	0.00	0.00	0.02	0.00	14.59	2.00	0.00	0.00	0.02	0.00
14.61	2.00	0.00	0.00	0.02	0.00	14.63	2.00	0.00	0.00	0.02	0.00
14.65	2.00	0.00	0.00	0.02	0.00	14.67	2.00	0.00	0.00	0.02	0.00
14.69	2.00	0.00	0.00	0.02	0.00	14.71	2.00	0.00	0.00	0.02	0.00
14.73	2.00	0.00	0.00	0.02	0.00	14.75	2.00	0.00	0.00	0.02	0.00
14.77	2.00	0.00	0.00	0.02	0.00	14.79	2.00	0.00	0.00	0.02	0.00
14.81	2.00	0.00	0.00	0.02	0.00	14.83	2.00	0.00	0.00	0.02	0.00
14.85	2.00	0.00	0.00	0.02	0.00	14.87	2.00	0.00	0.00	0.02	0.00
14.89	2.00	0.00	0.00	0.02	0.00	14.91	2.00	0.00	0.00	0.02	0.00
14.93	2.00	0.00	0.00	0.02	0.00	14.95	2.00	0.00	0.00	0.02	0.00
14.97	2.00	0.00	0.00	0.02	0.00	14.99	2.00	0.00	0.00	0.02	0.00
15.01	2.00	0.00	0.00	0.02	0.00	15.03	2.00	0.00	0.00	0.02	0.00
15.05	2.00	0.00	0.00	0.02	0.00	15.07	2.00	0.00	0.00	0.02	0.00
15.09	2.00	0.00	0.00	0.02	0.00	15.11	2.00	0.00	0.00	0.02	0.00
15.13	2.00	0.00	0.00	0.02	0.00	15.15	2.00	0.00	0.00	0.02	0.00
15.17	2.00	0.00	0.00	0.02	0.00	15.19	2.00	0.00	0.00	0.02	0.00
15.21	2.00	0.00	0.00	0.02	0.00	15.23	2.00	0.00	0.00	0.02	0.00
15.25	2.00	0.00	0.00	0.02	0.00	15.27	2.00	0.00	0.00	0.02	0.00
15.29	2.00	0.00	0.00	0.02	0.00	15.31	2.00	0.00	0.00	0.02	0.00
15.33	2.00	0.00	0.00	0.02	0.00	15.35	2.00	0.00	0.00	0.02	0.00
15.37	2.00	0.00	0.00	0.02	0.00	15.39	2.00	0.00	0.00	0.02	0.00
15.41	2.00	0.00	0.00	0.02	0.00	15.43	2.00	0.00	0.00	0.02	0.00
15.45	2.00	0.00	0.00	0.02	0.00	15.47	2.00	0.00	0.00	0.02	0.00
15.49	2.00	0.00	0.00	0.02	0.00	15.51	2.00	0.00	0.00	0.02	0.00
15.53	2.00	0.00	0.00	0.02	0.00	15.55	2.00	0.00	0.00	0.02	0.00
15.57	2.00	0.00	0.00	0.02	0.00	15.59	2.00	0.00	0.00	0.02	0.00
15.61	2.00	0.00	0.00	0.02	0.00	15.63	2.00	0.00	0.00	0.02	0.00
15.65	1.96	0.00	0.00	0.02	0.00	15.67	2.00	0.00	0.00	0.02	0.00
15.69	2.00	0.00	0.00	0.02	0.00	15.71	2.00	0.00	0.00	0.02	0.00
15.73	2.00	0.00	0.00	0.02	0.00	15.75	2.00	0.00	0.00	0.02	0.00
15.77	2.00	0.00	0.00	0.02	0.00	15.79	2.00	0.00	0.00	0.02	0.00
15.81	2.00	0.00	0.00	0.02	0.00	15.83	2.00	0.00	0.00	0.02	0.00
15.85	2.00	0.00	0.00	0.02	0.00	15.87	2.00	0.00	0.00	0.02	0.00
15.89	2.00	0.00	0.00	0.02	0.00	15.91	2.00	0.00	0.00	0.02	0.00
15.93	2.00	0.00	0.00	0.02	0.00	15.95	2.00	0.00	0.00	0.02	0.00
15.97	2.00	0.00	0.00	0.02	0.00	15.99	2.00	0.00	0.00	0.02	0.00
16.01	2.00	0.00	0.00	0.02	0.00	16.03	2.00	0.00	0.00	0.02	0.00
16.05	2.00	0.00	0.00	0.02	0.00	16.07	2.00	0.00	0.00	0.02	0.00
16.09	2.00	0.00	0.00	0.02	0.00	16.11	2.00	0.00	0.00	0.02	0.00
16.13	2.00	0.00	0.00	0.02	0.00	16.15	2.00	0.00	0.00	0.02	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
16.17	2.00	0.00	0.00	0.02	0.00						

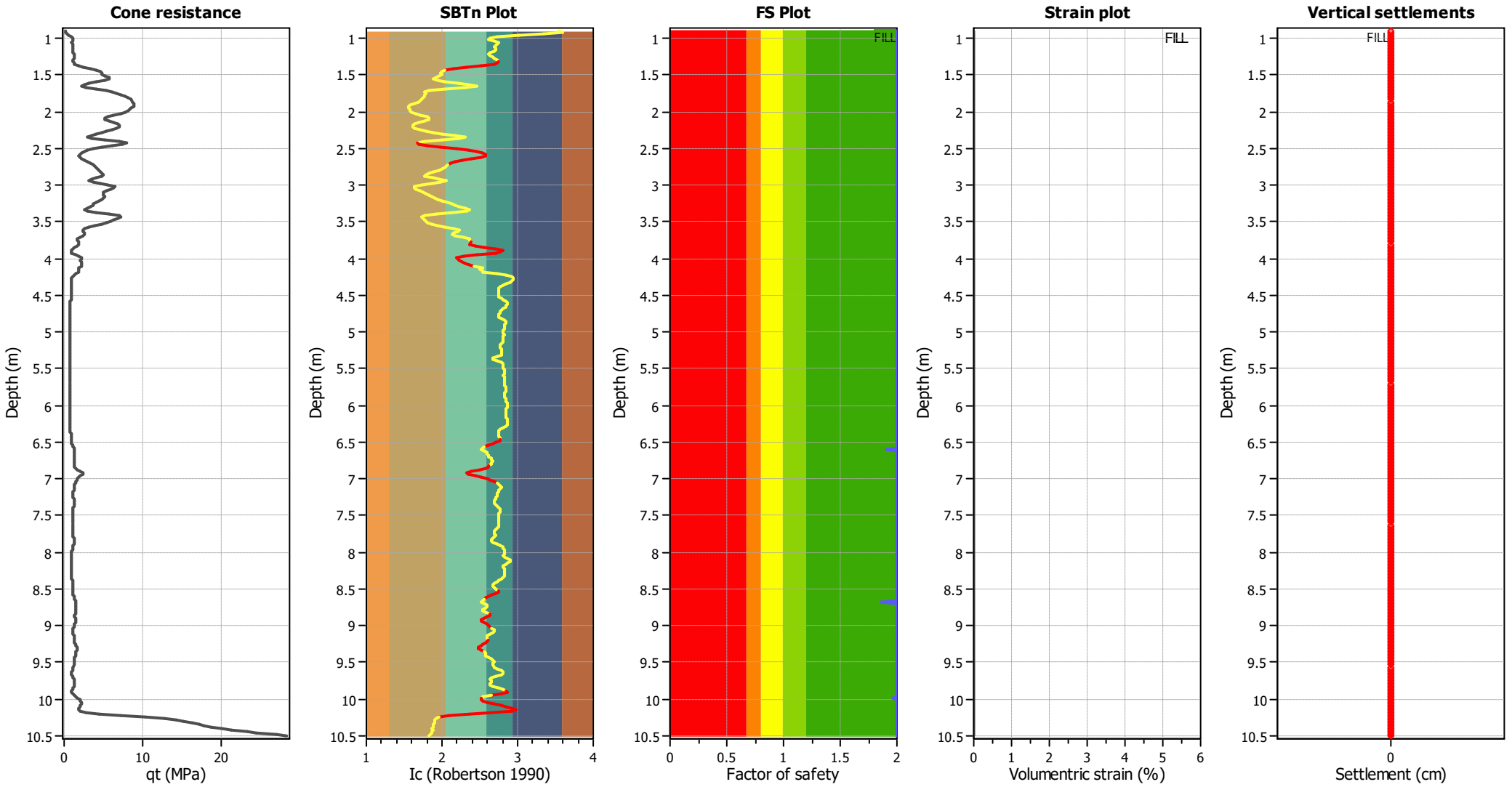
Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement due to soil liquefaction ::

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
6.57	77.38	2.00	0.00	0.64	0.00	6.59	86.46	2.00	0.00	0.63	0.00
6.61	93.67	2.00	0.00	0.63	0.00	6.63	97.22	2.00	0.00	0.63	0.00
6.65	88.55	2.00	0.00	0.63	0.00	6.67	138.79	2.00	0.00	0.63	0.00
6.69	137.29	2.00	0.00	0.63	0.00	6.71	192.78	2.00	0.00	0.63	0.00
6.73	99.79	2.00	0.00	0.63	0.00	6.75	101.88	2.00	0.00	0.63	0.00
6.77	102.70	2.00	0.00	0.62	0.00	6.79	205.70	2.00	0.00	0.62	0.00
6.81	99.39	2.00	0.00	0.62	0.00	6.83	98.53	2.00	0.00	0.62	0.00
6.85	204.55	2.00	0.00	0.62	0.00	6.87	166.31	2.00	0.00	0.62	0.00
6.89	148.44	2.00	0.00	0.62	0.00	6.91	165.69	2.00	0.00	0.62	0.00
6.93	204.56	2.00	0.00	0.61	0.00	6.95	244.99	2.00	0.00	0.61	0.00
6.97	116.01	2.00	0.00	0.61	0.00	6.99	120.97	2.00	0.00	0.61	0.00
7.01	122.85	2.00	0.00	0.61	0.00	7.03	253.95	2.00	0.00	0.61	0.00
7.05	115.01	2.00	0.00	0.61	0.00	7.07	95.97	2.00	0.00	0.61	0.00
7.09	98.55	2.00	0.00	0.61	0.00	7.11	109.71	2.00	0.00	0.60	0.00
7.13	118.60	2.00	0.00	0.60	0.00	7.15	121.16	2.00	0.00	0.60	0.00
7.17	123.84	2.00	0.00	0.60	0.00	7.19	130.85	2.00	0.00	0.60	0.00
7.21	138.66	2.00	0.00	0.60	0.00	7.23	139.47	2.00	0.00	0.60	0.00
7.25	126.35	2.00	0.00	0.60	0.00	7.27	109.53	2.00	0.00	0.60	0.00
7.29	101.33	2.00	0.00	0.59	0.00	7.31	107.03	2.00	0.00	0.59	0.00
7.33	115.42	2.00	0.00	0.59	0.00	7.35	103.76	2.00	0.00	0.59	0.00
7.37	104.88	2.00	0.00	0.59	0.00	7.39	122.75	2.00	0.00	0.59	0.00
7.41	131.95	2.00	0.00	0.59	0.00	7.43	145.52	2.00	0.00	0.59	0.00
7.45	159.72	2.00	0.00	0.59	0.00	7.47	169.97	2.00	0.00	0.58	0.00
7.49	174.59	2.00	0.00	0.58	0.00	7.51	174.36	2.00	0.00	0.58	0.00
7.53	171.09	2.00	0.00	0.58	0.00	7.55	174.49	2.00	0.00	0.58	0.00
7.57	171.29	2.00	0.00	0.58	0.00	7.59	165.73	2.00	0.00	0.58	0.00
7.61	161.53	2.00	0.00	0.58	0.00	7.63	158.13	2.00	0.00	0.58	0.00
7.65	154.79	2.00	0.00	0.57	0.00	7.67	149.44	2.00	0.00	0.57	0.00
7.69	139.03	2.00	0.00	0.57	0.00	7.71	127.58	2.00	0.00	0.57	0.00
7.73	124.97	2.00	0.00	0.57	0.00	7.75	120.77	2.00	0.00	0.57	0.00
7.77	121.50	2.00	0.00	0.57	0.00	7.79	124.08	2.00	0.00	0.57	0.00
7.81	122.36	2.00	0.00	0.57	0.00	7.83	128.48	2.00	0.00	0.56	0.00
7.85	129.84	2.00	0.00	0.56	0.00	7.87	130.11	2.00	0.00	0.56	0.00
7.89	125.74	2.00	0.00	0.56	0.00	7.91	119.29	2.00	0.00	0.56	0.00
7.93	119.93	2.00	0.00	0.56	0.00	7.95	113.84	2.00	0.00	0.56	0.00
7.97	104.85	2.00	0.00	0.56	0.00	7.99	105.09	2.00	0.00	0.56	0.00
8.01	117.82	2.00	0.00	0.56	0.00	8.03	119.49	2.00	0.00	0.55	0.00
8.05	132.96	2.00	0.00	0.55	0.00	8.07	153.85	2.00	0.00	0.55	0.00
8.09	148.82	2.00	0.00	0.55	0.00	8.11	138.84	2.00	0.00	0.55	0.00
8.13	140.78	2.00	0.00	0.55	0.00	8.15	122.41	2.00	0.00	0.55	0.00
8.17	115.62	2.00	0.00	0.55	0.00	8.19	122.34	2.00	0.00	0.55	0.00
8.21	134.71	2.00	0.00	0.54	0.00	8.23	148.90	2.00	0.00	0.54	0.00
8.25	190.36	2.00	0.00	0.54	0.00	8.27	178.55	2.00	0.00	0.54	0.00
8.29	116.58	2.00	0.00	0.54	0.00	8.31	96.98	2.00	0.00	0.54	0.00
8.33	90.41	2.00	0.00	0.54	0.00	8.35	89.82	2.00	0.00	0.54	0.00
8.37	94.29	2.00	0.00	0.54	0.00	8.39	99.57	2.00	0.00	0.53	0.00
8.41	104.37	2.00	0.00	0.53	0.00	8.43	108.14	2.00	0.00	0.53	0.00
8.45	110.92	2.00	0.00	0.53	0.00	8.47	111.73	2.00	0.00	0.53	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
8.49	111.03	2.00	0.00	0.53	0.00	8.51	106.64	2.00	0.00	0.53	0.00
8.53	101.67	2.00	0.00	0.53	0.00	8.55	86.90	2.00	0.00	0.53	0.00
8.57	92.74	2.00	0.00	0.52	0.00	8.59	88.57	2.00	0.00	0.52	0.00
8.61	85.20	2.00	0.00	0.52	0.00	8.63	92.69	2.00	0.00	0.52	0.00
8.65	103.89	2.00	0.00	0.52	0.00	8.67	98.83	2.00	0.00	0.52	0.00
8.69	108.19	2.00	0.00	0.52	0.00	8.71	105.89	2.00	0.00	0.52	0.00
8.73	100.64	2.00	0.00	0.52	0.00	8.75	92.28	2.00	0.00	0.51	0.00
8.77	87.75	2.00	0.00	0.51	0.00	8.79	99.96	2.00	0.00	0.51	0.00
8.81	107.07	2.00	0.00	0.51	0.00	8.83	111.69	2.00	0.00	0.51	0.00
8.85	113.59	2.00	0.00	0.51	0.00	8.87	112.38	2.00	0.00	0.51	0.00
8.89	109.50	2.00	0.00	0.51	0.00	8.91	107.38	2.00	0.00	0.51	0.00
8.93	107.93	2.00	0.00	0.50	0.00	8.95	110.67	2.00	0.00	0.50	0.00
8.97	109.46	2.00	0.00	0.50	0.00	8.99	108.92	2.00	0.00	0.50	0.00
9.01	113.24	2.00	0.00	0.50	0.00	9.03	115.60	2.00	0.00	0.50	0.00
9.05	115.84	2.00	0.00	0.50	0.00	9.07	128.86	2.00	0.00	0.50	0.00
9.09	133.16	2.00	0.00	0.49	0.00	9.11	126.42	2.00	0.00	0.49	0.00
9.13	122.59	2.00	0.00	0.49	0.00	9.15	118.45	2.00	0.00	0.49	0.00
9.17	113.99	2.00	0.00	0.49	0.00	9.19	107.33	2.00	0.00	0.49	0.00
9.21	99.44	2.00	0.00	0.49	0.00	9.23	87.35	2.00	0.00	0.49	0.00
9.25	77.52	2.00	0.00	0.49	0.00	9.27	74.18	2.00	0.00	0.48	0.00
9.29	76.10	2.00	0.00	0.48	0.00	9.31	77.76	2.00	0.00	0.48	0.00
9.33	74.91	2.00	0.00	0.48	0.00	9.35	71.44	2.00	0.00	0.48	0.00
9.37	68.50	2.00	0.00	0.48	0.00	9.39	69.30	2.00	0.00	0.48	0.00
9.41	73.17	2.00	0.00	0.48	0.00	9.43	73.24	2.00	0.00	0.48	0.00
9.45	75.91	2.00	0.00	0.47	0.00	9.47	74.67	2.00	0.00	0.47	0.00
9.49	78.43	2.00	0.00	0.47	0.00	9.51	101.24	2.00	0.00	0.47	0.00
9.53	93.31	2.00	0.00	0.47	0.00	9.55	96.67	2.00	0.00	0.47	0.00
9.57	93.32	2.00	0.00	0.47	0.00	9.59	87.01	2.00	0.00	0.47	0.00
9.61	73.79	2.00	0.00	0.47	0.00	9.63	66.52	2.00	0.00	0.47	0.00
9.65	65.30	2.00	0.00	0.46	0.00	9.67	64.57	2.00	0.00	0.46	0.00
9.69	64.27	2.00	0.00	0.46	0.00	9.71	71.77	2.00	0.00	0.46	0.00
9.73	82.92	2.00	0.00	0.46	0.00	9.75	94.06	2.00	0.00	0.46	0.00
9.77	100.65	2.00	0.00	0.46	0.00	9.79	124.71	2.00	0.00	0.46	0.00
9.81	107.93	2.00	0.00	0.46	0.00	9.83	126.70	2.00	0.00	0.45	0.00
9.85	126.42	2.00	0.00	0.45	0.00	9.87	134.76	2.00	0.00	0.45	0.00
9.89	147.10	2.00	0.00	0.45	0.00	9.91	149.09	2.00	0.00	0.45	0.00
9.93	143.90	2.00	0.00	0.45	0.00	9.95	139.82	2.00	0.00	0.45	0.00
9.97	132.73	2.00	0.00	0.45	0.00	9.99	123.75	2.00	0.00	0.45	0.00
10.01	112.38	2.00	0.00	0.44	0.00	10.03	104.72	2.00	0.00	0.44	0.00
10.05	99.25	2.00	0.00	0.44	0.00	10.07	96.80	2.00	0.00	0.44	0.00
10.09	95.89	2.00	0.00	0.44	0.00	10.11	95.11	2.00	0.00	0.44	0.00
10.13	94.72	2.00	0.00	0.44	0.00	10.15	94.35	2.00	0.00	0.44	0.00
10.17	95.37	2.00	0.00	0.43	0.00	10.19	95.68	2.00	0.00	0.43	0.00
10.21	95.94	2.00	0.00	0.43	0.00	10.23	95.52	2.00	0.00	0.43	0.00
10.25	95.34	2.00	0.00	0.43	0.00	10.27	93.85	2.00	0.00	0.43	0.00
10.29	91.35	2.00	0.00	0.43	0.00	10.31	87.24	2.00	0.00	0.43	0.00
10.33	83.43	2.00	0.00	0.43	0.00	10.35	80.10	2.00	0.00	0.42	0.00
10.37	77.74	2.00	0.00	0.42	0.00	10.39	76.53	2.00	0.00	0.42	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
10.41	76.28	2.00	0.00	0.42	0.00	10.43	75.87	2.00	0.00	0.42	0.00
10.45	75.33	2.00	0.00	0.42	0.00	10.47	76.34	2.00	0.00	0.42	0.00
10.49	79.32	2.00	0.00	0.42	0.00	10.51	80.82	2.00	0.00	0.42	0.00
10.53	79.88	2.00	0.00	0.41	0.00	10.55	76.52	2.00	0.00	0.41	0.00
10.57	74.70	2.00	0.00	0.41	0.00	10.59	73.66	2.00	0.00	0.41	0.00
10.61	73.44	2.00	0.00	0.41	0.00	10.63	72.53	2.00	0.00	0.41	0.00
10.65	71.45	2.00	0.00	0.41	0.00	10.67	70.62	2.00	0.00	0.41	0.00
10.69	70.39	2.00	0.00	0.41	0.00	10.71	70.27	2.00	0.00	0.41	0.00
10.73	69.61	2.00	0.00	0.40	0.00	10.75	69.09	2.00	0.00	0.40	0.00
10.77	68.75	2.00	0.00	0.40	0.00	10.79	68.33	2.00	0.00	0.40	0.00
10.81	67.69	2.00	0.00	0.40	0.00	10.83	66.84	2.00	0.00	0.40	0.00
10.85	66.57	2.00	0.00	0.40	0.00	10.87	66.64	2.00	0.00	0.40	0.00
10.89	66.88	2.00	0.00	0.40	0.00	10.91	66.95	2.00	0.00	0.39	0.00
10.93	67.18	2.00	0.00	0.39	0.00	10.95	67.51	2.00	0.00	0.39	0.00
10.97	67.74	2.00	0.00	0.39	0.00	10.99	67.45	2.00	0.00	0.39	0.00
11.01	62.20	2.00	0.00	0.39	0.00	11.03	111.13	2.00	0.00	0.39	0.00
11.05	116.93	2.00	0.00	0.39	0.00	11.07	67.84	2.00	0.00	0.39	0.00
11.09	75.73	2.00	0.00	0.38	0.00	11.11	76.67	2.00	0.00	0.38	0.00
11.13	76.22	2.00	0.00	0.38	0.00	11.15	76.12	2.00	0.00	0.38	0.00
11.17	75.80	2.00	0.00	0.38	0.00	11.19	75.21	2.00	0.00	0.38	0.00
11.21	73.54	2.00	0.00	0.38	0.00	11.23	71.72	2.00	0.00	0.38	0.00
11.25	69.77	2.00	0.00	0.38	0.00	11.27	68.50	2.00	0.00	0.37	0.00
11.29	68.45	2.00	0.00	0.37	0.00	11.31	68.89	2.00	0.00	0.37	0.00
11.33	69.23	2.00	0.00	0.37	0.00	11.35	69.40	2.00	0.00	0.37	0.00
11.37	69.47	2.00	0.00	0.37	0.00	11.39	70.10	2.00	0.00	0.37	0.00
11.41	70.75	2.00	0.00	0.37	0.00	11.43	71.31	2.00	0.00	0.36	0.00
11.45	71.20	2.00	0.00	0.36	0.00	11.47	70.83	2.00	0.00	0.36	0.00
11.49	70.45	2.00	0.00	0.36	0.00	11.51	70.19	2.00	0.00	0.36	0.00
11.53	70.17	2.00	0.00	0.36	0.00	11.55	70.12	2.00	0.00	0.36	0.00
11.57	70.24	2.00	0.00	0.36	0.00	11.59	70.19	2.00	0.00	0.36	0.00
11.61	70.14	2.00	0.00	0.35	0.00	11.63	70.08	2.00	0.00	0.35	0.00
11.65	70.01	2.00	0.00	0.35	0.00	11.67	69.78	2.00	0.00	0.35	0.00
11.69	69.54	2.00	0.00	0.35	0.00	11.71	68.98	2.00	0.00	0.35	0.00
11.73	68.67	2.00	0.00	0.35	0.00	11.75	68.27	2.00	0.00	0.35	0.00
11.77	68.35	2.00	0.00	0.35	0.00	11.79	68.25	2.00	0.00	0.34	0.00
11.81	68.19	2.00	0.00	0.34	0.00	11.83	68.14	2.00	0.00	0.34	0.00
11.85	68.46	2.00	0.00	0.34	0.00	11.87	68.67	2.00	0.00	0.34	0.00
11.89	68.84	2.00	0.00	0.34	0.00	11.91	68.86	2.00	0.00	0.34	0.00
11.93	68.99	2.00	0.00	0.34	0.00	11.95	68.34	2.00	0.00	0.34	0.00
11.97	66.71	2.00	0.00	0.34	0.00	11.99	65.15	2.00	0.00	0.33	0.00
12.01	64.53	2.00	0.00	0.33	0.00	12.03	65.11	2.00	0.00	0.33	0.00
12.05	66.43	2.00	0.00	0.33	0.00	12.07	67.49	2.00	0.00	0.33	0.00
12.09	69.37	2.00	0.00	0.33	0.00	12.11	70.58	2.00	0.00	0.33	0.00
12.13	71.53	2.00	0.00	0.33	0.00	12.15	71.40	2.00	0.00	0.33	0.00
12.17	68.90	2.00	0.00	0.32	0.00	12.19	124.45	2.00	0.00	0.32	0.00
12.21	98.45	2.00	0.00	0.32	0.00	12.23	70.64	2.00	0.00	0.32	0.00
12.25	65.42	2.00	0.00	0.32	0.00	12.27	64.35	1.90	0.00	0.32	0.00
12.29	84.77	2.00	0.00	0.32	0.00	12.31	98.01	2.00	0.00	0.32	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
12.33	106.06	2.00	0.00	0.32	0.00	12.35	112.52	2.00	0.00	0.31	0.00
12.37	123.50	2.00	0.00	0.31	0.00	12.39	140.85	2.00	0.00	0.31	0.00
12.41	154.04	2.00	0.00	0.31	0.00	12.43	155.47	2.00	0.00	0.31	0.00
12.45	145.39	2.00	0.00	0.31	0.00	12.47	138.53	2.00	0.00	0.31	0.00
12.49	122.82	2.00	0.00	0.31	0.00	12.51	117.42	2.00	0.00	0.30	0.00
12.53	97.10	2.00	0.00	0.30	0.00	12.55	70.47	2.00	0.00	0.30	0.00
12.57	66.94	2.00	0.00	0.30	0.00	12.59	68.20	2.00	0.00	0.30	0.00
12.61	71.85	2.00	0.00	0.30	0.00	12.63	77.97	2.00	0.00	0.30	0.00
12.65	85.18	2.00	0.00	0.30	0.00	12.67	122.89	2.00	0.00	0.30	0.00
12.69	160.29	2.00	0.00	0.29	0.00	12.71	207.30	2.00	0.00	0.29	0.00
12.73	104.46	2.00	0.00	0.29	0.00	12.75	105.00	2.00	0.00	0.29	0.00
12.77	104.26	2.00	0.00	0.29	0.00	12.79	101.58	2.00	0.00	0.29	0.00
12.81	97.51	2.00	0.00	0.29	0.00	12.83	91.54	2.00	0.00	0.29	0.00
12.85	87.05	2.00	0.00	0.29	0.00	12.87	84.04	2.00	0.00	0.28	0.00
12.89	82.81	2.00	0.00	0.28	0.00	12.91	82.23	2.00	0.00	0.28	0.00
12.93	81.50	2.00	0.00	0.28	0.00	12.95	80.30	2.00	0.00	0.28	0.00
12.97	163.53	2.00	0.00	0.28	0.00	12.99	163.00	2.00	0.00	0.28	0.00
13.01	170.20	2.00	0.00	0.28	0.00	13.03	82.80	2.00	0.00	0.28	0.00
13.05	84.11	2.00	0.00	0.28	0.00	13.07	85.76	2.00	0.00	0.27	0.00
13.09	86.34	2.00	0.00	0.27	0.00	13.11	86.24	2.00	0.00	0.27	0.00
13.13	84.51	2.00	0.00	0.27	0.00	13.15	83.04	2.00	0.00	0.27	0.00
13.17	81.86	2.00	0.00	0.27	0.00	13.19	81.51	2.00	0.00	0.27	0.00
13.21	81.12	2.00	0.00	0.27	0.00	13.23	80.66	2.00	0.00	0.27	0.00
13.25	80.38	2.00	0.00	0.26	0.00	13.27	79.61	2.00	0.00	0.26	0.00
13.29	78.89	2.00	0.00	0.26	0.00	13.31	77.87	2.00	0.00	0.26	0.00
13.33	76.54	2.00	0.00	0.26	0.00	13.35	74.80	2.00	0.00	0.26	0.00
13.37	154.61	2.00	0.00	0.26	0.00	13.39	146.63	2.00	0.00	0.26	0.00
13.41	151.26	2.00	0.00	0.26	0.00	13.43	73.17	2.00	0.00	0.25	0.00
13.45	73.06	2.00	0.00	0.25	0.00	13.47	143.95	2.00	0.00	0.25	0.00
13.49	130.77	2.00	0.00	0.25	0.00	13.51	133.92	2.00	0.00	0.25	0.00
13.53	152.44	2.00	0.00	0.25	0.00	13.55	81.25	2.00	0.00	0.25	0.00
13.57	84.67	2.00	0.00	0.25	0.00	13.59	86.52	2.00	0.00	0.24	0.00
13.61	84.30	2.00	0.00	0.24	0.00	13.63	83.07	2.00	0.00	0.24	0.00
13.65	81.67	2.00	0.00	0.24	0.00	13.67	80.43	2.00	0.00	0.24	0.00
13.69	78.79	2.00	0.00	0.24	0.00	13.71	76.41	2.00	0.00	0.24	0.00
13.73	75.82	2.00	0.00	0.24	0.00	13.75	76.10	2.00	0.00	0.24	0.00
13.77	77.50	2.00	0.00	0.23	0.00	13.79	78.08	2.00	0.00	0.23	0.00
13.81	76.75	2.00	0.00	0.23	0.00	13.83	75.15	2.00	0.00	0.23	0.00
13.85	73.86	2.00	0.00	0.23	0.00	13.87	74.56	2.00	0.00	0.23	0.00
13.89	75.95	2.00	0.00	0.23	0.00	13.91	77.18	2.00	0.00	0.23	0.00
13.93	76.73	2.00	0.00	0.23	0.00	13.95	75.63	2.00	0.00	0.23	0.00
13.97	74.59	2.00	0.00	0.22	0.00	13.99	74.01	2.00	0.00	0.22	0.00
14.01	72.06	2.00	0.00	0.22	0.00	14.03	68.96	2.00	0.00	0.22	0.00
14.05	66.45	2.00	0.00	0.22	0.00	14.07	63.87	2.00	0.00	0.22	0.00
14.09	62.56	2.00	0.00	0.22	0.00	14.11	120.23	2.00	0.00	0.22	0.00
14.13	121.57	2.00	0.00	0.21	0.00	14.15	129.71	2.00	0.00	0.21	0.00
14.17	63.56	2.00	0.00	0.21	0.00	14.19	64.46	2.00	0.00	0.21	0.00
14.21	64.75	2.00	0.00	0.21	0.00	14.23	63.66	2.00	0.00	0.21	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
14.25	109.42	2.00	0.00	0.21	0.00	14.27	87.41	2.00	0.00	0.21	0.00
14.29	76.09	2.00	0.00	0.21	0.00	14.31	68.41	2.00	0.00	0.20	0.00
14.33	60.94	2.00	0.00	0.20	0.00	14.35	60.59	1.86	0.00	0.20	0.00
14.37	71.11	2.00	0.00	0.20	0.00	14.39	89.93	2.00	0.00	0.20	0.00
14.41	97.34	2.00	0.00	0.20	0.00	14.43	84.23	2.00	0.00	0.20	0.00
14.45	68.71	2.00	0.00	0.20	0.00	14.47	67.12	2.00	0.00	0.20	0.00
14.49	84.98	2.00	0.00	0.20	0.00	14.51	105.95	2.00	0.00	0.19	0.00
14.53	110.14	2.00	0.00	0.19	0.00	14.55	86.72	2.00	0.00	0.19	0.00
14.57	65.77	2.00	0.00	0.19	0.00	14.59	56.57	2.00	0.00	0.19	0.00
14.61	55.96	2.00	0.00	0.19	0.00	14.63	67.38	2.00	0.00	0.19	0.00
14.65	80.70	2.00	0.00	0.19	0.00	14.67	91.48	2.00	0.00	0.18	0.00
14.69	100.24	2.00	0.00	0.18	0.00	14.71	109.21	2.00	0.00	0.18	0.00
14.73	125.75	2.00	0.00	0.18	0.00	14.75	124.95	2.00	0.00	0.18	0.00
14.77	115.23	2.00	0.00	0.18	0.00	14.79	93.71	2.00	0.00	0.18	0.00
14.81	79.67	2.00	0.00	0.18	0.00	14.83	73.92	2.00	0.00	0.18	0.00
14.85	79.32	2.00	0.00	0.17	0.00	14.87	84.25	2.00	0.00	0.17	0.00
14.89	78.69	2.00	0.00	0.17	0.00	14.91	71.00	2.00	0.00	0.17	0.00
14.93	61.22	2.00	0.00	0.17	0.00	14.95	53.28	2.00	0.00	0.17	0.00
14.97	52.82	2.00	0.00	0.17	0.00	14.99	54.42	2.00	0.00	0.17	0.00
15.01	57.70	2.00	0.00	0.17	0.00	15.03	70.73	2.00	0.00	0.17	0.00
15.05	81.10	2.00	0.00	0.16	0.00	15.07	79.60	2.00	0.00	0.16	0.00
15.09	79.77	2.00	0.00	0.16	0.00	15.11	88.11	2.00	0.00	0.16	0.00
15.13	106.20	2.00	0.00	0.16	0.00	15.15	124.40	2.00	0.00	0.16	0.00
15.17	131.80	2.00	0.00	0.16	0.00	15.19	123.25	2.00	0.00	0.16	0.00
15.21	116.08	2.00	0.00	0.15	0.00	15.23	125.82	2.00	0.00	0.15	0.00
15.25	63.65	2.00	0.00	0.15	0.00	15.27	65.95	2.00	0.00	0.15	0.00
15.29	65.27	2.00	0.00	0.15	0.00	15.31	63.61	2.00	0.00	0.15	0.00
15.33	60.64	2.00	0.00	0.15	0.00	15.35	57.22	2.00	0.00	0.15	0.00
15.37	99.87	2.00	0.00	0.15	0.00	15.39	91.49	2.00	0.00	0.14	0.00
15.41	103.99	2.00	0.00	0.14	0.00	15.43	107.92	2.00	0.00	0.14	0.00
15.45	96.70	2.00	0.00	0.14	0.00	15.47	93.59	2.00	0.00	0.14	0.00
15.49	115.24	2.00	0.00	0.14	0.00	15.51	64.32	2.00	0.00	0.14	0.00
15.53	66.67	2.00	0.00	0.14	0.00	15.55	67.00	2.00	0.00	0.14	0.00
15.57	65.89	2.00	0.00	0.14	0.00	15.59	62.87	2.00	0.00	0.13	0.00
15.61	105.07	2.00	0.00	0.13	0.00	15.63	62.16	2.00	0.00	0.13	0.00
15.65	63.24	1.96	0.00	0.13	0.00	15.67	69.32	2.00	0.00	0.13	0.00
15.69	91.31	2.00	0.00	0.13	0.00	15.71	128.30	2.00	0.00	0.13	0.00
15.73	240.52	2.00	0.00	0.13	0.00	15.75	135.18	2.00	0.00	0.13	0.00
15.77	154.96	2.00	0.00	0.12	0.00	15.79	168.81	2.00	0.00	0.12	0.00
15.81	174.56	2.00	0.00	0.12	0.00	15.83	168.12	2.00	0.00	0.12	0.00
15.85	253.02	2.00	0.00	0.12	0.00	15.87	109.29	2.00	0.00	0.12	0.00
15.89	114.16	2.00	0.00	0.12	0.00	15.91	146.63	2.00	0.00	0.12	0.00
15.93	177.88	2.00	0.00	0.12	0.00	15.95	197.56	2.00	0.00	0.11	0.00
15.97	210.80	2.00	0.00	0.11	0.00	15.99	223.16	2.00	0.00	0.11	0.00
16.01	233.22	2.00	0.00	0.11	0.00	16.03	240.88	2.00	0.00	0.11	0.00
16.05	251.94	2.00	0.00	0.11	0.00	16.07	270.39	2.00	0.00	0.11	0.00
16.09	288.01	2.00	0.00	0.11	0.00	16.11	313.09	2.00	0.00	0.10	0.00
16.13	327.53	2.00	0.00	0.10	0.00	16.15	352.18	2.00	0.00	0.10	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)	Depth (m)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (cm)
16.17	362.66	2.00	0.00	0.10	0.00						

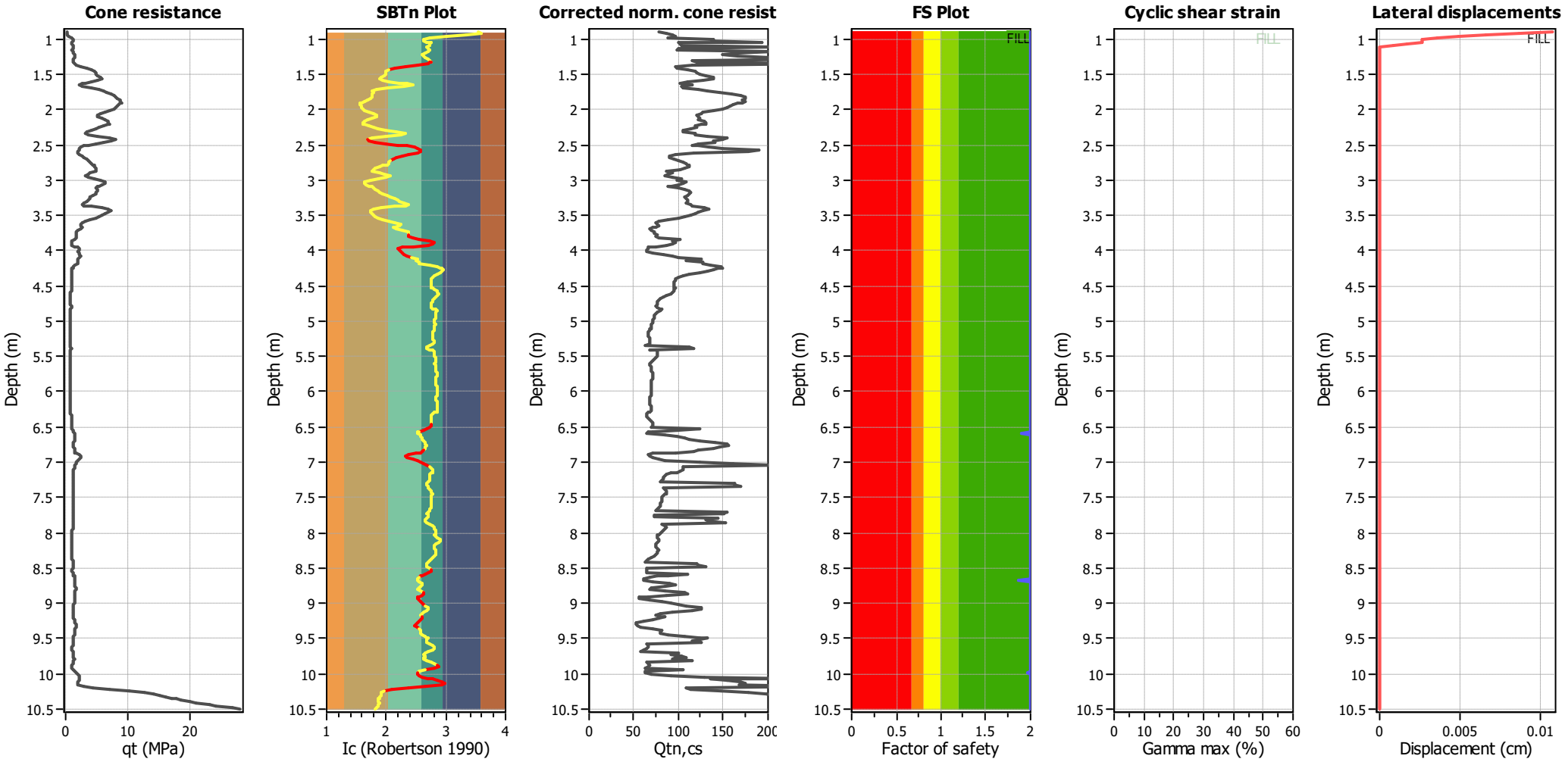
Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Estimation of post-earthquake lateral Displacements

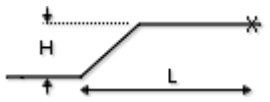
Geometric parameters: Level ground (or gently sloping) with free face (L: 47.00 m - H: 3.40 m)



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



:: Lateral displacement index calculation ::

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
6.57	0.19	3.43	5.19	77.38	2.00	0.00	0.14	0.00
6.59	0.19	3.42	6.80	86.46	2.00	0.00	0.14	0.00
6.61	0.30	5.69	5.20	93.67	2.00	0.00	0.12	0.00
6.63	0.55	10.64	3.51	97.22	2.00	0.00	0.09	0.00
6.65	0.89	17.23	2.29	88.55	2.00	8.95	0.07	0.00
6.67	1.09	21.15	1.98	138.79	2.00	15.72	0.00	0.00
6.69	1.12	21.83	2.02	137.29	2.00	16.77	0.00	0.00
6.71	1.04	20.21	2.34	192.78	2.00	14.23	0.00	0.00
6.73	0.98	18.93	2.72	99.79	2.00	12.06	0.06	0.00
6.75	1.02	19.82	2.77	101.88	2.00	13.58	0.06	0.00
6.77	1.08	21.03	2.74	102.70	2.00	15.54	0.06	0.00
6.79	1.13	22.04	2.59	205.70	2.00	17.08	0.00	0.00
6.81	1.08	20.91	2.59	99.39	2.00	15.35	0.06	0.00
6.83	1.03	20.00	2.60	98.53	2.00	13.89	0.06	0.00
6.85	1.08	21.02	2.50	204.55	2.00	15.52	0.00	0.00
6.87	1.19	23.18	2.36	166.31	2.00	18.75	0.00	0.00
6.89	1.30	25.24	2.35	148.44	2.00	21.57	0.00	0.00
6.91	1.32	25.66	2.53	165.69	2.00	22.10	0.00	0.00
6.93	1.29	25.17	2.83	204.56	2.00	21.47	0.00	0.00
6.95	1.24	24.17	3.06	244.99	2.00	20.13	0.00	0.00
6.97	1.20	23.28	3.21	116.01	2.00	18.89	0.05	0.00
6.99	1.18	22.97	3.46	120.97	2.00	18.44	0.05	0.00
7.01	1.24	24.09	3.48	122.85	2.00	20.02	0.05	0.00
7.03	1.35	26.30	3.29	253.95	2.00	22.92	0.00	0.00
7.05	1.76	34.24	2.51	115.01	2.00	31.62	0.00	0.00
7.07	2.45	47.85	1.79	95.97	2.00	42.67	0.00	0.00
7.09	3.35	65.59	1.41	98.55	2.00	53.08	0.00	0.00
7.11	4.15	81.47	1.25	109.71	2.00	60.24	0.00	0.00
7.13	4.63	90.87	1.21	118.60	2.00	63.84	0.00	0.00
7.15	4.75	93.30	1.21	121.16	2.00	64.71	0.00	0.00
7.17	4.84	95.03	1.27	123.84	2.00	65.32	0.00	0.00
7.19	5.19	101.91	1.25	130.85	2.00	67.62	0.00	0.00
7.21	5.63	110.72	1.17	138.66	2.00	70.36	0.00	0.00
7.23	5.77	113.39	1.07	139.47	2.00	71.15	0.00	0.00
7.25	5.11	100.35	1.09	126.35	2.00	67.12	0.00	0.00
7.27	4.14	81.27	1.25	109.53	2.00	60.15	0.00	0.00
7.29	3.14	61.46	1.64	101.33	2.00	50.93	0.00	0.00
7.31	2.57	50.17	2.10	107.03	2.00	44.23	0.00	0.00
7.33	2.22	43.23	2.53	115.42	2.00	39.32	0.00	0.00
7.35	2.74	53.60	1.92	103.76	2.00	46.42	0.00	0.00
7.37	4.01	78.67	1.14	104.88	2.00	59.08	0.00	0.00
7.39	5.29	103.95	0.77	122.75	2.00	68.28	0.00	0.00
7.41	6.09	119.64	0.72	131.95	2.00	72.92	0.00	0.00
7.43	6.55	128.82	0.85	145.52	2.00	75.36	0.00	0.00
7.45	7.26	142.70	0.93	159.72	2.00	78.74	0.00	0.00
7.47	7.81	153.52	0.97	169.97	2.00	81.15	0.00	0.00
7.49	8.16	160.58	0.98	174.59	2.00	82.63	0.00	0.00
7.51	8.42	165.60	0.95	174.36	2.00	83.65	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
7.53	8.70	171.09	0.86	171.09	2.00	84.72	0.00	0.00
7.55	8.87	174.49	0.71	174.49	2.00	85.37	0.00	0.00
7.57	8.92	171.29	0.59	171.29	2.00	84.76	0.00	0.00
7.59	8.78	165.73	0.51	165.73	2.00	83.67	0.00	0.00
7.61	8.56	161.53	0.50	161.53	2.00	82.83	0.00	0.00
7.63	8.36	158.13	0.51	158.13	2.00	82.12	0.00	0.00
7.65	8.17	154.79	0.51	154.79	2.00	81.42	0.00	0.00
7.67	7.82	149.44	0.53	149.44	2.00	80.26	0.00	0.00
7.69	7.15	139.03	0.57	139.03	2.00	77.88	0.00	0.00
7.71	6.30	123.67	0.64	127.58	2.00	74.01	0.00	0.00
7.73	5.53	108.51	0.73	124.97	2.00	69.70	0.00	0.00
7.75	5.19	101.68	0.77	120.77	2.00	67.55	0.00	0.00
7.77	5.22	102.31	0.77	121.50	2.00	67.75	0.00	0.00
7.79	5.72	112.29	0.67	124.08	2.00	70.83	0.00	0.00
7.81	6.27	122.36	0.56	122.36	2.00	73.66	0.00	0.00
7.83	6.80	128.48	0.48	128.48	2.00	75.27	0.00	0.00
7.85	6.95	129.84	0.45	129.84	2.00	75.62	0.00	0.00
7.87	6.99	130.11	0.44	130.11	2.00	75.69	0.00	0.00
7.89	6.70	125.74	0.46	125.74	2.00	74.56	0.00	0.00
7.91	6.17	119.29	0.57	119.29	2.00	72.82	0.00	0.00
7.93	5.42	106.21	0.66	119.93	2.00	68.99	0.00	0.00
7.95	4.76	93.30	0.80	113.84	2.00	64.71	0.00	0.00
7.97	4.11	80.45	1.03	104.85	2.00	59.82	0.00	0.00
7.99	3.50	68.31	1.57	105.09	2.00	54.42	0.00	0.00
8.01	3.04	59.16	2.25	117.82	2.00	49.67	0.00	0.00
8.03	3.58	69.96	2.04	119.49	2.00	55.21	0.00	0.00
8.05	5.22	102.30	1.35	132.96	2.00	67.75	0.00	0.00
8.07	7.10	138.41	0.88	153.85	2.00	77.73	0.00	0.00
8.09	7.99	148.82	0.69	148.82	2.00	80.12	0.00	0.00
8.11	7.39	138.84	0.70	138.84	2.00	77.83	0.00	0.00
8.13	6.14	120.43	0.88	140.78	2.00	73.14	0.00	0.00
8.15	4.82	94.33	1.22	122.41	2.00	65.07	0.00	0.00
8.17	3.75	73.13	1.81	115.62	2.00	56.67	0.00	0.00
8.19	2.99	58.12	2.41	122.34	2.00	49.09	0.00	0.00
8.21	2.50	48.51	3.02	134.71	2.00	43.12	0.00	0.00
8.23	2.26	43.80	3.30	148.90	2.00	39.75	0.00	0.00
8.25	2.04	39.44	3.53	190.36	2.00	36.29	0.00	0.00
8.27	1.92	37.06	3.29	178.55	2.00	34.24	0.00	0.00
8.29	1.97	37.99	2.67	116.58	2.00	35.05	0.00	0.00
8.31	2.21	42.83	1.91	96.98	2.00	39.01	0.00	0.00
8.33	2.55	49.39	1.55	90.41	2.00	43.72	0.00	0.00
8.35	2.96	57.45	1.33	89.82	2.00	48.71	0.00	0.00
8.37	3.36	65.36	1.24	94.29	2.00	52.96	0.00	0.00
8.39	3.70	72.06	1.19	99.57	2.00	56.18	0.00	0.00
8.41	3.95	77.04	1.19	104.37	2.00	58.39	0.00	0.00
8.43	4.15	80.92	1.19	108.14	2.00	60.01	0.00	0.00
8.45	4.33	84.46	1.14	110.92	2.00	61.43	0.00	0.00
8.47	4.50	87.82	0.99	111.73	2.00	62.71	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
8.49	4.67	90.13	0.81	111.03	2.00	63.57	0.00	0.00
8.51	4.85	90.75	0.62	106.64	2.00	63.80	0.00	0.00
8.53	4.91	89.83	0.52	101.67	2.00	63.46	0.00	0.00
8.55	4.78	86.90	0.47	86.90	2.00	62.37	0.00	0.00
8.57	3.99	75.79	0.60	92.74	2.00	57.85	0.00	0.00
8.59	3.56	69.29	0.74	88.57	2.00	54.89	0.00	0.00
8.61	3.22	62.49	0.93	85.20	2.00	51.48	0.00	0.00
8.63	3.67	71.48	0.85	92.69	2.00	55.92	0.00	0.00
8.65	4.59	85.74	0.68	103.89	2.00	61.92	0.00	0.00
8.67	5.61	98.83	0.48	98.83	2.00	66.61	0.00	0.00
8.69	6.39	108.19	0.37	108.19	2.00	69.60	0.00	0.00
8.71	6.28	105.89	0.35	105.89	2.00	68.89	0.00	0.00
8.73	5.93	100.64	0.36	100.64	2.00	67.21	0.00	0.00
8.75	5.35	92.28	0.38	92.28	2.00	64.35	0.00	0.00
8.77	5.00	87.75	0.43	87.75	2.00	62.69	0.00	0.00
8.79	4.90	87.30	0.52	99.96	2.00	62.52	0.00	0.00
8.81	5.05	90.87	0.63	107.07	2.00	63.84	0.00	0.00
8.83	5.08	92.53	0.74	111.69	2.00	64.44	0.00	0.00
8.85	4.96	91.75	0.86	113.59	2.00	64.16	0.00	0.00
8.87	4.74	88.84	0.96	112.38	2.00	63.09	0.00	0.00
8.89	4.34	83.27	1.13	109.50	2.00	60.96	0.00	0.00
8.91	3.98	77.40	1.32	107.38	2.00	58.54	0.00	0.00
8.93	3.76	73.09	1.52	107.93	2.00	56.65	0.00	0.00
8.95	3.62	70.39	1.71	110.67	2.00	55.41	0.00	0.00
8.97	3.35	64.95	1.82	109.46	2.00	52.75	0.00	0.00
8.99	2.93	56.74	2.00	108.92	2.00	48.29	0.00	0.00
9.01	2.62	50.69	2.27	113.24	2.00	44.58	0.00	0.00
9.03	2.93	56.66	2.22	115.60	2.00	48.25	0.00	0.00
9.05	4.02	78.28	1.65	115.84	2.00	58.92	0.00	0.00
9.07	5.72	103.31	1.05	128.86	2.00	68.07	0.00	0.00
9.09	6.93	118.43	0.75	133.16	2.00	72.58	0.00	0.00
9.11	7.27	121.54	0.64	126.42	2.00	73.44	0.00	0.00
9.13	6.78	113.83	0.63	122.59	2.00	71.28	0.00	0.00
9.15	6.25	105.75	0.64	118.45	2.00	68.85	0.00	0.00
9.17	5.86	99.61	0.63	113.99	2.00	66.87	0.00	0.00
9.19	5.38	91.87	0.61	107.33	2.00	64.20	0.00	0.00
9.21	4.76	82.34	0.62	99.44	2.00	60.59	0.00	0.00
9.23	3.90	69.23	0.66	87.35	2.00	54.86	0.00	0.00
9.25	3.17	58.02	0.75	77.52	2.00	49.03	0.00	0.00
9.27	2.57	48.92	0.97	74.18	2.00	43.40	0.00	0.00
9.29	2.32	44.64	1.16	76.10	2.00	40.38	0.00	0.00
9.31	2.43	46.74	1.16	77.76	2.00	41.90	0.00	0.00
9.33	2.62	49.41	0.98	74.91	2.00	43.73	0.00	0.00
9.35	2.61	48.62	0.86	71.44	2.00	43.20	0.00	0.00
9.37	2.31	43.60	0.90	68.50	2.00	39.60	0.00	0.00
9.39	1.95	37.26	1.08	69.30	2.00	34.41	0.00	0.00
9.41	1.75	33.24	1.27	73.17	2.00	30.65	0.00	0.00
9.43	1.73	32.88	1.28	73.24	2.00	30.28	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
9.45	1.77	33.70	1.36	75.91	2.00	31.10	0.00	0.00
9.47	1.76	33.41	1.32	74.67	2.00	30.82	0.00	0.00
9.49	1.59	30.04	1.50	78.43	2.00	27.30	0.00	0.00
9.51	1.29	24.23	1.75	101.24	2.00	20.22	0.00	0.00
9.53	1.03	19.00	2.30	93.31	2.00	12.18	0.06	0.00
9.55	0.88	16.14	2.60	96.67	2.00	6.80	0.07	0.00
9.57	0.91	16.74	2.40	93.32	2.00	8.01	0.07	0.00
9.59	0.99	18.16	2.06	87.01	2.00	10.69	0.06	0.00
9.61	1.45	27.33	1.38	73.79	2.00	24.19	0.00	0.00
9.63	1.91	35.89	1.01	66.52	2.00	33.18	0.00	0.00
9.65	2.22	40.66	0.86	65.30	2.00	37.30	0.00	0.00
9.67	2.12	39.03	0.87	64.57	2.00	35.95	0.00	0.00
9.69	2.02	37.29	0.90	64.27	2.00	34.44	0.00	0.00
9.71	2.15	39.95	1.11	71.77	2.00	36.71	0.00	0.00
9.73	2.25	42.39	1.43	82.92	2.00	38.67	0.00	0.00
9.75	2.28	43.60	1.78	94.06	2.00	39.60	0.00	0.00
9.77	2.14	40.86	2.04	100.65	2.00	37.46	0.00	0.00
9.79	1.84	34.87	2.58	124.71	2.00	32.23	0.00	0.00
9.81	1.90	36.14	2.45	107.93	2.00	33.41	0.00	0.00
9.83	1.82	34.45	2.58	126.70	2.00	31.83	0.00	0.00
9.85	1.81	34.40	2.58	126.42	2.00	31.78	0.00	0.00
9.87	1.44	27.08	3.70	134.76	2.00	23.89	0.05	0.00
9.89	1.22	22.76	4.59	147.10	2.00	18.14	0.05	0.00
9.91	1.09	20.05	5.01	149.09	2.00	13.96	0.06	0.00
9.93	1.01	18.44	4.93	143.90	2.00	11.20	0.06	0.00
9.95	0.97	17.71	4.79	139.82	2.00	9.87	0.06	0.00
9.97	0.95	17.31	4.42	132.73	2.00	9.11	0.07	0.00
9.99	0.95	17.25	3.90	123.75	2.00	9.00	0.07	0.00
10.01	0.95	17.33	3.28	112.38	2.00	9.15	0.07	0.00
10.03	0.97	17.65	2.87	104.72	2.00	9.75	0.07	0.00
10.05	0.98	17.90	2.59	99.25	2.00	10.22	0.06	0.00
10.07	0.99	18.08	2.47	96.80	2.00	10.55	0.06	0.00
10.09	0.99	18.09	2.43	95.89	2.00	10.57	0.06	0.00
10.11	0.98	17.94	2.40	95.11	2.00	10.28	0.06	0.00
10.13	0.98	17.90	2.38	94.72	2.00	10.22	0.06	0.00
10.15	0.99	18.07	2.36	94.35	2.00	10.53	0.06	0.00
10.17	1.00	18.22	2.40	95.37	2.00	10.81	0.06	0.00
10.19	0.99	17.95	2.42	95.68	2.00	10.31	0.06	0.00
10.21	0.94	17.10	2.48	95.94	2.00	8.71	0.07	0.00
10.23	0.89	16.00	2.52	95.52	2.00	6.51	0.07	0.00
10.25	0.83	14.78	2.59	95.34	2.00	3.90	0.07	0.00
10.27	0.78	13.91	2.58	93.85	2.00	1.89	0.08	0.00
10.29	0.76	13.43	2.48	91.35	2.00	0.74	0.08	0.00
10.31	0.75	13.29	2.28	87.24	2.00	0.38	0.08	0.00
10.33	0.75	13.18	2.09	83.43	2.00	0.11	0.08	0.00
10.35	0.75	13.24	1.93	80.10	2.00	0.28	0.08	0.00
10.37	0.77	13.59	1.80	77.74	2.00	1.12	0.08	0.00
10.39	0.79	14.04	1.73	76.53	2.00	2.19	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
10.41	0.80	14.19	1.71	76.28	2.00	2.55	0.08	0.00
10.43	0.80	14.21	1.69	75.87	2.00	2.60	0.08	0.00
10.45	0.81	14.36	1.66	75.33	2.00	2.95	0.07	0.00
10.47	0.82	14.50	1.70	76.34	2.00	3.27	0.07	0.00
10.49	0.80	14.11	1.85	79.32	2.00	2.36	0.08	0.00
10.51	0.75	13.14	1.96	80.82	2.00	0.02	0.08	0.00
10.53	0.70	12.28	1.96	79.88	2.00	0.00	0.08	0.00
10.55	0.69	11.95	1.82	76.52	2.00	0.00	0.08	0.00
10.57	0.69	11.89	1.73	74.70	2.00	0.00	0.08	0.00
10.59	0.68	11.83	1.68	73.66	2.00	0.00	0.08	0.00
10.61	0.68	11.77	1.68	73.44	2.00	0.00	0.08	0.00
10.63	0.69	11.89	1.63	72.53	2.00	0.00	0.08	0.00
10.65	0.69	11.97	1.57	71.45	2.00	0.00	0.08	0.00
10.67	0.68	11.82	1.54	70.62	2.00	0.00	0.08	0.00
10.69	0.67	11.63	1.54	70.39	2.00	0.00	0.08	0.00
10.71	0.67	11.50	1.54	70.27	2.00	0.00	0.08	0.00
10.73	0.67	11.50	1.51	69.61	2.00	0.00	0.08	0.00
10.75	0.67	11.48	1.48	69.09	2.00	0.00	0.08	0.00
10.77	0.66	11.42	1.47	68.75	2.00	0.00	0.09	0.00
10.79	0.67	11.47	1.45	68.33	2.00	0.00	0.08	0.00
10.81	0.67	11.60	1.41	67.69	2.00	0.00	0.08	0.00
10.83	0.68	11.78	1.37	66.84	2.00	0.00	0.08	0.00
10.85	0.69	11.93	1.35	66.57	2.00	0.00	0.08	0.00
10.87	0.70	12.04	1.35	66.64	2.00	0.00	0.08	0.00
10.89	0.70	12.06	1.36	66.88	2.00	0.00	0.08	0.00
10.91	0.70	11.93	1.37	66.95	2.00	0.00	0.08	0.00
10.93	0.69	11.79	1.38	67.18	2.00	0.00	0.08	0.00
10.95	0.69	11.71	1.40	67.51	2.00	0.00	0.08	0.00
10.97	0.69	11.67	1.41	67.74	2.00	0.00	0.08	0.00
10.99	0.70	11.89	1.39	67.45	2.00	0.00	0.08	0.00
11.01	0.74	12.36	1.16	62.20	2.00	0.00	0.08	0.00
11.03	0.77	12.80	0.95	111.13	2.00	0.00	0.00	0.00
11.05	0.80	13.32	1.04	116.93	2.00	0.47	0.00	0.00
11.07	0.79	13.30	1.37	67.84	2.00	0.41	0.08	0.00
11.09	0.78	13.26	1.70	75.73	2.00	0.32	0.08	0.00
11.11	0.76	12.92	1.76	76.67	2.00	0.00	0.08	0.00
11.13	0.76	12.85	1.74	76.22	2.00	0.00	0.08	0.00
11.15	0.75	12.71	1.74	76.12	2.00	0.00	0.08	0.00
11.17	0.75	12.53	1.74	75.80	2.00	0.00	0.08	0.00
11.19	0.73	12.23	1.72	75.21	2.00	0.00	0.08	0.00
11.21	0.71	11.88	1.66	73.54	2.00	0.00	0.08	0.00
11.23	0.70	11.58	1.59	71.72	2.00	0.00	0.08	0.00
11.25	0.69	11.41	1.51	69.77	2.00	0.00	0.09	0.00
11.27	0.69	11.33	1.45	68.50	2.00	0.00	0.09	0.00
11.29	0.69	11.21	1.45	68.45	2.00	0.00	0.09	0.00
11.31	0.68	11.12	1.48	68.89	2.00	0.00	0.09	0.00
11.33	0.68	11.09	1.49	69.23	2.00	0.00	0.09	0.00
11.35	0.68	11.14	1.50	69.40	2.00	0.00	0.09	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
11.37	0.69	11.18	1.50	69.47	2.00	0.00	0.09	0.00
11.39	0.69	11.11	1.53	70.10	2.00	0.00	0.09	0.00
11.41	0.68	11.03	1.57	70.75	2.00	0.00	0.09	0.00
11.43	0.68	10.98	1.59	71.31	2.00	0.00	0.09	0.00
11.45	0.69	11.05	1.59	71.20	2.00	0.00	0.09	0.00
11.47	0.70	11.20	1.56	70.83	2.00	0.00	0.09	0.00
11.49	0.71	11.34	1.54	70.45	2.00	0.00	0.09	0.00
11.51	0.71	11.44	1.52	70.19	2.00	0.00	0.08	0.00
11.53	0.71	11.36	1.52	70.17	2.00	0.00	0.09	0.00
11.55	0.70	11.18	1.53	70.12	2.00	0.00	0.09	0.00
11.57	0.69	10.99	1.54	70.24	2.00	0.00	0.09	0.00
11.59	0.69	10.87	1.55	70.19	2.00	0.00	0.09	0.00
11.61	0.68	10.75	1.55	70.14	2.00	0.00	0.09	0.00
11.63	0.68	10.63	1.55	70.08	2.00	0.00	0.09	0.00
11.65	0.67	10.53	1.55	70.01	2.00	0.00	0.09	0.00
11.67	0.67	10.50	1.54	69.78	2.00	0.00	0.09	0.00
11.69	0.67	10.52	1.53	69.54	2.00	0.00	0.09	0.00
11.71	0.68	10.61	1.50	68.98	2.00	0.00	0.09	0.00
11.73	0.69	10.67	1.48	68.67	2.00	0.00	0.09	0.00
11.75	0.69	10.73	1.46	68.27	2.00	0.00	0.09	0.00
11.77	0.69	10.71	1.47	68.35	2.00	0.00	0.09	0.00
11.79	0.69	10.67	1.46	68.25	2.00	0.00	0.09	0.00
11.81	0.69	10.55	1.46	68.19	2.00	0.00	0.09	0.00
11.83	0.68	10.43	1.47	68.14	2.00	0.00	0.09	0.00
11.85	0.68	10.35	1.49	68.46	2.00	0.00	0.09	0.00
11.87	0.67	10.32	1.50	68.67	2.00	0.00	0.09	0.00
11.89	0.68	10.32	1.50	68.84	2.00	0.00	0.09	0.00
11.91	0.67	10.27	1.51	68.86	2.00	0.00	0.09	0.00
11.93	0.68	10.34	1.51	68.99	2.00	0.00	0.09	0.00
11.95	0.70	10.63	1.47	68.34	2.00	0.00	0.09	0.00
11.97	0.74	11.21	1.37	66.71	2.00	0.00	0.09	0.00
11.99	0.78	11.75	1.29	65.15	2.00	0.00	0.08	0.00
12.01	0.80	12.15	1.25	64.53	2.00	0.00	0.08	0.00
12.03	0.82	12.37	1.27	65.11	2.00	0.00	0.08	0.00
12.05	0.84	12.67	1.31	66.43	2.00	0.00	0.08	0.00
12.07	0.85	12.88	1.35	67.49	2.00	0.00	0.08	0.00
12.09	0.86	13.03	1.43	69.37	2.00	0.00	0.08	0.00
12.11	0.87	13.07	1.48	70.58	2.00	0.00	0.08	0.00
12.13	0.87	13.13	1.51	71.53	2.00	0.00	0.08	0.00
12.15	0.87	13.16	1.51	71.40	2.00	0.05	0.08	0.00
12.17	0.93	13.97	1.38	68.90	2.00	2.04	0.08	0.00
12.19	1.01	15.08	1.24	124.45	2.00	4.57	0.00	0.00
12.21	1.10	16.39	1.15	98.45	2.00	7.30	0.00	0.00
12.23	1.18	17.40	0.97	70.64	2.00	9.29	0.00	0.00
12.25	1.25	18.48	0.99	65.42	2.00	11.27	0.00	0.00
12.27	1.31	19.36	1.03	64.35	1.90	12.81	0.00	0.00
12.29	1.32	19.65	1.26	84.77	2.00	13.29	0.00	0.00
12.31	1.32	19.62	1.38	98.01	2.00	13.24	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
12.33	1.32	19.66	1.46	106.06	2.00	13.31	0.00	0.00
12.35	1.32	19.68	1.52	112.52	2.00	13.35	0.00	0.00
12.37	1.31	19.54	1.60	123.50	2.00	13.11	0.00	0.00
12.39	1.29	19.25	1.72	140.85	2.00	12.62	0.00	0.00
12.41	1.28	19.04	1.80	154.04	2.00	12.26	0.00	0.00
12.43	1.27	18.92	1.80	155.47	2.00	12.05	0.00	0.00
12.45	1.28	18.92	1.72	145.39	2.00	12.05	0.00	0.00
12.47	1.30	19.17	1.69	138.53	2.00	12.49	0.00	0.00
12.49	1.35	19.87	1.62	122.82	2.00	13.67	0.00	0.00
12.51	1.38	20.22	1.60	117.42	2.00	14.25	0.00	0.00
12.53	1.45	21.18	1.48	97.10	2.00	15.78	0.00	0.00
12.55	1.66	24.08	1.29	70.47	2.00	20.01	0.00	0.00
12.57	2.08	29.75	1.10	66.94	2.00	26.99	0.00	0.00
12.59	2.35	33.51	1.09	68.20	2.00	30.92	0.00	0.00
12.61	2.37	33.86	1.20	71.85	2.00	31.26	0.00	0.00
12.63	2.09	30.15	1.46	77.97	2.00	27.43	0.00	0.00
12.65	1.86	26.96	1.69	85.18	2.00	23.73	0.00	0.00
12.67	1.68	24.53	1.94	122.89	2.00	20.62	0.00	0.00
12.69	1.59	23.21	2.18	160.29	2.00	18.79	0.00	0.00
12.71	1.49	21.93	2.43	207.30	2.00	16.93	0.00	0.00
12.73	1.41	20.68	2.64	104.46	2.00	14.98	0.06	0.00
12.75	1.34	19.61	2.71	105.00	2.00	13.22	0.06	0.00
12.77	1.28	18.74	2.72	104.26	2.00	11.74	0.06	0.00
12.79	1.25	18.14	2.63	101.58	2.00	10.65	0.06	0.00
12.81	1.22	17.61	2.47	97.51	2.00	9.67	0.07	0.00
12.83	1.21	17.30	2.22	91.54	2.00	9.09	0.07	0.00
12.85	1.19	16.90	2.04	87.05	2.00	8.32	0.07	0.00
12.87	1.18	16.68	1.92	84.04	2.00	7.90	0.07	0.00
12.89	1.16	16.40	1.88	82.81	2.00	7.32	0.07	0.00
12.91	1.16	16.39	1.86	82.23	2.00	7.30	0.07	0.00
12.93	1.18	16.57	1.82	81.50	2.00	7.66	0.07	0.00
12.95	1.21	16.96	1.76	80.30	2.00	8.44	0.07	0.00
12.97	1.23	17.23	1.70	163.53	2.00	8.95	0.00	0.00
12.99	1.25	17.46	1.72	163.00	2.00	9.40	0.00	0.00
13.01	1.25	17.46	1.77	170.20	2.00	9.39	0.00	0.00
13.03	1.25	17.39	1.85	82.80	2.00	9.26	0.07	0.00
13.05	1.22	17.02	1.91	84.11	2.00	8.55	0.07	0.00
13.07	1.19	16.48	2.00	85.76	2.00	7.50	0.07	0.00
13.09	1.14	15.84	2.05	86.34	2.00	6.18	0.07	0.00
13.11	1.12	15.43	2.06	86.24	2.00	5.31	0.07	0.00
13.13	1.11	15.33	1.99	84.51	2.00	5.11	0.07	0.00
13.15	1.13	15.49	1.92	83.04	2.00	5.45	0.07	0.00
13.17	1.15	15.68	1.86	81.86	2.00	5.85	0.07	0.00
13.19	1.15	15.71	1.85	81.51	2.00	5.91	0.07	0.00
13.21	1.15	15.68	1.83	81.12	2.00	5.84	0.07	0.00
13.23	1.15	15.58	1.81	80.66	2.00	5.63	0.07	0.00
13.25	1.15	15.57	1.80	80.38	2.00	5.60	0.07	0.00
13.27	1.13	15.33	1.78	79.61	2.00	5.10	0.07	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
13.29	1.11	14.98	1.76	78.89	2.00	4.35	0.07	0.00
13.31	1.10	14.75	1.72	77.87	2.00	3.82	0.07	0.00
13.33	1.11	14.89	1.66	76.54	2.00	4.15	0.07	0.00
13.35	1.15	15.34	1.58	74.80	2.00	5.11	0.07	0.00
13.37	1.18	15.78	1.51	154.61	2.00	6.05	0.00	0.00
13.39	1.20	15.90	1.46	146.63	2.00	6.30	0.00	0.00
13.41	1.18	15.66	1.47	151.26	2.00	5.81	0.00	0.00
13.43	1.16	15.33	1.51	73.17	2.00	5.11	0.07	0.00
13.45	1.17	15.47	1.50	73.06	2.00	5.41	0.07	0.00
13.47	1.21	15.98	1.45	143.95	2.00	6.48	0.00	0.00
13.49	1.26	16.59	1.41	130.77	2.00	7.70	0.00	0.00
13.51	1.28	16.90	1.46	133.92	2.00	8.31	0.00	0.00
13.53	1.27	16.80	1.58	152.44	2.00	8.13	0.00	0.00
13.55	1.22	16.16	1.82	81.25	2.00	6.84	0.07	0.00
13.57	1.17	15.40	1.99	84.67	2.00	5.25	0.07	0.00
13.59	1.12	14.66	2.11	86.52	2.00	3.63	0.07	0.00
13.61	1.08	14.05	2.03	84.30	2.00	2.22	0.08	0.00
13.63	1.04	13.49	2.00	83.07	2.00	0.89	0.08	0.00
13.65	1.01	13.04	1.96	81.67	2.00	0.00	0.08	0.00
13.67	1.00	12.92	1.91	80.43	2.00	0.00	0.08	0.00
13.69	1.00	12.77	1.84	78.79	2.00	0.00	0.08	0.00
13.71	0.99	12.68	1.73	76.41	2.00	0.00	0.08	0.00
13.73	0.96	12.22	1.73	75.82	2.00	0.00	0.08	0.00
13.75	0.91	11.51	1.77	76.10	2.00	0.00	0.08	0.00
13.77	0.87	10.87	1.88	77.50	2.00	0.00	0.09	0.00
13.79	0.86	10.77	1.91	78.08	2.00	0.00	0.09	0.00
13.81	0.90	11.23	1.82	76.75	2.00	0.00	0.09	0.00
13.83	0.94	11.78	1.71	75.15	2.00	0.00	0.08	0.00
13.85	0.98	12.26	1.63	73.86	2.00	0.00	0.08	0.00
13.87	1.00	12.51	1.65	74.56	2.00	0.00	0.08	0.00
13.89	1.00	12.51	1.72	75.95	2.00	0.00	0.08	0.00
13.91	0.99	12.38	1.78	77.18	2.00	0.00	0.08	0.00
13.93	0.99	12.30	1.76	76.73	2.00	0.00	0.08	0.00
13.95	0.98	12.25	1.71	75.63	2.00	0.00	0.08	0.00
13.97	0.97	12.07	1.67	74.59	2.00	0.00	0.08	0.00
13.99	0.96	11.89	1.66	74.01	2.00	0.00	0.08	0.00
14.01	0.97	11.98	1.56	72.06	2.00	0.00	0.08	0.00
14.03	1.00	12.28	1.42	68.96	2.00	0.00	0.08	0.00
14.05	1.02	12.55	1.31	66.45	2.00	0.00	0.08	0.00
14.07	1.05	12.86	1.20	63.87	2.00	0.00	0.08	0.00
14.09	1.08	13.25	1.14	62.56	2.00	0.28	0.08	0.00
14.11	1.13	13.80	1.09	120.23	2.00	1.63	0.00	0.00
14.13	1.14	13.97	1.11	121.57	2.00	2.04	0.00	0.00
14.15	1.12	13.64	1.14	129.71	2.00	1.25	0.00	0.00
14.17	1.07	12.98	1.18	63.56	2.00	0.00	0.08	0.00
14.19	1.03	12.39	1.23	64.46	2.00	0.00	0.08	0.00
14.21	1.02	12.34	1.24	64.75	2.00	0.00	0.08	0.00
14.23	1.08	13.08	1.18	63.66	2.00	0.00	0.08	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
14.25	1.18	14.34	1.06	109.42	2.00	2.90	0.00	0.00
14.27	1.27	15.39	0.97	87.41	2.00	5.23	0.00	0.00
14.29	1.32	16.00	0.92	76.09	2.00	6.52	0.00	0.00
14.31	1.38	16.77	0.90	68.41	2.00	8.06	0.00	0.00
14.33	1.47	17.78	0.89	60.94	2.00	10.00	0.00	0.00
14.35	1.52	18.50	0.93	60.59	1.86	11.31	0.00	0.00
14.37	1.51	18.39	1.03	71.11	2.00	11.11	0.00	0.00
14.39	1.46	17.82	1.17	89.93	2.00	10.06	0.00	0.00
14.41	1.44	17.54	1.22	97.34	2.00	9.54	0.00	0.00
14.43	1.50	18.13	1.14	84.23	2.00	10.64	0.00	0.00
14.45	1.56	18.85	1.04	68.71	2.00	11.92	0.00	0.00
14.47	1.57	18.91	1.02	67.12	2.00	12.02	0.00	0.00
14.49	1.49	17.93	1.13	84.98	2.00	10.27	0.00	0.00
14.51	1.39	16.67	1.22	105.95	2.00	7.88	0.00	0.00
14.53	1.33	15.95	1.20	110.14	2.00	6.40	0.00	0.00
14.55	1.34	15.95	1.01	86.72	2.00	6.40	0.00	0.00
14.57	1.39	16.45	0.85	65.77	2.00	7.43	0.00	0.00
14.59	1.43	16.86	0.79	56.57	2.00	8.24	0.00	0.00
14.61	1.44	16.98	0.79	55.96	2.00	8.48	0.00	0.00
14.63	1.41	16.60	0.88	67.38	2.00	7.73	0.00	0.00
14.65	1.37	16.11	0.97	80.70	2.00	6.74	0.00	0.00
14.67	1.33	15.64	1.03	91.48	2.00	5.77	0.00	0.00
14.69	1.26	14.74	1.02	100.24	2.00	3.82	0.00	0.00
14.71	1.19	13.81	1.01	109.21	2.00	1.65	0.00	0.00
14.73	1.11	12.74	1.02	125.75	2.00	0.00	0.00	0.00
14.75	1.09	12.53	1.00	124.95	2.00	0.00	0.00	0.00
14.77	1.12	12.79	0.96	115.23	2.00	0.00	0.00	0.00
14.79	1.19	13.69	0.89	93.71	2.00	1.36	0.00	0.00
14.81	1.26	14.50	0.84	79.67	2.00	3.27	0.00	0.00
14.83	1.29	14.90	0.82	73.92	2.00	4.15	0.00	0.00
14.85	1.27	14.65	0.85	79.32	2.00	3.60	0.00	0.00
14.87	1.26	14.42	0.87	84.25	2.00	3.08	0.00	0.00
14.89	1.29	14.84	0.86	78.69	2.00	4.03	0.00	0.00
14.91	1.36	15.60	0.85	71.00	2.00	5.67	0.00	0.00
14.93	1.43	16.44	0.81	61.22	2.00	7.41	0.00	0.00
14.95	1.49	17.21	0.77	53.28	2.00	8.93	0.00	0.00
14.97	1.58	18.25	0.76	52.82	2.00	10.86	0.00	0.00
14.99	1.65	19.04	0.80	54.42	2.00	12.26	0.00	0.00
15.01	1.62	18.73	0.91	57.70	2.00	11.71	0.00	0.00
15.03	1.54	17.74	0.98	70.73	2.00	9.91	0.00	0.00
15.05	1.46	16.80	1.02	81.10	2.00	8.12	0.00	0.00
15.07	1.44	16.48	0.98	79.60	2.00	7.50	0.00	0.00
15.09	1.42	16.20	0.96	79.77	2.00	6.92	0.00	0.00
15.11	1.36	15.42	0.98	88.11	2.00	5.30	0.00	0.00
15.13	1.29	14.56	1.05	106.20	2.00	3.40	0.00	0.00
15.15	1.23	13.85	1.12	124.40	2.00	1.76	0.00	0.00
15.17	1.21	13.57	1.14	131.80	2.00	1.09	0.00	0.00
15.19	1.21	13.56	1.08	123.25	2.00	1.05	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
15.21	1.22	13.66	1.04	116.08	2.00	1.28	0.00	0.00
15.23	1.20	13.36	1.08	125.82	2.00	0.55	0.00	0.00
15.25	1.14	12.60	1.19	63.65	2.00	0.00	0.08	0.00
15.27	1.05	11.58	1.31	65.95	2.00	0.00	0.08	0.00
15.29	1.01	10.96	1.30	65.27	2.00	0.00	0.09	0.00
15.31	0.99	10.73	1.23	63.61	2.00	0.00	0.09	0.00
15.33	1.00	10.81	1.11	60.64	2.00	0.00	0.09	0.00
15.35	1.08	11.80	0.96	57.22	2.00	0.00	0.08	0.00
15.37	1.17	12.81	0.86	99.87	2.00	0.00	0.00	0.00
15.39	1.25	13.70	0.87	91.49	2.00	1.40	0.00	0.00
15.41	1.24	13.67	0.96	103.99	2.00	1.33	0.00	0.00
15.43	1.26	13.86	1.00	107.92	2.00	1.77	0.00	0.00
15.45	1.29	14.18	0.95	96.70	2.00	2.53	0.00	0.00
15.47	1.30	14.26	0.93	93.59	2.00	2.71	0.00	0.00
15.49	1.24	13.56	1.03	115.24	2.00	1.05	0.00	0.00
15.51	1.14	12.34	1.22	64.32	2.00	0.00	0.08	0.00
15.53	1.05	11.25	1.34	66.67	2.00	0.00	0.09	0.00
15.55	0.97	10.28	1.40	67.00	2.00	0.00	0.09	0.00
15.57	0.93	9.71	1.37	65.89	2.00	0.00	0.09	0.00
15.59	1.02	10.86	1.20	62.87	2.00	0.00	0.09	0.00
15.61	1.23	13.24	0.93	105.07	2.00	0.27	0.00	0.00
15.63	1.52	16.72	0.83	62.16	2.00	7.97	0.00	0.00
15.65	1.72	19.08	0.99	63.24	1.96	12.33	0.00	0.00
15.67	1.97	22.09	1.23	69.32	2.00	17.16	0.00	0.00
15.69	2.11	23.83	1.57	91.31	2.00	19.67	0.00	0.00
15.71	2.21	25.04	2.01	128.30	2.00	21.30	0.00	0.00
15.73	2.14	24.41	2.85	240.52	2.00	20.46	0.00	0.00
15.75	2.09	23.96	3.81	135.18	2.00	19.84	0.05	0.00
15.77	2.08	23.85	4.76	154.96	2.00	19.69	0.05	0.00
15.79	1.92	22.04	5.71	168.81	2.00	17.09	0.06	0.00
15.81	1.79	20.36	6.31	174.56	2.00	14.47	0.06	0.00
15.83	1.94	22.13	5.65	168.12	2.00	17.22	0.05	0.00
15.85	2.82	32.24	3.53	253.02	2.00	29.64	0.00	0.00
15.87	4.37	49.73	2.12	109.29	2.00	43.94	0.00	0.00
15.89	7.16	80.76	1.47	114.16	2.00	59.95	0.00	0.00
15.91	10.25	114.90	1.36	146.63	2.00	71.58	0.00	0.00
15.93	12.73	142.46	1.48	177.88	2.00	78.68	0.00	0.00
15.95	14.25	159.30	1.57	197.56	2.00	82.37	0.00	0.00
15.97	15.20	169.73	1.68	210.80	2.00	84.46	0.00	0.00
15.99	16.24	180.96	1.70	223.16	2.00	86.58	0.00	0.00
16.01	17.06	189.82	1.74	233.22	2.00	88.15	0.00	0.00
16.03	17.79	197.48	1.73	240.88	2.00	89.46	0.00	0.00
16.05	18.61	206.38	1.80	251.94	2.00	90.91	0.00	0.00
16.07	20.09	222.53	1.86	270.39	2.00	93.40	0.00	0.00
16.09	21.19	234.64	2.04	288.01	2.00	95.15	0.00	0.00
16.11	23.27	257.18	2.09	313.09	2.00	98.18	0.00	0.00
16.13	24.33	268.66	2.17	327.53	2.00	99.62	0.00	0.00
16.15	26.91	295.98	2.09	352.18	2.00	100.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	R_f (%)	$Q_{tn,cs}$	FS	D_r	$Gamma_{max}$ (%)	Lat. disp. (cm)
16.17	28.21	309.43	2.04	362.66	2.00	100.00	0.00	0.00

Total estimated displacement: 0.01

Abbreviations

q_t: Total cone resistance
Q_{tn}: Adjusted cone resistance to an effective overburden stress of 1 atm
R_f: Friction ration
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
FS: Calculated factor of safety against liquefaction
D_r: Calculated relative density
$Gamma_{max}$: Calculated maximum cyclic shear strain
Lat. disp.: Lateral displacement

:: Strength loss calculation (Robertson (2009) ::

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
6.57	0.19	3.43	22.59	77.38	3.53	0.08	0.92
6.59	0.19	3.42	25.32	86.46	3.60	0.08	0.90
6.61	0.30	5.69	16.45	93.67	3.35	0.16	1.46
6.63	0.55	10.64	9.14	97.22	3.02	0.16	2.67
6.65	0.89	17.23	5.14	88.55	2.74	0.73	0.73
6.67	1.09	21.15	4.02	85.03	2.63	0.81	0.81
6.69	1.12	21.83	3.96	86.45	2.62	0.81	0.81
6.71	1.04	20.21	4.60	92.92	2.69	0.88	0.88
6.73	0.98	18.93	5.27	99.79	2.75	0.75	0.75
6.75	1.02	19.82	5.14	101.88	2.74	0.75	0.75
6.77	1.08	21.03	4.88	102.70	2.72	0.75	0.75
6.79	1.13	22.04	4.56	100.53	2.69	0.89	0.89
6.81	1.08	20.91	4.75	99.39	2.70	0.75	0.75
6.83	1.03	20.00	4.93	98.53	2.72	0.75	0.75
6.85	1.08	21.02	4.63	97.33	2.69	0.89	0.89
6.87	1.19	23.18	4.15	96.23	2.64	0.85	0.85
6.89	1.30	25.24	3.87	97.59	2.61	0.82	0.82
6.91	1.32	25.66	4.00	102.57	2.63	0.85	0.85
6.93	1.29	25.17	4.34	109.26	2.66	0.89	0.89
6.95	1.24	24.17	4.70	113.57	2.70	0.93	0.93
6.97	1.20	23.28	4.98	116.01	2.73	0.78	0.78
6.99	1.18	22.97	5.27	120.97	2.75	0.78	0.78
7.01	1.24	24.09	5.10	122.85	2.74	0.79	0.79
7.03	1.35	26.30	4.62	121.46	2.69	0.94	0.94
7.05	1.76	34.24	3.17	108.58	2.53	0.77	0.77
7.07	2.45	47.85	2.01	95.97	2.32	0.74	0.74
7.09	3.35	65.59	1.50	98.55	2.15	0.75	0.75
7.11	4.15	81.47	1.35	109.71	2.04	0.77	0.77
7.13	4.63	90.87	1.31	118.60	2.00	0.78	0.78
7.15	4.75	93.30	1.30	121.16	1.99	0.78	0.78
7.17	4.84	95.03	1.30	123.84	2.00	0.79	0.79
7.19	5.19	101.91	1.28	130.85	1.97	0.80	0.80
7.21	5.63	110.72	1.25	138.66	1.92	0.81	0.81
7.23	5.77	113.39	1.23	139.47	1.89	0.81	0.81
7.25	5.11	100.35	1.26	126.35	1.93	0.79	0.79
7.27	4.14	81.27	1.35	109.53	2.04	0.77	0.77
7.29	3.14	61.46	1.65	101.33	2.21	0.75	0.75
7.31	2.57	50.17	2.13	107.03	2.35	0.76	0.76
7.33	2.22	43.23	2.67	115.42	2.45	0.78	0.78
7.35	2.74	53.60	1.94	103.76	2.30	0.76	0.76
7.37	4.01	78.67	1.33	104.88	2.03	0.76	0.76
7.39	5.29	103.95	1.18	122.75	1.83	0.79	0.79
7.41	6.09	119.64	1.10	131.95	1.76	0.80	0.80
7.43	6.55	128.82	1.13	145.52	1.78	0.82	0.82
7.45	7.26	142.70	1.12	159.72	1.77	0.84	0.84
7.47	7.81	153.52	1.11	169.97	1.76	0.85	0.85
7.49	8.16	160.58	1.09	174.59	1.75	0.86	0.86
7.51	8.42	165.60	1.05	174.36	1.73	0.86	0.86

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
7.53	8.70	171.09	1.00	171.09	1.69	0.85	0.85
7.55	8.87	174.49	1.00	174.49	1.63	0.86	0.86
7.57	8.92	171.29	1.00	171.29	1.59	0.85	0.85
7.59	8.78	165.73	1.00	165.73	1.56	0.85	0.85
7.61	8.56	161.53	1.00	161.53	1.56	0.84	0.84
7.63	8.36	158.13	1.00	158.13	1.57	0.84	0.84
7.65	8.17	154.79	1.00	154.79	1.58	0.83	0.83
7.67	7.82	149.44	1.00	149.44	1.61	0.83	0.83
7.69	7.15	139.03	1.00	139.03	1.65	0.81	0.81
7.71	6.30	123.67	1.03	127.58	1.72	0.79	0.79
7.73	5.53	108.51	1.15	124.97	1.80	0.79	0.79
7.75	5.19	101.68	1.19	120.77	1.83	0.78	0.78
7.77	5.22	102.31	1.19	121.50	1.83	0.79	0.79
7.79	5.72	112.29	1.11	124.08	1.76	0.79	0.79
7.81	6.27	122.36	1.00	122.36	1.69	0.79	0.79
7.83	6.80	128.48	1.00	128.48	1.63	0.80	0.80
7.85	6.95	129.84	1.00	129.84	1.61	0.80	0.80
7.87	6.99	130.11	1.00	130.11	1.61	0.80	0.80
7.89	6.70	125.74	1.00	125.74	1.63	0.79	0.79
7.91	6.17	119.29	1.00	119.29	1.70	0.78	0.78
7.93	5.42	106.21	1.13	119.93	1.78	0.78	0.78
7.95	4.76	93.30	1.22	113.84	1.88	0.77	0.77
7.97	4.11	80.45	1.30	104.85	2.00	0.76	0.76
7.99	3.50	68.31	1.54	105.09	2.17	0.76	0.76
8.01	3.04	59.16	1.99	117.82	2.32	0.78	0.78
8.03	3.58	69.96	1.71	119.49	2.23	0.78	0.78
8.05	5.22	102.30	1.30	132.96	1.99	0.80	0.80
8.07	7.10	138.41	1.11	153.85	1.77	0.83	0.83
8.09	7.99	148.82	1.00	148.82	1.68	0.83	0.83
8.11	7.39	138.84	1.00	138.84	1.70	0.81	0.81
8.13	6.14	120.43	1.17	140.78	1.82	0.81	0.81
8.15	4.82	94.33	1.30	122.41	1.99	0.79	0.79
8.17	3.75	73.13	1.58	115.62	2.19	0.78	0.78
8.19	2.99	58.12	2.10	122.34	2.34	0.79	0.79
8.21	2.50	48.51	2.78	134.71	2.47	0.81	0.81
8.23	2.26	43.80	3.18	139.48	2.53	0.83	0.83
8.25	2.04	39.44	3.60	142.12	2.58	0.88	0.88
8.27	1.92	37.06	3.60	133.46	2.58	0.86	0.86
8.29	1.97	37.99	3.07	116.75	2.51	0.78	0.78
8.31	2.21	42.83	2.26	96.98	2.38	0.74	0.74
8.33	2.55	49.39	1.83	90.41	2.27	0.73	0.73
8.35	2.96	57.45	1.56	89.82	2.18	0.73	0.73
8.37	3.36	65.36	1.44	94.29	2.12	0.74	0.74
8.39	3.70	72.06	1.38	99.57	2.07	0.75	0.75
8.41	3.95	77.04	1.35	104.37	2.05	0.76	0.76
8.43	4.15	80.92	1.34	108.14	2.03	0.76	0.76
8.45	4.33	84.46	1.31	110.92	2.01	0.77	0.77
8.47	4.50	87.82	1.27	111.73	1.95	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.49	4.67	90.13	1.23	111.03	1.89	0.77	0.77
8.51	4.85	90.75	1.18	106.64	1.82	0.76	0.76
8.53	4.91	89.83	1.13	101.67	1.78	0.75	0.75
8.55	4.78	86.90	1.00	86.90	1.77	0.72	0.72
8.57	3.99	75.79	1.22	92.74	1.88	0.73	0.73
8.59	3.56	69.29	1.28	88.57	1.96	0.73	0.73
8.61	3.22	62.49	1.36	85.20	2.06	0.72	0.72
8.63	3.67	71.48	1.30	92.69	1.99	0.73	0.73
8.65	4.59	85.74	1.21	103.89	1.86	0.76	0.76
8.67	5.61	98.83	1.00	98.83	1.73	0.75	0.75
8.69	6.39	108.19	1.00	108.19	1.64	0.76	0.76
8.71	6.28	105.89	1.00	105.89	1.64	0.76	0.76
8.73	5.93	100.64	1.00	100.64	1.66	0.75	0.75
8.75	5.35	92.28	1.00	92.28	1.71	0.73	0.73
8.77	5.00	87.75	1.00	87.75	1.75	0.72	0.72
8.79	4.90	87.30	1.15	99.96	1.79	0.75	0.75
8.81	5.05	90.87	1.18	107.07	1.82	0.76	0.76
8.83	5.08	92.53	1.21	111.69	1.86	0.77	0.77
8.85	4.96	91.75	1.24	113.59	1.90	0.77	0.77
8.87	4.74	88.84	1.26	112.38	1.94	0.77	0.77
8.89	4.34	83.27	1.31	109.50	2.01	0.77	0.77
8.91	3.98	77.40	1.39	107.38	2.08	0.76	0.76
8.93	3.76	73.09	1.48	107.93	2.14	0.76	0.76
8.95	3.62	70.39	1.57	110.67	2.18	0.77	0.77
8.97	3.35	64.95	1.69	109.46	2.23	0.77	0.77
8.99	2.93	56.74	1.92	108.92	2.30	0.76	0.76
9.01	2.62	50.69	2.23	113.24	2.37	0.77	0.77
9.03	2.93	56.66	2.04	115.60	2.33	0.78	0.78
9.05	4.02	78.28	1.48	115.84	2.14	0.78	0.78
9.07	5.72	103.31	1.25	128.86	1.92	0.80	0.80
9.09	6.93	118.43	1.12	133.16	1.78	0.80	0.80
9.11	7.27	121.54	1.04	126.42	1.73	0.79	0.79
9.13	6.78	113.83	1.08	122.59	1.75	0.79	0.79
9.15	6.25	105.75	1.12	118.45	1.77	0.78	0.78
9.17	5.86	99.61	1.14	113.99	1.79	0.77	0.77
9.19	5.38	91.87	1.17	107.33	1.81	0.76	0.76
9.21	4.76	82.34	1.21	99.44	1.86	0.75	0.75
9.23	3.90	69.23	1.26	87.35	1.94	0.72	0.72
9.25	3.17	58.02	1.34	77.52	2.03	0.48	0.70
9.27	2.57	48.92	1.52	74.18	2.16	0.36	0.69
9.29	2.32	44.64	1.70	76.10	2.23	0.42	0.70
9.31	2.43	46.74	1.66	77.76	2.22	0.48	0.70
9.33	2.62	49.41	1.52	74.91	2.16	0.38	0.70
9.35	2.61	48.62	1.47	71.44	2.13	0.29	0.69
9.37	2.31	43.60	1.57	68.50	2.18	0.23	0.68
9.39	1.95	37.26	1.86	69.30	2.28	0.24	0.68
9.41	1.75	33.24	2.20	73.17	2.37	0.33	0.69
9.43	1.73	32.88	2.23	73.24	2.37	0.33	0.69

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
9.45	1.77	33.70	2.25	75.91	2.38	0.42	0.70
9.47	1.76	33.41	2.23	74.67	2.37	0.37	0.69
9.49	1.59	30.04	2.61	78.43	2.44	0.51	0.70
9.51	1.29	24.23	3.42	82.97	2.56	0.75	0.75
9.53	1.03	19.00	4.91	93.31	2.72	0.74	0.74
9.55	0.88	16.14	5.99	96.67	2.81	0.74	0.74
9.57	0.91	16.74	5.57	93.32	2.78	0.74	0.74
9.59	0.99	18.16	4.79	87.01	2.71	0.72	0.72
9.61	1.45	27.33	2.70	73.79	2.46	0.35	0.69
9.63	1.91	35.89	1.85	66.52	2.28	0.19	0.67
9.65	2.22	40.66	1.61	65.30	2.20	0.17	0.67
9.67	2.12	39.03	1.65	64.57	2.22	0.16	0.67
9.69	2.02	37.29	1.72	64.27	2.24	0.16	0.67
9.71	2.15	39.95	1.80	71.77	2.26	0.29	0.69
9.73	2.25	42.39	1.96	82.92	2.31	0.71	0.71
9.75	2.28	43.60	2.16	94.06	2.36	0.74	0.74
9.77	2.14	40.86	2.46	100.65	2.42	0.75	0.75
9.79	1.84	34.87	3.24	113.04	2.54	0.79	0.79
9.81	1.90	36.14	3.04	110.04	2.51	0.76	0.76
9.83	1.82	34.45	3.27	112.78	2.54	0.79	0.79
9.85	1.81	34.40	3.27	112.58	2.54	0.79	0.79
9.87	1.44	27.08	4.98	134.76	2.73	0.81	0.81
9.89	1.22	22.76	6.46	147.10	2.85	0.82	0.82
9.91	1.09	20.05	7.44	149.09	2.92	0.83	0.83
9.93	1.01	18.44	7.80	143.90	2.94	0.82	0.82
9.95	0.97	17.71	7.89	139.82	2.95	0.81	0.81
9.97	0.95	17.31	7.67	132.73	2.93	0.80	0.80
9.99	0.95	17.25	7.17	123.75	2.90	0.79	0.79
10.01	0.95	17.33	6.48	112.38	2.85	0.77	0.77
10.03	0.97	17.65	5.93	104.72	2.81	0.76	0.76
10.05	0.98	17.90	5.54	99.25	2.77	0.75	0.75
10.07	0.99	18.08	5.35	96.80	2.76	0.74	0.74
10.09	0.99	18.09	5.30	95.89	2.75	0.74	0.74
10.11	0.98	17.94	5.30	95.11	2.75	0.74	0.74
10.13	0.98	17.90	5.29	94.72	2.75	0.74	0.74
10.15	0.99	18.07	5.22	94.35	2.75	0.74	0.74
10.17	1.00	18.22	5.23	95.37	2.75	0.74	0.74
10.19	0.99	17.95	5.33	95.68	2.76	0.74	0.74
10.21	0.94	17.10	5.61	95.94	2.78	0.74	0.74
10.23	0.89	16.00	5.97	95.52	2.81	0.74	0.74
10.25	0.83	14.78	6.45	95.34	2.85	0.74	0.74
10.27	0.78	13.91	6.75	93.85	2.87	0.74	0.74
10.29	0.76	13.43	6.80	91.35	2.87	0.73	0.73
10.31	0.75	13.29	6.57	87.24	2.85	0.72	0.72
10.33	0.75	13.18	6.33	83.43	2.84	0.71	0.71
10.35	0.75	13.24	6.05	80.10	2.82	0.59	0.71
10.37	0.77	13.59	5.72	77.74	2.79	0.48	0.70
10.39	0.79	14.04	5.45	76.53	2.77	0.44	0.70

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
10.41	0.80	14.19	5.38	76.28	2.76	0.43	0.70
10.43	0.80	14.21	5.34	75.87	2.76	0.41	0.70
10.45	0.81	14.36	5.25	75.33	2.75	0.40	0.70
10.47	0.82	14.50	5.26	76.34	2.75	0.43	0.70
10.49	0.80	14.11	5.62	79.32	2.78	0.55	0.71
10.51	0.75	13.14	6.15	80.82	2.82	0.63	0.71
10.53	0.70	12.28	6.50	79.88	2.85	0.58	0.71
10.55	0.69	11.95	6.40	76.52	2.84	0.44	0.70
10.57	0.69	11.89	6.29	74.70	2.83	0.38	0.69
10.59	0.68	11.83	6.23	73.66	2.83	0.34	0.69
10.61	0.68	11.77	6.24	73.44	2.83	0.34	0.69
10.63	0.69	11.89	6.10	72.53	2.82	0.31	0.69
10.65	0.69	11.97	5.97	71.45	2.81	0.29	0.69
10.67	0.68	11.82	5.97	70.62	2.81	0.27	0.68
10.69	0.67	11.63	6.05	70.39	2.82	0.26	0.68
10.71	0.67	11.50	6.11	70.27	2.82	0.26	0.68
10.73	0.67	11.50	6.05	69.61	2.82	0.25	0.68
10.75	0.67	11.48	6.02	69.09	2.81	0.24	0.68
10.77	0.66	11.42	6.02	68.75	2.81	0.23	0.68
10.79	0.67	11.47	5.96	68.33	2.81	0.22	0.68
10.81	0.67	11.60	5.84	67.69	2.80	0.21	0.68
10.83	0.68	11.78	5.68	66.84	2.79	0.20	0.68
10.85	0.69	11.93	5.58	66.57	2.78	0.19	0.67
10.87	0.70	12.04	5.53	66.64	2.77	0.19	0.67
10.89	0.70	12.06	5.55	66.88	2.77	0.20	0.68
10.91	0.70	11.93	5.61	66.95	2.78	0.20	0.68
10.93	0.69	11.79	5.70	67.18	2.79	0.20	0.68
10.95	0.69	11.71	5.77	67.51	2.79	0.21	0.68
10.97	0.69	11.67	5.80	67.74	2.80	0.21	0.68
10.99	0.70	11.89	5.67	67.45	2.79	0.21	0.68
11.01	0.74	12.36	5.03	62.20	2.73	0.13	0.66
11.03	0.77	12.80	4.44	56.91	2.67	0.77	0.77
11.05	0.80	13.32	4.46	59.45	2.68	0.78	0.78
11.07	0.79	13.30	5.10	67.84	2.74	0.21	0.68
11.09	0.78	13.26	5.71	75.73	2.79	0.41	0.70
11.11	0.76	12.92	5.93	76.67	2.81	0.44	0.70
11.13	0.76	12.85	5.93	76.22	2.81	0.43	0.70
11.15	0.75	12.71	5.99	76.12	2.81	0.42	0.70
11.17	0.75	12.53	6.05	75.80	2.82	0.41	0.70
11.19	0.73	12.23	6.15	75.21	2.82	0.39	0.70
11.21	0.71	11.88	6.19	73.54	2.83	0.34	0.69
11.23	0.70	11.58	6.19	71.72	2.83	0.29	0.69
11.25	0.69	11.41	6.12	69.77	2.82	0.25	0.68
11.27	0.69	11.33	6.05	68.50	2.82	0.23	0.68
11.29	0.69	11.21	6.11	68.45	2.82	0.22	0.68
11.31	0.68	11.12	6.19	68.89	2.83	0.23	0.68
11.33	0.68	11.09	6.24	69.23	2.83	0.24	0.68
11.35	0.68	11.14	6.23	69.40	2.83	0.24	0.68

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
11.37	0.69	11.18	6.22	69.47	2.83	0.24	0.68
11.39	0.69	11.11	6.31	70.10	2.84	0.26	0.68
11.41	0.68	11.03	6.42	70.75	2.84	0.27	0.69
11.43	0.68	10.98	6.49	71.31	2.85	0.28	0.69
11.45	0.69	11.05	6.44	71.20	2.85	0.28	0.69
11.47	0.70	11.20	6.32	70.83	2.84	0.27	0.69
11.49	0.71	11.34	6.21	70.45	2.83	0.26	0.68
11.51	0.71	11.44	6.14	70.19	2.82	0.26	0.68
11.53	0.71	11.36	6.18	70.17	2.83	0.26	0.68
11.55	0.70	11.18	6.27	70.12	2.83	0.26	0.68
11.57	0.69	10.99	6.39	70.24	2.84	0.26	0.68
11.59	0.69	10.87	6.46	70.19	2.85	0.26	0.68
11.61	0.68	10.75	6.52	70.14	2.85	0.26	0.68
11.63	0.68	10.63	6.59	70.08	2.86	0.26	0.68
11.65	0.67	10.53	6.65	70.01	2.86	0.25	0.68
11.67	0.67	10.50	6.65	69.78	2.86	0.25	0.68
11.69	0.67	10.52	6.61	69.54	2.86	0.25	0.68
11.71	0.68	10.61	6.50	68.98	2.85	0.23	0.68
11.73	0.69	10.67	6.44	68.67	2.85	0.23	0.68
11.75	0.69	10.73	6.36	68.27	2.84	0.22	0.68
11.77	0.69	10.71	6.39	68.35	2.84	0.22	0.68
11.79	0.69	10.67	6.40	68.25	2.84	0.22	0.68
11.81	0.69	10.55	6.46	68.19	2.85	0.22	0.68
11.83	0.68	10.43	6.53	68.14	2.85	0.22	0.68
11.85	0.68	10.35	6.61	68.46	2.86	0.22	0.68
11.87	0.67	10.32	6.65	68.67	2.86	0.23	0.68
11.89	0.68	10.32	6.67	68.84	2.86	0.23	0.68
11.91	0.67	10.27	6.70	68.86	2.86	0.23	0.68
11.93	0.68	10.34	6.67	68.99	2.86	0.23	0.68
11.95	0.70	10.63	6.43	68.34	2.84	0.22	0.68
11.97	0.74	11.21	5.95	66.71	2.81	0.19	0.67
11.99	0.78	11.75	5.54	65.15	2.77	0.17	0.67
12.01	0.80	12.15	5.31	64.53	2.75	0.16	0.67
12.03	0.82	12.37	5.26	65.11	2.75	0.17	0.67
12.05	0.84	12.67	5.24	66.43	2.75	0.19	0.67
12.07	0.85	12.88	5.24	67.49	2.75	0.21	0.68
12.09	0.86	13.03	5.32	69.37	2.76	0.24	0.68
12.11	0.87	13.07	5.40	70.58	2.76	0.27	0.68
12.13	0.87	13.13	5.45	71.53	2.77	0.29	0.69
12.15	0.87	13.16	5.43	71.40	2.76	0.29	0.69
12.17	0.93	13.97	4.93	68.90	2.72	0.23	0.68
12.19	1.01	15.08	4.36	65.83	2.67	0.79	0.79
12.21	1.10	16.39	3.90	63.84	2.62	0.75	0.75
12.23	1.18	17.40	3.39	58.98	2.56	0.27	0.68
12.25	1.25	18.48	3.23	59.69	2.54	0.18	0.67
12.27	1.31	19.36	3.16	61.18	2.53	0.16	0.67
12.29	1.32	19.65	3.46	68.04	2.57	0.72	0.72
12.31	1.32	19.62	3.65	71.56	2.59	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
12.33	1.32	19.66	3.75	73.70	2.60	0.76	0.76
12.35	1.32	19.68	3.83	75.33	2.61	0.77	0.77
12.37	1.31	19.54	3.97	77.51	2.62	0.79	0.79
12.39	1.29	19.25	4.18	80.47	2.65	0.81	0.81
12.41	1.28	19.04	4.33	82.53	2.66	0.83	0.83
12.43	1.27	18.92	4.36	82.45	2.67	0.83	0.83
12.45	1.28	18.92	4.25	80.50	2.66	0.82	0.82
12.47	1.30	19.17	4.16	79.80	2.65	0.81	0.81
12.49	1.35	19.87	3.94	78.20	2.62	0.79	0.79
12.51	1.38	20.22	3.85	77.83	2.61	0.78	0.78
12.53	1.45	21.18	3.54	74.95	2.57	0.74	0.74
12.55	1.66	24.08	2.93	70.47	2.49	0.26	0.68
12.57	2.08	29.75	2.25	66.94	2.38	0.20	0.68
12.59	2.35	33.51	2.03	68.20	2.33	0.22	0.68
12.61	2.37	33.86	2.12	71.85	2.35	0.30	0.69
12.63	2.09	30.15	2.59	77.97	2.44	0.49	0.70
12.65	1.86	26.96	3.10	83.69	2.52	0.72	0.72
12.67	1.68	24.53	3.65	89.57	2.59	0.79	0.79
12.69	1.59	23.21	4.09	95.04	2.64	0.84	0.84
12.71	1.49	21.93	4.58	100.51	2.69	0.89	0.89
12.73	1.41	20.68	5.05	104.46	2.73	0.76	0.76
12.75	1.34	19.61	5.36	105.00	2.76	0.76	0.76
12.77	1.28	18.74	5.56	104.26	2.78	0.76	0.76
12.79	1.25	18.14	5.60	101.58	2.78	0.75	0.75
12.81	1.22	17.61	5.54	97.51	2.77	0.74	0.74
12.83	1.21	17.30	5.29	91.54	2.75	0.73	0.73
12.85	1.19	16.90	5.15	87.05	2.74	0.72	0.72
12.87	1.18	16.68	5.04	84.04	2.73	0.72	0.72
12.89	1.16	16.40	5.05	82.81	2.73	0.71	0.71
12.91	1.16	16.39	5.02	82.23	2.73	0.70	0.71
12.93	1.18	16.57	4.92	81.50	2.72	0.66	0.71
12.95	1.21	16.96	4.73	80.30	2.70	0.60	0.71
12.97	1.23	17.23	4.59	79.06	2.69	0.84	0.84
12.99	1.25	17.46	4.56	79.66	2.69	0.84	0.84
13.01	1.25	17.46	4.63	80.90	2.69	0.85	0.85
13.03	1.25	17.39	4.76	82.80	2.71	0.71	0.71
13.05	1.22	17.02	4.94	84.11	2.72	0.72	0.72
13.07	1.19	16.48	5.20	85.76	2.75	0.72	0.72
13.09	1.14	15.84	5.45	86.34	2.77	0.72	0.72
13.11	1.12	15.43	5.59	86.24	2.78	0.72	0.72
13.13	1.11	15.33	5.51	84.51	2.77	0.72	0.72
13.15	1.13	15.49	5.36	83.04	2.76	0.71	0.71
13.17	1.15	15.68	5.22	81.86	2.75	0.68	0.71
13.19	1.15	15.71	5.19	81.51	2.74	0.66	0.71
13.21	1.15	15.68	5.17	81.12	2.74	0.64	0.71
13.23	1.15	15.58	5.18	80.66	2.74	0.62	0.71
13.25	1.15	15.57	5.16	80.38	2.74	0.60	0.71
13.27	1.13	15.33	5.19	79.61	2.74	0.57	0.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
13.29	1.11	14.98	5.26	78.89	2.75	0.53	0.70
13.31	1.10	14.75	5.28	77.87	2.75	0.49	0.70
13.33	1.11	14.89	5.14	76.54	2.74	0.44	0.70
13.35	1.15	15.34	4.88	74.80	2.72	0.38	0.70
13.37	1.18	15.78	4.64	73.24	2.69	0.83	0.83
13.39	1.20	15.90	4.54	72.21	2.68	0.82	0.82
13.41	1.18	15.66	4.62	72.34	2.69	0.83	0.83
13.43	1.16	15.33	4.77	73.17	2.71	0.33	0.69
13.45	1.17	15.47	4.72	73.06	2.70	0.33	0.69
13.47	1.21	15.98	4.50	71.99	2.68	0.82	0.82
13.49	1.26	16.59	4.29	71.22	2.66	0.80	0.80
13.51	1.28	16.90	4.30	72.69	2.66	0.80	0.80
13.53	1.27	16.80	4.52	75.87	2.68	0.83	0.83
13.55	1.22	16.16	5.03	81.25	2.73	0.65	0.71
13.57	1.17	15.40	5.50	84.67	2.77	0.72	0.72
13.59	1.12	14.66	5.90	86.52	2.80	0.72	0.72
13.61	1.08	14.05	6.00	84.30	2.81	0.72	0.72
13.63	1.04	13.49	6.16	83.07	2.82	0.71	0.71
13.65	1.01	13.04	6.27	81.67	2.83	0.67	0.71
13.67	1.00	12.92	6.22	80.43	2.83	0.61	0.71
13.69	1.00	12.77	6.17	78.79	2.82	0.53	0.70
13.71	0.99	12.68	6.03	76.41	2.81	0.43	0.70
13.73	0.96	12.22	6.20	75.82	2.83	0.41	0.70
13.75	0.91	11.51	6.61	76.10	2.86	0.42	0.70
13.77	0.87	10.87	7.13	77.50	2.89	0.47	0.70
13.79	0.86	10.77	7.25	78.08	2.90	0.50	0.70
13.81	0.90	11.23	6.83	76.75	2.87	0.45	0.70
13.83	0.94	11.78	6.38	75.15	2.84	0.39	0.70
13.85	0.98	12.26	6.02	73.86	2.81	0.35	0.69
13.87	1.00	12.51	5.96	74.56	2.81	0.37	0.69
13.89	1.00	12.51	6.07	75.95	2.82	0.42	0.70
13.91	0.99	12.38	6.23	77.18	2.83	0.46	0.70
13.93	0.99	12.30	6.24	76.73	2.83	0.44	0.70
13.95	0.98	12.25	6.18	75.63	2.83	0.41	0.70
13.97	0.97	12.07	6.18	74.59	2.83	0.37	0.69
13.99	0.96	11.89	6.22	74.01	2.83	0.35	0.69
14.01	0.97	11.98	6.02	72.06	2.81	0.30	0.69
14.03	1.00	12.28	5.62	68.96	2.78	0.23	0.68
14.05	1.02	12.55	5.29	66.45	2.75	0.19	0.67
14.07	1.05	12.86	4.97	63.87	2.72	0.15	0.67
14.09	1.08	13.25	4.72	62.56	2.70	0.14	0.66
14.11	1.13	13.80	4.45	61.42	2.68	0.78	0.78
14.13	1.14	13.97	4.45	62.15	2.67	0.79	0.79
14.15	1.12	13.64	4.59	62.65	2.69	0.80	0.80
14.17	1.07	12.98	4.90	63.56	2.72	0.15	0.67
14.19	1.03	12.39	5.20	64.46	2.75	0.16	0.67
14.21	1.02	12.34	5.25	64.75	2.75	0.17	0.67
14.23	1.08	13.08	4.87	63.66	2.72	0.15	0.67

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
14.25	1.18	14.34	4.24	60.85	2.65	0.77	0.77
14.27	1.27	15.39	3.82	58.77	2.61	0.72	0.72
14.29	1.32	16.00	3.58	57.36	2.58	0.42	0.70
14.31	1.38	16.77	3.40	56.93	2.56	0.22	0.68
14.33	1.47	17.78	3.19	56.79	2.53	0.12	0.66
14.35	1.52	18.50	3.14	58.16	2.52	0.12	0.66
14.37	1.51	18.39	3.33	61.27	2.55	0.28	0.69
14.39	1.46	17.82	3.66	65.23	2.59	0.73	0.73
14.41	1.44	17.54	3.79	66.42	2.60	0.74	0.74
14.43	1.50	18.13	3.55	64.45	2.58	0.72	0.72
14.45	1.56	18.85	3.26	61.52	2.54	0.23	0.68
14.47	1.57	18.91	3.23	61.13	2.54	0.20	0.68
14.49	1.49	17.93	3.58	64.19	2.58	0.72	0.72
14.51	1.39	16.67	3.97	66.27	2.63	0.76	0.76
14.53	1.33	15.95	4.10	65.30	2.64	0.77	0.77
14.55	1.34	15.95	3.76	59.95	2.60	0.72	0.72
14.57	1.39	16.45	3.37	55.45	2.55	0.18	0.67
14.59	1.43	16.86	3.17	53.45	2.53	0.09	0.65
14.61	1.44	16.98	3.15	53.50	2.52	0.08	0.64
14.63	1.41	16.60	3.39	56.26	2.56	0.21	0.68
14.65	1.37	16.11	3.65	58.82	2.59	0.62	0.71
14.67	1.33	15.64	3.86	60.36	2.61	0.73	0.73
14.69	1.26	14.74	4.07	60.04	2.64	0.75	0.75
14.71	1.19	13.81	4.30	59.35	2.66	0.76	0.76
14.73	1.11	12.74	4.65	59.30	2.69	0.79	0.79
14.75	1.09	12.53	4.67	58.52	2.70	0.79	0.79
14.77	1.12	12.79	4.50	57.63	2.68	0.77	0.77
14.79	1.19	13.69	4.08	55.87	2.64	0.74	0.74
14.81	1.26	14.50	3.77	54.72	2.60	0.57	0.71
14.83	1.29	14.90	3.64	54.21	2.59	0.35	0.69
14.85	1.27	14.65	3.75	54.99	2.60	0.55	0.71
14.87	1.26	14.42	3.86	55.61	2.61	0.72	0.72
14.89	1.29	14.84	3.73	55.29	2.60	0.52	0.70
14.91	1.36	15.60	3.53	55.05	2.57	0.28	0.69
14.93	1.43	16.44	3.29	54.05	2.54	0.12	0.66
14.95	1.49	17.21	3.08	53.06	2.51	0.07	0.64
14.97	1.58	18.25	2.89	52.82	2.49	0.06	0.63
14.99	1.65	19.04	2.86	54.42	2.48	0.07	0.64
15.01	1.62	18.73	3.08	57.64	2.51	0.09	0.65
15.03	1.54	17.74	3.37	59.74	2.55	0.27	0.69
15.05	1.46	16.80	3.60	60.53	2.58	0.64	0.71
15.07	1.44	16.48	3.60	59.41	2.58	0.56	0.71
15.09	1.42	16.20	3.63	58.79	2.59	0.57	0.71
15.11	1.36	15.42	3.83	59.01	2.61	0.72	0.72
15.13	1.29	14.56	4.18	60.80	2.65	0.76	0.76
15.15	1.23	13.85	4.50	62.33	2.68	0.79	0.79
15.17	1.21	13.57	4.63	62.81	2.69	0.80	0.80
15.19	1.21	13.56	4.52	61.28	2.68	0.79	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.21	1.22	13.66	4.41	60.24	2.67	0.78	0.78
15.23	1.20	13.36	4.58	61.14	2.69	0.79	0.79
15.25	1.14	12.60	5.05	63.65	2.73	0.15	0.67
15.27	1.05	11.58	5.69	65.95	2.79	0.18	0.67
15.29	1.01	10.96	5.96	65.27	2.81	0.17	0.67
15.31	0.99	10.73	5.93	63.61	2.81	0.15	0.67
15.33	1.00	10.81	5.61	60.64	2.78	0.12	0.66
15.35	1.08	11.80	4.85	57.22	2.71	0.09	0.65
15.37	1.17	12.81	4.28	54.77	2.66	0.75	0.75
15.39	1.25	13.70	4.05	55.44	2.63	0.73	0.73
15.41	1.24	13.67	4.24	57.96	2.65	0.76	0.76
15.43	1.26	13.86	4.27	59.24	2.66	0.76	0.76
15.45	1.29	14.18	4.08	57.80	2.64	0.74	0.74
15.47	1.30	14.26	4.02	57.34	2.63	0.74	0.74
15.49	1.24	13.56	4.41	59.81	2.67	0.78	0.78
15.51	1.14	12.34	5.21	64.32	2.75	0.16	0.67
15.53	1.05	11.25	5.92	66.67	2.81	0.19	0.67
15.55	0.97	10.28	6.52	67.00	2.85	0.20	0.68
15.57	0.93	9.71	6.79	65.89	2.87	0.18	0.67
15.59	1.02	10.86	5.79	62.87	2.80	0.14	0.66
15.61	1.23	13.24	4.30	56.99	2.66	0.76	0.76
15.63	1.52	16.72	3.29	54.95	2.54	0.13	0.66
15.65	1.72	19.08	3.16	60.23	2.53	0.15	0.67
15.67	1.97	22.09	3.10	68.42	2.52	0.24	0.68
15.69	2.11	23.83	3.32	79.15	2.55	0.73	0.73
15.71	2.21	25.04	3.68	92.18	2.59	0.80	0.80
15.73	2.14	24.41	4.65	113.55	2.69	0.93	0.93
15.75	2.09	23.96	5.64	135.18	2.78	0.81	0.81
15.77	2.08	23.85	6.50	154.96	2.85	0.83	0.83
15.79	1.92	22.04	7.66	168.81	2.93	0.85	0.85
15.81	1.79	20.36	8.57	174.56	2.99	0.86	0.86
15.83	1.94	22.13	7.60	168.12	2.93	0.85	0.85
15.85	2.82	32.24	4.29	138.22	2.66	0.94	0.94
15.87	4.37	49.73	2.20	109.29	2.36	0.76	0.76
15.89	7.16	80.76	1.41	114.16	2.10	0.77	0.77
15.91	10.25	114.90	1.28	146.63	1.96	0.82	0.82
15.93	12.73	142.46	1.25	177.88	1.92	0.86	0.86
15.95	14.25	159.30	1.24	197.56	1.90	0.88	0.88
15.97	15.20	169.73	1.24	210.80	1.91	0.90	0.90
15.99	16.24	180.96	1.23	223.16	1.89	0.91	0.91
16.01	17.06	189.82	1.23	233.22	1.89	0.92	0.92
16.03	17.79	197.48	1.22	240.88	1.88	0.93	0.93
16.05	18.61	206.38	1.22	251.94	1.88	0.94	0.94
16.07	20.09	222.53	1.22	270.39	1.87	0.95	0.95
16.09	21.19	234.64	1.23	288.01	1.89	0.97	0.97
16.11	23.27	257.18	1.22	313.09	1.87	0.99	0.99
16.13	24.33	268.66	1.22	327.53	1.87	1.00	1.00
16.15	26.91	295.98	1.19	352.18	1.84	1.02	1.02

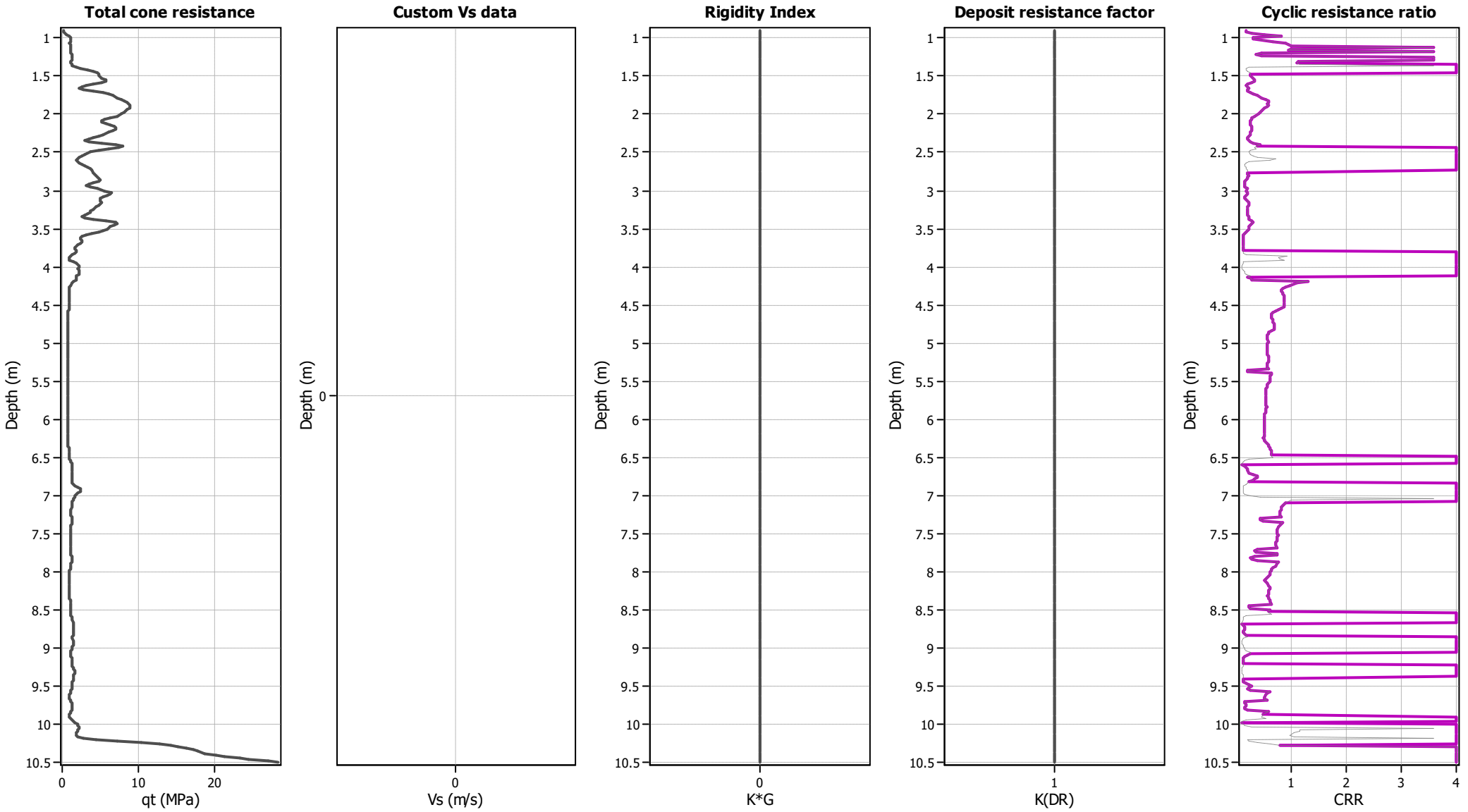
:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (m)	q_t (MPa)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.17	28.21	309.43	1.17	362.66	1.82	1.02	1.02

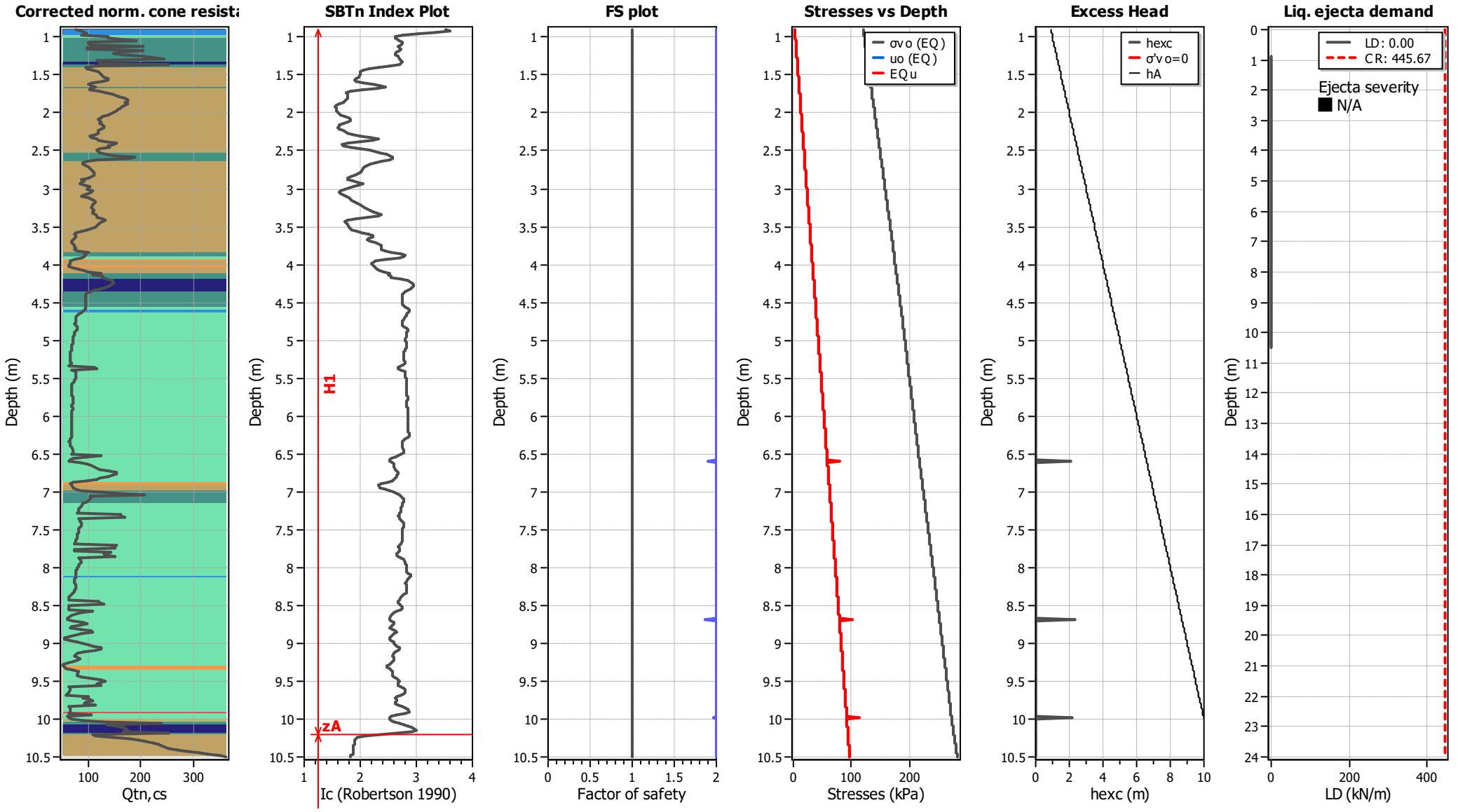
Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

Aging Calculation Estimation

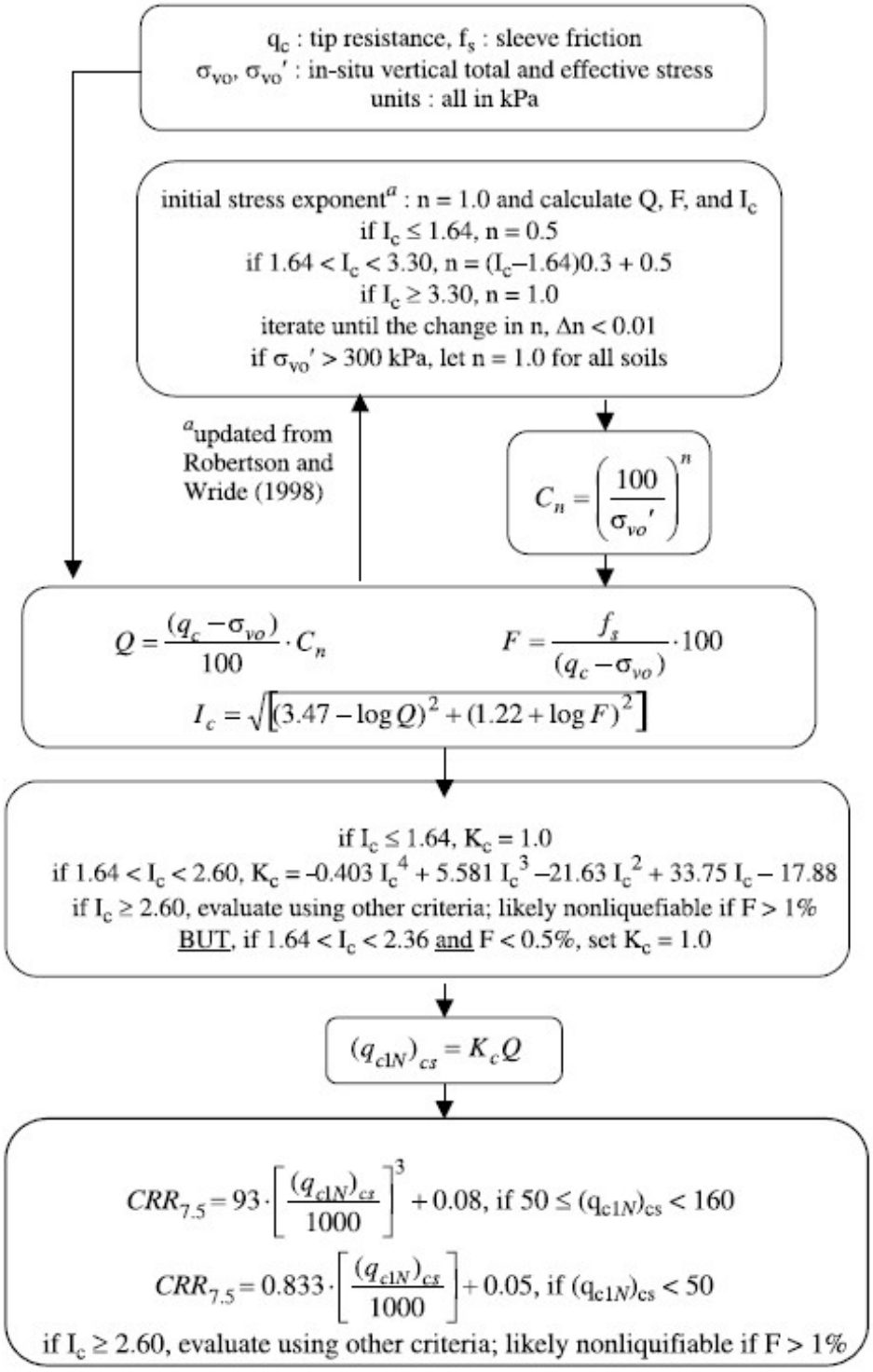


Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

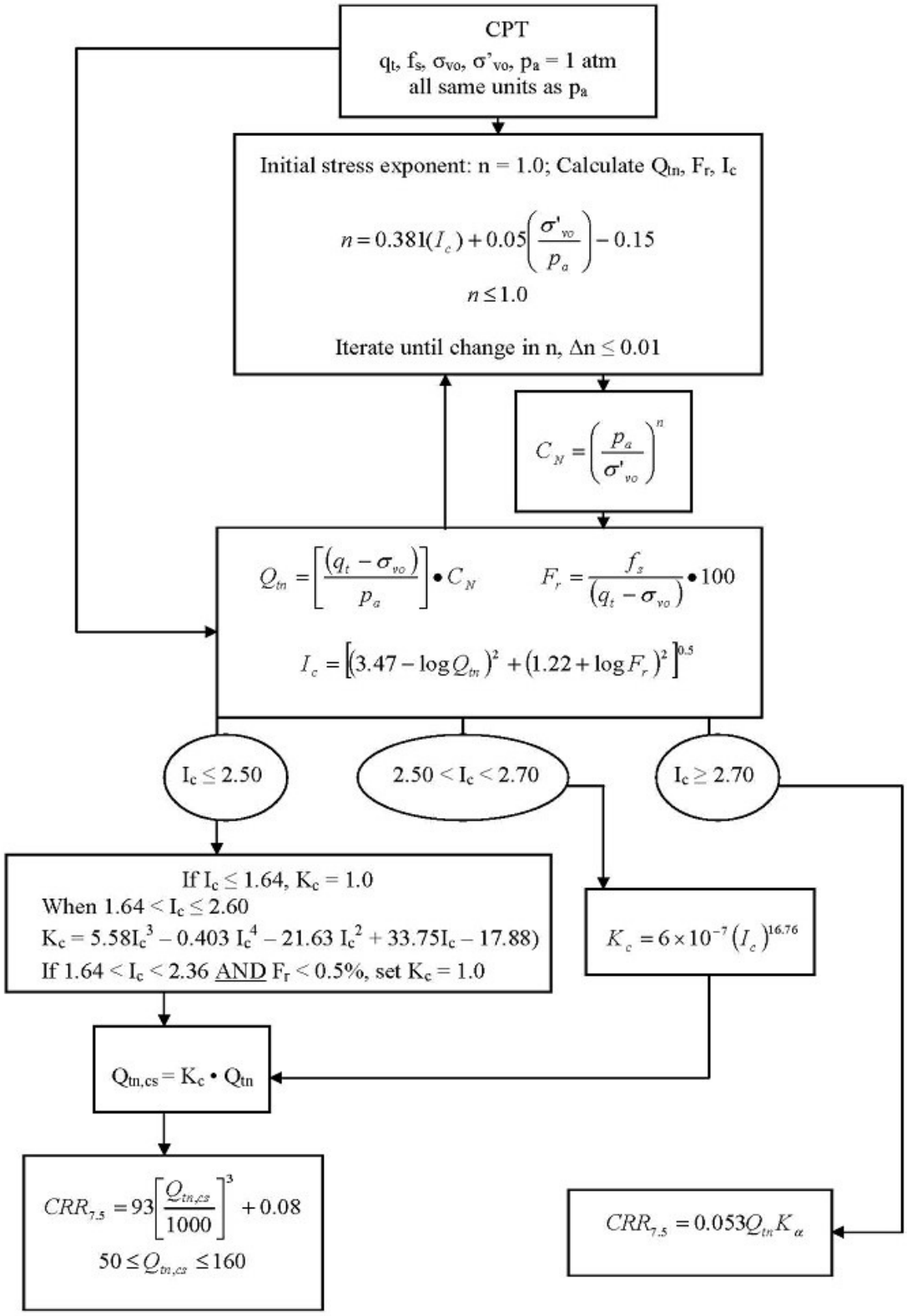
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

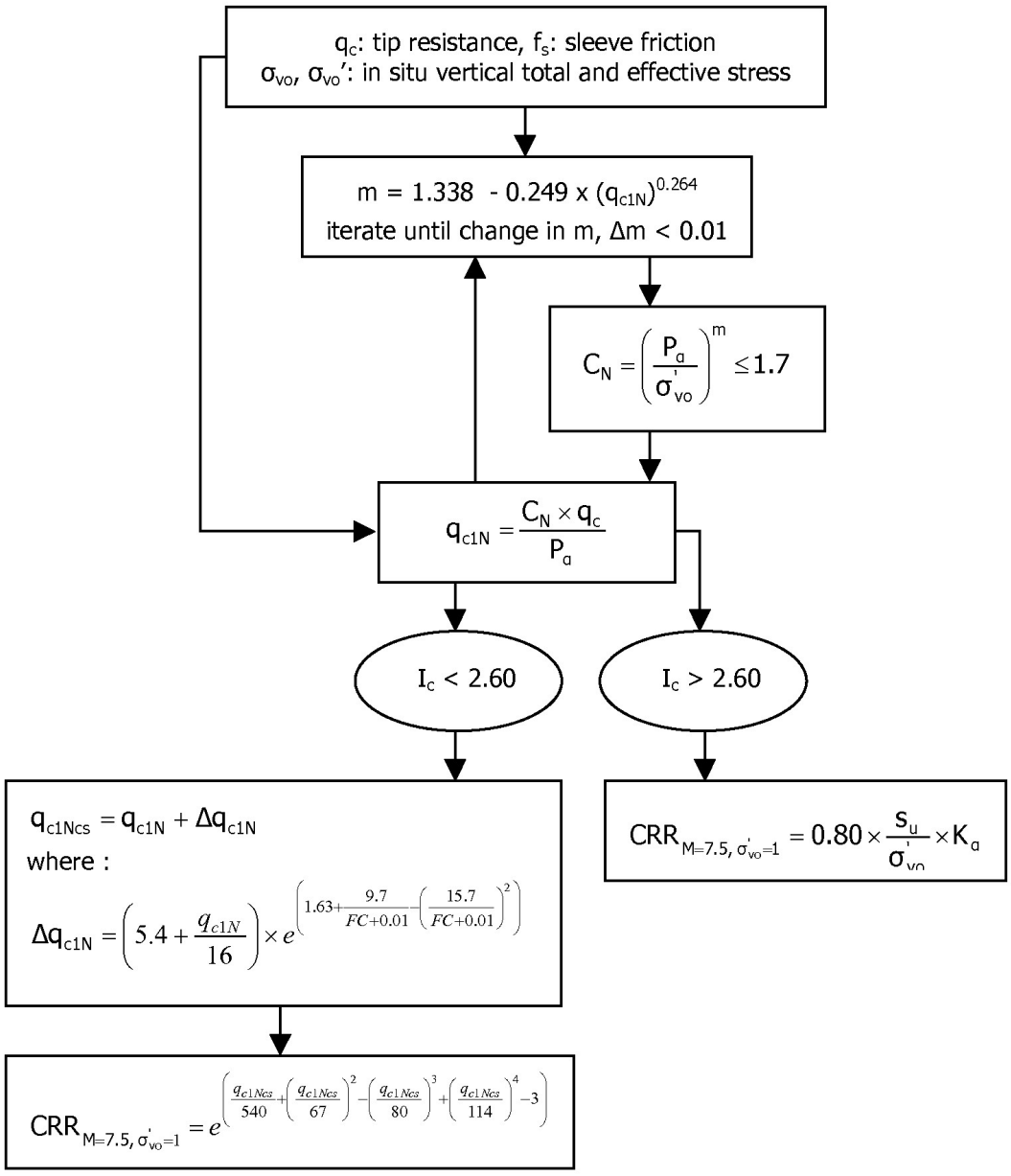
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

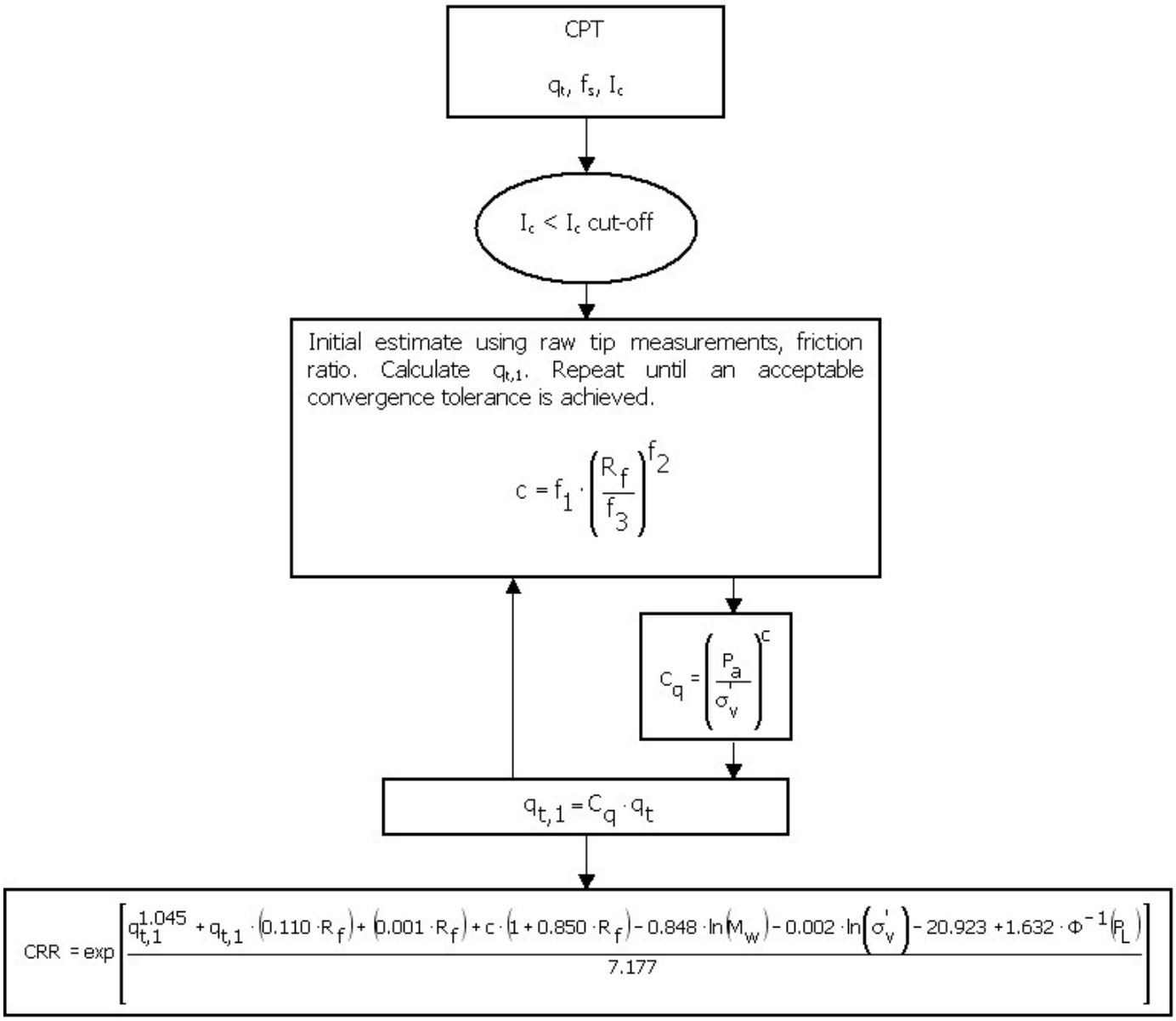


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

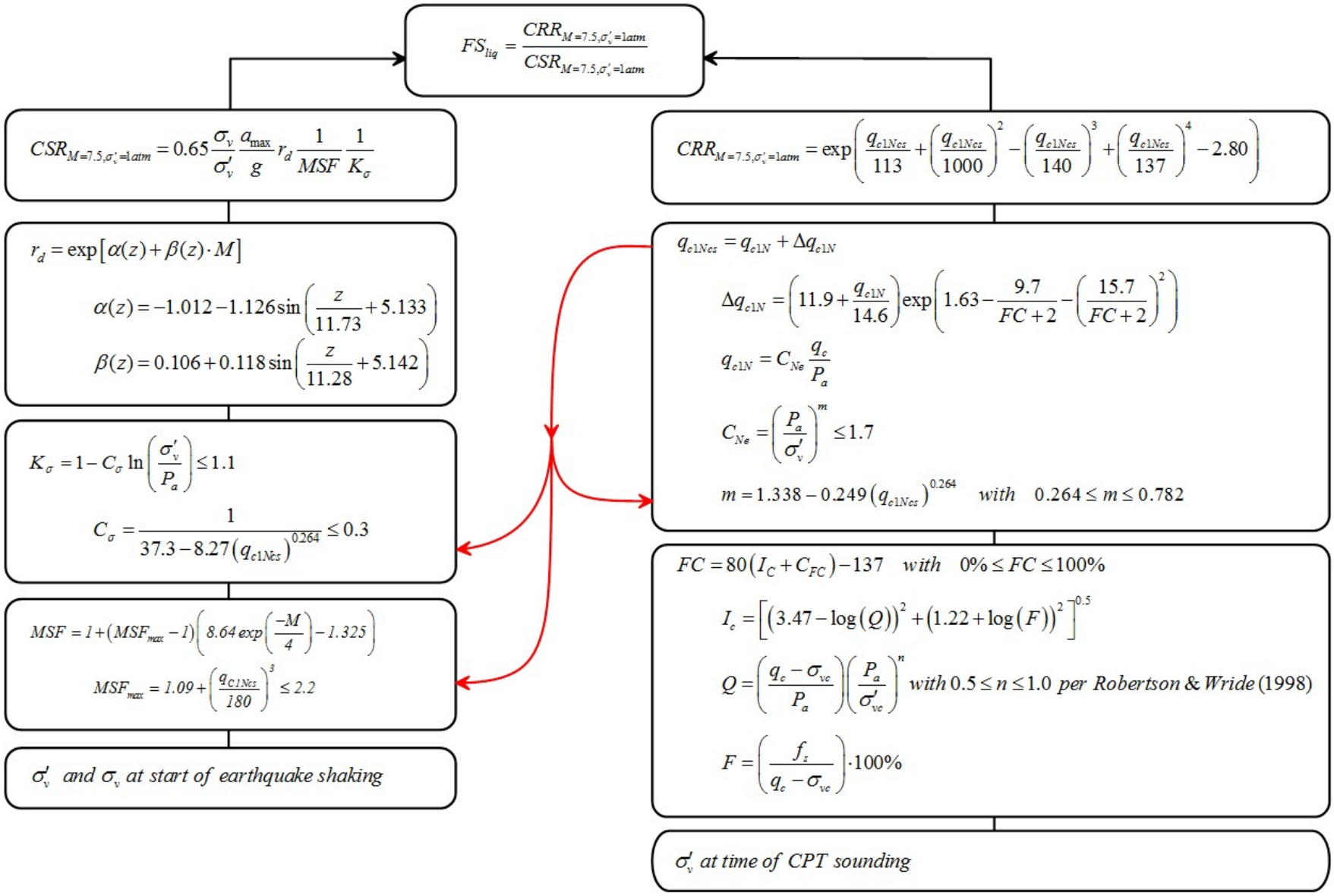
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



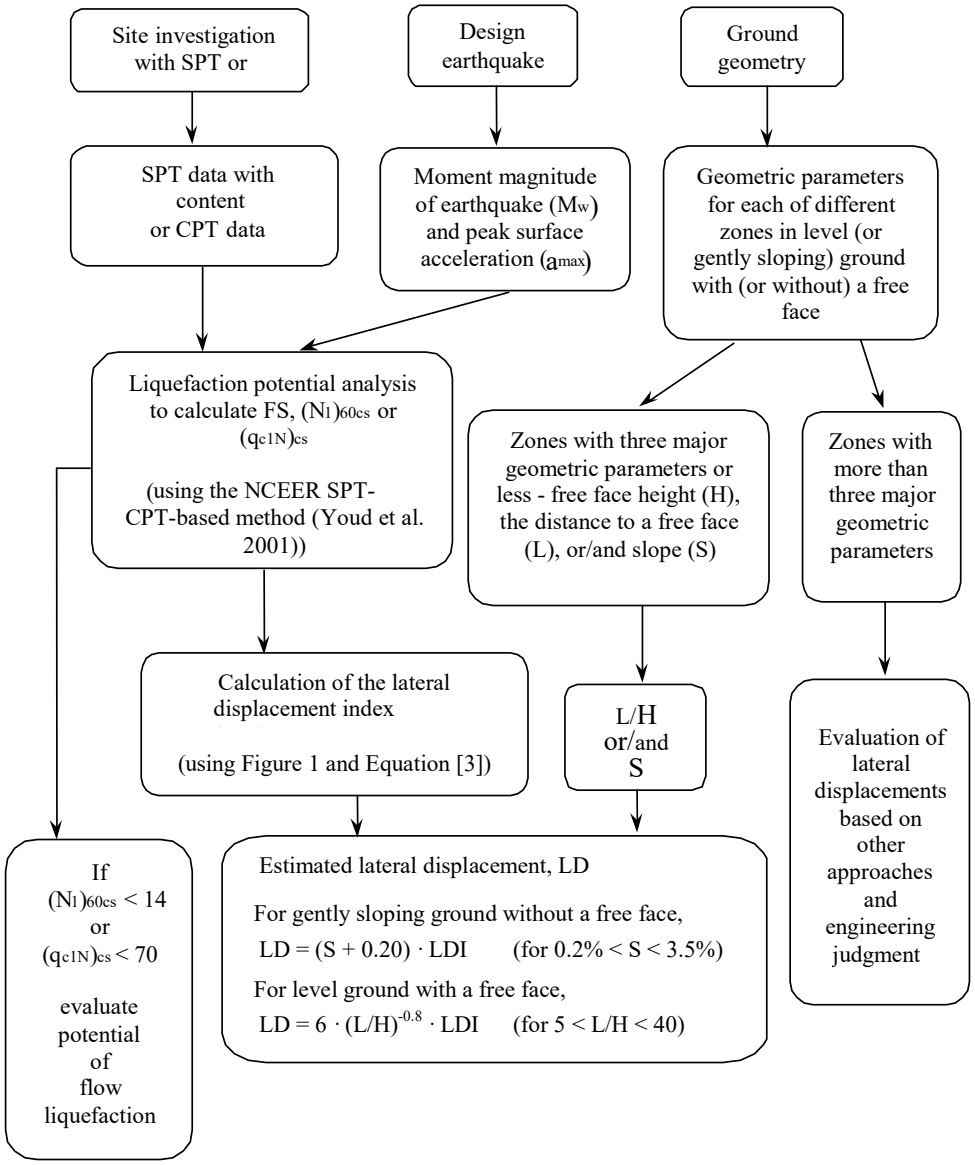
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



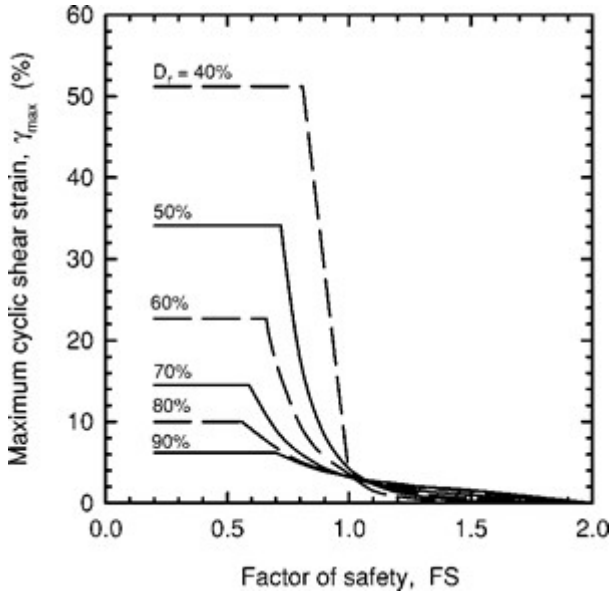
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



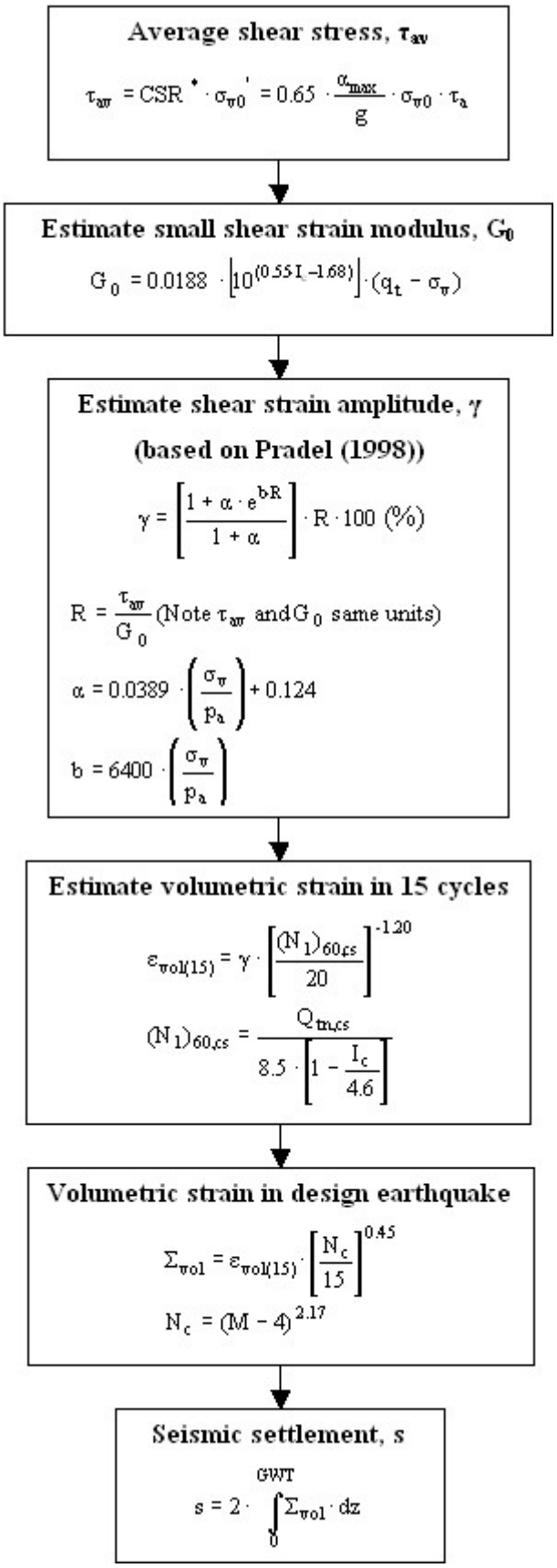
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

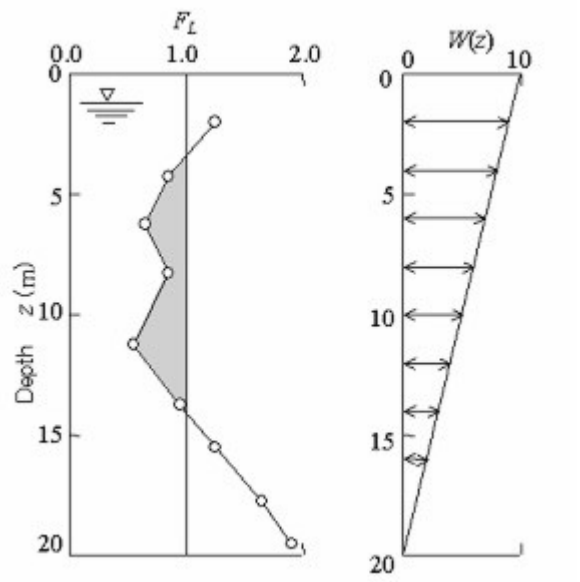
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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